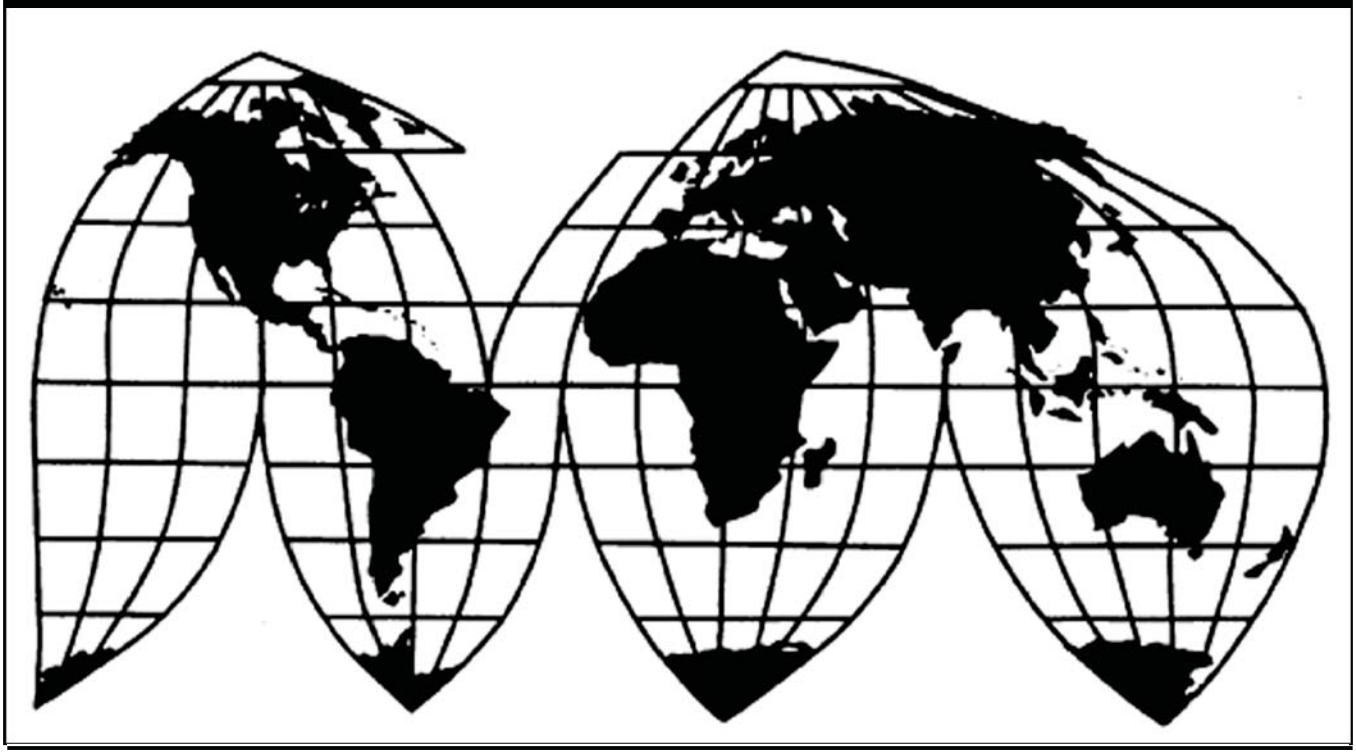
In the Matter of

Certain Silicon Microphone Packages and Products Containing the Same

Investigation No. 337-TA-629

Publication 4159 **September 2010**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Certain Silicon Microphone Packages and Products Containing the Same

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REVISED

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN SILICON MICROPHONE PACKAGES AND PRODUCTS CONTAINING THE SAME**	**Investigation No. 337-TA-629**

NOTICE OF COMMISSION FINAL DETERMINATION OF VIOLATION OF SECTION 337; ISSUANCE OF A LIMITED EXCLUSION ORDER; TERMINATION OF INVESTIGATION

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined that there is a violation of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337) by respondent MEMS Technology Berhad of Malaysia ("MemsTech") in the above-captioned investigation. The Commission has issued a limited exclusion order against the respondent and has terminated the investigation.

FOR FURTHER INFORMATION CONTACT: Michael Liberman, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, SW, Washington, D.C. 20436, telephone (202) 205-3116. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, SW, Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov.* The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov.* Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on January 14, 2008, based on the complaint of Knowles Electronics, LLC of Itasca, Illinois ("Knowles"). 73 *Fed. Reg.* 2277 (Jan. 14, 2008). The complaint alleges violations of section

337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain silicon microphone packages or products containing same by reason of infringement of one or more of claims 1 and 2 of U.S. Patent No. 6,781,231 ("the '231 patent"), and claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of U.S. Patent No. 7,242,089 ("the '089 patent"). The only named respondent is MemsTech.

The evidentiary hearing in this investigation was held on September 22-25, 2008. On January 12, 2009, the presiding administrative law judge ("ALJ") issued an Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond, finding a violation of section 337. All parties to this investigation, including the Commission investigative attorney, filed timely petitions for review of various portions of the final ID, as well as timely responses to the petitions.

The Commission determined to review various portions of the final ID and issued a Notice to that effect dated March 13, 2009. 74 *Fed. Reg.* 11748 (Mar. 19, 2009). In the Notice, the Commission also set a schedule for the filing of written submissions on the issues under review, including certain questions posed by the Commission, and on remedy, the public interest, and bonding. The parties have briefed, with initial and reply submissions, the issues under review and the issues of remedy, the public interest, and bonding.

On review, the Commission has determined as follows.

(1) With respect to the '231 patent:

(a) to affirm with modifications the ALJ's finding that MemsTech's accused products infringe claims 1 and 2 of the '231 patent;

(b) to affirm with modifications the ALJ's determination that claims 1 and 2 of the '231 patent are not invalid due to anticipation or obviousness;

(2) With respect to the '089 patent:

(a) to affirm the ALJ's construction of the term "electrically coupled";

(b) to affirm with modifications the ALJ's construction of the term "volume;"

(c) to affirm with modifications the ALJ's finding that MemsTech accused products infringe the asserted claims of the '089 patent;

(d) to affirm the ALJ's determination that Knowles SiSonic products practice claim 1 of the '089 patent;

(e) to affirm with modifications the ALJ's determination that the asserted claims of the '089 patent are not invalid due to anticipation or obviousness;

REVISED

(f) to affirm the ALJ's determination that evidence shows that the commercial success of the SiSonic products is attributable to the '089 patent.

(3) to affirm the ALJ on any other findings under review except insofar as they are inconsistent with the opinion of the Commission.

The Commission determined that the appropriate form of relief in this investigation is a limited exclusion order prohibiting the unlicensed entry of silicon microphone packages that infringe claims 1 and 2 of U.S. Patent No. 6,781,231 and claims 1, 2, 9, 15, 17, 20, 28, and 29 of U.S. Patent No. 7,242,089, and that are manufactured abroad by or on behalf of, or imported by or on behalf of, MemsTech.

The Commission further determined that the public interest factors enumerated in section 337(d)(1) (19 U.S.C. § 1337(d)(1)) do not preclude issuance of the limited exclusion order. Finally, the Commission determined that there should be no bond during the period of Presidential review. The Commission's original order was delivered to the President and the United States Trade Representative on the day of its issuance.

The Commission has therefore terminated this investigation. The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and sections 210.41-.42, 210.50 of the Commission's Rules of Practice and Procedure (19 CFR § 210.41-.42, 210.50).

By order of the Commission.

Marilyn R. Abbott
Secretary to the Commission

Issued: August 18, 2009

REVISED

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN SILICON MICROPHONE PACKAGES AND PRODUCTS CONTAINING THE SAME	**Inv. No. 337-TA-629**

LIMITED EXCLUSION ORDER

The Commission has determined that there is a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the unlawful importation, sale for importation, and sale after importation by MEMS Technology Berhad's ("MemsTech") silicon microphone packages that infringe claims 1 and 2 of U.S. Patent No. 6,781,231, and claims 1, 2, 9, 15, 17, 20, 28, and 29 of U.S. Patent No. 7,242,089.

Having reviewed the record in this investigation, including the written submissions of the parties, the Commission has made its determination on the issues of remedy, the public interest, and bonding. The Commission has determined that the appropriate form of relief is a limited exclusion order prohibiting the unlicensed entry of infringing silicon microphone packages manufactured abroad by or on behalf of, or imported by or on behalf of MemsTech.

The Commission has further determined that the public interest factors enumerated in 19 U.S.C. § 1337(d) do not preclude issuance of the limited exclusion order and that respondent may import without posting bond during the period of Presidential review.

Accordingly, the Commission hereby **ORDERS** that:

1. Silicon microphone packages that are covered by claims 1 and 2 of U.S. Patent

No. 6,781,231 and claims 1, 2, 9, 15, 17, 20, 28, and 29 of U.S. Patent No. 7,242,089, and that are manufactured abroad by or on behalf of, or imported by or on behalf of, MemsTech or any of their affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns, shall be excluded from entry for consumption into the United States, entry for consumption from a foreign-trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patents except under license of the patent owner as provided by law.

2. At the discretion of U.S. Customs and Border Protection ("CBP") and pursuant to procedures it establishes, persons seeking to import silicon microphone packages that are potentially subject to this Order may be required to certify that they are familiar with the terms of this Order, that they have made appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry under paragraph 1 of this Order. At its discretion, CBP may require persons who have provided the certification described in this paragraph to furnish such records or analyses as are necessary to substantiate the certification.

3. In accordance with 19 U.S.C. § 1337(l), the provisions of this Order shall not apply to silicon microphone packages that are imported by and for the use of the United States, or imported for, and to be used for, the United States with the authorization or consent of the Government.

4. The Commission may modify this Order in accordance with the procedures described in Rule 210.76 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.76.

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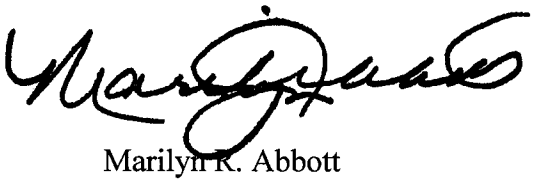
5. The Secretary shall serve copies of this Order upon each party of record in this investigation and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and CBP.

6. Notice of this Order shall be published in the *Federal Register*.

By Order of the Commission.



Marilyn R. Abbott
Secretary to the Commission

Issued: August 18, 2009

CERTAIN SILICON MICROPHONE PACKAGES AND PRODUCTS CONTAINING THE SAME **337-TA-629**

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **REVISED NOTICE OF COMMISSION FINAL DETERMINATION OF VIOLATION OF SECTION 337; ISSUANCE OF A LIMITED EXCLUSION ORDER; TERMINATION OF INVESTIGATION** has been served by hand upon the Commission Investigative Attorney, Mareesa Frederick, Esq., and the following parties as indicated, on AUG 19 2009.

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In the Matter of **CERTAIN SILICON MICROPHONE PACKAGES AND PRODUCTS CONTAINING THE SAME**	**Investigation No. 337-TA-629**

COMMISSION OPINION

On June 11, 2009, the Commission issued notice of its final determination of violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) ("section 337"), entry of a limited exclusion order, and termination of this investigation. This opinion sets forth the reasons for the Commission's determination on the issues it previously determined to review, and on the issues of remedy, the public interest, and bonding.

I. BACKGROUND AND PROCEDURAL HISTORY

On January 14, 2008, the Commission instituted an investigation under section 337 of the Tariff Act of 1930, 19 U.S.C. §1337, based on a complaint filed by Knowles Electronics, LLC of Itasca, Illinois ("Knowles"), alleging a violation of section 337 in the importation, sale for importation, and sale within the United States after importation of certain silicon microphone packages or products containing same by reason of infringement of one or more of claims 1 and 2 of U.S. Patent No. 6,781,231 ("the '231 patent"), and claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of U.S. Patent No. 7,242,089 ("the '089 patent"). 73 *Fed. Reg.* 2277 (Jan. 14, 2008). The

complainant named MEMS Technology Berhad of Malaysia ("MemsTech") as the only respondent. *Id.* The complaint sought, *inter alia*, a limited exclusion order covering infringing silicon microphone packages and products containing the same.

The technology at issue in this investigation generally relates to packaging for MEMS devices.[1] To be protected from the outside environment, including light and electromagnetic interference, MEMS devices must be encapsulated, *i.e.*, in a package. '231 patent, 1:15-26. A package also allows a MEMS device to be connected to a printed circuit board (or printed wiring board), which carries all the electrical components for a given system. CX-392C, Gilleo Witness Statement, page 4; RX-035, MEMS231961.

Both patents involved in the subject investigation cover silicon microphone packages. More specifically, the '231 patent claims a packaging for a MEMS microphone that "provides a shield for a MEMS microphone from an interference signal and/or environmental condition." '231 patent, 1:38-40. The package includes a cover, substrate, and microphone. The package is formed by connecting the cover to the substrate, and the microphone is found in the housing created by the connection of the cover to the substrate. '231 patent, 1:44-47.

The invention of the '089 patent is directed to a silicon condenser microphone package

---

[1]"MEMS" stands for a microelectromechanical system. MEMS devices are small devices that "move or cause motion in a controlled manner using an electrical signal and/or electrical energy." CX-392C, Gilleo Witness Statement, page 3. MEMS devices can be made of a number of materials, including silicon. RX-363, Mallon Witness Statement, page 14. The most common type of MEMS devices are sensors, such as accelerometers, pressure sensors, and transducers. The MEMS devices that are at issue in the present investigation are MEMS transducers, specifically, microphones.

that allows acoustic energy to contact a transducer which provides the necessary pressure reference while at the same time protects the transducer from light, electromagnetic interference, and physical damage. '089 patent, 1:44-49. The package is formed by connecting the cover to the substrate, and the microphone is located in the chamber created by the connection of the cover to the substrate. '089 patent, 1:54-56.

On January 12, 2009, the presiding administrative law judge ("ALJ") issued his "Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond." The ALJ found a violation of section 337 and recommended that the Commission issue a limited exclusion order directed to MemsTech, and require no bond during the period of Presidential review.

On March 13, 2009, the Commission determined to review the final ID in part, and issued a notice ("the Commission Notice") in which the Commission specified the issues under review and the questions pertaining to such issues. 74 *Fed. Reg.* 11748 (March 19, 2009). In particular, the Commission determined to review:

(1) With respect to the '231 patent:

> (a) the ALJ's determination that MemsTech's accused products infringe the '231 patent;
>
> (b) the ALJ's determination that U.S. Patent No. 4,533,795 to Baumhauer, Jr. et al. ("Baumhauer") does not anticipate claims 1 and 2 of the '231 patent;
>
> (c) the ALJ's determination that claims 1 and 2 of the '231 patent are not rendered obvious in view of U.S. Patent No. 5,459,368 to Onishi et al. ("Onishi");
>
> (d) the ALJ's determination that U.S. Patent No. 6,522,762 to Mullenborn et al. ("Mullenborn") taken in combination with Baumhauer does not render claim 1

obvious;

(e) the ALJ's determination that the master's thesis by David Patrick Arnold entitled "A MEMS-Based Directional Acoustic Array for Aeroacoustic Measurements" ("Arnold") taken in combination with Baumhauer does not render claims 1 and 2 obvious.

(2) With respect to the '089 patent:

(a) the ALJ's construction of the limitation "electrically coupled" in the asserted claims of the '089 patent;

(b) the ALJ's construction of the limitation "volume" in the asserted claims of the '089 patent;

(c) the ALJ's determination that the MemsTech's accused products infringe the '089 patent;

(d) the ALJ's determination that Knowles SiSonic products practice claim 1 of the '089 patent;

(e) the ALJ's determination that Mullenborn does not anticipate claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089 patent;

(f) the ALJ's determination that claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089 patent are not invalid as obvious in view of: (i) Baumhauer alone; (ii) Baumhauer in combination with an article by Kress et al. entitled "Integrated Silicon Pressure Sensor for Automotive Applications with Electronic Trimming," SAE Document 950533 (1995) ("Kress"); (iii) Baumhauer in combination with U.S. Patent No. 4,277,814 to Giachino et al. ("Giachino"); and (iv) Onishi;

(g) the ALJ's determination that evidence shows that the commercial success of the SiSonic products is attributable to the '089 patent.

The Commission determined not to review the remainder of the final ID. *Id.* at 11749.

On review, the Commission requested briefing on the issues under review based on the evidentiary record, and responses by the parties to certain questions pertaining to the issues under

review. *See id.* at 11750. The Commission also requested briefing on the issues of remedy, the public interest, and bonding from the parties as well as from interested non-parties.

In accordance with the Commission notice, all parties to this investigation, including the Commission investigative attorney (IA), filed timely written submissions regarding the issues under review, and filed timely reply submissions. No submissions were received from interested non-parties.

II. SUMMARY OF COMMISSION DETERMINATIONS

The Commission has determined as follows with respect to the issues under Commission review and the issues of remedy, the public interest, and bonding.

A. Issues Under Review

(1) With respect to the '231 patent:

(a) The Commission affirms the ALJ's determination that MemsTech's accused products infringe the '231 patent with certain modifications as detailed below.

(b) The Commission affirms the ALJ's determination that Baumhauer does not anticipate claims 1 and 2 of the '231 patent with certain modifications as detailed below.

(c) The Commission affirms the ALJ's determination that claims 1 and 2 of the '231 patent are not rendered obvious in view of Onishi.

(d) The Commission affirms the ALJ's determination that Mullenborn, taken in combination with Baumhauer, does not render claim 1 obvious with certain modifications as detailed below.

(e) The Commission affirms the ALJ's determination that Arnold, taken in combination with Baumhauer, does not render claims 1 and 2 obvious with certain modifications as detailed below.

(2) With respect to the '089 patent:

(a) The Commission affirms the ALJ's construction of the term "electrically coupled."

(b) The Commission affirms the ALJ's construction of the term "volume" with certain modifications as detailed below.

(c) The Commission affirms the ALJ's determination that MemsTech's accused products infringe the '089 patent with certain modifications as detailed below.

(d) The Commission affirms the ALJ's determination that Knowles SiSonic products practice the '089 patent and, accordingly, that a domestic industry exists for this patent.

(e) The Commission affirms the ALJ's determination that Mullenborn does not anticipate claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089 patent.

(f) The Commission affirms the ALJ's determination that claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089 patent are not invalid as obvious in view of: (i) Baumhauer alone; (ii) Baumhauer in combination with Kress; (iii) Baumhauer in combination with Giachino; or (iv) Onishi, with certain modifications as detailed below.

(g) The Commission affirms the ALJ's determination that the commercial success of Knowles' SiSonic products is attributable to the '089 patent.

B. Remedy, the Public Interest and Bonding

The Commission has determined that: (i) the appropriate remedy is a limited exclusion order directed to MemsTech's products that infringe the asserted claims of the '231 or '089 patent; (ii) the public interest will not be adversely affected by entry of the limited exclusion order; and (iii) there should be no bond during the period of Presidential Review.

III. STANDARD ON REVIEW

Commission review of an initial determination is limited to the issues set forth in the notice of review and all subsidiary issues therein. *Certain Bar Clamps, Bar Clamp Pads, and*

Related Packaging Display and Other Materials, Inv. No. 337-TA-429, Comm'n. Op. at 3 (January 1, 2001). Once the Commission determines to review an initial determination, its review is conducted under a *de novo* standard. *Certain Polyethylene Terephthalate Yarn and Products Containing Same*, Inv. No. 337-TA-457, Comm'n. Op. at 9 (June 18, 2002). Upon review the "Commission has 'all the powers which it would have in making the initial determination,' except where the issues are limited on notice or by rule." *Certain Flash Memory Circuits and Products Containing Same,* Inv. No. 337-TA-382, Comm'n. Op. on the Issues Under Review and on Remedy, the Public Interest, and Bonding at 9-10 (June 2, 1997), USITC Pub. 3046 (July 1997) (quoting *Certain Acid-Washed Denim Garments and Accessories,* Inv. No. 337-TA-324, Comm'n. Op. at 5 (Nov. 1992)).

On review, "the Commission may affirm, reverse, modify, set aside or remand for further proceedings, in whole or in part, the initial determination of the administrative law judge. The Commission may also make any findings or conclusions that in its judgment are proper based on the record in the proceeding." 19 C.F.R. § 210.45(c).

IV. DISCUSSION

A. The '231 Patent

(1) The ALJ's determination that MemsTech's accused products infringe the '231 patent.

We affirm the ALJ's determination that the MemsTech's accused products infringe the '231 patent, with certain modifications. Specifically, while we agree with the ALJ's finding that the accused products infringe the '231 patent, we believe it is necessary to modify the ID by

striking out the ALJ's references to exhibits that were not properly admitted into evidence, *i.e.*, CX-231C and CX-228, and substituting other record evidence to support his findings.

Knowles and the IA assert that the ALJ's reliance on exhibit CX-231, *see* ID at 197, appears to be a typographical error. They support this assertion by noting that, when citing to CX-231, the ALJ refers to Bates numbers MEMS061075-92, which are included in exhibit CX-49C, which was admitted into evidence. We agree with Knowles and the IA and, accordingly, strike the ALJ's citation to un-admitted exhibit CX-231 and rely instead on exhibit CX-49C to support the ALJ's infringement determination.

We note that the ALJ also relies in part on un-admitted exhibit CX-228 for his finding that "[t]he accused products contain a substrate including a surface at least partially covered by a first layer of a conductive material." ID at 184. We also agree with the IA and Knowles that Dr. Gilleo's testimony at CX-392C at 17-18, to which the ALJ also cited, provides adequate support for this finding. *See* IResponse at 3. *See also* KResponse at 5. Therefore, we strike the reference to exhibit CX-228 on page 184 of the ID.

(2) The ALJ's determination that Baumhauer does not anticipate claims 1 and 2 of the '231 patent.

We affirm the ALJ's determination that Baumhauer does not anticipate claims 1 and 2 of the '231 patent with certain modifications. We agree with the ALJ that Baumhauer fails to anticipate claims 1 and 2 of the '231 patent because it does not disclose a "microelectromechanical package." ID at 65. The ALJ's finding is based *inter alia*, on the testimony of Dr. Gilleo that Baumhauer does not disclose a "package" because it does not

disclose the ability to connect the microphone to another circuit. (Gilleo Tr., p. 727, lines 4-8; p. 729, lines 16-22).[2]

However, we do not rely on the ALJ's finding that "[t]he substrate in Baumhauer is not exclusive to the transducer, and it extends beyond [the] cover." ID at 65. That finding cannot now be used to support his conclusion that "Baumhauer does not disclose a 'microelectromechanical system package.'" Claims 1 and 2 of the '231 patent do not require that the substrate be exclusive to the transducer or not extend beyond the cover. In this regard, we observe that the ALJ did not require Knowles to prove that MemsTech's products have a substrate that is exclusive to the transducer or that the substrate did not extend beyond the cover to find that the microelectromechanical system package claim limitation was met and claims 1 and 2 were infringed.[3] We therefore strike the corresponding portion of the ALJ's discussion on page 65 of his ID.

---

[2] Dr. Gilleo specifically testified as follows with respect to Baumhauer:

> Baumhauer Figure 6 is an example of attaching the microphone device to an end-user board and then attaching a protective cover onto that portion of the PC board where the microphone resides. Therefore, Baumhauer discloses a device, not a package.

CX 411C at Q. 19.

[3] The ALJ found that the term "microelectromechanical system package" in the preambles of claims 1 and 2 of the '231 patent is a claim limitation. ID at 13, 15. The ALJ stated that "[b]ecause there is no dispute as to the meaning of this term, I find it unnecessary to construe it." ID at 16. The Commission did not review the ALJ's finding.

(3) The ALJ's determination that Mullenborn, taken in combination with Baumhauer, does not render claim 1 obvious.

We affirm the ALJ's determination that Mullenborn, taken in combination with Baumhauer, does not render claim 1 obvious, with certain modifications. We agree with the ALJ that the record evidence does not clearly and convincingly show that it would have been obvious to one of ordinary skill in the art to modify Mullenborn in view of Baumhauer to arrive at the invention recited in claim 1 of the '231 patent. Mullenborn and Baumhauer fail to teach or suggest a number of limitations recited in claims 1 and 2, and the record evidence has not shown how or why one skilled in the art would have modified these references to include these missing limitations. For example, the ALJ correctly found that Mullenborn fails to disclose the "housing formed by connecting the peripheral edge portion of the cover to the substrate." ID at 102. MemsTech's arguments with respect to the Mullenborn/Baumhauer combination are based on the assumption that Mullenborn teaches every single limitation recited in claim 1 with the exception of a cover comprising multiple layers, when in fact the ALJ also found that Mullenborn failed to teach a "housing" limitation. MemsTech did not address this missing limitation. Moreover, there is no record evidence to explain why one skilled in the art would have modified Mullenborn in view of Baumhauer to meet claims 1 and 2 of the '231 patent and modify the final ID to incorporate this finding. *See* ID at 102.

(4) The ALJ's determination that Arnold, taken in combination with Baumhauer, does not render claims 1 and 2 of the '231 patent obvious.

We affirm, with one modification, the ALJ's determination that Arnold, taken in

combination with Baumhauer, does not render claims 1 and 2 obvious. The ALJ did not make a finding as to whether there is any evidence in the record to suggest to one of ordinary skill in the art that Baumhauer and Arnold could be combined to make the '231 invention. We find that there is no such evidence on the record, and modify the final ID to incorporate this finding.

B. The '089 Patent

(1) The ALJ's construction of the limitation "volume" in the asserted claims of the '089 patent.

We affirm the ALJ's construction of the claim term "volume" with the following modifications. We determine not to rely on the ALJ's statement on page 55 of the ID: "Another embodiment recites, '[t]he back volume 18 is formed by a combination of the back hole of the transducer 58 (mounted down) and the bottom portion 50.' (CX-2 at 7:5-7.)" We find that this sentence is not needed to support the ALJ's construction and strike it from the ID.

MemsTech and the IA proposed an alternative construction of "volume" that required a recess in the substrate. We note, however, that the doctrine of claim differentiation provides additional support for the Commission's construction of the term "volume." Claim 3 of the '089 patent, which depends from claim 1, expressly added a limitation to claim 1 that a volume "includes a recess in the substrate." *See* '089 patent, 11:49-50. There is, therefore, a presumption that claim 1 should not require the same limitation. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (*en banc*) ("[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in

the independent claim."). MemsTech and the IA did not overcome this presumption in the present case. *See Finisar Corp. v. DIRECTV Group, Inc.*, 523 F.3d 1323, 1331 (Fed. Cir. 2008) ("In this instance, the doctrine of claim differentiation also bolsters this court's interpretation.")

(2) The ALJ's determination that MemsTech's accused products infringe the '089 patent.

We affirm the ALJ's determination that the MemsTech's accused products infringe the '089 patent, with certain modifications. While we agree with the ALJ's finding that the accused products infringe the '089 patent, we believe it is necessary to modify the ID by striking out the ALJ's reference to an exhibit that was not properly admitted into evidence, *i.e.*, CX-466C, and substituting other record evidence to support his finding.

We note that in reaching his infringement determination, the ALJ relied, *inter alia*, on exhibit CX-466C, which was not admitted into evidence. *See* MResponse at 36-38. Specifically, the ALJ improperly relied on CX-466C for his finding that the volume is acoustically coupled to the transducer. ID at 201 *citing* CX-466C. We agree with the IA and Knowles, however, that Dr. Gilleo's witness statement provides alternative support for this proposition. CX-392C. *See* IReply at 2-3; KResponse at 8-9. Accordingly, we strike the reference to CX-466C on page 201 of the final ID, and substitute a reference to CX-392C for the above stricken reference.

(3) The ALJ's determination that claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089 patent are not invalid as obvious in view of: (i) Baumhauer alone; (ii) Baumhauer in combination with Kress; (iii) Baumhauer in combination with Giachino; and (iv) Onishi.

We affirm the ALJ's determination that claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089

patent are not invalid as obvious in view of: (i) Baumhauer alone; (ii) Baumhauer in combination with Kress; (iii) Baumhauer in combination with Giachino; and (iv) Onishi, with certain modifications.

Baumhauer

We affirm the ALJ's finding that Baumhauer does not render the '089 patent obvious, but we do not adopt the ALJ's statement that "Baumhauer fails to teach or suggest a package because it does not disclose first or second level connections and it fails to disclose a package substrate. (CX-411C at Q. 39.)" ID at 132. We find that the ALJ used one claim construction for "surface mountable package," when he did his infringement analysis, and another when he did his invalidity analysis. In performing the infringement analysis, the ALJ concluded that the term "surface mountable package" needed no construction, and found that MemsTech's products were surface mountable packages. ID at 132. However, the ALJ concluded in his invalidity analysis that Baumhauer does not disclose a "surface mountable package" since it "does not disclose first or second level connections and it fails to disclose a package substrate." *Id.* Thus, it appears that the ALJ applied additional requirements to assess validity.

There is, however, record evidence that sufficiently supports the ALJ's finding that Baumhauer does not render the '089 patent obvious, even if the Commission does not require that Baumhauer disclose first or second level connections and a package substrate to support an invalidity conclusion. Specifically, the ALJ found, *inter alia*, that "[t]he entire fabric of Baumhauer is directed to the design of the microphone to be mounted on a substrate, *not to a package for mounting*." ID at 132 (emphasis in the original). According to Dr. Gilleo,

Baumhauer discloses a device that is mounted on an end-user's board, and Figure 6 of Baumhauer depicts the Baumhauer device mounted to a circuit board that is subsequently provided to an end-user. CX-411 at 39. MemsTech fails to rebut this evidence. We adopt the ALJ's finding that the term "package" makes clear that all of the components listed in the claim body must come together and form a "package," *i.e.*, the elements cannot simply be found on printed circuit board, but must be provided as a single, self-contained unit. *See* ID at 15. Therefore, we find that Baumhauer does not disclose a package because it does not teach or suggest a package composed of the elements in the manner recited in the claims.

Baumhauer in combination with Kress

The ALJ correctly determined that Baumhauer in combination with Kress does not render the '089 patent obvious. The ALJ specifically found:

> As discussed, *supra*, Baumhauer does not teach or suggest 'a surface-mountable package.' The further proposal to modify Baumhauer with Kress does not cure this deficiency. I see no rational basis to combine the teachings of Baumhauer with the teachings of Kress.

ID at 133. The ALJ found that even though Kress mentions packaging for a transducer, it does so in the context of automotive silicon pressure sensors, as opposed to surface mountable packages for microphones. Moreover, the ALJ found that Kress lacks the detail necessary to cause one of ordinary skill in the art to adapt it to an acoustic MEMS package. ID at 133 *citing* RX-45 at MEMS 155376. The ALJ concluded that MemsTech failed to provide clear and convincing evidence of a reason why a person having ordinary skill in the art would be moved to use Baumhauer in combination with Kress to create the MEMS package for a microphone taught

by the '089 patent. ID at 134.

We affirm the ALJ's finding that Baumhauer in combination with Kress does not render claim 1 of the '089 patent obvious. We note, however, that in reaching his finding of non-obviousness, the ALJ stated that "Baumhauer fails to teach or suggest a package because it does not disclose first or second level connections and it fails to disclose a package substrate." ID at 133. For the same reason that we modified his finding of non-obviousness based on Baumhauer alone, we modify the final ID to clarify that the Commission does not rely on the ALJ's such finding.

Baumhauer in combination with Giachino

We affirm the ALJ's determination that Baumhauer in combination with Giachino does not render the '089 patent obvious, but similarly modify it to clarify that the Commission does not rely on the ALJ's finding that "Baumhauer fails to teach or suggest a package because it does not disclose first or second level connections and it fails to disclose a package substrate." ID at 132 (citations omitted).

Onishi

While the ALJ correctly determined that Onishi does not render claim 1 of the '089 patent obvious, he did not make findings with respect to dependent claims 2, 9, 15, 17, 20, 28, and 29, even though MemsTech argued that those claims are also obvious in view of Onishi. A determination regarding obviousness with respect to dependent claims depends on the obviousness finding with respect to the independent claim. *See, e.g., Hartness Int'l, Inc. v. Simplimatic Engineering Co.*, 819 F.2d 1100, 1108 (Fed. Cir. 1987) ("For the reasons stated

below, the district court was correct in holding that independent claim 1 was nonobvious. *A fortiori*, dependent claim 3 was nonobvious (and novel) because it contained all the limitations of claim 1 plus a further limitation.") Therefore, determining that Onishi does not render claim 1 of the '089 patent obvious leads to the determination that dependent claims 2, 9, 15, 17, 20, 28, and 29 are also not invalid as obvious in view of Onishi. Accordingly, we supplement the ALJ's finding regarding claim 1 with further findings that Onishi does not render claims 2, 9, 15, 17, 20, 28, and 29 of the '089 patent obvious for the same reasons that it does not render claim 1 obvious.

B. Remedy, the Public Interest, and Bonding

We determine that: (i) the appropriate remedy is a limited exclusion order ("LEO") directed to MemsTech's products found to infringe the asserted claims of the '231 patent; (ii) the public interest will not be adversely affected by entry of this exclusion order; and (iii) no bond should be required during the period of Presidential review.

The ALJ recommended that the Commission issue a limited exclusion order that applies to MemsTech and all of its affiliated companies, parents, subsidiaries, or other related business entities, or its successors or assigns and that is limited to those of MemsTech's silicon microphones that have been found to infringe the '231 or '089 patents. ID/RD at 218. The ALJ stated that it would be inappropriate to limit the exclusion order by listing specific product names or model numbers. He specifically noted that MemsTech's "chamber chip" products were not part of this investigation, and therefore, recommended that any remedy should not apply to those products. ID/RD at 218 n.33.

The ALJ recommended no bond during the period of Presidential review because Knowles did not present any evidence regarding bonding. The ALJ based his recommendation on Commission precedent finding that no bond should be required where there is "no evidence in the record to support any bond to offset any competitive advantage resulting from the unfair acts of [respondents] from their importations." ID/ RD at 220-21 *citing Certain Rubber Antidegradants, Components Thereof, and Products Containing Same,* Inv. No. 337-TA-533, Comm'n Op., 2006 ITC LEXIS 591 (July 21, 2006), at *59. He found that Knowles provided no legitimate reason for its failure to offer pricing differential or royalty rate evidence, noting that Knowles did not assert that MemsTech failed to produce pricing information, or move to compel such information during discovery. ID/ RD at 222. The ALJ observed that the complainant has the burden of supporting any proposition it advances, including the amount of the bond. ID/RD at 221 (citations omitted).

The IA objected only to the ALJ's recommendation that silicon microphones instead of silicon packages be excluded because "certain silicon microphone packages or products containing same," rather than silicon microphones, are at issue in this investigation. 73 *Fed. Reg.* 2277 (Jan. 14, 2008).[4] In the IA's view, the entry of the limited exclusion order would not be contrary to the public interest. *See* 19 U.S.C. § 1337(d).

Knowles agrees that the Commission should issue a limited exclusion order if it finds a

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[4] *See also* ID at 223 ("Based on the foregoing, and the record as a whole, it is my Final Initial Determination that there is a violation of 19 U.S.C. § 1337(a)(1) in the importation into the United States, sale for importation, and the sale within the United States after importation of certain *silicon microphone packages* and products containing the same.") (emphasis added).

violation in this investigation but contends, contrary to the ALJ's recommendation, that the Commission's limited exclusion order should cover all accused MemsTech products, even those that have a so-called chamber chip. Knowles does not dispute the ALJ's recommendation that no bond be required for imports during the period of Presidential review. Finally, Knowles submits that the entry of relief in the form of a limited exclusion order would not raise any public interest concerns under 19 U.S.C. §1337(d).

MemsTech states that the only disputed remedy issue is the scope of any limited exclusion order and, more particularly, whether such exclusion order should cover all MemsTech's silicon microphones including those containing its "chamber chip" configuration. MemsTech points out that the Commission rejected Knowles' petition on this issue since the Commission's Notice of Review does not identify it as an issue to be reviewed. MReply at 58 *citing Commission Notice* at 3.

Remedy

We note that in a Section 337 proceeding, the Commission has "broad discretion in selecting the form, scope, and extent of the remedy." *Viscofan, S.A. v. United States Int'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986). We determine that the appropriate remedy in this investigation is a limited exclusion order covering MemsTech accused products that infringe the asserted claims of the '231 or '089 patent. With respect to MemsTech's "chamber chip" products, pursuant to Commission practice we are not making a finding as to whether particular products not considered by the ALJ are or are not within the scope of the order, but note that the order generally covers products that infringe the relevant patent claims.

We agree with the ALJ's recommendation that any limited exclusion order be directed to "MemsTech and all of its affiliated companies, parents, subsidiaries, or other related business entities, or its successors or assigns," ID/RD at 281, however our limited exclusion order covers silicon microphone packages rather than silicon microphones, as recommended by the ALJ, because silicon microphone packages are at issue in this investigation, *see* 73 *Fed. Reg.* 2277 (Jan. 14, 2008).

The Public Interest

Before issuing a remedy for a violation of Section 337, the Commission must consider the effect of the remedy on certain public interest considerations: (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) the U.S. production of articles that are like or directly competitive with those which are the subject of the investigation, and (4) U.S. consumers. 19 U.S.C. § 1337(d); *Certain Ink Jet Print Cartridges and Components Thereof* Inv. No. 337-TA-446, Comm'n. Op. at 14 (October 2002).

We find that the issuance of the proposed LEO would not be contrary to the public interest. There is no evidence in the record that the U.S. demand for silicon microphone packages cannot be met by other entities, including Knowles. Moreover, silicon microphone packages are not the sort of product that has been shown to be necessary to safegard the public interest.

Bonding

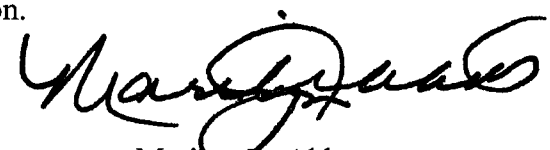
When the Commission issues an exclusion order, infringing products are entitled to entry under bond during the period of Presidential review. 19 U.S.C. § 1337(j). The Commission must set the amount of the bond at a level that would be sufficient to protect complainant from injury.

19 C.F.R. § 210.50(a)(3). As noted, the ALJ recommended that no bonding be required based on the record in this investigation and Commission precedent. ID/RD at 220. Because Knowles failed to provide any evidence to support a bond, we adopt the ALJ's recommendation that no bond should be set during the period of Presidential review.

V. CONCLUSION

The Commission has determined that there has been a violation of section 337, and has further determined that the appropriate form of relief in this investigation is a limited exclusion order prohibiting the unlicensed entry of silicon microphone packages and products containing same that infringe claims 1 and 2 of the '231 patent and claims 1, 2, 9, 15, 17, 20, 28, and 29 of the '089 patent, and that are manufactured abroad by or on behalf of, or imported by or on behalf of, MemsTech. The Commission further has determined that the public interest factors enumerated in section 337(d)(1) (19 U.S.C. § 1337(d)(1)) do not preclude issuance of the limited exclusion order. Finally, the Commission has determined that there should be no bond during the period of Presidential review.

By order of the Commission.



Marilyn R. Abbott
Secretary to the Commission

Issued: August 18, 2009

CERTAIN SILICON MICROPHONE PACKAGES AND PRODUCTS CONTAINING THE SAME **337-TA-629**

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **REVISED COMMISSION OPINION** has been served by hand upon the Commission Investigative Attorney, Mareesa Frederick, Esq., and the following parties as indicated, on AUG 19 2009.

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN SILICONE MICROPHONE PACKAGES AND PRODUCTS CONTAINING THE SAME	**Investigation No. 337-TA-629**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Robert K. Rogers, Jr.

(January 12, 2009)

Appearances:

For the Complainant Knowles Electronics LLC:

Allan J. Sternstein, Esq.; Timothy K. Sendek, Esq. of Dykema Gossett PLLC of Chicago, Illinois

David Patterson, Esq.; William Cramer, Esq. of Dykema Gossett PLLC of Dallas, Texas

Lyle B. Vander Schaaf, Esq.; Jay H. Reiziss, Esq. of Bryan Cave LLP of Washington, D.C.

For the Respondent MEMS Technology Berhad:

Richard D. Kelly, Esq.; Thomas J. Fisher, Esq.; Barry J. Herman, Esq.; Eric W. Schweibenz, Esq. of Oblon, Spivak, McClelland, Maier & Neustadt, P.C. of Alexandria, Virginia

For the Commission Investigative Staff:

Lynn I. Levine, Esq., Director; Thomas S. Fusco, Esq., Supervisory Attorney; Mareesa A. Frederick, Esq., Investigative Attorney; of the Office of Unfair Import Investigations, U.S. International Trade Commission, of Washington, D.C.

TABLE OF CONTENTS

Pursuant to the Notice of Investigation and Rule 210.42 of the Rules of Practice and Procedure of the United States International Trade Commission, this is the Administrative Law Judge's Final Initial Determination in the matter of Certain Silicon Microphone Packages and Products Containing the Same, Investigation No. 337-TA-629.

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain silicon microphone packages and products containing the same, in connection with U.S. Patent No. 6,781,231. Furthermore, the Administrative Law Judge hereby determines that a domestic industry in the United States exists that practices U.S. Patent No. 6,781,231.

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain silicon microphone packages and products containing the same, in connection with U.S. Patent No. 7,242,089. Furthermore, the Administrative Law Judge hereby determines that a domestic industry in the United States exists that practices U.S. Patent No. 7,242,089.

The following abbreviations may be used in this Initial Determination:

CDX	Complainant's demonstrative exhibit
CFF	Complainant's proposed findings of fact
CIB	Complainant's initial post-hearing brief
CORFF	Complainant's objections to Respondent's proposed findings of fact
COSFF	Complainant's objections to Staff's proposed findings of fact
CPX	Complainant's physical exhibit
CRB	Complainant's reply post-hearing brief
CX	Complainant's exhibit
Dep.	Deposition
JSRCC	Joint Statement Regarding Claim Construction
JSUF	Joint Statement of Undisputed Facts
JX	Joint Exhibit
RDX	Respondent's demonstrative exhibit
RFF	Respondent's proposed findings of fact
RIB	Respondent's initial post-hearing brief
ROCFF	Respondent's objections to Complainant's proposed findings of fact
ROSFF	Respondent's objections to Staff's proposed findings of fact
RPX	Respondent's physical exhibit
RRB	Respondent's reply post-hearing brief
RRX	Respondent's rebuttal exhibit
RX	Respondent's exhibit
SFF	Staff's proposed findings of fact
SIB	Staff's initial post-hearing brief
SOCFF	Staff's objections to Complainants' proposed findings of fact
SORFF	Staff's objections to Respondents' proposed findings of fact
SRB	Staff's reply post-hearing brief
Tr.	Transcript

I. BACKGROUND

A. Procedural History

On January 4, 2008, the Commission issued a notice of investigation, which was published in the *Federal Register* on January 14, 2008. The notice states that, pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, the Commission instituted this investigation to determine:

> [W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain silicon microphone packages or products containing same by reason of infringement of one or more of claims 1 and 2 of U.S. Patent No. 6,781,231 and claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of U.S. Patent No. 7,242,089, and whether an industry in the United States exists as required by subsection (a)(2) of section 337[.]

73 Fed. Reg. 2277-2278 (2008).

The complainant is Knowles Electronics, LLC of Itasca, Illinois ("Knowles"). The respondent is MEMS Technology Berhad of Malaysia ("MemsTech"). The Commission Investigative Staff ("Staff") of the Office of Unfair Import Investigations is also a party in this investigation.

The complaint accuses MemsTech's products of infringing various claims of U.S. Patent No. 6,781,231 ("the '231 patent") and U.S. Patent No. 7,242,089 ("the '089 patent"). The complaint further alleges that there exists a domestic industry with respect to the '231 patent and '089 patent. Knowles seeks a limited exclusion order of the infringing silicon microphone packages and products containing the same.

The investigation was originally assigned to Administrative Law Judge Charneski. On July 11, 2008, Chief Administrative Law Judge Luckern permanently reassigned the

investigation to me.

On August 20, 2008, Knowles filed a motion for summary determination that it has satisfied the importation requirement of 19 U.S.C. § 1337(a)(1)(B). On September 4, 2008, I issued Order No. 22, an initial determination granting the motion in part. I found that Knowles had satisfied the importation requirement with respect to the following MemsTech products: MSM1, MSM1C, MSM2, MSM2C, MSM3, MSM3C, and MSM4. On September 23, 2008, the Commission issued a notice of decision not to review the initial determination.

On August 20, 2008, Knowles filed a motion for summary determination that it did not commit patent misuse. On September 8, 2008, I issued Order No. 25, an initial determination granting the motion. On September 26, 2008, the Commission issued a notice of decision not to review the initial determination.

On August 20, 2008, Knowles filed a motion for summary determination that it has satisfied the domestic industry requirement. On September 8, 2008, I issued Order No. 26, an initial determination granting the motion in part. I found that Knowles had fully satisfied the economic prong of the domestic industry requirement and the technical prong of the domestic industry requirement with respect to the '231 patent. On September 26, 2008, the Commission issued a notice of decision not to review the initial determination.

I denied all other motions for summary determination filed by the parties.

An evidentiary hearing was conducted before me from September 22-25, 2008. Knowles, MemsTech and Staff participated in the hearing. In support of their case-in-chief and rebuttal case, Knowles called the following witnesses:

- Dr. Peter V. Loeppert (Vice President of Research & Development for Knowles Acoustics);

- Jeffrey S. Niew (President of Knowles);
- Dr. Kenneth Burton Gilleo (expert witness for Knowles).

In support of their case-in-chief and rebuttal case, MemsTech called the following witnesses:

- Mr. Kathirgamasundram Sooriakumar (CEO & CTO of MemsTech);
- Mr. Joseph R. Mallon, Jr. (expert witness for MemsTech);
- Mr. Joseph M. Giachino (expert witness for MemsTech).

In addition, various deposition transcripts were received into evidence in lieu of direct witness statements or live testimony.

After the hearing, post-hearing briefs and reply briefs, together with proposed findings of fact, conclusions of law and rebuttals to the same, were filed on October 15, 2008 and October 29, 2008, respectively.

B. The Parties

1. Knowles Electronics, LLC

Knowles is a Limited Liability Company organized under the laws of the State of Delaware and having its principal place of business in Itasca, Illinois. (Complaint at ¶ 13.)

2. MEMS Technology Berhad

MemsTech is a Malaysian company with its principal place of business in Petaling Jaya Malaysia. (Complaint at ¶ 4; Resp. to Complaint at ¶ 4.)

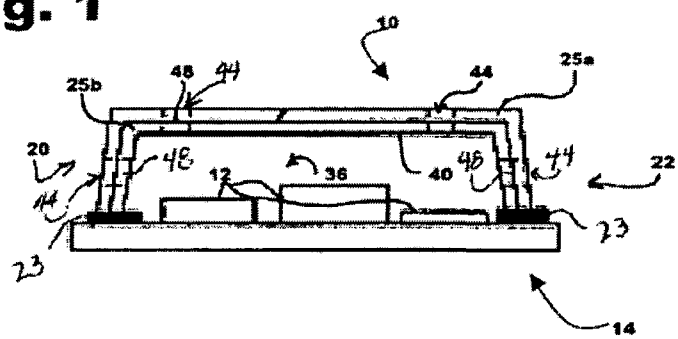
C. Overview Of The Technology & Patents At Issue

At issue in this investigation are two patents relating to silicon microphone packages and products containing same. The '231 patent is entitled "Microelectromechanical System Package With Environmental and Interface Shield" and was issued on August 24, 2004, based on

Application No. 10/238,256 filed on September 10, 2002. (CX-1.) The named inventor of the '231 patent is Anthony D. Minervini and the patent was assigned to Knowles. (*Id.*) The '231 patent has a total of 22 claims. (*Id.*) The claims of the '231 patent asserted against MemsTech in this investigation are claims 1 and 2.

The '231 patent relates to packaging for a microelectromechanical system ("MEMS") microphone. As stated in the specification, the package "provides a shield for a MEMS microphone from an interference signal and/or environmental condition." (CX-1 at 1:38-40.) The package includes a cover, substrate, and microphone. The package is formed by connecting the cover to the substrate, and the microphone is found in the housing created by the connection of the cover to the substrate. Figure 1 of the '231 patent depicts a preferred embodiment of the invention:

Fig. 1



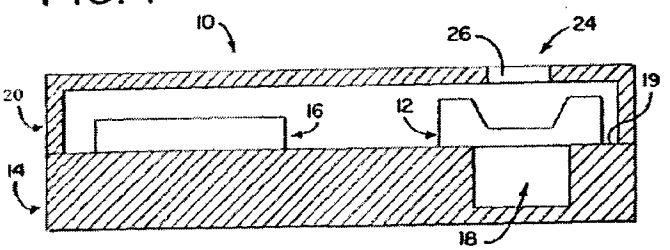
(CX-1 at Fig. 1.) In Figure 1, element 20 is the cover and element 14 is the substrate. (*Id.* at 3:25-27.) The cover and substrate form a housing (labeled 22) wherein surface mountable components (labeled 12) may be mounted. (*Id.*)

The '089 patent is entitled "Miniature Silicon Condenser Microphone" and was issued on July 10, 2007, based on Application No. 11/112,043 filed on April 22, 2005. (CX-2.) The named inventor of the '089 patent is Anthony D. Minervini and the patent was assigned to Knowles. (*Id.*) The '089 patent has a total of 29 claims. (*Id.*) The claims of the '089 patent

asserted against MemsTech in this investigation are: 1, 2, 9, 10, 15, 17, 20, 28, and 29.

The '089 patent relates to a surface mountable package for a silicon condenser microphone. As stated in the Summary of the Invention, the package "allows acoustic energy to contact a transducer" and "protects the transducer from light, electromagnetic interference, and physical damage." (CX-2 at 1:44-49.) The package includes a cover, substrate, and microphone. The package further includes a volume defined by the transducer and one of the cover or the substrate. The package is formed by connecting the cover to the substrate, and the microphone is located in the chamber created by the connection of the cover to the substrate. Figure 1 of the '089 patent depicts a preferred embodiment of the invention:

FIG. 1



(CX-2 at Fig. 1.) In Figure 1, element 20 is the cover and element 14 is the substrate. (*Id.* at 3:36-48.) Element 12 is a transducer, while element 16 is an amplifier. This embodiment includes a back volume 18 formed by drilling a recess in the substrate. (*Id.* at 3:46-52.)

D. Products At Issue

Knowles accuses the MemsTech MSM family of silicon microphone packages of infringement. Mr. Sooriakumar testified that MemsTech has made or is in the process of making the following general categories of microphones: MSM1, MSM2, MSM2-RM, MSM3, MSM3-RM, MSM4, MSM4-RM, MSM5. (RX-18 at Q. 194.) MemsTech does not dispute that it imports the accused MSM devices.

