

Semiconductors, Printed Circuit Boards, Other Electronic Components

1998

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Information about the scope of the survey, methodology, explanation of terms and historical notes for this survey may be found in the introduction of the 1997 Manufacturing Profiles, issued August 1999.

Current data are released electronically on Internet for all individual surveys as they become available. Use: <http://www.census.gov/econ/www/manumenu.html>. Individual reports can be accessed by choosing "Current Industrial Reports (CIR's)," clicking on "Report Number Index;" from the "Industrial Products by Numeric Index," choose the survey of interest. Follow the menu to view the PDF file or to download the worksheet file (WK format) to your personal computer.

These data are also available through the U.S. Department of Commerce and STAT-USA Electronic Bulletin Board by subscription. To access, dial 202-482-3870 and follow the prompts to register. Also, you may call 202-482-1986 or 1-800-STAT-USA, for further information. The Internet address is: www.stat-usa.gov/.

NOTE: Data are now published on the new North American Industry Classification System (NAICS) basis and therefore are not always comparable

to the old Standard Industrial Classification (SIC) code. For further information on NAICS, see www.census.gov/epcd/www/naics.html.

Summary of Findings

During 1998, the total value of shipments of semiconductors, printed circuit boards, and other electronic components was \$130,163.0 million. This represents a 1.0-percent decrease from the revised 1997 total of \$131,512.4 million. The 1998 data include electron tubes and parts, \$4,141.7 million, a decrease of 2.6 percent from 1997; printed circuit boards, \$9,423.7 million, an increase of 8.3 percent from 1997; semiconductors and related devices, \$70,405.1 million, an increase of 0.6 percent over the revised total from 1997. Capacitors decreased 2.4 percent to \$2,047.6 million; resistors decreased by 20.5 percent to \$789.7 million; coils and transformers had a 5.2-percent increase to \$1,351.6 million; electronic connectors had \$5,034.2 million in 1998, compared to \$5,279.1 million in 1997, a decrease of 4.6 percent; and other electronic components decreased to \$36,969.4 million from a revised 1997 total of \$38,790.2 million, a decrease of 4.7 percent.

Address inquiries concerning these data to Investment Goods Industries Branch, Manufacturing and Construction Division (MCD), Washington, DC 20233-6900, or call Philippe S.J. Morris, 301-457-4819.

For mail or fax copies of this publication, please contact the Information Services Center, MCD, Washington, DC 20233-6900, or call 301-457-4673.

U S C E N S U S B U R E A U

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Table 1. Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components
by Class of Product: 1993 to 1998
[Value in million of dollars]

Product code	Product description	1998	1997	1996	1995	1994	1993
3344111	Transmittal, industrial, and special-purpose electron tubes (except x-ray).....	624.5	655.9	611.4	854.9	854.9	677.6
3344114	Receiving type electron tubes and cathode ray picture tubes.....	3,370.1	3,433.6	3,272.0	2,907.0	2,627.1	2,258.6
3344117	Electron tube parts.....	147.1	161.0	153.1	120.2	114.9	160.1
3344120	Printed circuit boards.....	9,423.7	8,702.4	8,216.8	8,367.3	6,812.3	6,273.0
3344131	Integrated microcircuits (semiconductor networks).....	59,005.1	57,019.4	52,639.3	48,437.9	36,020.4	23,636.1
3344134	Transistors.....	779.0	1,500.2	945.9	942.5	834.6	704.5
3344137	Diodes and rectifiers.....	650.9	1,190.5	861.4	1,066.7	829.5	640.7
334413A	Other semiconductor devices.....	9,970.1	10,262.3	10,976.1	12,639.4	9,915.4	6,908.2
3344140	Capacitors for electronic applications.....	2,047.6	2,098.7	1,653.4	1,785.3	1,512.3	1,294.3
3344150	Resistors.....	789.7	993.4	911.9	953.2	869.5	716.5
3344160	Coils, transformers, reactors, and chokes for electronic applications.....	1,351.6	1,425.7	1,435.6	1,411.8	1,250.7	1,121.4
3344171	Coaxial connectors.....	596.1	581.0	656.9	731.6	642.4	419.0
3344174	Cylindrical connectors.....	584.1	554.9	642.5	552.9	511.3	482.8
3344177	Rack and panel connectors.....	748.7	657.9	530.7	540.5	545.6	427.6
334417A	Printed circuit connectors.....	1,124.8	1,276.5	1,095.3	1,026.4	923.4	859.4
334417D	Other connectors, including parts.....	1,980.5	2,208.8	1,617.1	1,401.9	1,377.2	1,152.8
3344191	Filters (except microwave) and piezoelectric devices.....	802.4	814.7	719.3	729.2	674.1	534.3
3342207	Microwave components and devices.....	1,494.8	1,439.8	1,251.4	1,233.4	1,227.2	1,136.3
3344194	Transducers, electrical/electronic input or output.....	1,368.6	1,219.6	1,104.8	1,111.3	970.5	832.5
3344197	Switches, mechanical types for electronic circuitry.....	870.0	791.2	738.0	666.3	621.5	572.6
334418A	Printed circuit assemblies.....	25,455.7	27,040.2	24,937.3	24,447.7	17,514.8	15,087.1
334419D	All other electronic components, n.e.c.....	6,977.9	7,484.7	7,199.1	6,978.1	6,149.7	5,257.6

n.e.c. Not elsewhere classified.

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998 and 1997
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
334411	Electron tubes.....	(NA)	(X)	4,141,711	(X)	4,250,531
3344111---	Transmittal, industrial, and special purpose electron tubes (except X-ray).....	43	(X)	624,472	(X)	655,922
	Power and special purpose tubes:					
3344111105	High vacuum tubes, including triodes, multigrid external and internal anodes, diodes, and other.....	7	151	67,429 r/	131	66,955
3344111110	Gas and vapor tubes, including ignitrona, gas duplexers, spark gaps and others.....	11	306	43,215	295 r/	38,477
3344111115	Klystrons, including amplifier, reflex, and other.....	7	278	43,824 r/	483	47,587
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other.....	8	47	50,808 r/	43	46,083
	Traveling wave tubes (TWT):					
	Forward wave:					
	Continuous wave (CW):					
3344111225	Up to and including 10 watts CW power output rating 1/.....	2	(D)	(D)	(D)	(D)
3344111230	Over 10 watts CW power output rating 1/.....	5	2,634	58,797	2,555	80,354
	Pulsed power:					
3644111235	Up to and including 1 kW peak power output rating 2/.....	3	(D)	(D)	(D)	(D)
3344111240	Over 1 kW peak power output rating 2/.....	5	1,289	78,471	795	87,364
3344111265	Backward wave 2/.....	1	(D)	(D)	(D)	(D)
	Light sensing tubes:					
3344111345	Camera tubes, photo emissive and photo conductive 3/.....	5	(D)	(D)	(D)	(D)
3344111350	Image intensifiers and converters 3/.....	3	(D)	(D)	(D)	(D)
3344111355	Photo multipliers and other 3/.....	4	53	41,955 r/	60 r/	41,860
3344111360	Light emitting devices, including storage tubes all sizes, cathode ray tubes, color and monochrome (industrial and military), special display devices, including alphanumeric readout tubes, figure indicating tubes, and other.....	13	2,656	122,038	3,652	119,748
3344111370	Miscellaneous special-purpose tubes (reference cavities, radiation detection (geiger, neutron counters, etc.), beam deflection, decade counters, orbital beam, vacuum gauges, vacuum capacitors, switches, relays, etc.).....	10	(X)	102,088	(X) r/	109,372
3344114---	Receiving type electron tubes and cathode ray picture tubes.....	(NA)	(X)	3,370,095	(X)	3,433,621
3344114005	Receiving type electron tubes, all types, including rebuilt.....	9	(D)	(D)	(D)	(D)
	Television tubes, including any defective tube that has been rebuilt:					
	Color having a video display diagonal of:					
3344114010	50 cm and under (20 inches and under).....	12	10,097	730,940	10,917	816,307
3344114015	Over 50 cm but not exceeding 63 cm (21 through 25 inches).....	4	4,597	493,680	4,370	476,634
3344114020	Exceeding 63 cm (26 inches and over).....	9	10,723	2,078,326	10,495	2,080,908
3344114025	Other, including rebuilt color and new and rebuilt black and white.....	6	(D)	(D)	(D)	(D)
3344117030	Electron tube parts (except glass blanks): bases, getters, cathodes, headers, guns.....	18	(X)	147,144	(X)	160,988
334412	Printed-circuit (wiring) boards.....	599	(X)	9,423,718	(X)	8,702,365
3344120105	Single-sided glass printed.....	297	(X)	350,065	(X)	307,475
3344120210	Double-sided glass printed.....	405	(X)	1,483,842	(X)	1,427,131
3344120315	Multilayer glass printed.....	392	(X)	5,058,117	(X)	4,533,916
3344120420	Single-sided flex printed.....	48	(X)	201,624	(X)	180,543
3344120425	Double-sided flex printed.....	47	(X)	114,122	(X)	119,793
3344120430	Multilayer flex and rigid/flex printed.....	57	(X)	385,702	(X)	453,732
3344120435	All paper/mat/composite printed boards.....	19	(X)	64,983	(X)	107,028
3344120440	Other substitute printed boards.....	54	(X)	1,188,477	(X)	1,023,115
3344120545	Receipts for contract work on printed circuit boards (etching, dip-soldering, imprinting, etc.), but not printed board assembly.....	86	(X)	576,786	(X) r/	549,632

