4600 Silicon Drive, Durham, NC 27703 USA
Main: (919) 407-5300

January 28, 2013

PUBLIC DOCUMENT

Submitted electronically to publiccomments@bis.doc.gov

Regulatory Policy Division
Bureau of Industry and Security
U.S. Department of Commerce
Room 2099B
14th Street and Pennsylvania Avenue, NW
Washington, DC 20230

ATTN: Brian Baker, Director, Electronics and Materials Division
Office of National Security and Technology Transfer Controls

Re: **RIN 0694–AF64**

Dear Mr. Baker:

Cree, Inc. ("Cree") respectfully submits these comments in response to the November 28, 2012 notice of proposed rulemaking published by the U.S. Department of Commerce, Bureau of Industry and Security ("BIS") concerning military electronic equipment. See "Revisions to the Export Administration Regulations ('EAR'): Control of Military Electronic Equipment and Related Items the President Determines No Longer Warrant Control Under the United States Munitions List ('USML')," 77 C.F.R. 70,945 (November 28, 2012).

BIS specifically requested comment on whether the controls in paragraphs (c) and (d) of the proposed export control classification number ("ECCN") 3A611, which would regulate certain radio frequency amplifiers and transistors, are "sufficiently limited to those not now or likely to be in normal commercial use by U.S. or foreign telecommunications or other non-military applications." See 77 Fed. Reg. at 70,947. As a leading U.S. manufacturer of these products, Cree is well-positioned to address this question. In short, the proposed regulation is too broad in its power thresholds for these items, as it would impose more restrictive controls on several commercial or dual-use radio frequency amplifiers and transistors already on the market. Furthermore, ECCN 3A611 would create regulatory ambiguity, as its control parameters overlap with those already implemented in ECCNs 3A001 and 3A982.

I. Background

Cree is a publicly traded company headquartered in North Carolina, with over $1 billion in annual revenue. Its operations are primarily domestic, and it has approximately 3,000 U.S. employees.

Cree manufactures a variety of discrete radio frequency transistors (also referred to as high electron mobility transistors) ("HEMTs"), microwave monolithic integrated circuit ("MMIC") power amplifiers, and bare transistor die, several of which would become more restrictively controlled as the result of this regulation.

Cree markets several of its products to the telecommunications ("telecom") industry, as well as to other commercial industries. For example, wireless broadband and mobile carriers operate in the 2.5-2.7 GHz segment of the S-band frequency range. Also, telecom infrastructure providers use wide band-gap products, such as with a frequency range of DC-18 GHz, for backhaul services (meaning that telecom providers can take the traffic at a local cell phone tower back to the switchboard by aggregating the calls). In December 2012, the Federal Communications Commission ("FCC") announced a proposed rule that will allow small cells/citizens band radio to operate in the 3.55-3.65 GHz band (the spectrum is currently used by naval radar systems). As a result, Cree anticipates there will be a surge in commercial demand for transistors with a rated peak power of 120 W in that bandwidth. For the Federal Register notice, see 78 Fed. Reg. 1,188 (January 8, 2013).

These products improve service and reduce costs for the telecom industry. Cree, and other domestic producers of transistors and amplifiers, are positioned at this critical moment to have their products designed into next generation systems for these applications. However, constraining U.S. companies with increased controls will make them uncompetitive and could result in the loss of this billion dollar market to foreign competitors.

The proposed ECCN 3A611 would expand controls on several commercial parts that presently are, and should continue to be, regulated under ECCN 3A001 or EAR99. Similar parts are available without licensing restrictions on the foreign market, such as those manufactured by UMS (Germany), Mitsubishi (Japan), Toshiba (Japan), and Sumitomo (Japan). Increasing controls on parts that are currently available without restriction, and creating regulatory ambiguity as to the intersection between the proposed ECCN 3A611 and ECCNs 3A001 and 3A982, would create an unlevel playing field for U.S. manufacturers. Ultimately, an increase in controls could jeopardize thousands of high-paying U.S. export jobs and cede growth opportunities in the next-generation telecom infrastructure to foreign competitors.