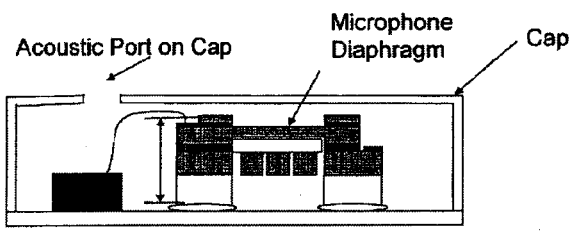
Knowles states the MemsTech products listed on CX-40, CX-41, and CX-43 are the

MEMS Silicon Microphone products currently imported by MemsTech and offered for sale in the United States. This is supported by the testimony of Mr. Srini Naidu, executive director of MemsTech. (CX-28C at 83:16-88:4, 102:18-103:3.) That list of products is as follows:

Top Mount Products	Reverse Mount Products	Differential Products
MSM1C-S3035	MSM2C-RM-S3035	MSM2C-DP-S3035
MSM1C-S3540	MSM2C-RM-S3540	MSM2C-DP-S3540
MSM1C-S4045	MSM2C-RM-S4045	MSM2C-DP-S4045
MSM2C-S3035	MSM2C-RM6-S3035	
MSM2C-S3540	MSM2C-RM6-S3540	
MSM2C-S4045	MSM2C-RM6-S4045	
MSM3C-S3035	MSM3C-RM-S3035	
MSM3C-S4045	MSM3C-RM-S3540	
	MSM3C-RM-S4045	
	MSM3C-RM5-S3035	
	MSM3C-RM5-S3540	
	MSM3C-RM5-S4045	

Dr. Gilleo's infringement analysis covers the products found in CX-40, CX-41, and CX-43, which are all listed above. (CX-392C at Qs. 30, 73.) Knowles asserts that there are three basic configurations for the accused products. The first is a "top mount" configuration,[1] where the acoustic port is in the cap of the package:

MSM1,MSM2,MSM3,MSM4- Std Models

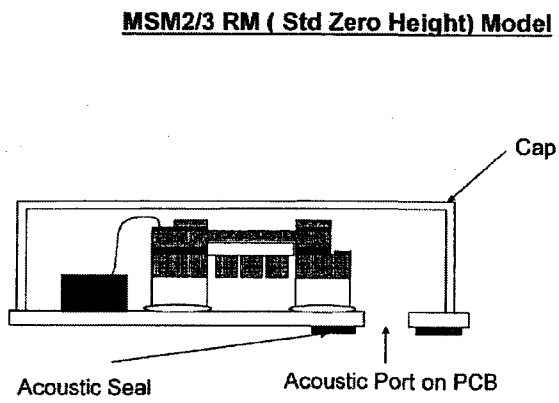


(CX-36C.)

The second is a "reverse mount" configuration (noted by an "RM" in the product name)

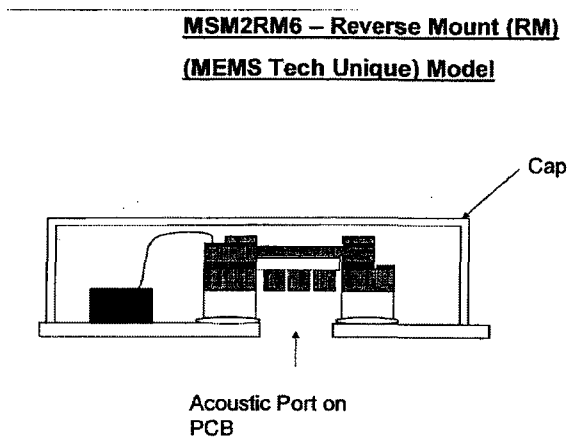
[1] I note that the top mount configuration includes a model labeled MSM4 standard model, which will be considered as part of the accused MemsTech family of products, because for purposes of this investigation it is identical to MSM1, MSM2 and MSM3 standard models. (CX 36C)

with the acoustic port in the substrate and next to the transducer:



(*Id.*)

The third is a "reverse mount" configuration with the acoustic port in the substrate and under the transducer:



(*Id.*) Mr. Sooriakumar confirmed this in his testimony. (*See* RX-18 at Qs. 196-206.)

Mr. Sooriakumar testified that the other difference between the products relates to footprint (i.e. size) of the product. (RX-18 at Q. 195.) There are other designations added to the MSM product names, but those designations relate to variables (such as the type of preamplifier used) that are not relevant to this investigation. (*See* CX-30C at 247-250.) Thus, the accused MemsTech products can be generally defined as the MSM1, MSM2, MSM3, MSM4, MSM2-

RM, MSM2-DP, and MSM3-RM, including all configurations of those products. [2]

Knowles claims that its SiSonic microphone products meet the domestic industry requirement. (CIB at 4, 32, 41.) The standard SiSonic packages have an acoustic port in the top cover. (CX-233C.) The "Zero Height" SiSonic packages have the acoustic port in the bottom substrate. (CX-29C; CX-233C.) The following figure from Knowles' SiSonic Design Guide depicts the top view and bottom view of the different SiSonic packages:

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}

(CX-233C at KE0000322.)

II. JURISDICTION

A. Subject Matter Jurisdiction

The complaint alleges that MemsTech has violated Subsection 337(a)(1)(B) by the

[2] There is an additional configuration of the MSM products that is relevant to this investigation, the so-called "chamber chip" configuration. Mr. Sooriakumar testified that MemsTech's current products include a chamber chip, underneath the glass pedestal, which creates more back volume under the transducer. (Tr. at 224:18-225:5.) Knowles asked, and Staff agreed, that I rule that the chamber chip configuration not be included in this investigation. MemsTech did not oppose. (Tr. at 654:19-656:17, 658:3-11, 657:16-18, 659:5-12.) The chamber chip configuration is, therefore, not a part of this decision as it is not properly before me.

importation and sale of products that infringe the asserted patents. I have found that MemsTech has imported accused MSM products. (*See* Order No. 22.) Thus, I find that the Commission has subject matter jurisdiction over this investigation under Section 337 of the Tariff Act of 1930. *See Amgen, Inc. v. U.S. Int'l Trade Comm'n*, 902 F.2d 1532, 1536 (Fed. Cir. 1990).

B. Personal Jurisdiction

MemsTech responded to the complaint and notice of investigation, participated in the investigation, made an appearance at the hearing, and submitted post-hearing briefs. Thus, I find that MemsTech submitted to the personal jurisdiction of the Commission. *See Certain Miniature Hacksaws*, Inv. No. 337-TA-237, Initial Determination, 1986 WL 379287 (October 15, 1986).

C. In Rem Jurisdiction

The Commission has *in rem* jurisdiction over the products at issue by virtue of the finding that accused products have been imported into the United States. *See Sealed Air Corp. v. United States Int'l Trade Comm'n*, 645 F.2d 976, 985 (C.C.P.A. 1981).

III. CLAIM CONSTRUCTION

A. Applicable Law

"An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996) (citation omitted). Claim construction "is a matter of law exclusively for the court." *Id.* at 970-71. "The construction of claims is simply a way of elaborating the normally terse claim language in order to understand and explain, but not to change, the scope of the claims." *Embrex, Inc. v. Serv. Eng'g Corp.*, 216 F.3d 1343, 1347 (Fed. Cir. 2000). "[O]nly those [claim]

terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Claim construction focuses on the intrinsic evidence, which consists of the claims themselves, the specification, and the prosecution history. *See generally Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). The Federal Circuit in *Phillips* explained that in construing terms, courts must analyze each of these components to determine the "ordinary and customary meaning of a claim term," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313.

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Id.* at 1312 (citations omitted). "Quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claim terms." *Id.* at 1314. For example, "the context in which a term is used in the asserted claim can be highly instructive," and "[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term." *Id.*

"[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (citation omitted). "The longstanding difficulty is the contrasting nature of the axioms that (a) a claim must be read in view of the specification and (b) a court may not read a limitation into a claim from the specification." *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1117 (Fed. Cir. 2004). The Federal Circuit has explained that there are certain instances when the specification may limit the meaning of the claim language:

> [O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise

> possess. In such cases, the inventor's lexicography governs. In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor. In that instance as well, the inventor has dictated the correct claim scope, and the inventor's intention, as expressed in the specification, is regarded as dispositive.

Phillips, 415 F.3d at 1316.

In addition to the claims and the specification, the prosecution history should be examined if in evidence. "The prosecution history...consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent. Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Id.* at 1317 (citation omitted). "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

If the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence may be considered. Extrinsic evidence consists of all evidence external to the patent and the prosecution history, including dictionaries, inventor testimony, expert testimony and learned treatises. *Id.* at 1317. Extrinsic evidence is generally viewed "as less reliable than the patent and its prosecution history in determining how to read claim terms[.]" *Id.* at 1318. "The court may receive extrinsic evidence to educate itself about the invention and the relevant technology, but the court may not use extrinsic evidence to arrive at a claim construction that is clearly at odds with the construction mandated by the intrinsic evidence." *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999).

B. '231 Patent

1. Claim Preambles

The preamble of claim 1 is "[a] microelectromechanical system package comprising" while the preamble of claim 2 is "[a] microelectromechanical system package for providing a shield from an interference signal, the microelectromechanical package comprising." While the parties do not dispute the meaning of claim terms in the preambles, they dispute whether or not the preambles are claim limitations.

Knowles' Position: Knowles argues that the claim preambles are limitations and that "microelectromechanical system package" should be construed to mean "the overall device that contains the elements recited in the claims." (CIB at 20.)

Knowles claims that the invention of the '231 patent is a microelectromechanical package, as evidenced by the patent title, field of invention, summary of the invention, and detailed description. (CRB at 7.) Knowles states that "[t]hroughout, the invention is termed and described as a microelectromechanical package, and a microelectromechanical package as recited in the preamble is a claim limitation." (*Id.* (citing *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989) and *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332 (Fed. Cir. 2003)).)

MemsTech's Position: MemsTech argues that the preambles of claims 1 and 2 are not limitations. According to MemsTefch, "[t]he preambles in claims 1 and 2...do not 'breathe life' into the remainder of the claims and are at best statements of intended use." (RIB at 8.)

MemsTech claims that there is nothing in the claims that refer back to the preambles, thus there is not an antecedent basis issue. (*Id.* at 9.) MemsTech further claims that "microelectromechanical system package" is a "descriptive name" that adds nothing to the claim,

as evidenced by the construction of the term offered by Knowles and Staff. (*Id.*)

MemsTech takes issue with Knowles' alleged failure to raise its position regarding the preambles in its pre-hearing statement. MemsTech points to Ground Rule 4(d), arguing that Knowles has waived the right to claim that the preambles are limitations. (RIB at 9; RRB at 8.) MemsTech claims that it has been prejudiced by Knowles' change in position at such a late stage of the investigation. (RIB at 7-8; RRB at 7-8.)

Commission Investigative Staff's Position: Staff argues that the claim preambles are limitations and that "microelectromechanical system package" should be construed to mean "the overall device that contains the elements recited in the claims." (CIB at 26.)

Staff argues that in view of the specification, "microelectromechanical system package" should be considered a limitation. (*Id.* at 27.) Staff points out that the specification makes clear that the invention is "focused on creating a package that provide[s] protection and [can] be made cheaply and easily." (*Id.*) Staff asserts that the preamble does not merely state a purpose or intended use for the claimed structure, but gives life and meaning to the claim and provides a "further positive limitation" to the claimed invention. (*Id.*)

Staff argues that MemsTech's position is misplaced, because a preamble can be a claim limitation without serving as an antecedent basis. (SRB at 3 (citing *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997); *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1572-1573 (Fed. Cir. 1996)).) Staff also argues that the "microelectromechanical system package" limitation adds something to the claim that is not already present because "the preamble provides the framework for the limitations recited in the body of the claims." (*Id.* at 4.)

Discussion and Conclusion: I find that the term "microelectromechanical system package" in the preambles of claims 1 and 2 is a claim limitation.

Whether to treat a claim preamble as a limitation is a determination made after a review of the entire patent. *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002). In *Catalina*, the Federal Circuit stated:

> In general, a preamble limits the invention if it recites essential structure or steps, or if it is "necessary to give life, meaning, and vitality" to the claim. Conversely, a preamble is not limiting "where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention."

Id. (citations omitted). The court went on to explain that "a preamble generally is not limiting when the claim body describes a structurally complete invention such that deletion of the preamble phrase does not affect the structure or steps of the claimed invention." *Id.* at 809.

The invention at issue in *Catalina* was a system for distributing coupons to consumers through kiosks. The court had to determine whether the phrase "located at predesignated sites such as consumer stores" was a limitation when it appeared in the preamble. *Id.* at 807-808. The court found that the phrase was not a claim limitation. The court examined the specification and found that the location of the kiosks was not an essential feature of the invention. *Id.* at 810. The applicants did not rely on the preamble to distinguish the invention from the prior art during prosecution. *Id.* Importantly, the court found that the claim was complete without the preamble:

> Moreover, deletion of the disputed phrase from the preamble of Claim 1 does not affect the structural definition or operation of the terminal itself. The claim body defines a structurally complete invention. The location of the terminals in stores merely gives an intended use for the claimed terminals.

Id.

In *Corning Glass*, cited by Knowles, the claim preamble was "[a]n optical waveguide comprising." 868 F.2d at 1256. The court found that the preamble served as a limitation because the specification was clear that the invention was limited to fibers working as waveguides. As the court explained: "[t]he invention is restricted to those fibers that work as

waveguides as defined in the specification, which is not true with respect to fibers constructed with the limitations of paragraphs (a) and (b) only." *Id.* at 1257.

I find that the situation before me is closer to *Corning Glass* than *Catalina*. Here, the term "microelectromechanical system package" is necessary to give meaning to the claims. The term makes clear that all of the components listed in the claim body must come together and form a "package." This term adds a limitation that is not otherwise present in the claim body. This is supported by the specification, which discusses mounting the package on an end-user's PCB. (CX-1 at 3:3-16.)[3]

Looking at claim 1, the components found in the body of the claim are, broadly stated, a microphone, substrate, cover, and housing formed by the connection of the substrate and cover. Such a combination of elements could be found on a printed circuit board containing other elements that are not fully enclosed by the cover. Such a device would not be a "package" because it would not be a single, self-contained housing for a MEMS microphone.

Dr. Gilleo testified that one of ordinary skill in the art would know that a "package" is a self-contained unit that has two levels of connection, to the device and to a circuit (or other system). If there is only one connection level, then there is no package. (CX-392C at Q. 13.) This is distinguished from what Dr. Gilleo called "chip-on-board," where the microphone is mounted directly on the printed circuit board. (CX-392C at Q. 14.) This is further supported by Dr. Gilleo's textbook on packages, where he states that "[t]he package provides the first-level (device to package) interconnect structure and must enable second-level (package to circuit board) electrical connections." (CX-396 at 8.)

Therefore, I find that the term "microelectromechanical system package" in the preamble

[3] I have not considered the '231 patent prosecution history for resolution of this issue or any other issue in this investigation because no party entered it into evidence during the hearing. I denied Staff's motion to re-open the evidentiary record after the hearing to admit the '231 patent prosecution history. (Order No. 28.)

is a limitation. Because there is no dispute as to the meaning of this term, I find it unnecessary to construe it.

Regarding MemsTech's concern that this issue was not properly raised prior to the hearing, I find otherwise. In its pre-hearing statement, Staff included an argument regarding why the preambles should be claim limitations. Thus, the issue is properly before me, and MemsTech was on notice that such an issue would be raised.

2. "layer"

The term "layer" appears in asserted claims 1 and 2.

Knowles' Position: Knowles contends that "layer" should be construed to mean "a single thickness of material." (CIB at 20.) Knowles states that both claims 1 and 2 use the term "layer" in the singular form, thus signifying the term only requires a "single thickness." (*Id.*) Knowles argues that there is nothing in the specification requiring "layer" to mean multiple layers. (*Id.*) Knowles asserts that the specification expressly contemplates the use of a single layer cover. (*Id.* (citing CX-1 at 2:18-20).) Construing "layer" to require multiple layers would, according to Knowles, improperly exclude this embodiment. (*Id.* at 21 (citing *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007)).) Knowles claims that Mr. Giachino acknowledged that the specification of the '231 patent disclosed a single layer structure. (CRB at 8 (citing Tr. at 354:6-10).)[4]

Knowles asserts that claim 5 is identical to claim 1, except that claim 5 requires a cover with multiple layers. Under the doctrine of claim differentiation, Knowles argues that it would be improper to construe "layer" to require multiple layers because such a construction would

[4] In their briefs the parties frequently cite their own proposed Findings of Fact by number. For clarity and easier reference to actual evidence, I will instead refer throughout this Initial Determination to the underlying evidence, if any, they cite in their proposed Findings of Fact.

render claim 5 redundant. (CIB at 21; CRB at 8-9.)

MemsTech's Position: MemsTech contends that "layer" should be construed to mean "one thickness, course, or fold laid or lying over or under another." (RIB at 10.) MemsTech further states that the term "should *not* be construed to cover a solid metal cover formed as a single piece." (*Id.* (emphasis in original).)

MemsTech points to the specification for support, arguing that the specification describes a multi-layer cover which includes an inner cup formed of a conductive layer and an outer cup formed of a conductive layer. According to MemsTech, "[t]he specification only describes layers in the context of the cover as a muti-layered structure...and it is this special layered cover that the '231 patent identifies as protecting the surface mounted components from EMI and environmental elements." (*Id.* at 11 (citing CX-1 at 4:5-5:6).)[5]

MemsTech claims that Dr. Gilleo admitted that the term layer, as used in the '231 patent specification, only refers to multiple layer structures. (*Id.* (citing Tr. at 162:8-12).) MemsTech claims that Dr. Gilleo admitted that his proposed construction of "layer" is wholly divorced from the '231 patent. (*Id.* (citing Tr. at 163:7-13, 164:23-165:5, 167:16-20).)

MemsTech claims that the doctrine of claim differentiation does not apply because claim 5 includes an "environmental barrier layer" limitation that is not found in claim 1. (*Id.* at 11-12.) MemsTech asserts that this added limitation would not render claim 5 redundant if MemsTech's construction of "layer" is adopted. (*Id.* at 12; RRB at 10-11 (citing *Mantech Envtl. Corp. v. Hudson Envtl. Servs.*, 152 F.3d 1368, 1376 (Fed. Cir. 1998)).)

MemsTech argues that the fact that the term "layer" is singular does not support Knowles' construction. (RRB at 8-9.) MemsTech agrees that the layer can be singular, as

[5] MemsTech actually cites to RX-133. Both CX-1 and RX-133 are copies of the '231 patent. For the sake of consistency, I will cite to CX-1 when referring to the '231 patent.

allegedly evidenced by its proposed construction of "*one* thickness, course, or fold laid or lying over or under another." (*Id.* at 9 (emphasis in original).) MemsTech states that Knowles' construction is incorrect, as "[t]he point is that the layer needs to be laid or lying over *something* and thus, it follows that a solid metal cap does not have a layer on it as required by the claims." (*Id.* (emphasis in original).)

Commission Investigative Staff's Position: Staff states that "layer" should be construed to mean "single thickness." (SIB at 18.) Staff argues that the claim language from claims 1 and 2 support such a construction, as the term "layer" is singular. (*Id.*) Further, Staff claims that the use of "a conductive layer" in the claims supports the construction because "the Federal Circuit typically construes 'a' to mean 'at least one.'" (*Id.* (citing *Abtox, Inc.v. Exitron Corp.*, 122 F.3d 1019, 1023 (Fed. Cir. 1997)).)

Staff claims that the specification includes multiple embodiments for the claimed "cover," with at least one of them calling for a cover comprising a single layer. (*Id.* at 19-20; SRB at 6.) Staff argues that MemsTech's construction is based on a single embodiment depicted in Figure 1, and thus improperly imports limitations from the specification into the claims. (*Id.* at 20 (citing *Decisioning.com, Inc. v. Federated Dept. Stores, Inc.*, 527 F.3d 1300, 1309 (Fed. Cir. 2008)).)

Staff echoes Knowles' argument that the doctrine of claim differentiation supports its construction of "layer" because claim 5 is very similar to claim 1, but claim 5 requires the cover to be made of two cups in a mating relationship (i.e. a multi-layer cover). (*Id.* at 21.)

Construction to be applied: "a single thickness of material"

In claim 1, the term "layer" appears in the following phrase: "a cover comprising a conductive layer having a center portion bounded by a peripheral edge portion." In claim 2,

"layer" appears in two claim elements: "a substrate including a surface at least partially covered by a first layer of a conductive material..." and "a cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material..."

The claims use the term "layer" in the singular form as describing a component of the package cover and substrate. When describing the cover and substrate, the claims use the transitional terms "comprising" and "including," indicating that the cover and substrate may include additional, unclaimed components beyond the claimed layer. *Georgia-Pacific Corp. v. United States Gypsum Co.*, 195 F.3d 1322, 1327 (Fed. Cir. 1999) ("The transitional term 'comprising'...is inclusive or open-ended and does not exclude additional, unrecited elements or method steps."); *SanDisk Corp. v. Memorex Prods., Inc.*, 415 F.3d 1278, 1284 (Fed. Cir. 2005) ("As a patent law term of art, 'includes' means 'comprising.'...Neither includes, nor comprising, forecloses additional elements that need not satisfy the stated claim limitations.").

The specification describes multiple types of covers that may be used in the package. For example, in the Summary of the Invention, a cover consisting of a formed metal cup is disclosed: "[t]he cover includes a formed metal cup electrically connected to the first layer of a conductive material." (CX-1 at 2:18-20.) The Summary goes on to disclose another embodiment in which the cover consists of two metal cups with an environmental barrier layer between the two cups: "[t]he cover has a central portion bounded by a peripheral edge, and comprises a first formed metal cup and a second metal cup fit within the first metal cup in mating relationship. The cover further comprises an environmental barrier layer disposed between the first and second metal cups." (*Id.* at 2:28-31.) The preferred embodiment in the specification only discloses use of the two cups in a mating relationship. (*Id.* at 4:5-18.)

Both the single-cup cover and double-cup cover are explicitly claimed in claims 4 and 5, respectively. Claims 1 and 2 are silent on the use of cups, instead requiring that the cover include a conductive layer.

I find that the intrinsic evidence does not limit "layer" to require a cover with multiple layers, as argued by MemsTech. MemsTech argues that the only description of a cover in the specification is of a multi-layered structure. (RIB at 10-11.) This is incorrect, as the specification discloses a cover made up of a single metal cup. (CX-1 at 2:18-20.)

Even if MemsTech was correct in its assertion that the specification only discloses a multi-layer structure, that is not necessarily a sufficient justification to limit the claims to that structure. As the Federal Circuit stated, "we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment." *Phillips*, 415 F.3d at 1323. Because the claim language makes clear that the cover may be made up of a single layer, the term has a meaning that is broader than the two-cup structure described in the preferred embodiment.

After examining the claim language and the specification, it is clear to me that "layer" is not limited to multiple layers, and should be given its plain and ordinary meaning, which I find to be "a single thickness of material." I find that examination of the extrinsic evidence (such as expert testimony) offered by the parties is unnecessary because the intrinsic evidence is sufficient to understand the meaning of "layer." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996) ("In most situations, an analysis of the intrinsic evidence alone will resolve any ambiguity in a disputed claim term. In such circumstances, it is improper to rely on extrinsic evidence.")

3. "electrically coupled"

The term "electrically coupled" appears in asserted claim 2.

Knowles' Position: Knowles asserts that "electrically coupled" should be construed to mean "a connection between two nodes through which electrons may flow from one node to another." (CIB at 21.) Knowles claims that this is a simple and straightforward definition that "best comports with the language of the claims and even the most basic understanding of electricity." (*Id.*)

Knowles argues that MemsTech's proposed construction, requiring a direct connection, is incorrect. (*Id.* at 22.) Knowles claims that MemsTech's definition improperly imports the direct connection limitation from the embodiments described in the specification. (*Id.* (citing *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1340 (Fed. Cir. 2001) and *Phillips*, 415 F.3d at 1323).) Knowles further asserts that MemsTech's proposed construction is at odds with statements made by MemsTech's expert witnesses. (*Id.* at 22-23; CRB at 9.) Knowles states that the district court case upon which MemsTech relies for support is distinguishable based on the claim language of the patent at issue in that case. (CRB at 9-10.)

MemsTech's Position: MemsTech asserts that "electrically coupled" should be construed to mean "that the microphone is directly connected to the layer of conductive material on the substrate." (RIB at 12.) MemsTech argues that "[t]he specification consistently and only refers to surface mounting the components onto the substrate, which is a direct connection." (*Id.*; *see also* RRB at 12.) Further, MemsTech claims that there is no description in the '231 patent of any indirect electrical connections. (RRB at 13.) MemsTech cites *PCTEL, Inc. v. Agere Sys., Inc.*, a district court case where an allegedly similar claim term was construed to require a direct connection. (RIB at 13.) MemsTech offers the testimony of its expert Mr. Mallon as support for

its construction. (*Id.*)

Commission Investigative Staff's Position: Staff asserts that "electrically coupled" should be construed to mean "the microphone is directly or indirectly connected to the substrate." (SIB at 22.)

Staff argues that because claim 2 refers to "electrically connected" as well as "electrically coupled," the two phrases must have different meanings. (*Id.* at 23-24.) Staff claims that the specification makes clear that "electrically connected" requires a direct connection, and that "electrically coupled" must therefore have a different meaning than a direct connection. (*Id.* (citing *ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1099 (Fed. Cir. 2003); *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 n. 3 (Fed. Cir. 2006); *CAE Screenplates Inc. v. Heinrich Fiedler GmbH*, 224 F.3d 1308, 1317 (Fed. Cir. 2000)).)

Staff argues that the ordinary meaning of "electrically coupled" allows for direct or indirect connections, and MemsTech is improperly limiting the term based on the specification. (SIB at 25.) Staff cites numerous district court cases where "coupled" was allegedly construed as allowing for a direct or indirect connection. (*Id.* at 25-26.)

Construction to be applied: "arranged so that electrical signals may be passed either directly, or indirectly via intervening circuitry, from one component to another."

The term "electrically coupled" appears in asserted claim 2 in the following phrase: "the silicon-based microphone is electrically coupled to the layer of a conductive material[.]" The same phrase appears in the Summary of the Invention. (CX-1 at 1:58-60.) Otherwise, there is no further description of the term "electrically coupled" in the specification. The description of the preferred embodiment depicts the microphone as a surface-mountable component with a direct physical connection between the microphone and the substrate. (*See, e.g., id.* at 3:17-65, Fig. 1.)

I find that the ordinary meaning of "electrically coupled" does not require a direct physical connection. *Silicon Graphics, Inc. v. n Vidia Corp.*, 58 F. Supp. 2d 331, 346 (D. Del. 1999) ("The court notes that the ordinary and accustomed meaning of the term 'couple,' even when used in an electronics context does not solely mean 'directly coupled.'"). In *GSK Techs. Inc. v. Eaton Elec. Inc.*, 2008 WL 906713 (E.D. Tex. Apr. 1, 2008), the court construed "electrically coupled." In construing the term, the court noted that "[a]s the intrinsic evidence does not provide a special meaning for 'electrically coupled,' its plain and ordinary meaning applies." *Id.* at *5. The court found that the plain and ordinary meaning of the term did not require a direct physical connection. *Id.* It construed "electrically coupled" to mean "arranged so that electrical signals may be passed either directly, or indirectly via intervening circuitry, from one component to another." *Id.*

Here, I find that the intrinsic evidence does not provide any special meaning for "electrically coupled," and the plain and ordinary meaning should apply. Therefore, I concur with the sound reasoning of the courts in *Silicon Graphics* and *GSK* and adopt a construction of "electrically coupled" that allows for an indirect connection. I have adopted the construction set forth by the court in *GSK*, as I find that it most clearly describes the plain and ordinary meaning of "electrically coupled."

MemsTech asserts that "electrically coupled" should be limited to direct physical connections because the specification only describes and depicts a direct physical connection. (RIB at 12-13; RRB at 12-13.) As explained *supra*, the claims should not be limited to the preferred embodiment simply because it is the only embodiment disclosed in the specification. *Phillips*, 415 F.3d at 1323. The specification will limit the claims when the inventor acts as his own lexicographer or when there is a clear disavowal of claim scope. *Id.* at 1316. I do not find

that either of these circumstances exist in the '231 patent specification. Therefore, it would be improper to limit "electrically coupled" based on the preferred embodiment.

MemsTech also relies on *PCTEL, Inc. v. Agere Sys., Inc.*, 2006 WL 734385 (N.D. Cal. Mar. 20, 2006) to support its position that "electrically coupled" requires a direct physical connection. (RIB at 13.) In *PCTEL*, the court construed the phrase "a device coupled to the local bus" to mean "a device directly connected to the local bus." *Id.* at *6. *PCTEL* is distinguishable from the present case and thus does not support MemsTech's argument. In *PCTEL*, the intrinsic evidence dictated the construction of "coupled." Specifically, the court found that additional claim language, the specification, and the prosecution history all required an interpretation of "coupled" that was limited to a direct physical connection. *Id.* at *5-6. Here, there is no intrinsic evidence requiring such a limitation. Therefore, it would be improper to adopt a construction of "electrically coupled" that varied from the term's ordinary meaning.

C. '089 Patent

1. Claim 1 Preamble

The preamble of claim 1 is "[a] surface mountable package for containing a transducer, the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals, the surface mountable package comprising:" While the parties do not dispute the meaning of claim terms in the preamble, they dispute whether or not the preamble amounts to a claim limitation.

Knowles' Position: Knowles argues that the term "surface mountable package" makes clear that the invention is directed toward the package that is the overall device that contains the elements recited in the claims. (CIB at 23.)

Knowles argues that the term "surface mountable package" appearing in the preamble is

a limitation in the claim. Knowles cites *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003) to support the position that "[w]hen limitations in the body of the claim rely upon and derice antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention" such that the preamble is an express limitation. (CRB at 10-11.)

MemsTech's Position: MemsTech argued in its post-hearing brief that the preamble of claim 1 should not be construed as limiting. Nevertheless, they agreed with Knowles and Staff that the definition of "a surface mountable package" should be the overall device, capable of being mounted to the surface of a printed circuit board, that contains the elements recited in the claims. (RIB at 14-15.)

Commission Investigative Staff's Position: Staff argues that, although the claim preamble is not usually construed as a claim limitation, the preamble is regarded as limiting if it recites essential structure that is important to the invention or necessary to give meaning to the claim. (SIB at 54 (citing *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1305 (Fed. Cir. 2005)).) Staff submits that the term "surface mountable package" in the preamble means "the overall device, capable of being mounted to the surface of a printed circuit board, that contains the elements recited in the claims."

Staff argues that the preamble, in light of the specification, makes clear that "surface mountable package" is a limitation in the claim. (SIB at 55 (citing citing *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989)).) Staff recites the '089 specification which states that the invention claimed therein is directed to "a silicon condenser microphone package which allows acoustic energy to contact a transducer which provides the necessary pressure reference while at the same time protects the transducer from light,

electromagnetic interference, and physical damage." (*Id.* (quoting CX-2 at 1:44-49).) They also note that the specification states "[t]he present invention is directed to microphone packages." (*Id.* (quoting CX-2 at 3:11).)

Staff asserts that the specification makes clear that the inventor was working on the problem of finding a better package – one that overcame the problems associated with having unexposed microphone elements built directly on the surface of a silicon die and having packages that were too expensive or difficult to manufacture. (SIB at 55 (citing CX-2 at 1:21-40).) Staff says that the '089 invention is not directed to devices where the microphone is built directly on a silicon die, nor is it directed to metal can, DIP or SOIC packages. (*Id.*) Rather, the inventor was focused on creating packages that provided protection and could be made cheaply and easily. (*Id.* at 55-56.) Staff asserts that the preamble does not merely state a purpose or intended use for the claimed structure, but gives life and meaning to the claim and provides a "further positive limitation" to the claimed invention. (*Id.* at 56.)

Staff argues that, because the body of claim 1 refers back to the preamble, the preamble should be construed as a limitation. (SRB at 17 (citing *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002)).) Staff points out that the preamble recites, among other things, a surface mountable package, and that the body of claim 1 includes a reference to "the surface mountable package." (*Id.* (citing CX-2 at claim 1).)

Staff points to MemsTech's argument that Staff's proposed construction "is not limiting in any meaningful way." (SRB at 17.) Staff asserts that its proposed construction does in fact limit the '089 invention, because it explains how the limitations recited in the body of the claims relate to one another. (*Id.*) Hence, it provides the structural framework for the elements in the claims and requires the substrate, cover, and transducer to function as a "package," which is

consistent with the teachings of the '089 specification. (*Id.*)

Discussion and Conclusion: I find that the term "surface mountable package" in the preamble of claim 1 is a claim limitation.

Whether to treat a claim preamble as a limitation is a determination made after a review of the entire patent. *Catalina*, 289 F.3d at 808. In *Catalina*, the Federal Circuit stated:

> In general, a preamble limits the invention if it recites essential structure or steps, or if it is "necessary to give life, meaning, and vitality" to the claim. Conversely, a preamble is not limiting "where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention."

Id. (citations omitted). The court went on to explain that "a preamble generally is not limiting when the claim body describes a structurally complete invention such that deletion of the preamble phrase does not affect the structure or steps of the claimed invention." *Id.* at 809.

The invention at issue in *Catalina* was a system for distributing coupons to consumers through kiosks. The court had to determine whether the phrase "located at predesignated sites such as consumer stores" was a limitation when it appeared in the preamble. *Id.* at 807-808. The court found that the phrase was not a claim limitation. The court examined the specification and found that the location of the kiosks was not an essential feature of the invention. *Id.* at 810. The applicants did not rely on the preamble to distinguish the invention from the prior art during prosecution. *Id.* Importantly, the court found that the claim was complete without the preamble:

> Moreover, deletion of the disputed phrase from the preamble of Claim 1 does not affect the structural definition or operation of the terminal itself. The claim body defines a structurally complete invention. The location of the terminals in stores merely gives an intended use for the claimed terminals.

Id.

In *Corning Glass*, the claim preamble was "[a]n optical waveguide comprising." 868 F.2d at 1256. The court found that the preamble served as a limitation because the specification

was clear that the invention was limited to fibers working as waveguides. As the court explained: "[t]he invention is restricted to those fibers that work as waveguides as defined in the specification, which is not true with respect to fibers constructed with the limitations of paragraphs (a) and (b) only." *Id.* at 1257.

I find that the situation before me is closer to *Corning Glass* than *Catalina.* Here, the term "surface mountable package" is necessary to give meaning to the claims. The term makes clear that all of the components listed in the claim body must come together and form a "package." This term adds a limitation that is not otherwise present in the claim body.

Additionally, the term "the surface mountable package" is found in the body of claim 1, and thus the preamble provides an antecedent basis. This further supports the conclusion that the preamble acts as a limitation. *Bicon, Inc. v. Straumann, Co.*, 441 F.3d 945, 952-953 (Fed. Cir. 2006) (finding that a claim preamble was a limitation because, *inter alia*, it provided antecedent basis for the claim body); *NTP, Inc.*, 418 F.3d at 1306 (stating that "[b]ecause [the claim] limitations derive their antecedent basis from the claim 1 preamble and are necessary to provide context for the claim limitations, the use of these limitations in the preamble limits the claim.")

Looking at claim 1, the components found in the body of the claim are, broadly stated, a transducer, first member, second member, chamber formed by connection of first and second members, volume, and aperture. Such a combination of elements could be found on a printed circuit board containing other elements that are not fully enclosed by the cover. Such a device would not be a "package" because it would not be a single, self-contained housing for a MEMS microphone.

Dr. Gilleo testified that one of ordinary skill in the art would know that a "package" is a self-contained unit that has two levels of connection, to the device and to a circuit (or other

system). If there is only one connection level, then there is no package. (CX-392C at Q. 13.) This is distinguished from what Dr. Gilleo called "chip-on-board," where the microphone is mounted directly on the printed circuit board. (CX-392C at Q. 14.) This is further supported by Dr. Gilleo's textbook on packages, where he states that "[t]he package provides the first-level (device to package) interconnect structure and must enable second-level (package to circuit board) electrical connections." (CX-396 at 8.)

Therefore, I find that the term "surface mountable package" in the preamble is a limitation. Because there is no dispute regarding the meaning of this term, I find it unnecessary to construe it.

2. "transducer"

The term "transducer" appears in asserted claims 1, 9, 10, 15 and 29.

Knowles' position: Knowles contends that the term should be defined as "a condenser microphone which converts acoustic signals to electrical signals." (JSRCC.)

Knowles argues that the preamble limits the transducer to one that is "responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals." Knowles argues that this equates to a "microphone." (CIB at 23-24.) Knowles points to the testimony of MemsTech's expert who, they assert, "conceded at hearing, general pressure sensors are not responsive to the tiny complex acoustic signals that one needs to pick up with a microphone." (CIB at 24 (citing Tr. at 334-335).)

MemsTech's position: MemsTech contended prior to the hearing that this term needs no construction. (JSRCC.) MemsTech did not address this term further in either its initial or reply post-hearing briefs.

Commission Investigative Staff's Position: Staff contended prior to the hearing that the

term should be construed as "the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals". (JSRCC.) Staff did not address this term further in either its initial or reply post-hearing briefs.

Construction to be applied: "a microphone."

In relevant part, the preamble of claim 1 requires "[a] surface mountable package for containing a transducer, the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals ..." The foregoing passage describes, in its ordinary meaning, a "microphone."

Support for this construction is provided by the dictionary definition of the term "microphone" as: "an instrument whereby sound waves are caused to generate or modulate an electric current usu. for the purpose of transmitting or recording sound (as speech or music)." WEBSTER'S NEW COLLEGIATE DICTIONARY (1979 ed.) p. 721.

3. "electrically coupled"

The term "electrically coupled" appears in asserted claim 1.

Knowles' position: Knowles contends that this term should be construed as "a connection between two nodes through which electrons may flow from one node to the other." (JSRCC.)

Knowles refers to its argument regarding this term in its discussion of the '231 patent. Knowles argues that the term should be given its meaning commonly understood when an electrical connection between electronic components is described, which is a connection between two nodes through which electrons may flow from one node to another. Knowles says this definition is simple and straightforward and best comports with the language of the claims and the most basic understanding of electricity. (CIB at 21) Knowles points out that both Mr.

Mallon and Mr. Giachino – using identical language – state in their expert reports that they "interpret the word 'coupled' to mean that two coupled items may be directly or indirectly attached, as by a linking member." (CIB at 22-23 (citing Tr. at 360, 535-536).)

Knowles argues that there is no "direct" limitation in the claims or anywhere else in the '089 patent. Knowles asserts there is no clear limitation in the specification, and points out that the patent expressly states that no limitations are to be construed. (CIB at 24 (citing CX-1 at2:63[6]; CX-2 at 11:14-18; *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336 (Fed. Cir. 2001)).)

Knowles argues that preferred embodiments, even an only embodiment, do not limit the scope of claims. (CIB at 24-25 (citing *Phillips*, 415 F.3d at 1323).) Knowles adds that a preferred embodiment incorporating a direct connection to the substrate is not an instance in which a direct connection is "described as the advantage and distinction of the invention" as required in the analysis of *On Demand Machine Corp.*, 442 F.3d at 1340, upon which MemsTech relies in its argument. (*Id.*)

Knowles asserts that MemsTech has not offered any evidence suggesting an intent in the '089 patent to incorporate such a limitation into the claims. Knowles concedes that *Southwall Techs., Inc. v. Cardinal IG Co.,* 54 F.3d 1570 (Fed. Cir. 1995) found that arguments made during the prosecution regarding the meaning of a claim term are relevant to the interpretation of that term. Knowles adds, however, that Knowles did not make any arguments during prosecution of the '089 patent regarding the meaning of the term "electrically coupled." (CIB at 25.)

Knowles asserts that nowhere in the application for the '089 patent is an argument recited about a "direct" connection. Knowles avers that MemsTech's argument that a November 9, 2006 office action added those limitations is in error when it asserts Knowles distinguished the

[6] While the issue here is only construction of a claim in the '089 patent, Knowles cited language in the '231 patent along with language in the '089 patent. I will consider the language from the '089 patent (i.e. CX-2) in this construction.

invention of the '089 patent from Cote by arguing that Cote does not disclose a direct connection to the substrate. Knowles says that the distinction made between Cote and the invention of the '089 patent that was argued was that Cote did not have a transducer mounted to a surface at all, and as such, could not teach any electrical connection – not that it could not teach simply a direct connection. (CIB at 25 (citing RX-255 at 207).)

Knowles concludes that the remarks in the November 9, 2006 response do not constitute and cannot be construed as "words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope." (CIB at 26 (citing *Teleflex, Inc.*, 299 F.3d at 1327).)

MemsTech's position: MemsTech contends that the term should be given the meaning "the transducer is directly connected, (such as through a wire bond or a flip-chip bond) to the patterned conductive layer on the substrate. Citing '089 patent, col. 3:47-48, col. 3:61-63, col. 6:56-59, col. 6:64-65, col. 7:2-5, col. 7:18-20, Figs. 1, 6." (JSRCC.)

MemsTech argues that the term should be construed to mean that the transducer is directly connected to the patterned conductive layer on the substrate. MemsTech asserts that this construction is consistent with the specification, prosecution history, and with how one of ordinary skill in the art would construe "electrically coupled" in the context of the '089 patent. (RIB at 15.)

MemsTech says that all of the intrinsic evidence supports its position. (RIB at 15-16 (citing RX-363 at Q. 134; CX-2[7] at 3:62-63, 6:64-65; RX-368C at Q. 75).) MemsTech points to the testimony of its expert, Mr. Mallon, on the issue:

> The specification makes clear that electrical coupling means a direct electrical connection. No other mode of connection is described or contemplated. Flip chip

[7] MemsTech actually cites to RX-132. Both RX-132 and CX-2 are copies of the '089 patent. For the sake of consistency, I will cite to CX-2 when referring to the '089 patent.

> bump bonding, the preferred method of electrical coupling and the only method shown only allows a direct connection to the substrate for die[s] that are substrate mounted.

(RX-363 at Q. 134.)

MemsTech also asserts that Mallon testified that the prosecution history of the '089 patent supported its proposed construction for "electrically coupled," particularly where the applicant distinguished its invention over the prior art Cote reference:

> During prosecution of the '089 patent, the applicant argued that a prior art reference did not disclose the transducer being attached to the surface of the substrate. [RX-255, November 9, 2006 Amendment in Response to Non-Final Office Action, at 9]. The applicant then argued that since the transducer is not attached to the surface, there cannot be "the further claimed electrical connection between the transducer and the at least one patterned conductive layer formed on the surface to which it is attached." [*Id.* at 10]. In order to avoid the prior art, the applicant distinguished the invention on the ground that the transducer is surface mounted, *i.e.* directly connected to the patterned conductive layer formed on the substrate.

(RX-368C at Q. 76.)

MemsTech argues that Knowles' assertion of infringement requires that the term "electrically coupled" include a transducer that is first wired to another device, which in turn is wired to the substrate. MemsTech argues that is not consistent with the meaning of "electrically coupled" as the intrinsic evidence shows. MemsTech argues that Knowles' proposed construction is not supported by the specification or the prosecution history, does not comport with the understanding of those of skill in the art, and is contrary to the "holding in *Phillips* that the specification is the single best guide to determine a claim term's meaning. 415 F.3d at 1316-17." (RIB at 16.) MemsTech also cites an unpublished district court case – *PCTEL, Inc. v. Agere Sys, Inc.,* 2006 U.S. Dist. LEXIS 25943, *12-19 (N.D. Cal. March 20, 2006) – saying "[t]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the

course of prosecution, making the claim scope narrower than it would otherwise be." (RIB at 16.)

In its reply brief, MemsTech argues that the Knowles' position regarding the meaning of the disputed portion of the prosecution history is contrary to the file history and Mr. Mallon's unchallenged testimony. (RRB at 15.) MemsTech asserts that the applicant told the USPTO that "Cote cannot teach the further claimed electrical connection between the transducer and the at least one patterned conductive layer formed on the surface to which it is attached." (RX-255 at 207.) They say this "electrical connection" is how the transducer is "electrically coupled" to the substrate. (RRB at 15.)

MemsTech also supports the Staff's argument on this construction. (RRB at 15.)

Commission Investigative Staff's Position: Staff contends that the term should be defined as "the transducer is directly connected, (such as through a wire bond or a flip-chip bond) to the patterned conductive layer on the substrate." (JSRCC.)

Staff agrees with MemsTech's proposed construction. Staff argues that, unlike the same term used in the '231 patent, Knowles limited "electrically coupled" to require a direct connection, based on statements made during the prosecution of the application leading to the '089 patent. (SIB at 52.)

Staff cites to *Phillips*, 415 F.3d at 1317 and states that "the prosecution history, which consists of the complete record of the proceedings before the PTO, can provide some of the best evidence of what the patent was meant to cover." Staff includes the following quote from *Phillips*: "[t]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise

be." *Id.* (citing *Vitronics,* 90 F.3d at 1582-83). Staff argues that Knowles made clear and express representations during prosecution regarding the meaning of the term "electrically coupled" and thus limited the scope of this claim term.

Staff asserts that Knowles submitted an argument distinguishing its claims from the Cote prior art reference, to wit:

> Cote does not teach or suggest that the *transducer is mounted to a surface*. As such, Cote cannot teach the further claimed electrical connection between the transducer and the at least one patterned conductive layer formed on the surface to which it is attached. In fact, Cote fails to teach or suggest the formation of the patterned conductive layer associated with any part of the described electret microphone.

(RX-255.)

Staff avers that the Examiner issued the claims based on this representation by Knowles. (SIB at 53.) Staff says that the foregoing excerpt from the prosecution history shows that Knowles understood its invention to cover a transducer mounted (i.e. directly attached) to the substrate by both physical and electrical means. (*Id.* (citing *Ekchian v. Home Depot, Inc.,* 104 F.3d 1299, 1304 (Fed. Cir. 1997) ("[S]ince by distinguishing the claimed invention over the prior art, the applicant is indicating what the claims do not cover, he is by implication surrendering such protection.")).)

In its reply brief, Staff argues that Knowles is attempting to read out "mounted to a surface" in the Office Action Response. (SRB at 18.) They assert that the use of the phrase is important, because it shows that Knowles, at the time it was seeking patent protection, understood the invention of claim 1 to require the transducer to be "mounted to a surface." (*Id.*) They continue that the use of the term "as such" shows that, because Cote did not teach a transducer mounted to a surface; this reference could not further teach an electrical connection between the surface and the transducer. (*Id.*) Staff argues that Knowles characterized its

invention as requiring the transducer to be mounted to the surface in order to have an electrical connection between the two, and Knowles' characterization of the prosecution history should be rejected. (*Id.*)

Construction to be applied: "arranged so that electrical signals may be passed either directly, or indirectly via intervening circuitry, from one component to another."

Element 1 of claim 1 provides, in part, "the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber." (CX-2 at 11:28-31.)

The term "electrically coupled" appears in the element 2 of asserted claim 1, which reads "the surface being formed with at least one patterned conductive layer, the patterned conductive layer being electrically coupled to the transducer; an outside surface of the surface mountable package comprising a plurality of terminal pads electrically coupled to the patterned conductive layer." (*Id.* at 11:32-36.)

The ordinary meaning of "electrically coupled" does not require a direct physical connection. *Silicon Graphics, Inc. v. n Vidia Corp.*, 58 F. Supp. 2d 331, 346 (D. Del. 1999) ("The court notes that the ordinary and accustomed meaning of the term 'couple,' even when used in an electronics context does not solely mean 'directly coupled.'"). In *GSK Techs. Inc. v. Eaton Elec. Inc.*, 2008 WL 906713 (E.D. Tex. Apr. 1, 2008), the court construed "electrically coupled." In construing the term, the court noted that "[a]s the intrinsic evidence does not provide a special meaning for 'electrically coupled,' its plain and ordinary meaning applies." *Id.* at *5. The court found that the plain and ordinary meaning of the term did not require a direct physical connection. *Id.* It construed "electrically coupled" to mean "arranged so that electrical signals may be passed either directly, or indirectly via intervening circuitry, from one component

to another." *Id.*

Here, I find that the intrinsic evidence does not provide any special meaning for "electrically coupled" and the plain and ordinary meaning should apply. Therefore, I concur with the sound reasoning of the courts in *Silicon Graphics* and *GSK* and adopt a construction of "electrically coupled" that allows for an indirect connection. I have adopted the construction set forth by the court in *GSK*, as I find that it most clearly describes the plain and ordinary meaning of "electrically coupled."

MemsTech bases its argument in part on the testimony of its expert Mallon, and in part on the prosecution history in which Knowles distinguished Cote on the basis that it did not teach a transducer mounted to the surface of the substrate. MemsTech's expert Mallon said in his direct statement that the term should be construed as requiring a direct connection:

> The specification makes clear that electrical coupling means a direct electrical connection. No other mode of connection is described or contemplated. Flip chip bump bonding, the preferred method of electrical coupling and the only method shown only allows a direct connection to the substrate for die that are substrate mounted.

(RX-363 at Q. 134.)

I do not concur with Mr. Mallon's approach to construction. I have already observed that the claim itself does not provide any special meaning for the term "electrically coupled" and the plain meaning should normally apply. Mr. Mallon's testimony cited, *supra*, by MemsTech (RX-363 at Q. 134) relies generally on the specification rather than the language of the claim. As discussed in *Phillips*, *supra*, it is well settled that the claims of a patent define the invention to which the patentee is entitled the right to exclude. While the specification is always highly relevant to the claim construction analysis, it cannot be used to import limitations into claims, absent exceptions to the rule not relevant here. That error is precisely what Mr. Mallon commits

in his approach to claim construction. Mr. Mallon also makes a leap in logic that is not in evidence when he attempts to limit the invention of the '089 patent to one that includes "flip chip bump bonding," asserting that it is the "only method shown" in the specification, and saying that it "only allows a direct connection to the substrate for die that are substrate mounted."

