

Semiconductors, Printed Circuit Boards, Other Electronic Components

1999

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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.

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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 1999, the total value of shipments of semiconductors, printed circuit boards, and other electronic components was \$140.0 billion. This represents a 7.4-percent increase from the revised 1998 total of \$130.4 billion. The 1999 data include electron tubes and parts, \$4.3 billion, an increase of 4.6 percent from 1998; printed circuit boards, \$8.0 billion, a decrease of 5.9 percent from 1998; semiconductors and related devices, \$76.6 billion, an increase of 8.6 percent over the revised total from 1998. Capacitors increased 2.4 percent to \$2.0 billion; resistors increased by 0.6 percent to \$1 billion; coils and transformers had a 1.7-percent increase to \$1.4 billion; electronic connectors had \$4.7 billion in 1999 compared to \$5.1 billion in 1998, a decrease of 6.7 percent; and other electronic components increased to \$42.1 billion from a revised 1998 total of \$38.0 billion, an increase of 10.8 percent.

Current
Industrial
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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.

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Table 1. Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components
by Class of Product: 1994 to 1999
[Value in million of dollars]

Product code	Product description	1999	1998	1997	1996	1995	1994
3344111	Transmittal, industrial, and special-purpose electron tubes (except X-ray).....	685.0	629.5	655.9	611.4	854.9	854.9
3344114	Receiving type electron tubes and cathode ray picture tubes.....	3,513.4	3,367.1	3,433.6	3,272.0	2,907.0	2,627.1
3344117	Electron tube parts.....	136.4	146.6	161.0	153.1	120.2	114.9
3344120	Printed circuit boards.....	7,976.5	8,473.2	8,702.4	8,216.8	8,367.3	6,812.3
3344131	Integrated microcircuits (semiconductor networks).....	62,829.4	57,643.5	57,019.4	52,639.3	48,437.9	36,020.4
3344134	Transistors.....	810.8	887.0	1,500.2	945.9	942.5	834.6
3344137	Diodes and rectifiers.....	954.8	907.6	1,190.5	861.4	1,066.7	829.5
334413A	Other semiconductor devices.....	11,996.4	11,055.8	10,262.3	10,976.1	12,639.4	9,915.4
3344140	Capacitors for electronic applications.....	1,993.4	1,946.9	2,098.7	1,653.4	1,785.3	1,512.3
3344150	Resistors.....	950.4	944.6	993.4	911.9	953.2	869.5
3344160	Coils, transformers, reactors, and chokes for electronic applications.....	1,391.4	1,368.3	1,425.7	1,435.6	1,411.8	1,250.7
3344171	Coaxial connectors.....	572.6	590.3	581.0	656.9	731.6	642.4
3344174	Cylindrical connectors.....	504.3	579.5	554.9	642.5	552.9	511.3
3344177	Rack and panel connectors.....	380.4	745.6	657.9	530.7	540.5	545.6
334417A	Printed circuit connectors.....	1,230.9	1,124.8	1,276.5	1,095.3	1,026.4	923.4
334417D	Other connectors, including parts.....	1,990.1	1,973.1	2,208.8	1,617.1	1,401.9	1,377.2
3344191	Filters (except microwave) and piezoelectric devices.....	841.6	797.5	814.7	719.3	729.2	674.1
3342207	Microwave components and devices.....	1,466.7	1,580.7	1,439.8	1,251.4	1,233.4	1,227.2
3344194	Transducers, electrical/electronic input or output.....	1,498.9	1,372.7	1,219.6	1,104.8	1,111.3	970.5
3344197	Switches, mechanical types for electronic circuitry.....	831.8	882.5	791.2	738.0	666.3	621.5
334418A	Printed circuit assemblies.....	30,381.6	26,046.5	27,040.2	24,937.3	24,447.7	17,514.8
334419D	All other electronic components, n.e.c.	7,090.8	7,322.4	7,484.7	7,199.1	6,978.1	6,149.7

n.e.c. Not elsewhere classified.