II. Comments

A. Proposed Control Thresholds Overlap with and Are More Restrictive than Existing Regulations

Cree strongly urges BIS to remove the provisions for HEMTs and MMICs from the proposed ECCN 3A611 altogether, as the proposed control thresholds overlap with existing controls on the CCL. In the alternative, if the HEMT and MMIC provisions remain in ECCN 3A611, BIS should tailor the provisions more narrowly so that they apply only to a limited range of products that truly are specially designed for military use, with no potential commercial applications in the designated power, frequency, and efficiency ranges.

Cree notes that there is total overlap between the lowest frequency tier in the proposed ECCN 3A611 – 2.7 to 3.2 GHz – and the full frequency range of HEMTs and MMICs currently covered under

ECCN 3A982. The only difference is that ECCN 3A611 would include a power added efficiency metric of 30%, and it would add a third unit of measure for power thresholds[1] to the two already implemented under ECCN 3A982[2]. As a result, the ECCN 3A982 controls would be fully subsumed within the ECCN 3A611 controls, and ECCN 3A982 would become redundant. However, the HEMTs currently covered under ECCN 3A982, which are eligible for the STA license exception, would lose that eligibility and would be subject to more restrictive licensing requirements under ECCN 3A611. In other words, this proposed regulation represents a tightening of export controls for products already on the CCL, rather than export control reform.

For the control tiers exceeding 3.2 GHz, the proposed ECCN 3A611 would encompass the same frequencies covered by ECCN 3A001 (except for carve-outs in the 31.8 GHz to 37.5 GHz range and for frequencies exceeding 75GHz). However, the power thresholds would become more restrictive. The wattage cut-off points are the same between ECCNs 3A001 and 3A611, but the unit of measure would change from average power to peak power. This would have the effect of dramatically tightening the existing controls. For example, a HEMT rated for operation between 3.5 and 4.0 GHz, with a peak power of 100 W and a duty cycle of 20%, would fall below the 60 W average thresholds for ECCN 3A001 because the HEMT's average power would be 20 W. Accordingly, under the current rules, the HEMT would be EAR99. By contrast, under the proposed rule, the 100 W HEMT would be subject to ECCN 3A611, by exceeding the 60 W peak power threshold, and would be eligible for export only to Canada without a license.

As a final note on this point, the proposed power thresholds for HEMTs and MMICs in ECCN 3A611 bear no direct correlation to military-specific applications, in accordance with the stated intention behind this rulemaking. By taking the existing frequency and power thresholds under ECCNs 3A001 and 3A982, and then converting the power unit of measure for a tighter metric, this rule would have the opposite effect.

Since the proposed controls on HEMTs and MMICs under ECCN 3A611 would only represent an overlap and a tightening of existing controls, Cree strongly urges BIS to eliminate the HEMT and MMIC controls from ECCN 3A611 altogether. If BIS does retain that aspect of 3A611, the regulation needs to be reframed so that the ECCNs work together. There should be a logical progression of controls, commensurate with increasing capability thresholds, between ECCNs 3A001, 3A982, and 3A611. Furthermore, ECCN 3A611, which is intended to be a transition place for defense articles migrated from the USML, should be very precisely and narrowly tailored around frequency and power thresholds that have no commercial applications.

Cree is proposing alternative power thresholds, which would more accurately reflect the current state of the market and the technology, while drawing lines around more sensitive products. Cree's proposal is attached to the end of these comments.

---

1 75 W peak power for MMICs, 240 W peak power for HEMTs.

2 MMICs –15 W average power, or 75 W pulse power with a 20% duty cycle. HEMTs – 48 W average power, or 240 pulse power with a 20% duty cycle.

B. The Power Added Efficiency Thresholds Should Be Narrowly Tailored and Correspond to Rationally to Increase in Frequency

The inclusion of a power added efficiency ("PAE") metric to the proposed ECCN 3A611 does not lessen the impact of the overly restrictive power thresholds. As a practical matter, most Gallium Nitride ("GaN") HEMTs and MMICs currently available on the commercial market (and classified as ECCN 3A982, ECCN 3A001 or EAR99) perform at levels that exceed the proposed PAE thresholds for ECCN 3A611. Accordingly, that metric does not help to focus the proposed regulation on high performance parts; rather, it would have the effect of capturing most GaN HEMTs and MMICs that are presently used in commercial telecom, backhaul, point-to-point and satellite applications.

