

CURRENT INDUSTRIAL REPORTS SERIES

2008

MA334Q — SEMICONDUCTORS, ELECTRONIC COMPONENTS, AND SEMICONDUCTOR MANUFACTURING EQUIPMENT

DEFINITIONS AND SPECIAL INSTRUCTIONS

1. Scope of survey

This survey covers the manufacture of semi-conductors, printed circuit boards, connectors, capacitors, and other electronic components (except relays) and semi-conductor machinery in the United States.

2. Figures to be reported

Companies with more than one establishment manufacturing the products covered by this survey are requested to complete a separate report form for each location. If you have not received a separate form for each of your establishments, please call the contact shown on the report form or write to the U.S. Census Bureau for additional forms.

a. Value of Shipments

The figures on value of shipments should include the physical shipments of all products sold, transferred to other establishments within your company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges and returns. Shipments to your own branches should be assigned the same value as comparable sales to unaffiliated customers, i.e., the value includes an appropriate allocation of company overhead and profit. Products bought and resold without further manufacture should not be included in shipments. The quantity of shipments is no longer collected.

Shipments should include the following —

Private brand units as well as your own company brand units

Leased machines and equipment — For products leased or rented by your company, report the number and estimated value. The estimate should approximate the value of the products sold outright. If no such basis is available, you may use the valuation placed on these items for tax, insurance, or similar purposes.

Do not include the following —

Products manufactured for you by others

Imports which are reshipped without further domestic

manufacture.

Your figure should include —

Electronic components parts (integrated microcircuits, transistors, diodes, rectifiers, capacitors, resistors, coils, transformers, connectors, filters, etc.)

(See Reference List for complete list of products collected on this survey.)

but exclude —

Electric wiring devices should be reported on survey MA335K, "Wiring Devices and Supplies."

Home entertainment electronic equipment, such as home and automobile radio receivers, television receivers, phonographs, hi-fidelity components, consumer audio and video tape recorders, loudspeakers, microphones, ear phones, phonograph cartridges, and public address systems should be reported on survey MA334M, "Consumer Electronics."

Analytical and optical instruments should be reported in MA334A, "Electromedical Equipment and Analytical Instructions."

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DEFINITIONS AND SPECIAL INSTRUCTIONS – Continued

a. Value of shipments—Continued

Industrial process control instruments should be reported in MA334C, "Control Instruments."

Aeronautical, nautical, and navigational instruments should be reported in MA334D, "Defense, Navigational, and Aerospace Electronics."

Physical properties testing and nuclear radiation, detection, and monitoring instruments should be reported in MA334T, "Meters and Test Devices."

b. Research and development

Dollar shipments should reflect income from development, design, and engineering services performed by the reporting plant in connection with the manufacture of the products shipped, whether included in a single production contract, or contracted for separately, but intended as preparation for the manufacture of the specific products.

Other income from research and development on a contract or fee basis should be reported separately following the appropriate subitem under the section headed "Selected Nonmanufacturing Revenues" (item codes 9930-9952).

c. Columnar structure of report

When entering your figures on the report form, please be sure to report the information in the correct columns as follows:

Column 1 — Quantity, no longer collected

Column 2 — Value (report shipments in thousands of dollars. Example: \$1,000,000, report as \$1,000)

3. Definitions

The product detail for this survey, as shown in the Reference List, is defined according to standard nomenclature for this industry.

SEMICONDUCTOR MACHINERY (Item codes 5201–5229)—This industry is comprised of establishments engaging in the manufacturing of wafer processing equipment, semiconductor assembly and packaging equipment, and other semiconductor making machinery.

TRANSMITTING, INDUSTRIAL, AND SPECIAL PURPOSE ELECTRON TUBES (Item codes 5747–6020)—Power and special purpose tubes include:

High vacuum tube — An electronic device in which conduction by electrons takes place through a vacuum within a sealed container and which is used for amplification, generation, control, or conversion of electromagnetic energy.

Triode — A three-electrode tube whose defining elements are a cathode for the emission of electrons, an anode for the collection of said electrons, and an inter-interspersed grid for controlling or regulating the number of electrons (current) that flow between cathode and anode.

Diode — An electron tube whose defining elements are a cathode for the emission of electrons, and an anode for the collection of said electrons.

Anode — The positive electrode through which a principal stream of electrons leaves the interelectrode space in an electron tube.

Gas and vapor tube — An electron tube in which the contained gas or vapor performs the primary role in the operation of the tube.

Thyratron — A hot cathode gas tube in which one or more control electrodes initiate but do not limit the anode current except under certain operating conditions.