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999 and 1998
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
334411	Electron tubes.....	(NA)	(X)	4,334,821	(X)	4,143,206
3344111	Transmittal, industrial, and special purpose electron tubes (except X-ray).....	37	(X)	685,048	(X)	629,472
	Power and special-purpose tubes:					
3344111105	High vacuum tubes, including triodes, multigrid external and internal anodes, diodes, and other.....	6	102	68,720	151	67,429
3344111110	Gas and vapor tubes, including ignitrona, gas duplexers, spark gaps and others.....	9	220	34,367	306	42,285
3344111115	Klystrons, including amplifier, reflex, and other.....	6	285	51,480	278	43,824
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other.....	5	18	39,698	47	50,808
	Traveling wave tubes (TWT):					
	Forward wave:					
	Continuous wave (CW):					
3344111225	Up to and including 10 watts CW power output rating 1/.....	1	(D)	(D)	(D)	(D)
3344111230	Over 10 watts CW power output rating 1/.....	4	3,154	95,781	2,749 r/	76,796
	Pulsed power:					
3644111235	Up to and including 1 kW peak power output rating 2/.....	2	(D)	(D)	(D)	(D)
3344111240	Over 1 kW peak power output rating 2/.....	5	1,029	84,343	1,289	78,471
3344111265	Backward wave	-	-	-	(D)	(D)
	Light sensing tubes:					
3344111345	Camera tubes, photo emissive and photo conductive 3/.....	3	(D)	(D)	(D)	(D)
3344111350	Image intensifiers and converters	3	(D)	(D)	(D)	(D)
3344111355	Photo multipliers and other 3/.....	3	49	25,687	52 r/	31,846
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.....	10	2,133	127,491	2,656	122,038
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)	94,583	(X)	100,408
3344114	Receiving type electron tubes and cathode ray picture tubes.....	(NA)	(X)	3,513,413	(X)	3,367,131
3344114005	Receiving type electron tubes, all types, including rebuilt	3	(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).....	9	9,550	713,856	9,312	701,537
3344114015	Over 50 cm but not exceeding 63 cm (21 through 25 inches).....	4	5,568	570,754	4,624	496,388
3344114020	Exceeding 63 cm (26 inches and over).....	10	11,736	2,156,563	10,743	2,081,430
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.....	16	(X)	136,360	(X)	146,603
334412	Printed-circuit (wiring) boards.....	570	(X)	7,976,474	(X)	8,473,174
3344120105	Single-sided glass printed.....	289	(X)	307,216	(X) r/	322,292
3344120210	Double-sided glass printed.....	391	(X)	1,288,488	(X)	1,428,350
3344120315	Multilayer glass printed.....	373	(X)	4,858,715	(X) r/	4,784,569
3344120420	Single-sided flex printed.....	53	(X)	192,982	(X) r/	185,278
3344120425	Double-sided flex printed.....	52	(X)	146,231	(X)	114,122
3344120430	Multilayer flex and rigid/flex printed.....	66	(X)	291,766	(X)	403,584
3344120435	All paper/mat/composite printed boards.....	17	(X)	38,647	(X)	68,391
3344120440	Other substitute printed boards.....	53	(X)	448,890	(X) r/	593,437
3344120545	Receipts for contract work on printed circuit boards (etching, dip-soldering, imprinting, etc.), but not printed board assembly.....	79	(X)	403,539	(X)	573,151
334413	Semiconductors and related devices.....	(NA)	(X)	76,591,347	(X)	70,493,906
3344131	Monolithic integrated circuits.....	217	15,777,178	62,829,377	13,694,191	57,643,461

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999 and 1998
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
Monolithic integrated circuits, digital, nonsilicon (e.g., gallium arsenide):						
3344131036	Memory	5	124,674	260,025	(D)	(D)
3344131048	Logic and other.....	12	229,441	1,281,344	210,933	1,053,538
Monolithic integrated circuits, digital, silicon:						
Bipolar transistors, memory:						
3344131015	Static read-write random access (SRAM).....	7	729	1,208	(D)	(D)
3344131021	Other memory.....	4	3,106	8,775	(D)	(D)
Other bipolar transistors, including logic:						
3344131024	Transistor-transistor logic (TTL).....	16	370,169	187,997	989,840 r/	263,592
3344131027	Emitter coupled logic (ECL).....	10	(D)	(D)	(D)	(D)
3344131030	Other.....	9	(D)	(D) r/	417,104 r/	816,391
Metal oxide semiconductor (MOS) field effect transistors:						
Volatile memory DRAMS (dynamic read-write random access):						
3344131064	Not over 80 k 4/.....	5	(D)	(D)	(D)	(D)
3344131066	Over 80 k but not over 300 k 4/.....	4	(D)	(D)	(D)	(D)
3344131068	Over 300 k but not over 3 MB 4/.....	4	85,757	855,071	89,804	826,997
3344131070	Over 3 MB but not over 15 MB	7	32,093	89,722 r/	71,012	268,758
3344131072	Over 15 MB.....	11	502,727	3,677,831 r/	419,839	2,580,778
Volatile memory SRAMS (static read-write random access):						
3344131082	Not over 40 k.....	9	34,843	189,494	33,437 r/	192,397
3344131084	Over 40 k but not over 80 k.....	9	48,635	121,635	48,155	109,688
3344131086	Over 80 k but not over 300 k 5/.....	13	(D)	(D)	(D)	(D)
3344131088	Over 300 k but not over 3MB 5/.....	11	103,198	1,025,342 r/	91,580 r/	736,189
3344131090	Over 3 MB 5/.....	8	(D)	(D)	(D)	(D)
Nonvolatile EEPROMs (electrically erasable programmable read-only memory):						
3344131092	Not over 80 k	7	370,113	307,034 r/	517,455 r/	353,028
3344131094	Over 80 k but not over 900 k	5	30,731	149,860 r/	92,505 r/	423,873
3344131096	Over 900 k	3	(D)	(D)	(D)	(D)
Nonvolatile EPROMs (erasable, except electrically, programmable read-only memory):						
3344131074	Not over 80 k.....	5	(D)	(D)	14,703	53,347
3344131076	Over 80 k but not over 900 k.....	10	(D)	(D)	(D)	(D)
3344131078	Over 900 k	6	(D)	(D)	(D)	(D)
3344131080	Other nonvolatile memory.....	13	650,434	2,901,252 r/	360,176 r/	1,324,211
Other, including microprocessors, controllers, application specific integrated circuits (ASIC's), and programmable logic arrays (PLA's):						
3344131054	Microprocessors having an internal data bus of 8 bits or less.....	14	558,033	955,216	(D)	(D)
3344131057	Microprocessors having an internal data bus of 16 bits.....	14	(D)	(D)	312,453 r/	1,142,954
3344131060	Microprocessors having an internal data bus of 32 bits or more.....	17	(D)	(D)	(D)	(D)
3344131033	Other (microcontrollers, ASICs, PLA's, etc.).....	36	1,322,135	9,320,556 r/	1,230,663	7,208,336
Other digital, silicon, including bipolar combined with MOS:						
3344131039	Complementary BiMOS (BiCMOS).....	5	174,428	669,527	(D)	(D)
3344131042	Other complementary BiMOS(BiCMOS), including logic.....	10	755,393	480,582	532,192	415,438
3344131045	Other digital silicon ICs.....	25	514,092	2,557,497	462,866 r/	1,196,816
Nondigital silicon monolithic integrated circuits (e.g., linear, analog):						
3344131062	Radio frequency.....	7	1,297,206	129,624	85,797	66,961
3344131003	Other, analog.....	26	2,593,158	2,887,870	1,178,456	2,270,834
3344131006	Other, including mixed signal (analog and digital), logic.....	10	(D)	(D)	(D)	(D)
3344131009	Other, including mixed signal (analog and digital), other.....	18	677,228	3,338,597 r/	426,640 r/	2,257,145
Hybrid integrated circuits:						
3344131018	Radio frequency.....	27	127,806	431,841	86,643	417,583
3344131051	Other.....	57	92,902	731,935	55,470	657,135
3344131012	Other.....	53	3,581,734	4,320,445 r/	2,984,009 r/	4,948,691
3344134	Transistors.....	37	(X)	810,780	(X)	887,035
3344134005	Signal (less than 1 watt dissipation).....	21	(X)	187,698	(X) r/	247,901
3344134010	Power (1 watt or greater dissipation).....	33	(X)	623,082	(X) r/	639,134