Continued

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998 and 1997
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
334413	Semiconductors and related devices.....	(NA)	(X)	70,405,209	(X)	69,972,455
3344131---	Monolithic integrated circuits.....	228	12,812,166	59,005,147	13,514,824	57,019,414
	Monolithic integrated circuits, digital, nonsilicon (e.g., gallium arsenide):					
3344131036	Memory	7	(D)	(D)	r/ 6,085	r/ 133,666
3344131048	Logic and other.....	14	210,933	1,053,538	r/ 231,186	r/ 1,050,970
	Monolithic integrated circuits, digital, silicon:					
	Bipolar transistors, memory:					
3344131015	Static read-write random access (SRAM).....	9	(D)	(D)	(D)	(D)
3344131021	Other memory.....	6	(D)	(D)	(D)	(D)
	Other bipolar transistors, including logic:					
3344131024	Transistor-transistor logic (TTL).....	21	1,010,036	318,339	r/ 2,196,707	r/ 1,088,126
3344131027	Emitter coupled logic (ECL).....	13	(D)	(D)	481,283	132,453
3344131030	Other.....	15	555,756	1,220,726	799,117	1,160,681
	Metal oxide semiconductor (MOS) field effect transistors:					
	Volatile memory DRAMS (dynamic read-write random access):					
3344131064	Not over 80 k 4/.....	8	(D)	(D)	(D)	(D)
3344131066	Over 80 k but not over 300 k 4/.....	5	(D)	(D)	(D)	(D)
3344131068	Over 300 k but not over 3 MB 4/.....	11	90,104	827,817	87,551	845,677
3344131070	Over 3 MB but not over 15 MB	13	76,427	282,460	116,813	433,336
3344131072	Over 15 MB.....	15	442,686	2,617,815	319,329	2,808,330
	Volatile memory SRAMS (static read-write random access):					
3344131082	Not over 40 k.....	12	33,980	206,067	r/ 28,647	222,205
3344131084	Over 40 k but not over 80 k.....	13	48,058	107,057	42,068	130,108
3344131086	Over 80 k but not over 300 k 5/.....	17	(D)	(D)	(D)	(D)
3344131088	Over 300 k but not over 3MB 5/.....	14	(D)	(D)	(D)	(D)
3344131090	Over 3 MB 5/.....	8	83,943	685,079	133,407	1,376,615
	Nonvolatile EEPROMs (electrically erasable programmable read-only memory):					
3344131092	Not over 80 k.....	10	462,669	256,604	r/ 307,116	268,498
3344131094	Over 80 k but not over 900 k	9	99,896	395,096	r/ 80,702	r/ 270,038
3344131096	Over 900 k.....	6	(D)	(D)	(D)	(D)
	Nonvolatile EPROMs (erasable, except electrically, programmable read-only memory):					
3344131074	Not over 80 k.....	6	14,703	53,347	r/ 14,692	r/ 61,313
3344131076	Over 80 k but not over 900 k.....	14	(D)	(D)	169,039	637,406
3344131078	Over 900 k.....	7	170,601	572,634	41,279	129,280
3344131080	Other nonvolatile memory.....	12	324,508	1,049,922	r/ 288,229	r/ 1,279,642
	Other, including microprocessors, controllers, application specific integrated circuits (ASIC's), and programable logic arrays (PLA's):					
3344131054	Microprocessors having an internal data bus of 8 bits or less.....	21	(D)	(D)	r/ 1,245,912	r/ 3,528,351
3344131057	Microprocessors having an internal data bus of 16 bits.....	21	304,407	1,473,764	r/ 139,148	1,559,218
3344131060	Microprocessors having an internal data bus of 32 bits or more.....	17	(D)	(D)	(D)	(D)
3344131033	Other (microcontrollers, ASICs, PLA's, etc.).....	43	1,722,386	7,444,183	r/ 1,666,754	r/ 6,501,797
	Other digital, silicon, including bipolar combined with MOS:					
3344131039	Complementary BiMOS (BiCMOS).....	5	(D)	(D)	(D)	(D)
3344131042	Other complementary BiMOS(BiCMOS), including logic.....	12	532,192	415,438	(D)	(D)
3344131045	Other digital silicon ICs.....	30	462,877	2,609,584	r/ 586,764	r/ 1,269,274
	Nondigital silicon monolithic integrated circuits (e.g., linear, analog):					
3344131062	Radio frequency.....	8	85,797	66,961	80,510	62,528
3344131003	Other, analog.....	27	1,195,818	2,316,843	r/ 1,107,893	r/ 2,194,715
3344131006	Other, including mixed signal (analog and digital), logic.....	10	(D)	(D)	(D)	(D)
3344131009	Other, including mixed signal (analog and digital), other.....	18	(D)	(D)	(D)	(D)