Mr. Mallon testified regarding the prosecution history, characterizing it as:

> During prosecution of the '089 patent, the applicant argued that a prior art reference did not disclose the transducer being attached to the surface of the substrate. [RX-255, November 9, 2006 Amendment in Response to Non-Final Office Action, at 9]. The applicant then argued that since the transducer is not attached to the surface, there cannot be "the further claimed electrical connection between the transducer and the at least one patterned conductive layer formed on the surface to which it is attached." [*Id.* at 10]. In order to avoid the prior art, the applicant distinguished the invention on the ground that the transducer is surface mounted, *i.e.* directly connected to the patterned conductive layer formed on the substrate. The patent was obtained in part based on that argument. The configuration shown was patentable specifically because prior art references did not show a direct electrical connection, and the attorney argued that the transducer must be mounted on the substrate to obtain such a connection. That is not true for anything except a flip chip type of mounting. In fact, a transducer connected through a wire or even a transducer connected through a wire bond could not be mounted separate from the substrate and that connection could still be made. Clearly the argument is being made here for a direct connection that would not be covered by an electrical coupling to an ASIC.

(RX-368C at Q. 76.)

Staff supports MemsTech's position, asserting in addition that the Examiner issued the claims based on this representation by Knowles, and that Knowles is attempting to read out "mounted to a surface" in the Office Action Response.

I find that the prosecution history does not amount to an attempt by Knowles to "read out" the term "mounted to a surface," nor does it attempt to avoid the prior art by distinguishing the invention on the ground that the transducer is directly connected to the patterned conductive layer formed on the substrate, as Mr. Mallon posits. There is no showing that the types of connections described by Mr. Mallon in his testimony could not be accomplished with a

transducer mounted on the same surface as that containing a patterned conductive layer.

The prosecution history contains one reference relevant to this issue, to wit:

> The package set forth by claims 22-60 is unique and particularly adapted for use with a MEMS type silicon microphone, although other transducer types may benefit from the inventive package. The electret transducer taught by Cote is not mounted or attached to a surface formed on one of the first and second members. Instead, Cote teaches an electret microphone that mounts to an upper rim portion of a base (col. 3, line 30) and an annular shoulder of a cap (col. 3, line 58). Thus, Cote does not teach the claimed structure wherein the microphone transducer is attached to a surface of one of the first and second members.
>
> Cote does not teach or suggest that the transducer is mounted to a surface. As such, ***Cote cannot teach the further claimed electrical connection between the transducer and the at least one patterned conductive layer formed on the surface to which it is attached.*** In fact, Cote fails to teach or suggest the formation of a patterned conductive layer associated with any part of the described electret microphone."

(RX-255 at 206-207) (emphasis added.)

The claim indicates that the transducer is attached to a surface on one of the first or second member. That surface is formed with at least one patterned conductive layer that is electrically coupled to the transducer. The prosecution history reveals that Knowles argued that Cote cannot teach the electrical connection between the transducer and the at least one patterned conductive layer formed *on the surface to which it is attached,* because Cote does not teach that the transducer is mounted to a surface. Knowles said in addition that Cote fails to teach or suggest the formation of a patterned conductive layer associated with any part of the described electret microphone. Nothing in the prosecution history argues to limit the term "electrically coupled" to a direct connection.

In addition, the USPTO's stated reason for granting the patent does not contradict this construction. Contrary to Mr. Mallon's testimony, the invention was not patentable "specifically because prior art references did not show a ***direct electrical connection***, and the attorney argued

that the transducer must be mounted on the substrate to obtain such a connection." (RX-368 at Q. 76) (emphasis added.) The USPTO's rationale for issuing the patent merely states as one reason for granting the patent that "the prior art of record does not teach or suggest the combination of the surface being formed with at least one patterned conductive layer, the patterned conductive layer being electrically coupled to the transducer." (RX-255 at 366.)

4. "volume"

The term "volume" appears in asserted claims 1, 15 and 28.

Knowles' position: Knowles originally contended that the term should be construed as "an interior open space defined by a transducer and one of a first member or a second member." (JSRCC.)

Knowles argues that the spatial limitations described in the claim are "straightforward: One boundary of the defined space is provided by the transducer. Another boundary is provided by ***at least*** one of the first member or second member." (CIB at 26) (emphasis added.)

Knowles says that MemsTech attempts to include three additional limitations into the construction of this term: (1) that the "volume" must be within a recess in the substrate; (2) that the "volume" must be a "back volume;" and (3) that the boundary of the defined space cannot include the first member and the second member. Knowles takes exception to these limitations, arguing that they add limits not found in the claim language, add limits contrary to language in the claims and the doctrine of claim differentiation, and add limits that are inconsistent with exemplary embodiments shown in the specification. *Id.*

Knowles posits that there is nothing stated in the claim adding a limitation that the volume must be formed by a recess in the substrate, and argues that such a limitation should not be written into the claim. (*Id.* (citing *PrimaTeck II, L.L.C. v.Polypap S.A.R.L.*, 318 F.3d 1143

(Fed. Cir. 2003) and *Markman v. Westview Instruments, Inc.*, 52 F.3d 967 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996)).) Knowles argues that the doctrine of claim differentiation prevents reading this limit into the claim, because claim 3, which depends from claim 1, adds the limitation that the volume "includes a recess formed in the surface." (*Id.* at 26-27 (citing *Phillips*, 415 F.3d at 1315).) Knowles also asserts that there is nothing in the specification or the file history that would limit the claimed "volume" to a particular volume in the substrate. Knowles points to Figures 15 and 23 to show that the specification contains examples of the volume formed without use of a recess or hole in the substrate. (CIB at 27.) Knowles contrasts Figures 15 and 23 with Figures 16 and 24, which show a recess in the substrate. (*Id.*)

Regarding the description of the volume as a "back volume," Knowles says that there is no limitation in the specification that the term must refer to a particular type of volume (i.e. a back volume). To the contrary, Knowles argues, the specification expressly disavows any limitation to the embodiments shown (CIB at 29 (citing CX-1 at 2:63, 5:7-11[8]; CX-2 at 4:4, 11:14-18; *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336 (Fed. Cir. 2001)).) Knowles asserts that MemsTech's argument on this point is only pertinent to MemsTech's defenses related to its "reverse mount" unit where the transducer is directly over the acoustic port. (*Id.*) That configuration, Knowles states, is specifically shown and described in the '089 patent in Figure 26 and related text and is expressly claimed in dependent claims 7 and 26. (*Id.*)

Regarding the alleged limit that the boundary of the defined space cannot include the first member and the second member, Knowles argues that there is no language limiting the volume to one defined by "only" one of the first member or second member, as opposed to "at least" one of the first member or the second member. (CIB at 29.) Knowles argues that MemsTech's

[8] Knowles actually cites its proposed findings of fact 311-314. Findings of Fact 311 and 312 refer to the '231 patent and not to the '089 patent, and appear irrelevant to the construction of "volume" as used in the '089 patent.

position leads to inconsistent or untenable results. First, they say, under claim 28, the volume includes a portion of the chamber. In this situation, the volume has to be the portion of the package above the transducer and under the cover, as shown in Figure 26. They assert the volume would also thus be defined by both the first member (e.g. cover) and the second member (e.g. substrate). Knowles argues that this position leads to an unworkable and unintelligible claim 28. (CIB at 29.)

In addition, Knowles argues that claim 7, which depends from claim 1, expressly claims a configuration whereby the transducer is attached to the surface completely covering the acoustic port, as shown in Figure 26. Knowles asserts that if the volume is limited to a "back" volume as asserted by MemsTech, then that volume must be the area above the transducer and below the cover of the unit, similar to the configuration shown in Figure 14. This would, they say, comport with claim 28, which claims that the "volume" includes a portion of the chamber. Since claim 28 depends from claim 1, and since claim 1 is the only independent claim and covers the embodiment of Figure 26, the volume would be defined by both the first member or the second member. They characterize this as two interpretations that are inherently inconsistent and cannot co-exist. (CIB at 30.)

Knowles argues that under its proposed construction, whereby volume is not limited and can be a front volume or a back volume, and whereby the volume is defined by "at least" one of the recited first member or second member, all of the claims are consistent and cover all of the embodiments shown in the specification. (CIB at 30.)

In its reply brief, Knowles addresses the argument that under its construction claim 1 of the '089 patent would be identical to claims 1 and 2 of the '231 patent, thereby raising a double patent issue. (CRB at 14.) First, Knowles points to MemsTech's pre-hearing statement at 137,

in which it is acknowledged that the '089 patent claims include pads for surface mounting while the '231 patent claims do not. (*Id.*) Knowles also asserts that claim 1 of the '231 patent expressly requires a package for providing a shield from an interference signal and claim 2 requires a package for providing a shield from an interference signal. (*Id.* (citing CX-1).) Knowles argues that there is no such limit or requirement in claim 1 of the '089 patent. (*Id.* (citing CX-2).) Conversely, Knowles avers, claim 1 of the '089 patent requires and is limited to a package that is surface mountable, and no such limit or requirement exists in claim 1 or claim 2 of the '231 patent. (*Id.* (citing CX-1; CX-2).)

Knowles argues that when the claims are not identical, double patenting cannot exist. (*Id.* (citing *Perricone v. Medicis Pharm. Corp.,* 432 F.3d 1368, 1373 (Fed. Cir. 2005).) Knowles also asserts that there is no evidence of obviousness-type double patenting. Assuming *arguendo* that such evidence did exist, Knowles argues that double patenting can be overcome, at any time and without limiting the claims, by a terminal disclaimer. (*Id.* (citing *Bott v. Four Star Corp.,* 675 F. Supp. 1069 (E.D. Mich. 1987); *Bayer AG v. Barr Lab,* 798 F. Supp. 196 (S.D.N.Y. 1992)).)

MemsTech's position: MemsTech contends that the term should be defined as "a space that resides at least partly within (for example in a recess or hole in) the substrate (second member) or the cover (first member) and is at least partly bounded by the transducer. Citing the '089 patent, 3:41-43, 3:49-64, 4:8-11, 7:5-7, Figs. 1-6 (element 18), 24 (element 18); RX-257, '089 provisional application no. 60/253,543; RX-255, '089 Pros. Hist. (Original claim 1 filed with application on Apr. 22, 2005)." (JSRCC.)

MemsTech points to the testimony of Mr. Mallon in which, they assert, he said the term means "the transducer back volume formed by the transducer and the substrate which include a

recess that forms the back volume." (RIB at 17 (citing RX-363 at Qs. 136, 137).) MemsTech says that Mr. Mallon based this definition on the specification, in which "the word volume in the specification is only used with the word back always forming the phrase back volume." (*Id.*) MemsTech asserts that Dr. Gilleo admitted that every instance of the word "volume" in the '089 patent referred to the back volume, and that every figure in the '089 patent that includes back volume figure element 18 shows it as a recess or hole in the substrate. (*Id.* (citing Tr. at 172:23-173:13).)

MemsTech asserts that Dr. Gilleo testified that the volume is defined, in part, by the first member (substrate), defined, in part, by the second member (cover), defined, in part, by the transducer, and defined, in part, by the amplifier. (RIB at 17 (citing Tr. at 170:21-172:14).) MemsTech avers that Gilleo admitted that, according to his construction, the volume is not defined by the transducer and one of the first member or the second member, which is what the claim language recites. (*Id.* (citing Tr. at 172:15-18).) MemsTech says that Gilleo admitted that, under his proposed construction, all MEMS microphone packages would have a chamber, a volume, and an aperture. (*Id.* (citing Tr. at 172:19-22; RX-370 at Fig. 1).)

MemsTech attacks Gilleo's construction, saying it cannot be squared with the claim requirement that the volume be defined by the transducer and one of the first member or the second member. (RIB at 18.) Gilleo's construction, MemsTech argues, "to the extent it can be understood" would result in the volume being defined by (in addition to other elements) both the first member and the second member. (*Id.*) MemsTech argues that its proffered construction is consistent with the claim language in that the back volume 18 is defined by the transducer and the first member only. (*Id.*)

In its reply brief, MemsTech asserts that Knowles' reference to Figures 15 and 23 to

support its argument is misplaced. (RRB at 18.) MemsTech states that Figure 15 does not show any volume whatsoever, or a microphone. (*Id.*) Instead, MemsTech says, it is providing an alternative description of layer 50 in the printed circuit board. (*Id.*) MemsTech argues that the specification states that the back volume 18 in Figure 23 is formed by the back hole of the silicon microphone only, a different embodiment from that of the asserted claims. (*Id.* (citing CX-2 at 6:59-60).) MemsTech argues that Figure 23 does not relate to claim 1 of the '089 patent, which requires that the volume is formed by the transducer and one of the first or second member. (*Id.*)

MemsTech counters Knowles' argument that since claim 28 requires that the volume includes a portion of the chamber, the volume must be the portion of the package above the transducer. (RRB at 18.) MemsTech argues that according to Knowles' claim construction, claim 1 already requires that the volume is the portion of the package above the transducer. (*Id.*) This means that claim 28, which depends from claim 1, is superfluous and an improper dependent claim under 35 U.S.C. § 112, ¶ 4, which requires claims to specify a further limitation. (*Id.* (citing *Pfizer Inc. v. Ranbaxy Labs. Ltd.*, 457 F.3d 1284, 1291-1292 (Fed. Cir. 2006) (finding a dependent claim invalid because it did not add a limitation to the independent claim from which it depended)).) MemsTech indicates that, using its construction, the volume limitation of claim 1 is directed to a recess in the substrate under the transducer. (*Id.*) MemsTech argues that this construction comports with the claim language, and under this construction claim 28 covers the configuration where the volume is further enlarged to include the back hole of the transducer, which would result in the volume reaching up to include a portion of the chamber. (*Id.* at 18-19.)

Commission Investigative Staff's Position: Staff takes the position that the term should be construed as "a space that resides at least partly within (for example in a recess or hole in) the substrate (second member) or the cover (first member) and is at least partly bounded by the

transducer." (JSRCC.)

Staff supports MemsTech's proposed construction, saying that the claim explicitly requires the volume to be defined by the transducer and either the first member or the second member. (SIB at 47.) Staff points to the '089 patent, stating that the specification lacks any embodiment that describes the volume as defined by the transducer, the first member, and the second member. (*Id.* (citing CX-2).) In fact, Staff argues, the term "volume" appears nowhere in the '089 specification, and Staff asserts that every instance of the word "volume" in the '089 patent is part of the phrase "back volume." (*Id.*) Thus, Staff avers, the term "volume" as used in claim 1 is synonymous with the term "back volume" used in the specification. (*Id.*)

Staff focuses on the specification, saying that it makes explicitly clear that the "back volume" is the air cavity created by the transducer and the substrate and not the transducer, substrate and cover. (SIB at 47.) Staff refers to the following parts of the '089 patent to support its argument: (1) the abstract, which refers to "a back volume of the transducer unit is formed between the transducer unit and the substrate" (CX-2); (2) Figure 1-3 embodiments, which include "... a back volume or air cavity 18 ..." (RX-216[9] at 2:38-43); (3) Figure 1-3 embodiments, "... the combination of the substrate and the user's board 28 creates the back volume 18. The back volume 18 is covered by the transducer 12" (RX-216[10] at 3:59-64); (4) Figure 5 embodiment "... a method of enlarging the back volume 18 by including a chamber 32 within the end user's circuit board 28." (RX-216 at 4:8-11); and (5) Figure 16-17 embodiments "... illustrate embodiments of the bottom portion 50 with enlarged back volume 18." (RX-216 at

[9] Staff's reference is to the deposition testimony of Knowles' expert Dr. Gilleo; but the reference does not appear in the transcript. Alternatively, considering the '089 patent (CX-2), this reference does not reveal the language quoted in Staff's brief.

[10] This cited reference is to the deposition testimony of Knowles' expert Dr. Gilleo; but the reference does not appear in the deposition transcript. This reference and the two following references actually coincide with columns and lines in exhibit CX-2, the '089 patent.

6:18-19). (SIB at 47-48.)

Staff argues that the prosecution history of the '089 patent supports their construction. They assert that both the provisional application and the application leading to the '089 patent only refer to "back volume." (SIB at 48-49.) Staff points to the abstract of the provisional application which described the "back volume" as being formed "between the transducer unit and the substrate." (*Id.* at 49 (citing RX-257 at Abstract).) Staff asserts that all the figures depict embodiments where the "back volume" is formed between the substrate and the transducer. (*Id.* (citing RX-257 at Figs. 1, 2, 3, 4, 5 and 6).) Staff quotes the Summary of Invention of the provisional application to include:

> A silicon microphone condenser package comprises a transducer, a substrate, and a cover. The substrate has an upper surface with a recess formed therein. The transducer is attached to the upper surface of the substrate and ovelaps at least a portion of the recess so that a back volume of the transducer is formed between the transducer and the substrate.

(RX-257.)

In its reply brief, Staff reiterates the quote from the Summary of Invention, *supra*, and attributes it to the '089 patent, CX-2 at 1:49-54. (SRB at 20-21.) Staff argues that the Federal Circuit has held that statements in the "summary of the invention" section of a specification that tend to describe the invention overall are more likely to have a limiting impact than statements in the section describing preferred embodiments. (*Id.* (citing *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 864 (Fed. Cir. 2004)).)

Staff argues that the excerpt from the provisional application is identical to the language used to describe the claimed subject matter in the '089 patent. (SIB at 49 (citing CX-2 at 1:50-55).) Thus, they argue, the provisional application describes the area between the substrate and the transducer as the "back volume." (*Id.*)

Staff says that the original claim 1 filed with the '089 patent application renamed the area between the transducer and the substrate as "volume." (*Id.* (citing RX-255).) They say that, although the name changed, the structure remained the same (i.e. the volume is still the area formed by the substrate and the transducer). (*Id.*)

Staff alleges that the Knowles expressly and unambiguously characterized the invention as having a back volume during the prosecution of the application for the '089 patent. They point to a Restriction Requirement issued by the Examiner that required Knowles to elect specific claims to prosecute on the merits. They say the examiner argued that the pending claims were directed to the following two categories of patently distinct species:

> "Species of surface mountable package:
>
> A1. A surface mountable packaging having a volume with a recess.
> A2. A surface mountable package having a volume with a through hole.
>
> Species of the location of an aperture:
>
> B1. An aperture in the first member.
> B2. An aperture in the second member.
> B3. An aperture in the first and second member."

(RX-255 at 260.)

Staff asserts that the Examiner then required Knowles to elect a species from each group to prosecute. In response, Knowles disagreed with the Restriction Requirement, and they quote:

> The claims of the stated five groups of species are concerned with and recite related subjected [*sic*] matter; specifically, each relate to the methods of packaging a microphone transducer component and providing an acoustic inlet and a back volume.

(RX-255 at 274.)

Staff argues that the quoted excerpt shows that Knowles equated "volume" with "back volume." (SIB at 50.) Specifically, Knowles characterized all of the then pending claims (which

issued as claims 1-29) as having a "back volume." (*Id.*)

Staff argues that the doctrine of claim differentiation (cited by Knowles) cannot override the clear and express language in the claims, and in this case, the prosecution history. (SIB at 51 (citing *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 541 (Fed. Cir. 1998) ("The doctrine of claim differentiation cannot broaden claims beyond the scope that is supported by the specification.")).) Staff says that in *ATD* the court refused to use the doctrine of claim differentiation to interpret an independent claim more broadly than a dependent claim. (SIB at 51.) Staff cites several cases for the proposition that claim differentiation will not be used to require an interpretation of a patent claim broader than that supported by the specification, and contrary to the prosecution history, arguing that similarity with another claim "will have to be tolerated" when the claim will bear only one interpretation. (*Id.* (citing *Tandon Corp. v. United States Int'l Trade Comm'n*, 583 F.2d 1017 (Fed. Cir. 1987); *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991) and quoting *Autogiro Co. of Am. v. United States*, 181 Ct. Cl. 55, 384 F.2d 391, 404 (1967)).)

Staff argues that claim 1 only reasonably covers one interpretation – that the "volume" limitation is limited to "a space that resides at least partly within the substrate or the cover and is at least partly bound by the transducer." (SIB at 51.) In addition, Staff argues that Knowles' construction would result in claim 1 of the '089 patent being identical to claims 1 and 2 of the '231 patent. Staff argues that an inventor cannot obtain two different patents for the same invention. *Id.* at 51-52 (citing 35 U.S.C. § 101 (a party "may obtain a patent"); *In Re Goodman*, 11 F.3d 1046, 1052 (Fed. Cir. 1993) ("If the claimed inventions are identical in scope, the proper rejection is under 35 U.S.C. § 101, because an inventor is entitled to a single patent for a single invention.")).

Staff discusses Knowles' arguments related to claims 7 and 28, which refer to Figure 14, and avers that there is no "Figure 14" in the '089 patent. (SRB at 22, fn 4.)

Staff argues that the specification describes three ways in which the "back volume" 18 can be formed: (1) "controlled depth drilling of an upper surface 19 of the substrate 14 to form a recess over which the silicon condenser microphone is mounted;" (2) "drilling and routing of several individual sheets of FR-4 and laminating the individual sheets to form a back volume 18;" and (3) "drilling completely through the substrate 14 and providing a sealing ring 22 on the bottom of the device that will seal the back volume 18 during surface mounting to a user's board 28." (SRB at 23 (citing CX-2 at 3:49-61).) Staff argues that claim 7 is specifically directed at the first method – controlled depth drilling of an upper surface 19 of the substrate 14 to form a recess. (*Id.*) Staff argues that its proposed construction does not lead to a superfluous claim 7, because claim 7 narrows the scope of claim 1 by restricting the "volume" to a recess formed only by the method of controlled drilling. (*Id.*)

Staff notes that claim 28 requires the "volume to include a portion of the chamber." Staff points to Knowles' argument regarding claim 28 that the volume must be the portion of the package above the transducer and under the cover as shown in Figure 26 in order for that claim to be consistent with claim 1. (*Id.*) Staff disagrees and submits that its construction does not lead to an inconsistent result. Staff asserts that claim 28 appears to read on Figure 24 of the '089 patent. (*Id.*) Figure 24 depicts a transducer 58 that includes a back hole that forms part of the back volume 18 defined by the transducer and package member 50. Staff claims that, in describing Figure 24, the specification states "[t]he back volume 18 is formed by a combination of the back hole of the transducer 58 (mounted down) and the bottom portion 50." (*Id.* (citing CX-2 at 8:4-7).) Staff states that the portion of the back hole is part of transducer 58 and is

located above the substrate in the chamber. (*Id.* at 23-24.) Staff avers that claim 28 further limits claim 1 by further defining "volume." (*Id.* at 24.) Therefore, Staff argues, its construction does no violate the principles of claim differentiation. (*Id.*)

Staff asserts that Knowles' construction "seeks to rewrite" claim 1 to read "a volume being defined by the transducer and at least one of the first member or the second member." (SRB at 24.) Staff argues that the underlined language reflects Knowles' suggested interpretation of claim 1 which allows the "volume" to be defined by all three components – the transducer, the first member and the second member. (*Id.*) This construction, they argue, is not supported by the intrinsic record. Rather, claim 1 expressly states that the "volume" is defined by the transducer and "*one of* the first member *or* the second member." (*Id.*) (emphasis in original.)

Staff argues that Knowles could have used the term "at least" if it intended that meaning in defining "volume" and points out that the term "at least" was used by Knowles in requiring the "surface mountable package" to have "at least a first member and a second member." (SRB at 24 (citing CX-1 at claim 1).) This omission, they argue, means that the Knowles did not intend to require the "volume" to be formed from the transducer, the first member and the second member. (*Id.*)

Staff argues that in *Chef Am. Inc. v. Lamb Weston, Inc.*, 358 F.3d 1371, 1374 (Fed. Cir. 2004) the Federal Circuit made clear that a patent must be interpreted as written, not as the patentees wish they had written it. (SRB at 25.) They argue that a party cannot be awarded a patent based on a certain set of claims and then seek to rewrite those claims when the patent becomes involved in litigation. (*Id.*) Staff submits that "volume" should be construed to mean "a space that resides at least partly within (for example in a recess or hole) the substrate (second

member) or the cover (first member) and is at least partly bounded by the transducer." (*Id.*)

Construction to be applied: "a space defined by the transducer and one of the first member or the second member"

All of the parties agree that the "volume" is defined on one side by the transducer. The difference of opinion among the parties is how the "volume" is defined by the "member."

The construction applied is consistent with the construction originally suggested by Knowles. (JSRCC.) In its subsequent argument, however, Knowles changed its position to argue that the construction should say, "[o]ne boundary of the defined space is provided by the transducer. Another boundary is provided by ***at least*** one of the first member or second member." (CIB at 26) (emphasis added.)

In arriving at the construction to be applied, I have rejected Knowles argument that one boundary be provided by ***at least*** one of the first member or second member, because Knowles' construction would allow for the boundary to include both the first and second member. Inasmuch as claim 1 clearly speaks in the disjunctive, saying "one of the first member or the second member," it is clear that the claim does not contemplate the boundary to include both of them. *Phillips*, 415 F.3d at 1314 ("Quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claim terms.")

In addition, claim 1 provides in element 1, "at least a first member and a second member and a chamber being defined by the first member and the second member, the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber". The described "chamber" is the space within which the transducer resides in the package and is defined by the first and the second member. To use the definition

championed by Knowles would require that the construction allow for the "chamber" and the "volume" to be synonymous. In the absence of any evidence to the contrary, I must presume that the use of these different terms in the claims connotes different meanings. *CAE Screenplates, Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000) (citing *Tandon Corp.*, 831 F.2d at 1023.)

Here the evidence supports a finding that the terms "chamber" and "volume" are not synonymous. First, in the '089 patent Abstract, Summary of the Invention, and the detailed descriptions of preferred embodiments, the term "volume" is mentioned 17 times, and each time it is mentioned it is described as a "back volume." The term "volume" does not appear by itself. Second, the preferred embodiment describes the back volume as providing "a pressure reference for the transducer." (CX-2 at 3:41-43.) Third, the preferred embodiment describes an "inner chamber 56 which is adapted for housing a transducer unit..." (*Id.* at 4:23-24.) Fourth, the preferred embodiment describes the chamber as having an "inner lining," the purpose of which is to protect the transducer against electromagnetic interference, "much like a faraday cage" (*Id.* at 4:30-36) and as having an environmental barrier layer that protects the transducer unit from environmental elements such as sunlight, moisture, oil, dirt and/or dust. (*Id.* at 4:37-47.)

Finally, the prosecution history reveals that Knowles opposed the USPTO's proposed restriction to be applied to all claims[11] by asserting:

> The claims of the stated five groups of specie are concerned with and recite related subject matter; specifically each relate to methods of packaging a microphone transducer component and providing an acoustic inlet ***and a back volume***. The subject matter recited in all of the pending claims is sufficiently similar such that a complete search directed to the specie B1 would include a

[11] The proposed restriction lists claims 22, 23, 26, 27, 35-45, 47-51, 54, 59 and 60, and omits to mention claims 24, 25, 28-34, 46, 52-53, and 55-58. All of the claims that are subject to the proposed restriction related to the term "volume" relate directly or indirectly back to claims 22 or 51. Those two claims became claim 1of the '089 patent by an amendment of the examiner upon issuing the patent. Thus, Knowles' response addresses the issue of "volume" as described in claim 1.

search directed to the non-elected species.

(RX-255 at 260, 274) (emphasis added.) The proposed restriction was withdrawn by the examiner after receipt of Knowles' response. (RX-255 at 365.)

Based on the foregoing, I find that the term "volume" in claim 1 is defined by the transducer and ***one of*** *the first member* ***or*** *the second member.*

My construction of this term is consistent with the doctrine of claim differentiation, when viewed in light of claim 28, which teaches "The surface mountable package of claim 1, wherein the volume includes a portion of the chamber." Dependent claims are presumed to be of narrower scope than the independent claims from which they depend. *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1242 (Fed. Cir. 2003). In this case, claim 1 provides for a "volume" that is defined by the transducer and one of the first member or the second member. Claim 28 adds to claim 1 the limitation that the volume must include a portion of the chamber, further narrowing the scope of the claim.

While the construction applied herein appears to exclude one of the many preferred embodiments in the '089 patent, I believe this is the rare case in which that result must obtain, because of the logical inconsistency among claim 1, claim 11 and the embodiment at CX 2, 7:8-14. Claim 1 recites the "volume" at issue here. Unasserted claim 11, which depends from claim 1, teaches the "surface mountable package of claim 1, the aperture is formed in each of the first member and the second member." One of the numerous embodiments in the '089 specification refers to Fig. 25 and relates to unasserted claim 11. That embodiment describes:

> In Fig. 25, connection to the end user's board is also made through the bottom portion 50. Again, the package mounting orientation is bottom portion 50 connection from the transducer 58 to the plated through holes are made by wire bonding. *With acoustic ports 54 on both sides of the package, there is no back volume,* [*sic*] This method is suitable to a directional microphone.

(CX-2, 7:8-14) (emphasis added.) Inasmuch as, claim 11 includes the "surface mountable package" of claim 1, which includes the volume construed here, and claim 11 does not provide an exception to allow for no volume, given its two apertures, it necessarily excludes the foregoing embodiment to the extent that the embodiment does not contain a back volume. The alternative, however, would be to import the limit of "no back volume" into claim 11 from the embodiment, which would clearly be an error.

MemsTech and Staff both argue that the construction should be limited to one or the other of the first or second member, as I have already done; but they would add the requirement that the space must reside at least partly within (for example in a recess or hole in) one or the other of the first or second member. Claim 1 does not provide this additional limit.

Even when characterized as a "back volume" it does not necessarily follow that the space between the transducer and the surface upon which it is mounted would require that the space reside at least partly within that surface (e.g. in a recess or hole in the surface). This is illustrated in one of the embodiments which provides, "[t]he transducer back volume 18 is formed by the back hole (mounted down) of the silicon microphone only." (CX-2 at 6:55, 59-60 (referring to Fig. 23.) Another embodiment recites, "[t]he back volume 18 is formed by a combination of the back hole of the transducer 58 (mounted down) and the bottom portion 50." (CX-2 at 7:5-7.) Finally, Figures 28 and 29 both show a silicon microphone (58) mounted on a surface using epoxy (86) and a retaining ring (84). There is no recess in the surface, and the shape of the microphone is such that it is open toward the surface upon which it is attached, thereby creating a space (i.e. back volume) between the microphone and the surface. (CX-2 at 7:29-51, Figs. 28-29.)

All of the foregoing embodiments fit within the construction of "volume" applied here;

but they would not be covered if the term were defined to include a requirement that the space reside at least in part ***within*** one or the other of the first or second member. Such a construction would exclude several iterations of the preferred embodiment from the scope of the claim, which the Federal Circuit has described as being rarely correct. *Verizon Servs., Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007); *MBO Labs., Inc. v. Becton, Dickinson & Co.*, 474 F.3d 1323, 1333 (Fed. Cir. 2007).

Based upon the foregoing, I construe the term "volume" as used in the '089 patent to mean "a space defined by the transducer and one of the first member or the second member."

IV. INVALIDITY

It is Respondents' burden to prove invalidity, and the burden of proof never shifts to the patentee to prove validity. *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1380 (Fed. Cir. 2008). "Under the patent statutes, a patent enjoys a presumption of validity, *see* 35 U.S.C. § 282, which can be overcome only through facts supported by clear and convincing evidence[.]" *SRAM Corp. v. AD-II Eng'g, Inc.*, 465 F.3d 1351, 1357 (Fed. Cir. 2006).

The clear and convincing evidence standard placed on the party asserting the invalidity defense requires a level of proof beyond the preponderance of the evidence. Although not susceptible to precise definition, "clear and convincing" evidence has been described as evidence which produces in the mind of the trier of fact "an abiding conviction that the truth of a factual contention is 'highly probable.'" *Price v. Symsek*, 988 F.2d 1187, 1191 (Fed. Cir. 1993) (citing *Buildex, Inc. v. Kason Indus., Inc.*, 849 F.2d 1461, 1463 (Fed.Cir.1988).)

A. Knowles' Failure To Address Invalidity In Its Initial Post-Hearing Brief

In its reply brief, MemsTech takes issue with the way Knowles addressed invalidity. (RRB at 30-32.) Knowles waited until its reply brief to delve into the substance of the invalidity

issues. MemsTech argues that this was an improper tactic that deprived MemsTech and Staff of the opportunity to respond to Knowles' arguments. MemsTech seeks a finding that Knowles waived its opportunity to put forward any argument or evidence on the issue of invalidity. (*Id.*) MemsTech states that "Complainant's refusal to address this overwhelming evidence [of invalidity] in its post-hearing brief is directly contrary to ITC precedent." (*Id.* at 31 (citing *Certain Optical Disk Controller Chips and Chipsets and Products Containing Same, Including DVD Players and PC Optical Storage Devices*, Inv. No. 337-TA-506, 2005 ITC LEXIS 881, at *64-65 (Sept. 28, 2005) ("*Optical Disk Controller Chips*"); *Certain Integrated Circuits, Processes for Making Same, and Products Containing Same*, Inv. No. 337-TA-450, Commission Opinion at 32, 44-45, 54-55 (July 24, 2003)).)

MemsTech further argues that Knowles violated Ground Rule 10, which relates to the proposed findings of fact submitted by the parties. Ground Rule 10 states that "[f]ollowing the close of the hearing, each party will submit proposed findings of fact with its post-hearing brief and a final revised exhibit list." The rule goes on to state that "[t]he findings should reflect all section 337 elements, all issues outlined in the notice of investigation, and any other issues that arose during the course of the investigation." Knowles did not include invalidity findings of fact with the findings of fact submitted with its initial post-hearing brief. Instead, Knowles' invalidity findings of fact are found in its response to MemsTech's findings of fact.

Staff raises the same issue in its reply brief, stating that Knowles' approach is "highly improper." (SRB at 30.) Staff cites to Ground Rule 10, and claims that Knowles violated the Ground Rule by not submitting invalidity findings of fact with its initial findings of fact. Staff also cites to *Optical Disk Controller Chips* for the proposition that the Commission looks with disapproval upon parties who save new issues for reply briefs. (*Id.* at 31.)

I find that Knowles violated Ground Rule 10 by not including its invalidity findings of fact in its initial post-hearing submission. This deprived MemsTech of the opportunity to respond to Knowles' findings. While I have found that Knowles violated the Ground Rules, I do not find that Knowles has completely waived the opportunity to rebut MemsTech's invalidity argument. I will only consider argument and evidence submitted by Knowles in its reply brief that is directly responsive to an issue raised by MemsTech or Staff in their initial briefs. Any new arguments regarding invalidity raised by Knowles in its reply brief will not been taken into consideration in my decision. *See Certain Above-Ground Swimming Pools*, Inv. No. 337-TA-25, 1977 ITC LEXIS 8, at *13-14 (Feb. 10, 1977) (holding that "any new issues raised for the first time in reply briefs which were not direct responses to discussions of the same issue or issues in the brief to which the reply was addressed" will not be considered).

B. Anticipation

1. Applicable Law

"A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention. Moreover, a prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference." *Schering Corp. v. Geneva Pharm., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003). "When no prior art other than that which was considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir. 1984). Therefore, the challenger's "burden is especially difficult when the prior art was before the PTO examiner during prosecution of the application." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*,

909 F.2d 1464, 1467 (Fed.Cir.1990).

2. '231 Patent

a. Mullenborn

MemsTech asserts that U.S. Patent No. 6,522,762 to Mullenborn et al. ("Mullenborn") anticipates claim 1 of the '231 patent pursuant to 35 U.S.C. 102. (RIB at 30.)

MemsTech's Position: MemsTech states that Mullenborn discloses a "microelectromechanical system package" when it explains that "FIG. 2 shows a package..." (RIB at 30 (citing RX-363; Tr. at 735:22-24; RX-31 at 5:31).) MemsTech states that Mullenborn discloses a "microelectromechanical system microphone" when it states that the invention relates to "condenser microphone systems adapted for surface mounting on, *e.g.*, printed circuit boards (PCB's)." (*Id.* at 31 (citing RX-31 at 1:12-14).) MemsTech points to element 2 of Figure 4 in Mullenborn as the substrate that supports the microphone. (*Id.* (citing RX-363; Tr. at 735:25-736:24; RX-31 at Fig. 4).)

MemsTech asserts that element 5 of Figure 4 is the cover of claim 1, as Mullenborn states that the cover (referred to as the "lid") can be made "from metal or polymer." (*Id.* (citing RX-31 at 5:40-41).) MemsTech states that "[a]s shown in figure 4 of Mullenborn, the lid is spaced from the surface of the substrate to form a housing that accommodates the microphone." (*Id.* (citing RX-31 at Fig. 4).) MemsTech claims that the opening shown as element 4 of Figure 4 is the acoustic port required by the claim. (*Id.* (citing RX-31 at 5:59-60).) MemsTech claims that the package of Mullenborn can be encapsulated by an EMI shield as shown as element 16 of Figure 4. (*Id.* (citing RX-363; Tr. at 739:18-20; RX-31 at 5:51-53).)

MemsTech offers the expert opinion of Mr. Mallon that Mullenborn anticipates claim 1. (*Id.* at 33 (citing RX-346 – RX-353).) MemsTech asserts that Knowles' arguments relating to

Mullenborn are baseless because they are based on the incorrect premise that the preamble to claim 1 serves as a limitation. (*Id.* at 32-33; see also RRB at 41.)

In its reply brief, MemsTech argues that Knowles is incorrect in asserting that in order to challenge a patent's validity based on prior art that before the examiner during prosecution, a respondent must prove that the patent examiner was wrong in deciding to grant the patents. (RRB at 33.) MemsTech cites case law indicating that the question of patent validity is one for the courts, without deference to the rulings of the patent examiner. (*Id.* (citing *Quad Envtl. Techs. Corp. v. Union Sanitary Dist.*, 946 F.2d 870, 876 (Fed. Cir. 1991).)

MemsTech also takes issue with the argument put forward by Knowles regarding MemsTech's expert's lack of understanding of the clear and convincing legal standard. (RRB at 34-35.) MemsTech argues that its experts are experts in MEMS packaging technology, and they are not legal experts. MemsTech asserts that it is the job of the administrative law judge, and not the experts, to apply the legal standard to the evidence presented. (*Id.* at 35 (citing *Certain Digital Satellite (DSS) Receivers and Components Thereof*, Inv. No. 337-TA-392, Order No. 79 (Oct. 20, 1997); *EZ Dock, Inc. v. Schafer Sys., Inc.*, 2003 U.S. Dist. LEXIS 3634, at *18-21 (D. Minn. Mar. 8, 2003).)

Knowles' Position: Knowles argues that Mullenborn does not anticipate claim 1 because it does not disclose a "package." Knowles states that "[i]t is uncontrovertyed that a PHOSITA would know that a 'package' for a MEMS device must provide physical protection from the environment." (CRB at 26 (citing CX-392C; CX-411C; Tr. at 348:7-13, 461:18-21, 484:4-13, 706:8-16; CX-418).) Knowles claims that "[w]hile the top of the enclosure disclosed in Mullenborn '762 provides some physical protection to its MEMS microphone, it does not provide any physical protection for the sides and bottom of its MEMS microphone." (*Id.* at 27

(citing RX-31 at 3:1-7, 4:5-11, 5:35-37, Fig. 4; CX-411C).)

Knowles also argues that if MemsTech's demonstrative exhibit RX-353 is to be believed, then the "housing" of Mullenborn cannot be formed by connecting the cover and the substrate, as required by the claims. Instead, the housing would be the same thing as the cover, and the substrate is something that is within the housing's interior. (*Id.* at 29 (citing CX-411C; CDX-8).)

Commission Investigative Staff's Position: Staff argues that Mullenborn does not anticipate claim 1. Staff argues that Mullenborn fails to disclose a cover having a "center portion bounded by a peripheral edge portion." (SIB at 34 (citing CX-411).) According to Staff, because Mullenborn is missing this limitation, it does not meet additional limitations of claim 1 that rely on this limitation. (*Id.*)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that Mullenborn anticipates claim 1 of the '231 patent.

MemsTech focuses on Figure 4 of Mullenborn when analyzing claim 1. Figure 4 is depicted below:

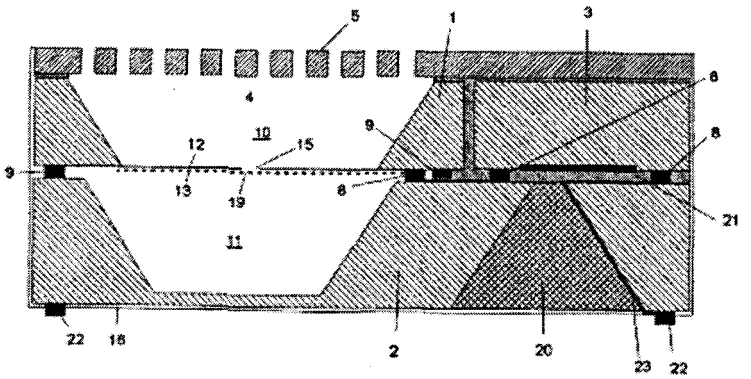


Figure 4

The specification provides the following description of Figure 4:

> In FIGS. 3 and 4 a system for microphone applications is shown. In these embodiments the transducer element 1 is a microphone and a back chamber 11 has been etched into the silicon substrate 2. The back chamber is etched into the silicon carrier by wet etching processes using reactants as KOH, TMAH or EDP or by dry etching processes such as reactive ion etching. The cavity 11 can be etched in the same step as the feed-through hole 20.
>
> The difference between FIGS. 3 and 4 is that the system, in FIG. 4, has been encapsulated with a filter 5 for providing EMI-shielding. The EMI-shield 16 is a conductive polymer layer, such as silver epoxy or a metal layer, such as electroplated or evaporated Cu or Au. Furthermore, the integrated circuit chip 3 and the filter 5 in FIG. 4 have been connected and fixed with additional means such as underfill or glue 21.
>
> The function of the microphone is as follows. The opening 4 functions as a sound inlet, and ambient sound pressure enters through the filter 5 covering the opening 4 to the cavity 10 functioning as a front chamber for the microphone. The sound pressure deflects the diaphragm 12, which causes the air between the diaphragm 12 and the back plate 13 to escape through the perforations 19.

(RX-31 at 5:42-65.)

I find that Mullenborn fails to disclose the "housing formed by connecting the peripheral edge portion of the cover to the substrate." When describing Figure 4, Mullenborn makes clear that the substrate and microphone are "encapsulated" by the combination of the filter 5 and EMI shield 16. Thus the housing is not formed by connecting the cover to the substrate, as the substrate is entirely within the "housing" of Mullenborn. Instead, the housing is formed by the connection of the filter 5 to the EMI shield 16. Dr. Gilleo's testimony supports such a finding, as he stated that "the housing is the same thing as the cover, and the substrate is something that is within the interior of the housing." (CX-411 at Q. 85.)

b. <u>Baumhauer</u>

MemsTech argues that U.S. Patent No. 4,533,795 to Baumhauer, Jr. et al. ("Baumhauer") anticipates claims 1 and 2 of the '231 patent pursuant to 35 U.S.C. § 102. (RIB at 35.)

MemsTech's Position: With respect to claim 1, MemsTech claims that Baumhauer

discloses a "microelectromechanical system package." (RIB at 35 (citing RX-363; Tr. at 493:23-494:24; RX-21 at 4:22-25).) MemsTech states that Baumhauer discloses a "microelectromechanical system microphone" when it describes "[a]n electrostatic transducer, primarily in the form of a capacitive microphone." (RIB at 35 (citing RX-363; Tr. at 720:4-7; RX-21 at Abstract).) MemsTech points to element 31 of Figure 6 in Baumhauer as the substrate that supports the microphone. (*Id.* (citing RX-21 at 9:51-52, Fig. 6; RX-363; Tr. at 694:18-695:7, 720:8-10).) While this element is labeled a "carrier substrate," Mr. Mallon testified that the term implies that the device is a package. (*Id.* (citing RX-363).)

MemsTech asserts that element 36 of Figure 6 is the cover of claim 1, as Baumhauer states that the cover "can be made of conductive or conductively plated plastic or metal." (*Id.* at 36 (citing RX-21 at 9:54-59; RX-363; Tr. at 720:11-13).) MemsTech claims that the cover in Baumhauer is electrically connected to a conductive layer on the substrate and provides EMI shielding. The cover and substrate in Baumhauer are allegedly spaced to provide a housing for a microphone. (*Id.* (citing RX-21 at 9:51-64; RX-363; Tr. at 723:1-14, 725:16-22; CX-1).) MemsTech claims that Baumhauer discloses the claimed acoustic port as element 32 of Figure 6. (*Id.* (citing RX-363; Tr. at 723:16; RX-21 at 9:49-51, 10:9-11).)

With respect to claim 2, MemsTech claims that Baumhauer discloses a substrate including a surface at least partially covered by a layer of conductive material. MemsTech states:

> Figure element 37 of figure 6 of Baumhauer show conductive pads on the substrate to which the cover is electrically connected. Further, figure elements 34 and 35 of figure 6 of Baumhauer are wires that electrically couple the transducer to a conductive layer on the substrate. Figure element 13 of Baumhauer figure 6 provides a front volume for the silicon microphone.

(*Id.* at 38 (citing RX-363; RX-21 at 9:45-64).) For the other elements of claim 2, MemsTech

relies on its claim 1 analysis. (*Id.* at 37.) MemsTech offers the expert opinion of Mr. Mallon that Baumhauer anticipates claims 1 and 2. (*Id.* at 37-39 (citing RX-302 – RX-318).)

MemsTech asserts that Knowles' arguments relating to Baumhauer are baseless because they are based on the incorrect premise that the preambles to the claims serve as limitations. (*Id.* at 39-40 (citing Tr. at 698:25-700:7, 702:15-19, 727:4-8, 729:16-22; JSRCC); see also RRB at 40.) Further, MemsTech asserts that Dr. Gilleo's opinion adds limitations to the claims that are not even present in Knowles' proposed construction of "package." (*Id.*)

Knowles' Position: Knowles argues that Baumhauer does not anticipate claims 1 and 2 of the '231 patent because it does not disclose a "package" in the sense that the term is used in the claims. (CRB at 30.)

Knowles states that "[i]t is uncontroverted that a PHOSITA would know that a 'package' for a MEMS device must provide two levels of electrical interconnect." (*Id.* (citing CX-392C; CX-411C; Tr. at 699:1-6; CX-396; CX-418).) Knowles then states that "[i]t is uncontroverted that the enclosure of Baumhauer does not provide two levels of electrical interconnect." (*Id.* at 31 (citing RX-21 at 9:45-48; CX-411C; CDX-5; Tr. at 495:11-14, 729:16-730:6).) Knowles argues that other claim elements "lose any meaning outside of the scope of the package required" by claims 1 and 2. (*Id.* at 32-33 (citing CX-411C; CDX-5; CX-1; CDX-7).)

Commission Investigative Staff's Position: Staff argues that Baumhauer does not anticipate either claim 1 or claim 2 because it fails to teach or suggest a "microelectromechanical package." (SIB at 33; SRB at 13.) Staff states that Baumhauer fails to disclose a second-level connection between the package and the circuit board. (*Id.* (citing CX-411).)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that Baumhauer anticipates claims 1 or 2 of

the '231 patent. Specifically, I find that Baumhauer does not does not disclose a "microelectromechanical system package."[12]

Baumhauer discloses a transducer mounted on a substrate. Nowhere in Baumhauer is the word "package" used. The substrate in Baumhauer is not exclusive to the transducer, and it extends beyond cover (described in Baumhauer as the "enclosure member"). Figure 6 of Baumhauer makes this clear:

FIG. 6

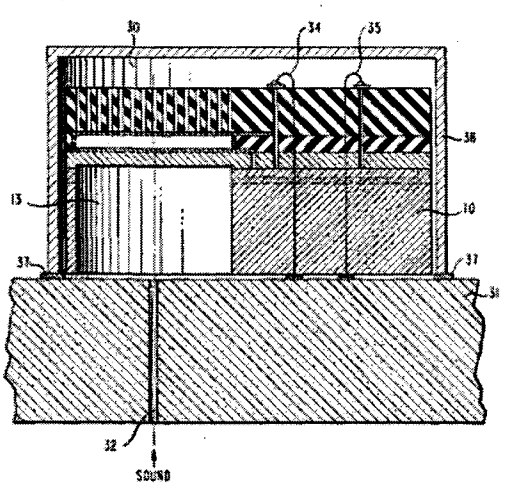


Figure 6 of Baumhauer

The jagged lines at the ends of carrier substrate 31 clearly indicate that the substrate extends beyond the enclosure member 36. Thus, this is not a "microelectromechanical system package," as described in the claim construction section *supra*; it is merely an enclosed transducer mounted on a substrate which includes other elements. This is supported by the opinion offered by Dr. Gilleo. (*See* CX-411 at Qs. 16-19.)

c. Giachino

MemsTech asserts that U.S. Patent No. 4,277,814 to Giachino et al. ("Giachino") anticipates claims 1 and 2 of the '231 patent pursuant to 35 U.S.C. § 102. (RIB at 42.)

[12] I note that Baumhauer was cited during the prosecution of the '231 patent. (CX-1.)

MemsTech's Position: With respect to claim 1, MemsTech states that Giachino discloses a package for a microelectromechanical transducer. (RIB at 42 (citing RX-363).) MemsTech states that Giachino discloses a "variable capacitance pressure transducer," which MemsTech equates to a microelectromechanical system microphone. (*Id.* at 43 (citing RX-19 at 1:19-20; RX-18; Tr. at 223:7-13).) MemsTech points to element 12 of Figure 2 in Giachino as the substrate that supports the transducer. (*Id.* (citing RX-19 at 2:17; CX-362; Tr. at 732:9-11).)

MemsTech asserts that element 16 of Figure 2 is the cover of claim 1, and MemsTech states that "[o]ne skilled in the art of packaging MEMS transducers would recognize that the cover of Giachino is conductive..." (*Id.* (citing RX-19 at 3:34-37).) MemsTech claims that Giachino includes the remaining elements of claim1:

> Figure element 18 of figure 2 of Giachino is an aperture (*i.e.*, acoustic port) through which the pressure can enter the package and reach the MEMS transducer. The cover 16 of Giachino is connected to the substrate to form a housing. The cover of Giachino is spaced to accommodate the MEMS transducer. The conductive cover 16 will provide protection from EMI.

(*Id.* at 44 (citing RX-362; RX-19 at 2:18-26, 3:21-22; Tr. at 734:17-24, 735:8-13).)

With respect to claim 2, MemsTech claims that Giachino discloses all of the claimed elements:

> Figure elements 40 and 44 of figure 1 of Giachino show conductive strips on the substrate. The conductive strips 40 and 44 of figure 1 of Giachino are electrically coupled to the transducer via solder bumps 34 and 36 of figure 2 of Giachino. The space above the transducer and under the cover of figure 2 of Giachino provides a front volume, which allows the transducer to move in response to changes in pressure. The cover 16 of Giachino is electrically connected to the substrate 12 by solder bumps to form a chamber in which the transducer is located.