Microwave tube — An electron tube designed for operation at wavelengths in the range of about 30 to 0.1 cm.

Klystron — A velocity-modulated tube comprising an input resonator, a drift space, and one or more intermediate or output resonators separated by appropriate drift spaces.

Amplifier — A klystron with two or more cavities uncoupled except by the beam, designed primarily for power amplification or generation. Also called power klystron.

Reflex — A single-resonator oscillator klystron in which the electron beam is reversed by a negative electrode so that it passes twice through the resonator, thus providing feedback.

Magnetron — A two-electrode electron tube with a resonant anode structure in which the flow of electrons to the anode is controlled by a combination of crossed steady electric and magnetic fields in such a way as to produce microwave output.

Tunable — A magnetron that can be tuned over a range of frequencies by electronic or mechanical means.

Traveling wave tube (TWT) — An electron tube in which a stream of electrons interacts continuously or repeatedly with a guided electromagnetic wave moving substantially in synchronism with it, and in such a way that there is a net transfer of energy from the stream to the wave.

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DEFINITIONS AND SPECIAL INSTRUCTIONS — Continued

3. Definitions — Continued

TRANSMITTING, INDUSTRIAL, AND SPECIAL PURPOSE ELECTRON TUBES (Item codes 5747—6020) — Continued

— Forward wave—A wave whose group velocity is in the same direction as the electron in stream motion.

Continuous wave (CW)—A mode of operation in which the rf output energy is not interrupted.

Pulsed power—The mode of operation in which an RF source is successfully turned on and off to provide repetitive pulses of high RF power.

Backward wave—A wave whose group velocity is opposite to the direction of electron stream motion.

Camera tube — A tube for conversion of an optical image into an electrical signal.

Photoemissive — Consists of a glass or quartz tube containing two electrodes, of which the cathode is coated with a layer of photosensitive material; under the action of the light, this layer emits electrons which establish conductivity between the electrodes and are collected on the anode. Also called photoemissive cell.

Image intensifier—An electronic tube in which an image projected on to a photoemissive surface produces a corresponding intensive image on a luminescent surface.

Image converter—An electron tube reproduces on its fluorescent screen an image of the optical image or other irradiation pattern incident on its photosensitive surface.

Photomultiplier—Photosensitive vacuum tubes comprising a photoemissive cathode and an electron multiplier

Storage tube—An electron tube into which information can be introduced and read at a later time.

Cathode ray tube (CRT)—A display device in which controlled electron beams are used to present alphanumeric or graphical data on an electro-luminescent screen.

Special display device — A CRT that forms alphanumeric and symbolic characters on its screen for viewing or recording purposes.

CATHODE-RAY PICTURE TUBE (Item code 6005)—A cathode ray tube (CRT) used for display purposes to produce an image by varying the electron beam intensity as the beam or beams is deflected to form a prescribed raster.

RECEIVING TYPE ELECTRON TUBE (item code 6015)— An electron device used in old time receiving sets in which conduction of electricity is provided by electrons moving through a vacuum of gaseous medium within a gastight envelope.

INTEGRATED MICROCIRCUIT PACKAGES (Item codes 6214—6300)

Integrated circuit (IC) — A microcircuit consisting exclusively of elements formed in situ on or within a single semiconductor substrate, with at least one of the elements formed within the substrate.

Hybrid microcircuit — A microcircuit consisting of elements that are a combination of one or both of these with discrete parts.

Monolithic IC — An integrated circuit consisting exclusively of elements formed in situ on or within a single semiconductor substrate with at least one of the elements formed within the substrate.

Bipolar IC — Semiconductor device used mostly as logic circuits.

Transistor-transistor logic (TTL) — A kind of bipolar circuit logic which takes its name from the way the basic transistor components are interconnected.

Current-mode logic (CML) or emitter-coupled logic (ECL) — Logic in which transistors operate in the unsaturated mode as distinguished from most other logic types which operate in the saturation region. Has very fast switching speeds and low logic swings.

Integrated injection logic (IIL) — It is made with a five mask process without the need for current source and load resistors, and can handle digital and analog functions on a single chip.

Microprocessor — An integrated circuit capable of:

1. operation on coded instructions,
2. carrying out, in accordance with the instructions, all of:

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DEFINITIONS AND SPECIAL INSTRUCTIONS — Continued

3. Definitions — Continued

INTEGRATED MICROCIRCUIT PACKAGES (Item codes 6214—6300) — Continued

Microprocessor — Continued

- (a) the acceptance of coded data for processing and/or storage,
 - (b) arithmetic and logical operations on the input data together with any relevant data stored in the internal registers of the microprocessor integrated circuit and/or in external memories,
 - (c) the delivery of coded data
3. accepting and/or delivering signals controlling and/or describing the operation or state of the microprocessor integrated circuit.