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Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
	Hybrid integrated circuits:					
3344131018	Radio frequency.....	26	86,642	417,533	62,265 r/	397,038
3344131051	Other.....	56	56,429	670,455	72,459	826,374
3344131012	Other.....	57	1,552,862	4,557,032	1,792,691	4,808,041
3344134---	Transistors.....	40	(X)	778,988	(X)	1,500,252
3344134005	Signal (less than 1 watt dissipation).....	22	(X)	177,105	(X)	(D)
3344134010	Power (1 watt or greater dissipation).....	36	(X)	601,883	(X)	(D)
3344137---	Diodes and rectifiers.....	64	4,104,465	650,939	4,394,972	1,190,459
3344137010	Signal diodes and assemblies thereof (maximum current 0.5 amps).....	25	41,625	17,508 r/	46,480 r/	17,463
3344137015	Semiconductor rectifiers/power diodes and assemblies thereof (current rating greater than 0.5 amps).....	36	929,062	268,974 r/	1,866,663 r/	482,352
3344137025	Zener diodes (voltage regulator and voltage reference diodes) 6/.....	27	(D)	(D)	1,848,762	345,378
3344137005	Selenium rectifiers 6/.....	5	(D)	(D)	(D)	(D)
3344137020	Microwave diodes (mixers, detectors, varactors, parametric, harmonic generators, etc.).....	18	474,015	192,860 r/	632,865 r/	343,157
334413A---	Other semiconductor devices.....	185	(X)	9,970,135	(X)	10,262,330
	Light-sensitive and light-emitting devices:					
334413A005	Solar cells.....	15	(X)	137,947	(X) r/	131,457
334413A010	Photovoltaic modules.....	8	(X)	68,190	(X)	56,236
	Light-emitting diodes (LED):					
334413A015	Discrete, infrared and laser.....	18	(X)	447,868	(X)	420,528
334413A020	Alpha or numeric displays.....	9	(X)	55,622	(X)	74,609
334413A025	Photodiodes, including infrared detectors.....	19	(X)	114,722	(X)	87,514
334413A030	Optical coupled isolators, including sensors and emitters.....	9	(X)	223,871	(X)	110,467
334413A035	Other light sensitive and light-emitting devices, including photovoltaic devices and photoelectric-magnetic devices.....	11	(X)	177,527	(X) r/	188,544
	Other semiconductor devices:					
334413A040	Thyristors (SCR's, triacs, PNP diodes).....	10	(X)	100,296	(X)	172,576
334413A045	Hall effect devices.....	-	(X)	-	(X)	-
334413A050	All other semiconductor devices (tunnel diodes, thermoelectric semiconductor junctions, metal-oxide varistors, solidstate transducers, and special semiconductor devices, n.e.c.).....	23	(X)	1,427,689	(X) r/	1,847,071
	Semiconductor parts:					
	Chips and wafers:					
334413A055	For integrated circuits (IC's).....	51	(X)	4,391,374	(X) r/	4,397,919
334413A060	For discrete semiconductors.....	42	(X)	1,453,631	(X)	1,376,661
334413A065	All other semiconductor parts (headers, packages, heat sinks, other accessories, etc.).....	44	(X)	1,371,398	(X) r/	1,398,748
334414	Capacitors.....	106	(X)	2,047,560	(X)	2,098,750
	Paper, plastic (film), metalized, and dual (film/paper) dielectric capacitors, fixed:.....	(NA)	82,759	154,642	85,729	161,468
	Ac types:					
3344140103	Less than 300 volts.....	19	20,942	35,065	16,852	29,416
3344140106	300 volts to 599 volts.....	18	52,772	93,458	56,575	99,030
3344140109	600 volts to 999 volts.....	12	6,034	10,145	8,090	16,204
3344140112	1,000 volts or over.....	10	3,011	15,974	4,212	16,818
	Capacitors having a reactive power handling capacity of 0.5 kVAR or less:					
	Dc types/other:					
3344140215	Axial lead.....	23	36,021	42,068	38,140	42,343
3344140218	Radial lead	13	82,168	20,578	109,149	24,010
3344140221	Chips and other leaded devices.....	2	(D)	(D)	(D)	(D)
	Tantalum electrolytic:					
3344140324	Metal case, including foil and wet 7/.....	11	(D)	(D)	26,596	50,543
3344140327	Dipped 7/	6	(D)	(D)	(D)	(D)

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 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
3344140330	Chips 7/.....	8	(D)	(D)	(D)	(D)
3344140333	Other leaded (molded axial and molded radial) 7/.....	5	1,900,587	273,333	566,659	182,171
	Aluminum electrolytic:					
3344140436	Less than 18 mm through 35 mm 8/.....	6	(D)	(D)	(D)	(D)
3344140439	Small can style (over 35mm through 51 mm) 8/.....	5	(D)	(D)	(D)	(D)
3344140442	Other can style (over 51 mm)	6	7,003	58,941	7,169	59,086
3344140445	Ac motor start 8/.....	1	80,148	95,963	80,963	102,253
	Ceramic dielectric, single layer:					
3344140554	Axial and radial 9/	9	(D)	(D)	(D)	(D)
3344140548	Chips 9/.....	4	138,598	24,922 r/	156,762 r/	26,929
	Ceramic dielectric, multilayer:					
3344140551	Axial leads 10/.....	4	(D)	(D)	(D)	(D)
3344140557	Radial leads 10/.....	11	4,649,691	173,203 r/	3,562,775 r/	170,422
3344140560	Chips.....	18	45,202,117	693,025	41,320,525 r/	680,477
	Other:					
3344140663	Mica dielectric.....	10	12,013	10,454	12,049	11,021
3344140666	All other fixed.....	21	205,842	92,752 r/	197,066 r/	92,586
	Variable:					
3344140769	Mica, ceramic or glass dielectric.....	4	(D)	(D)	(D)	(D)
3344140772	Other.....	5	2,041	6,476	1,153	6,749
3344140875	Parts of capacitors, including unfinished chips for further finishing and assembly.....	14	(X)	(D)	(X)	(D)
334415	Resistors.....	108	(X)	789,665	(X)	993,445
3344150104	Fixed carbon resistors, composition or film types.....	13	44,591	14,265	111,535	46,100
	Other fixed resistors (power capacity 20W or less):					
	Surface mounted, having two terminals:					
3344150208	Flat resistor chips.....	26	378,323	54,542	758,862	62,432
3344150212	Cylindrical leadless resistors, including metal film, metal oxide, and thick cermet film.....	6	(D)	(D)	(D)	(D)
	Surface mounted, having more than two terminals (resistor networks):					
3344150216	Dual-in-line package.....	10	109,191	33,820	121,680	38,713
3344150220	Other, including flat packs.....	13	81,712	38,444	107,214 r/	45,384
	Resistors, having two leads:					
3344150224	Wirewound.....	25	130,635	75,778	106,077	70,239
3344150228	Other, including metal film, metal oxide, and thick cermet film.....	22	725,232	87,354	927,718	99,899
	Resistor networks, having more than two leads:					
3344150232	Single-in-line.....	19	154,846	48,588	209,484	49,173
3344150236	Dual-in-line.....	12	28,069	11,671	33,563	13,435
3344150240	Other.....	13	62,494	51,817	7,272	23,568
	Variable, nonwirewound:					
	Trimmers:					
3344150344	Single-turn, carbon and other film.....	11	13,160	10,201	16,549	12,861
3344150348	Multiturn, carbon and other film	7	(D)	(D)	(D)	(D)
3344150356	Surface mounted.....	-	-	-	(D)	(D)
	Potentiometers:					
3344150352	Precision type 11/.....	16	17,395	77,000	26,393	100,414
3344150360	Panel type 11/.....	4	(D)	(D)	(D)	(D)
	Variable, wirewound:					
3344150468	Variable wirewound (except potentiometers), including nonprecision and trimmers.....	4	3,263	4,169	3,488	4,965
3344150464	Potentiometers, precision type 12/.....	10	2,483	30,624	4,725	35,808
3344150472	Potentiometers panel type 12/.....	5	(D)	(D)	(D)	(D)
	Miscellaneous:					
3344150576	Varistors.....	7	(D)	(D)	(D)	(D)
3344150580	Thermistors, bead type, disc, rod.....	16	209,926	83,634 r/	229,895	103,742
3344150684	Parts for resistors.....	12	(X)	(D)	(X)	(D)
334416	Coils, transformers, reactors, and chokes for electronic applications.....	269	(X)	1,351,645	(X)	1,425,682
3344160020	Audio frequency (AF) transformers.....	96	56,052	143,048	59,712	156,438
3344160025	Low frequency (LF) chokes.....	95	11,651	69,320	8,183	66,308
3344160030	Plate and filament transformers, including auto-transformers (except toroidal).....	68	13,655	117,942	16,641	145,647

