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JETRO Japanese Market Report

–Regulations & Practices–

Electronic Components

Introduction

Following the global expansion of the market for electronic equipment, the semiconductor market has been developing and growing rapidly. In the semiconductor market, there was once a sales cycle known as the “silicon cycle”, caused by the advancement of production technologies and changes in demand. But since around 1993, trends in semiconductor sales have not always changed cyclically in line with developments in semiconductors and the expansion of their applications. This has made it difficult for semiconductor manufacturers to make accurate plans for production and sales estimates as they did before.

Until around 1990, Japanese semiconductor manufacturers were strong in the mass production of semiconductors for consumer products such as TVs, VCRs, audio equipment and household appliances, and held a large share of the global market. This prominence in the market led the U.S. government, in the Japan – U.S. Semiconductor Agreement of 1986, to ask Japan to raise by over 20% the share of U.S. products in the total purchase of semiconductors in Japan. However, after the agreement was concluded, the main applications for semiconductors gradually shifted from consumer products to information and communication equipment, leading to an increase in the presence in the Japanese market of manufacturers from the U.S., Europe, and Korea.

Today, the electronic equipment market in Japan has been “de-industrialized.” Among the market R&D sector, which develops and experiments with advanced technologies and new products, and the specific products sector, stay in Japan. Currently, exports account for more than 50% of the total sales of Japanese semiconductor manufacturers.

Now, having established overseas sales and production bases, Japanese electronic equipment makers purchase semiconductors not only from Japanese manufacturers but also increasingly from overseas manufacturers. At the same time, Japanese semiconductor manufacturers that produce all processes began to outsource some of their production processes, having been exposed to the global trend towards specialization in manufacturing semiconductors. They also started to create spinoff subsidiaries aiming to increase profits by reducing costs.

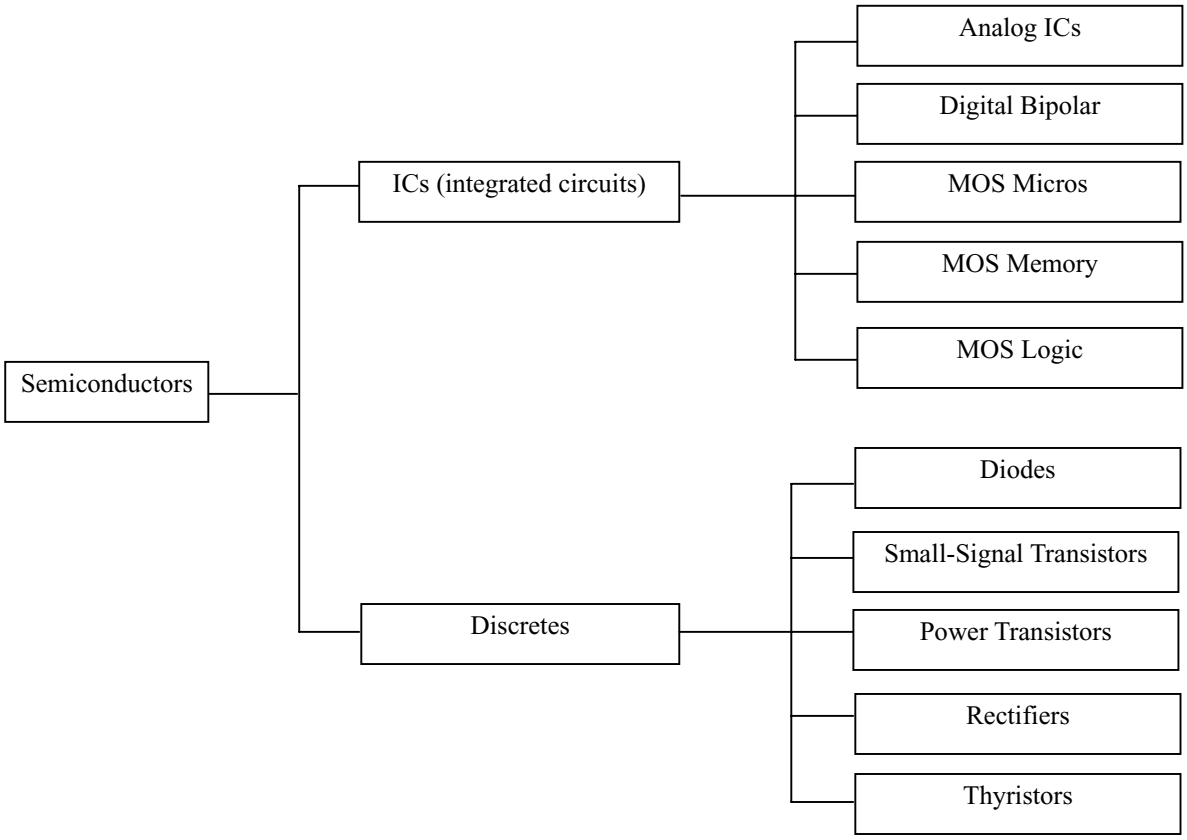
PCs, peripheral devices and cellular phones have led the Japanese electronic equipment market since the late 1990’s, but it is expected that product development will center around networking products such as the next generation cellular phones, TVs and set-top boxes for household use, and video game units. This type of equipment requires semiconductors loaded with technologies for communication networks, or still and live image processing as well as technologies related to these areas. Although Japanese semiconductor manufacturers have started to develop products for these markets, the demand for overseas makers that are more advanced in these areas is expected to increase.