(*Id.* at 45 (citing RX-362; RX-19 at 2:21-26, 2:61-3:2, 3:42).) For the other elements of claim 2, MemsTech relies on its claim 1 analysis. (*Id.* at 44-45.) MemsTech offers the expert opinion of Mr. Giachino that Giachino anticipates claims 1 and 2. (*Id.* at 44-46 (citing RX-363; RX-39 at

31, 33; RX-292; CX-1; CX-411C; Tr. at 694:18-21, 695:4-7).)

MemsTech asserts that Knowles' arguments relating to Giachino are baseless because they are based on the incorrect premise that a MEMS pressure sensor is not a MEMS microphone. (*Id.* at 46 (citing CX-392C).) In its reply brief, MemsTech reiterates that Giachino discloses a capacitive pressure transducer, and a microphone is a capacitive pressure transducer. (RRB at 42.)

Knowles' Position: Knowles argues that Giachino does not anticipate claims 1 and 2 of the '231 patent because it does not disclose a microphone. (CRB at 33.) Knowles states that "it is readily apparent that Giachino discloses a pressure sensor for measuring fluids and not a microphone." (*Id.* (citing RX-19 at Abstract, 1:19-26, 1:41-44, 2:22-27, 2:50-55, 3:25-34, 3:51-53, 4:50-56).) Knowles goes on to explain that "[w]hile a microphone is a type of pressure sensor, not all pressure sensors are microphones." (*Id.*) Knowles offered expert testimony regarding the differences between the fluid pressure sensor disclosed in Giachino and a microphone for use in the claimed invention. (*Id.* at 34 (citing CX-411C; CDX-4).)

Beyond the lack of a microphone, Knowles claims that Giachino fails to disclose the electrical connection between the cover and substrate. (*Id.* at 36 (citing Tr. at 379:9-381:1).) Knowles claims that the cover in Giachino is not conductive and does not provide an EMI protection. (*Id.* (citing CX-411C).) Knowles claims that the substrate on which the transducer sits is not the same substrate that is part of the housing. (*Id.* at 37 (citing RX-19 at 2:17; RX-362; Tr. at 732:9-11 RX-31 at Summary of the Invention; RX-362; CX-411C; CDX-9).)

Commission Investigative Staff's Position: Staff argues that Giachino does not anticipate claim 1 because it fails to disclose a microphone. (SIB at 36; SRB at 14.) Staff states that Giachino fails to anticipate claim 2 because it is missing the following limitations: (1) "a

silicon-based microphone;" (2) "cover electrically connected to the first layer of conductive material;" and (3) "acoustic front volume." (SIB at 36 (citing CX-411; RX-19 at 3:34-37; Tr. at 379:16-24, 382:3-6).)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that Giachino anticipates claims 1 or 2 of the '231 patent.

Claim 1 requires a "microelectromechanical system microphone," and claim 2 requires "a silicon-based microphone." Thus both claims explicitly require a microphone. Giachino does not disclose a package including a microphone. Instead, Giachino discloses the use of a "capacitive pressure transducer device." (RX-19 at 1:39.)

Mr. Giachino, the inventor of the Giachino patent and one of MemsTech's experts, admitted that microphones are a subset of pressure transducers, and that while all microphones are pressure transducers, not all pressure transducers are microphones. (Tr. at 334:15-335:5.) Thus, by disclosing a "capacitive pressure transducer device," Giachino does not necessarily disclose a microphone. The "capacitive pressure transducer device" described in the specification of Giachino is used to measure fluid pressure. (RX-19 at 1:19-26, 2:16-26.) Dr. Gilleo makes clear the differences between a microphone and a pressure transducer used to sense fluid pressure. (CX-411 at Q. 11.) Dr. Gilleo opines that Giachino does not disclose a microphone. (*Id.* at Qs. 39, 54.) I concur with Dr. Gilleo and find that Giachino does not disclose the "microelectromechanical system microphone" of claim 1 or the "silicon-based microphone" of claim 2.

d. Arnold

MemsTech asserts that the master's thesis by David Patrick Arnold entitled "A MEMS-

Based Directional Acoustic Array for Aeroacoustic Measurements," ("Arnold") anticipates claims 1 and 2 of the '231 patent pursuant to 35 U.S.C. § 102. (RIB at 48.)

MemsTech's Position: With respect to claim 1, MemsTech states that Arnold discloses a package for a MEMS microphone. (RIB at 48 (citing RX-363).) MemsTech states that Arnold discloses a MEMS microphone. (*Id.* (citing RX-363; RX-39 at 30).) MemsTech claims that the silicon substrate and the TO-5 style header base together form the substrate for supporting the MEMS microphone. (*Id.* (citing RX-363).)

MemsTech asserts that the metal lid in Figure 3-3 of Arnold is the "cover comprising a conductive layer..." (*Id.* (citing RX-363).) MemsTech claims that Arnold includes the remaining elements of claim1:

> The Arnold cover is connected at its periphery to the package body to form housing that accommodates the MEMS microphone. The slots and the central hole of the Arnold cover are acoustic ports that allow the signal to reach the MEMS microphone. Arnold states that the package "body and lid are connected to the circuit ground to provide additional shielding against electromagnetic interference."

(*Id.* at 49 (citing RX-363; RX-39 at 31).)

With respect to claim 2, MemsTech claims that Arnold discloses all of the claimed elements:

> Figures 3-4 and 3-5 of Arnold shows the patterned conductive layer that partially covers the surface of the silicon substrate. Figures 3-4 and 3-5 show that the silicon-based MEMS microphone is electrically coupled directly to this conductive layer. The substrate and the cover together form an acoustic chamber that provides an acoustic front volume for the microphone. Arnold states that its "can body and lid are connected to the circuit ground [i.e. they are electrically connected together] to provide additional shielding against electromagnetic interference."

(*Id.* at 50 (citing RX-363; RX-39 at 31, 33, 39).) For the other elements of claim 2, MemsTech relies on its claim 1 analysis. (*Id.* at 49-50.) MemsTech offers the expert opinion of Mr. Mallon

that Arnold anticipates claims 1 and 2. (*Id.* at 50-51 (citing RX-301).)

MemsTech asserts that Knowles' arguments relating to Arnold are baseless. MemsTech claims that the fact that the substrate and the package are separate components does not disqualify Arnold as anticipatory prior art. (*Id.* at 51 (citing RX-363; JSRCC).) MemsTech claims that Dr. Gilleo is wrong in stating that there is no electrical connection between the lid and the conductive layer of the substrate. (*Id.* at 52 (citing CX-411C; RX-363; RX-39 at 31).)

Knowles' Position: Knowles argues that Arnold does not anticipate claims 1 or 2. Knowles acknowledges that Arnold discloses a package and a MEMS microphone. (CRB at 38.) Knowles states that the package in Arnold is formed by connecting the package lid and the package base, and not by attaching the package lid to the substrate as required by claim 1. (*Id.* at 39 (citing RX-39 at Fig. 3-3; CX-411C; CDX-10).) Along the same lines, Knowles states that there is no evidence that Arnold's lid is electrically connected to the substrate as required by claim 2. (*Id.* at 39-40 (citing CX-1 at 5:35-37; RX-363; RX-39).)

Commission Investigative Staff's Position: Staff argues that Arnold does not anticipate claim 1 or claim 2. Staff asserts that Arnold does not disclose the "housing formed by connecting the peripheral edge portion of the cover to the substrate" as required by claim 1 because the substrate of Arnold is encapsulated by the package. (SIB at 35 (citing CX-411).) Staff asserts that Arnold does not anticipate claim 2 because the package in Arnold is formed by connecting the lid to the package body, and not the substrate. Thus, Arnold does not disclose a "cover electrically connected to the first layer of a conductive material [on the substrate.]" (*Id.* (citing CX-411).)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that Arnold anticipates claims 1 or 2 of the

'231 patent.

Arnold does not disclose the "housing formed by connecting the peripheral edge portion of the cover to the substrate" limitation found in claim 1. In Arnold, the housing is formed by connecting the "lid" to the "package body." The substrate sits inside of the housing. (CX-411 at Q. 48.) This is made clear by Figure 3-3 in Arnold:

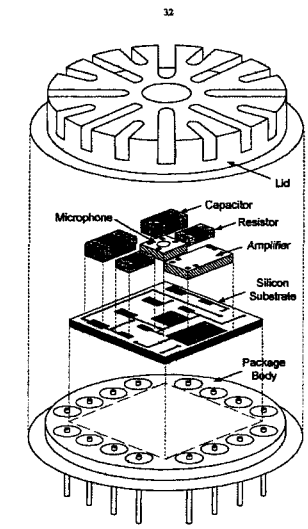


Figure 3-3: Diagram of four construction layers used in construction of the hybrid-microphone amplifier package.

MEMS197583

Figure 3-3 of Arnold

MemsTech claims that the substrate and base of Arnold, taken together, form the "substrate" of claim 1. It offers testimony from Mr. Mallon, who opines that "[t]he silicon substrate and the TO-5 style header base taken together form the substrate." (RX-363 at Q. 69.) This opinion is nonsensical in that it takes two elements labeled "silicon substrate" and "package body" and deems them the "substrate" of claim 1 without any rational explanation for doing so. Arnold already labeled an element of his package a "substrate," and it is unnecessary and improper to combine the "silicon substrate" and "package body" of Arnold and call them a

"substrate."[13]

With respect to claim 2, MemsTech has not proven that Arnold discloses a "cover electrically connected to the first layer of a conductive material [on the substrate.]" In asserting that Arnold meets this element, MemsTech asserts: "Arnold states that its 'can body and lid are connected to the circuit ground [i.e. they are electrically connected together] to provide additional shielding against electromagnetic interference.'" (RIB at 50.) Mr. Mallon makes the same assertion. (RX-363 at Q. 69.) As I have already explained *supra*, the can body in Arnold is not part of the substrate. Thus, this passage from Arnold does not describe any electrical connection between the cover and the substrate.

3. '089 Patent

a. Claim 1

MemsTech asserts that Mullenborn anticipates claim 1 of the '089 patent pursuant to 35 U.S.C. § 102. (RIB at 52.)

MemsTech's Position: MemsTech argues that each of the limitations in claim 1 of the '089 patent is specifically included in Mullenborn (RX-31). MemsTech argues that Mullenborn discloses a surface mountable MEMS microphone package that includes a substrate and a cover, that together define a chamber in which the transducer resides. (RIB at 52.) MemsTech argues that the Mullenborn transducer is electrically coupled to a patterned conductive layer on the substrate, and it includes a volume that is created by etching out a portion of the substrate underneath the transducer. (*Id.*) MemsTech asserts that the cover of the Mullenborn package includes an aperture to allow sound to enter the package and interact with the microphone. (*Id.*)

MemsTech says that Mullenborn discloses the same features set forth in claim 1 of the

[13] The parties agreed-upon construction of substrate is "the base material upon which at least one electronic device can be mounted." (JSRCC.) Even under this construction, the package body of Arnold is not a substrate, as there is no evidence that an electronic device can be mounted on the package body.

'089 patent, and refers to Figure 4 of Mullenborn as an illustration:

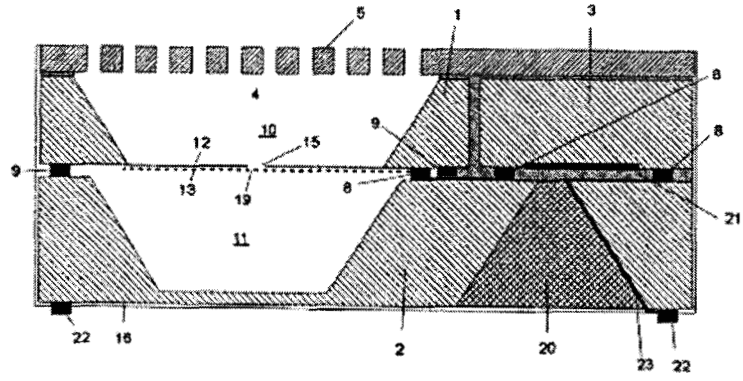


Figure 4

MemsTech avers that, at the evidentiary hearing, Knowles' expert confirmed that each of the limitations of claim 1 of the '089 patent is present in Mullenborn. Gilleo's testimony at the hearing, MemsTech says, was consistent with his deposition, and confirmed the testimony of Mr. Mallon in which he demonstrated that Mullenborn anticipates claim 1 of the '089 patent. (RIB at 52-53.)

More specifically, MemsTech asserts that:

1. Mullenborn discloses a package. The Mullenborn package is surface mountable. (RIB at 53 (citing RX-363; RX-31 at 1:12-14; Tr. at 740:16-18).) Element 1 of Figure 4 of Mullenborn is a transducer. (*Id.* (citing RX-363; RX-31 at 5:7; Tr. at 735:22-24).) The Mullenborn transducer is responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals. (RX-363; RX-31 at 6:8-11; Tr. 735:25-736:24) (RIB 53)

2. Element 2 of Figure 4 of Mullenborn is a substrate (i.e. first member). (RIB at 53 (citing RX-363; RX-31 at 5:3; Tr. at 735:25-736:24).) Element 5 of Figure 4 of Mullenborn is a cover (i.e. second member). (*Id.* (citing RX-363; Tr. at 738:13-22).) Mullenborn refers to the

cover as a "lid" that can be made, e.g. "from metal or polymer." (*Id.* at 54 (citing RX-31 at 5:40-41).) As shown in Figure 4 of Mullenborn, the lid is spaced from the surface of the substrate to define a chamber, in which the transducer resides. (*Id.* (citing RX-363; RX-31 at Fig. 4).)

3. The substrate in Mullenborn has a patterned conductive layer on it to which the transducer is electrically coupled. (*Id.* (citing RX-363; RX-31 at 5:16-20; Tr. at 742:13-16).)

4. Elements 22 of Figure 4 of Mullenborn are solder bumps, which are on the outside surface of the package and are electrically coupled to the patterned conductive layer on the substrate through the feed lines 23 and 24. (Id. (citing RX-363; RX-31 at 5:29-30, 6:15-19; Tr. at 743:10-18).)

5. Element 11 of Figure 4 of Mullenborn is a back volume formed by etching a recess in the substrate. (*Id.* (citing RX-363; RX-31 at 5:45-46; Tr. at 743:19-21).) This back volume is acoustically coupled to the transducer. (*Id.* (citing RX-363; Tr. at 743:22-24).)

6. Element 4 of Figure 4 of Mullenborn is an opening (i.e. aperture) that "functions as a sound inlet." (*Id.* (citing RX-363; RX-31 at 5:59-60).) The package in Mullenborn can be encapsulated by an EMI shield, shown as element 16 of Figure 4, which provides shielding from an interference signal. (*Id.* at 55 (citing RX-363; RX-31 at 5:51-53).) The EMI shield of Mullenborn can be a conductive polymer or a metal layer. (*Id.* (citing RX-31 at 5:53-55).)

MemsTech argues that, at the evidentiary hearing, Dr. Gilleo testified that under his claim construction for the '089 patent, every MEMS microphone package would necessarily have a "chamber," a "volume," and an "aperture," as set forth in claim 1 of the '089 patent. (RIB at 55 (citing Tr. at 172:15-22).)

MemsTech states that during discovery, Knowles admitted in its responses to MemsTech's requests for admissions ("RFAs") that many of the features recited in the '089

patent were disclosed in Mullenborn. (*Id.* (citing RX-131).) MemsTech says that that Knowles admitted (RX-131 at 11) that Mullenborn discloses the claimed "volume being defined by the transducer and one of the first member or the second member," which is the focus of the '089 patent. (RIB at 55 (citing RX-31 at Summary of Invention).) MemsTech alleges that, in its responses to MemsTech's RFAs, Knowles admitted that all of the ***emphasized*** language of claim 1 shown below was disclosed in Mullenborn:

> 1. A surface mountable package for containing a transducer, ***the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals***, the surface mountable package comprising:
>
> at least a first member and a second member and a chamber being defined by the first member and the second member, the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber;
>
> the surface being formed with at least one patterned conductive layer, ***the patterned conductive layer being electrically coupled to the transducer; an outside surface of the surface mountable package comprising a plurality of terminal pads electrically coupled to the patterned conductive layer;***
>
> ***a volume being defined by the transducer and one of the first member or the second member, the volume being acoustically coupled to the transducer***; and
>
> one of the first member or the second member being formed to include an aperture, the aperture configured to permit the passage of an acoustic signal to the transducer.

(RIB at 55-56 (citing RX-131 at 9-11).)

MemsTech asserts that Gilleo argues, "[a]s he did with respect to the '231 patent," that Mullenborn does not anticipate claim 1 of the '089 patent because it does not disclose a "package" under his claim construction. (RIB at 56.) MemsTech posits that Gilleo's arguments fail to rebut MemsTech's showing that Mullenborn anticipates claim 1 of the '089 patent. (*Id.*)

MemsTech says that Gilleo tries to buttress his argument by intimating that there are further significant differences between Mullenborn and claim 1 of the '089 patent by presenting an argument premised on his construction that Mullenborn is not a "package." (*Id.* (citing CX-

411C).) This argument fails, MemsTech argues, because Mullenborn does disclose a package, and does so not only under the construction adopted by Knowles in this investigation, but under any reasonable claim construction. (*Id.*)

Knowles' Position: Knowles argues that claim 1 of the '089 patent, which is the only independent claim in the patent, requires a "surface mountable package," and as was the case when comparing Mullenborn to claims 1 and 2 of the '231 patent, Mullenborn cannot anticipate claim 1 of the '089 patent because Mullenborn fails to disclose a package. (CRB at 40-41.) Knowles avers that Mullenborn was considered by the examiner during the prosecution of the application that became the '089 patent. (*Id.* at 41 (citing CX-2; RX-256 at 250).) Knowles argues that this makes MemsTech's burden to prove invalidity especially difficult since there is "a presumption that the Examiner did his duty and knew what claims he was allowing." (*Id.* (quoting *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1323 (Fed. Cir. 1999)).)

Knowles asserts that it is "uncontroverted" that a person of ordinary skill in the art would know that a "package" for a MEMS device must provide physical protection from the environment. (CRB at 41 (citing CX-392C; CX-411C; Tr. at 348:7-13, 461:18-21, 484:4-13, 706:8-16; CX-418 at 47).)

Knowles avers that Dr. Gilleo noted the fragility of MEMS devices in his testimony, and another reference book identified by Dr. Gilleo also supports this assertion. (*Id.* (citing CX-1 at 1:21-23; CX-392C; CX-411C; CX-426 at 19).) Knowles asserts that it is uncontroverted that the microphone transducer disclosed in Mullenborn is no more or less fragile than any other MEMS microphone transducer. (*Id.* (citing RX-31 at 5:66-6:7; RX-363; CX-411).) Knowles alleges that while the top of the enclosure disclosed in Mullenborn provides some physical protection to its MEMS microphone, it does not provide any physical protection for the sides and bottom of its

MEMS microphone. (*Id.* (citing RX 31, 3:1-7, 4:5-11, 5:35-37, Fig. 4; CX-411).) Therefore, Knowles argues, because the enclosure disclosed in Mullenborn does not provide physical protection for the electronics within, it cannot be a package. (*Id.* (citing CX-411C; CDX 6).)

Knowles argues that the lack of a package in Mullenborn leads to the conclusion that Mullenborn inherently cannot disclose the components of the package. For example, they argue, while Mullenborn has a lid and a substrate "of sorts", these cannot be the "first member" of the package or "second member" of the package because there is no package. (CRB at 42.) Knowles argues that without a first member and a second member, Mullenborn can have no "surface," "volume," "chamber," or "aperture," because each of these is defined in terms of the first member and/or a second member. (*Id.* (citing CX-411C; CDX 12).) Knowles continues that without a "surface," Mullenborn can have no "patterned conductive layer" or "terminal pads electrically coupled to the patterned conductive layer," because these are defined as being located on the surface. (*Id.*)

Knowles says that during the hearing, MemsTech "attempted to turn the non-package device disclosed by Mullenborn '762 into a package by asserting that a thin EMI shield, shown in Fig. 6 of Mullenborn '762, could somehow provide physical protection to the silicon components." Knowles asserts that Dr. Gilleo thoroughly refuted that suggestion (citing RX-31 at 5:53-55; Tr. 746:14-747:24; Tr. 747:16-748:20: 748:22-749:7), and that this position would further erode MemsTech's position on identification of a first and second member within the enclosure of Mullenborn. In particular, Knowles reasons, if this EMI shield was actually a part of the package, that is, either a first member or second member, then there would be no first or second member upon which the microphone is attached, as required by claim 1 of the '089 patent. (CRB at 42-43 (citing CX-411C; CDX-12).)

Commission Investigative Staff's Position: Staff argues that the evidence has shown that Mullenborn fails to teach or disclose the "surface mountable package" of claim 1. (SIB at 64 (citing CX-411).) Staff asserts that claim 1 requires a "first member" and a "second member" that together form a chamber. (*Id.* (citing CX-2).) Staff posits that the first and second members of Mullenborn are the lid 5 and EMI shield and not the lid 5 and the substrate 2. (*Id.*) Thus, Staff asserts, the substrate 2, where the transducer is mounted, is not a part of the package. (*Id.*) Staff argues that Mullenborn does not disclose a "package." Staff also states that Mullenborn does not teach or suggest the "surface," "patterned conductive layer," or "terminal pads electrically coupled to the patterned conductive layer" limitations. (*Id.*)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that Mullenborn anticipates claim 1 of the '089 patent.

Claim 1 of the '089 patent teaches, *inter alia*, as follows:

> A surface mountable package ... comprising:
>
> at least a first member and a second member and a chamber being defined by the first member and the second member, the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber;
>
> the surface being formed with at least one patterned conductive layer, the patterned conductive layer being electrically coupled to the transducer ...

(CX-2 at 11:21-34.)

Figure 4 of Mullenborn, (RX-31 at Fig. 4), which is the focus of MemsTech's argument on this issue, discloses what can arguably be described as a package. It does not, however, meet the other limits of claim 1 quoted above. Figure 4 of Mullenborn contains, among other things, a "lid" (element 5 of Figure 4), a "transducer" (element 1 of Figure 4), a "substrate" (element 2 of

Figure 4), and an "EMI shield" (element 16 of Figure 4). MemsTech argues that the "substrate" of Figure 4 of Mullenborn corresponds to the "first member" contemplated by claim 1 of the '089 patent, and the "lid" (i.e. "cover") of Figure 4 of Mullenborn corresponds to the "second member" taught by claim 1 of the '089 patent.

Claim 1 of the '089 patent requires the existence of a "chamber being defined by the first member and the second member." A chamber is defined as "a room or a natural or artificial enclosed space or cavity." WEBSTER'S NEW COLLEGIATE DICTIONARY, (1979 Ed.), at p. 183. Using the substrate and lid of Mullenborn, as the "first member" and the "second member," respectively, a chamber is not formed, because there are no sides formed by those members enclosing the space within which the transducer may reside. In order to form a chamber, using Mullenborn, a third element must be included, which is represented by the "EMI shield" (element 16 of Figure 4).[14] Therefore, Mullenborn does not meet the limit of claim 1 of the '089 patent that teaches "a chamber being defined by the first member and the second member."

On the other hand, if one were to use the Staff's approach and substitute the "EMI shield" for the "substrate" as the "first member," a chamber might be formed by the lid and the EMI shield; but the transducer would then not be attached to a surface formed on the first member. In that case, the transducer might be considered to be "attached" to a surface formed on the second member (i.e. the "lid" of Mullenborn), because Figure 4 shows glue (element 21 of Figure 4) connecting the lid to the transducer. In that case, the limits of claim 1 of the '089 patent would still not be met, because the surface to which the transducer would be attached on the lid is not formed with at least one patterned conductive layer.

Based on the foregoing, I find that Mullenborn does not anticipate claim 1 of the '089 patent, and claim 1 is not rendered invalid as anticipated by Mullenborn.

[14] MemsTech recognized the need for this third element in its initial brief at pages 54-55.

b. Claim 2

MemsTech asserts that Mullenborn anticipates claim 2 of the '089 patent pursuant to 35 U.S.C. § 102. (RIB at 57.)

MemsTech's Position: MemsTech asserts that claim 2 of the '089 patent depends from claim 1, and further requires that "the first member comprises a substrate and the second member comprises a cover coupled to the substrate to define the chamber." (CX-2.) MemsTech argues that Mullenborn's silicon carrier substrate (element 2 of Figure 4 of Mullenborn) is a substrate, and the lid (element 5 of Figure 4) is a cover. (RIB at 57.) MemsTech says that the silicon carrier substrate and lid are coupled, at least by the EMI-shield (element 16 of Figure 4) or electronic device (element 3 of Figure 4). (*Id.* (citing RX-363).) They say Knowles presented no evidence that claim 2 adds anything to claim 1 of the '089 patent that is not disclosed in Mullenborn. (*Id.*)

Knowles' Position: Knowles argues that MemsTech's assertion that claim 2 of the '089 patent, dependent on claim 1, is anticipated by Mullenborn, fails because Mullenborn does not disclose all of the elements of claim 1. (CRB at 43-44.) Therefore, they argue, it cannot disclose the dependent claims which incorporate the elements of claim 1 of the '089 patent. (*Id.*)

Commission Investigative Staff's Position: Staff argues that for the same reasons as set forth in its argument regarding anticipation of claim 1, Mullenborn fails to teach the limitations disclosed in dependent claim 2. (SIB at 64.)

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be anticipated and invalid, I could still find that claim 2, which depends from claim 1, is valid. Since, however, I have found claim 1 to be ***not*** anticipated, claim 2 is

necessarily not anticipated, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992); *In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *see also In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

In addition to the foregoing, claim 2 recites that "... the first member comprises a substrate and the second member comprises a cover coupled to the substrate to define the chamber." MemsTech says that Mullenborn's silicon carrier substrate (element 2 of Figure 4 of Mullenborn) represents the substrate and its lid (element 5 of Figure 4) represents the cover. MemsTech then argues that the two are "coupled at least" by the EMI shield (element 16 of Figure 4). I do not concur. The term "coupled" in this context means "fastened together." WEBSTER'S NEW COLLEGIATE DICTIONARY, (1979 Ed.), at p. 258. The substrate and lid of Mullenborn are not in any way "coupled" or "fastened" when viewed in Figure 4 of Mullenborn. They are at opposite ends of the structure and do not form a chamber as required by claims 1 and 2 of the '089 patent. (RX-31 at Fig. 4.)

The EMI-shield is described in Mullenborn as "a conductive polymer layer, such as silver epoxy or a metal layer, such as electroplated or evaporated Cu or Au." The EMI-shield is described as encapsulating the system. (RX-31 at 5:51-55, Fig. 4.) The EMI-shield does not serve as a structure that in any way "couples" the substrate and the lid of Mullenborn.

Based on the foregoing, I find that Mullenborn does not anticipate claim 2 of the '089 patent, and claim 2 is not rendered invalid as anticipated by Mullenborn.

c. Claim 9

MemsTech asserts that Mullenborn anticipates claim 9 of the '089 patent pursuant to 35

U.S.C. § 102. (RIB at 58.)

MemsTech's Position: MemsTech asserts that claim 9 of the '089 patent depends from claim 1, and further requires that "the aperture being formed in the respective one of the first member and the second member, the surface being formed on the respective other one of the first member and the second member and the aperture is acoustically coupled by the chamber to the transducer." (CX-2.) MemsTech alleges that, in Mullenborn, the aperture (element 4 of Figure 4 of Mullenborn) is formed in the lid (element 5 of Figure 4), which is one of the two package members. (RIB at 58.) They state the transducer (element 1 of Figure 4) is mounted on the silicon carrier substrate (element 2 of Figure 4). (*Id.*) This is, MemsTech alleges, the "other package member." (*Id.*) MemsTech asserts that sound enters the opening and passes through the front chamber (element 10, the part of the chamber defined by the substrate and lid) to the transducer diaphragm. (*Id.*) MemsTech argues that Knowles presented no evidence that claim 9 adds anything to claim 1 of the '089 patent that is not disclosed in Mullenborn. (*Id.* (citing RX-363).)

Knowles' Position: Knowles argues that MemsTech's assertion that claim 9 of the '089 patent, dependent on claim 1, is anticipated by Mullenborn fails because Mullenborn fails to disclose all of the elements of claim 1. (CRB at 43-44.) Therefore, they argue, it cannot disclose the dependent claims which incorporate the elements of claim 1. (*Id.*)

Knowles argues, too, that dependent claim 9 requires "the aperture being formed in the respective one of the first member and the second member, the surface being formed on the respective other one of the first member and the second member and the aperture is acoustically coupled by the chamber to the transducer." Knowles asserts that this claim requires an aperture, a first member, a second member, a surface, and a chamber, all of which are lacking from claim

1. (CRB at 44 (citing CX-411C; CDX 12).) Thus, they say, whatever Mullenborn may disclose regarding claim 9 is irrelevant. (*Id.*)

Commission Investigative Staff's Position: Staff argues that for the same reasons as set forth in its argument regarding anticipation of claim 1, Mullenborn fails to teach the limitations disclosed in dependent claim 9. (SIB at 64.)

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be anticipated and invalid, I could still find that claim 2, which depends from claim 1, is valid. Since, however, I have found claim 1 to be ***not*** anticipated, claim 2 is necessarily not anticipated, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992); *In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *see also In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Based on the foregoing, I find that Mullenborn does not anticipate claim 9 of the '089 patent, and claim 9 is not rendered invalid as anticipated by Mullenborn.

d. <u>Claim 15</u>

MemsTech asserts that Mullenborn anticipates claim 15 of the '089 patent pursuant to 35 U.S.C. § 102. (RIB at 58.)

MemsTech's Position: MemsTech asserts that claim 15 of the '089 patent depends from claim 1, and further requires that "the patterned conductive layer comprising a plurality of terminal pads, the terminal pads providing an electrical connection between the transducer within the volume and an exterior of the surface mountable package." (CX-2.) MemsTech alleges that

in Mullenborn, the silicon carrier substrate (element 2 of Figure 4 of Mullenborn) has solder bumps (elements 8, 22 of Figure 4) on a first surface and a second surface, respectively. RIB at 58-59.) The solder bumps (element 8 of Figure 4) meet the terminal pads. (*Id.* (citing RX-363; RX-31 at 5:2-5).) MemsTech argues "The electrical signal is carried from the first surface to the second surface via feedthrough lines 23." (*Id.* (citing RX-363; RX-31 at 5:5-6).) They aver that the feed through lines (element 23 of Figure 4) connect to the solder bumps (element 8 of Figure 4). (*Id.*) MemsTech says the path (element 23 of Figure 4) carries the electrical signal from the transducer (element 1 of Figure 4) or the electronic circuit (figure element 3 of Figure 4) to the base of the carrier. (*Id.* (citing RX-363; RX-31 at 5:25-28).) MemsTech argues that Knowles presented no evidence that claim 15 adds anything to claim 1 of the '089 patent that is not disclosed in Mullenborn. (*Id.*)

Knowles' Position: Knowles argues that MemsTech's assertion that claim 15 of the '089 patent, dependent on claim 1, is anticipated by Mullenborn, fails because Mullenborn fails to disclose all of the elements of claim 1. (CRB at 43-44.) Therefore, they argue, it cannot disclose the dependent claims which incorporate the elements of claim 1. (*Id.*)

Commission Investigative Staff's Position: Staff argues that for the same reasons as set forth in its argument regarding anticipation of claim 1, Mullenborn fails to teach the limitations disclosed in dependent claim 15. (SIB at 64.)

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be anticipated and invalid, I could still find that claim 2, which depends from claim 1, is valid. Since, however, I have found claim 1 to be ***not*** anticipated, claim 2 is necessarily not anticipated, because it depends from claim 1 and necessarily contains all of the

elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992); *In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *see also In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Based on the foregoing, I find that Mullenborn does not anticipate claim 15 of the '089 patent, and claim 15 is not rendered invalid as anticipated by Mullenborn.

e. Claim 17

MemsTech asserts that Mullenborn anticipates claim 17 of the '089 patent pursuant to 35 U.S.C. § 102. (RIB at 59.)

MemsTech's Position: MemsTech asserts that claim 17 of the '089 patent depends from claim 1, and further requires "one or both of the first member and the second member including a shield against electromagnetic interference." (CX-2.) MemsTech alleges that Mullenborn states that its lid (element 5 of Figure 4 of Mullenborn) can be metal. (RIB at 59.) Metal lids, they say, provide shielding from electromagnetic interference. (*Id.* (citing RX-363; RX-31 at 5:41-42).) MemsTech argues that Mullenborn further states that the system is encapsulated with a filter (element 5 of Figure 4) for providing EMI-shielding. (*Id.* (citing RX-363; RX-31 at 5:51-54).) MemsTech argues that Knowles presented no evidence that claim 17 adds anything to claim 1 of the '089 patent that is not disclosed in Mullenborn. (*Id.*)

Knowles' Position: Knowles argues that MemsTech's assertion that claim 17 of the '089 patent, dependent on claim 1, is anticipated by Mullenborn, fails because Mullenborn fails to disclose all of the elements of claim 1. (CRB at 43-44.) Therefore, they argue, it cannot disclose the dependent claims which incorporate the elements of claim 1. (*Id.*)

Commission Investigative Staff's Position: Staff argues that for the same reasons as set

forth in its argument regarding anticipation of claim 1, Mullenborn fails to teach the limitations disclosed in dependent claim 17. (SIB at 64.)

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be anticipated and invalid, I could still find that claim 2, which depends from claim 1, is valid. Since, however, I have found claim 1 to be ***not*** anticipated, claim 2 is necessarily not anticipated, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992); *In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *see also In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Based on the foregoing, I find that Mullenborn does not anticipate claim 17 of the '089 patent, and claim 17 is not rendered invalid as anticipated by Mullenborn.

f. Claim 28

MemsTech asserts that Mullenborn anticipates claim 28 of the '089 patent pursuant to 35 U.S.C. § 102. (RIB at 59.)

MemsTech's Position: MemsTech takes the position that claim 28 of the '089 patent depends from claim 1, and further requires that "the volume [defined by the transducer and one of the first member or the second member] includes a portion of the chamber [defined by the first member and the second member]." (CX-2.) MemsTech asserts that in Mullenborn, the back volume (element 11 of Figure 4 of Mullenborn) extends up into the chamber formed by the substrate (element 2 of Figure 4) and the lid (element 5 of Figure 4). (RIB at 59-60 (citing RX-363; RX-31 at Fig. 4).) MemsTech argues that Knowles presented no evidence that claim 28

adds anything to claim 1 of the '089 patent that is not disclosed in Mullenborn. (*Id.*)

Knowles' Position: Knowles argues that MemsTech's assertion that claim 28 of the '089 patent, dependent on claim 1, is anticipated by Mullenborn, fails because Mullenborn fails to disclose all of the elements of claim 1. (CRB at 43-44.) Therefore, they argue, it cannot disclose the dependent claims which incorporate the elements of claim 1. (*Id.*)

Commission Investigative Staff's Position: Staff argues that for the same reasons as set forth in its argument regarding anticipation of claim 1, Mullenborn fails to teach the limitations disclosed in dependent claim 28. (SIB at 64.)

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be anticipated and invalid, I could still find that claim 2, which depends from claim 1, is valid. Since, however, I have found claim 1 to be ***not*** anticipated, claim 2 is necessarily not anticipated, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992); *In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *see also In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Based on the foregoing, I find that Mullenborn does not anticipate claim 28 of the '089 patent, and claim 28 is not rendered invalid as anticipated by Mullenborn.

g. <u>Claim 29</u>

MemsTech asserts that Mullenborn anticipates claim 29 of the '089 patent pursuant to 35 U.S.C. § 102. (RIB at 60.)

MemsTech's Position: MemsTech asserts that claim 29 of the '089 patent depends from

claim 1, and further requires that "the acoustic signal is coupled to the transducer via the chamber." (CX-2.) MemsTech alleges that in Mullenborn, sound enters the openings (element 4 of Figure 4 of Mullenborn) in the lid (element 5 of Figure 4), travels through the chamber (element 10 of Figure 4) defined by the substrate (element 2 of Figure 4) and lid (element 5 of Figure 4), and reaches the transducer (element 1 of Figure 4). (RIB at 60 (citing RX-363; RX-31 at Fig. 4, 5:59-63).) MemsTech argues that Knowles presented no evidence that claim 29 adds anything to claim 1 of the '089 patent that is not disclosed in Mullenborn. (*Id.*)

Knowles' Position: Knowles argues that MemsTech's assertion that claim 29 of the '089 patent, dependent on claim 1, is anticipated by Mullenborn, fails because Mullenborn fails to disclose all of the elements of claim 1. (CRB at 43-44.) Therefore, they argue, it cannot disclose the dependent claims which incorporate the elements of claim 1. (*Id.*)

Commission Investigative Staff's Position: Staff argues that for the same reasons as set forth in its argument regarding anticipation of claim 1, Mullenborn fails to teach the limitations disclosed in dependent claim 29. (SIB at 64.)

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be anticipated and invalid, I could still find that claim 2, which depends from claim 1, is valid. Since, however, I have found claim 1 to be ***not*** anticipated, claim 2 is necessarily not anticipated, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992); *In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *see also In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Based on the foregoing, I find that Mullenborn does not anticipate claim 29 of the '089 patent, and claim 29 is not rendered invalid as anticipated by Mullenborn.

C. Obviousness

1. Applicable Law

Section 103 of the Patent Act states:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35 U.S.C. § 103(a) (2008).

"Obviousness is a question of law based on underlying questions of fact." *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1379 (Fed. Cir. 2008). The underlying factual determinations include: "(1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art, and (4) objective indicia of non-obviousness." *Id.* (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). These factual determinations are often referred to as the "*Graham* factors."

"When no prior art other than that which was considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co.*, 725 F.2d at 1359. Therefore, the challenger's "burden is especially difficult when the prior art was before the PTO examiner during prosecution of the application." *Hewlett-Packard Co.*, 909 F.2d at 1467.

The critical inquiry in determining the differences between the claimed invention and the

prior art is whether there is a reason to combine the prior art references. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 127 S.Ct. 1727, 1740-41 (2007). In *KSR*, the Supreme Court rejected the Federal Circuit's rigid application of the teaching-suggestion-motivation test. The Court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.* at 1741. The Court described a more flexible analysis:

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue...As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

KSR, 127 S.Ct. at 1740-41.

Since *KSR* was decided, the Federal Circuit has announced that, where a patent challenger contends that a patent is invalid for obviousness based on a combination of prior art references, "the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, . . . and would have had a reasonable expectation of success in doing so." *PharmaStem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007).

The analogous art test requires the judge to determine that "a reference is either in the field of the applicant's endeavor or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference for a basis for [invalidity due to obviousness.]" *In re Kahn*, 441 F.3d 977, 986-87 (Fed. Cir. 2006); *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379-1380 (Fed. Cir. 2007); *Bausch & Lomb, Inc. v. Barnes-*

Hind/Hydrocurve, Inc., 796 F.2d 443, 447 (Fed. Cir. 1986).

2. Level of Ordinary Skill in the Art

MemsTech's Position: MemsTech takes the position that the private parties have proposed definitions regarding the level of ordinary skill in the art that do not differ in any meaningful way.

MemsTech states that its definition of a person having ordinary skill in the art is one who has at least a bachelor's degree in engineering or science (e.g. electrical, mechanical or chemical engineering, physics or chemistry, or equivalent experience) plus three to five years experience in MEMS, semiconductor packaging, semiconductor devices or processing, micromachining, or sensors such as pressure sensors, microphones, MEMS accelerometers, etc. (RX-363 at Q. 71.)

MemsTech says that Dr. Gilleo testified that a person of ordinary skill in the art would have a degree in engineering or one of the physical sciences and a minimum of one to two years of full-time experience in device packaging. (CX-392C at Q. 21.)

Knowles' Position: Knowles asserts that a person having ordinary skill in the art (a "PHOSITA") needs a general knowledge of electronic packaging that would include some understanding of package designs, constructions, functions, attributes, and processes used to produce them and to incorporate the devices into the package. (CRB at 15.) The PHOSITA would typically need a degree in engineering or one of the physical sciences and a minimum of one to two years experience in packaging of devices. (*Id.*)

Knowles adds that a two-year degree, such as a technical associate's degree, and one to two years of full-time experience in device packaging could suffice, however, mere experience in the assembly of completed packages already containing electronic devices to PCBs would not necessarily qualify one to be a PHOSITA. (*Id.*) In addition to the basic requirements, because

the patents deal with a specialized field of packaging, MEMS microphones, a PHOSITA would have some understanding of the requirements for packaging MEMS devices, and specific knowledge of the special requirements for MEMS microphone packaging. (*Id.* (citing CX-392C at Qs. 21-22).)

Commission Investigative Staff's Position: Staff says the parties generally agree as to the level of skill in the art. (SIB at 38.) Staff asserts that MemsTech's expert has opined that one of ordinary skill in the art "would have had at least a bachelor's degree in engineering or science, for example, electrical, mechanical, or chemical engineering, physics or chemistry, or equivalent experience, plus three to five years of experience and/or educational training in one or more of the following fields: microelectromechanical systems (MEMS), semiconductor packaging, semiconductor devices or processing, micromachining, or sensors such as pressure sensors, microphones, MEMS accelerometers, gyroscopes, strain gauges, load cells or the like." (*Id.* at 38-39 (citing Mallon Initial Expert Report at 14).)

Staff states that Dr. Gilleo contends that one of ordinary skill in the art to which the patents-in-suit pertain would have "a general knowledge of electronic packaging including some understanding of package designs, constructions, functions, attributes and processes used to produce them and to incorporate devices into a package. [This person] would typically have a degree in engineering, or one of the physical sciences, and a minimum of 1-2 years experience in packaging of devices." (*Id.* at 39 (citing Gilleo Expert Report on Validity at 4).) Thus, says Staff, both experts agree that one of ordinary skill in the art must have (1) educational experience in engineering or science and (2) some practical experience in packaging. (*Id.*)

Discussion and Conclusion: I find that a person of ordinary skill in the art related to both the '231 patent and '089 patent would have: (1) a degree in engineering or one of the

physical sciences; (2) a minimum of one to two years of full-time experience in device packaging; and (3) general knowledge of electronic packaging that would include some understanding of package designs, constructions, functions, attributes, and processes used to produce them and to incorporate the devices into the package.

Section 103 of the Patent Act states that the relevant time period for determining the level of ordinary skill in the art is "the time the invention was made." Because neither party has alleged an earlier invention date for either patent, the earliest patent application priority dates serve as the relevant dates of invention.[15]

The application that lead to the '231 patent was filed on September 10, 2002. It does not claim priority to any earlier-filed application.

The '089 patent is a division of U.S. Application Ser. No. 09/886,854, filed June 21, 2001, now U.S. Pat. No. 7,166,910 (the '910 patent), which claims the benefit of Provisional Patent Application Ser. No. 60/253,543 filed November 28, 2000. Hence, the relevant date for defining a person of ordinary skill in the art is November 28, 2000. *Transco Prods., Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 555-556 (Fed. Cir. 1994); 35 U.S.C. §§ 119(e), 120; 37 CFR §§ 1.78(a)(4)-(a)(6), 1.78(a)(1)-(a)(3); MPEP §§ 201.06, 201.11.

The definition adopted herein is based in part on the testimony of Knowles' expert Dr. Gilleo. (CX-392C at Qs. 21-22.) In addition, the record reflects that, at the relevant time periods for the '231 and '089 patents, the inventor, Mr. Minervini, had at least one year of experience in device packaging and general knowledge of electronic packaging as required by the adopted definition. (Tr. at 135:1-16, 138:11-140:3.)

The testimony of MemsTech's expert Mr. Mallon indicates his opinion that a person of

[15] While there was testimony that Mr. Minervini developed the concept for a microphone package in September 2000, there was no allegation that the relevant lab notebooks offered into evidence disclosed all of the elements found in the claimed inventions. (*See* Tr. at 136:12-140:3.)

ordinary skill in the art would have three to five years of experience in one or more of the following fields: MEMS, semiconductor packaging, semiconductor devices or processing, micromachining, or sensors such as pressure sensors, microphones, MEMS accelerometers, gyroscopes, strain gauges, load cells or the like. (RX-363 at Q. 71.) I am not convinced that such a high or specialized level of skill was required for a person of ordinary skill in the art in the year 2000 or the year 2002. There is, for example, no evidence that the inventor had such experience in either 2000 or 2002. To require a higher level of experience, or more specialized experience, than the inventor would disqualify him as a person of ordinary skill in the art.

3. '231 Patent

MemsTech argues that Mullenborn, either taken alone or in combination with Baumhauer, renders claim 1 obvious. MemsTech argues that Arnold, either taken alone or in combination with Baumhauer, renders claims 1 and 2 obvious. MemsTech argues that claims 1 and 2 are rendered obvious in view of U.S. Patent No. 5,459,368 to Onishi et al. ("Onishi"). (RIB at 65.) MemsTech argues that claims 1 and 2 are rendered obvious in view of an article by Kress et al. entitled "Integrated Silicon Pressure Sensor for Automotive Applications with Electronic Trimming," SAE Document 950533 (1995) ("Kress").

MemsTech's Position: MemsTech has offered a claim construction that requires the cover of the package to include at least two layers. MemsTech states that "[u]nder such a construction, the devices such as those described in Mullenborn and Arnold may not be found to anticipate claims 1 and 2 of the '231 patent since they include a monolithic cover, as is used in MemsTech's products. If the ALJ construes the claims as urged by MemsTech, claims 1 and 2 of the '231 patent would still be invalid as obvious in view of the prior art." (RIB at 64.)

MemsTech argues that it would have been "simple, routine engineering" to replace the

covers in Arnold or Mullenborn with a cover laminated from two materials. (*Id.* (citing RX-363; Tr. at 756:11-17).) MemsTech points to Baumhauer, which allegedly describes "a cover laminated from conductive and non-conductive layers." (*Id.* at 65 (citing RX-21 at 9:56-59).) Thus, MemsTech states that it would have been obvious to one of ordinary skill in the art in 2000 to adapt the single-layer covers of Mullenborn and Arnold to create multi-layer structures. (*Id.* (citing (RX-363).)

MemsTech claims that Onishi discloses each of the limitations of claims 1 and 2 of the '231 patent except the aperture in the housing:

> Onishi discloses a package. As shown in figure 1 of Onishi, the package provides head room for the transducer to operate. Figure element 8 of figure 1 of Onishi is a multilayer substrate. Figure element 13 of figure 1 of Onishi is a metallic lid. Figure element 1 of figure 1 of Onishi is a transducer. The lid of the Onishi package is electrically connected to a layer on the substrate to provide EMI shielding. The transducer inside the package is surface mounted to a patterned conductive layer on the substrate.

(*Id.* at 66 (citing Tr. at 749:15-750:3, 750:10-17; RX-26 at Fig. 1; RX-363; RX-26 at 4:38, 4:45-47, 4:51-54;).)

MemsTech claims that the use of an aperture in MEMS packaging for allowing sound to enter the package was well known prior to the filing of the '231 patent. (*Id.* (citing RX-363).) MemsTech states that while Onishi discloses a SAW device, those skilled in the art would know to use the package of Onishi with a MEMS microphone. (*Id.* (citing RX-363; Tr. at 752:9-11, 753:1-10, 753:14-16).)

MemsTech states that "Kress describes packaging a MEMS pressure transducer either in a TO-8 package, similar to that used in Arnold, or in a surface mountable package, depending on the application." (RIB at 67 (citing RX-45).) MemsTech focuses on Figures 6 and 9 from Kress, stating that the figures and accompanying descriptions disclose the same features as found in

claims 1 and 2 of the '231 patent. (*Id.*) Specifically, MemsTech states that Kress discloses the following:

> Kress discloses a package. The Kress packages provide head room to allow the transducer to operate. The Kress packages include an aperture to allow the pressure signal to reach the transducer. The Kress packages enclose both the sensor and the electronics. The sensor is soldered onto the substrate.

(*Id.* at 68 (citing RX-363; RX-45; Tr. at 754:6-17, 754:23-25).)

MemsTech argues that Kress demonstrates that it was well known as of 1995 that one could change the sensor inside of the package to fit the necessary application. (*Id.* (citing Tr. at 755:24-756:8; RX-45 at MEMS155376).) MemsTech also argues that Kress demonstrates that it was well known in 1995 that one could change the design and properties of the packaging to fit a specific application. (*Id.* (citing RX-45).) MemsTech therefore argues that it would have been obvious to one of ordinary skill in the art to adapt the package disclosed in Kress for use as a microphone package as disclosed in claims 1 and 2. (*Id.* at 68-69.)

In its reply brief, MemsTech claims that Staff applies an unnecessarily rigorous test when analyzing the obviousness references. (RRB at 36.) MemsTech argues that Staff's analysis was performed based on case law that has been altered by the Supreme Court's *KSR* decision. (*Id.* at 36-37.) MemsTech claims that all of the elements of claims 1 and 2 of the '231 patent were known in the art, and that common sense dictates that it would have been obvious for one of ordinary skill in the art to arrive at the claimed combinations. (*Id.* at 37-38.) MemsTech highlights the Federal Circuit's decision in *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157 (Fed. Cir. 2007) as a case where the court applied the teachings of *KSR* in a similar factual context. MemsTech states that "[i]n this investigation, as with the patentee in *Leapfrog*, Complainant presents no evidence that the inclusion of the claimed features was uniquely challenging or difficult for one of ordinary skill in the MEMS packaging art, nor does

Complainant present any evidence that the inclusion of the claimed features represents an unobvious step over the prior art." (RRB at 38.)

Knowles' Position: Knowles first attempts to rebut the assertion by MemsTech that the invention in the '231 patent is a matter of "routine engineering." Knowles cites to numerous exhibits where people in the field of packaging, including both of MemsTech's experts, expressed the difficulty that goes along with creating MEMS packaging. (CRB at 46 (citing CX-147 at 1, 8; CX-424C at 80:11-16; CX-411C; CX-397 at 38; CX-411C; CX-428 at KE0467624; CX-427 at 1077-78; CX-425 at 1; CX-396 at xii; CX-426).)

Knowles addresses the assertion made by MemsTech that, because it only took Mr. Minervini six days to invent the subject matter found in the '231 patent, the claims are obvious. (CRB at 47-48.) Knowles states that the manner in which the invention made has no effect on the patentability. (*Id.* (citing 35 U.S.C. § 103(a)).) Knowles further states that the testimony shows that Mr. Minervini succeeded where others, including Dr. Loeppert, failed. (*Id.* at 48 (citing Tr. at 143:1-7; CX-389C).)

Knowles avers that every MEMS application has features that are unique to the specific application. (*Id.* (citing CX-411C; Tr. at 332:4-12, 334:15-335:5, 428:10-16, 713:13-714:1; CX-392C).) Knowles also argues that, contrary to MemsTech's assertion, "a person of ordinary skill in the art of MEMS microphone packaging would have no reason to look at non-MEMS microphone packages in order to solve a problem with MEMS microphone packaging." (*Id.* (citing CX-411C).)