Continued

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998 and 1997
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
3344160035	Pulse transformers, computer, and other types.....	90	35,160	126,143	37,671	129,994
3344160005	Radio frequency (RF) chokes.....	39	85,606	41,618	85,559	32,407
3344160010	Radio frequency (RF) coils.....	43	165,295	84,968	206,570	95,161
3344160015	Intermediate frequency (IF) transformers.....	36	7,961	58,394	6,778	48,104
3344160040	Television transformers and reactors (horizontal output, vertical deflection, focus coils, deflection yokes, etc.).....	20	19,245	115,421 r/	19,667 r/	123,168
3344160045	Toroidal windings (transformers and reactors) (except complete magnetics amplifiers).....	120	37,736	180,636	37,225	182,827
3344160050	Other (balun coils, permeability tuning devices, etc.).....	99	(X)	414,155	(X) r/	445,628
334417	Electronic connectors.....	(NA)	(X)	5,034,242	(X)	5,279,182
3344171---	Coaxial (RF) connectors.....	56	600,216	596,136	529,469	580,973
3344171005	Miniature (BNC, PNC, MHB).....	26	60,565	80,019	52,197	76,185
3344171010	Subminiature (SMA, SMB, SMC).....	28	36,381	98,172	35,039	95,132
3344171015	Other standard and precision.....	42	503,270	417,945	442,233 r/	409,656
3344174--	Cylindrical connectors.....	42	108,093	584,087 r/	188,623	554,930
3344174005	Heavy duty and standard.....	34	83,476	355,990	83,105	309,897
3344174010	Miniature.....	16	15,005	115,546	12,577	102,390
3344174015	Subminiature.....	10	9,612	112,551 r/	92,941 r/	142,643
3344177---	Rack and panel (rectangular) connectors.....	45	2,259,311	748,665 r/	1,804,523	657,898
3344177005	Integral shell, Mil-C-22857 (8434) and similar types.....	27	795,973	188,183 r/	546,400 r/	165,678
	Subminiature:					
3344177010	Ribbon, including planar cable type.....	9	(D)	(D)	(D)	(D)
3344177015	D-Subminiature, including planar cable type.....	22	(D)	(D)	(D)	(D)
3344177020	Microminiatures.....	10	10,127	35,641 r/	7,404 r/	32,106
334417A--	Printed circuit connectors.....	65	5,747,059	1,124,802	3,823,928	1,276,526
334417A005	Card insertion types.....	32	405,943	141,895	238,865	141,267
	Two-piece types:					
334417A010	Post, header and receptacle type.....	40	4,014,253	549,533	2,988,630	641,142
334417A015	Other two-piece types.....	29	1,326,863	433,374	596,433	494,117
334417D--	Other connectors, including parts.....	114	(X)	1,980,552	(X)	2,208,855
334417D005	Hermetic sealed (except single-contact and coaxial types).....	25	242,610	133,565	263,008	134,777
334417D010	Plate module types.....	5	9,847	32,938	10,348	32,464
334417D015	Fiber optic connectors.....	11	32,426	222,657	37,941	192,048
334417D030	Other planar cable (flat conductor or ribbon cable), excluding rack and panel (rectangular types).	23	280,563	172,174	1,004,808	359,661
334417D020	Miscellaneous special purpose.....	62	2,567,705	1,288,919 r/	2,337,437 r/	1,354,969
334417D025	Parts for connectors (connectors shipped but still requiring further manufacture).....	22	(X)	130,299	(X) r/	134,936
334419	Electronic components and subassemblies, n.e.c.....	(NA)	(X)	36,969,388	(X)	38,790,134
3344191---	Filters (except microwave) and piezoelectric devices..	128	249,383	802,383	215,139	814,666
33441911	Filters (except microwave).....	(NA)	151,855	290,641	135,761	298,598
3344191105	Mechanical, excluding optical lenses (germanium silicon, fused quartz, rock salt, and other).....	9	232	17,314	182	18,231
	Radio frequency interference/electro magnetic interference (RFI/EMI) control filters:					
3344191110	Ceramic dielectric.....	16	125,906	104,738	110,911 r/	121,287
3344191115	Combination or other dielectric.....	20	25,161	142,989	24,041	134,982
3344191120	Electronic wave filters (LC band and high pass).....	21	556	25,600	627	24,098
33441912	Piezoelectric devices.....	(NA)	97,528	511,742	79,378	516,068
	Oscillator crystals:					
3344191225	AT-cut.....	28	11,083	36,166	9,306 r/	40,530

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998 and 1997
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
3344191230	Other.....	11	52,188	74,420	41,525	69,836
	Crystal oscillators:					
3344191235	Oven.....	8	138	30,998	159 r/	30,943
3344191240	TCXO/VCXO.....	11	2,326	34,596	424	26,403
3344191245	Hybrid.....	13	3,836	45,743 r/	3,604 r/	44,210
3344191250	Other.....	7	2,666	21,863	2,605	26,925
	Crystal filters:					
3344191255	Monolithic, including filter crystals and/or monolithic filter units not assembled into filters.	6	803	13,288	979	15,783
3344191260	Packaged AT-cut, including monolithic, tandem monolithic, and resonator filter assemblies.....	10	120	6,034	236	7,774
3344191265	Other.....	5	13,134	80,130	7,763	76,213
	Crystal blanks:					
3344191270	AT-cut.....	6	2,577	5,728	3,049	6,508
3344191275	Other.....	24	8,657	162,776 r/	9,728 r/	170,943
3342207---	Microwave components and devices (except antenna), tubes, and semiconductors.....	141	(X)	1,494,772	(X)	1,439,767
3342207005	Ferrite, including yttrium garnets, microwave components (circulators, isolators, phase shifters, attenuators, equalizers, limiters, mixers, etc.).....	46	(X)	426,002	(X) r/	342,545
	Microwave devices, other than ferrite and solid state:					
3342207010	Attenuators (dummy loads, high and low-power terminations, etc.).....	38	(X)	92,102	(X)	91,951
3342207015	Cavities (amplifier cavities, coaxial tuned cavities, etc.).....	15	(X)	46,230	(X) r/	50,533
3342207020	Couplers (directional couplers, hybrid junctions, etc.).....	29	(X)	61,499	(X) r/	66,109
3342207025	Reactive microwave components, n.e.c.....	42	(X)	207,266	(X) r/	189,903
3342207030	Switches, coaxial and waveguide.....	35	(X)	86,409	(X) r/	74,662
3342207035	Rigid waveguide and fittings (bend and twists, couplings, flanges, other simple waveguide components, n.e.c.).....	23	(X)	(D)	(X)	(D)
3342207040	Flexible waveguides and fittings.....	13	(X)	(D)	(X)	(D)
3342207045	Other microwave components (except ferrite devices) (coaxial to waveguide and other transitions, duplexers and diplexers, holders and mounts, linear and circular polarizers, magnetron test plumbing, rotary joints and sector scan joints, mixer arrays, shutters, tuners, windows, etc.).....	44	(X)	203,158	(X) r/	240,782
3342207050	Microwave subassemblies, including parametric amplifiers and other solid-state assemblies.....	32	(X)	276,224	(X) r/	285,334
3344194---	Transducers, electrical/electronic I/O, n.e.c.....	95	112,127	1,368,574 r/	103,301	1,219,626
3344194005	Electroacoustic (sonar, ultrasonic, vibration*, etc.).....	17	17,487	133,668 r/	15,995 r/	121,255
	Electromechanical:					
3344194010	Accelerometers*.....	13	6,084	204,440 r/	3,902	126,810
3344194015	Pressure*.....	39	52,812	541,336	51,893	531,662
3344194020	Strain gauges and other mechanical*.....	23	1,047	135,555	910	136,640
3344194025	Thermoelectric (pyrometers, thermocouples*, etc.).....	9	2,138	62,272	1,993	59,264
3344194030	Other (optical, chemical, magnetic, nuclear*, etc.).....	28	32,559	291,303	28,608 r/	243,995
3344197---	Switches, mechanical types for electronic circuitry.....	83	(X)	870,028	(X)	791,230
3344197020	Slide, including rocker, miniature and subminiature*..	15	(X)	58,284	(X)	58,872
3344197025	Rotary selector, including lever and jog-lever, miniature and subminiature*.....	20	(X)	52,057	(X) r/	56,543
3344197030	Keyboard*.....	8	(X)	58,046	(X)	51,884
3344197035	Pushbutton*.....	26	(X)	99,410	(X) r/	55,590
3344197040	Snap-action*.....	11	(X)	22,456	(X)	25,399
3344197045	Thumbwheel*.....	7	(X)	21,411	(X)	22,920
3344197015	Membrane.....	17	(X)	77,990	(X) r/	74,043
3344197005	Toggle standard type	13	(X)	39,421	(X)	43,472
3344197010	Toggle miniature and subminiature.....	5	(X)	(D)	(X)	(D)
3344197050	DIP.....	6	(X)	(D)	(X)	(D)
3344197055	Other.....	30	(X)	385,162	(X)	314,377