Memory — An integrated circuit consisting of memory cells and usually including associated circuits such as those for address selection and amplification.

Random access memory (RAM) — A memory in which access to all storage data can be achieved in essentially the same time, independent of the location. In a multipart memory, this term refers to that portion of the array which contains the memory cell array and its drivers, sense amplifiers, and control circuitry associated with the normal random access data port.

Read only memory (ROM) — A memory in which the contents are not intended to be altered during normal operation.

Metal oxide semiconductor (MOS) IC — A subcategory of MIS, in which the insulator employed is an oxide of the semiconductor substrate material. The term MOS is often misused to include other categories of insulated-gate technology such as MIS, MNS, and silicon gate (SIS).

MOS memory—A memory using a semiconductor circuit; generally used in high speed buffer memory and ROM.

Dynamic random access memory (DRAM)— These devices are made using dynamic RAM circuit configuration that have data storage that must be refreshed periodically. Also, a read/write memory in which the cell requires the repetitive application of control signals generated inside or outside the integrated circuit in order to retain stored data.

Static random access memory (SRAM)—A read/write memory in which the data is retained in the absence of control circuits generated inside or outside the integrated circuit.

Metal-oxide silicon read-only memory (MOSROM)—A ROM storage medium that employs metal-oxide silicon transistor (MOST) cells to store binary 1s and 0s.

Erasable programmable ROM (EPROM)—A reprogrammable read-only memory in which all cells may be simultaneously erased using ultraviolet light and in which each cell may be reprogrammed electrically.

Electrically erasable programmable ROM (EEPROM)—A reprogrammable read-only memory in which cells may be erased electrically and in which each cell may be reprogrammed electrically.

TRANSISTORS (Item code 6305)

Transistor—A semiconductor device capable of providing power amplification and having three or more electrodes.

Signal transistor—Device capable of being used up to half a watt.

Power transistor—Device capable of being used at high power ratings.

DIODES and RECTIFIERS (Item code 6317)

Diode—A semiconductor device having two electrodes and exhibiting a nonlinear voltage-current characteristic, used for detection, rectification, switching, etc.

Semiconductor rectifier diode—A semiconductor device that has two electrodes, exhibits an asymmetrical voltage-current characteristic, and is used for current and voltage rectification.

Zener Diode—Alternative name used for voltage-reference diode or the voltage regulator diode.

Voltage reference diode—A diode that is normal biased to operate in the breakdown region of its voltage-current characteristic and that develops across its terminal a reference voltage of specific accuracy when biased to operate throughout a specified current and temperature range.

Rectifier—A device that converts alternating current into a current having a large unidirectional component, such as gas tube, metallic rectifier, semiconductor diode, or vacuum tube.

Selenium rectifier—A device whose essential characteristics are governed by the flow of charge carried within a semiconductor.

SEMICONDUCTORS (Item codes 6328–6499)

Semiconductor device—A device whose essential characteristics are governed by the flow of charge carried within a semiconductor.

3. Definitions — Continued

SEMICONDUCTORS (Item codes 6328–6499)—Continued

Semiconductor device — Continued

Solar cell—A photoelectric cell used to convert the radiant energy of the sun into electric power.

Photovoltaic module—A photovoltaic device for generating electricity that is packaged for electrical interface with other electrical equipment.

Light-emitting diode (LED)—A diode capable of emitting luminous energy resulting from the recombination of electrons and holes.

Photodiode—A semiconductor diode in which the reverse current varies with illumination.

Photovoltaic cell—Converts light directly into electrical energy without the need for an external source of current. Used mainly in luxmeters and exposure meters.

Thyristor—A bistable semiconductor device that comprises three or more junctions and can be switched from the off state to the on state or vice versa. **NOTE:** The term thyristor is used as a generic term to cover the whole range of pnpn-type switches. It may be used by itself for any member of the thyristor family when such use does not result in ambiguity or misunderstanding. In particular, the abbreviated term “thyristor” is widely used for the reverse-blocking triode thyristor alternately called “silicon controlled rectifier” or “semiconductor controlled rectifier.”

Chip — A separated part (or whole) of a wafer intended to perform a function or functions in a device. **Wafer**—A slice or flat disk, either of semiconductor material or of such a material deposited on a substrate, in which one or more circuits or devices are simultaneously processed and that subsequently may be separated into chips.