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Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
3344137	Diodes and rectifiers.....	59	5,241,594	954,758	4,223,592	907,614
3344137010	Signal diodes and assemblies thereof (maximum current 0.5 amps).....	22	38,339	18,641 r/	59,628 r/	30,392
3344137015	Semiconductor rectifiers/power diodes and assemblies thereof (current rating greater than 0.5 amps).....	33	1,139,935	513,544 r/	999,862 r/	480,521
3344137025	Zener diodes (voltage regulator and voltage reference diodes) 6/.....	24	(D)	(D)	(D)	(D)
3344137005	Selenium rectifiers 6/.....	4	3,538,459	204,893	2,691,097	199,388
3344137020	Microwave diodes (mixers, detectors, varactors, parametric, harmonic generators, etc.).....	15	524,861	217,680	473,005	197,313
334413A	Other semiconductor devices.....	181	(X)	11,996,432	(X)	11,055,796
	Light-sensitive and light-emitting devices:					
334413A005	Solar cells.....	16	(X)	151,148	(X)	137,951
334413A010	Photovoltaic modules.....	9	(X)	91,730	(X)	68,089
	Light-emitting diodes (LED):					
334413A015	Discrete, infrared and laser.....	19	(X)	814,310	(X)	447,760
334413A020	Alpha or numeric displays.....	8	(X)	70,234	(X)	55,715
334413A025	Photodiodes, including infrared detectors.....	20	(X)	124,476	(X)	112,159
334413A030	Optical coupled isolators, including sensors and emitters.....	7	(X)	375,433	(X)	223,871
334413A035	Other light sensitive and light-emitting devices, including photovoltaic devices and photoelectric-magnetic devices.....	13	(X)	341,769	(X)	177,527
	Other semiconductor devices:					
334413A040	Thyristors (SCR's, triacs, PNP diodes).....	9	(X)	148,264	(X)	100,296
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.).....	21	(X)	2,252,151	(X) r/	2,096,224
	Semiconductor parts:					
	Chips and wafers:					
334413A055	For integrated circuits (IC's).....	46	(X)	4,469,431	(X)	4,575,104
334413A060	For discrete semiconductors.....	39	(X)	1,444,573	(X)	1,453,631
334413A065	All other semiconductor parts (headers, packages, heat sinks, other accessories, etc.).....	46	(X)	1,712,913	(X) r/	1,607,469
334414	Capacitors.....	102	(X)	1,993,443	(X)	1,946,914
	Paper, plastic (film), metalized, and dual (film/paper) dielectric capacitors, fixed:					
	Ac types:					
3344140103	Less than 300 volts.....	19	18,693	35,410 r/	19,678	34,245
3344140106	300 volts to 599 volts.....	19	48,388	88,767	52,775	93,459
3344140109	600 volts to 999 volts.....	13	6,624	10,871	6,054	10,158
3344140112	1,000 volts or over.....	10	2,070	13,359	2,997	15,959
	Capacitors having a reactive power handling capacity of 0.5 kVAR or less:					
	Dc types/other:					
3344140215	Axial lead.....	21	39,779	41,230	36,021	42,068
3344140218	Radial lead.....	10	84,348	24,099	82,168	20,578
3344140221	Chips and other leaded devices.....	2	(D)	(D)	(D)	(D)
	Tantalum electrolytic:					
3344140324	Metal case, including foil and wet 7/.....	11	(D)	(D)	(D)	(D)
3344140327	Dipped 7/.....	5	(D)	(D)	(D)	(D)
3344140330	Chips 7/.....	8	(D)	(D)	(D)	(D)
3344140333	Other leaded (molded axial and molded radial) 7/.....	3	2,114,472	303,867	1,898,086	275,813
	Aluminum electrolytic:					
3344140436	Less than 18 mm through 35 mm 8/.....	4	(D)	(D)	(D)	(D)
3344140439	Small can style (over 35mm through 51 mm).....	4	582	2,263	(D)	(D)
3344140442	Other can style (over 51 mm).....	6	7,801	58,014	7,003	58,941
3344140445	Ac motor start 8/.....	1	71,130	83,943	80,148	95,963
	Ceramic dielectric, single layer:					
3344140554	Axial and radial 9/.....	8	(D)	(D)	(D)	(D)
3344140548	Chips 9/.....	4	150,292	23,383	138,598	24,922
	Ceramic dielectric, multilayer:					
3344140551	Axial leads 10/.....	4	(D)	(D)	(D)	(D)