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998 and 1997
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997			
			Quantity	Value	Quantity	Value		
334418A---	Printed circuit assemblies (loaded boards, subassemblies and modules) 13/.....	792	(X)	25,455,728	(X)	27,040,174		
334418A005	Computer and peripheral printed board assemblies 13/.....	324	(X)	12,209,910	(X) r/	12,455,073		
334418A010	Communications printed board assemblies 13/.....	246	(X)	5,233,837	(X) r/	4,625,398		
334418A015	Industrial process control board assemblies 13/.....	220	(X)	787,762	(X) r/	615,545		
334418A020	Instrumentation printed board assemblies (except industrial process) 13/.....	193	(X)	1,447,171	(X)	3,419,520		
334418A025	Search and detection printed board assemblies 13/.....	47	(X)	54,488	(X) r/	45,172		
334418A030	Consumer electronics, printed board assemblies 13/.....	135	(X)	466,588	(X)	520,360		
334418A035	Other electronics, printed board assemblies, including office equipment and point of sales 13/.....	320	(X)	5,255,972	(X) r/	5,359,106		
334419D---	Electronic components and subassemblies, n.e.c.....	595	(X)	6,977,903	(X)	7,484,671		
	Antenna systems (except structural towers sold separately):							
334419D108	Home antenna.....	10		24,735	286,020	20,075	258,789	
334419D110	Auto antenna.....	13		22,065	73,757	19,762	78,667	
334419D115	Antenna accessories, sold separately (pedestals, drives, passive reflectors, rotators, radomes, etc.).....	23	(X)	91,059		(X) r/	85,457	
334419D220	Delay lines (distributed constant, lumped constant, magnetostrictive, ultrasonic, etc.).....	16		6,049	34,830	6,679	40,922	
334419D325	Oscillators (except instrumentation and crystal types).....	22	(D)		(D) r/	6,498 r/	158,447	
3342203051	Magnetic recording and reproducing heads, including audio, video, digital and instrumentation.....	18	(D)		(D) r/	30,098 r/	758,062	
	Static power supply converters for electronic applications, sold separately:							
334419D530	Regulated.....	85		58,626	1,341,187	r/	56,716 r/	1,377,891
334419D535	Other (unregulated, variable frequency, ac, dc, converters and inverters, vibrator, etc.).....	51	(X)	602,081		(X)	626,834	
334419D640	Electronic cable harnesses and cable assemblies.....	260	(X)	1,790,092		(X) r/	1,716,994	
334419D745	Cryogenic cooling devices (cryostats, etc.) for infrared detectors, masers.....	6	(X)	20,285		(X)	14,956	
334419D850	Liquid crystal displays (LCD) and other liquid devices.....	15	(X)	108,511		(X)	104,402	
334419D955	Magnetic cores.....	18	(X)	357,438		(X) r/	365,411	
	Electronic parts, n.e.c. and specialized electronic hardware:							
	Sockets for electronic component insertion:							
334419DA65	Integrated circuit sockets.....	13	(X)	105,703		(X)	173,124	
334419DA60	Other, including tube, relay, discrete semiconductors, ac and dc converters and inverters, etc.....	12	(X)	93,016		(X)	(D)	
336322C119	Electronic control modular chips for motor vehicles**.....	2	(X)		(D)	(X)	(D)	
334419D870	All other electronic parts and specialized electronic hardware, n.e.c.....	133	(X)	1,649,816		(X)	1,574,946	
	Electronic research, development, testing, and evaluation (receipts or billings, not reported as shipments of specific products):							
99980 42	Systems.....	23	(X)	132,263		(X) r/	142,943	
99980 43	Equipment and subassemblies.....	41	(X)	237,633		(X)	239,537	
99980 44	Component parts.....	34	(X)	177,303		(X)	115,317	

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998 and 1997
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1998		1997	
			Quantity	Value	Quantity	Value
99980 46	Basic scientific electronic research.....	23	(X)	72,953	(X)	81,888
99980 47	Design and engineering services.....	65	(X)	458,774	(X)	111,462
99980 48	Software.....	10	(X)	21,801	(X)	(D)
99980 49	Testing.....	7	(X)	5,053	(X)	10,506
99980 50	Supplies and accessories sold with components.....	9	(X)	1,175	(X)	2,111

*Similar products are collected on Current Industrial Report Series MA335A, "Switchgear and Industrial Controls" and MA335K, "Wiring Devices and Supplies." D Withheld to avoid disclosing data for individual companies. NA Not available. n.e.c. Not elsewhere classified. r/Revised by 5 percent or more from previously published data. X Not applicable.

- 1/Product code 3344111225 is combined with product code 3344111230 to avoid disclosing data for individual companies.
- 2/Product code 3344111235 is combined with product code 3344111240 to avoid disclosing data for individual companies.
- 3/Product code 3344111345 is combined with product code 3344111355 to avoid disclosing data for individual companies.
- 4/Product codes 3344131064 and 3344131066 are combined with product code 3344131068 to avoid disclosing data for individual companies.
- 5/Product codes 3344131086 and 3344131088 are combined with product code 3344131090 to avoid disclosing data for individual companies.
- 6/Product code 3344131076 is combined with product code 3344131078 to avoid disclosing data for individual companies.
- 7/Product codes 3344140324, 3344140327, and 3344140330 are combined with product code 3344140333 to avoid disclosing data for individual companies.
- 8/Product codes 3344140436 and 3344140439 are combined with product code 3344140445 to avoid disclosing data for individual companies.
- 9/Product code 3344140554 is combined with product code 3344140548 to avoid disclosing data for individual companies.
- 10/Product code 3344140551 is combined with product code 3344140557 to avoid disclosing data for individual companies.
- 11/Product code 3344150352 is combined with product code 3344150360 to avoid disclosing data for individual companies.
- 12/Product code 3344150464 is combined with product code 3344150472 to avoid disclosing data for individual companies.
- 13/These data are collected on two Current Industrial Report forms, MA334R, "Computers and Office and Accounting Machines," and MA334Q, "Semiconductors, Printed Circuit Boards, and Other Electronic Components."

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998
 [Values in Thousands]

Product code	Product description	Manufactures' shipments (value, f.o.b. plant)	Exports of domestic merchandise (value at port) 1/	Imports for consumption 2/
3344111105	High vacuum tubes.....	67,429	40,292	17,069
3344111110	Gas and vapor tubes.....	43,215	9,849	1,321
3344111115	Klystrons, including amplifier, reflex and other.....	43,824	40,331	94,426
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other.....	50,808	6,966	42,468
3344111345, 350	Light sensing tubes, including camera tubes, photo emissive and photo conductive, and image intensifiers and converters.....	(D)	291,215	32,268
3344111355	Light sensing tubes, n.e.c., including photo multipliers.....	(D)	22,689	23,327
3344114005	Receiving type electron tubes, including rebuilt.....	(D)	6,609	6,706
3344114010, 015, 020, 025	Television tubes, color, and black and white new and rebuilt.....	(D)	1,756,443	173,723
3344117030	Electron tube parts (except glass blanks).....	147,144	107,993	391,426
3344120105, 210, 315, 420, 425, 430, 435, 440	Printed circuit boards.....	8,846,932	2,178,189	2,134,396
3344131048	Monolithic integrated circuits, digital (except memory and silicon).....	1,053,538	935,789	99,359
3344131036	Monolithic integrated circuits, digital, memory (except silicon).....	(D)	229,244	313,338
3344131015	Monolithic integrated circuits, digital, silicon, bipolar transistors, memory, static random access memory (SRAM).....	(D)	28,084	4,913
3344131021	Monolithic integrated circuits, digital, silicon, bipolar transistors, memory (except static random access memory (SRAM)).....	(D)	14,962	20,494
3344131027	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, emitter logic (ECL)).....	(D)	19,351	69,034
3344131024	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, transistor-transistor logic (TTL)).....	(D)	29,507	168,789
3344131030	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, n.e.c.).....	1,220,726	67,435	125,169
	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors:			
3344131064, 066	With volatile memory (DRAM), not over 300 k 3/.....	(D)	83,300	57,110
3344131068, 070, 072	With volatile memory (DRAM), over 300 k 3/.....	3,728,092	1,222,877	4,585,301
3344131082, 084, 086	With volatile memory (SRAM), not over 300 k	(D)	89,965	301,906
3344131088, 090	With volatile memory (SRAM), over 300 k	(D)	76,321	758,686
3344131092, 094, 096	Except volatile memory, electrically (EEPROM).....	(D)	397,821	1,779,319
3344131074, 076, 078	Except volatile memory (except electrically (EEPROM)).....	625,981	149,619	538,554
3344131080	Except volatile memory, n.e.c.	1,049,922	558,833	1,081,652
	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except memory type):			
3344131054	Microprocessors 8 bits or less.....	(D)	211,889	1,348,111