CAPACITORS (Item codes 6767–6797)

Capacitor—A device consisting essentially of two conducting surfaces separated by a dielectric material such as air, paper, mica, ceramic, glass, or Mylar. A capacitor stores electric energy, blocks the flow of direct current, and permits the flow of alternating current to a degree dependent on its capacitance and frequency. This includes the following:

Fixed capacitor—A capacitor having a definite capacitance value that cannot be adjusted.

Paper capacitor—A fixed capacitor consisting of two strips of metal foil separated by oiled or waxed paper or other insulating material, and commonly rolled together in compact tubular or other form.

Metallized paper capacitor—A paper capacitor in which a film of metal is deposited directly on the insulating paper to serve in place of a separate foil strip.

Dual (film/paper) dielectric capacitor—A dielectric (a material that can serve as an insulator because it has poor electric conductivity) plastic film and paper is used between metal-foil plates of a capacitor to separate the plates electrically and store electric energy.

Tantalum electrolytic capacitor—An electrolytic capacitor that uses tantalum in the form of foil or a sintered slug as the anode, in an acid base electrolyte.

Aluminum electrolytic capacitor—An electrolytic capacitor that uses plain or etched aluminum foil for both electrodes.

Ceramic dielectric capacitor—A capacitor whose dielectric is a ceramic material such as steatite or barium titanate, the composition of which can be varied to give a wide range of temperature coefficients.

Mica dielectric capacitor—A fixed capacitor that uses mica sheets as the dielectric.

Variable capacitor—A capacitor whose capacitance can be varied by moving one set of metal plates with respect to another.

RESISTORS (Item codes 6885–6896)

Resistor—A device designed intentionally to have a definite amount of electrical resistance. Used in circuits to limit current flow or to provide a voltage drop. This includes the following:

Fixed carbon resistor—A resistor that has no provision for varying its resistance value and consisting of particles mixed with a binder, usually molded into a cylindrical shape, and baked.

Variable resistor—A resistor whose value may be changed readily by means of a control knob to control the current in a circuit. It has one fixed terminal and one that is connected to the sliding or rolling contact. Also called a rheostat.

Wirewound resistor—A resistor employing as the resistance element a length of high-resistance wire or ribbon, usually Nichrome, wound on an insulating form.

Potentiometer—Resistor having a continuously adjustable sliding contact that is generally mounted on a rotating shaft. Used chiefly as a voltage divider.

Varistor—A two-electrode semiconductor device having a voltage-dependent non linear resistance. Resistance drops as the applied voltage is increased.

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DEFINITIONS AND SPECIAL INSTRUCTIONS — Continued

3. Definitions — Continued

RESISTORS — Continued

Thermistor— A bolometer that makes use of the change in resistivity of a semiconductor with change in temperature.

COILS, TRANSFORMERS, REACTORS, AND CHOKES FOR ELECTRONIC APPLICATIONS (Item code 6967)

Coil— A number of turns a wire used to introduce inductance into an electric circuit, to produce magnetic flux, or to react mechanically to a changing magnetic flux.

Radio frequency (RF) coil— A coil having one continuous untapped winding, specifically designed to furnish inductive reactance for tuning purposes in a circuit carrying radio frequency (RF) current.

Toroidal winding— One or more turns of wire wound on a doughnut-shape core forming a continuous coil for a transformer, relay, rotating machine, or other electrical device.

Transformer— A component consisting of two or more coils that are coupled together by magnetic induction. Used to transfer electric energy from one or more circuits without change in frequency but usually with changed values of voltage and current.

Audio transformer or audio frequency (AF) transformer — An iron-core transformer used for coupling between AF circuits.

Filament transformer— A small transformer used exclusively to supply filament or heater current for one or more electron tubes.

Pulse transformer— A transformer capable of operating over a wide range of frequencies, used to transfer nonsinusoidal pulses without materially changing their wave-forms.

Intermediate-frequency (IF) transformer— The transformer used at the input and output of each IF amplifier stage in a superheterodyne receiver for coupling purposes and to provide selectivity.

Reactor— A device that introduces either inductive or capacitive reactance into circuits, such as a coil or capacitor.

Choke— An inductance used in a circuit to present a high impedance to frequencies above a specified frequency range without appreciably limiting the flow of direct current.

Radio frequency (RF) choke— An RF coil designed and used specifically to block the flow of RF current while passing lower frequencies or direct current.

CONNECTORS (Item codes 7007—7087)— A complete electric connecting device, consisting of a mating plug and receptacle for cables, or of mechanically mating flanges for waveguides.