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Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
3344140557	Radial leads 10/.....	9	3,493,724	132,844 r/	3,851,442 r/	143,639
3344140560	Chips.....	17	49,167,591	632,149	44,136,383 r/	645,069
	Other:					
3344140663	Mica dielectric.....	9	12,656	8,717	12,013	10,454
3344140666	All other fixed.....	20	205,228	73,146	197,341 r/	68,302
	Variable:					
3344140769	Mica, ceramic or glass dielectric.....	4	(D)	(D)	(D)	(D)
3344140772	Other.....	5	1,316	7,050	2,041	6,476
3344140875	Parts of capacitors, including unfinished chips for further finishing and assembly.....	13	(X)	(D)	(X)	(D)
334415	Resistors.....	100	(X)	950,443	(X)	944,589
3344150104	Fixed carbon resistors, composition or film types.....	10	46,919	15,211	46,193	14,615
	Other fixed resistors (power capacity 20W or less):					
	Surface mounted, having two terminals:					
3344150208	Flat resistor chips.....	26	344,905	59,555	377,991	53,642
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.....	8	148,217	39,186	109,181	33,800
3344150220	Other, including flat packs.....	13	78,780	24,020	81,662	38,384
	Resistors, having two leads:					
3344150224	Wirewound.....	23	122,278	72,039	132,111	75,778
3344150228	Other, including metal film, metal oxide, and thick cermet film.....	20	554,425	87,960	725,336	87,660
	Resistor networks, having more than two leads:					
3344150232	Single-in-line.....	18	224,279	53,621	154,846	48,588
3344150236	Dual-in-line.....	9	30,559	9,745	28,069	11,671
3344150240	Other.....	13	75,687	70,773	62,489	51,817
	Variable, nonwirewound:					
	Trimmers:					
3344150344	Single-turn, carbon and other film.....	7	14,507	12,097	13,160	10,201
3344150348	Multiturn, carbon and other film.....	6	(D)	(D)	(D)	(D)
3344150356	Surface mounted.....	-	-	-	-	-
	Potentiometers:					
3344150352	Precision type 11/.....	14	15,595	76,703 r/	17,405 r/	77,012
3344150360	Panel type 11/.....	2	(D)	(D)	(D)	(D)
	Variable, wirewound:					
3344150468	Variable wirewound (except potentiometers), including nonprecision and trimmers.....	4	3,777	4,419	3,263	4,169
3344150464	Potentiometers, precision type 12/.....	10	2,482	29,141 r/	2,493 r/	30,636
3344150472	Potentiometers panel type 12/.....	4	(D)	(D)	(D)	(D)
	Miscellaneous:					
3344150576	Varistors.....	6	(D)	(D)	(D)	(D)
3344150580	Thermistors, bead type, disc, rod.....	13	433,768	117,950 r/	391,783 r/	128,775
3344150684	Parts for resistors.....	10	(X)	(D)	(X)	(D)
334416	Coils, transformers, reactors, and chokes for electronic applications.....	262	(X)	1,391,417	(X)	1,368,270
3344160020	Audio frequency (AF) transformers.....	93	58,787	133,855	56,167	143,110
3344160025	Low frequency (LF) chokes.....	96	12,073	70,051	11,744	69,375
3344160030	Plate and filament transformers, including auto-transformers (except toroidal).....	67	15,183	129,227	13,670	118,033
3344160035	Pulse transformers, computer, and other types.....	88	43,390	131,155	35,652	127,517
3344160005	Radio frequency (RF) chokes.....	38	67,768	41,036	85,606	41,618
3344160010	Radio frequency (RF) coils.....	45	191,322	90,179	165,295	84,968
3344160015	Intermediate frequency (IF) transformers.....	37	8,326	63,333	7,971	58,484
3344160040	Television transformers and reactors (horizontal output, vertical deflection, focus coils, deflection yokes, etc.).....	22	19,700	164,190	19,245 r/	150,263
3344160045	Toroidal windings (transformers and reactors) (except complete magnetics amplifiers).....	115	36,280	174,887	36,901	180,164
3344160050	Other (balun coils, permeability tuning devices, etc.).....	99	(X)	393,504	(X)	394,738
334417	Electronic connectors.....	(NA)	(X)	4,678,225	(X)	5,013,271
	Coaxial (RF) connectors.....	55	636,699	572,582	592,013	590,288
3344171005	Miniature (BNC, PNC, MHB).....	26	32,965	67,148 r/	55,074	76,164
3344171010	Subminiature (SMA, SMB, SMC).....	30	25,852	73,078	35,670	98,072
3344171015	Other standard and precision.....	43	577,882	432,356	501,269	416,052