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998
 [Values in Thousands]

Product code	Product description	Manufactures' shipments (value, f.o.b. plant)	Exports of domestic merchandise (value at port) 1/	Imports for consumption 2/
3344131057	Microprocessors 16 bits.....	1,473,764	126,108	659,558
3344131060	Microprocessors 32 bits or more.....	(D)	1,230,757	2,212,331
3344131033	Other (microcontrollers, ASIC's PLA's, etc.).....	7,444,183	1,611,049	7,615,892
3344131039	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, complementary BiMOS, memory type.....	(D)	42,776	192,247
3344131042	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, complementary BiMOS (except memory type).....	(D)	66,920	238,314
3344131045	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, complementary BiMOS, n.e.c., including logic type (except memory types).....	2,609,584	306,170	143,440
3344131062, 003, 006, 009	Monolithic integrated circuits, nondigital, silicon, including linear, analog, radio frequency, etc.....	(D)	1,723,668	4,525,530
3344131018, 051	Hybrid integrated circuits.....	1,087,988	680,107	722,260
3344140324	Capacitors, fixed, tantalum electrolytic, metal case, including foil and wet 4/.....	(D)	14,256	11,480
3344140327	Capacitors, fixed, tantalum electrolytic, dipped 4/.....	(D)	12,235	36,937
3344140330	Capacitors, fixed, tantalum electrolytic, chips 4/.....	(D)	130,576	296,709
3344140333	Capacitors, fixed, tantalum electrolytic, n.e.c., including leaded 4/.....	273,333	33,448	29,437
3344140436	Capacitors, fixed, aluminum electrolytic, not exceeding 35 mm.....	(D)	52,586	260,114
3344140439, 442, 445	Capacitors, fixed, aluminum electrolytic, over 35 mm.....	(D)	12,488	20,665
3344140548	Capacitors, fixed, ceramic dielectric, single layer, chips 5/.....	24,922	18,521	5,563
3344140554	Capacitors, fixed ceramic dielectric, single layer, axial and radial 5/.....	(D)	14,149	32,154
3344140551	Capacitors, fixed ceramic dielectric, multilayer, axial leads 6/.....	(D)	47,278	36,648
3344140557	Capacitors, fixed ceramic dielectric, multilayer, radial leads 6/.....	173,203	28,332	43,915
3344140560	Capacitors, fixed ceramic dielectric, multilayer, chips.....	693,025	343,881	345,447
3344140663	Capacitors, fixed, mica dielectric.....	10,454	1,435	4,022
3344140666	Capacitors, fixed, n.e.c.....	92,752	407,418	56,888
3344140769	Capacitors, variable, mica/ceramic/glass dielectric.....	(D)	10,995	10,246
3344140772	Capacitors, variable, n.e.c.....	6,476	41,236	14,929
3344140875	Capacitors, parts, including unfinished chips for further finishing.....	(D)	271,504	37,972
3344140103	Capacitors, fixed, ac type, less than 300 volts.....	35,065	7,005	43,721
3344140106	Capacitors, fixed, ac type, 300-599 volts.....	93,458	8,372	30,819
3344140109	Capacitors, fixed, ac type, 600-999 volts.....	10,145	258	2,957
3344140112	Capacitors, fixed, ac type, 1,000 volts or more.....	15,974	7,730	728
3344140215	Capacitors, fixed, dc type, axial.....	42,068	1,301	3,977
3344140218	Capacitors, fixed, dc type, radial.....	20,578	998	50,207
3344140221	Capacitors, fixed, dc type, chips and other leaded.....	(D)	7,077	22,128
3344134005	Transistors, signal, less than 1 watt dissipation.....	177,105	97,616	351,537
3344134010	Transistors, signal, 1 watt or greater dissipation.....	601,883	196,005	688,301
3344137010	Signal diodes and assemblies.....	17,508	15,590	67,286
3344137025	Zener diodes.....	(D)	31,938	101,151
3344137015, 005	Diodes and rectifiers, n.e.c.....	(D)	249,755	529,592

Continued

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998
 [Values in Thousands]

Product code	Product description	Manufactures' shipments (value, f.o.b. plant)	Exports of domestic merchandise (value at port) 1/	Imports for consumption 2/
3344137020	Microwave diodes.....	192,860	37,409	24,415
334413A005	Solar cell.....	137,947	122,266	59,740
334413A015, 020	Light-emitting diodes.....	503,490	121,730	477,845
334413A030	Optical coupled isolators.....	223,871	23,330	123,931
334413A035	Other light-sensitive and light-emitting devices.....	177,527	78,935	171,432
334413A040	Thyristors, SCR's, triacs, and PNP diodes.....	100,296	33,153	170,275
334413A055	Chips and wafers for integrated circuits.....	4,391,374	14,702,251	1,681,292
334413A060	Chips and wafers for discrete semiconductors.....	1,453,631	1,664,586	214,033
334413A065	Other semiconductor parts.....	1,371,398	178,009	152,393
3344150104	Carbon resistors, fixed, composition or film types, designed for surface mounting (SMD) by contact, having two terminals, cylindrical leadless having two leads, carbon composition, and carbon film.....	14,265	24,289	41,866
3344150208, 212	Carbon resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having two terminals, flat resistor chips, and cylindrical leadless resistors.....	(D)	46,738	92,014
3344150216, 220	Carbon resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having more than two terminals, resistor, and resistor-capacitor networks.....	72,264	11,109	21,425
3344150224	Resistors, fixed, with a power capacity of 20 watts or less, wirebound, having two leads.....	75,778	19,187	28,384
3344150228	Resistors, fixed, with a power capacity of 20 watts or less, other than wirebound, having two leads.....	87,354	37,178	68,772
3344150232, 236, 240	Resistors, fixed, with a power capacity of 20 watts or less, resistor networks, having more than two leads.....	112,076	52,848	60,862
3344150468, 464, 472	Resistors, variable, wirewound, including rheostats and potentiometers, for a power handling capacity not exceeding 20 watts.....	34,793	4,367	25,508
3344150344, 348, 352, 356, 360, 576, 580	Resistors, variable, n.e.c.	(D)	88,915	177,432
3344150684	Resistors, parts	(D)	163,176	26,654
3344191225, 230, 235, 240, 245, 250, 255, 260, 265	Piezoelectric devices (except crystal blanks).....	343,238	167,295	546,340
3344191270, 275	Piezoelectric devices, crystal blanks.....	168,504	24,280	12,472
3344160040	Television transformers and reactors.....	115,421	18,286	131,280
3344160020, 030, 035, 010, 015, 045, 050	Coils, transformers, reactors, and chokes for electronic applications, n.e.c.	1,125,286	318,686	718,929
3344171000	Connectors coaxial.....	596,136	104,801	155,888
3344174000	Connectors, cylindrical	584,087	32,189	94,427
3344177000	Connectors, rack and panel	748,665	20,403	24,895
334417A000	Connectors, printed circuit	1,124,802	234,005	318,953
334419D108, 110, 115	Antenna systems (except structural towers, sold separately).....	450,836	51,273	42,296
3342203051	Magnetic recording and reproducing heads.....	(D)	10,806.0	23,612
3344197025	Switches, rotary selector.....	52,057	27,562	26,149
3344197035	Switches, pushbutton.....	99,410	70,632	143,924

Continued

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1998
 [Values in Thousands]

Product code	Product description	Manufacturers' shipments (value, f.o.b. plant)	Exports of domestic merchandise (value at port) 1/	Imports for consumption 2/
3344197020	Switches, slide, including rocker, miniature and subminiature.....	58,284	3,438	15,150
3344197040	Switches, snap-action.....	22,456	25,530	80,905
3344197030, 045, 015, 005, 010, 050, 055	Switches, other.....	637,821	644,898	997,055

D Withheld to avoid disclosing data for individual companies. n.e.c. Not elsewhere classified.