CRYSTALS, FILTERS, PIEZOELECTRIC, AND OTHER RELATED DEVICES (Item Codes 7153—7189)

FILTERS (Item code 7153)

Filter — A selective that transmits a desired range of matter or energy while substantially attenuating all other ranges. This includes the following:

Mechanical filter— A filter designed to separate mechanical waves of different frequencies.

Radio frequency interference/electromagnetic interference (RFI/EM) control filter— A filter designed to separate unwanted interference of electromagnetic radiation of radio frequency signals into operating circuits.

Electronic wave filter — A transducer for separating waves on the basis of their frequency.

PIEZOELECTRIC DEVICES (Item code 7187)

Piezoelectric device— A device having the ability to generate a voltage when mechanical force is applied, or producing a mechanical force when a voltage is applied. This includes the following:

Oscillator crystal— A quartz crystal that has been cut and polished and which is used to generate a reference frequency in various types of instruments.

Crystal oscillator— An oscillator in which the principal frequency-determining factor is the mechanical resonance of a piezoelectric crystal.

Crystal filter— A electric wave filter employing piezoelectric crystals for its reactive elements.

Crystal blank— The result of the final cutting operation on a natural crystal.

TRANSDUCERS (Item codes 8402—8599)

Transducer— A device that converts energy from one form to another, as from acoustic energy to electric or mechanical energy.

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DEFINITIONS AND SPECIAL INSTRUCTIONS — Continued

3. Definitions — Continued

TRANSDUCERS (Item codes 8402—8599) — Continued

Electroacoustic transducer—A transducer for receiving waves and delivering waves to an acoustic system, or vice versa.

Electromechanical transducer—A transducer for receiving waves from an electric system and delivering waves to a mechanical system, or vice versa.

Thermoelectric device—A generic term for thermoelectric heat pumps (a device that transfers thermal energy from one body to another by the direct interaction of an electric current and heat flow) and thermoelectric generators (a device that converts thermal energy into electric energy by direct interaction of a heat flow and the charge carried in electric circuit which requires the existence of a temperature difference in the electric circuit).

PRINTED CIRCUIT BOARD (Item codes 8602—8639) — An insulating board serving as a base for a printed circuit. It may include printed components as well as printed wiring, completely processed as far as the printed portion is concerned.

SWITCHES (Item code 8739)

Switch (electronic)—An electronic device that directs the flow of electrical or optical signals from one side to the other. This includes the following:

Toggle switch—A small switch that is operated by manipulation of a projecting lever that is combined with a spring to provide a snap action for opening or closing a circuit quickly.

Slide switch—A switch that is actuated by sliding a button, bar, or knob.

Rotary selector switch—A switch that is operated by rotating its shaft.

Keyboard switch—A primary switch on various control panels which when pressed or activated will cause the first part or step of a program cycle or a procedure to begin

Pushbutton—A master switch that is operated by finger pressure on the end of an operating button.

Snap-action switch—A switch that responds to very small movements of its actuating button or lever, and changes rapidly and positively from one contact position to the other. Also called a sensitive switch.

Thumbwheel switch—A rigid circular ring type switch actuated by finger pressure on a control panel.

PRINTED CIRCUIT ASSEMBLY (Item codes 8740—8799) —Loaded circuit boards and board assemblies for replacement, upgrade, further assembly, or installation in another computer system (including single board computers), by electronics manufacturing services providers/contract assembly companies.

Computer and peripheral printed board assemblies—End use includes: mini-computers, business, personal, mainframes, laptops, key and non-key input, printers, plotters, CRT terminals.

Communications printed board assemblies—End use includes: central office switching equipment transmitters, airborne radio, facsimiles, voice recognition, voice output, modems, carrier inter-faces, LAN'S, land mobile, amateur radio, fixed station, microwave, TV broadcast, radio broadcast, terrestrial/satellite navigation, CATV, pagers, smoke/intrusion detectors.

Industrial process control board assemblies—End use includes: controllers, nuclear reactors, inspection and test, energy management, pollution monitoring, temperature controls, geophysical, meteorological, particle escalators, robotics, semiconductor testing.

Instrumentation printed board assemblies, except industrial process—End use includes: test and measurement, oscilloscopes, field recorders, ATE, auto diagnostics, medical instrumentation, diagnostics, therapeutics, radiology, chronomotographs, spectrophotometers, electromechanical analyzers, lasers, avionics instrumentation.

Search and detection printed board assemblies—End use includes: radar tracking, guidance control, airborne/marine ground military communication, electronic warfare, jammers, warning receivers, electro-optics, sonar system surface, sonar sub-surface.