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999 and 1998
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
3344174	Cylindrical connectors.....	43	100,499	504,263	107,570	579,506
3344174005	Heavy duty and standard.....	35	72,757	313,508	82,953	351,409
3344174010	Miniature.....	19	14,820	91,031	15,005	115,546
3344174015	Subminiature.....	12	12,922	99,724	9,612	112,551
3344177	Rack and panel (rectangular) connectors.....	44	887,288	380,374	2,256,792	745,616
3344177005	Integral shell, Mil-C-22857 (8434) and similar types.....	28	363,036	135,705	795,973	188,183
	Subminiature:					
3344177010	Ribbon, including planar cable type.....	8	(D)	(D)	(D)	(D)
3344177015	D-Subminiature, including planar cable type.....	23	(D)	(D)	(D)	(D)
3344177020	Microminiatures.....	8	7,417	30,562 r/	7,608 r/	32,592
334417A	Printed circuit connectors.....	65	4,874,999	1,230,879	5,747,059	1,124,802
334417A005	Card insertion types.....	32	524,849	101,529	405,943	141,895
	Two-piece types:					
334417A010	Post, header and receptacle type.....	41	3,799,239	588,000	4,014,253	549,533
334417A015	Other two-piece types.....	30	554,911	541,350	1,326,863	433,374
334417D	Other connectors, including parts.....	112	(X)	1,990,127	(X)	1,973,059
334417D005	Hermetic sealed (except single-contact and coaxial types).....	24	237,699	134,520	243,390	137,220
334417D010	Plate module types.....	6	9,630	34,148	9,847	32,938
334417D015	Fiber optic connectors.....	12	(D)	(D)	32,426	222,657
334417D030	Other planar cable (flat conductor or ribbon cable), excluding rack and panel (rectangular types).....	27	(D)	(D)	280,563	172,174
334417D020	Miscellaneous special purpose.....	64	1,858,164	1,261,974	2,564,352	1,282,007
334417D025	Parts for connectors (connectors shipped but still requiring further manufacture).....	21	(X)	121,612	(X)	126,063
334419	Electronic components and subassemblies, n.e.c.	(NA)	(X)	42,111,396	(X)	38,002,451
3344191	Filters (except microwave) and piezoelectric devices..	122	279,550	841,562	247,419	797,520
33441911	Filters (except microwave).....	(NA)	156,923	290,052	151,860	290,498
3344191105	Mechanical, excluding optical lenses (germanium silicon, fused quartz, rock salt, and other).....	8	125	13,381	232	17,314
	Radio frequency interference/electro magnetic interference (RFI/EMI) control filters:					
3344191110	Ceramic dielectric.....	14	139,241	139,582	125,906	104,738
3344191115	Combination or other dielectric.....	20	14,360	105,039	25,161	142,989
3344191120	Electronic wave filters (LC band and high pass).....	21	3,197	32,050	561	25,457
33441912	Piezoelectric devices.....	(NA)	122,627	551,510	95,559	507,022
	Oscillator crystals:					
3344191225	AT-cut.....	28	7,813	31,971 r/	9,240 r/	34,047
3344191230	Other.....	11	54,346	72,368	52,082	74,092
	Crystal oscillators:					
3344191235	Oven.....	9	137	25,107	138	29,920
3344191240	TCXO/VCXO.....	10	2,768	38,669	2,336	35,227
3344191245	Hybrid.....	14	4,115	52,990	3,836	45,743
3344191250	Other.....	6	2,545	22,472	2,666	21,863
	Crystal filters:					
3344191255	Monolithic, including filter crystals and/or monolithic filter units not assembled into filters.....	6	662	16,979 r/	866 r/	17,912
3344191260	Packaged AT-cut, including monolithic, tandem monolithic, and resonator filter assemblies.....	9	596	7,078 r/	110 r/	4,150
3344191265	Other.....	7	33,829	82,561	13,137	80,170
	Crystal blanks:					
3344191270	AT-cut.....	7	4,345	10,209 r/	3,090 r/	6,425
3344191275	Other.....	21	11,471	191,106 r/	8,058 r/	157,473
3342207	Microwave components and devices (except antenna), tubes, and semiconductors.....	137	(X)	1,466,701	(X)	1,580,745
3342207005	Ferrite, including yttrium garnets, microwave components (circulators, isolators, phase shifters, attenuators, equalizers, limiters, mixers, etc.).....	43	(X)	349,226	(X)	446,665
	Microwave devices, other than ferrite and solid state:					
3342207010	Attenuators (dummy loads, high and low-power terminations, etc.).....	36	(X)	93,500	(X)	92,177
3342207015	Cavities (amplifier cavities, coaxial tuned cavities, etc.).....	16	(X)	45,660	(X)	46,700