Furthermore, the proposed PAE thresholds, as a function of bandwidth, bear no logical correlation to the way that HEMT and MMIC technology actually works. The lower frequencies should correspond with higher PAE; as the frequency goes higher, the PAEs should decrease. The proposed PAE thresholds, by contrast, start at 30% for the lowest frequency tier, then go up to 40%, and then go back down to 35% before hitting 30% again. As an industry leader in this technology, Cree's view is that the proposed PAE thresholds are arbitrary and impractical.

As discussed in the prior section, Cree strongly recommends the elimination of controls on MMICs and HEMTs altogether from the proposed ECCN 3A611. Should BIS decide to proceed with those controls, however, Cree is proposing alternative PAE thresholds that follow a rational progression and that are more narrowly tailored to capture high performance products. See the attached proposal following these comments.

C. HEMTs and MMIC Should Be Eligible for STA License Exception

In its notice of proposed rulemaking, BIS stated that it will preclude the use of the Strategic Trade Authorization ("STA") license exception (15 C.F.R. § 740.20) for MMICs and HEMTs controlled under ECCN 3A611. See 77 Fed. Reg. 70,949. Given that national security column 1 ("NS1") and regional stability column 1 ("RS1") controls would apply, in addition to U.N. embargo ("UN") and anti-terrorism column 1 ("AT1"), a license would be required for export to every destination except Canada. Ordinarily, the STA exception is available for HEMTs and MMICs controlled under ECCN 3A001, as well as HEMTs controlled under ECCN 3A982. The exclusion of HEMTs and MMICs from STA eligibility under the proposed ECCN 3A611 would have the effect of controlling these items as if they were they were subject to the ITAR. With ECCN 3A611's broad control criteria capturing many products that currently are EAR99 or controlled elsewhere on the CCL, proposed ECCN 3A611 would increase restrictions on items already available on the domestic and foreign markets for export without a license.

Cree strongly urges BIS to reconsider its proposed policy of precluding the STA exception for HEMTs and MMICs controlled under the proposed ECCN 3A611. Rather, Cree requests that, if ECCN 3A611 is to control HEMTs and MMICs, that it follow the same license exception policy as the ECCNs that already control those products. Specifically, all HEMTs should be eligible for STA. If MMICs are to be excluded at all from STA, the exclusion should be limited to a narrow range of high-power products such as those currently controlled under ECCN 3A982, which are not eligible for STA.

D. Consistent Units of Measure Should Be Used Across all ECCNs Regulating HEMTs and MMICs

If BIS decides to keep the provision for HEMTs and MMICs in ECCN 3A611, the units of measure should be harmonized among all ECCNs that currently control those items. Cree notes that BIS is proposing to use peak saturated power output, as well as average power and pulse power, as the measures for power thresholds in ECCN 3A611. ECCN 3A001 currently uses average output power, and ECCN 3A982 currently uses both average output power and pulsed output power as units of measure. (Neither the terms average nor pulsed power output are defined for HEMTs and MMICs). For consistency, the same unit of measure should apply across all ECCNs that regulate transistors and amplifiers, and that unit of measure should be defined.

In Cree's view, saturated peak output power, as BIS is proposing to introduce in ECCN 3A611, is the most appropriate measure. Cree also appreciates that BIS is proposing to include a note defining that measure of power. A peak output power metric would most accurately address potential concerns relating to the military importance of the parts (for example, MMICs with high peak power could have applications in phased array radars). Furthermore, this unit eliminates many of the close-to-the-threshold concerns by providing a more precise measure of power. While Cree recommends the elimination of the HEMT and MMIC controls from the proposed ECCN 3A611 altogether, it encourages BIS to consider changing the unit of measure to peak power across all ECCNs and to implement its proposed definition for that term. In particular, the average power metric should be eliminated from this proposed regulation as well as from ECCNs 3A001 and 3A982, or at least clearly defined in a way that corresponds to peak power.