Consumer electronics printed board assemblies—End use includes: radios, television, audio equipment, musical instruments, video players, electronic games, garage door openers, home appliances, watches, clocks, personal electronics, cameras.

Other electronics printed board assemblies—End use includes: Calculators, copying machines, cash registers, electronic gaming, gas pump meters, point-of-sale terminals, and plotter controllers.

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DEFINITIONS AND SPECIAL INSTRUCTIONS — Continued

3. Definitions — Continued

OTHER ELECTRONIC COMPONENTS (Item codes
9712—9819)

MICROWAVE COMPONENTS AND DEVICES

(Item codes 8805—8859)—This includes the following:

Attenuator—An arrangement of fixed and variable resistive elements used to reduce the strength of an RF or AF signal by a desired adjustable amount without introducing appreciable distortion.

Cavity—A resonator formed by a volume of propagating medium bounded by reflecting surfaces.

Coupler—A component used to transfer energy from one circuit to another.

Coaxial switch—A switch used with and designed to simulate the critical electric properties of coaxial conductors.

Waveguide switch—A switch designed for mechanically positioning a waveguide section so as to couple it to one of several other sections in a waveguide system.

Rigid waveguide—An inflexible rectangular or circular metal pipe having a predetermined cross-section, specifically designed to guide or conduct high-frequency electromagnetic waves through its interior, or any other equivalent system of material boundaries capable of guiding waves.

Flexible waveguide—A waveguide that can be bent or twisted without appreciably changing its electrical properties.

Parametric amplifier—A microwave amplifier having as its basic element an electron tube or solid-state device whose reactance can be varied periodically by an A.C. voltage at a pumping frequency.

Solid state assemblies—A number of basic parts or subassemblies, or any combination thereof, joined together to perform a specific function whose operation depends on the control of electric or magnetic phenomena in solids.

Magnetic recording head — A magnetic head used to transform electric variations into magnetic variations for storage on magnetic media.

Magnetic reproducing head — A magnetic head used to convert magnetic variations on magnetic media into electrical variations.

Delay line — A device utilizing the time of wave propagation to produce a time delay of a signal.

Oscillators—An electronic circuit used to generate high frequency pulses.

Static power supply converter — Electronic devices for transforming electric power.

Electronic cable harness and assembly — An assembly of insulated wires of various lengths, bent to a pattern and tied together before installation in a piece of equipment.

Cryogenic cooling device — A device utilizing properties of materials near absolute-zero temperature.

Liquid crystal display (LCD) — A display made of material whose reflectance or transmittance changes when an electric field is applied.

Magnetic core — A quantity of ferrous material placed in a coil or transformer to provide a better path than air for magnetic flux, thereby increasing the inductance of the coil and increasing the coupling between the windings of a transformer. Also called a core.

Socket — A device designed to provide electric connections and mechanical support for an electronic or electric component requiring convenient replacement.

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4. Comparability

Data reported in this survey should correspond to data reported in the Annual Survey of Manufactures form. The sum of values for item codes shown in column (a) should correspond to dollar values reported under product class codes indicated in column (b) below.

Current Industrial Reports (Form MA334Q)	Annual Survey of Manufactures
Item codes (a)	Product class codes (b)
5201 through 5228	3332950
5747 through 5917	3344111
6005	3344114
6015	3344117
6214 through 6288	3344131
6305	3344134
6317	3344137
6328 through 6450	334413A
6767 and 6782	3344140
6885 and 6894	3344150
6967	3344160
7007	3344171
7027	3344174
7047	3344177
7063	334417A
7079 and 7084	3344170
7153 and 7187	3344191
8402 through 8597	3344194
8602 through 8637	3344120
8729	3344197
8740 through 8768	334418B
8805 through 8850	334419A
9712 through 9815	334419E

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REFERENCE LIST

SEMICONDUCTORS, ELECTRONIC COMPONENTS, AND SEMICONDUCTOR MANUFACTURING EQUIPMENT

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FORM MA334Q—SEMICONDUCTORS, ELECTRONIC COMPONENTS, AND SEMICONDUCTOR MANUFACTURING EQUIPMENT