Knowles argues that claims 1 and 2 are not rendered obvious by Mullenborn or Arnold, whether taken alone or in combination with Baumhauer. (CRB at 49.) Knowles argues that a multi-layer cover is not required in claims 1 and 2. (*Id.* (CX-1 at 2:13-24, Fig. 1; RX-368C; Tr.

at 353:20-354:10, 528:11-531:21).) Knowles states that adding a multi-layer cover to either of Mullenborn or Arnold still does not resolve the deficiencies in these references that Knowles highlighted with regard to anticipation. (*Id.* (citing CX-411C; CDX-6; CX-1 at 1:27-33; CX-411C; Tr. at 464:15-465:13, 507:5-14).)

Knowles argues that claims 1 and 2 are not rendered obvious by Onishi. Knowles avers that MemsTech never asserted this position during the course of the investigation, and as such, any attempt to introduce this defense now, after the hearing, is in violation of the Ground Rules of this investigation. (CRB at 50.) Knowles states that MemsTech only made a "passing reference" to Onishi in its pre-hearing statement in the context of obviousness for the '231 patent. (*Id.*) Knowles argues that nothing in MemsTech's pre-hearing statement could be construed as setting forth "with particularity a party's contentions on each of the proposed issues, including citations to legal authorities in support thereof." (*Id.* (citing Order 2, Ground Rule 4(d)).)

Knowles asserts that none of the evidence cited by MemsTech was uncovered for the first time at hearing, and that MemsTech cannot claim that it could not have become aware of this position at the time of the filing of its prehearing statement. (CRB at 50 (citing Order 2, Ground Rule 4(d)).) Knowles further states that Staff, in their pre-hearing statement, argued that Onishi did not render claim 1 obvious. (*Id.*)

Knowles avers that during the hearing, Staff attempted to elicit testimony from MemsTech's expert Mr. Mallon regarding an obviousness defense using Onishi as a prior art reference against claims 1 and 2 of the '231 patent. (CRB at 50 (citing Tr. at 564:6-9).) Knowles states that Knowles objected to this untimely line of questioning, and after a short recess, counsel for Staff agreed that MemsTech had not raised an obviousness defense using

Onishi or Kress as a prior art reference. (*Id.* at 50-51 (citing Tr. at 567:6-11).) Knowles states that I then struck the entire line of questioning. (*Id.* at 51 (citing Tr. at 567:12-25).)

Knowles says that MemsTech now asserts that Onishi renders all asserted claims of the '231 patent obvious, which violates the Ground Rules of this investigation and is contrary to the "unambiguous ruling of this Court during the hearing." (CRB at 51.) Knowles argues that I should disregard any attempt by MemsTech to assert an obviousness defense using Onishi as a prior art reference. (*Id.*)

As to the substantive issues, Knowles argues that Onishi discloses a surface acoustic wave ("SAW") device, and there is no evidence that this is a microelectromechanical system device. (*Id.* at 51 (citing RX-26).) Knowles claims that one of ordinary skill in the art would not look to Onishi because Onishi does not disclose a package for a MEMS device. (*Id.*) Knowles further asserts that Onishi teaches away from creating an aperture in the housing as required by the '231 patent because a SAW device seeks to avoid external sound waves. (*Id.* at 51-52 (citing CX-411C; RX-26 at Abstract, 3:5-8; 3:54-57, 7:51-57, 8:36-39, 10:10-13).) Knowles points to the testimony of Dr. Gilleo, who stated that putting a MEMS microphone in the package disclosed in Onishi would cause "serious problems." (*Id.* at 52 (citing Tr. at 752:20-25).)

Knowles argues that claims 1 and 2 are not rendered obvious by Kress. Knowles avers that MemsTech never asserted this position during the course of the investigation, and as such, any attempt to introduce this defense now, after the hearing, is in violation of the Ground Rules of this investigation. (CRB at 53.) Knowles states that in its pre-hearing statement, MemsTech only stated that it "would have been obvious for a person packaging a microhone to look to prior pressure transducer packages" and did not actually reference Kress. (*Id.* at 52.) Knowles argues that nothing in MemsTech's pre-hearing statement could be construed as setting forth "with

particularity a party's contentions on each of the proposed issues, including citations to legal authorities in support thereof." (*Id.* at 52-53 (citing Order 2, Ground Rule 4(d)).)

Knowles asserts that none of the evidence cited by MemsTech was uncovered for the first time at hearing, and that MemsTech cannot claim that it could not have become aware of this position at the time of the filing of its prehearing statement. (*Id.* at 53 (citing Order 2, Ground Rule 4(d)).)

Knowles avers that during the hearing, Staff attempted to elicit testimony from MemsTech's expert Mr. Mallon regarding an obviousness defense using Kress as a prior art reference against claims 1 and 2 of the '231 patent. (CRB at 53 (citing Tr. at 564:6-9).) Knowles states that Knowles objected to this untimely line of questioning, and after a short recess, counsel for Staff agreed that MemsTech had not raised an obviousness defense using Onishi or Kress as a prior art reference. (*Id.* at 53 (citing Tr. at 567:6-11).) Knowles states that I then struck the entire line of questioning. (*Id.* (citing Tr. at 567:12-25).)

Knowles says that MemsTech now asserts that Kress renders all asserted claims of the '231 patent obvious, which violates the Ground Rules of this investigation and is contrary to the "unambiguous ruling of this Court during the hearing." (CRB at 53.) Knowles argues that I should disregard any attempt by MemsTech to assert an obviousness defense using Onishi as a prior art reference. (*Id.*)

Knowles argues that Kress discloses a package for an automotive field pressure sensor, and not a MEMS microphone package. (*Id.* at 53-54 (citing RX-45 at MEMS155372; CX-411C).) Knowles claims that only the TO-style package in Kress discloses a conductive cover and soldering the sensor to the substrate. (*Id.* at 54 (citing CX-1 at 1:27-33; CX-411C; Tr. at 464:15-465:13, 507:5-14).) Knowles claims that the '231 patent expressly seeks to avoid TO-

style packages. (*Id.*) Knowles asserts that while Kress generally discusses modifying the package and sensor to fit the application, there is no detailed discussion of how to modify a package to accommodate a MEMS microphone. (*Id.* (citing RX-45 at MEMS155376; CX-9 at 29).)

Commission Investigative Staff's Position: Staff argues that claims 1 or 2 are not obvious in view of Mullenborn or Arnold, whether alone or in combination with Baumhauer. (SIB at 43.) Staff states that "[t]he evidence has not shown how or why one skilled in the art would have modified these references to include these missing limitations." (*Id.* (citing CX-411).)

Staff argues that Onishi renders claims 1 and 2 obvious.[16] Staff asserts that Onishi includes all of the limitations from claims 1 and 2 with the exception of a microphone and an aperture:

> In particular, Onishi discloses a package. Gilleo Tr. 749:15-17. Figure 1 of Onishi discloses a substrate having multiple layers. Gilleo Tr. 749:17-19. Onishi also discloses a metallic lid that is electrically connected to the substrate. Gilleo Tr. 749:21-23; 750:10-13. The Onishi package also provides both physical and EMI protection for the transducer. Gilleo Tr. 753:1-10. The transducer inside the package is also electrically coupled to a patterned conductive layer on the substrate. Gilleo Tr. 750:14-17. Thus, Onishi fails to teach only a microphone or silicon microphone and an aperture.

(SIB at 44.)

Staff asserts that the evidence shows that it would have been obvious to one of ordinary skill in the art to incorporate the missing claim elements into Onishi. Staff claims that one of ordinary skill in the art would look to various types of MEMS packaging for packaging MEMS devices. (*Id.* (citing RX-363; RX-45; RX-46).) Staff claims that use of acoustic ports was well known at the time of the '231 patent invention. (*Id.* (citing RX-363; RX-33; RX-45).)

[16] Staff notes that in its pre-hearing brief, it took the position that Onishi did not render claims 1 and 2 obvious. (SIB at 43-44.) Staff states that testimony at the hearing caused it to change its position. (*Id.*)

Therefore, according to Staff, it would have been obvious to one of ordinary skill in the art to incorporate a MEMS microphone and an aperture in the package disclosed in Onishi to create the packages claimed in claims 1 and 2. (*Id.*)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claims 1 or 2 are obvious in view of the asserted prior art.

I find that MemsTech has not put forward clear and convincing evidence that claim 1 is obvious in view of Mullenborn taken alone, or Mullenborn in combination with Baumhauer. MemsTech argues that if I adopt a construction of "layer" requiring multiple layers, Mullenborn discloses all of the elements of claim 1 except for a multilayer cover. MemsTech states that it would have been obvious to add a multilayer cover to Mullenborn, and MemsTech points to Baumhauer as disclosing a multilayer cover.

I did not construe claim 1 to require a multilayer cover. Furthermore, I have found, *supra,* that Mullenborn does not anticipate claim 1 because it fails to disclose the "housing formed by connecting the peripheral edge portion of the cover to the substrate" element. MemsTech offers no argument or evidence to explain how this element is met by Mullenborn in combination with Baumhauer, or how it would have been obvious to modify Mullenborn to meet this limitation. Thus, I find that MemsTech has not met its burden to demonstrate that claim1 is obvious in view of Mullenborn, alone or in combination with Baumhauer.

MemsTech argues that Arnold, taken alone or in combination with Baumhauer, renders claims 1 and 2 obvious. MemsTech makes the same argument here as made with respect to Mullenborn: it would have been obvious to add a multilayer cover to Arnold.

I found, *supra,* that MemsTech failed to demonstrate that Arnold discloses the "housing

formed by connecting the peripheral edge portion of the cover to the substrate" element of claim 1 and the "cover electrically connected to the first layer of a conductive material" element of claim 2. MemsTech offers no argument or evidence to explain how these elements are met by Arnold in combination with Baumhauer, or how it would have been obvious to modify Arnold to meet these limitations. Thus, I find that MemsTech has not met its burden to demonstrate by clear and convincing evidence that claims 1 or 2 are obvious in view of Arnold, alone or in combination with Baumhauer.

MemsTech argues that claims 1 and 2 are rendered obvious by Onishi. First, I find that MemsTech's arguments regarding Onishi have not been waived, as Knowles argues. Onishi was listed by MemsTech in its Initial Notice of Prior Art filed on May 28, 2008. In its pre-hearing statement, MemsTech identified Onishi as a reference that renders the asserted '231 patent claims obvious. (*See* MemsTech's Pre-Hearing Statement at 92-93, 95.) MemsTech's pre-hearing statement stated that Onishi was similar to MemsTech's devices, but lacked an aperture. While MemsTech's discussion of Onishi is brief, it was enough to put Knowles on notice that Onishi could be asserted as an obviousness reference in this investigation. Thus, I find that MemsTech did not waive its obviousness argument regarding Onishi.

To the extent that MemsTech's argument on this point is limited to the issue set forth above, it does not violate Ground Rule 4(d) promulgated by Order 2 in this case. Knowles is correct that better practice would have been for MemsTech to provide claim charts lining up the elements of the asserted claims against Onishi and/or to include a narrative describing which elements of the asserted claims compared to which features of Onishi.

Knowles' reference to the testimony of Mr. Mallon when questioned by Staff incorrectly characterizes events in light of the context at trial. Staff attempted on cross-examination to elicit

testimony from Mr. Mallon regarding an obviousness defense using Onishi and Kress in combination as prior art references against claims 1 and 2 of the '231 patent. (Tr. at 564:6-565:6.) Knowles objected to this line of questioning, asserting that the opinions sought in the questioning involved multiple prior art references that had not been presented in the expert report or direct testimony. After a short recess, counsel for Staff stated that she could not find those combined references in Mr. Mallon's direct testimony or his expert reports. Inasmuch as the line of questioning was beyond the scope of the direct, I sustained the objection and the testimony was stricken. There was no agreement that "MemsTech had not raised an obviousness defense using Onishi or Kress as a prior art reference." (Tr. at 565:17-567:25.) In fact, Ms. Frederick stated correctly at trial that Mr. Mallon had discussed the references individually, and indicated she was trying to question him about them ***in combination***. (Tr. at 565:17-20; RX-363 at Q. 202.) The attempt to cross-examine Mr. Mallon using the prior art references in combination was what put the line of questioning outside of the bounds of direct and was the basis for sustaining the objection.

Onishi discloses a surface acoustic wave (SAW) device package. (RX-26.) MemsTech claims that Figure 1 of Onishi discloses each of the elements of claim 1 except for the microelectromechanical system microphone and the acoustic port in the housing. MemsTech claims that it would have been obvious to change the package of Onishi to include a microphone and acoustic port. Figure 1 of Onishi is depicted below:

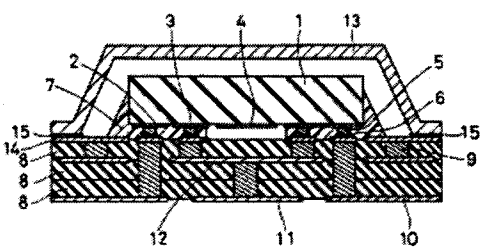


Figure 1 of Onishi

I find that Onishi fails to disclose more than just the microphone and acoustic port. In Figure 1, the inter-digital transducer (IDT) is depicted as element 4. (RX-26 at 4:35-43.) It is formed on a piezoelectric substrate shown as element 1. (*Id.*) This is different from the multilayer substrate depicted as element 8. (*Id.* at 4:43-46.) Therefore, Figure 1 of Onishi does not disclose both "a substrate comprising a surface for supporting the microelectromechanical microphone" and "a housing formed by connecting the peripheral edge portion of the cover to the substrate" because the substrate that the IDT is formed on is not the same substrate that forms the housing. MemsTech provides no argument about whether one of ordinary skill in the art would know how to modify Onishi so that the microphone would be mounted on the same substrate that connects with the cover to form the housing. Thus, MemsTech has failed to present clear and convincing evidence that Onishi renders claim 1 obvious.

Additionally, I find that Onishi teaches away from the inclusion of an acoustic port in the housing. "To teach away, the reference must 'criticize, discredit, or otherwise discourage the solution' reached by the proposed invention." *Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 526 F. Supp. 2d 162, 170 (D. Mass. 2007) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)).

Onishi makes multiple references to the fact that the metallic lid attaches to the substrate to form an airtight chamber:

> A metallic lid is attached to the electrode pattern by a solder or a conductive resin so that the surface acoustic wave element is sealed in an airtight condition.

(RX-26 at Abstract.)

> A metallic lid is attached to the electrode pattern by a solder or a conductive resin so that the surface acoustic wave element is sealed in an airtight condition by the metallic lid.

(*Id.* at 3:5-8.)

> A metallic lid is attached to the electrode pattern by a solder or a conductive resin to seal the surface acoustic wave element in an airtight condition.

(*Id.* at 3:54-57.)

> Although only a surface acoustic wave element 1 is sealed by a metallic lid 13 in Example 6, an entire module is sealed in an airtight condition by metallic lid 13 in this example. Since elements, which are individually sealed by a lid in a conventional surface acoustic wave device mounted module, are sealed by a lid in one body, packaging costs are reduced.

(*Id.* at 7:51-57.)

Dr. Gilleo provides an explanation regarding why the SAW device of Onishi needs an airtight chamber:

> A SAW device (an electronic filter) creates and detects surface vibrations, not sound waves, and as such, its package requirements are diametrically opposed to those for a microphone – there is not acoustic port because from the SAW device's perspective, external sound waves are "noise" that must be filtered out.

(CX-411C at Q. 69.) The fact that Onishi teaches away from the inclusion of an acoustic port supports a finding of nonobviousness with respect to claim 1. *KSR*, 127 S.Ct. at 1740 ("[W]hen the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious."); *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1308 (Fed. Cir. 2006) ("[A] reference that 'teaches away' from a given combination may negate a motivation to modify the prior art to meet the claimed invention.")

Claim 2 does not explicitly require an acoustic port, but it does require a "chamber providing an acoustic front volume for the silicon-based microphone." I find that by including the "acoustic front volume" limitation, the claim requires that an acoustic signal must be able to reach the claimed silicon-based microphone.[17] As explained *supra*, Onishi teaches away from

[17] I did not construe the term "acoustic front volume." Knowles offered the following construction: "a portion of the chamber which allows an acoustic signal to reach the microphone." (JSRCC.) Neither MemsTech nor Staff offered a construction for the term, claiming that it needed no construction. (*Id.*)

this by its emphasis on sealing the IDT in an airtight chamber. Thus, I find that it would not have been obvious to modify Onishi to meet all of the claim limitations in claim 2. *KSR*, 127 S.Ct. at 1740.

MemsTech argues that claims 1 and 2 are rendered obvious by Kress. First, I find that MemsTech's arguments regarding Kress have not been waived, as Knowles argues. Kress was listed by MemsTech in its Initial Notice of Prior Art filed on May 28, 2008. In its pre-hearing statement, MemsTech identified Kress as a reference that renders the asserted '231 patent claims obvious. (*See* MemsTech's Pre-Hearing Statement at 92-93, 96-97.) MemsTech's pre-hearing statement stated "[o]ne need only to use a MEMS pressure sensor with adequately high sensitivity and use a metal cover as suggested by Figure 6 of Kress instead of a plastic cover to have the structure claimed in the '231 patent." (*Id.* at 97.) While MemsTech's discussion of Kress is brief, it was enough to put Knowles on notice that Kress could be asserted as an obviousness reference in this investigation. Thus, I find that MemsTech did not waive its obviousness argument regarding Kress.

To the extent that MemsTech's argument on this point is limited to the issue set forth above, it does not violate Ground Rule 4(d) promulgated by Order 2 in this case. Knowles is correct that better practice would have been for MemsTech to provide claim charts lining up the elements of the asserted claims against Kress and/or to include a narrative describing which elements of the asserted claims compared to which features of Kress.

Knowles' reference to the testimony of Mr. Mallon when questioned by Staff incorrectly characterizes events in light of the context at trial. Staff attempted on cross-examination to elicit testimony from Mr. Mallon regarding an obviousness defense using Onishi and Kress in combination as prior art references against claims 1 and 2 of the '231 patent. (Tr. at 564:6-

565:6.) Knowles objected to this line of questioning, asserting that the opinions sought in the questioning involved multiple prior art references that had not been presented in the expert report or direct testimony. After a short recess, counsel for Staff stated that she could not find those combined references in Mr. Mallon's direct testimony or his expert reports. Inasmuch as the line of questioning was beyond the scope of the direct, I sustained the objection and the testimony was stricken. There was no agreement that "MemsTech had not raised an obviousness defense using Onishi or Kress as a prior art reference." (Tr. at 565:17-567:25.) In fact, Ms. Frederick stated correctly at trial that Mr. Mallon had discussed the references individually, and indicated she was trying to question him about them ***in combination***. (Tr. at 565:17-20; RX-363 at Q. 202.) The attempt to cross-examine Mr. Mallon using the prior art references in combination was what put the line of questioning outside of the bounds of direct and was the basis for sustaining the objection.

As to the substance of Kress, I find that Kress fails to include enough detail to render either claims 1 or 2 obvious. Kress discloses two types of packages – a metal can and a surface-mountable package. (RX-45 at MEMS155375-76.)

Looking first at the metal can, the description from Kress is as follows:

> The pressure sensor chip is soldered onto a TO8-type header. The cap is welded under vacuum in order to enclose the reference vacuum above the chip for absolute measurements.

(*Id.* at MEMS155375.) In addition, Figure 6 depicts a "complete pressure sensor." (*Id.*)

The description of the metal can package clearly fails to disclose the following elements from claim 1: "a microelectromechanical system microphone" and "an acoustic port for allowing an acoustic signal to reach the microelectromechanical system microphone." The object to which the sensor is soldered is unclear, as is the object to which the cap is welded.

Therefore, it is unclear that this package meets both the "substrate comprising a surface for supporting the microelectromechanical microphone" limitation and the "housing formed by connecting the peripheral edge portion of the cover to the substrate" limitation.

The description of the metal can package clearly fails to disclose the following elements from claim 2: "a silicon-based microphone," "a cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material," and "the chamber providing an acoustic front volume for the silicon-based microphone." The object to which the sensor is soldered is unclear, as is the object to which the cap is welded. Therefore, it is unclear that this package meets the "cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material" limitation.

Looking next at the surface-mountable package, the description from Kress is as follows:

> In Fig. 9 a barometric pressure sensor for PCB-application is shown. The chip is mounted onto a ceramic substrate and protected by a plastic cap. The requirements for environmental media resistance for the barometric measurement are not as stringent as for MAP sensor. The package has the contacts on the bottom side of the ceramic base; this device is suitable for SMD-processing.

(RX-45 at MEMS155376.) In addition, Figure 9 depicts a "[s]ingle chip integrated barometric pressure sensor for SMD-mounting." (*Id.*)

The description of the surface-mountable package clearly fails to disclose the following elements from claim 1: "a microelectromechanical system microphone," "an acoustic port for allowing an acoustic signal to reach the microelectromechanical system microphone," and "a cover comprising a conductive layer having a center portion bounded by a peripheral edge portion." Because there is no description of how the cap connects to form the package, it is unclear that this package meets the "housing formed by connecting the peripheral edge portion of the cover to the substrate" limitation.

The description of the surface-mountable package clearly fails to disclose the following elements from claim 2: "a silicon-based microphone," "a cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material," and "the chamber providing an acoustic front volume for the silicon-based microphone." It is unclear whether or not there is a layer of conductive material on the substrate, and whether or not the sensor is electrically coupled to this layer. Therefore, it is unclear that this package meets the "a substrate including a surface at least partially covered by a first layer of a conductive material, the silicon-based microphone is electrically coupled to the layer of a conductive material" limitation.

Thus, MemsTech provides no explanation as to how all of the elements in claims 1 and 2 are met. MemsTech also provides little explanation as to why one of skill in the art would know to modify the metal can package and/or surface-mountable package Kress to obtain a package as claimed in claims 1 or 2. MemsTech relies on the following statement from Kress for support that one of ordinary skill in the art would know to modify Kress:

> The integrated sensor chip can be modified for various pressure ranges. The packaging scheme can be changed depending on the application.

(RX-45 at MEMS155376.)

I find that the first sentence only relates to modifying the sensor to detect different pressure ranges, and provides no reason to modify Kress to include a microphone. The second sentence is too generalized to provide any reason to modify Kress to make the claimed MEMS microphone package. Mr. Mallon's testimony relating to Kress is very brief, with no detailed explanation of how Kress discloses the elements of the claims or how it would have been obvious for one of ordinary skill in the art to modify Kress. (RX-363 at Qs. 86-88.) Under the standard articulated in *KSR*, this evidence falls short in demonstrating a sufficient reason to

modify Kress. *KSR*, 127 S.Ct. at 1740-41 (describing the analysis that a court should undertake "to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.") Thus, I find that MemsTech has failed to produce clear and convincing evidence that claims 1 or 2 of the '231 patent are rendered obvious by Kress.

Based upon the foregoing, I find that MemsTech has failed to show by clear and convincing evidence that claims 1 or 2 of the '231 patent are obvious in view of the asserted prior art.

4. '089 Patent

MemsTech argues generally that claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent include only known elements used for their established functions and yield no unexpected result, and are therefore obvious under *KSR*. (RIB at 62.)

More specifically, MemsTech asserts that the claimed structure of the MEMS packages to include a substrate, and a cover including an aperture, was not only known, but necessary for any "pressure sensor" since "common sense dictates that if one wants to house a pressure sensor to protect it, one must provide an aperture so that the sensor can interact with the medium to be measured." MemsTech points to Mallon's testimony and says he testified that all of the claim limitations of claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent were known before October 2000. (RIB at 69-70 (citing RX-363).)

MemsTech asserts that providing protection for a MEMS transducer by placing it in a package was well known in 2000, and surface mountable packages were well known in 2000. (RIB at 71.) MemsTech alleges that providing an aperture so that an acoustic signal can reach the transducer was well known in 2000. (*Id.*) MemsTech avers that mounting a transducer on a substrate was well known in 2000, as was electrically connecting a transducer to a substrate, (*id.*

(citing RX-31; RX-21; RX-19; RX-39; RX-26; RX-45; RX-363)) and creating an enlarged back volume for a transducer by etching out a portion of the substrate under the transducer. (*Id.* (citing RX-31; RX-21).)

MemsTech claims that the asserted claims of the '089 patent are directed to various configurations of a surface mountable package for protecting a MEMS microphone that includes a conductive cover having an aperture and an enlarged back volume created by forming a recess in the substrate underneath the transducer. (RIB at 70 (citing RX-32).) MemsTech alleges that, in 2000, prior to the filing of the '089 patent, one could have designed a package with an enlarged back volume if desired as a matter of routine engineering. (RIB at 70-71 (citng RX-363; RX-362).) The reason for doing so, they say, would have been to create a package with increased performance of the microphone. (*Id.* (citing RX-363).) MemsTech asserts that those working in the MEMS field would have looked to *inter alia* existing microphone packages (both MEMS and non-MEMS) as well as the pressure sensor art and semiconductor art. (*Id.* (citing RX-363; RX-362).)

MemsTech argues that claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent employ techniques that were well known in 2000 in the same way that they were used in the prior art to achieve their well established functions. (RIB at 71 (citing RX-363).) MemsTech asserts that Knowles' combination of known elements used to achieve their established functions is not innovation, but is merely the application of ordinary skill and common sense, and are thus invalid under *KSR*. There is, they allege, no evidence to rebut the evidence MemsTech put forth at the evidentiary hearing that the combinations claimed in claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent include anything other than prior art elements, and there is no evidence that the claimed combinations yield anything other than a predictable result. (*Id.*)

Knowles argues generally that MemsTech's argument regarding claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 restates the reasoning first stated regarding patent '231, including the time it took for Mr. Minervini to produce his invention and the assertion that Mr. Minervini's work was "routine engineering." (CRB at 55.)

a. Claim 1

MemsTech asserts that claim 1 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino. (RIB at 72.) In a separate argument, MemsTech asserts that claim 1 of the '089 patent is invalid as obvious in view of Onishi. (*Id.* at 84.) In a final separate argument, MemsTech asserts that claim 1 of the '089 patent is invalid as obvious in view of Kress. (*Id.* at 86.)

MemsTech's Position: MemsTech argues that the "chamber," "volume," and "aperture" limitations of claim 1 of the '089 patent cannot be considered points of novelty because under Knowles's expert Gilleo's claim construction for the '089 patent, all MEMS microphone packages include such features. (*Id.* (citing Tr. at 172:19-22).) MemsTech argues that under "a proper claim construction" in the context of the '089 patent intrinsic evidence, the "volume" claim limitation should be construed to mean a back volume formed by creating a recess in the substrate underneath the transducer. Under either construction, though, MemsTech posits that the concept was not novel in 2000, as demonstrated, for example, by Mullenborn and Baumhauer. (*Id.*)

MemsTech asserts that claim 1 of the '089 patent is directed to a "surface mountable package for containing a transducer, the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals." (CX-2 at claim 1.) MemsTech alleges that Baumhauer's assembly contains and protects an

"electroacoustic transducer, primarily in the form of a capacitive microphone." (RIB at 72 (citing RX-363; RX-21 at Abstract).) In Baumhauer's device, MemsTech states, sound is incident on the transducer, and "an electrical equivalent to the acoustic signal is produced." (*Id.* (citing RX-363; RX-21 at 4:27-36).) MemsTech argues that, if the preamble is construed to be a limitation, Baumhauer shows all of the elements of the preamble except that the package is for surface mounting, which would be an obvious modification to one of ordinary skill in the MEMS packaging art in view of references such as Kress. (*Id.* (citing RX-363; RX-45).) MemsTech argues that Kress discloses changing the packaging, for example from a TO-8 type package to a surface mountable package to meet the desired application. (*Id.* (citing RX-45 at MEMS155376).) MemsTech asserts that, while Baumhauer is silent on the external electrical connections of the carrier substrate, it would have been known that surface mounting is an option. (*Id.* (citing RX-363; RX-45).)

MemsTech avers that Giachino discloses a surface mountable upper substrate containing a pressure transducer. (RIB at 72 (citing RX-362; RX-19).) MemsTech states that Giachino shows all of the elements of the preamble. (*Id.*)

MemsTech says that claim 1 of the '089 patent further requires "at least a first member and a second member and a chamber being defined by the first member and the second member." (CX-2.) MemsTech posits that Baumhauer shows a carrier substrate, and an enclosure member, which define a chamber. (RIB at 72 (citing RX-363; RX-21 at Figs. 5-6).) MemsTech states that Dr. Gilleo testified that under his construction of the '089 patent claims, all MEMS microphone packages have a chamber, a volume, and an aperture as required by claim 1 of the '089 patent. (Id. (citing Tr. at 172:19-22).)

MemsTech asserts that Figure 6 of Baumhauer shows an embodiment with sound

entering through the substrate, whereas figure 5 of Baumhauer shows an arrangement where sound enters the microphone from the top, but does not show a cover on this embodiment. (RIB at 73 (citing RX-363).) According to MemsTech, one of ordinary skill in the art could easily have added a cover similar to that shown in figure 6 of Baumhauer to the embodiment shown in figure 5, and would have been motivated to do so to protect the microphone, or to provide shielding as is also taught by Baumhauer. (*Id.* (citing RX-363; RX-21 at 9:56-64).) MemsTech argues that Baumhauer describes a cover similar to the enclosure shown in figure 6, but having an aperture. (*Id.* (citing RX-363; RX-21 at 10:8-12).)

MemsTech states that Figure 2 of Giachino shows a lower substrate as a first member and a cover as a second member that define a chamber or front volume for the pressure transducer. MemsTech asserts that together, the substrate and the cover define a chamber or front volume for the pressure transducer. (RIB at 73 (citing RX-362, Giachino Dir. Stmt. Q. 88; RX-19, Figure 2).) MemsTech reiterates that Gilleo testified that under his construction of the '089 patent claims, all MEMS microphone packages have a chamber, a volume, and an aperture as required by claim 1 of the '089 patent. (*Id.* (citing Tr. at 172:19-22).)

MemsTech continues, claim 1 of the '089 patent further requires "the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber." (CX-2.) According to MemsTech, Figure 5 of Baumhauer shows the microphone transducer mounted on the surface of carrier substrate, which resides in the chamber defined by carrier substrate and enclosure member, (RIB at 73 (citing RX-363)) and Figure 2 of Giachino shows the transducer attached to a surface formed on the first member substrate and the transducer resides within the chamber formed by the substrate and the cover. (*Id.* (citing RX-362).)

MemsTech points out that claim 1 of the '089 patent also requires "the surface being formed with at least one patterned conductive layer." (CX-2.) They say that Baumhauer's carrier substrate "can be a printed wiring board." (RIB at 73-74.) MemsTech asserts that printed wiring boards typically have traces and pads patterned on the surface for connecting components. (*Id.* at 74.) MemsTech alleges that Baumhauer also shows a grounded pad on the substrate for connecting the enclosure member. (*Id.*) They say the grounded pad is conductive and is a layer on the surface of carrier substrate. (*Id.*) MemsTech avers that Baumhauer's microphone transducer is connected to the substrate using wire bonds connected to the top surface of the carrier substrate. (*Id.*) They argue that the surface of the substrate must necessarily have conductive areas to receive these wire bonds. (*Id.* (citing RX-363; RX-21 at 9:45-48, 62).) MemsTech asserts that Figure 1 of Giachino shows conductive leads connected to solder bumps. (*Id.* (citing RX-362).)

MemsTech says that claim 1 of the '089 patent also requires "the patterned conductive layer being electrically coupled to the transducer." (CX-2.) MemsTech alleges that Baumhauer's wire bonds electrically connect the transducer to the patterned conductive layer on carrier substrate. (RIB at 74 (citing RX-363; RX-21 at 9:45-48).) They assert that Figure 1 of Giachino shows that the conductive leads are connected to the solder bumps. (*Id.* (citing RX-362).)

MemsTech says that claim 1 of the '089 patent also requires "an outside surface of the surface mountable package comprising a plurality of terminal pads electrically coupled to the patterned conductive layer." (CX-2.) MemsTech states that while Baumhauer does not expressly show surface mounting, this was a well known option to one of ordinary skill in the art. (RIB at 74.) They say an external connection, such as surface mounting, would have been necessary for

the device of Baumhauer to be operational. (*Id.* (citing RX-363).) MemsTech alleges that Figure 1 of Giachino shows that the substrate has terminal pads and the substrate could be made surface mountable. (*Id.* (citing RX-362).)

MemsTech states that claim 1 of the '089 patent also requires "a volume being defined by the transducer and one of the first member or the second member." (CX-2.) According to MemsTech, Baumhauer's front cavity resides at least partly in a recess in the substrate and is at least partly bounded by the transducer. (RIB at 74-75 (citing RX-363).) They say this is exactly the arrangement shown in Figure 24 of the '089 patent defining the back volume 18. (*Id.*) Under Gilleo's claim construction, all MEMS microphone packages have a volume. (*Id.* (citing Tr. at 172:19-22).) MemsTech avers that Giachino discloses such a volume since the pressure transducer and the cover define a volume. (*Id.* at 75 (citing RX-362).)

MemsTech points out that claim 1 of the '089 patent also requires "the volume being acoustically coupled to the transducer." (CX-2.) MemsTech asserts that Baumhauer's front cavity is acoustically coupled to the transducer, because it permits transmission of an acoustic signal to the transducer. (RIB at 75 (citing RX-363).) MemsTech argues that Giachino shows that air would enter the volume (under Knowles's claim construction) from the outside and contact the transducer. (*Id.* (citing RX-362).)

MemsTech recites that Claim 1 of the '089 patent also requires "one of the first member or the second member being formed to include an aperture." (CX-2.) MemsTech alleges that Baumhauer's carrier substrate is formed with an acoustic port. (RIB at 75.) MemsTech avers that the cover shown in figure 6 of Baumhauer could be used with the sensor shown in figure 5, with an aperture provided in the top of enclosure member. (*Id.* (citing RX-363; RX-21 at 10:8-12).) MemsTech reiterates that under Gilleo's claim construction, all MEMS microphone

packages have an aperture. (*Id.* (citing Tr. at 172:19-22).) MemsTech says that Giachino includes a tubular extension of the cover, which includes an aperture. (*Id.* (citing RX-362).)

MemsTech states that claim 1 of the '089 patent also requires "the aperture configured to permit the passage of an acoustic signal to the transducer." (CX-2.) MemsTech posits that Figure 6 of Baumhauer shows sound entering the acoustic port on its way to the transducer. MemsTech argues, if the cover described at Baumhauer 10:8-12 is used with the microphone of figure 5 of Baumhauer, the aperture in the top of the cover would also permit passage of an acoustic signal to the transducer. (*Id.* (citing RX-363; RX-21 at 10:11-22).) MemsTech says that the tubular extension in Giachino allows pressure and pressure variations, *i.e.* an acoustic signal, to enter and reach the transducer. (*Id.* (citing RX-362).)

According to MemsTech, the only limitations of claim 1 of the '089 patent that are not expressly set forth in Baumhauer are surface mounting of the package, and that the package have a plurality of terminal pads (for surface mounting) coupled to the patterned conductive layer. RIB at 75-76.) MemsTech says these limitations are both directed to surface mounting, which would be an obvious option for the Baumhauer device to one of ordinary skill in the art. (*Id.* at 76 (citing RX-363).)

MemsTech asserts that Figure 9 of Kress teaches these surface mounting features. (RIB at 76.) MemsTech alleges that Kress describes a MEMS pressure transducer in a surface mountable package. (*Id.*) They say the package has a plurality of terminal pads on its outside surface, and the terminal pads are necessarily electrically connected to a patterned conductive layer on the surface to which the pressure sensor is mounted (inside the package enclosure). (*Id.*) MemsTech avers that Mallon testified, at the time of the '089 patent, one of ordinary skill in the MEMS packaging art would have been familiar with such pressure sensors, and would have

considered prior pressure sensor packages in developing a package for a silicon microphone or other transducers. (*Id.*) MemsTech argues that one would be motivated to adopt such a surface mount package in order to obtain a self-contained component compatible with surface mounting equipment, particularly if the ultimate application used surface mount technology -- as is the case with cellular telephones. (*Id.* (citing RX-363; RX-45 at MEMS155376).)

Referring to Onishi, MemsTech argues that it discloses a package. (RIB at 84 (citing RX-363; Tr. at 749:15-17).) MemsTech alleges that figure 1 of Onishi shows that the package provides head room for the transducer to operate. (*Id.* (citing RX-26 at Fig. 1).) MemsTech posits that element 8 of figure 1 of Onishi is a multilayer substrate. MemsTech asserts that element 13 of figure 1 of Onishi is a metallic lid. (*Id.* (citing RX-363; RX-26 at 4:51; Tr. at 749:18-20, 21-23).) MemsTech claims that element 1 of figure 1 of Onishi is a transducer. (*Id.* (citing RX-363; RX-26 at 4:38; Tr. at 749:24-750:3).) They continue, saying lid of the Onishi package is electrically connected to a layer on the substrate to provide EMI shielding. (*Id.* (citing RX-363; RX-26 at 4:52-54; Tr. at 750:10-13).) MemsTech avers that the transducer inside the package is surface mounted to a patterned conductive layer on the substrate. (*Id.* (citing RX-26 at 4:45-47; Tr. at 750:14-17).) MemsTech asserts that element 10 of figure 1 of Onishi is a terminal pad on the outside surface of the package. (*Id.* (citing RX-26 at 4:49; Tr. at 750:7-9).) MemsTech alleges that the Onishi package is surface mountable. (*Id.* (citing Tr. at 750:4-6).) MemsTech argues that under Dr. Gilleo's claim construction, the Onishi package includes both a "chamber" and a "volume." (*Id.* (citing Tr. 172:19-22).)

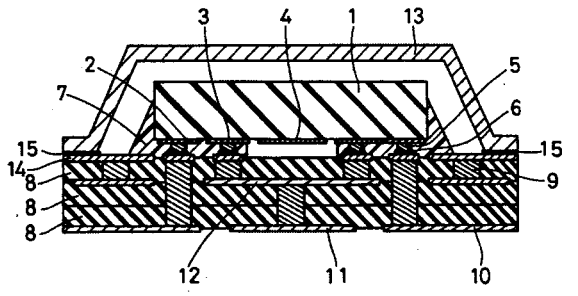


Figure 1 of Onishi

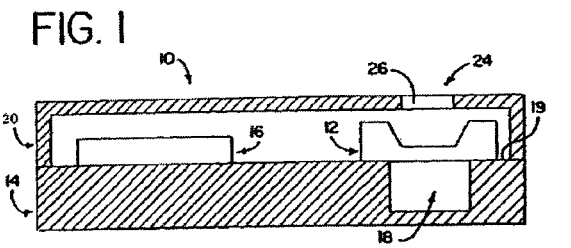


Figure 1 of the '089 Patent

(RX-26; CX-2.)

MemsTech argues that Figure 1 of Onishi and Figure 1 of the '089 patent (shown above) demonstrate that Onishi discloses all of the structure set forth in claim 1 of the '089 patent with the exception that claim 1 requires an acoustic port so that the signal can interact with the transducer. (*Id.* (citing RX-26).) MemsTech alleges that the use of apertures for the established purpose of allowing a signal to enter the package was well known prior to the filing of the application for the '089 patent, and "it would be common sense to add an aperture if the Onishi package were to be used for a microphone." (*Id.* at 84-85 (citing RX-363).)

MemsTech admits that the transducer in Onishi is a SAW device, but argues that those skilled in the art knew to use packages from different types of MEMS sensors for packaging microphones. (RIB at 85 (citing RX-363).) MemsTech asserts that the Onishi package could be used to package a MEMS microphone transducer. (*Id.* (citing Tr. at 752:9-11).) MemsTech argues that the Onishi package would provide physical protection and protection from EMI for a MEMS microphone. (*Id.* (citing Tr. at 753:1-10).) MemsTech says that adding an aperture to the Onishi package would allow an acoustic signal to enter the package and interact with the transducer, which is the established function of an aperture. (*Id.* (citing Tr. at 753:14-16).) MemsTech reiterates that Gilleo testified that, under his proposed construction, *all* MEMS microphone packages would have a chamber, a volume, and an aperture. (*Id.* (citing Tr. at

172:19-22).) So, they argue, it follows that it would have been obvious to adapt the Onishi package for use as a microphone package which would result in it having a chamber, a volume, and an aperture, all as required by the claims of the '089 patent. (*Id.* at 85.)

Regarding dependent claims 2, 9, 10, 15, 17, 20, 28, and 29, MemsTech argues only that they add no limitations to claim 1 that would be anything other than a mere design choice to one of ordinary skill in the MEMS packaging art – and there is no evidence to the contrary. (RIB at 85-86.) MemsTech asserts, therefore, that claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent require nothing more than an arrangement of old elements with each performing the same function that it had been known to perform and yield no more than one would expect from such an arrangement. (*Id.* at 86 (citing *KSR*, 127 S.Ct. at 1740).)

In its added argument, MemsTech asserts that the packages shown in figures 6 and 9 of Kress, together with their descriptions, disclose the same features set forth in the asserted claims of the '089 patent. (RIB at 86.) They say figure 6 shows a package including a conductive cover, whereas figure 9 shows the device packaged with a plastic cap in a surface mountable package. (*Id.* (citing RX-45).) MemsTech asserts that each of the described covers includes an aperture for allowing the pressure signal to reach the transducer. (*Id.*)

MemsTech alleges that Kress discloses a package, (RIB at 86 (citing RX-363; RX-45 at MEMS155375-6; Tr. at 754:6-8)) and the Kress packages provide head room to allow the transducer to operate. (*Id.* (citing Tr. at 754:9-10).) MemsTech asserts that the Kress packages include an aperture to allow the pressure signal to reach the transducer. (*Id.* (citing Tr. at 754:11-17).) MemsTech says the Kress package encloses both the sensor and the electronics. (*Id.* (citing RX-45; Tr. at 754:23-25).) MemsTech states that the sensor is soldered onto the substrate. (*Id.* (citing RX-45 at MEMS155375).) MemsTech argues, again, that under

Knowles's expert Gilleo's claim construction for the '089 patent, the Kress packages include a "chamber," a "volume," and an "aperture." (*Id.* (citing Tr. at 172:19-22).)

MemsTech argues that Kress demonstrates that it was known at least as early as 1995 that the packaging and the sensor could be changed to fit the application. (RIB at 86 (citing Tr. at 755:24-756:8).) MemsTech presents as an example that, Kress states that "[t]he integrated sensor chip can be modified for various pressure ranges." (*Id.*) MemsTech continues with respect to the packaging, Kress states that "[t]he packaging scheme can be changed depending on the application." (*Id.*) MemsTech avers that in the surface mountable package shown in figure 9 of Kress, the transducer is mounted to a ceramic substrate and protected by a plastic cap. (*Id.*) MemsTech alleges that the package includes contacts on the bottom side such that it can be mounted to a printed circuit board. (*Id.* at 86-87 (citing RX-45 at MEMS155376).) MemsTech argues that these statements establish that "it was known in 1995 that modifications to the transducer (e.g., adapting a pressure transducer so that it will react to acoustic signals) and the packaging (e.g., repackaging a device from a TO-8 type package such as that shown in figure 6 of Kress into a surface mountable package such as that shown in figure 9 of Kress) were well known design choices that were employed by those working in the MEMS packaging field." (*Id.* at 87 (citing RX-45).) MemsTech posits that the reason for making such packaging choices is to adapt the package for the particular application for which the device is intended to be used. (*Id.*)

Regarding dependent claims 2, 9, 10, 15, 17, 20, 28, and 29 MemsTech argues only that they add no limitations to claim 1 that would be anything other than a mere design choice to one of ordinary skill in the MEMS packaging art. (RIB at 87.) MemsTech concludes, therefore, that claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent require nothing more than an arrangement of old elements with each performing the same function that it had been known to

perform and yield no more than one would expect from such an arrangement. (*Id.* (citing *KSR*, 127 S.Ct. at 1740).)

Knowles's Position: Knowles states that MemsTech's argument that claim 1 of the '089 patent is rendered obvious by adding surface mounting to Baumhauer is irrelevant. Knowles asserts that, because Baumhauer is not a package, it cannot disclose other components that are defined in terms of the package, including the "first member" and "second member," the "surface," "volume," "chamber," and "aperture," which are all defined in terms of the "first member" and/or "second member," and the "patterned conductive layer" and "terminal pads electrically coupled to the patterned conductive layer," which are defined in terms of the surface. (CRB at 55-56 (citing CX-411C).) Knowles asserts that Baumhauer was considered by the examiner during the prosecution of the application that became the '089 patent. (*Id.* at 56 (citing CX-2; RX-256 at 249).) Knowles argues that this makes MemsTech's burden to prove invalidity more difficult since there is "a presumption that the Examiner did his duty and knew what claims he was allowing." (*Id.* (citing *Al-Site,* 174 F.3d at 1323).)

Knowles argues that claim 1 is not rendered obvious in view of Giachino, because Giachino discloses a pressure sensor for measuring fluid pressure. (CRB at 56 (citing RX-19 at Abstract, 1:19-26, 1:41-44, 2:22-27, 2:50-55, 3:25-34, 3:51-53, 4:50-56).) Knowles asserts that Giachino does not disclose a MEMS microphone and it does not disclose a package for a MEMS microphone. (*Id.* (citing CX-411C; CDX-4).) Knowles argues that it is readily apparent from the preamble of claim 1 that the "transducer" that converts acoustic signals to electric signals is in fact a microphone, while the specification refers repeatedly to silicon condenser microphones and never refers to any other type of transducer. (*Id.* (citing CX-2 at Title, Abstract, Fig. 14b, Fig. 14d, Fig. 23, Fig. 24, Fig. 25, Fig. 26, Technical Field, Background of the Invention,

Summary of the Invention, Brief Description of Drawings, Detailed Description of Preferred Embodiments; CX-411C).) Knowles reasons that there is no rational basis to modify a package for a non-microphone device in order to create a package for a MEMS microphone. (*Id.* (citing CX-411C).) Knowles states that Giachino's failure to disclose a MEMS microphone is fatal to MemsTech's obviousness argument. (*Id.*)

Knowles alleges that, contrary to MemsTech's assertion, while Dr. Gilleo did testify that "all MEMS microphone packages" would have a chamber, volume, and an aperture, he never testified, nor did anyone else testify, that "all MEMS microphone packages" would have the same configuration of chamber, volume, and an aperture as required by claim 1. (CRB at 56-57.) Knowles asserts that, because the components required by claim 1 are defined according to their relationship to the MEMS microphone, and since Giachino does not disclose a package for a MEMS microphone, Giachino's "transducer," "substrate," "cover," and "aperture" cannot be the "transducer," "first member," "second member" and "aperture" required by the '089 patent. (*Id.* at 57 (citing RX-362).)

Knowles concludes that, because Baumhauer and Giachino are both significantly different than the MEMS microphone package claimed by claim 1, they cannot render claim 1 obvious. (CRB at 57.)

Knowles argues two reasons why claim 1 is not invalid as obvious in view of Onishi. The first of these is procedural: Knowles avers that MemsTech never asserted this position during the course of the investigation, and as such, any attempt to introduce this defense now, after the hearing, is in violation of the Ground Rules of this investigation. (CRB at 62.) Knowles states that, in its section addressing alleged invalidity of the asserted claims of the '089 patent, MemsTech's Pre-Hearing Statement "contains an unsubstantiated statement that 'One of

ordinary skill in the art looking for a package for a microphone could readily have adapted the Onishi package for such a purpose.'" (*Id.* (citing MemsTech Pre-Hearing Statement at 127).) Knowles alleges that MemsTech included no claim charts lining up the elements of the asserted claims against Onishi, and included no narrative describing which elements of the asserted claims compared to which features of Onishi. (*Id.*) Knowles asserts that the short reference to Onishi in the Pre-Hearing Statement does not mention any of the asserted claims of the '089 patent. Knowles continues that nothing in its Pre-Hearing Statement could be construed as setting forth "with particularity a party's contentions on each of the proposed issues, including citations to legal authorities in support thereof." (*Id.* (citing Order 2, Ground Rule 4(d)).)

Knowles asserts that none of the evidence cited by MemsTech was uncovered for the first time at hearing, and that MemsTech cannot claim that it could not have become aware of this position at the time of the filing of its prehearing statement. (CRB at 62-63 (citing Order 2, Ground Rule 4(d)).) Knowles argues that by failing to raise this issue in their Pre-Hearing Briefs, MemsTech abandoned any right to assert an obviousness defense using Onishi as a prior art reference. (*Id.* at 63.)

Knowles avers that during the hearing, Staff attempted to elicit testimony from MemsTech's expert Mr. Mallon regarding an obviousness defense using Onishi as a prior art reference against claims 1 and 2 of the '231 patent. (CRB at 63 (citing Tr. at 564:6-9).) Knowles states that Knowles objected to this untimely line of questioning, and after a short recess, counsel for Staff agreed that MemsTech had not raised an obviousness defense using Onishi or Kress as a prior art reference. (*Id.* (citing Tr. at 567:6-11).) Knowles states that I then struck the entire line of questioning. (*Id.* (citing Tr. at 567:12-25).)

Knowles says that MemsTech now asserts that Onishi renders all asserted claims of the

'089 patent obvious, which violates the Ground Rules of this investigation and is contrary to the "unambiguous ruling of this Court during the hearing." (CRB at 63.) Knowles argues that I should disregard any attempt by MemsTech to assert an obviousness defense using Onishi as a prior art reference. (*Id.*)

The second argument raised by Knowles that this assertion must fail is that the facts do not support the assertion that Onishi renders claim 1 of the '089 patent (or any of its dependent claims) obvious. (CRB at 63.) Knowles asserts that Onishi discloses a surface acoustic wave ("SAW") device, and there is no evidence that a SAW device is even a microelectromechanical system device. (*Id.*) Thus, Knowles says, even if it was true that as MemsTech asserts, "those skilled in the art knew to use packages from different types of MEMS sensors for packaging microphones," (RX-363) there is no evidence that this applies to non-MEMS devices. (*Id.* at 63-64.) Knowles provides an example that the assertion of MemsTech that "those skilled in the art knew to use packages from different types of MEMS sensors" is irrelevant, since Onishi does not disclose a package for a MEMS sensor. (*Id.* at 64.) Knowles continues that a SAW device, like that disclosed by Onishi, seeks to avoid external sound waves because the sound waives are "noise" signals that must be filtered out. (*Id.* (CX-411C).) Accordingly, they say, Onishi expressly teaches away from creating an aperture in its enclosure because its interior must remain sealed. (*Id.* (citing RX-26 at Abstract, 3:5-8, 3:54-57, 7:51-57, 8:36-39, 10:10-13).)