E. Parts Designed for ITU Radiocommunications Bands Should Be Exempt from ECCN 3A611

If BIS proceeds with controlling HEMTs and MMICs under proposed ECCN 3A611, Cree recommends that BIS include a note at the end of the discrete transistors section, stating:

Note: ***Does not control discrete microwave transistors specifically designed for radiocommunications in a frequency band allocated by the ITU.***

Cree proposes that BIS include a similar note at the end of the MMIC section, stating:

Note: ***Does not control MMICs specifically designed for radiocommunications in a frequency band allocated by the ITU.***

This language would have the effect of excluding items from ECCN 3A611 (thus defaulting to 3A001 or EAR99), if those items are primarily designed to function in commercial telecom, satcom, backhaul and point-to-point frequency bandwidths.[3] For example, this note would cover the following commercial radiocommunications frequency ranges: 2.5-2.7 GHz, 3.4-3.8 GHz, 5.8-6.8 GHz, and 12-15 GHz.

---

[3] The ITU (International Telecommunication Union) is the United Nations specialized agency responsible for standardizing international telecom and radio frequency spectrums.

Similar exclusion language is used throughout ECCN 3A001,[4] and the term "allocated by the ITU" is already included in the definitions section of the CCL at Part 772.[5] Such a note would add clarity to the regulation and prevent it from inadvertently capturing items that truly are commercial and widely available in the international marketplace.

F. Frequency Thresholds Should Use "Exceeding" as the Bottom Cut-Off

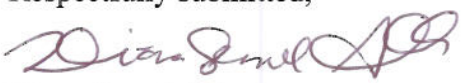
The regulations also should be consistent in the language used to describe frequency thresholds. Currently, ECCN 3A001 establishes a bottom cut-off for each control tier with the language, "frequencies exceeding [X] GHz up to and including [Y] GHz." Under the proposed technical revisions, the new control tiers at the lowest frequency range would use the language, "frequencies of 2.7 GHz up to and including 3.2 GHz." (Emphasis added.) The use of a bottom cut-off equal to the lowest frequency in a range – rather than "exceeding" that frequency – is not consistent with the other control tiers in that ECCN.[6]

Cree's concern is that a bottom cut-off equal to 2.7 GHz creates a problem, in that it catches basic telecom and other commercial parts that are frequently rated for performance up to and including 2.7 GHz. As noted in the background section above, standard cell phone carrier equipment typically operates in the range of 2.5 to 2.7 GHz, with a performance roll-off slightly above that frequency. Use of the language "exceeding" to describe the 2.7 GHz threshold would prevent the proposed ECCN 3A611 from unintentionally capturing a large segment of commercial products that are currently EAR99.[7]

* * *

Cree appreciates this opportunity to submit these comments for consideration. We would welcome the opportunity to answer any questions BIS may have concerning the issues raised in these comments.

Respectfully submitted,



Diana Semel Allen
Associate General Counsel
Cree, Inc.

---

4 See e.g., ECCN 3A001.b.1, ECCN 3A001.b.8.

5 The definition provides as follows: "*'Allocated by the ITU'.* (Cat 3 and Cat 5 part 1) -- The allocation of frequency bands according to the current edition of the ITU Radio Regulations for primary, permitted and secondary services. ***N.B.*** *Additional and alternative allocations are not included.*" See 15 C.F.R. Part 772.

6 ECCN 3A982 currently uses the language: "rated for operation at frequencies from 2.7 GHz up to and including 3.2 GHz." Cree has similar concerns with that language.

7 Transistors designed for the commercial telecom bandwidth of 2.5 to 2.7 GHz, which are currently EAR99, are frequently rated for a peak power of up to 400 W. Accordingly, they would cross the proposed power threshold of 240 W peak power if captured in the proposed lowest frequency tier of ECCN 3A611.