Product code	Item code	Item description
		SEMICONDUCTOR MACHINERY MANUFACTURING (Report value only)
3332950106	5201	Semiconductor wafer processing equipment: thin layer chemical vapor deposition
3332950211	5204	Semiconductor wafer processing equipment: thin layer physical vapor deposition
3332950326	5207	Semiconductor wafer processing equipment: plasma etch
3332950401	5210	Microlithography, including aligners
3332950416	5213	Semiconductor wafer processing equipment: thin layer epitaxial growth deposition
3332950421	5216	Semiconductor wafer processing equipment: wet etch
3332950441	5222	Ion implantation, including current and voltage ion implanters
3332950456	5225	Wafer processing equipment: pattern generating apparatus
3332950461	5227	Other semiconductor wafer processing equipment
3332950500	5228	Parts for semiconductor manufacturing machinery, including packaging equipment
3332950	5229	Total semiconductor machinery manufacturing (Sum of item codes 5201 – 5228) (Report value only)
		TRANSMITTING, INDUSTRIAL, AND SPECIAL PURPOSE ELECTRON TUBES (EXCLUDE X-RAY) (Report value only)
334411130	5747	Power and special purpose electron tubes, except forward wave tubes
334411210	5827	Forward wave transmitting and industrial electron tubes (excluding X-ray)
334411310	5917	All other transmitting, industrial, and special purpose electron tubes, (excluding X-ray), including light sensing, light emitting devices, and miscellaneous special purpose tubes.
3344111	5999	Total transmitting, industrial, and special purpose electron tubes (sum of item codes 5747 – 5917) (Report value only)
*3344114	6005	Total cathode ray picture and receiving tubes (Report value only)
3344117	6015	Total electron tube parts, except glass blanks (Report value only)
3344110	6020	Total electron tubes & parts, exclude glass blanks (Sum of item codes 5747-6015) (Report value only)
		INTEGRATED CIRCUIT PACKAGES (Report value only)
3344131550	6214	Digital monolithic integrated circuits nonsilicon
3344131552	6218	Digital monolithic integrated circuits silicon
3344131574	6222	Volatile memory DRAMS: 16 megabit and less
3344131575	6224	Volatile memory DRAMS: greater than 16 Mb, but less than 64 Mb
3344131576	6226	Volatile memory DRAMS: 64 Mb, but less than 128 Mb
3344131577	6228	Volatile memory DRAMS: greater than 128 Mb, but less than 256 Mb
3344131578	6232	Volatile memory DRAMS: greater than 256 Mb
3344131583	6234	Volatile memory SRAMS: 2 megabit and less
3344131587	6236	Volatile memory SRAMS: greater than 2 megabit
3344131588	6238	Nonvolatile EEPROM
3344131581	6242	NAND Type Flash EEPROM
3344131593	6244	NOR Type Flash EEPROM
3344131589	6262	Other Nonvolatile Memory

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REFERENCE LIST – Continued

FORM MA334Q		
Product code	Item code	Item description
		INTEGRATED CIRCUIT PACKAGES—Continued
3344131256	6264	Single core microprocessors (MPU)
3344131257	6266	Multi-core microprocessors (MPU) operating with an external bus of 16 bits or less
3344131260	6269	Multi-core microprocessors (MPU) operating with an external bus of 32 bits or more
3344131234	6270	Microcontrollers (MCU) operating with an external data bus of 8 bits or less
3344131235	6272	Microcontrollers (MCU) operating with an external data bus of 16 bits
3344131236	6274	Microcontrollers (MCU) operating with an external data bus of 32 bits or greater
3344131943	6278	Complementary BiMOS
3344131945	6280	Other digital silicon IC's
3344131962	6282	Nondigital silicon monolithic integrated circuits: radio frequency
3344131903	6284	Nondigital silicon monolithic integrated circuits: analog
3344131907	6285	Nondigital silicon monolithic integrated circuits: other
3344131918	6286	Hybrid integrated circuits: radio frequency
3344131951	6287	Hybrid integrated circuits: other
3344131912	6288	Other
3344131	6300	Total integrated circuit packages (Sum of item codes 6214—6288) (Report value only)
3344134	6305	Total transistors (Report value only)
3344137	6317	Total diodes and rectifiers (Report value only)
		OTHER SEMICONDUCTOR DEVICES (Report value only)
334413A105	6328	Solar cells
334413A110	6333	Photovoltaic modules
334413A123	6344	Light-emitting diodes (LED's)
334413A137	6357	Other light sensitive and light-emitting devices
334413A140	6402	Thyristors
334413A150	6404	Other semiconductor devices
334413A155	6405	Semiconductor parts: chips and wafers for integrated circuits
334413A160	6407	Semiconductor parts: chips and wafers for discrete semiconductors
334413A165	6450	All other semiconductor parts
334413A	6499	Total other semiconductor devices (Sum of item codes 6328-6450) (Report value only)
		CAPACITORS FOR ELECTRONIC CIRCUITRY (Report value only)
3344140173	6767	Capacitors
3344140175	6782	Parts for capacitors
3344140	6797	Total capacitors (Sum of item codes 6767 and 6782) (Report value only)
		RESISTORS FOR ELECTRONIC CIRCUITRY (Report value only)
3344150182	6885	Resistors
3344150184	6894	Parts for resistors
3344150	6896	Total resistors (Sum of item codes 6885 and 6894) (Report value only)