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999 and 1998
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
3342207020	Couplers (directional couplers, hybrid junctions, etc.).....	29	(X)	64,379	(X)	62,709
3342207025	Reactive microwave components, n.e.c.	40	(X)	185,026	(X)	202,837
3342207030	Switches, coaxial and waveguide.....	32	(X)	67,412	(X)	85,114
3342207035	Rigid waveguide and fittings (bend and twists, couplings, flanges, other simple waveguide components, n.e.c.).....	22	(X)	52,462	(X) r/	50,161
3342207040	Flexible waveguides and fittings.....	13	(X)	56,541	(X) r/	41,923
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.).....	39	(X)	205,370	(X) r/	185,386
3342207050	Microwave subassemblies, including parametric amplifiers and other solid-state assemblies.....	33	(X)	347,125	(X) r/	367,073
3344194	Transducers, electrical/electronic I/O, n.e.c.	95	130,601	1,498,860	111,842	1,372,735
3344194005	Electroacoustic (sonar, ultrasonic, vibration*, etc.).....	19	29,155	252,269	17,731	133,637
	Electromechanical:					
3344194010	Accelerometers*.....	13	6,632	216,086	6,084	204,438
3344194015	Pressure*.....	39	55,956	533,381	52,368	540,003
3344194020	Strain gauges and other mechanical*.....	24	1,595	129,424	1,047	135,492
3344194025	Thermoelectric (pyrometers, thermocouples*, etc.).....	8	2,372	52,749	2,138	62,272
3344194030	Other (optical, chemical, magnetic, nuclear*, etc.).....	25	34,891	314,951	32,474	296,893
3344197	Switches, mechanical types for electronic circuitry.....	84	(X)	831,848	(X)	882,543
3344197020	Slide, including rocker, miniature and subminiature*..	16	(X)	59,507	(X)	58,284
3344197025	Rotary selector, including lever and jog-lever, miniature and subminiature*.....	20	(X)	53,469	(X)	52,209
3344197030	Keyboard*.....	12	(X)	56,263	(X)	58,046
3344197035	Pushbutton*.....	25	(X)	76,217	(X)	99,410
3344197040	Snap-action*.....	11	(X)	44,976	(X)	22,456
3344197045	Thumbwheel*.....	6	(X)	19,578	(X)	21,411
3344197015	Membrane.....	17	(X)	82,345	(X)	77,990
3344197005	Toggle standard type	13	(X)	38,970	(X)	39,421
3344197010	Toggle miniature and subminiature.....	6	(X)	(D)	(X)	(D)
3344197050	DIP.....	8	(X)	(D)	(X)	(D)
3344197055	Other.....	39	(X)	349,434	(X)	397,525
334418A	Printed circuit assemblies (loaded boards, subassemblies and modules) 13/.....	784	(X)	30,381,640	(X)	26,046,467
334418A005	Computer and peripheral printed board assemblies 13/.....	312	(X)	12,963,506	(X)	11,986,136
334418A010	Communications printed board assemblies 13/.....	259	(X)	7,663,623	(X)	5,106,263
334418A015	Industrial process control board assemblies 13/.....	238	(X)	904,616	(X) r/	853,683
334418A020	Instrumentation printed board assemblies (except industrial process) 13/.....	206	(X)	2,936,629	(X) r/	2,052,976
334418A025	Search and detection printed board assemblies 13/.....	55	(X)	101,266	(X) r/	79,101
334418A030	Consumer electronics, printed board assemblies 13/.....	149	(X)	509,480	(X) r/	507,083
334418A035	Other electronics, printed board assemblies, including office equipment and point of sales 13/.....	325	(X)	5,302,520	(X)	5,461,225
334419D	Electronic components and subassemblies, n.e.c.	581	(X)	7,090,785	(X)	7,322,441
	Antenna systems (except structural towers sold separately):					
334419D108	Home antenna.....	12	19,408	250,654	25,926	295,747
334419D110	Auto antenna.....	13	23,353	78,352	22,065	73,757
334419D115	Antenna accessories, sold separately (pedestals, drives, passive reflectors, rotators, radomes, etc.).....	21	(X)	86,322	(X)	92,454
334419D220	Delay lines (distributed constant, lumped constant, magnetostrictive, ultrasonic, etc.).....	16	7,920	39,922	6,049	34,830
334419D325	Oscillators (except instrumentation and crystal types).....	22	4,408	143,709	r/ 5,623	r/ 137,098
3342203051	Magnetic recording and reproducing heads, including audio, video, digital and instrumentation.....	14	(D)	(D)	(D)	(D)

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999 and 1998
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	1999		1998	
			Quantity	Value	Quantity	Value
	Static power supply converters for electronic applications, sold separately:					
334419D530	Regulated.....	83	49,435	1,379,824	58,204	1,341,928
334419D535	Other (unregulated, variable frequency, ac, dc, converters and inverters, vibrator, etc.).....	51	(X)	579,668	(X)	600,190
334419D640	Electronic cable harnesses and cable assemblies.....	265	(X)	1,976,971	(X)	1,820,809
334419D745	Cryogenic cooling devices (cryostats, etc.) for infrared detectors, masers.....	4	(X)	16,021	(X)	20,285
334419D850	Liquid crystal displays (LCD) and other liquid devices.....	17	(X)	76,498	(X)	108,571
334419D955	Magnetic cores.....	17	(X)	328,373	(X) r/	329,132
	Electronic parts, n.e.c. and specialized electronic hardware:					
	Sockets for electronic component insertion:					
334419DA65	Integrated circuit sockets.....	22	(X)	131,022	(X)	105,703
334419DA60	Other, including tube, relay, discrete semiconductors, ac and dc converters and inverters, etc.....	14	(X)	110,769	(X)	93,278
336322C119	Electronic control modular chips for motor vehicles.....	3	(X)	(D)	(X)	(D)
334419D870	All other electronic parts and specialized electronic hardware, n.e.c.	141	(X)	1,793,193	(X)	1,644,077
	Electronic research, development, testing, and evaluation (receipts or billings, not reported as shipments of specific products):					
9998042	Systems.....	23	(X)	115,335	(X)	133,082
9998043	Equipment and subassemblies.....	37	(X)	261,004	(X)	237,633
9998044	Component parts.....	34	(X)	172,482	(X)	172,303
9998046	Basic scientific electronic research.....	23	(X)	71,110	(X)	71,115
9998047	Design and engineering services.....	66	(X)	475,386	(X)	461,527
9998048	Software.....	7	(X)	(D)	(X)	21,801
9998049	Testing.....	12	(X)	23,414	(X) r/	6,497
9998050	Supplies and accessories sold with components.....	11	(X)	2,058	(X) r/	1,415