Knowles also avers that when asked if the SAW device in Onishi could be replaced with a MEMS microphone, Dr. Gilleo gave his estimate of the likelihood of success as follows: "[i]t will fit in there. The particular package probably is going to cause serious problems if you do put a MEMS microphone in here." (*Id.* (citing Tr. at 752:20-25)) (emphasis in original.) Knowles asserts that Dr. Gilleo's testimony was the only testimony presented on the topic of whether or

not a person of ordinary skill in the art would have a reasonable expectation of success, and "he clearly indicated that success was unlikely." (*Id.*)

Knowles concludes its argument saying that Onishi was expressly considered by the examiner during the prosecution of the application that became the '089 patent. (*Id.* (citing RX-255 at 87, 207, 358, 363-367).) Knowles asserts that it is clear that the examiner was well aware of the features of Onishi, because he cited many of those features (including a multi-layer substrate with a conductive layer, a cover with a conductive layer, terminal pads) in making a non-final rejection. (*Id.* at 64-65.) Knowles states that the applicant successfully traversed the examiner's rejections by pointing out that the device in Onishi was not a microphone and therefore did not need an aperture or a volume. (*Id.* at 65.) Knowles posits that the examiner subsequently allowed the pending claims that had previously been rejected for obviousness over Onishi. (*Id.*) Knowles argues that this makes MemsTech's burden to prove invalidity especially difficult since there is "a presumption that the Examiner did his duty and knew what claims he was allowing." (*Id.* (citing *Al-Site,* 174 F.3d at 1323).)

Referring to MemsTech's final added argument, that Kress renders claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent obvious Knowles argues that this argument fails for both procedural and factual reasons. (CRB at 65.)

Knowles asserts that, in its section on the alleged invalidity of the '089 patent, the only references to Kress were as a source for surface mount technology when combined with Baumhauer. (CRB at 65 (citing MemsTech Pre-Hearing Statement at 110-17).) Knowles alleges that MemsTech never argued that Kress, by itself, could be the source of an obviousness defense. (*Id.*) Knowles avers that MemsTech provided no claim charts lining up the elements of the asserted claims against Kress, and included no narrative describing which elements of the

asserted claims compared to which features of Kress. (*Id.*) Knowles argues that nothing in MemsTech's Pre-Hearing Statement could be construed as setting forth "with particularity a party's contentions on each of the proposed issues, including citations to legal authorities in support thereof." (*Id.* at 65-66 (citing Order 2, Ground Rule 4(d)).) Knowles says that none of the evidence cited by MemsTech in its Post-Hearing brief was uncovered for the first time at hearing, and as such, MemsTech cannot claim that it could not have become aware of this position at the time of the filing of its prehearing statement. (*Id.* at 66.) Knowles argues that by failing to raise this issue in their Pre-Hearing Briefs, MemsTech abandoned any right to assert an obviousness defense using Kress as a stand-alone prior art reference against the '089 patent. (*Id.*)

Knowles avers that, during the hearing, Staff attempted to elicit testimony from MemsTech's expert Mr. Mallon regarding an obviousness defense using Kress as a prior art reference against the '231 patent. (CRB at 66 (citing Tr. at 564:6-9).) Knowles says that Knowles objected to this line of questioning, and after a short recess, Staff agreed that MemsTech had not raised an obviousness defense using Kress as a prior art reference. (*Id.* (citing Tr. at 567:6-11).) Knowles says that I then struck the entire line of questioning. (*Id.* (citing Tr. at 567:12-25).)

Knowles says that MemsTech now asserts that Kress renders claims 1, 2, 9, 10, 15, 17, 20, 28, and 29 of the '089 patent obvious, which violates the Ground Rules of this investigation and is contrary to the "unambiguous ruling of this Court during the hearing." (CRB at 66.) Knowles argues that I should disregard any attempt by MemsTech to assert an obviousness defense using Kress as a prior art reference. (*Id.*)

Knowles also argues that MemsTech's attempt to assert Kress as an obviousness defense

should fail, because the facts do not support this position. Specifically, Knowles asserts that Kress discloses a package for an automotive field pressure sensor for "applications like manifold intake pressure, fuel tank, ABS hydraulic pressure, fuel rail measurement," not a microphone. (CRB at 67 (citing CX-411C; RX-45 at MEMS155372).) Knowles states this is evident on the face of Kress, and that MemsTech "agrees, noting in its Pre-Hearing Statement that 'The Kress device is a pressure transducer and not a microphone.'" (*Id.* (citing MemsTech's Pre-Hearing Statement at 96)) (emphasis in original.) Knowles says there is no evidence regarding the amount of head room comparing the amount of head room required to make a barometric pressure sensor operative versus the amount of head room required to make a MEMS microphone operative. (*Id.*) Knowles asserts there is no evidence that the barometric pressure sensor in Kress would have the same configuration of chamber, volume, and aperture as required by Minervini '089. (*Id.*) Knowles alleges that, although Kress discloses two packages, one which is a TO-style package and the other which is a surface mountable package, only the TO-style package discloses soldering the sensor to the substrate, Knowles says that the '089 patent expressly seeks to avoid TO-style packages. (*Id.* (citing CX-2 at 1:34-40).) Knowles posits that while Kress alludes generally to modifying the package and sensor to fit the application, it provides no specific direction on how to change a given packaging scheme or sensor to meet a given application. (*Id.* (citing RX-45 at MEMS155376).) Knowles asserts that "it is uncontroverted that MEMS packaging is application and device specific." (*Id.*) Knowles alleges that microphones are a type of pressure sensor, but not all pressure sensors are microphones. (*Id.* at 68 (citing CX-411C; Tr. at 332:4-12, 334:15-335:5, 428:10-16).) Knowles says that Dr. Gilleo and Mr. Giachino share this opinion. (*Id.*)

Knowles concludes by arguing that a person of ordinary skill in the art of MEMS

microphone packaging would have no reason to look at non-microphone package in order to come up with a design for a MEMS microphone package. (CRB at 54 (citing CX-411C).)

Commission Investigative Staff's Position: Staff argues that claim 1 is not invalid as obvious in view of Baumhauer and Kress either alone or in combination with Giachino, and/or National Semiconductor. (SIB at 55-56.) Staff asserts that the evidence has shown that Baumhauer fails to disclose a package, as discussed *supra*. In particular, Staff asserts, Baumhauer fails to teach or suggest a package because it does not disclose first or second level connections and it fails to disclose a package substrate. (*Id.* (citing CX-411C).) Accordingly, they reason, Baumhauer does not teach or suggest "a surface-mountable package." (*Id.*) Staff argues that the further proposal to modify Baumhauer with Kress (or the other secondary references) does not cure this deficiency. (*Id.*) Staff takes the position that no rational basis would have existed to combine the teachings of Baumhauer with the teachings of the secondary references. (*Id.*)

Staff submits that the evidence has shown that Giachino does not teach a package having "a transducer being responsive to sound pressure of levels of an acoustic signal to provide an electrical output representative of the acoustic signals." (SIB at 67 (citing CX-411).) Staff asserts that Giachino does not disclose "a surface mountable package." (*Id.*) Staff avers that the evidence showed that the pressure transducer 14 is mounted on substrate 28. (Id. (citing RX-362).) Because substrate 28 is not the first or second member, Staff asserts, it cannot form part of the package. (*Id.* (citing CX-411).) Staff posits that, because Giachino does not teach or suggest "a transducer being responsive to sound pressure levels of an acoustic signal" it also fails to teach or suggest "an aperture configured to permit the passage of an acoustic signal." (*Id.*)

Discussion and Conclusion: Based upon the evidence before me, I find that MemsTech

has failed to show by clear and convincing evidence that claim 1 of the '089 patent is rendered obvious to a person having ordinary skill in the art by: (a) Baumhauer alone; or (b) in combination with Kress; or (c) in combination with Giachino; or (d) Onishi alone; or (e) Kress alone.

MemsTech has failed to provide evidence that Baumhauer teaches or suggests a MEMS package of any description, nor have they provided clear and convincing evidence of the reason why a person having ordinary skill in the art would be moved to modify Baumhauer to create the MEMS package taught by the '089 patent.

Moreover Baumhauer, Giachino and Onishi were considered by the examiner during the prosecution of the application that became the '089 patent. (CX-2; RX-255 at 87, 207, 358, 362-368; RX-256 at 249-250.) That fact makes MemsTech's burden to prove invalidity more difficult since there is "a presumption that the Examiner did his duty and knew what claims he was allowing." *Al-Site,* 174 F.3d at 1323.

Baumhauer

MemsTech has argued that all of the elements of claim 1 of the '089 patent are present in or, as in the case of the surface mounting of a package and a plurality of terminal pads coupled to the patterned conductive layer, they are either suggested by Baumhauer or were well known to one of ordinary skill in the art.

While Baumhauer may contain some characteristics that are similar to the elements of claim 1 of the '089 patent, none of the similarities cited by MemsTech provides clear and convincing evidence that the '089 patent is rendered obvious by Baumhauer.

Baumhauer is directed to various iterations of design of a ***microphone*** to be mounted directly on a user's substrate. It does not teach a package. As described *supra*, element 10 of

Figure 1 of Baumhauer clearly shows a jagged line at each end indicating that the substrate shown is part of a larger structure and not the discrete substrate contemplated in a package. The detailed description of Baumhauer makes clear that Figure 1 shows "only a small portion of a semiconductor substrate which in this example includes a great many other identical, integrated, electronic transducer devices which are separated along saw lines..." (RX-21 at 3:39-44.) Baumhauer's description also teaches that "[t]he electronics for driving the device may be fabricated in the adjacent area of the semiconductor substrate..." (*Id.* at 4:16-18.)

The entire fabric of Baumhauer is directed to the design of the ***microphone*** to be mounted on a substrate, ***not to a package for mounting***. Each of the independent claims of Baumhauer is directed to an "electroacoustic transducer" (i.e. microphone). (RX-21 at 10:41-42, 11:32-33, 12:22-23.) Finally, Baumhauer fails to teach or suggest a package because it does not disclose first or second level connections and it fails to disclose a package substrate. (CX-411C at Q. 39.)

MemsTech's reliance on Figures 5 and 6 of RX-21 is misplaced. Figure 5 does not show a package and does not include a chamber. Figure 6, while arguably depicting a "chamber," uses an "enclosure member" (element 36) surrounding the microphone, which is attached directly to the user's semiconductor substrate (element 31), and does not teach a package. I note that Dr. Gilleo testified that all MEMS packages have a chamber, a volume and an aperture. Contrary to the inference desired by MemsTech, however, Dr. Gilleo did not testify to the obverse – that is to say that all devices having a chamber, a volume and an aperture are MEMS packages. (Tr. at 171:12-173:21.) MemsTech has failed to provide evidence that Baumhauer teaches or suggests a MEMS package of any description, nor have they provided clear and convincing evidence of the reason why a person having ordinary skill in the art would be moved to modify Baumhauer to

create a MEMS package.

Based upon the foregoing, I find that Baumhauer alone does not render claim 1 of the '089 patent obvious, because it would not have been obvious to one having ordinary skill in the art to modify Baumhauer to create the package taught by the '089 patent.

Baumhauer in combination with Kress

MemsTech has said that Baumhauer shows all of the elements of the preamble except that the package is for surface mounting, which would be an obvious modification to one of ordinary skill in the MEMS packaging art in view of references such as Kress. (RX-363 at Q. 181; RX-45.) MemsTech argues that Kress discloses changing the packaging, for example from a TO-8 type package to a surface mountable package to meet the desired application. (RX-45 at MEMS155376.) MemsTech says that Kress describes a MEMS pressure transducer in a surface mountable package having a plurality of terminal pads on its outside surface, and the terminal pads are necessarily electrically connected to a patterned conductive layer on the surface to which the pressure sensor is mounted (inside the package enclosure).

I find Staff's argument persuasive that Baumhauer fails to teach or suggest a package because it does not disclose first or second level connections and it fails to disclose a package substrate. As discussed, *supra*, Baumhauer does not teach or suggest "a surface-mountable package." The further proposal to modify Baumhauer with Kress does not cure this deficiency. I see no rational basis to combine the teachings of Baumhauer with the teachings of Kress.

Kress, while it does mention packaging for a transducer, arises in the context of automotive silicon pressure sensors. The problem addressed in the '089 patent is surface mountable packages for microphones. Kress lacks the detail necessary to cause one of ordinary skill in the art to adapt it to an acoustic MEMS package. Examining RX-45 at MEMS 155376, I

note only two references to changing the packaging scheme. First, it says, "[t]he packaging scheme can be changed depending on the application." and second, figure 9 on that page indicates, "[s]ingle chip integrated barometric pressure sensor for SMD-mounting." No further enlightenment on changing from a TO-8 type package to a "surface mountable package" is afforded by a review of Kress. MemsTech has failed to provide clear and convincing evidence of the reason why a person having ordinary skill in the art would be moved to use Baumhauer in combination with Kress to create the MEMS package for a microphone taught by the '089 patent.

Based upon the foregoing, I find that Baumhauer in combination with Kress does not render claim 1 of the '089 patent obvious.

Baumhauer in view of Giachino

MemsTech avers that Giachino discloses all of the elements of the preamble to claim 1. They say that Figure 5 of Baumhauer shows the microphone transducer mounted on the surface of carrier substrate, which resides in the chamber defined by carrier substrate and enclosure member, and Figure 2 of Giachino shows the transducer attached to a surface formed on the first member substrate and the transducer resides within the chamber formed by the substrate and the cover. MemsTech's argument ignores the fact that Baumhauer does not disclose a package, as I have already found. Giachino, which arguably discloses a package, does not relate to a microphone (i.e. a transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals).

MemsTech asserts that Figure 1 of Giachino shows conductive leads connected to solder bumps and shows that the substrate has terminal pads, and argues "the substrate ***could be made*** surface mountable." MemsTech avers that Figure 2 of Giachino discloses the volume required

by Gilleo's definition of a MEMS package, since the pressure transducer and the cover define a volume. MemsTech argues that Giachino shows that air would enter the volume (under Knowles's claim construction) from the outside and contact the transducer. MemsTech says that Giachino includes a tubular extension of the cover, which includes an aperture, and that the tubular extension in Giachino "allows pressure and pressure variations, *i.e.* an acoustic signal," to enter and reach the transducer.

Knowles argues, more persuasively, that claim 1 is not rendered obvious in view of Giachino, because Giachino discloses a pressure sensor for measuring ***fluid pressure***.

Giachino does not teach a package having "a transducer being responsive to sound pressure of levels of an acoustic signal to provide an electrical output representative of the acoustic signals." Giachino does not disclose "a surface mountable package." The pressure transducer (element 14 of Figure 2) is mounted to a glass or insulating material, (element 28 of Figure 2) which is in turn mounted on a dielectric substrate (element 12 of Figure 2). Because substrate 28 is not the first or second member, it cannot form part of the package. Giachino does not teach or suggest "a transducer being responsive to sound pressure levels of an acoustic signal" and it also fails to teach or suggest "an aperture configured to permit the passage of an acoustic signal." It is, in fact, a fluid pressure sensor device.

I have already found that Baumhauer does not teach or suggest "a surface-mountable package." The further proposal to modify Baumhauer with Giachino does not cure this deficiency, because Giachino does not teach or suggest a surface mountable package.

The record lacks clear and convincing evidence to support finding a reason for a person having ordinary skill in the art to be moved to modify Baumhauer in combination with Giachino to create the MEMS package for a microphone taught by the '089 patent.

Based on the foregoing, I find that Baumhauer in view of Giachino does not render claim 1 of the '089 patent obvious.

Onishi

MemsTech argues that Figure 1 of Onishi and Figure 1 of the '089 patent show that Onishi discloses all of the structure set forth in claim 1 of the '089 patent with the exception that claim 1 requires an acoustic port so that the signal can interact with the transducer. MemsTech says that the use of apertures for the established purpose of allowing a signal to enter the package was well known prior to the filing of the application for the '089 patent, and "it would be common sense to add an aperture if the Onishi package were to be used for a microphone."

MemsTech argues that Onishi discloses a package and details the various features of Onishi, comparing Figure 1 of Onishi and Figure 1 of the '089 patent.

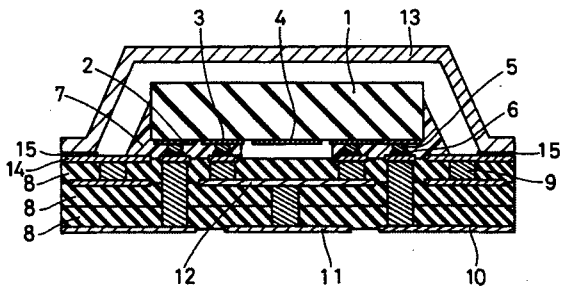


Figure 1 of Onishi

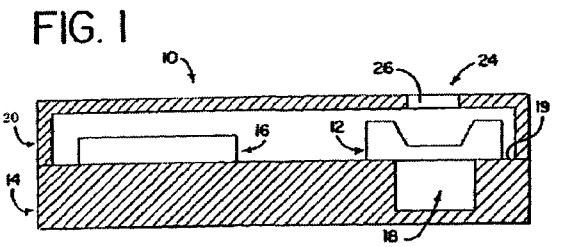


Figure 1 of the '089 Patent, CX-2

(RX-026; CX-2.)

MemsTech admits that the transducer in Onishi is a SAW device; but argues that those skilled in the art knew to use packages from different types of MEMS sensors for packaging microphones.

Knowles says that this argument is presented here for the first time in this investigation by MemsTech. MemsTech's prehearing statement at page 127 mentions Onishi in the context of an item of prior art that renders the '089 patent obvious. It states, "The Onishi transducer is a

SAW device that does not need an aperture. One of ordinary skill in the art looking for a package for a microphone could readily have adapted the Onishi package for such a purpose." (Referring to RX-363 at page 91, which is essentially the same language that appears in MemsTech's prehearing statement). Onishi was listed by MemsTech in its Initial Notice of Prior Art filed on May 28, 2008. While not a model of clarity, MemsTech's mention of Onishi alleges that it includes all of the limits of the '089 patent except for the inclusion of an aperture. To the extent that MemsTech's argument on this point is limited to the issue set forth above, it does not violate Ground Rule 4(d) promulgated by Order 2 in this case. Knowles is correct that better practice would have been for MemsTech to provide claim charts lining up the elements of the asserted claims against Onishi and/or to include a narrative describing which elements of the asserted claims compared to which features of Onishi. MemsTech will be limited to arguing what it disclosed in its prehearing statement.

Knowles's reference to the testimony of MemsTech's expert, Mr. Mallon, when questioned by Staff incorrectly characterizes events in light of the context at trial. Staff attempted on cross-examination to elicit testimony from Mr. Mallon regarding an obviousness defense using Onishi and Kress in combination as prior art references against claims 1 and 2 of the '231 patent. (Tr. at 564:6-565:6.) Knowles objected to this line of questioning, asserting that the opinions sought in the questioning involved multiple prior art references that had not been presented in the expert report or direct testimony. After a short recess, counsel for Staff stated that she could not find those combined references in Mr. Mallon's direct testimony or his expert reports. Inasmuch as the line of questioning was beyond the scope of the direct, I sustained the objection and the testimony was stricken. There was no agreement that "MemsTech had not raised an obviousness defense using Onishi or Kress as a prior art reference." (Tr. at 565:17-

567:25.) In fact, Ms. Frederick stated correctly at trial that Mr. Mallon had discussed the references individually, and indicated she was trying to question him about them ***in combination***. (Tr. at 565:17-20; RX-363 at Q. 202.) The attempt to cross-examine Mr. Mallon using the prior art references in combination was what put the line of questioning outside of the bounds of direct and was the basis for sustaining the objection.

Considering Onishi on the merits, Onishi discloses a surface acoustic wave ("SAW") device, and not a microelectromechanical system device. Onishi expressly teaches away from creating an aperture in its enclosure because its interior must remain sealed. According to the testimony of Dr. Gilleo, a SAW device, like that disclosed by Onishi, is an electronic filter that creates and detects surface vibrations, not sound waves, and as such its package requirements are diametrically opposed to those for a microphone. There is no acoustic port, because from the SAW device's perspective, external sound waves are "noise" that must be filtered out. (CX-411C, Gilleo Rbtl. Stmt. Q. 69)

Comparing Figure 1 of Onishi to Figure 1 of the '089 patent, I find that Onishi does not render the '089 patent obvious. Onishi teaches an inter-digital transducer (IDT) (figure element 4 of Figure 1) mounted to a substrate (figure element 1 of Figure 1); but the substrate to which the IDT is mounted is located within the package and cannot be either the first member or the second member described in claim 1 of the '089 patent. In Onishi, the "first member" would necessarily be the multilayer substrate (element 8 of Figure 1), and the "second member" would be the metallic lid (element 13 of Figure 1), which together would define a chamber within which the transducer (i.e. the IDT) would reside, as described in the first element of claim 1 of the '089 patent. Inasmuch as the IDT is mounted on figure element 1, it is not mounted on either the first member or the second member of the device shown in Onishi, Figure 1.

In addition, the device shown in Figure 1 of Onishi, as MemsTech admits, does not contain the aperture included in one of the first member or the second member as required by element 4 of claim 1 of the '089 patent.

At trial Dr. Gilleo gave his estimate of the likelihood of success in adding a microphone to the Onishi device, saying that it would fit in the device; but that the package would cause serious problems if one put a MEMS microphone in it. (Tr. at 752:20-25.)

Onishi was expressly considered by the examiner during the prosecution of the application that became the '089 patent, and the examiner cited specific features, including a multi-layer substrate with a conductive layer, a cover with a conductive layer, terminal pads, in making a non-final rejection. After the applicant successfully traversed the examiner's rejections the examiner allowed the pending claims that had previously been rejected for obviousness over Onishi. (RX 255, pp. 53, 207, 260, 365 and 366)

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that Onishi renders claim 1 of the '089 patent obvious, because it would not have been obvious to one having ordinary skill in the art to modify Onishi to create the package taught by the '089 patent.

Kress

In its added argument, MemsTech asserts that the packages shown in figures 6 and 9 of Kress, together with their descriptions, disclose the same features set forth in the asserted claims of the '089 patent.

Knowles says that this argument is presented here for the first time in this investigation by MemsTech in violation of Ground Rule 4(d) promulgated by Order 2 in this case. I concur. The only reference to Kress in MemsTech's prehearing statement is in combination with

Baumhauer, as set forth, *supra* of this Discussion and Conclusion. I found neither separate reference to Kress alone nor arguments regarding Kress in the detail set forth in MemsTech's added argument. There is no indication that the evidence and arguments cited by MemsTech in this context were first discovered at the hearing. Thus, I find that MemsTech's presentation of that argument here violates Ground Rule 4(d) and should not be considered on its merits.

Nevertheless, even if I were to consider Kress alone on its merits, I have previously found that Kress (in combination with Baumhauer), while it does mention packaging for a transducer, arises in the context of automotive silicon fluid pressure sensors and is not relevant to the field of endeavor of the '089 patent. Examining RX-45 at MEMS 155376, I noted only two references to changing the packaging scheme. First, "[t]he packaging scheme can be changed depending on the application" and second, Figure 9 on that page indicates, "[s]ingle chip integrated barometric pressure sensor for SMD-mounting." No further enlightenment on changing from a TO-8 type package to a "surface mountable package" is afforded by a review of Kress.

Based upon the evidence before me, I find that MemsTech has improperly added a set of issues not set forth in its prehearing statement as required by Ground Rule 4(d). In addition, MemsTech has failed to show by clear and convincing evidence that Kress, standing alone, renders the '089 patent obvious, because it would not have been obvious to one having ordinary skill in the art to modify Kress to create the package taught by the '089 patent.

b. Claim 2

MemsTech asserts that claim 2 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino. (RIB at 77.)

MemsTech's Position: MemsTech recites that claim 2 of the '089 patent depends from claim 1, and further requires that "the first member comprises a substrate and the second member comprises a cover coupled to the substrate to define the chamber." (CX-2.) MemsTech asserts that Figure 6 of Baumhauer shows that the carrier substrate is a substrate and is a first member, and the enclosure member is a cover and is a second member. (RIB at 77 (citing RX-363).) MemsTech alleges that Figure 2 of Giachino shows that the pressure transducer package has a lower substrate and a cover coupled to the substrate that defines a chamber. (*Id.* (citing RX-362).)

Knowles' Position: Knowles argues that since Baumhauer, alone or in combination with Kress does not render claim 1 obvious and since since claim 2 depends on claim 1, it too cannot be rendered obvious by Baumhauer, either alone or in combination with Kress. (CRB at 57.)

Similarly, Knowles argues that since Giachino does not render claim 1 obvious, and since claim 2 depends on claim 1, it too cannot be rendered obvious by Giachino. (CRB at 57-58.)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 2. Therefore the argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 2 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 2 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 2 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino.

c. Claim 9

MemsTech asserts that claim 9 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress or Giachino, or, alternatively, in view of Giachino. (RIB at 77.)

MemsTech's Position: MemsTech recites that claim 9 of the '089 patent depends from claim 1, and further requires that "the aperture being formed in the respective one of the first member and the second member, the surface being formed on the respective other one of the first member and the second member and the aperture is acoustically coupled by the chamber to the transducer." (CX-2.) MemsTech asserts that claim 9 of the '089 patent requires that the transducer is attached to one package member, and the aperture is in the other member, and that sound enters the aperture and passes through the chamber on its way to the transducer. MemsTech alleges that Baumhauer describes in the specification adding an acoustic port to enclosure member. (RIB at 77-78.) MemsTech posits that at least Kress and Giachino show pressure sensors having this configuration. (*Id.* (citing RX-363; RX-21 at 10:7-12).) MemsTech lists Figure 2 of Giachino to show a pressure sensor in the configuration recited in claim 9. (*Id.* at 78 (citing RX-362).)

Knowles' Position: Knowles argues that Baumhauer, alone or in combination with Kress does not render claim 9 obvious, because Baumhauer does not render claim 1 obvious. (CRB at 58.) Knowles asserts that, since claim 9 depends on claim 1, it too cannot be rendered

obvious by Baumhauer, either alone or in combination with Kress or Giachino. (*Id.*)

Knowles continues that Giachino does not render claim 1 obvious, and since claim 9 depends on claim 1, it too cannot be rendered obvious by Giachino. (CRB at 58.)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 9. Therefore the argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 9 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 9 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

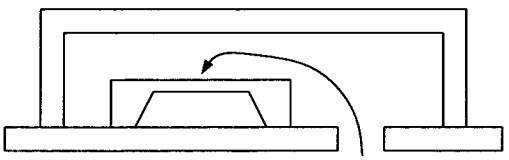
Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 9 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino.

d. <u>Claim 10</u>

MemsTech asserts that claim 10 of the '089 patent is invalid as obvious in view of Mullenborn and the 1977 National Semiconductor Pressure Transducer Handbook, (RX-52 at MEMS 199819) or, alternatively, in view of Baumhauer either alone or in combination with Kress and The 1977 National Semiconductor Pressure Transducer Handbook. (RIB at 78.)

MemsTech's Position: MemsTech asserts that Mr. Mallon testified that, to the extent

claim 10 of the '089 patent can be understood, it is obvious in view of Mullenborn and the 1977 National Semiconductor Pressure Transducer Handbook. (RIB at 78-79.) MemsTech alleges that the arrangement of the transducer and the aperture recited in claim 10 is not described or shown in the specification or drawings of the '089 patent. (*Id.* (citing RX-363).) MemsTech recites that claim 10 of the '089 patent depends from claim 1, and further requires that "the aperture is formed in the respective one of the first member and the second member, the surface is formed on the respective one of the first member and the second member and the transducer is attached to the surface leaving the aperture uncovered by the transducer, wherein the aperture is coupled to the transducer via the chamber." (CX-2.) MemsTech reasons that as best understood, claim 10 would require an arrangement as set forth in the figure below:



Mallon's Interpretation of Claim 10 of the '089 Patent

(*Id.* (citing RX-363).)

MemsTech asserts that this exact arrangement of a pressure transducer in a package is shown in the 1977 National Semiconductor Pressure Transducer Handbook.

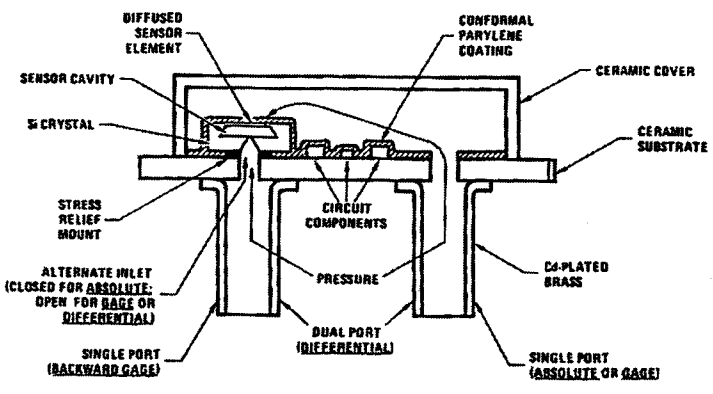


FIGURE 1. Basic Hybrid IC Pressure Transducer Structure

The 1977 National Semiconductor Pressure Transducer Handbook

(*Id.* at 79 (citing RX-363; RX-52 at MEMS199819).)

According to MemsTech, the figure above, from the 1977 National Semiconductor Pressure Transducer Handbook, shows a generalized transducer with two ports, but explains that for absolute pressure applications the port covered by the transducer (the port on the left) is closed, leaving just the port uncovered by the transducer (the port on the right) available. (RIB at 79 (citing RX-363; RX-52 at MEMS199819, 199826).) MemsTech reasons that one of ordinary skill in the art would have been motivated to combine the package disclosed in Mullenborn with the configuration shown the 1977 National Semiconductor Pressure Transducer Handbook, for instance in order to gain flexibility in the positioning of the resulting package into a product. (*Id.* (citing RX-363).)

MemsTech argues that in *In re Sovish*, 769 F.2d 738 (Fed. Cir. 1985), the Federal Circuit affirmed the PTO's obviousness rejection of a claim, because the differences between what was taught by the prior art and the claim was simply a "matter of design choice." (RIB at 80 (citing *Sovish*, 769, F.2d at 741; *In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975) (affirming that since the placement of a contact provided no novel or unexpected result, such placement was "an obvious matter of design choice within the skill of the art")).)

MemsTech asserts that alternatively, one of skill in the art would have been motivated to make the combination of Baumhauer (either alone or in combination with Kress) with the 1977 National Semiconductor Pressure Transducer Handbook in order to gain flexibility in the positioning of the components within the package. (RIB at 80 (citing RX-363).)

Knowles' Position: Knowles argues that claim 10 is not rendered obvious by combining Mullenborn with a particular aperture configuration disclosed by the 1977 National Semiconductor Pressure Transducer Handbook, because the enclosure disclosed in Mullenborn

does not provide physical protection for the electronics within, and therefore it cannot be the package required by claim 1. (CRB at 58-59 (citing CX-411C; CDX-6).) Knowles asserts that "simply providing a particular aperture configuration cannot remove this infirmity," and since claim 10 depends on claim 1, claim 10 cannot be rendered obvious by Mullenborn in combination with the 1977 National Semiconductor Pressure Transducer Handbook. (*Id.*)

Knowles argues that claim 10 is not rendered obvious in light of Baumhauer by itself or in combination with Kress and the 1977 National Semiconductor Pressure Transducer Handbook, because Baumhauer does not disclose a package. (CRB at 59 (citing CX-411C; CDX-5; CX-2; RX 256 at 249).) Knowles reiterates that "simply providing a particular aperture configuration cannot remove this infirmity." (*Id.*) Knowles asserts that since claim 10 depends on claim 1, claim 10 cannot be rendered obvious by Baumhauer by itself or in combination with Kress and the 1977 National Semiconductor Pressure Transducer Handbook. (*Id.*)

Commission Investigative Staff's Position: Staff argues that Mullenborn fails to teach or suggest a package according to claim 1, and the further proposal to modify this reference with National Semiconductor does not cure the underlying deficiencies of Mullenborn. (SIB at 65 (citing CX-411C).) Staff adds that there is no rational basis for a person skilled in the art to combine the MEMs microphone package with the fluid pressure sensors disclosed in the secondary references. (*Id.*) Accordingly, staff asserts, the evidence has not shown that these references render claim 10 obvious. (*Id.*)

In addition, Staff's argument that claim 1 was not rendered obvious included the same points as to claim 10. Therefore that argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I

determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 10 is valid. If, however, I find claim 1 to be valid in view of the asserted prior art and ***not*** obvious to a person having ordinary skill in the art, claim 10 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992). Therefore, although this issue arises in connection with claim 10, I must begin by considering claim 1.

Mullenborn and the 1977 National Semiconductor Pressure Transducer Handbook

While MemsTech's argument regarding claim 10 does not focus on claim 1, MemsTech previously argued that Mullenborn anticipates claim 1.[18] In discussing anticipation, I compared Mullenborn to the '089 patent and found that the record lacks clear and convincing evidence of such anticipation.

Claim 1 of the '089 patent teaches, *inter alia*, as follows:

> A surface mountable package ... comprising:
>
> at least a first member and a second member and a chamber being defined by the first member and the second member, the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber;
>
> the surface being formed with at least one patterned conductive layer, the patterned conductive layer being electrically coupled to the transducer ...

(CX-2 at 11:21-34.)

Figure 4 of Mullenborn, (RX-31) which was the focus of MemsTech's argument on the anticipation issue, discloses what can arguably be described as a package. It does not, however, meet the other limits of claim 1 quoted above. Figure 4 of Mullenborn contains, among other things, a "lid" (element 5 of Figure 4), a "transducer" (element 1 of Figure 4), a "substrate" (element 2 of Figure 4), and an "EMI shield" (element 16 of Figure 4). MemsTech argues that

[18] *See* Section IV B 3 (a) of this Decision, *supra.*

the "substrate" of Figure 4 of Mullenborn corresponds to the "first member" contemplated by claim 1 of the '089 patent, and the "lid" (i.e. "cover") of Figure 4 of Mullenborn corresponds to the "second member" taught by claim 1 of the '089 patent.

Claim 1 of the '089 patent requires the existence of a "chamber being defined by the first member and the second member." A chamber is defined as "a room or a natural or artificial enclosed space or cavity." WEBSTER'S NEW COLLEGIATE DICTIONARY, (1979 Ed.), at p. 183. Using the substrate and lid of Mullenborn, as the "first member" and the "second member," respectively, a chamber is not formed, because there are no sides formed by those members enclosing the space within which the transducer may reside. In order to form a chamber, using Mullenborn, a third element must be included, which is represented by the "EMI shield" (element 16 of Figure 4).[19] Therefore, Mullenborn does not meet the limit of claim 1 of the '089 patent that teaches "a chamber being defined by the first member and the second member."

On the other hand, if one were to substitute the "EMI shield" for the "substrate" as the "first member," a chamber might be formed by the lid and the EMI shield; but the transducer would then not be attached to a surface formed on the first member. In that case, the transducer might be considered to be "attached" to a surface formed on the second member (i.e. the "lid" of Mullenborn), because Figure 4 shows glue (figure element 21 of Figure 4) connecting the lid to the transducer. In that case, the limits of claim 1 of the '089 patent would still not be met, because the surface to which the transducer would be attached on the lid is not formed with at least one patterned conductive layer.

MemsTech's expert, Mr. Mallon, testified that he had reviewed Mullenborn and the 1977 National Semiconductor Pressure Transducer Handbook (hereinafter "National Semiconductor").

[19] MemsTech recognized the need for this third element in its initial brief at pages 54-55.

Using his definition of one having ordinary skill in the art,[20] Mr. Mallon testified that combining Mullenborn with National Semiconductor would render claim 10 obvious, because the person of ordinary skill in the art would be motivated to make the combination of Mullenborn and National Semiconductor in order to gain the flexibility in the positioning of the resulting package in a product. (RX-363 at Qs. 62, 63, 71, 92, 179, 180.)

Mr. Mallon's opinion regarding the combination of Mullenborn and National Semiconductor to render claim 10 obvious did not touch on the details of how, if at all, that combination would have rendered obvious claim 1, from which claim 10 depends. I am left with the unconvincing testimony of Mr. Mallon on the issue of anticipation of claim 1 by Mullenborn, discussed, *supra,* at section IV B 3 (a) of this decision.

The record lacks clear and convincing evidence to support finding a reason for a person having ordinary skill in the art to be moved to modify Mullenborn in combination with National Semiconductor to create the claimed MEMS package for a microphone. Based on the foregoing, I find that MemsTech has failed to provide clear and convincing evidence that Mullenborn in combination with National Semiconductor renders claim 1 of the '089 patent obvious

Notwithstanding the foregoing, even if claim 1 had been rendered obvious by the asserted references, I see nothing in National Semiconductor to induce one having ordinary skill in the art to amend the device of claim 1 of the '089 patent to arrive at the invention taught in claim 10. First, the package described in National Semiconductor is not surface mountable, as Mr. Mallon admitted when he testified that modifications would need to be made to the National Semiconductor device to make it surface mountable. (RX-363 at Q. 179.)

Second, the National Semiconductor device is not used for a microphone, it is a pressure

[20] The definition of "one having ordinary skill in the art" adopted previously herein requires less experience in MEMS packaging than required by Mr. Mallon's definition.

transducer and is connected directly into a pressure-flow system. Its diaphragm responds to direct stress from applied pressure, sometimes in a fluid environment. Even the version of the transducer for "acoustic applications" has a diaphragm that has a natural frequency outside the audio range (~50 kHz), and it does not generate audio-range harmonics from input sound waves. In short, the device does not employ a transducer that is a "microphone" as construed in this decision. (RX-52 at MEMS 199819 and 199824.)

I see no clear and convincing evidence in the record that would support a finding that a person of ordinary skill in the art would combine Mullenborn and National Semiconductor to arrive at the invention of claim 10 of the '089 patent.

Based on the foregoing, I find that claim 10 is not rendered obvious by Mullenborn in combination with the 1977 National Semiconductor Pressure Transducer Handbook.

Baumhauer

A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 10 is valid. Since, however, I have found claim 1 to be valid in view of Baumhauer and ***not*** obvious to a person having ordinary skill in the art, claim 10 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 10 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer.

Baumhauer in combination with Kress and The 1977 National Semiconductor Pressure Transducer Handbook

A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 10 is valid. Since, however, I have found claim 1 to be valid in view of Baumhauer in combination with Kress and ***not*** obvious to a person having ordinary skill in the art, claim 10 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

In addition to the foregoing, based upon the same evidence discussed *supra*, treating Mullenborn in combination with the 1977 National Semiconductor Pressure Transducer Handbook, I see no clear and convincing evidence that would render claim 10 obvious to a person having ordinary skill in the art in light of Baumhauer in combination with Kress and the 1977 National Semiconductor Pressure Transducer Handbook.

The record lacks clear and convincing evidence to support finding a reason for a person having ordinary skill in the art to be moved to modify Baumhauer in combination with Kress and National Semiconductor to create a MEMS package for a microphone.

Based on the foregoing, I find that claim 10 is not rendered obvious by Baumhauer in combination with Kress and the 1977 National Semiconductor Pressure Transducer Handbook.

e. Claim 15

MemsTech asserts that claim 15 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino. (RIB at 80.)

MemsTech's Position: MemsTech recites that claim 15 of the '089 patent depends from

claim 1, and further requires "the patterned conductive layer comprising a plurality of terminal pads, the terminal pads providing an electrical connection between the transducer within the volume and an exterior of the surface mountable package." (CX-2.) MemsTech asserts that Figure 6 of Baumhauer shows a plurality of terminal pads to which wire bonds are connected. (RIB at 80-81.) They say these terminal pads are on the surface of the carrier substrate, which may be a printed wiring board. (*Id.*) MemsTech posits that the pads must necessarily conductive if the device is to have any utility. In addition, they argue, at least Kress teaches this feature. (*Id.* (citing RX-363; RX-45 at Fig. 9).)

MemsTech alleges that Figure 1 of Giachino shows exterior terminal pads, which are described in the specification as conductive leads. (RIB at 81.) MemsTech asserts that the Giachino transducer is electrically connected to the substrate and the substrate has electrical traces that take the signal outside the chamber. (*Id.* (citing RX-362; RX-19 at 2:61-3:2).)

Knowles' Position: Knowles argues that, because Baumhauer, alone or in combination with Kress does not render claim 1 obvious, and since claim 15 depends on claim 1, it too cannot be rendered obvious by Baumhauer, either alone or in combination with Kress. (CRB at 59.)

Knowles reasons that, because Giachino does not render claim 1 obvious and since claim 15 depends on claim 1, it too cannot be rendered obvious by Giachino. (CRB at 59-60.)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 15. Therefore that argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could

still find that claim 15 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 15 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based on the foregoing, I find that claim 15 is not rendered obvious by Baumhauer in combination with Kress, or, alternatively in view of Giachino.

f. Claim 17

MemsTech asserts that Claim 17 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino. (RIB at 81.)

MemsTech's Position: MemsTech recites that claim 17 of the '089 patent depends from claim 1, and further requires "one or both of the first member and the second member including a shield against electromagnetic interference." (CX-2.) MemsTech alleges that Baumhauer states that the package provides EMI shielding. (RIB at 81 (citing RX-363; RX-21 at 9:56-64).) MemsTech asserts that Giachino includes a metal cover in order to provide a shield against electromagnetic interference. (*Id.* (citing RX-362).)

Knowles' Position: Knowles argues that, because Baumhauer, alone or in combination with Kress does not render claim 1 obvious, and since claim 17 depends on claim 1, it too cannot be rendered obvious by Baumhauer, either alone or in combination with Kress. (CRB at 60.)

Knowles argues that, because Giachino does not render claim 1 obvious, and since claim 17 depends on claim 1, it too cannot be rendered obvious by Giachino. (*Id.*)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 17. Therefore that argument will not be

repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 17 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 17 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 17 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino.

g. Claim 20

MemsTech asserts that Claim 20 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino. (RIB at 82.)

MemsTech's Position: MemsTech recites that claim 20 of the '089 patent depends from claim 1, and further requires that "the first member comprising a printed circuit board." (CX-2.) MemsTech asserts that Baumhauer states that the carrier substrate, which is a first package member, can be a printed wiring board. (RIB at 82.) MemsTech reasons that one of ordinary skill in the art would recognize that printed circuit board and printed wiring board are synonymous terms. (*Id.* (citing RX-363; RX-21 at 9:9).)

MemsTech says that Giachino describes using alumina, but other electrical insulating

materials, such as PCB, could be used. (*Id.*) MemsTech asserts that in 1981, PCB was a recognized material, and was extensively used in automotive applications other than under the hood. (*Id.* (citing RX-362).)

Knowles' Position: Knowles argues that, because Baumhauer, alone or in combination with Kress does not render claim 1 obvious, and since claim 20 depends on claim 1, it too cannot be rendered obvious by Baumhauer, either alone or in combination with Kress. (CRB at 60.)

Knowles also asserts that, because Giachino does not render claim 1 obvious, and since claim 20 depends on claim 1, it too cannot be rendered obvious by Giachino. (CRB at 60-61.)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 20. Therefore that argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 20 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 20 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 20 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino.

h. Claim 28

MemsTech asserts that claim 28 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino. (RIB at 82.)

MemsTech's Position: MemsTech recites that claim 28 of the '089 patent depends from claim 1, and further requires that "the volume [defined by the transducer and one of the first member or the second member] includes a portion of the chamber [defined by the first member and the second member]." (CX-2.) MemsTech argues that "to the extent that this claim language can be understood," Figure 6 of Baumhauer shows a volume that is part of the chamber. (RIB at 82-83 (citing RX-363).)

MemsTech states that Figure 2 of Giachino patent shows the volume (under Knowles' claim construction) in the chamber. (*Id.* at 83 (citing RX-362).)

Knowles' Position: Knowles argues that, because Baumhauer, alone or in combination with Kress does not render claim 1 obvious, and since claim 28 depends on claim 1, it too cannot be rendered obvious by Baumhauer, either alone or in combination with Kress. (CRB at 61.)

Knowles also reasons that, because Giachino does not render claim 1 obvious, and since claim 28 depends on claim 1, it too cannot be rendered obvious by Giachino. (*Id.*)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 28. Therefore that argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could

still find that claim 28 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 28 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 28 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer either alone or in combination with Kress, or, alternatively, in view of Giachino.

i. Claim 29

MemsTech asserts that claim 29 of the '089 patent is invalid as obvious in view of Baumhauer either alone or in combination with Kress and/or Giachino. (RIB at 83.)

MemsTech's Position: MemsTech recites that claim 29 of the '089 patent depends from claim 1, and further requires that "the acoustic signal is coupled to the transducer via the chamber." (CX-2.) MemsTech asserts that this claim language is unclear and not explained in the '089 patent specification. (RIB at 83.) MemsTech alleges that Baumhauer describes an embodiment with a configuration similar to that shown in figure 6, but with an aperture in the enclosure member. MemsTech argues that in such a configuration, sound would enter through the aperture and pass through the chamber on its way to the transducer. (*Id.*) They also allege that both Kress and Giachino disclose sensor packages in which the pressure signal enters a top cover, passes through the chamber, and reaches the transducer. (*Id.* (citing RX-363; RX-21 at 10:8-12).) Giachino shows a sensor package where the signal enters through the tubular extension of the cover and reaches the transducer. (*Id.* (citing RX-362).)

Knowles' Position: Knowles argues that, because Baumhauer, alone or in combination

with Kress does not render claim 1 obvious, and since claim 29 depends on claim 1, it too cannot be rendered obvious by Baumhauer, either alone or in combination with Kress. (CRB at 61.)

Knowles continues that, because Giachino does not render claim 1 obvious, and since claim 29 depends on claim 1, it too cannot be rendered obvious by Giachino. (*Id.* at 61-62.)

Commission Investigative Staff's Position: Staff's argument that claim 1 was not rendered obvious included the same points as to claim 29. Therefore that argument will not be repeated here.

Discussion and Conclusion: A patent is presumed to be valid, and each claim of a patent shall be presumed valid even though dependent on an invalid claim. 35 U.S.C. § 282. If I determined claim 1 to be obvious to a person having ordinary skill in the art and invalid, I could still find that claim 29 is valid. Since, however, I have found claim 1 to be valid and ***not*** obvious to a person having ordinary skill in the art, claim 29 is necessarily valid, because it depends from claim 1 and necessarily contains all of the elements of claim 1. *See In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Based upon the evidence before me, I find that MemsTech has failed to show by clear and convincing evidence that claim 29 of the '089 patent is rendered obvious to a person having ordinary skill in the art by Baumhauer either alone or in combination with Kress and/or Giachino.

5. <u>Objective Indicia of Non-Obviousness</u>

Knowles' Position: Knowles asserts that MemsTech has not established a *prima facie* case based on clear and convincing evidence that the '231 and '089 patents are invalid as obvious, and so there is no burden on Knowles to come forward with rebuttal evidence. As such, they argue, any discussion of secondary considerations is "premature." (CRB at 68-69 (citing

Canon Computer Sys., Inc. v. Nu-Kote Int'l, Inc., 134 F.3d 1085, 1088 (Fed. Cir. 1998); *Oxford Gene Tech. Ltd. v. Mergen Ltd.*, 345 F. Supp. 2d 444, 456 (D. Del. 2004)).) Nevertheless, assuming *arguendo* that MemsTech had established a *prima facie* case for invalidity based on obviousness, they argue that "certain factors weigh against any such finding." (*Id.*)

Knowles asserts that the commercial success of its SiSonic products supports a finding of non-obviousness. Knowles asserts that Dr. Loeppert testified that "[t]he new designs involved an innovative batch fabrication method for low cost packaging using FR-4 printed circuit board material that at the same time provided the needed protection for the MEMS die and necessary acoustic access to the environment." (CRB at 70.) Knowles alleges that Mr. Minervini's patented packaging designs made it possible to use these low-cost methods as is expressly detailed in the patents-in-suit. (*Id.* (citing CX-389C; CX-1 at 3:3-16, 3:36-38; CX-2 at 3:11-35, 3:43-46, claim 1 preamble).)

Knowles states that Dr. Loeppert testified that one cannot separate the packaging solution from the products and that Mr. Minervini's packaging solution was key to the successful commercialization of Knowles Acoustics' SiSonic microphone products. (CRB at 71 (citing CX-389C).)

Knowles says its President, Jeffrey S. Niew, established that one of the key advantages of Minervini's patented designs over traditional electret condenser microphones was the fact that SiSonic was a self-contained surface mountable package and much easier and cheaper to use. (CRB at 71 (citing CX-410C; CX-2 at 3:11-35, 3:43-46).) Again, these advantages and benefits are touted in the patents-in-suit. (*Id.*) Knowles asserts that while recognizing that there are other reasons for the success of the SiSonic microphone, Mr. Niew testified that the package was a critical part of the success. (*Id.* (citing CX-410C).)

Knowles argues that the evidence shows that the Knowles SiSonic microphone has been very successful because of the advantages the packaging design provides over traditional electret condenser microphones previously used in consumer applications. (CRB at 71 (citing CX-410C; CX-412C; CX-414C; CX-415C; CX-416; CX-417).) Knowles asserts that it sold no SiSonic microphones in 2003, but after incorporation of Mr. Minervini's patented packaging designs, it has now sold over 700 million units as of September 2008. (*Id.*)

Knowles alleges that many experts in the field have identified packaging as the key to successful commercialization of MEMS devices. (CRB at 71-72 (citing CX-411C; CX-396 at Preface p. xii/KEO467073, p. 20/KEO467351; CX-425 at 1; CX-426 at xxiii/KEO467325; CX-427 at 1077-1078; CX-428 at KEO467624; RX-363).) Knowles asserts that Dr. Petersen states in the introduction to Dr. Hsu's book that "[p]ackage development and implementation will make or break a MEMS product." (*Id.*) Knowles says that Dr. Hsu agrees, "MEMS and microsystem packaging, which includes assembly and testing, has been identified as being the single most serious stumbling block in commercialization [*sic*]." (*Id.*)

Knowles says that Mr. Mallon stated in his 2005 editorial "*The MEMS Packaging Problem; the MEMS Packaging Opportunity*" that, "for a MEMS device such as a sensor, most of the cost, value added and many of the customer requirements center on the package. The fundament[al] enabling technology is the MEMS die, it can provide significant user benefit and product differentiation, but only if packaged in a way that meets customer needs." (CRB at 72 (citing CX-397 at 38).)