1/Source: Census Bureau report EM 545, U.S. Exports.

2/Source: Census Bureau report IM 145, General imports for Consumption.

3/Manufacturers' shipments for "Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, with volatile memory (DRAM) not over 300 k bits" and "Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, with volatile memory (DRAM) over 300 k bits" are combined to avoid disclosing data for individual companies.

4/Manufacturers' shipments for "Capacitors, fixed, tantalum electrolytic, metal case, including foil and wet," "Capacitors, fixed, tantalum electrolytic, dipped," "Capacitors, fixed, tantalum electrolytic, chips" and "Capacitors, fixed, tantalum electrolytic, n.e.c., including leaded" are combined to avoid disclosing data for individual companies.

5/Manufacturers' shipments for "Capacitors, fixed, ceramic dielectric, single layer, chips" and "Capacitors, fixed, ceramic dielectric, single layer, axial and radial" are combined to avoid disclosing data for individual companies.

6/Manufacturers' shipments for "Capacitors, fixed, ceramic dielectric, multilayer, axial leads" and "Capacitors, fixed, ceramic dielectric, multilayer, radial leads" are combined to avoid disclosing data for individual companies.

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
3344114005	Receiving-type electron tubes	8540.81.0000	8540.81.0000
3344114010, 015, 015, 020, 025	Television tubes, color, black and white, new and rebuilt	8540.11.0035	8540.11.1030
		8540.11.0070	8540.11.1040
		8540.11.0080	8540.11.1050
		8540.12.0000	8540.11.1055
			8540.11.1065
			8540.11.1080
			8540.11.2400
			8540.11.2800
			8540.11.3000
			8540.11.4400
			8540.11.4800
			8540.11.5000
			8540.12.1040
			8540.12.1080
	8540.12.2000		
	8540.12.5040		
	8540.12.5080		
	8540.12.7000		
3344111110	Gas and vapor tubes	8540.89.0020	8540.89.0020
3344111115	Klystrons, including amplifiers, reflex, and other	8540.72.0000	8540.72.0000
		8540.79.0000	8540.79.0000
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other	8540.71.2000	8540.71.2000
		8540.71.4000	8540.71.4000
3344111345, 350	Light-sensing tubes, including camera tubes, photo emissive and photo conductive, and image intensifiers and converters	8540.20.2000	8540.20.2040
		8540.20.4000	8540.20.2080
			8540.20.4000
3344111355	Light-sensing tubes, n.e.c., including photo multipliers	8540.89.0060	8540.89.0060
3344111105	High vacuum tubes, including triodes, multigrid external and internal anodes, diodes and others	8540.89.0040	8540.89.0040
		8540.89.0080	8540.89.0080
3344117030	Electron tube parts (except glass blanks)	8540.91.2000	8540.91.1500
		8540.91.4000	8540.91.2000
		8540.99.0000	8540.91.5000
			8540.99.8000
3344131036	Monolithic integrated circuits, digital, memory (except silicon)	8542.13.8092	8542.13.8092
		8542.13.8096	8542.13.8096
3344131048	Monolithic integrated circuits, digital (except memory and silicon)	8542.13.8010	8542.13.8010
3344131015	Monolithic integrated circuits, digital, silicon, bipolar transistors, memory, SRAM	8542.14.8004	8542.14.8004
3344131021	Monolithic integrated circuits, digital, silicon, bipolar transistors, memory (except SRAM)	8542.14.8007	8542.14.8007

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
3344131024	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, transistor-transistor logic (TTL))	8542.14.8011	8542.14.8011
3344131027	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, emitter coupled logic (ECL))	8542.14.8012	8542.14.8012
3344131030	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, n.e.c.)	8542.14.8017	8542.14.8017
3344131064, 066	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors volatile memory, (DRAM), not over 300,000 bits	8542.13.8027	8542.13.8021 8542.13.8022 8542.13.8023
3344131068, 070, 072	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors volatile memory, (DRAM), over 300,000 bits	8542.13.8028	8542.13.8024 8542.13.8026 8542.13.8034
3344131082, 084, 086	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors volatile memory, (SRAM), not over 300,000 bits	8542.13.8043	8542.13.8037 8542.13.8038 8542.13.8039
3344131088, 090	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors volatile memory (SRAM), over 300,000 bits	8542.13.8044	8542.13.8041 8542.13.8049
3344131092, 094, 096	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except volatile memory (EEPROM))	8542.13.8056	8542.13.8051 8542.13.8052 8542.13.8057
3344131074, 076, 078	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except volatile memory (EEPROM))	8542.13.8061	8542.13.8058 8542.13.8059 8542.13.8060
3344131080	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except volatile memory, n.e.c.)	8542.13.8065	8542.13.8065
3344131054	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, (except memory type, including microprocessors having an internal data bus of 8 bits or less)	8542.13.8066	8542.13.8066
3344131057	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except memory type, including microprocessors having an internal data bus of 16 bits)	8542.13.8067	8542.13.8067
3344131060	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except memory type, including microprocessors having an internal data bus of 32 bits)	8542.13.8068	8542.13.8068

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
3344131033	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, (except memory type: controllers, application specific intergrated circuits and programmable logic arrays (except microprocessors))	8542.13.8072	8542.13.8072
3344131039	Monolithic integrated circuits, digital, silicon, other than metal oxide (MOS) field effect transistors, complementary BiMOS, memory type	8542.19.8073	8542.19.8073
3344131042	Monolithic integrated circuits, digital, silicon, other than metal oxide (MOS) field effect transistors, complementary BiMOS, n.e.c., including logic type (except memory types)	8542.19.8078	8542.19.8078
3344131045	Monolithic integrated circuits, digital, silicon, other than metal oxide (MOS) field effect transistors, complementary BiMOS, n.e.c., including logic type (except memory types)	8542.19.8079	8542.19.8079
3344131062, 003, 006, 009	Monolithic integrated circuits, nondigital, inc. linear, analog, radio frequency, etc.	8542.30.0060 8542.30.0065 8542.30.0080 8542.30.0090	8542.30.0060 8542.30.0065 8542.30.0080 8542.30.0090
3344131018, 051	Hybrid integrated circuits	8542.40.0075 8542.40.0095	8542.40.0075 8542.40.0095
3344140324	Capacitors, fixed, tantalum electrolytic, metal case, including foil and wet	8532.21.0020	8532.21.0020
3344140327	Capacitors, fixed, tantalum electrolytic, dipped	8532.21.0040	8532.21.0040
3344140330	Capacitors, fixed, tantalum electrolytic, chips	8532.21.0050	8532.21.0050
3344140333	Capacitors, fixed, tantalum electrolytic, n.e.c., including leaded (molded axial and molded radial)	8532.21.0080	8532.21.0080
3344140436	Capacitors, fixed, alumiunum electrolytic, not exceeding 35mm	8532.22.0020 8532.22.0040	8532.22.0020 8532.22.0040
3344140439, 442, 445	Capcitors, fixed, alumiunum electrolytic, over 35 mm	8532.22.0060	8532.22.0060
3344140548	Capacitors, fixed, ceramic dielectric, single layer, chips	8532.23.0020	8532.23.0020
3344140554	Capacitors, fixed, ceramic dielectric, single layer, axial and radial	8532.23.0040 8532.23.0060	8532.23.0040 8532.23.0060
3344140551	Capacitors, fixed, ceramic dielectric, multilayer axial leads	8532.24.0040	8532.24.0040
3344140557	Capacitors, fixed, ceramic dielectric, multilayer radial leads	8532.24.0060	8532.24.0060