*Similar products are collected on Current Industrial Report Series MA335A, "Switchgear and Industrial Controls" and MA335K, "Wiring Devices and Supplies." - Represents zero. 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 3344131090 are combined with product code 3344131088 to avoid disclosing data for individual companies.
- 6/Product code 3344137025 is combined with product code 3344137005 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 code 3344140436 is 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 3344150360 is combined with product code 3344150352 to avoid disclosing data for individual companies.
- 12/Product code 3344150472 is combined with product code 3344150464 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: 1999
[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.....	68,720	39,174	14,876
3344111110	Gas and vapor tubes.....	34,367	11,048	478
3344111115	Klystrons, including amplifier, reflex and other.....	51,480	53,138	64,395
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other.....	39,698	8,477	36,026
3344111345, 350	Light sensing tubes, including camera tubes, photo emissive and photo conductive, and image intensifiers and converters.....	(D)	364,996	31,930
3344111355	Light sensing tubes, n.e.c., including photo multipliers.....	(D)	36,736	31,336
3344114005	Receiving type electron tubes, including rebuilt.....	(D)	7,182	6,564
3344114010, 015, 020, 025	Television tubes, color, and black and white new and rebuilt.....	(D)	1,595,293	175,502
3344117030	Electron tube parts (except glass blanks).....	136,360	122,647	395,422
3344120105, 210, 315, 420, 425, 430, 435, 440	Printed circuit boards.....	7,572,935	2,386,005	2,325,727
3344131048	Monolithic integrated circuits, digital (except memory and silicon).....	1,281,344	966,982	90,096
3344131036	Monolithic integrated circuits, digital, memory (except silicon).....	260,025	352,569	583,751
3344131015	Monolithic integrated circuits, digital, silicon, bipolar transistors, memory, static random access memory (SRAM).....	1,208	52,501	13,575
3344131021	Monolithic integrated circuits, digital, silicon, bipolar transistors, memory (except static random access memory (SRAM)).....	8,775	18,902	13,797
3344131027	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, emitter logic (ECL)).....	(D)	19,067	95,716
3344131024	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, transistor-transistor logic (TTL)).....	187,997	20,969	109,346
3344131030	Monolithic integrated circuits, digital, silicon, bipolar transistors (except memory, n.e.c.).....	(D)	64,998	125,051
3344131064, 066	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors: With volatile memory (DRAM), not over 300 k 3/.....	(D)	189,899	50,457
3344131068, 070, 072	With volatile memory (DRAM), over 300 k 3/.....	4,622,624	1,829,444	5,286,875
3344131082, 084, 086	With volatile memory (SRAM), not over 300 k	(D)	137,121	271,323
3344131088, 090	With volatile memory (SRAM), over 300 k	(D)	110,110	1,306,029
3344131092, 094, 096	Except volatile memory, electrically (EEPROM).....	(D)	459,727	2,030,706
3344131074, 076, 078	Except volatile memory (except electrically (EEPROM)).....	(D)	147,068	457,503
3344131080	Except volatile memory, n.e.c.	2,901,252	1,017,143	1,173,688
3344131054	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except memory type): Microprocessors 8 bits or less.....	955,216	179,896	1,522,698
3344131057	Microprocessors 16 bits.....	(D)	78,247	803,439
3344131060	Microprocessors 32 bits or more.....	(D)	1,299,964	2,142,567

Continued

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999
[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/
3344131033	Other (microcontrollers, ASIC's PLA's, etc.).....	9,320,556	1,996,860	8,435,379
3344131039	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, complementary BiMOS, memory type.....	669,527	38,541	222,280
3344131042	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, complementary BiMOS (except memory type).....	480,582	103,559	226,840
3344131045	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, complementary BiMOS, n.e.c., including logic type (except memory types).....	2,557,497	331,436	179,700
3344131062, 003, 006, 009	Monolithic integrated circuits, nondigital, silicon, including linear, analog, radio frequency, etc.....	(D)	2,232,096	5,305,823
3344131018, 051	Hybrid integrated circuits.....	1,163,776	717,999	868,718
3344140324	Capacitors, fixed, tantalum electrolytic, metal case, including foil and wet 4/.....	(D)	16,195	11,996
3344140327	Capacitors, fixed, tantalum electrolytic, dipped 4/.....	(D)	6,292	40,087
3344140330	Capacitors, fixed, tantalum electrolytic, chips 4/.....	(D)	75,603	321,219
3344140333	Capacitors, fixed, tantalum electrolytic, n.e.c., including leaded 4/.....	303,867	53,418	59,771
3344140436	Capacitors, fixed, aluminum electrolytic, not exceeding 35 mm.....	(D)	58,437	268,131
3344140439, 442, 445	Capacitors, fixed, aluminum electrolytic, over 35 mm.....	(D)	13,251	32,114
3344140548	Capacitors, fixed, ceramic dielectric, single layer, chips 5/.....	23,383	50,941	6,204
3344140554	Capacitors, fixed ceramic dielectric, single layer, axial and radial 5/.....	(D)	16,259	38,794
3344140551	Capacitors, fixed ceramic dielectric, multilayer, axial leads 6/.....	(D)	47,926	24,271
3344140557	Capacitors, fixed ceramic dielectric, multilayer, radial leads 6/.....	132,844	25,586	55,116
3344140560	Capacitors, fixed ceramic dielectric, multilayer, chips.....	632,149	401,606	595,814
3344140663	Capacitors, fixed, mica dielectric	8,717	1,718	3,363
3344140666	Capacitors, fixed, n.e.c.	73,146	390,607	71,794
3344140769	Capacitors, variable, mica/ceramic/glass dielectric.....	(D)	14,705	7,688
3344140772	Capacitors, variable, n.e.c.	7,050	104,411	23,659
3344140875	Capacitors, parts, including unfinished chips for further finishing.....	(D)	395,005	61,682
3344140103	Capacitors, fixed, ac type, less than 300 volts.....	35,410	7,599	32,390
3344140106	Capacitors, fixed, ac type, 300-599 volts.....	88,767	1,265	38,338
3344140109	Capacitors, fixed, ac type, 600-999 volts.....	10,871	291	3,783
3344140112	Capacitors, fixed, ac type, 1,000 volts or more.....	13,359	8,747	443
3344140215	Capacitors, fixed, dc type, axial	41,230	1,312	3,180
3344140218	Capacitors, fixed, dc type, radial	24,099	2,383	53,594
3344140221	Capacitors, fixed, dc type, chips and other leaded.....	(D)	8,733	16,984
3344134005	Transistors, signal, less than 1 watt dissipation.....	187,698	115,428	358,809
3344134010	Transistors, signal, 1 watt or greater dissipation.....	623,082	221,939	846,589
3344137010	Signal diodes and assemblies.....	18,641	13,019	65,125
3344137025	Zener diodes.....	(D)	31,587	100,670
3344137015, 005	Diodes and rectifiers, n.e.c.	(D)	335,369	557,599
3344137020	Microwave diodes.....	217,680	47,721	30,660
334413A005	Solar cell.....	151,148	126,805	81,191