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FORM MA334Q		
Product code	Item code	Item description
3344160	6967	Total coils, transformers, reactors, and chokes for electronic applications (Report value only)
		CONNECTORS FOR ELECTRONIC CIRCUITRY (Report value only)
3344171	7007	Coaxial connectors (Report value only)
3344174	7027	Cylindrical connectors (Report value only)
3344177	7047	Rack and panel connectors (Report value only)
334417A	7063	Printed circuit connectors (Report value only)
3344170D17	7079	Other connectors
3344170D25	7084	Parts for connectors
3344170	7087	Total connectors (Sum of item codes 7007–7084) (Report value only)
		CRYSTALS, FILTERS, PIEZOELECTRIC, AND OTHER RELATED DEVICES (Report value only)
3344191127	7153	Filters (except microwave)
3344191180	7187	Piezoelectric devices
3344191	7189	Total crystals, filters, piezoelectric, and other related devices (Sum of item codes 7153 and 7187) (Report value only)
		TRANSDUCERS (Report value only)
3344194105	8402	Transducers: electroacoustic
3344194110	8452	Transducers: accelerometers
3344194115	8462	Transducers: pressure
3344194120	8472	Transducers: strain gauges and other
3344194135	8597	Transducers: other
3344194	8599	Total transducers (Sum of item codes 8402–8597) (Report value only)
		BARE PRINTED CIRCUIT BOARD MANUFACTURING (Report value only)
3344120105	8602	Printed circuit (wiring) boards: single-sided glass printed
3344120110	8604	Printed circuit (wiring) boards: Double-sided glass printed
3344120115	8606	Printed circuit (wiring) boards: Multilayer glass printed
3344120120	8620	Printed circuit (wiring) boards: Single-sided flex printed
3344120125	8623	Printed circuit (wiring) boards: Double-sided flex printed
3344120130	8627	Printed circuit (wiring) boards: Multilayer flex and rigid/flex printed
3344120139	8632	Printed circuit (wiring) boards: other
3344120145	8637	Receipts for contract work on printed boards.
3344120	8639	Total printed circuit (wiring) boards (Sum of item codes 8602-8632) (Report value only)

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FORM MA334Q		
Product code	Item code	Item description
3344197	8729	Total switches for electronic circuitry (Report value only)
334418B105 334418B110 334418B115 334418B120 334418B125 334418B130 334418B137	8740 8741 8742 8743 8744 8745 8768	LOADED CIRCUIT BOARDS AND BOARD ASSEMBLIES (Report value only) Computer and peripheral printed board assemblies Communications printed board assemblies Industrial process control board assemblies Instrumentation printed board assemblies, except industrial process Search and detection printed board assemblies Consumer electronics, printed board assemblies Other printed board assemblies, subassemblies and modules, including office equipment and point of sales and plotter controllers
334418B	8799	Total printed circuit assemblies (Sum of item codes 8740–8768) (Report value only)
334419A105 334419A110 334419A125 334419A130 334419A147 334419A150	8805 8810 8825 8830 8847 8850	MICROWAVE COMPONENTS AND DEVICES (Report value only) Ferrite (including yttrium garnets) microwave components Attenuators Reactive microwave components Switches, coaxial and waveguide Other microwave devices Microwave subassemblies
334419A	8859	Total microwave components and devices except antennae, tubes, and semiconductors (Sum of item codes 8805-8850) (Report value only)
334419E125 334419E130 334419E135 334419E140 334419E155 334419E180	9712 9740 9745 9750 9770 9815	MISCELLANEOUS ELECTRONIC COMPONENTS (Report value only) Oscillators Regulated static power supplies for electronic applications, sold separately Other static power supplies Electronic cable harnesses and cable assemblies Magnetic cores All other specialized electronic hardware
334419E	9819	Total miscellaneous electronic components (Sum of item codes 9712–9815) (Report value only)
9999998900 9999998046 9999998047 9997372000	9930 9932 9942 9952	SELECTED NONMANUFACTURING REVENUES Resales— Sales of products bought and sold without further manufacture, processing, or assembly Basic scientific electronic research Design and engineering services Software services