Knowles asserts that praise in the industry supports a finding of non-obviousness. Knowles argues that the evidence shows that the awards given for Knowles Acoustics' SiSonic products by EDN magazine, Nanotech Briefs and Small Times magazine microphone are

directly related to the technical and manufacturing advantages and benefits provided by Mr. Minervini's packaging designs embodied in the '231 and '089 patents. (CRB at 72 (citing CX-389C; CX-199; CX-200; CX-205; CX-206; CX-207; CX-208; CX-209; CX-210; CX-214; CX-1 at 3:3-16, 3:36-38; CX-2 at 3:11-35, 3:43-46).) Knowles says that the EDN award notice for EDN's 15th Annual Innovator/Innovation campaign for 2004 states that the SiSonic microphone "incorporates an innovative packaging technique to provide advantages over common electret microphones." (*Id.* (citing CX-389C; CX-1 at 3:3-16, 3:36-38; CX-2 at 3:11-35, 3:43-46, claim 1 preamble; CX-9 at KE000488; CX-234 at KE07037081).)

Knowles asserts that the Nanotech Briefs 2005 First Annual Nano 50™ Award ("best of the best" award) for Knowles Acoustics' SiSonic "Zero-Height" MEMS-Based SMD Microphone was based on a submission directly linking the advantages of the microphone to Mr. Minervini's patented designs. (CRB at 73 (citing CX-389C; CX-199; CX-214C at KE0534411; CX-9 at KE000488; CX-1 at 3:3-16, 3:36-38; CX-2 at 3:11-35, 3:43-46, claim 1 preamble; CX-234 at KE0703081).) Knowles claims that the award submission states that the SiSonic "Zero-Height" microphone was the World's first surface mount microphone based on MEMS technology. (*Id.*) Knowles avers that the Small Times magazine "2003 Small Times Magazine Best of Small Tech Product Award" naming Knowles Acoustics' SiSonic microphone as runner-up was based on a submission directly linking the advantages of the microphone to Mr. Minervini's patented designs. (*Id.* (citing CX-389C).)

Knowles asserts that long-felt need and failure of others supports a finding of non-obviousness. Knowles says that Dr. Loeppert testified that, in 1996, he himself had attempted to develop a package for a MEMS microphone but his package failed because it was "difficult to assemble through automation processes and had very expensive components leading to a

relatively high per unit cost compared to conventional, consumer-based electret condenser microphones or ECMs." (CRB at 76 (citing CX-389C).)

Knowles alleges that, even after Mr. Minervini's inventions, others continued to seek viable MEMS microphone packages. (CRB at 76-78 (citing CX-425 at 1, 1077-1078; CX-411C).) Knowles asserts that "[t]his long felt need applies not only to MEMS microphone packages in particular, but also to MEMS device packaging generally." (*Id.* (citing CX-411C; CX-428 at KEO467624; CX-147 at 1, 8; CX-424C at 80:11-16; CX-397; CX-396 at xii; CX-426 at 20; RX-363).) Knowles argues that, given Dr. Loeppert's failures in designing a viable MEMS microphone package, and given the lengthy list of references explaining the need for viable MEMS packaging solutions, Knowles has "clearly established the secondary considerations of long-felt need and failure of others." (*Id.*)

MemsTech's Position: MemsTech argues that Knowles bears the burden of coming forward with evidence of secondary considerations, and that Knowles failed to do so at the hearing. (RIB at 88 (citing *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004)).)

MemsTech argues that there can be no finding of long-felt need or failure of others when people with "reasonable skill in the packaging art," such as Mr. Minervini and Mr. Sooriakumar, where able to quickly come up with a microphone package design based on their experience. (RIB at 88 (citing *Ecolochem v. Southern California Edison Co.*, 227 F.3d 1361, 1377 (Fed. Cir. 2000).) MemsTech points to Dr. Loeppert's testimony regarding the fact that Mr. Minervini developed the microphone package only six days after joining Knowles. (*Id.* at 89 (citing Tr. at 138:11-23, 139:13-140:1, 143:7-13).) Specifically, Dr. Loeppert testified that Mr. Minervini used the same approach that he had been using in his past job to come up with a suitable

microphone package. (*Id.*) MemsTech likewise points to Mr. Sooriakumar's testimony that he did not see anything inventive in the package he developed for MemsTech. (*Id.* (citing Tr. at 223:7-14).)

MemsTech argues that Knowles failed to demonstrate the required nexus between the claimed inventions and the commercial success of the SiSonic products. MemsTech states that Knowles relies solely on the testimony of Mr. Niew, who admitted that he had not read the patents and could not attribute commercial success to what is described in the patents in any definitive manner. (RIB at 90 (citing Tr. at 604:21-605:8).) Further, MemsTech points to Mr. Niew's testimony that there were "a hundred different things" that made the SiSonic products successful. (*Id.* (citing Tr. at 606:16-23).)

MemsTech claims that any success was due not to the claimed inventions, but to the fact that the silicon microphones used in the SiSonic products are capable of being surface mounted. MemsTech claims that the older electret condenser microphones ("ECM") could not withstand the heat necessary for surface mounting, and thus they had to be hand-inserted. (RIB at 91 (citing Tr. at 600:20-24, 601:12-602:4; RX-362).) Cell phone companies wanted the ability to surface mount the microphones to lower costs. (*Id.* (citing RX-369C; CX-148).) MemsTech therefore states that "it cannot reasonably be disputed that a significant reason (if not the primary reason) for the success of the SiSonic products was that the use of a silicon microphone die (i.e., the device inside the package and not the package itself) allowed it to be surface-mounted." (*Id.*) MemsTech states that because any commercial success is at best only partially due to the claimed features of the '231 and '089 patents, commercial success is irrelevant. (*Id.* (citing *Ormco*, 463 F.3d at 1311-1312).)

With regard to the awards that Knowles received for the SiSonic products, MemsTech

states that Dr. Loeppert admitted that the awards do not relate in any meaningful way to the packaging described in the '231 and '089 patents. (RIB at 92 (citing Tr. at 117:16-122:3).) Thus MemsTech claims that Knowles cannot establish a nexus between the patents and the awards. (*Id.* (citing *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994).)

Commission Investigative Staff's Position: Staff argues that evidence of industry praise does not support a finding of non-ovbiousness. (SIB at 42.) Staff claims that "[t]he evidence shows that [the awards given to Knowles] for the SiSonic products are due, in part, to other features not embodied by the asserted claims." (*Id.* (citing Tr. at 117:16-124:3).)

Staff also claims that Knowles' evidence of failure of others is lacking. Staff points to Dr. Loeppert's testimony that Knowles' prior microphone designs failed because they were expensive to manufacture. Staff claims that Dr. Loeppert testified that the inventions claimed in the '231 and '089 patents were inexpensive because Knowles used an "innovative batch fabrication method for low cost packaging using FR-4 printed circuit board." (*Id.* (quoting CX-389C).) Staff notes that this feature is not claimed in the patents-in-suit, and thus the prior failures are not relevant to the claimed inventions. (*Id.* at 42-43 (citing *Ormco*, 462 F.3d at 1313).)

Discussion and Conclusion: I have already found that MemsTech has failed to present clear and convincing evidence that the asserted claims of the '231 and '089 patents are obvious. Thus it is unnecessary to consider secondary considerations. Nevertheless, I will address the alleged evidence of secondary considerations raised by Knowles so that my analysis of the *Graham* factors is complete.

I find that Knowles has waived the ability to raise secondary considerations by failing to include the issue in its initial post-hearing brief and findings of fact, as discussed *supra*.

Knowles made a brief reference to secondary considerations in its pre-hearing statement. (*See* Ex. A to Knowles' Pre-Hearing Statement at 42-43.) Knowles then included a much more detailed discussion of secondary considerations in its reply brief, citing evidence introduced at the hearing as support. This prevented MemsTech from having the opportunity to properly respond to the secondary considerations arguments and evidence put forward by Knowles. Allowing Knowles to assert evidence of secondary considerations without providing MemsTech the opportunity to respond to and rebut such evidence is improper and unfair. Even though I now hold that Knowles has waived its secondary considerations arguments, I will consider the evidence in the event that the Commission finds otherwise.

Reviewing the evidence of secondary considerations is an important step in the obviousness analysis. As explained by the Federal Circuit:

> It is jurisprudentially inappropriate to disregard any relevant evidence on any issue in any case, patent cases included. Thus evidence rising out of the so-called "secondary considerations" must always when present be considered en route to a determination of obviousness. Indeed, evidence of secondary considerations may often be the most probative and cogent evidence in the record. It may often establish that an invention appearing to have been obvious in light of the prior art was not. It is to be considered as part of all the evidence, not just when the decisionmaker remains in doubt after reviewing the art.

Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538-39 (Fed. Cir. 1983) (citations omitted).

I find Knowles has submitted evidence that shows that the commercial success of the SiSonic products that is attributable to the '231 and '089 patents. "Evidence of commercial success, or other secondary considerations, is only significant if there is a nexus between the claimed invention and the commercial success." *Ormco*, 463 F.3d at 1311-1312. "When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention." *J.T. Eaton & Co. v.*

Atlantic Paste & Glue Co., 106 F.3d 1563, 1571 (Fed. Cir. 1997). If the patentee makes such a showing, the burden shifts to the challenger to prove that the commercial success is due to something other than the patented invention, such as advertising. *Id.*

Knowles has shown significant sales of the SiSonic products in the market from 2003 to the present. (CX-410C at Qs. 18-21, 24-26; CX-414C; CX-415C; CX-416; CX-417.) Since 2003, Knowles has sold over 700 million SiSonic units. (CX-410C at Q. 20.) Knowles also offers a 2006 article from EE Times titled "Knowles set to dominate acoustic MEMS," which states that "Knowles Acoustics is the leading provider of MEMS acoustic components with more than a 95 percent market share." (CX-416.) As discussed *infra* in connection with the domestic industry requirement, I find that the SiSonic practice the '231 and '089 patents. Knowles is therefore entitled to a presumption that the commercial success is due to the patented inventions.

In an attempt to rebut the showing by Knowles, MemsTech points to the testimony of Knowles' President, Mr. Niew. Specifically, MemsTech argues that the fact that Mr. Niew stated that the patents were only a small part of the success of the SiSonic microphone undercuts any nexus between the patents and the commercial success. I find otherwise. At the hearing, Mr. Niew testified:

> What I basically stated was, was that the practicing the patents and the things that were in the patents were a small part of the success, and the reason I said they were a small part was because I always look at this as a chain of a hundred different things that got to happen in order to make this product successful. And without the patents and without the package itself, the product wouldn't have been a success, so although it's a small portion, it's a critical portion to the success of the product.

(Tr. at 606:16-607:3.)

I find that Mr. Niew's testimony does not rebut the presumption of commercial success. Mr. Niew's testimony is the result of his big picture analysis in stating that many things need to

go right for a product to be successful. Mr. Niew still recognizes that the patents are a "critical portion" of the success of the products. Mr. Niew's testimony on this issue provides no other specific reason other than the claimed inventions as to why the products were a commercial success.

MemsTech also argues that the reason for the commercial success of the SiSonic products is that the silicon microphone die is able to withstand the heat of the surface mounting process, thus making SiSonic products more desirable than ECMs. MemsTech emphasizes that it is the microphone die itself – and not the package – that was susecptable to overheating problems when surface mounting. Mr. Niew's testimony on cross examination does not support that, as he testified that "[t]he whole microphone has to be able to withstand the heat, which includes everything." (Tr. at 603:8-604:7.) MemsTech fails to cite any evidence to contradict Mr. Niew's testimony. Thus, I do not find MemsTech's argument persuasive.

I find that Knowles' alleged evidence of industry praise does not support the finding of non-obviousness. "When a patentee offers objective evidence of nonobviousness, there must be a sufficient relationship between that evidence and the patented invention." *Paulsen*, 30 F.3d at 1482. As MemsTech and Staff note, the awards that Knowles won for its SiSonic product are not sufficiently tied to the features of the claimed inventions. (*See, e.g.,* Tr. at 117:16-124:3; CX-203C at KE0534353; CX-207C at KE0534384; CX-208C at KE0534394; CX-211C; CX-214C at KE0534411.)

I find that Knowles' alleged evidence of failure of others does not support the finding of non-obviousness. Knowles argues that Dr. Loeppert tried and failed to create a MEMS microphone package before Mr. Minervini invented the devices claimed in the '231 and '089 patents. In describing the package that he created in about 1996, Dr. Loeppert stated that the

package "was difficult to assemble...and had very expensive components[.]" (CX-389C at Q. 46.) Dr. Loeppert testified that while he was able to create a functional device, "it could not be successfully commercialized" due to the difficulty in assembly and high costs. (*Id.*)

This testimony does not support a finding that others besides Mr. Minervini failed at creating the patented packages. The testimony supports a finding that Dr. Loeppert failed to create a package that was commercially viable. This finding is further supported by Dr. Loeppert's answer when asked about why Mr. Minervini's package design worked:

> The new designs involved an innovative batch fabrication method for ***low cost*** packaging using FR-4 printed circuit board material that at the same time provided the needed protection for the MEMS die and necessary acoustic access to the environment.

(*Id.* at Q. 75) (emphasis added.) Further, the "innovative batch fabrication method" described above is not claimed in the '231 or '089 patents.

I find that Knowles' alleged evidence of long-felt but unresolved need does not support the finding of non-obviousness. The references generally relate to the importance of packaging in MEMS devices and the technical difficulty associated with packaging. (*See* CX-411C at Q. 185; CX-428 at KE0467624; CX-147 at 1, 8; CX-424C at 80:11-16; CX-397; CX-427 at 1077-78; CX-425 at 1; CX-396 at xii; CX-426C at 20.) None of these references demonstrate that prior to Mr. Minervini's inventions, there was a long-felt need but unresolved need in the industry for the claimed microphone packages.

D. The Written Description Requirement

The first paragraph of 35 U.S.C. § 112 requires:

> The specification ***shall contain a written description of the invention***, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art ... to make and use the same ...

(emphasis added.)

The Federal Circuit has interpreted 35 U.S.C. § 112, ¶ 1, to require the patent specification to "describe the claimed invention so that one skilled in the art can recognize what is claimed." *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 968 (Fed.Cir.2002). In evaluating whether a patentee has fulfilled this requirement, the standard is that the patent's "disclosure must allow one skilled in the art 'to visualize or recognize the identity of' the subject matter purportedly described." *Id.* (quoting *Regents of Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559, 1573 (Fed.Cir.1997)); *see also Cordis Corp. v. Medtronic Ave, Inc.*, 339 F.3d 1352, 1364 (Fed.Cir. 2003).

Terms need not be used *in haec verba*. *Eiselstein v. Frank*, 52 F.3d 1035, 1038 (Fed.Cir.1995). The written description requirement can be satisfied by "words, structures, *figures, diagrams,* formulas, etc." *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed.Cir.1997) (emphasis added).

MemsTech's Position: MemsTech argues that written description issues often arise when a patentee seeks to add or amend claims after the application is filed which are not encompassed by the disclosure of the invention in the original application. (RIB at 93.) MemsTech asserts that the purpose of the written description requirement is to guard against an "inventor's overreaching by insisting that he recount his invention in such detail that his future claims can be determined to be encompassed within his original disclosure." (*Id.* (quoting *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1561 (Fed. Cir. 1991)).)

MemsTech argues that in all cases, the purpose of the written description requirement is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him. (RIB at 93 (citing *Hyatt v. Boone*, 146 F.3d 1348, 1354 (1998); *Lockwood*, 107 F.3d at1572 ("a prior application itself must describe an invention,

and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought")).)

MemsTech states that claim 10 of the '089 patent adds to claim 1 "the aperture is formed in the respective one of the first member and the second member, the surface is formed on the respective one of the first member and the second member and the transducer is attached to the surface leaving the aperture uncovered by the transducer, wherein the aperture is coupled to the transducer via the chamber." (CX-2.) MemsTech alleges that claim 10 is difficult to construe, and to the extent it can be construed, it finds no support in the specification, and thus should be held invalid for failure to satisfy the written description requirement. (RIB at 93-94 (citing RX-363).)

MemsTech asserts that the arrangement of claim 10 is not shown or discussed anywhere in the '089 Patent. (RIB at 94 (citing RX-363).) MemsTech argues that "[i]t is evident that the applicant did not have possession of the subject matter of claim 10 at the time the application for the '089 patent was filed. Therefore, they say, claim 10 is invalid under 35 U.S.C. § 112." (*Id.*)

Knowles' Position: Knowles asserts that the configuration of MEMS microphone and aperture taught in claim 10 of the '089 patent is shown in Fig. 28 and 29 of the patent. (CRB at 78 (citing CX-411C).) Knowles argues that this is sufficient to meet the written description requirement of 35 U.S.C. §112. (*Id.*)

Commission Investigative Staff's Position: Staff asserts that, while the exact language at issue does not have to be in the original application, the original disclosure must convey to one of ordinary skill in the art that the inventor was in possession of the inventions claimed in the patent in order to satisfy the written description requirement. (SIB at 62-63 (citing *TurboCare Div. of Demag Delaval Turbomachinery Corp. v. General Elec.*, 264 F.3d 1111, 1119 (Fed. Cir.

2001); *Vas-Cath, Inc.*, 935 F.2d at 1563-64).) Staff argues that, "one of ordinary skill in the art, reading the original disclosure, must immediately discern the limitation at issue in the claims." (*Id.* at 63 (quoting *Purdue-Pharma, L.P. v. Fauling, Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000).) Staff reasons that, where a claim is amended or added during prosecution, the claim so amended or added must also find support in the original application. (*Id.* (citing *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998).)

Staff takes the view that the key issue to be resolved is whether Figures 28 and 29 disclose the configuration recited in claim 10. (SIB at 63.) Staff argues that Figures 28 and 29 have nothing to do with the various configurations of the transducer. (*Id.*) Rather, they assert, these figures relate to a preferred embodiment where the claimed invention includes a retaining ring 84. (*Id.* (citing CX-2 at 7:29-30).) Staff avers that the purpose of the retaining ring is to "prevent[] wicking of an epoxy 86 into the transducer 58 and from flowing into the acoustic port 86 or aperture 54." (*Id.* (quoting CX-2 at 7:31-33).) Staff says Figure 28 shows the retaining ring placed in such a manner to avoid contact with the transducer. (*Id.* at 63-64 (citing CX-2 at 7:7:45-48).) Staff states that in contrast, Figure 29 places the retaining ring in contact with the transducer. (*Id.* (citing CX-2 at 7:50-51).) Staff asserts that the figures themselves show that Knowles' position is contrary to the explicit disclosure in the '089 patent. (*Id.*)

Staff states that, if the aperture were on the same member as the transducer, as Knowles argues, the retaining ring would not prevent the flow of the epoxy into the aperture. (SIB at 64.) In fact, Staff argues, the epoxy would flow directly into the aperture, which is in direct contravention of the teachings of the '089 patent. (*Id.*)

Staff says that nothing in the description discussing these two figures expressly (or even implicitly) discloses that the aperture is located on the same member as the transducer. (SIB at

64.) Staff says that Knowles has based its argument on ambiguous figures. (*Id.*)

Finally, referring to an alleged continuation-in-part ("CIP") directed to an invention where the aperture is uncovered and located on the same member as the transducer, Staff asserts that claim 1 of said CIP recites "the transducer unit attached to the surface of the substrate adjacent the aperture." (SIB at 64 (citing MemsTech's Pre-Hearing Statement at 136).)[21] Staff argues that Knowles cannot seek to obtain patent protection for the same invention twice. (*Id.*) Staff submits that the specification of the '089 patent does not adequately describe claim 10, and the claim is thus invalid. (*Id.*)

Discussion and Conclusion: Based upon the evidence before me, I must conclude that the '089 patent does not contain the written description of claim 10 that is required by 35 U.S.C. § 112, ¶ 1. A detailed review of exhibit CX-2 did not produce any language that teaches an "aperture ... formed in the respective one of the first member and the second member, the surface ... formed on the respective one of the first member and the second member and the transducer ... attached to the surface ***leaving the aperture uncovered by the transducer*** ..." as required by claim 10 of the '089 patent.

The written description discusses and describes Figures 28 and 29 of the '089 patent, but never mentions the position of the transducer, the aperture or their relationship to one another. (CX-2 at 7:29-37, 7:45-51.) Likewise, Figures 28 and 29 do not show an aperture or its positional relation to the transducer. A person of ordinary skill in the art could not ascertain from the figures themselves where the aperture is to be placed and what relationship it would have to the transducer.[22]

Based upon the foregoing, I find that claim 10 of the '089 patent is invalid for failure to

[21] While not clear in Staff's brief, this appears to be a reference to page 136 of the Respondent's Pre-Hearing Brief.
[22] This is contrasted to Figure 27, which shows an aperture that is completely covered by the transducer.

contain the written description required by 35 U.S.C. § 112, ¶ 1.

V. INFRINGEMENT

A. Applicable Law

Complainants must prove either literal infringement or infringement under the doctrine of equivalents. Infringement must be proven by a preponderance of the evidence. *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 859 F.2d 878, 889 (Fed. Cir. 1988).

Literal infringement is a question of fact. *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1332 (Fed. Cir. 2008). Literal infringement requires the patentee to prove that the accused device contains each and every limitation of the asserted claim(s). *Frank's Casing Crew & Rental Tools, Inc. v. Weatherford Int'l, Inc.*, 389 F.3d 1370, 1378 (Fed. Cir. 2004).

As for the doctrine of equivalents:

> Infringement under the doctrine of equivalents may be found when the accused device contains an "insubstantial" change from the claimed invention. Whether equivalency exists may be determined based on the "insubstantial differences" test or based on the "triple identity" test, namely, whether the element of the accused device "performs substantially the same function in substantially the same way to obtain the same result." The essential inquiry is whether "the accused product or process contain elements identical or equivalent to each claimed element of the patented invention[.]"

TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc., 529 F.3d 1364, 1376-77 (Fed. Cir. 2008) (citations omitted).

Thus, if an element is missing or not satisfied, infringement cannot be found under the doctrine of equivalents as a matter of law. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538-39 (Fed. Cir. 1991). Determining infringement under the doctrine of equivalents "requires an intensely factual inquiry." *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.*, 212 F.3d 1377, 1381 (Fed. Cir. 2000).

B. '231 Patent

1. Claim 1

Claim 1 recites:

1. A microelectromechanical system package comprising:

a microelectromechanical system microphone;

a substrate comprising a surface for supporting the microelectromechanical microphone;

a cover comprising a conductive layer having a center portion bounded by a peripheral edge portion; and

a housing formed by connecting the peripheral edge portion of the cover to the substrate, the center portion of the cover spaced from the surface of the substrate to accommodate the microelectromechanical system microphone, the housing including an acoustic port for allowing an acoustic signal to reach the microelectromechanical system microphone wherein the housing provides protection from an interference signal.

Knowles' Position: Knowles argues that the accused products literally infringe claim 1. (CIB at 33.) Knowles claims that the accused products are all microelectromechanical system packages. (*Id.* (citing CX-218; CX-45C; CX-37C).) For the first claim element, Knowles claims that "[t]he microphone inside of the accused packages is a silicon condenser microphone, which is a particular type of MEMS microphone." (*Id.* (citing CX-392C at Q. 33).) For the second element, Knowles states that "the accused packages consistently indicate the inclusion of a package substrate." (*Id.* at 34 (citing CX-217; CX-220; CX-231; CX-232; CX-37C).) Knowles cites to Dr. Gilleo's testimony stating that he found that the MEMS microphone in the accused products was attached to the package substrate. (*Id.* (citing CX-392C at Q. 34).)

For the "cover comprising a conductive layer..." element, Knowles states that "MemsTech's documents showing the structure of the accused packages consistently indicate the inclusion of such a cover." (*Id.* (citing CX-392C at Q. 35; CX-221C; CX-37C; CX-231).)

Knowles claims that the cap on the accused products is made of metal, and is therefore conductive. (*Id.* at 34-35 (citing CX-221C; CX-33C; CX-392C at Q. 36; CX-30C; CX-32C).) Knowles states that "[t]he drawings found at CX-37-C (MEMS054915-38 clearly show a 'cap' with a center portion bounded by a peripheral edge portion[.]" (*Id.*)

The fourth element includes multiple requirements, and Knowles asserts that the accused products contain all of those requirements. Knowles claims that the accused products include a housing formed by the connection of the peripheral edge portion of the cover to the substrate, such that the housing provides room for the MEMS microphone. (*Id.* at 35 (citing CX-231; CX-37C; CX-224; CX-392C at Q. 36).)

The next part of the element requires an acoustic port in the housing to allow an acoustic signal to reach the MEMS microphone. Knowles states that "[d]ocuments referencing the accused packages consistently show the presence of an acoustic port that would allow the acoustic signal to reach the MEMS microphone." (*Id.* at 36 (citing CX-219; CX-232; CX-221; CX-224; CX-37C).) Knowles also relies on testimony from its expert and MemsTech's corporate representative that demonstrates that the accused products include the claimed acoustic port. (*Id.* (citing CX-29C; CX-392C at Q. 37).)

The last requirement of the "housing" element states that "the housing provides protection from an interference signal." Knowles claims that the metallic cover in the accused products "provides shielding from electromagnetic interference (EMI)." (*Id.* at 36-37 (citing CX-231; CX-392C at Q. 38; CX-224).) Knowles further cites to testimony from MemsTech employees for support. (*Id.* at 37 (citing CX-30C; Tr. at 253:8-16, 255:25-256:8; CX-44C; CX-28C; CX-33C).)

MemsTech's Position: MemsTech argues that its products do not infringe claim 1.

MemsTech argues that under a proper construction of "layer," the "integral, one-piece all-metal cover" of the accused products does not meet this claim limitation. (RIB at 22.) MemsTech claims that its monolithic cover cannot meet the "layer" limitation because claim 1 requires multiple layers. (*Id.* at 22-23.)

MemsTech claims that even under Knowles' proposed construction of "layer," there is insufficient evidence to find infringement. (*Id.* at 23; RRB at 20.) Dr. Gilleo stated that the accused products have a "cover," "cap," "microphone cap," and "metal cap," but he allegedly never stated that the MemsTech cover is a "layer" as required by the claim. (RIB at 23 (citing CX-392C at Qs. 35, 65).) MemsTech argues that this demonstrates that Knowles has failed to present enough evidence to find that the accused products include a "layer" as found in claim 1. (*Id.*; RRB at 20.)

Commission Investigative Staff's Position: Staff argues that under its proposed constructions, the accused MemsTech products literally infringe claim 1. Staff claims that the evidence shows that the accused products each contain a microphone mounted on the surface of a substrate. (SIB at 29 (citing CX-392C; CX-217; CX-231; CX-37C).) Staff claims that the evidence shows that the accused products contained the claimed cover. (*Id.* (citing CX-221; CX-37C; CX-392C; Tr. at 252:3-7).) Staff asserts that the accused products include the claimed housing which provides protection from an interference signal and the claimed acoustic port in the housing. (*Id.* at 29-30 (citing CX-392C; CX-37C; CX-224; CX-232; CX-221; CX-224; Tr. at 257:3-15).)

Discussion and Conclusion: Based upon the evidence before me, I find that the accused products literally infringe claim 1 of the '231 patent.

The only claim element that MemsTech contends is missing from its accused products is

"a cover comprising a conductive layer having a center portion bounded by a peripheral edge portion." MemsTech's non-infringement argument is primarily based on its proposed construction of "layer," which would read out the monolithic metal cap found in the accused products. As discussed *supra*, I have rejected that proposed construction and adopted a broader construction: "a single thickness of material."

Applying this claim construction, I find that the accused MemsTech products include "a cover comprising a conductive layer having a center portion bounded by a peripheral edge portion." Each of the accused products includes a cap attached to the substrate with a center portion bound by a peripheral edge portion. (*See* CX-37C; CX-221.) Each cap is made out of cold rolled steel. (Tr. at 252:3-7.) It is not disputed by MemsTech that cold rolled steel is a conductive material. (*See* Tr. at 254:16-257:15.) This is consistent with Dr. Gilleo's opinion that the accused products include "a cover comprising a conductive layer having a center portion bounded by a peripheral edge portion." (CX-392C at Q. 35.) Thus, the metal cap in the MemsTech products constitutes the "cover comprising a conductive layer…"

MemsTech also argues that Knowles failed to put forward sufficient evidence to prove the cover limitation. I find otherwise. Knowles put forward expert testimony from Dr. Gilleo in which he opined that the accused products meet the "cover comprising a conductive layer…" limitation. (CX-392C at Q. 35.) Knowles offered exhibits depicting the cover in the MemsTech products. (*See, e.g.,* CX-221; CX-37C.) Knowles cross-examined Mr. Sooriakumar, who testified that the covers in the accused products are made from cold rolled steel, which is a conductive material. (*See* Tr. at 252-257.) MemsTech is incorrect in its assertion that there is no evidence to support a finding that the accused products meet the "cover comprising a conductive

layer..." limitation. (*Id.*)[23]

I find that Knowles put forward sufficient evidence to prove that the accused products meet the limitations of the remaining elements of claim 1. The accused products are microelectromechanical system packages. (CX-392C at Q. 32; CX-218; CX-45C; CX-37C.) The accused products include a microelectromechanical system microphone. (CX-392C at Q. 33; CX-218; CX-45C; CX-37C.) The accused products contain a substrate comprising a surface for supporting the microelectromechanical microphone. (CX-392C at Q. 34; CX-217; CX-220; CX-231; CX-232; CX-37C.) The accused products include the housing formed by connecting the peripheral edge portion of the cover to the substrate, the center portion of the cover spaced from the surface of the substrate to accommodate the microelectromechanical system microphone. (CX-392C at Q. 36; CX-231; CX-37C; CX-224.) The accused products include an acoustic port in the housing. (CX-392C at Q. 37; CX-219; CX-232; CX-221; CX-224; CX-37C.) The housing in the accused products provides protection from an interference signal. (CX-392C at Q. 38; CX-231; CX-224.)

Based upon the foregoing, I find that the accused products literally infringe claim 1 of the '231 patent.

2. Claim 2

Claim 2 recites:

> 2. A microelectromechanical system package for providing a shield from an interference signal, the microelectromechanical package comprising:
>
> a silicon-based microphone;
>
> a substrate including a surface at least partially covered by a first layer of a conductive material, the silicon-based microphone is electrically coupled to the

[23] While MemsTech disputes that the nickel plating on the caps constitutes the "conductive layer," I find it unnecessary to decide that issue, as I have already found that the cold rolled steel cap constitutes the conductive layer.

layer of a conductive material;

a cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material and providing a chamber in which the silicon-based microphone is located, the chamber providing an acoustic front volume for the silicon-based microphone.

Knowles' Position: Knowles argues that the accused MemsTech products literally infringe claim 2. Knowles claims that the accused products are all microelectromechanical system packages. (CIB at 37.) The first element of claim 2 requires "a silicon-based microphone." Knowles states that it is "clear that the microphone inside of the accused packages is a silicon condenser microphone." (*Id.* (citing CX-218; CX-45C; CX-227; SF 202).)

The second element requires a substrate at least partially covered by a layer of conductive material, and the microphone electrically coupled to the layer. Knowles claims that the MemsTech products have "a package substrate with a conductive circuit pattern[.]" (*Id.* at 37-38 (citing CX-392C; CX-1 at 5:30-33; CX-369C; CX-227C; CX-30C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C; CX-228; CX-229).) Knowles also points to the testimony of a MemsTech engineer to support its assertion that the substrate in the accused products is partially covered with conductive material. (*Id.* at 38 (citing CX-124C; CX-33C).)

Knowles asserts that the MEMS microphone in the MemsTech products is electrically coupled to the substrate either through a direct connection,[24] or through an indirect connection via an amplifier. (*Id.* at 38-39 (citing CX-392C; Tr. at 262:3-263:24, 548, 550; CX-122C; RX-18).) Knowles cites the testimony of a MemsTech engineer, who testified that power is drawn from the substrate, through the preamplifier, to the microphone. (*Id.* at 39 (citing CX-122C; CX-33C).) Knowles claims that the electrical connection of the microphone and the substrate

[24] MemsTech disputes that any accused products include a microphone with a direct electrical connection to the substrate. (RRB at 22-23.)

through the amplifier constitutes an electrical coupling as required by the claim. (*Id.* at 38-39.) Knowles argues that even if MemsTech's construction of "electrically coupled" is adopted, there is still infringement under the doctrine of equivalents because the indirect wiring scheme of the MemsTech products is insubstantially different than a direct connection between the substrate and the microphone. (*Id.* at 39 (citing CX-32C).)

The third element requires a cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material and providing a chamber in which the silicon-based microphone is located. The chamber must provide an acoustic front volume for the microphone. Knowles argues that the metallic cover of the accused products contains a layer of conductive material and is electrically connected to the conductive layer on the substrate. (*Id.* at 39-40 (citing CX-392C).) Knowles argues that the connection of the cover and substrate form a chamber where the microphone resides. (*Id.* (citing CX-392C).) Knowles states that "[l]ogically, the 'acoustic front volume' is within the chamber irrespective of the orientation of the MEMS dies...and whether or not the aperture is located in the cover or in the package substrate." (*Id.* at 40.) Knowles states, in sum, that "[i]f Knowles' claim constructions are accepted, then all of MemsTech's products undoubtedly infringes [*sic*]. If MemsTech's constructions are used, MemsTech still infringes Minervini '231 Claim 2 but under the doctrine of equivalents." (CRB at 17.)

MemsTech's Position: MemsTech argues that its accused products do not infringe claim 2. MemsTech states that its accused products do not meet the "cover comprising a second layer of a conductive material" for the same reasons as argued, *supra*. (RIB at 23 (citing RX-368C; CX-392C).)

MemsTech also argues that its accused products do not meet the limitation requiring that

the "microphone is electrically coupled to the layer of a conductive material." (*Id.* at 24 (citing CX-1).) MemsTech claims that in the accused products, the microphone is wired only to the preamplifier, and not to a conductive layer on the substrate as required by claim 2. (*Id.* (citing RX-368C).) Thus, according to MemsTech, the accused products "include no electrical connection from the transducer to a conductive layer on the substrate." (*Id.* (citing RX-368C).) Because the microphone is only wired to the preamplifier, MemsTech argues that it cannot meet the "electrically coupled" claim limitation. (*Id.*) MemsTech argues that Dr. Gilleo's infringement analysis should be disregarded because it is based on an incorrect construction of "electrically coupled." (*Id.* (citing CX-392C; RX-368C).)

MemsTech argues that Knowles waived its doctrine of equivalents argument by not raising it earlier in the investigation. (RRB at 23-25.) Even assuming that Knowles' doctrine of equivalents argument is considered, MemsTech claims that Knowles presented insufficient evidence to find infringement under the doctrine of equivalents. (*Id.* at 25-26.)

Commission Investigative Staff's Position: Staff argues that the accused products literally infringe claim 2. According to Staff, the accused products include the "silicon-based microphone" of claim 2. (SIB at 30 (citing CX-392C; CX-218C; CX-45C).)

As for the second element, Staff states that "[t]he evidence showed that the accused products contain a silicon microphone and other components electrically coupled to the conductive layer of the substrate...In particular, the microphone is electrically coupled to the substrate through the amplifier." (*Id.* at 31 (citing CX-392C; CX-363; Tr. at 263:19-24).) Staff further asserts that the accused products include the final "cover" element of claim 2. (*Id.* (citing CX-392C).)

Staff agrees with MemsTech that Knowles' doctrine of equivalents argument has been

waived because Knowles never mentioned the doctrine of equivalents in its complaint, interrogatory responses, expert reports, and witness statements. (SRB at 9-10 (citing RX-126C).) Staff further argues that the "scant evidence" submitted by Knowles does not meet the threshold for proving infringement under the doctrine of equivalents. (*Id.* at 10-11.)

Discussion and Conclusion: Based on the evidence before me, I find that the accused products literally infringe claim 2 of the '231 patent.

MemsTech offers two non-infringement arguments. The first argument relates to the claim limitation requiring "a cover comprising a second layer of a conductive material..." MemsTech argues that its monolithic metal cap cannot meet this limitation. This argument is based on MemsTech's proposed construction of "layer," which would read out the monolithic metal cap found in the accused products. As discussed *supra*, I have rejected that proposed construction and adopted a broader construction: "a single thickness of material."

Applying this claim construction, I find that the accused MemsTech products include "a cover comprising a second layer of a conductive material." Each of the accused products includes a cap. (*See* CX-37C; CX-221.) Each cap is made out of cold rolled steel. (Tr. at 252:3-7.) It is not disputed by MemsTech that cold rolled steel is a conductive material. (*See* Tr. at 254:16-257:15.) This is consistent with Dr. Gilleo's opinion. (CX-392C at Qs. 35, 56.) Thus, the metal cap in the MemsTech products constitutes the "cover comprising a second layer of a conductive material ..." While the claim requires "a cover comprising a *second* layer of conductive material..." this does not require a multi-layer cover, as the first layer of conductive material is found on the surface of the substrate. (*See* CX-1 at claim 2.)

MemsTech's second non-infringement argument centers on the "electrically coupled" limitation. I have construed this term to mean "arranged so that electrical signals may be passed

either directly, or indirectly via intervening circuitry, from one component to another." Therefore, MemsTech cannot avoid infringement based on the fact that there is an indirect electrical connection between the microphone and substrate.

I find that the evidence shows that the accused products include a microphone electrically coupled to the layer of conductive material on the substrate. The microphone is wired to a preamplifier, and the preamplifier is electrically connected to the substrate. This allows electrical signals to flow from the substrate to the microphone. This finding is supported by MemsTech schematics and Dr. Gilleo's expert testimony. (*See* CX-392C at Q. 55; CX-122C; CX-363; RX-101C.) Mr. Sooriakumar's direct testimony also describes the connection between the microphone, amplifier, and substrate and supports my finding. (RX-18 at Qs. 150-170; RX-10; RX-11; RX-12.) This was confirmed during the cross examination of Mr. Sooriakumar, as he testified that power goes from the substrate to the transducer via the preamplifier. (Tr. at 262:13-263:24.) This is further confirmed by Mr. Mallon's testimony:

> Question No. 4 Please describe for us the structure of MemsTech's silicon microphones that are the subject of this investigation.
>
> A. These devices have a printed circuit board substrate on which is mounted a MEMS microphone transducer die and an ASIC amplifier die. The microphone die is electrically connected by wire bonding directly to the ASIC. The ASIC is bonded to a conductor layer on the substrate. A housing is formed by a cover that is bonded to the substrate. The cover has a port or aperture the purpose of which is to admit sound. Some devices have alternate constructions that have a rear aperture.

(RX-368C at Q. 4; *see also* Tr. at 546:8-548:24.)

As to the other elements of claim 2, I find that Knowles put forward sufficient evidence to prove that the accused products meet the limitations. The accused products are microelectromechanical system packages. (CX-392C at Qs. 32, 53; CX-218; CX-45C; CX-37C.) The accused products include a silicon-based microphone. (CX-392C at Q. 54; CX-218;

CX-45C; CX-227.) The accused products contain a substrate including a surface at least partially covered by a first layer of a conductive material. (CX-392C at Q. 55; CX-228; CX-363.) The accused products include the cover comprising a second layer of a conductive material, the cover electrically connected to the first layer of a conductive material and providing a chamber in which the silicon-based microphone is located. (CX-392C at Qs. 35, 56; CX-221;CX-37C; CX-231.) The chamber of the accused products provides an acoustic front volume for the silicon-based microphone. (*Id.*)

Based upon the foregoing, I find that the accused products literally infringe claim 2 of the '231 patent.[25]

C. '089 Patent

1. Claim 1

Claim 1 recites:

> A surface mountable package for containing a transducer, the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals, the surface mountable package comprising:
>
> at least a first member and a second member and a chamber being defined by the first member and the second member, the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber;
>
> the surface being formed with at least one patterned conductive layer, the patterned conductive layer being electrically coupled to the transducer; an outside surface of the surface mountable package comprising a plurality of terminal pads electrically coupled to the patterned conductive layer;
>
> a volume being defined by the transducer and one of the first member or the second member, the volume being acoustically coupled to the transducer; and

[25] As I have found literal infringement of claim 2, it is unnecessary to address the issue of doctrine of equivalents. Furthermore, I concur with MemsTech and Staff that Knowles waived any doctrine of equivalents argument by raising it in an untimely manner.

one of the first member or the second member being formed to include an aperture, the aperture configured to permit the passage of an acoustic signal to the transducer.

Knowles' Position: Knowles recites that claim 1 of the '089 patent comprises five elements along with a preamble. The preamble states "[a] surface mountable package for containing a transducer, the transducer being responsive to sound pressure levels of an acoustic signal to provide an electrical output representative of the acoustic signals, the surface mountable package comprising:" Knowles asserts that MemsTech's documents referencing the accused packages consistently indicate that the accused packages use surface mount technologies. (CIB at 42.) They say the document found at CX-230 (MEMS136624-47, particularly MEMS136626) indicates that the accused packages can be assembled using surface mount technologies and the datasheet found at CX-46C (MEMS030168-77) indicates that the accused packages are "surface mountable." (*Id.*) Knowles alleges that MemsTech's documents and witnesses also consistently indicate that the accused packages include a transducer for converting acoustic signals to an electrical output that is representative of the acoustic signals. (*Id.*) Knowles cites as an example, the document found at CX-231 (MEMS061068-92, particularly MEMS061075) stating that it indicates that the microphone in the accused packages includes a microphone die which "converts the mechanical/acoustical energy caused by the vibration of the diaphragm into electrical signals," (in other words, a "transducer") and various drawings such as those found in CX-37-C (MEMS054915-38) show the transducer residing within the package. (*Id.*)

Knowles recites that the first element of claim 1 requires "at least a first member and a second member and a chamber being defined by the first member and the second member, the transducer being attached to a surface formed on one of the first member or the second member and the transducer residing within the chamber." Knowles asserts that documents referencing

the accused packages show a chamber defined by the package substrate and the metal cap (which correspond to the first and second members). (CIB at 43.) Knowles points to drawings found at CX-37C (MEMS054915-38) to show a chamber formed by mating the package substrate and cap, and Knowles says the assembly process described in the document found at CX-231 (MEMS061068-92, e.g. MEMS061070) indicates that the cap is attached to the package substrate to form the chamber, and the document found at CX-224 (MEMS154131-35, e.g. MEMS154133) shows a chamber enclosing a MEMS microphone. (*Id.*) Knowles asserts that MemsTech's documents and witnesses' testimony also show the transducer mounted to the package substrate, which is either the first or second member. (*Id.*) For example, Knowles says, the assembly process described in the document found at CX-231 (MEMS061068-92, e.g. MEMS061070) indicates that the transducer is attached, or bonded to the package substrate surface. (*Id.*) Knowles continues that Dr. Gilleo also physically examined the interior of one of the accused packages and observed that the transducer resides on top of the package substrate. (*Id.* (citing CX-392C; CX-2 at 11:20-23; CX-230; CX-46C; CX-29C at 200:16-201:10; CX-49C; CX-37C; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C).)

Knowles recites that the second element of claim 1 requires "the surface being formed with at least one patterned conductive layer, the patterned conductive layer being electrically coupled to the transducer." Knowles asserts that MemsTech's documents and witnesses consistently establish that the transducer is electrically coupled to the patterned conductive layer of the package substrate. (CIB at 43-44.) Knowles provides as an example, the assembly process described in the document found at CX-231 (MEMS061068-92, especially at MEMS061070) stating that it "indicates that the transducer is electrically connected to the

package substrate surface using wire bonding." (*Id.* (citing CX-392C; CX-2 at 11:25-30; CX-37C; CX-49C; CX-224C; CX-227C; CX73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C).) Knowles avers that Mr. Kumaraswamy, project engineer for MemsTech, testified that in MemsTech's products, power is drawn from the substrate, through the preamplifier, to the microphone. (*Id.* (citing CX-122C at MEMS003927 and 52:1-53:10; CX-33C at 42:12-45:12).) Knowles also says MemsTech explicitly confirms this pathway constitutes an electrical connection in CX-94C, "showing that the substrate bond pads are electrically connected to the microphone." (*Id.* (citing CX-94C at MEMS005089).)

Knowles argues that even if MemsTech's claim interpretation of a "direct" connection was accepted, the MemsTech design would still infringe under the doctrine of equivalents. (CIB at 44.) Knowles asserts that Mr. Sooriakumar confirmed "the difference between MemsTech's design in which the microphone is directly connected to the substrate and the design in which the electrical pathway is formed out of the CMOS sensor is insubstantial." (*Id.*) Knowles states that Mr. Sooriakumar testified that design could just as easily incorporate the alternative wiring scheme as a substitute. (*Id.* (citing CX-32C at 50:10-51:9).)

Knowles recites that the third element of claim 1 requires "an outside surface of the surface mountable package comprising a plurality of terminal pads electrically coupled to the patterned conductive layer." Knowles asserts that documents referencing the accused packages show the bottom of the accused packages having terminal pads connected to the patterned connective layer. (CIB at 44-45.) As an example, Knowles points to the drawings found at CX-219 (MEMS005088-91, e.g. MEMS005089) stating that "they show that the accused packages have terminal pads, and the figure legend indicates 'Electrical contact to microphone,' the

drawings in a product line presentation found at CX-45-C (MEMS005107-23, e.g. MEMS005110) show the presence of terminal pads on the bottom of the accused packages, drawings in product data sheets such as that found at CX-46-C (MEMS030168-77, e.g. MEMS030171) show the terminal pads and their connection assignments." (*Id.* (citing CX-392C; CX-2 at 11:31-33; CX-49C; CX-30C at 276:15-22; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C).) Knowles says that MemsTech has admitted that the accused packages are surface mountable through the terminal pads on the bottoms of the packages. (*Id.* (citing CX-29C at 200:16-201:3).)

Knowles recites the fourth element of claim 1 requires "a volume being defined by the transducer and one of the first member or the second member, the volume being acoustically coupled to the transducer." Knowles asserts that MemsTech's documents showing construction of the accused packages show a volume positioned between the transducer and either the first or second member. (CIB at 45.) Knowles cites as an example, the drawings found at CX-37C (MEMS054915-38) which, they say, "show volumes defined by the package cap (which is either the first or second member) and the transducer, as do the conceptual drawings found at CX-232 (MEMS055164-72)." (*Id.* (citing CX-392C; CX-2 at 11:33-37; CX-219C; CX-45C; CX-46C; CX-30C at 426:5-427:17; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C).)

Knowles recites that the fifth element of claim 1 requires "one of the first member or the second member being formed to include an aperture, the aperture configured to permit the passage of an acoustic signal to the transducer." Knowles asserts that MemsTech's documents showing construction of the accused packages show an aperture through which the acoustic

signal will pass on its way to the transducer. (CIB at 45.) Knowles provides as an example, the drawings found at CX-37C (MEMS054915-38) which they say show "apertures formed in the package substrate and/or the cap (that is, the first and/or second member of the package), as do the conceptual drawings found at CX-232 (MEMS055164-72)." (*Id.* (citing CX-392C; CX-2 at 11:38-40; CX-37C; CX-232C; CX-219C; CX-45C; CX-46C; CX-30C at 426:5-427:17; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C).) Knowles alleges that MemsTech's corporate representative, Mr. Sooriakumar, testified that "the acoustic signal can pass to the microphone from a hole in the cap or a hole in the package substrate." (*Id.* (citing CX-29C at 157:15-158:6, 159:13-160:17).)

In their reply brief, Knowles asserts that MemsTech and Staff erroneously imply that all of the accused products contain a glass pedestal. (CRB at 3-4.) Knowles asserts that Mr. Sooriakumar testified that only *some* products include a pedestal. (*Id.* (citing CX-32C at 158:21-23).) Additionally, they state, the glass pedestal is not shown in any of the Build Sheets, and is not in any of the MemsTech product samples. (*Id.*) Knowles alleges, that, to the extent there is a glass pedestal, it is part of the microphone die (i.e. the "transducer"). (*Id.*) Knowles asserts that this is expressly shown in a diagram (CX-36C at MEMS 055166 below) labeled by MemsTech's Engineering Manager, Mr. Kumaraswamy, where he included the glass component in and part of, and not below, the circled Microphone Die. (*Id.* (citing CX-33C at 64:13-65:25; CX-464C at MEMS 055166; CX-36C; CX-123C).) Knowles avers that Mr. Sooriakumar similarly testified that the glass pedestal is part of the "transducer." (*Id.* (citing Tr. at 224:18-225:1).)

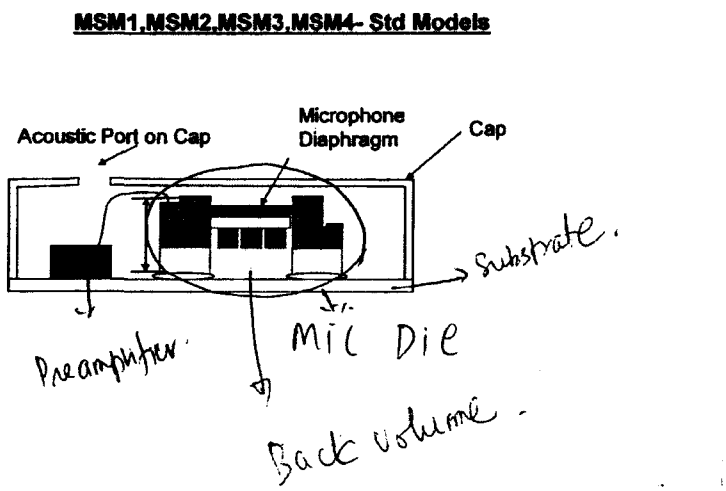


Exhibit CX-464C at MEMS 055166

Knowles argues that, because it is the entire "transducer" that is addressed in the '089 patent's claims, without reference to all materials of the transducer, or whether it is made of all silicon or partly of silicon and partly of glass, the existence of a glass component is irrelevant. (CRB at 4.) Knowles states that in either configuration, whether the transducer is all silicon or part silicon and part glass, it is the transducer (made of any material) that is positioned on the substrate, and it is the transducer (made of any material) that defines, in part, a volume such as shown and labeled in the drawing above. (*Id.*)

Knowles alleges that in both "Reverse Mount" configurations, the acoustic port is in the substrate; but in the MSM3C-RM5 and MSM2C-RM units, the transducer is located to the side of the acoustic port, and in the MSM3-RM unit the transducer is located over the acoustic port. (CRB at 4-5 (citing CX-458C; CX-450C; CX-73C).)

Knowles adds that, contrary to MemsTech's Post-Hearing Brief, at p. 2, the MemsTech accused products do not use an "integral, one-piece" all-metal cover. Knowles asserts that the covers used by MemsTech contain a cold-rolled steel layer in the middle with a layer of nickel plating formed on either side of the cold-rolled steel center. (CRB at 5 (citing CX-30C at 274:1-

275:10; CX-75C; CX-33C at 66:21-69:5, 103:8-11; CX-122C; CX-126C; CX-32C at 67:8-68:20).)