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
3344140560	Capacitors, fixed, ceramic dielectric, multilayer chips	8532.24.0020	8532.24.0020
3344140663	Capacitors, fixed, mica dielectric	8532.29.0020	8532.29.0020
3344140666	Capacitors, fixed, n.e.c.	8532.29.0040	8532.29.0040
3344140769	Capacitors, variable, mica/ceramic/glass dielectric	8532.30.0010	8532.30.0010
3344140772	Capacitors, variable, n.e.c.	8532.30.0090	8532.30.0090
3344140875	Capacitors, parts, including unfinished chips for further finishing and assembly	8532.90.0000	8532.90.0000
3344140103	Capacitors, fixed, paper, plastic(film), metalized, and dual film/paper dielectric, ac types, less than 300 volts	8532.25.0010	8532.25.0010
3344140106	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, 300 volts to 599 volts	8532.25.0020	8532.25.0020
3344140109	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, 600 volts to 999 volts	8532.25.0030	8532.25.0030
3344140112	Capacitors fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, 1000 volts or over	8532.25.0040	8532.25.0040
3344140215	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, dc types, axial lead	8532.25.0060	8532.25.0060
3344140218	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, dc types, radial lead	8532.25.0070	8532.25.0070
3344140221	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, dc types, chips and other leaded devices	8532.25.0050 8532.25.0080	8532.25.0080
3344134005	Transistors, signal, less than 1 watt dissipation	8541.21.0080	8541.21.0075 8541.21.0095
3344134010	Transistors, power, 1 watt or greater dissipation	8541.29.0080	8541.29.0075 8541.29.0095
3344137025	Zener diodes	8541.10.0050	8541.10.0050
3344137020	Microwave diodes	8541.10.0060	8541.10.0060
3344137010	Signal diodes and assemblies	8541.10.0070	8541.10.0070
3344137015, 005	Diodes and rectifiers, n.e.c.	8541.10.0080	8541.10.0080

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Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
334413A005	Solar cell	8541.40.6020 8541.40.6030	8541.40.6020 8541.40.6030
334413A015, 020	Light-emitting diodes	8541.40.2000	8541.40.2000
334413A030	Optical coupled isolators, including sensors and emitters	8541.40.8000	8541.40.8000
334413A040	Thyristors, SCR's, triacs, and PNP diodes	8541.30.0080	8541.30.0080
334413A035	Other light-sensitive and light-emitting devices	8541.40.7080 8541.40.9500	8541.40.7080 8541.40.9500
334413A060	Chips and wafers for discrete semiconductors	8541.10.0040 8541.21.0040 8541.29.0040 8541.30.0040 8541.40.6010 8541.40.7040 8541.50.0040 8541.50.0080	8541.10.0040 8541.21.0040 8541.29.0040 8541.30.0040 8541.40.6010 8541.40.7040 8541.50.0040 8541.50.0080
334413A055	Chips and wafers for integrated circuits	8542.13.8005 8542.13.8010 8542.14.8001 8542.14.8002 8542.19.8001 8542.19.8002 8542.30.0040	8542.13.8005 8542.13.8010 8542.14.8001 8542.14.8002 8542.19.8001 8542.19.8002 8542.30.0004
334413A065	Semiconductor parts, n.e.c., including headers, packages, heat sinks, accessories, etc.	8541.90.0000	8541.90.0000
3344150104	Resistors, fixed, carbon, composition or film types, designed for surface mounting (SMD) by contact, having two terminals, cylindrical leadless having two leads, carbon composition, and carbon film	8533.10.0042 8533.10.0070	8533.10.0042 8533.10.0060 8533.10.0065
3344150208, 212	Resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having two terminals, including bith flat resistor chips, and cylindrical leadless resistors	8533.21.0045	8533.21.0030 8533.21.0040
3344150216, 220	Resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having more than two terminals: resistor, resistor-capacitor networks	8533.21.0025	8533.21.0010 8533.21.0020
3344150224	Resistors, fixeds, with a power capacity of 20 watts or less, wirewound, having two leads	8533.21.0080	8533.21.0080
3344150228	Resistors, fixed, with a power capacity of 20 watts or less, other than wirewound, having two leads	8533.21.0090	8533.21.0090

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
3344150232, 236, 236, 240	Resistors, fixed, with a power capacity of 20 watts or less: resistor networks, having more than two leads	8533.10.0020	8533.10.0020
		8533.10.0057	8533.10.0057
		8533.21.0075	8533.21.0050
			8533.21.0060
			8533.21.0070
3344150468, 464 472	Resistors, variable, wirewound, including rheostats and potentiometers, for a power handling capacity not exceeding 20 watts	8533.31.0000	8533.31.0000
3344150344, 348, 356, 352, 360, 576, 580	Resistors, variable, n.e.c.	8533.40.0080	8533.40.8050
			8533.40.8060
			8533.40.8070
3344150684	Resistors, parts	8533.90.0000	8533.90.4000
			8533.90.8000
3344191225, 230, 235, 240, 245, 250, 255, 260, 265	Piezoelectric devices (except crystal blanks)	8541.60.0025	8541.60.0010
		8541.60.0060	8541.60.0020
		8541.60.0080	8541.60.0030
			8541.60.0050
			8541.60.0060
			8541.60.0080
3344191270, 275	Piezoelectric devices, crystal blanks	7104.10.0000	7104.10.0000
3344120105, 210, 315, 420, 425, 430, 435, 440	Printed circuit boards	8534.00.0020	8534.00.0020
		8534.00.0040	8534.00.0040
		8534.00.0050	8534.00.0050
		8534.00.0070	8534.00.0070
		8534.00.0080	8534.00.0080
		8534.00.0090	8534.00.0090
3344160040	Television transformers and reactors (horizontal) output, vertical deflection, focus coils, deflection yokes, etc.	8529.90.3540	8529.90.3600
		8540.91.2000	8540.91.2000
3344160020, 030, 035, 010, 015, 045, 050	Coils, transformers, reactors, and chokes for electronic applications, n.e.c.	8504.31.2000	8504.31.2000
		8504.31.4035	8504.31.4035
		8504.31.4065	8504.31.4065
		8504.31.6000	8504.31.6000
		8504.32.0000	8504.32.0000
		8504.33.0020	8504.33.0020
		8504.33.0040	8504.33.0040
		8504.34.0000	8504.34.0000
3344171000	Connectors, coaxial	8536.69.4010	8536.69.4010
3344174000	Connectors, cylindrical	8536.69.4020	8536.69.4020
3344177000	Connectors, rack and panel	8536.69.4030	8536.69.4030
334417A000	Connectors, printed circuit	8536.69.4040	8536.69.4040

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1998

Product code	Product description	Export numbers	Import numbers
334419D108, 110, 115	Antenna systems (except structural towers sold separately)	8529.10.2020	8529.10.2020
3342203051	Magnetic recording and reproducing heads, including audio, video, digital and instrumentation	8522.90.0010	8522.90.5540 8522.90.7540
3344197025	Rotary selector switches for electronic circuitry, including lever and jog-levers, miniature and subminiature	8536.50.9020 8536.50.9025	8536.50.9020
3344197035	Pushbutton switches for electronic circuitry	8536.50.9030 8536.50.9035	8536.50.9031 8536.50.9032 8536.50.9033 8536.50.9035
3344197020	Slide switches, including rocker for electronic circuitry, both miniature and subminiature	8536.50.9050**	8536.50.9050**
3344197040	Snap-action switches for electronic circuitry	8536.50.9040**	8536.50.7000** 8536.50.9040**
3344197030, 045, 015, 005, 010, 050, 055	Switches for electronic circuitry, n.e.c.	8536.50.9045** 8536.50.9055 8536.50.9065	8536.50.9055 8536.50.9065

** HS codes include switches of product class 3359315. n.e.c. Not elsewhere classified.