Cree, Inc.
Proposed Alternate Control Thresholds

c. Microwave ''monolithic integrated circuits'' (MMIC) power amplifiers having any of the following:

1. Rated for operation at frequencies ~~of~~ **exceeding** 2.7 GHz up to and including 3.2 GHz, having a power added efficiency of ~~30~~ **60**% or greater, and having any of the following:

~~a. An average output power greater than 15 W (41.7 dBm) with a ''fractional bandwidth'' greater than 15%;~~
~~b. A pulse power output greater than 75 W (48.75 dBm) and a duty cycle of 20% or more; or~~
c. A 'peak saturated power output' greater than 75 W (48.75 dBm);

2. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6.8 GHz and with a 'peak saturated power output greater' than 40W (46 dBm) with a ''fractional bandwidth'' greater than 15% and a power added efficiency of ~~40~~ **53**% or greater;

3. Rated for operation at frequencies exceeding 6.8 GHz up to and including 16 GHz and with a 'peak saturated power output' greater than ~~10~~ **20** W (40 dBm) with a ''fractional bandwidth'' greater than 10% and a power added efficiency of ~~35~~ **45**% or greater;

4. Rated for operation at frequencies exceeding 16 GHz up to and including 31.8 GHz and with a 'peak saturated power output' greater than ~~5~~ **10**W (37 dBm) with a ''fractional bandwidth'' greater than 10% and a power added efficiency of 30% or greater;

Note to paragraph .c.4: See ECCN 3A001.b.2.d for MMIC power amplifiers that are rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz.

5. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and with a 'peak saturated power output' greater than 2.5 W (34dBm) with a ''fractional bandwidth'' greater than 10% and a power added efficiency of 15% or greater; or

6. Rated for operation at frequencies exceeding 43.5 GHz up to and including 75 GHz and with a 'peak saturated power output' greater than 2.0 W (33dBm) with a ''fractional bandwidth'' greater than 5% and a power added efficiency of 10% or greater.

Note 1 to paragraph c: See ECCN 3A001.b.2.f for MMIC power amplifiers that are rated for operation at frequencies exceeding 75 GHz.

Note 2 to paragraph c: 'Peak saturated power output' is defined as that value where an increase in input rf power does not produce a concurrent increase in rf output power and may also be referred to as output power, saturated power output, maximum power output, peak power output, or peak envelope power output.

d. Discrete microwave transistors having any of the following:

1. Rated for operation at frequencies ~~of~~ **exceeding** 2.7 GHz up to and including 3.2 GHz, having a power added efficiency of ~~30~~ **65**% or greater, and having any of the following:

~~a. An average output power greater than 48 W (46.8 dBm);~~
~~b. A pulse power output greater than 240 W (53.8 dBm) and a duty cycle of 20% or more; or~~
c. A 'peak saturated power output' greater than 240 W (53.8 dBm);

2. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6.8 GHz and having a 'peak saturated power output' greater than ~~60~~**120**W (47.8 dBm) and a power added efficiency of ~~45~~ **57**% or greater;

3. Rated for operation at frequencies exceeding 6.8 GHz up to and including 31.8 GHz and having a 'peak saturated power output' greater than ~~20~~**50**W (43 dBm) and a power added efficiency of ~~35~~**50**% or greater;

Note to paragraph.d.3: See ECCN 3A001.b.3.c for discrete microwave transistors that are rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz.

4. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and having a 'peak saturated power output' greater than ~~1~~**20**W (30 dBm) and a power added efficiency of ~~20~~**30**% or greater; or

5. Rated for operation at frequencies exceeding 43.5 GHz up to and including 75 GHz and having a 'peak saturated power output' greater than ~~0.5~~**10**W (27 dBm) and a power added efficiency of 15% or greater; or

Note 1 to paragraph .d: See ECCN 3A001.b.3.e for discrete microwave transistors that are rated for operation at frequencies exceeding 75 GHz.

Note 2 to paragraph .d: 'Peak saturated power output' is defined as that value where an increase in input rf power does not produce a concurrent increase in rf output power and may also be referred to as saturated power, output power, saturated power output, maximum power output, peak power output, or peak envelope power output.