MemsTech's Position: MemsTech argues that its accused products do not infringe claim 1 of the '089 patent for two reasons: (1) they do not include a "volume being defined by the transducer and one of the first member or the second member;" and (2) they do not include a transducer "electrically coupled" to a patterned conductive layer on the surface on which the transducer is attached. (RIB at 25, 27.)

MemsTech alleges that none of their accused products include a recess or hole in the substrate underneath the transducer to create a back volume, and therefore, none of their products include a "volume being defined by the transducer and one of the first member or the second member" as required by claim 1 of the '089 patent. (RIB at 25.) MemsTech asserts that in their products, the transducer is mounted on a glass pedestal which is attached directly to the substrate and there is no recess in the substrate under the place where the transducer is mounted. (*Id.* (citing RX-368C).)

MemsTech asserts that Knowles failed to offer any proof that the MemsTech products infringe the "volume" limitation of claim 1 of the '089 patent. (RIB at 25.) MemsTech says that Dr. Gilleo never compared the actual structure of the MemsTech products with the claim. MemsTech argues that Dr. Gilleo "completely ignored that ***all*** of the MemsTech products have a transducer mounted on a glass pedestal in order to create a back volume." (*Id.*) The reason Gilleo ignored this, they say, is that "using a glass pedestal to create a back volume is completely different than etching out a recess in the substrate to create a back volume, as required by claim 1 of the '089 patent." (*Id.*)

MemsTech states that at the evidentiary hearing, Dr. Gilleo testified that he examined six

MemsTech devices under a microscope (Tr. at 663:13-16) and reviewed microphone run sheets (Tr. at 669:10-13), but did not recall seeing a glass pedestal in anything he reviewed. (RIB at 26 (citing Tr. at 676:22-677:22, 679:12-17).) MemsTech alleges that Dr. Gilleo admitted that the microphone run sheets (RX-386C and RX-387C) demonstrate that the MemsTech products include a glass pedestal. (*Id.* (citing Tr. at 676:9-12).) MemsTech asserts that Dr. Gilleo testified he also considered the June 12, 2008 Sooriakumar deposition transcript (CX-29C) in rendering his infringement analysis. (*Id.*) MemsTech alleges that in that deposition, Sooriakumar testified that the glass pedestal was added to provide the back volume. (*Id.*) MemsTech posits that Gilleo admitted that this demonstrated that the microphone is mounted on a glass pedestal. (*Id.* (citing Tr. at 680:24-3).)

MemsTech states that Dr. Gilleo also testified that the Kumaraswamy deposition transcript indicated that the microphone in the MemsTech products is mounted on a glass pedestal; and that documents, including RX-389C, show that MemsTech's microphone is mounted on a glass pedestal. (*Id.* (citing Tr. at 684:2-687:9).) In fact, they say, the same drawing relied upon by Knowles' counsel in his opening statement at the evidentiary hearing to demonstrate the structure of the accused MemsTech products "shows definitively that the back volume is created by mounting the microphone on a glass pedestal, and not by creating a recess in the substrate as described in the '089 patent." (*Id.* (citing Tr. at 685:9-12).)

MemsTech also asserts that the "chamber chip" configuration in the MemsTech products includes the combination of a glass pedestal and a chamber chip in order to create a back volume. (RIB at 26-27 (citing RX-17C; RX-388C).) MemsTech says that Dr. Gilleo "admitted that this configuration also does not involve the removal of material from the substrate in order to create a back volume." (*Id.* (citing Tr. 688:4-22).) MemsTech argues that "despite the

overwhelming evidence available to Gilleo that, in all of the MemsTech products, the microphone is mounted on a glass pedestal in order to create a back volume he testified that his infringement opinion did not address the glass pedestal." (*Id.* at 27 (citing Tr. at 687:7-9).)

MemsTech argues that claim 1 of the '089 patent requires a volume created by etching out a recess in the substrate underneath the microphone. (RIB at 27.) MemsTech says they mount their microphone on a glass pedestal in order to create a back volume, and do not etch out a recess in the substrate. (*Id.*) Accordingly, they argue that, "because none of MemsTech's products include a 'volume being defined by the transducer and one of the first member or the second member' as recited in claim 1 of the '089 patent, MemsTech's products cannot infringe claim 1 of the '089 patent." (*Id.* (citing *Strattec Sec. Corp.*, 126 F.3d at 1418).)

MemsTech argues that in their products the microphone is not electrically coupled to a layer of a conductive material on the substrate. (RIB at 27-28.) Instead, they say, the transducer is "wired only to the preamplifier." (*Id.*) MemsTech asserts there is no electrical connection from the microphone to a patterned conductive layer on the substrate as required by claim 1 of the '089 patent. (*Id.*) MemsTech argues the limitation "patterned conductive layer being electrically coupled to the transducer" cannot be met by "a microphone (transducer) that is wired only to the preamplifier, and which is not electrically coupled to a patterned conductive layer on the substrate." (*Id.* (citing RX-368C).)

MemsTech asserts, too, that there is a complete lack of proof from Knowles as to how MemsTech's products can infringe the "electrically coupled" limitation of claim 1 of the '089 patent. (RIB at 28.) MemsTech says that Dr. Gilleo only cites to two documents in his analysis of this claim limitation, neither of which is representative of an actual MemsTech product. (*Id.* (citing RX-392C).) MemsTech points to CX-229C which is a MemsTech drawing showing an

"experimental design that was not used in any actual MemsTech product," and asserts that Dr. Gilleo "was aware that this drawing was not representative of any MemsTech product prior to giving his infringement testimony." (*Id.* (citing RX-368C).) The other document MemsTech says was relied on by Gilleo (CX-49C at MEMS061070) is a flow chart that they assert generally describes the assembly process and "does not, in any way, demonstrate that the transducer is electrically connected to the substrate" or "that the transducer is wired to the preamplifier, since this document merely reflects the steps taken to assemble the devices." (*Id.* (citing RX-368C).)

Commission Investigative Staff's Position: Staff argues that the accused products do not include a "volume being defined by the transducer and one of the first member or the second member." Staff defines this limitation to mean "a space that resides at least partly within the substrate or the cover and is at least partly bound by the transducer." (SIB at 56.) Staff asserts that the evidence shows that none of the MemsTech products have a hole or space in the substrate underneath the transducer to create a back volume, as required by claim 1. (*Id.* at 56-57 (citing RX-18C at p. 48-51).)

Staff states that MemsTech generally makes two types of products: "top mount" and "reverse mount" microphone packages. (SIB at 57.) Staff says the "top mount" models have no hole or space in the substrate underneath the transducer to create a back volume and thus do not meet the "volume" limitation. (*Id.* (citing RX-18C at pp. 52-53; RX-372).) Staff alleges that, while the "reverse mount" packages do have a hole underneath the transducer, this hole is an acoustic port and not a "back volume," as required by the asserted claims. (*Id.* (citing RX-18C at p. 53).) Accordingly, Staff submits that the evidence has shown that the "volume being defined by the transducer and one of the first member or the second member" is not present in the accused products. (*Id.*)

Regarding claim 1 of the '089 patent, Staff has construed the term "electrically coupled" to mean "the microphone is directly connected, such as through wire bond or a flip-chip bond, to the substrate." (SIB at 57.) Staff asserts that the accused products do not have a microphone that is wired directly to the layer of conductive material on the substrate. (*Id.* (citing RX-18C at pp. 49-50; RX-368C at p. 29; RX-371; RX-11).) Staff alleges that the microphone is electrically connected to the preamplifier, which is in turn, wired to the conductive material on the substrate. (*Id.*) Thus, Staff argues, the microphone is only indirectly connected to the substrate. (*Id.*) For this reason, Staff submits that the accused products do not satisfy the "electrically coupled" limitation. (*Id.*)

In their reply brief, Staff asserts that Knowles' reliance on CX-229C is improper. (SRB at 26.) Staff avers that CX-229C is a MemsTech drawing showing an experimental design and is not the configuration used in any MemsTech product. (*Id.*) Staff asserts that this document is not a proper representative drawing of the accused products. (*Id.*) Staff alleges that the microphone in the accused products is electrically coupled to the substrate through the preamplifier. (*Id.*)

In their reply brief, Staff addresses Knowles' argument regarding MemsTech's accused products infringing under the doctrine of equivalents. Staff opposes what it describes as a new argument, referring back to its argument on the same subject regarding the '231 patent. (SRB at 26.)

Additionally, Staff submits that Knowles is barred from asserting infringement under the doctrine of equivalents based on the doctrine of prosecution history estoppel. In particular, Staff asserts, "[p]rosecution history estoppel limits the broad application of the doctrine of equivalents by barring . . . equivalents . . . relinquished . . . during prosecution." (SRB at 26-27 (quoting

Conoco, Inc. v. Energy & Envtl. Int'l, 460 F.3d 1349, 1363 (Fed. Cir. 2006) and citing *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 733-34 (2002)).) Staff argues that prosecution history estoppel arises in two ways: (1) by making a narrowing amendment to the claim ("amendment-based estoppel") or (2) surrendering claim scope through argument to the patent examiner ("argument-based estoppel"). (*Id.* at 27 (citing *Deering Precision Instruments* v. *Vector Distrib. Sys.*, 347 F.3d 1314, 1324-25 (Fed. Cir. 2003)).) Staff says that amendment-based estoppel arises when a patentee makes "a narrowing amendment to satisfy any requirement of the Patent Act . . . ." (*Id.* (quoting *Festo*, 535 U.S. at 736).)

Staff argues that Amendment-based estoppel limits the equivalents available to the claim elements at issue, unless the "patentee show[s] that at the time of the amendment one skilled in the art [would] not reasonably be expected to have drafted a claim that would have literally encompassed the alleged equivalent." (*Id.* at 27 (quoting *Deering*, 347 F.3d at 1325).) The patentee can prove this by demonstrating one of the following: "(1) the equivalent may have been unforeseeable at the time of the amendment; (2) the rationale underlying the amendment may bear no more than a tangential relation to the equivalent in question; or (3) there may be some other reason suggesting that the patentee could not reasonably be expected to have described the insubstantial substitute in question." (*Id.*) If the patentee does not carry one of these burdens, amendment-based estoppel bars the elements at issue from encompassing the disavowed equivalents. (*Id.* (citing *Festo*, 535 U.S. at 741).)

Staff argues that Argument-based estoppel arises when a patentee differentiates his invention from the prior art. (SRB at 27 (citing *Deering*, 347 F.3d at 1326-27).) A patentee invokes argument-based estoppel when the prosecution history "evince[s] a 'clear and unmistakable surrender of subject matter." (*Id.* (quoting *Pharmacia & Upjohn Co.* v. *Mylan*

Pharms., Inc., 170 F.3d 1373, 1376-77 (Fed. Cir. 1999)).) The court applies an objective test to determine when subject matter has been "clearly" and "unmistakably" surrendered: would "a competitor . . . reasonably believe that the applicant had surrendered the relevant subject matter." (*Id.* at 28 (quoting *AquaTex Indus. v. Techniche Solutions*, 419 F.3d 1374, 1382 (Fed. Cir. 2005)).) If the court determines that the patentee "clearly" and "unmistakably" surrendered equivalents, argument-based estoppel bars the elements at issue from encompassing the disavowed equivalents. (*Id.* (citing *Deering*, 347 F.3d at 1326-27).)

In this case, Staff avers, Knowles both amended its claims during the prosecution of the '089 patent and argued over the Cote reference by characterizing the '089 invention as requiring the transducer to have a direct electrical connection to the substrate. (SRB at 28.) Knowles has not shown that amendment-based or argument-based estoppel does not apply here, which it has the burden to do. (*Id.*) Accordingly, Staff claims that the doctrine of equivalents is simply not applicable here. (*Id.*)

Discussion and Conclusion: Based upon the evidence before me, I find that the accused products infringe claim 1 of the '089 patent.

The evidence demonstrates that the accused products are surface mountable packages as required by the preamble to claim 1. The document at CX-230 (MEMS136626) indicates that the accused packages can be assembled using surface mount technologies and the datasheet at CX-46C (MEMS030168-77) indicates that the accused packages are "surface mountable." The accused packages include a transducer for converting acoustic signals to an electrical output that is representative of the acoustic signals. CX-231 (at MEMS061075) states that the accused packages include a microphone die which "converts the mechanical/acoustical energy caused by the vibration of the diaphragm into electrical signals" and CX-37C (at MEMS054915-38) shows

the transducer residing within the package. Thus, the accused products contain all of the factors required to infringe the preamble of claim 1 of the '089 patent.

The documents illustrating the accused packages show a chamber defined by the package substrate and the metal cap (which correspond to the first and second members). CX-37C (at MEMS054915-38) shows a chamber formed by mating the package substrate and cap, and the assembly process described at CX-231 (at MEMS061068-92, e.g. MEMS061070) indicates that the cap is attached to the package substrate to form the chamber. In addition CX-224 (at MEMS154131-35, e.g. MEMS154133) shows a chamber enclosing a MEMS microphone. CX-231 (at MEMS061068-92, e.g. MEMS061070) indicates that the transducer is attached, or bonded to the package substrate surface. Dr. Gilleo testified that he physically examined the interior of one of the accused packages and observed that the transducer resides on top of the package substrate. (CX-392C at Q. 74.) CX-36C (at MEMS 055166-055171) shows the transducer to be located within the chamber. Therefore, all of the factors are present to show that the accused products infringe the first element of claim 1 of the '089 patent.

The assembly process described in CX-231 (at MEMS061068-92, especially at MEMS061070) indicates that the transducer is electrically connected to the package substrate surface using wire bonding. The surface of the substrate has a patterned conductive layer. (CX-392C at Q. 75; CX-29C at 160:4-161:15.) Mr. Kumaraswamy, project engineer for MemsTech, testified that in MemsTech's products, power is drawn from the substrate, through the preamplifier, to the microphone. (CX-122C at MEMS003927 and 52:1-53:10; CX-33C at 42:12-45:12.) Also, CX-94C (at MEMS005089), shows that the substrate bond pads are electrically connected to the microphone. While MemsTech and Staff argue that the accused products do not infringe this element because the transducer is not "directly" connected to the package substrate,

I have previously established that the term "electrically coupled" as used herein does not require a direct connection. The term is construed to mean "arranged so that electrical signals may be passed either directly, or indirectly via intervening circuitry, from one component to another." That requirement is met in the accused products.

CX-219 (at MEMS005088-91, e.g. MEMS005089) shows that the accused packages have terminal pads, and the figure legend indicates "Electrical contact to microphone." CX-45C (at MEMS005107-23, e.g. MEMS005110) shows the presence of terminal pads on the bottom of the accused packages, and CX-46C (at MEMS030168-77, e.g. MEMS030171) shows the terminal pads and their connection assignments. (CX-392C at Q. 76.) In addition, MemsTech has admitted that the accused packages are surface mountable through the terminal pads on the bottoms of the packages. (CX-29C at 200:16-201:3.) I find that the evidence shows that the accused products infringe the second element of claim 1 of the '089 patent.[26]

MemsTech's documents showing construction of the accused packages show a volume positioned between the transducer and either the first or second member. For example, CX-37C (at MEMS054915-38) and CX-232 (at MEMS055164-72) both show volumes defined by the package cap (which is either the first or second member) and the transducer. (CX-392C at Q. 77.) MemsTech and Staff argue, however, that none of the accused products include a recess or hole in the substrate underneath the transducer to create a "back volume," and therefore, none of the accused products include a "volume being defined by the transducer and one of the first member or the second member" as required by claim 1 of the '089 patent. MemsTech asserts that in their products, the transducer is mounted on a glass pedestal which is attached directly to the substrate and there is no recess in the substrate under the place where the transducer is

[26] Although Knowles has treated the second element as two elements (i.e. the second and third elements), I will treat this as one element, because that is the way it is structured in the actual claim language of the '089 patent.

mounted. (RX-368C at Q. 73.) As I have already established, the construction applied to the term "volume" in this matter does not require a recess in the substrate. The term is construed as, "a space defined by the transducer and one of the first member or the second member."

Dr. Gilleo testified that he examined six MemsTech devices under a microscope (Tr. at 663:13-16) and reviewed microphone run sheets (Tr. at 669:10-13), but did not recall seeing a glass pedestal in anything he reviewed. (Tr. at 676:22-677:22, 679:12-17.) The differing positions are explained by evidence adduced during Dr. Gilleo's testimony. When questioned, he testified that he examined six actual MemsTech packages (and drawings and build sheets for them) and did not see a glass pedestal in any of them. (Tr. at 641:16-642:2.) On cross-examination, however, he testified that the glass pedestal to which reference is made was a part of the microphone and not part of the package. Hence, it would not be revealed in the package drawings or build sheets or be seen on examination of the actual accused product, because it was a part of the microphone itself. (Tr. at 673:10-674:25.) I am persuaded that the accused products contain a "volume being defined by the transducer and one of the first member or the second member." In this case, the volume is created by the construction of the transducer mounted on the surface of the substrate, as shown in CX-36C (at MEMS 055166-055171) and as demonstrated by by MemsTech's Engineering Manager, Mr. Kumaraswamy, during his deposition, where he included the glass component in and part of, and not below, the circled microphone die. (CX-33C at 64:13-65:25; CX-464C; CX-36C; CX-123C.) Mr. Sooriakumar similarly testified that the glass pedestal is part of the "transducer." (Tr. at 224:18-225:1.) The fact that the microphone is constructed partially of glass does not add a separate element between the transducer and the substrate. In their post-hearing brief, MemsTech admits that the glass pedestal in their microphone creates a "back volume" without the need to "etch out a recess in

the substrate." (RIB at 27.) The volume is acoustically coupled to the transducer. (CX-466C at 21, ¶ 82.) Hence, the accused products infringe the third element of claim 1 of the '089 patent.

MemsTech's documents depicting the accused packages show an aperture through which the acoustic signal will pass on its way to the transducer. For example, CX-37C (at MEMS054915-38) and CX-232 (at MEMS055164-72) illustrate apertures formed in the package substrate and/or the cap (that is, the first and/or second member of the package). (CX-392C at Q. 78.) MemsTech's corporate representative, Mr. Sooriakumar, testified that "the acoustic signal can pass to the microphone from a hole in the cap or a hole in the package substrate." (CX-29C at 157:15-158:6, 159:13-160:17.) Therefore, the accused products contain the structure necessary to infringe the fourth element of claim 1 of the '089 patent.

Based upon the foregoing, I find that the accused products literally infringe claim 1 of the '089 patent.[27]

2. Claim 2

Claim 2 recites:

> The surface mountable package of claim 1, wherein the first member comprises a substrate and the second member comprises a cover coupled to the substrate to define the chamber.

Knowles' Position: Knowles asserts that claim 2 adds the limitation that "the first member comprises a substrate and the second member comprises a cover coupled to the substrate to define the chamber." Knowles avers that this claim identifies which member is the package substrate and which member is the cover. Knowles alleges that MemsTech products incorporate the requirements of Claim 2. (CIB at 46 (citing CDX-2; CX-392C; CX-233C; CX-266; CX-

[27] As I have found literal infringement of claim 1, it is unnecessary to address the issue of doctrine of equivalents. Furthermore, I concur with MemsTech and Staff that Knowles waived any doctrine of equivalents argument by raising it in an untimely manner.

235).) Knowles states that numerous documents and instances of MemsTech testimony identify the two member elements as "substrate" and "cap," particularly MemsTech's engineering documents. (*Id.* (citing CX-124C at MEMS 081439; CX-33C at 53:11-58:24, 66:21-69:5; CX-122C; CX-124C; CX-126C).)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 2 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 2 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: The evidence is uncontroverted that the accused MemsTech products identify the two member elements as the "substrate" and the "cap." (See e.g. CX-124C at MEMS 081439; CX-33C at 53:11-58:24, 66:21-69:5; CX-122C; CX-124C; CX-126C) Therefore, I find that the accused MemsTech products literally infringe claim 2 of the '089 patent.

3. Claim 9

Claim 9 recites:

> The surface mountable package of claim 1, the aperture being formed in the respective one of the first member and the second member, the surface being formed on the respective other one of the first member and the second member and the aperture is acoustically coupled by the chamber to the transducer.

Knowles' Position: Knowles recites that claim 9 adds the limitation that "the aperture being formed in the respective one of the first member and the second member, the surface being

formed on the respective other one of the first member and the second member and the aperture is acoustically coupled by the chamber to the transducer." Knowles asserts that the aperture is located on one member of the package and the surface where the transducer is mounted is on the other member of the package. (CIB at 46 (citing CX-392C; CX-2 at 12:7-12; CX-37C; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-361C; CX-454C; CX-456C; CX-463C).) Knowles says that this configuration corresponds to MSM1C, MSM2C, and MSM3C, as shown for example in the drawings found at CX-37C (MEMS054915-38). (*Id.*)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 9 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 9 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: The evidence before me (CX-36C at MEMS 055166) demonstrates that accused products MSM1, MSM2, MSM3 and MSM4 (standard models) and the MSM2X (cap 180 degree rotated) have an aperture that is located on one member of the package and the surface where the transducer is mounted is on the other member of the package. Therefore, those accused products have an "aperture being formed in the respective one of the first member and the second member, the surface being formed on the respective other one of the first member and the second member and the aperture is acoustically coupled by the chamber to the transducer."[28]

[28] In the discussion of claim 1, I have already found that the accused products have the aperture acoustically coupled by the chamber to the transducer.

Base upon the foregoing, I find that accused products MSM1, MSM2, MSM3 and MSM4 (standard models) and the MSM2X (cap 180 degree rotated) literally infringe claim 9 of the '089 patent.

4. Claim 10

Claim 10 recites:

> The surface mountable package of claim 1, the aperture is formed in the respective one of the first member and the second member, the surface is formed on the respective one of the first member and the second member and the transducer is attached to the surface leaving the aperture uncovered by the transducer, wherein the aperture is coupled to the transducer via the chamber.

Knowles' Position: Knowles recites that claim 10 adds the limitation that the "aperture is formed in the respective one of the first member and the second member, the surface is formed on the respective one of the first member and the second member and the transducer is attached to the surface leaving the aperture uncovered by the transducer, wherein the aperture is coupled to the transducer via the chamber." Knowles asserts that the aperture and transducer are located on the same member, but the transducer is not positioned over the aperture. This configuration, Knowles alleges, corresponds to MSM2-RM, as shown for example in the drawings found at CX-37-C (MEMS054915-38). (CIB at 46 (citing CX-392C; CX-2 at 12:13-19; CX-37C; CX-358C).) Knowles argues that, "at least the MSM2RM product infringes Claim 10." (*Id.*)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 10 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 10 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons

set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: I have previously found that claim 10 of the '089 patent is invalid for failure to contain the written description required by 35 U.S.C. § 112, ¶ 1. In light of that finding, I cannot find that any of the accused products infringe claim 10 of the '089 patent.[29]

5. Claim 15

Claim 15 recites:

> The surface mountable package of claim 1, the patterned conductive layer comprising a plurality of terminal pads, the terminal pads providing an electrical connection between the transducer within the volume and an exterior of the surface mountable package.

Knowles' Position: Knowles recites that claim 15 adds the limitation of "the patterned conductive layer comprising a plurality of terminal pads, the terminal pads providing an electrical connection between the transducer within the volume and an exterior of the surface mountable package." Knowles alleges that MemsTech's documents showing the construction of the accused packages show "the use of a printed circuit board for the package substrate with device connection terminals on the interior surface (the side covered by their cap) and exterior bonding pads for solder assembly to the end-user's printed circuit board, with a plurality of terminal pads on the interior surface providing a connection between the transducer and the exterior bonding pads." (CIB at 47.) Knowles provides as an example, the engineering drawing found at CX-229C (MEMS134842) which they say shows "the top view of a PCB substrate with bonding terminals on the upper or interior surface, with connections to the transducer and supporting devices, the drawings found at CX-219 (MEMS005088-91, especially at MEMS005089) show the package's exterior terminal pads (while not shown in this diagram, the

[29] If, however, claim 10 was found to be valid, the evidence before me would support a finding that the MSM2-RM and MSM3-RM models of the accused product literally infringe claim 10 of the '089 patent. (CX-36C at MEMS 055168.)

bottom terminals are connected to the patterned conductive layer since the drawing legend indicates 'Electrical contact to microphone' and the transducer is connected to the interior package terminals or bond pads with wire bonds which are not shown)." (*Id.*) Knowles also points to the engineering drawing at CX-236-C (MEMS006976) to show that "vias going through the package substrate connect the top and bottom layers." (*Id.* (citing CX-392C; CX-2 at 12:42-46; CX-219C; CX-236C; CX-30C at 277:17-279:21; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C; CX-233C; CX-226; CX-235).)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 15 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 15 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: Based upon the evidence before me,[30] I find that the accused products contain "the patterned conductive layer comprising a plurality of terminal pads, the terminal pads providing an electrical connection between the transducer within the volume and an exterior of the surface mountable package" described in claim 15 of the '089 patent. (*See, e.g.,* CX-392C; CX-2 at 12:42-46; CX-219C; CX-236C; CX-30C at 277:17-279:21; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C; CX-233C; CX-226; CX-235.) Therefore the

[30] I have not considered exhibit CX-229C in this Final Initial Determination, because it relates to a product not at issue herein.

accused products literally infringe claim 15 of the '089 patent.

6. Claim 17

Claim 17 recites:

> The surface mountable package of claim 1, one or both of the first member and the second member including a shield against electromagnetic interference.

Knowles' Position: Knowles recites that claim 17 adds the limitation that the "one or both of the first member and the second member including a shield against electromagnetic interference." Knowles alleges that MemsTech's documents showing the construction of accused packages show the use of a conductive cover that provides shielding from electromagnetic interference (EMI). (CIB at 47-48.) Knowles provides as an example, the engineering drawing at CX-221 (MEMS006980) which Knowles says describes the package cap as "made of metal (which is electrically conductive and therefore serves as an EMI shield) and the document found at CX-231 (MEMS061068-92, especially at MEMS061080) indicates that the package cap acts as a shield against radio wave interference (a form of EMI)." (*Id.* (citing CX-392C; CX-221C; CX-49C; CX-30C at 427:24-428:8; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C; CX-233C; CX-226; CX-235).) Knowles asserts, too, that MemsTech, through its corporate representative Mr. Sooriakumar, admitted that the metal cap provides shielding from EMI. (*Id.* (citing CX-30C at 427:22-428:8).)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 17 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 17 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: Based upon the uncontroverted evidence before me, including, *inter alia*, the admission of Mr. Sooriakumar, (CX-30C at 427:22-428:8) I find that the accused products meet the requirement that "one or both of the first member and the second member include[e] a shield against electromagnetic interference." Therefore, the accused products literally infringe claim 17 of the '089 patent.

7. Claim 20

Claim 20 recites:

> The surface mountable package of claim 1, the first member comprising a printed circuit board.

Knowles' Position: Knowles recites that claim 20 adds the limitation "the first member comprising a printed circuit board." Knowles asserts that MemsTech's documents showing construction of the accused packages show the use of printed circuit board (PCB) material as the package substrate. (CIB at 48.) Knowles provides as examples, (1) the MemsTech document found at CX-231-C (MEMS061068-92) which they say describes how the microphone components are attached to the "substrate PCB," (2) the document found at CX-224 (MEMS154131-35, especially at MEMS0154133) which they assert describes the use of "PCB substrate" as the package substrate, and (3) the engineering drawing at CX-229 (MEMS134842) which they allege indicates that the package substrate can be made with FR5 or BT, both commonly available printed circuit board materials. (*Id.* (citing CX-392C).) Knowles also states that MemsTech, through its corporate representative Mr. Sooriakumar, has admitted that the accused packages use a PCB substrate as a package substrate. (*Id.* (citing CX-30C at 386:7-

387:7).)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 20 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 20 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: Based upon the uncontroverted evidence before me, including, *inter alia*, the admission of Mr. Sooriakumar, (CX-30C at 386:7-387:7) I find that the accused products use a printed circuit board as the substrate. Therefore, the accused products literally infringe claim 20 of the '089 patent.

8. Claim 28

Claim 28 recites:

> The surface mountable package of claim 1, wherein the volume includes a portion of the chamber.

Knowles' Position: Knowles recites that claim 28 adds the limitation "the volume includes a portion of the chamber." Knowles asserts that documents referencing the accused packages show that the volume in the accused packages is found within the chamber. (CIB at 48.) Knowles provides as an example, MemsTech's drawings found at CX-219C (MEMS005088-91) which they say show the "back volume" within the chamber. (*Id.* (citing CX-392C; CX-2 at 14:8-9; CX-219C; CX-30C at 397:3-11; CX-233C; CX-226; CX-235).) Knowles also alleges that MemsTech, through its corporate representative Mr. Sooriakumar, has admitted that the accused packages include a back volume. (*Id.* (citing CX-30C at 418:24-

419:10).)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 28 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 28 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: The evidence before me supports a finding that the accused products include a volume that includes a portion of the chamber. In construing the term volume, I discussed the difference between that term and the term "chamber." I concluded that the chamber is the entire area formed by the first member and the second member, and that the volume is formed by the transducer and ***one of the first member or the second member***. In CX-219C at MEMS 005089, the volume is depicted as a "fixed back volume" in the MemsTech product description. That same configuration appears at CX-36C (MEMS0055166 and MEMS0055171). Therefore, I find that accused products MSM1, MSM2, MSM3 and MSM4 (standard models) and MSM2X (cap 180 degree rotated), literally infringe claim 28 of the '089 patent.

9. Claim 29

Claim 29 recites:

> The surface mountable package of claim 1, wherein the acoustic signal is coupled to the transducer via the chamber.

Knowles' Position: Knowles recites that claim 29 adds the limitation "the acoustic

signal is coupled to the transducer via the chamber." Knowles alleges that for each of the accused packages, the transducer resides in the chamber, and that the acoustic signal passes through portions of the chamber on its way to the transducer. (CIB at 49 (citing CX-392C; CX-2 at 14:10-12; CX-37C; CX-49C; CX-224C; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C; CX-232C).)

MemsTech's Position: MemsTech makes no substantive argument regarding claim 29 except to argue that, since it depends from claim 1, MemsTech's products do not infringe that claim, because they do not infringe claim 1 of the '089 patent. (RIB at 28 (citing *Whapeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989)).)

Commission Investigative Staff's Position: Staff takes the position that, because claim 29 depends from claim 1, MemsTech's products do not infringe that claim for the same reasons set forth for claim 1 of the '089 patent. (SIB at 58 (citing RX-368C).)

Discussion and Conclusion: The uncontroverted evidence before me supports a finding that the accused MemsTech products are structured so that "the acoustic signal is coupled to the transducer via the chamber." In each case the transducer resides within the chamber, and the acoustic signal passes through portions of the chamber to reach the transducer. (*See, e.g.*, CX-392C; CX-2 at 14:10-12; CX-37C; CX-49C; CX-224C; CX-227C; CX-73C; CX-74C; CX-75C; CX-122C; CX-217C; CX-358C; CX-361C; CX-363C; CX-450C; CX-454C; CX-456C; CX-458C; CX-463C; CX-232C.) Therefore, the accused MemsTech products literally infringe claim 29 of the '089 patent.

VI. DOMESTIC INDUSTRY

A. Applicable Law

In patent-based proceedings under section 337, a complainant must establish that an industry "relating to the articles protected by the patent...exists or is in the process of being established" in the United States. 19 U.S.C. § 1337(a)(2) (2008). Under Commission precedent, the domestic industry requirement of Section 337 consists of an "economic prong" and a "technical prong."

The "economic prong" of the domestic industry requirement is satisfied when it is determined that the economic activities set forth in subsections (A), (B), and/or (C) of subsection 337(a)(3) have taken place or are taking place with respect to articles protected under the asserted patent. *Certain Data Storage Systems and Components Thereof*, Inv. No. 337-TA-471, Initial Determination Granting EMC's Motion No. 471-8 Relating to the Domestic Industry Requirement's Economic Prong (unreviewed) at 3 (Public Version, October 25, 2002). With respect to the "economic prong," 19 U.S.C. § 1337(a)(2) and (3) provide, in full:

> (2) Subparagraphs (B), (C), (D), and (E) of paragraph (1) apply only if an industry in the United States, relating to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established.
>
> (3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned–
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

Given that these criteria are listed in the disjunctive, satisfaction of any one of them will

be sufficient to meet the domestic industry requirement. *Certain Integrated Circuit Chipsets and Products Containing Same*, Inv. No. 337-TA-428, Order No 10, Initial Determination (Unreviewed) (May 4, 2000), citing *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Commission Op. at 15, USITC Pub. 3003 (Nov. 1996).

To meet the technical prong, the complainant must establish that it practices at least one claim of the asserted patent. *Certain Point of Sale Terminals and Components Thereof*, Inv. No. 337-TA-524, Order No. 40 (April 11, 2005). "The test for satisfying the 'technical prong' of the industry requirement is essentially same as that for infringement, i.e., a comparison of domestic products to the asserted claims." *Alloc v. Int'l Trade Comm'n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). The technical prong of the domestic industry can be satisfied either literally or under the doctrine of equivalents. *Certain Excimer Laser Systems for Vision Correction Surgery and Components Thereof and Methods for Performing Such Surgery*, Inv. No. 337-TA-419, Order No. 43 (July 30, 1999).

B. Economic Prong

On September 8, 2008, I issued Order No. 26, an initial determination finding that Knowles satisfied the economic prong of the domestic industry requirement. On September 26, 2008, the Commission issued a notice of decision not to review the initial determination. Therefore, it is unnecessary to further discuss the economic prong.

C. Technical Prong

On September 8, 2008, I issued Order No. 26, an initial determination finding that Knowles satisfied the technical prong of the domestic industry requirement with respect to the '231 patent. On September 26, 2008, the Commission issued a notice of decision not to review the initial determination. Therefore, it is unnecessary to further discuss the technical prong with

respect to the '231 patent.

The parties dispute whether Knowles has satisfied the technical prong with respect to the '089 patent.

Knowles' Position: Knowles argues that its SiSonic line of silicon microphone packages meet all of the limitations of claim 1 of the '089 patent. (CIB at 41.) Knowles offers CX-25, which is a claim chart showing how the SiSonic products allegedly incorporate each element of claim 1. Dr. Loeppert testified that CX-25 accurately describes the features of the SiSonic products. (*Id.* (citing CX-389-C at Qs. 96-99).) Knowles points to Dr. Gilleo's testimony for support. (CRB at 79 (citing CX-392C; CX-233C; CX-226; CX-235; CX-25; CX-237C).)

Knowles claims that MemsTech disputes whether the transducer is "electrically coupled" to the patterned conductive layer as required in claim 1. (*Id.* at 40-41.) Knowles states that under a correct construction of "electrically coupled," it is undisputed that the SiSonic products practice claim 1. (*Id.*) Knowles claims that even under MemsTech's proposed construction of "electrically coupled," the SiSonic products practice claim 1 under the doctrine of equivalents. (CRB at 79.) Knowles states that under a correct construction of "volume," the SiSonic products meet the "volume being defined by the transducer and one of the first member or the second member" limitation. (CRB at 80.)

MemsTech's Position: MemsTech argues that the SiSonic products do not practice claim 1 of the '089 patent. MemsTech first argues that "the microphone is not electrically coupled to the layer of conductive material on the substrate." (RIB at 95 (citing RX-368C).) Instead, MemsTech states {

}. (*Id.*) MemsTech claims that the "electrically coupled" limitation "cannot be met by a microphone which is {

}

{ }

MemsTech next argues that Knowles failed to show that the SiSonic products include a "volume being defined by the transducer and one of the first member or the second member." MemsTech argues that Dr. Gilleo identified an area defined by the transducer and both the first and second members as the volume. (*Id.* at 96-97 (citing RX-370).) MemsTech argues that the claim requires the volume to be defined by **one of** the first or the second member, not **both** of the first and second members. (*Id.*; see also RRB at 46-48.)

Commission Investigative Staff's Position: Staff argues that the SiSonic products do not practice claim 1 of the '089 patent because the microphone is not "electrically coupled" to the substrate. (SIB at 65.) This argument is predicated on Staff's proposed construction of "electrically coupled," which requires a direct connection between the microphone and the substrate. (*Id.*) Staff states that the evidence shows that {

} (*Id.* (citing CX-233).) Staff further argues that Knowles' doctrine of equivalents argument is untimely and thus has been waived pursuant to Ground Rule 4(d). (SRB at 28-29.)

Discussion and Conclusion: I find that Knowles has demonstrated that its SiSonic products practice claim 1 of the '089 patent.

MemsTech and Staff only dispute two limitations from claim 1. I find that the microphone in the SiSonic products is electrically coupled to the substrate. I have found that "electrically coupled" means "arranged so that electrical signals may be passed either directly, or indirectly via intervening circuitry, from one component to another." In the SiSonic products, it is undisputed that the microphone is {

} (CIB at 41; RIB at 95; SIB at 65.) This configuration meets my adopted claim

construction of "electrically connected" because {

} MemsTech and Staff base their argument on an incorrect construction of "electrically coupled" that requires a direct connection.

As for the "volume being defined by the transducer and one of the first member or the second member" element, I find that the SiSonic products meet this limitation. Below is a figure from the SiSonic Design Guide that depicts "[t]he basic components of a SiSonic microphone:"

{

}

(CX-233C at KE0000321.) The figure shows that a "back volume" is defined by the MEMS transducer and the substrate. This is consistent with Knowles' argument in CX-25, where it points to the back volume in a similar diagram as the "volume being defined by the transducer and one of the first member or the second member." (CX-25; *see also* CX-392C at Qs. 82-85.) I concur with this analysis, and find that the "back volume" of the SiSonic product, which is defined by the transducer and the substrate, meets the "volume being defined..." limitation in claim 1 of the '089 patent.

Because the "electrically coupled" and "volume" limitations were the only limitations contested by MemsTech or Staff, I find that Knowles has met its burden in demonstrating that the SiSonic products practice claim 1 of the '089 patent. (*See* CX-25; CX-233; CX-392C at Qs.

80-85.)[31]

VII. REMEDY & BONDING

The Commission's Rules provide that subsequent to an initial determination on the question of violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, the administrative law judge shall issue a recommended determination containing findings of fact and recommendations concerning: (1) the appropriate remedy in the event that the Commission finds a violation of section 337; and (2) the amount of bond to be posted by respondents during Presidential review of Commission action under section 337(j). *See* 19 C.F.R. § 210.42(a)(1)(ii).

A. Limited Exclusion Order

A limited exclusion order directed to MemsTech's infringing products is among the remedies that the Commission may impose. 19 U.S.C. § 1337(d)(1). Knowles seeks a permanent limited exclusion order excluding entry into and sale or offer for sale within the United States of all infringing MemsTech silicon microphone packages. (CIB at 51-52; CRB at 82-83.) Knowles states that the Commission has rejected the idea of listing the products subject to the exclusion order by name or model number. (*Id.* at 52 (citing *Certain Integrated Repeaters, Switches, Transceivers, and Products Containing Same*, Inv. No. 337-TA-435, Comm'n Op. at 23, USITC Pub. 3547 (Oct. 2002)).)

MemsTech argues that any limited exclusion order should be narrow in scope. Specifically, MemsTech argues that the exclusion order should be limited in duration to the terms of the '231 and '089 patents,[32] should be limited to those specific components found to

[31] As I have found that the SiSonic products literally practice claim 1 of the '089 patent, it is unnecessary to address the issue of doctrine of equivalents. Furthermore, I concur with Staff that Knowles waived any doctrine of equivalents argument by raising it in an untimely manner.

[32] Any exclusion order issued by the Commission cannot extend in duration past the expiration dates of the patents. *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 851 F.2d 342, 344 (Fed. Cir. 1988) ("The ITC can issue only an exclusion order barring *future* importation or a cease and desist order barring *future* conduct. If the violation of section 337 involves patent infringement, neither of the above remedies is applicable once the patent expires.")

infringe, and should identify the precise MemsTech silicon microphone products that are found to be infringing. (RIB at 98.)

Staff argues that a limited exclusion order is appropriate if a violation of section 337 is found. (SRB at 32.) Staff states that "[i]n the event a limited exclusion order issues, the order should not be limited by name or model number in order to prevent future violations of section 337 with respect to the products involved in the investigation." (*Id.* at 32-33.)

I recommend that the Commission issue a limited exclusion order. The limited exclusion order should apply to MemsTech and all of its affiliated companies, parents, subsidiaries, or other related business entities, or its successors or assigns and should be limited to those of MemsTech's silicon microphones that have been found to infringe the '231 or '089 patents.[33] I concur with Knowles and Staff that it would be inappropriate to limit the exclusion order by listing specific product names or model numbers.

B. Bonding During Presidential Review Period

The administrative law judge and the Commission must determine the amount of bond to be required of a respondent, pursuant to section 337(j)(3), during the 60-day Presidential review period following the issuance of permanent relief, in the event that the Commission determines to order a remedy. The purpose of the bond is to protect the complainant from any injury. 19 C.F.R. §§ 210.42(a)(1)(ii), 210.50(a)(3).

When reliable price information is available, the Commission has often set the bond by eliminating the differential between the domestic product and the imported, infringing product. *See Certain Microsphere Adhesives, Processes for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op. a 24

[33] As I noted *supra*, the MemsTech "chamber chip" products are not part of this investigation, and thus, my recommended remedy does not apply to such products.

(1995). In other cases, the Commission has turned to alternative approaches, especially when the level of a reasonable royalty rate could be ascertained. *See, e.g., Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm'n Op. at 41 (1995).

Knowles' Position: In its initial post-hearing brief, Knowles requests that "a bond be imposed on any imports of MemsTech silicon microphone packages during the Presidential Review period in an amount that equals the percentage by which MemsTech profits from such sales." (CIB at 53.)

In its reply brief, Knowles states that "[b]ecause no royalty rate information could be submitted for the record due to confidentiality issues...and because insufficient pricing information was produced during discovery, the bond should be set at 100% of the entered value of the allegedly infringing products during the Presidential Review Period." (CRB at 83.) Knowles further states that because MemsTech has alleged that its importation has been minimal, the imposition of a 100% bond will not create any hardship for MemsTech. (*Id.* at 83-84.)

MemsTech's Position: MemsTech argues that Knowles failed to offer any evidence regarding price differential or royalty rates. (RIB at 99-100 (citing Knowles' December 17, 2007 Supplement to the Complaint; RFF 621; RFF 622).) MemsTech claims that Knowles cannot show how, if at all, it is injured by MemsTech's importation of the accused products. (*Id.* at 100 (citing RFF 623).) MemsTech therefore argues that there is no reason to require a bond pending the Commission's final determination. (*Id.*)

In its reply brief, MemsTech responds to Staff's argument that I should recommend a 100% bond. MemsTech claims that this is improper because it is Knowles' burden to present

evidence relevant to bonding during the hearing, and Knowles failed to meet its burden. (RRB at 50.) MemsTech argues that without such evidence from Knowles, it is improper to institute any bond. (*Id.* (citing *Certain Rubber Antidegradants, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-533, Comm'n Op., 2006 ITC LEXIS 591 (Jul. 21, 2006)).)

Commission Investigative Staff Position: Staff states that "because there was no reasonable royalty rate information presented at the hearing and there was insufficient pricing information provided, the bond should be set at 100% of the entered value of the allegedly infringing products imported during the Presidential Review Period." (SIB at 67-68.)

Discussion and Conclusion: My recommendation is that no bond be required during the Presidential Review Period.

The parties are in agreement that there is no evidence in the record regarding price differential or royalty rates. Thus, Knowles and Staff argue that a 100% bond is appropriate, while MemsTech argues that no bond is appropriate.

Neither Knowles nor MemsTech go into any detail regarding the lack of relevant evidence in the record relating to bonding. Knowles cites to Order No. 17 for the reason behind the lack of royalty rate information. In Order No. 17, I granted a protective order that prevented Knowles from having to produce documents from a prior trade secret litigation. I granted the motion to prevent Knowles from having to willingly violate a protective order issued by the United States District Court for the Northern District of Illinois. Knowles offers no specific reason or explanation as to why Order No. 17 prevented it from presenting any evidence regarding bonding.

In *Certain Rubber Antidegradants*, the Commission did not require a bond. The presiding administrative law judge had set no bond, finding, "no evidence in the record to

support any bond to offset any competitive advantage resulting from the unfair acts of [respondents] from their importations." *Certain Rubber Antidegradants*, 2006 ITC LEXIS 591, at *59.

The respondent argued that the lack of pricing information was due to the complainant's failure to provide such evidence during the hearing. (*Id.* at *60.) The respondent argued that the complainant should not be able to benefit from its failure to provide evidence. (*Id.*) In response, the complainant argued that it had no burden of proof with respect to bonding, and that the existence of a violation is sufficient to support a 100% bond. (*Id.*) In deciding the issue, the Commission stated:

> We find the ALJ's recommendation appropriate in the circumstances here and have determined not to require that a bond be posted for temporary importation. In our view, the complainant has the burden of supporting any proposition it advances, including the amount of the bond. [The complainant] did not meet that burden.

(*Id.*)

In contrast, the Commission has set a bond of 100% when the evidence supported a finding that it would be difficult or impossible to calculate a bond based on price differentials. *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Comm'n Op., 1996 WL 1056209 (Sept. 23, 1996) (finding that a bond of 100% was appropriate "because of the difficulty in quantifying the cost advantages of respondents' imported Enercon E-40 wind turbines and because of price fluctuations due to exchange rates and market conditions."); *Certain Systems For Detecting and Removing Viruses or Worms, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-510, Comm'n Op., 2007 WL 4473083 (Aug. 2007) (imposing a bond of 100% based on a finding that the parties had numerous models and products lines, and that a price comparison would be difficult because respondent's products were a combination of hardware and software while the complainant's

products were software only); *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, USITC Pub. No. 3046, Comm'n Op. at 26-27 (July 1997) (a 100% bond imposed when price comparison was not practical because the parties sold products at different levels of commerce, and the proposed royalty rate appeared to be *de minimis* and without adequate support in the record).

Here, I find that Knowles failed to meet its burden in supporting its argument that a 100% bond is appropriate. Knowles provided no legitimate reason for its failure to offer pricing differential or royalty rate evidence. Furthermore, Knowles does not assert that MemsTech failed to produce pricing information, and Knowles never moved to compel such information during discovery. Unlike the cases cited, *supra,* where a bond of 100% was set, there was no evidence submitted by Knowles demonstrating that it would be difficult or impossible to calculate a bond based on price differentials or royalty rates. With no evidence in the record supporting a bond of any amount, I recommend that the Commission set no bond during the Presidential Review Period.

VIII. MATTERS NOT DISCUSSED

This Initial Determination's failure to discuss any matter raised by the parties, or any portion of the record, does not indicate that it has not been considered. Rather, any such matter(s) or portion(s) of the record has/have been determined to be irrelevant, immaterial or meritless. Arguments made on brief which were otherwise unsupported by record evidence or legal precedent have been accorded no weight.

IX. CONCLUSIONS OF LAW

1. The Commission has subject matter jurisdiction, *in rem* jurisdiction, and *in personam* jurisdiction.

2. There has been an importation of the accused silicon microphone packages and products containing the same which are the subject of the alleged unfair trade allegations.

3. An industry does exist in the United States that exploits U.S. Pat. No. 6,781,231, as required by 19 U.S.C. § 1337(a)(2).

4. An industry does exist in the United States that exploits U.S. Pat. No. 7,242,089, as required by 19 U.S.C. § 1337(a)(2).

5. U.S. Pat. No. 6,781,231 is valid and enforceable.

6. Claim 10 of U.S. Pat. No. 7,242,089 is invalid for failure to comply with the written description requirement of 35 U.S.C. § 112, ¶ 1.

7. U.S. Pat. No. 7,242,089 is otherwise valid and enforceable.

8. All accused MemsTech products literally infringe claims 1 and 2 of U.S. Pat. No. 6,781,231.

9. All accused MemsTech products literally infringe claims 1, 2, 15, 17, 20, and 29 of U.S. Pat. No. 7,242,089.

10. The following accused MemsTech products literally infringe claims 9 and 28: MSM1, MSM2, MSM3 and MSM4 (standard models) and MSM2X (cap 180 degree rotated).

10. There is a violation of 19 U.S.C. § 1337(a)(1).

XI. ORDER

Based on the foregoing, and the record as a whole, it is my Final Initial Determination that there is a violation of 19 U.S.C. § 1337(a)(1) in the importation into the United States, sale for importation, and the sale within the United States after importation of certain silicon microphone packages and products containing the same.

If the Commission determines that there is a violation, I recommend that a limited

exclusion order should issue and that no bond be imposed during the Presidential review period.

I hereby **CERTIFY** to the Commission my Final Initial and Recommended Determinations together with the record consisting of the exhibits admitted into evidence. The pleadings of the parties filed with the Secretary, and the transcript of the pre-hearing conference and the hearing, as well as other exhibits, are not certified, since they are already in the Commission's possession in accordance with Commission rules.

It is further **ORDERED** that:

In accordance with Commission Rule 210.39, all material heretofore marked *in camera* because of business, financial and marketing data found by the administrative law judge to be cognizable as confidential business information under Commission Rule 201.6(a), is to be given *in camera* treatment continuing after the date this investigation is terminated.

The initial determination portion of the Final Initial and Recommended Determination, issued pursuant to Commission Rule 210.42(a)(1)(i), shall become the determination of the Commission sixty (60) days after the service thereof, unless the Commission, within that period, shall have ordered its review of certain issues therein, or by order, has changed the effective date of the initial determination portion. The recommended determination portion, issued pursuant to Commission Rule 210.42(a)(1)(ii), will be considered by the Commission in reaching a determination on remedy and bonding pursuant to Commission Rule 210.50(a).

Within fourteen days of the date of this document, each party shall submit to the office of the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version. The parties' submissions must be made by hard

copy by the aforementioned date and must include a copy of this document with red brackets indicating any portion asserted to contain confidential business information to be deleted from the public version. The parties' submission concerning the public version of this document need not be filed with the Commission Secretary.

SO ORDERED.

Issued: January 12, 2009
DATE

Robert K. Rogers, Jr.
Administrative Law Judge

CERTAIN SILICON MICROPHONE PACKAGE AND PRODUCTS CONTAINING THE SAME **Inv. No. 337-TA-629**

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **ORDER** was served upon Mareesa A. Frederick, Esq., Commission Investigative Attorney, and the following parties via first class mail and airmail where necessary on February 10, 2009.

Marilyn R. Abbott, Secretary JWCe
U.S. International Trade Commission
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Washington, D.C. 20436

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