Continued

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999
[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/
334413A015, 020	Light-emitting diodes.....	884,544	157,272	701,114
334413A030	Optical coupled isolators.....	375,433	52,736	120,557
334413A035	Other light-sensitive and light-emitting devices.....	341,769	101,038	121,255
334413A040	Thyristors, SCR's, triacs, and PNP diodes.....	148,264	50,404	184,247
334413A055	Chips and wafers for integrated circuits.....	4,469,431	18,905,732	1,357,844
334413A060	Chips and wafers for discrete semiconductors.....	1,444,573	1,704,848	185,395
334413A065	Other semiconductor parts.....	1,712,913	276,926	161,476
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.....	15,211	27,741	40,747
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)	31,649	86,650
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.....	63,206	13,231	21,820
3344150224	Resistors, fixed, with a power capacity of 20 watts or less, wirebound, having two leads.....	72,039	20,768	33,887
3344150228	Resistors, fixed, with a power capacity of 20 watts or less, other than wirebound, having two leads.....	87,960	46,708	64,080
3344150232, 236, 240	Resistors, fixed, with a power capacity of 20 watts or less, resistor networks, having more than two leads.....	134,139	78,461	76,480
3344150468, 464, 472	Resistors, variable, wirewound, including rheostats and potentiometers, for a power handling capacity not exceeding 20 watts.....	33,560	6,837	23,146
3344150344, 348, 352, 356, 360, 576, 580	Resistors, variable, n.e.c.	(D)	146,758	213,513
3344150684	Resistors, parts	(D)	177,734	28,079
3344191225, 230, 235, 240, 245, 250, 255, 260, 265	Piezoelectric devices (except crystal blanks).....	350,195	203,118	560,588
3344191270, 275	Piezoelectric devices, crystal blanks.....	201,315	25,124	11,160
3344160040	Television transformers and reactors.....	164,190	15,944	136,000
3344160020, 030, 035, 010, 015, 045, 050	Coils, transformers, reactors, and chokes for electronic applications, n.e.c.	1,116,140	363,114	770,112
3344171000	Connectors coaxial.....	572,582	136,368	206,717
3344174000	Connectors, cylindrical	504,263	36,324	102,941
3344177000	Connectors, rack and panel	380,374	17,318	22,482
334417A000	Connectors, printed circuit	1,230,879	280,736	409,902
334419D108, 110, 115	Antenna systems (except structural towers, sold separately).....	415,328	59,634	48,487
3342203051	Magnetic recording and reproducing heads.....	(D)	20,559	32,103
3344197025	Switches, rotary selector.....	53,469	34,876	18,529
3344197035	Switches, pshbutton.....	76,217	69,438	139,714
3344197020	Switches, slide, including rocker, miniature and subminiature.....	59,507	1,981	19,921

Continued

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 1999
 [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/
3344197040	Switches, snap-action.....	44,976	23,067	90,448
3344197030, 045, 015, 005, 010, 050, 055	Switches, other.....	597,679	748,120	1,082,787

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: 1999

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 8540.11.0070 8540.11.0080 8540.12.0000	8540.11.1030 8540.11.1040 8540.11.1050 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 8540.79.0000	8540.72.0000 8540.79.0000
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other	8540.71.2000 8540.71.4000	8540.71.2000 8540.71.4000
3344111345, 350	Light-sensing tubes, including camera tubes, photo emissive and photo conductive, and image intensifiers and converters	8540.20.2000 8540.20.4000	8540.20.2040 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, multigridd external and internal anodes, diodes and others	8540.89.0040 8540.89.0080	8540.89.0040 8540.89.0080
3344117030	Electron tube parts (except glass blanks)	8540.91.2000 8540.91.4000 8540.99.0000	8540.91.1500 8540.91.2000 8540.91.5000 8540.99.8000
3344131036	Monolithic integrated circuits, digital, memory (except silicon)	8542.13.8092 8542.13.8096	8542.13.8092 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

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1999

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 memoy, 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

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1999

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, aluminum electrolytic, not exceeding 35mm	8532.22.0020	8532.22.0020 8532.22.0040
3344140439, 442, 445	Capacitors, fixed, aluminum electrolytic, over 35 mm	8532.22.0055 8532.22.0085	8532.22.0055 8532.22.0085
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

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1999

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

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1999

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

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1999

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		
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

Continued

Table 4. Comparison of North American Industry Classification System-Based Product Codes with Schedule B Export Numbers, and HTSUSA Import Numbers: 1999

Product code	Product description	Export numbers	Import numbers
334417A000	Connectors, printed circuit	8536.69.4040	8536.69.4040
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.