Keeping this market environment in mind, this report will discuss the present conditions and prospects for the electronic component market in Japan, and give some advice for overseas

corporations entering the Japanese market.

This study will examine the following products:

<Products to be Examined>



Research was conducted into semiconductor manufacturers in Japan who produce and sell the products listed above, overseas semiconductor manufacturers who import their products into Japan, and importers and distributors of semiconductor products in Japan.

Table of Contents

Appendix

Yen-US Dollar Exchange Rates

End of Year	Yen/US$
1997	129.2
1998	115.2
1999	102.1
2000	114.9
2001	131.5

Note : Mean value between offer and bid in the inter-bank foreign exchange market in Tokyo.

Source: Bank of Japan, "Financial and Economic Statistics Monthly"

Summary

Trends in domestic sales and import of semiconductors:

Since 1998, the Japanese semiconductor market expanded steadily, peaking in 2000 (approximately 4,610 billion yen in total), due largely to the increase in demand for electronic equipment such as cellular phones. Amongst sales of semiconductors in Japan, imported products amounted to 1,580 billion yen in 2000, over 30% of the total sales.

Distribution:

Japan's major semiconductor manufacturers sell their products directly to electronic equipment production sections of their own or affiliated companies (internal sales), other sales (external sales) being handled by their distributors. Among the overseas semiconductor manufacturers who import their products for distribution in Japan there are two types, those who have established Japanese subsidiaries and those who have not. The former usually sell their products through distributors, sometimes using their Japanese subsidiaries to sell products directly to strategic target users. Those without subsidiaries distribute the products through their agents in Japan. There are about 100 large and small distributors of imported semiconductors in Japan and they deal the products of more than 300 overseas semiconductor manufacturers. Outsourcing business liked foundry businesses (in wafer process) and sub contract business (in assemble process) are now being established.

Advice on starting business in the Japanese market:

There are already some internationally prominent semiconductor manufacturers in Japan, and competition in product development and pricing is fierce. However, the needs of the Japanese electronic equipment makers who use semiconductors are concentrated on high value-added products. It is difficult for Japanese semiconductor manufacturers to cope with these products, because of their technology. As a result, demands for overseas semiconductors are increasing in these product areas.

In this market environment, the following products have good prospects for sales in Japan:

Semiconductors used for mass-produced electronic equipment, which can be manufactured at low cost and supplied steadily (discretes, analog ICs, DRAM, SRAM, micro controllers, ASSPs, etc. for PCs and peripheral devices, TVs, VCRs and audio equipment);

Custom semiconductors for specific applications (ASSPs, ASICs/system LSIs, MPUs/MCUs, AS memory, discretes, etc. for newly-developed electronic equipment such as next generation cellular phones, digital TVs, set-top boxes, game units, routers, etc.)

Among latter products suggestions to users for the development of high value-added products, joint product development with users, and technical support are all sought after in the

Japanese market. Semiconductors that include features which other manufacturers' products lack, and that have design data, have a particularly good chance of success.

Ⅰ. Outline of the Japanese Semiconductor Market

A. Global Semiconductor Market and Japan's Position

In 2000, the global semiconductor market grew by more than 35% from the previous year to about 194 billion dollars on the back of an expansion of electronic product markets such as cellular phones and network-related hardware. The Japanese semiconductor market grew to about 43 billion dollar in the same year, accounting for 22% of the global market.

In 2001It is estimated that, the global slowdown in electronic products market will lead sales and decrease 35% from 2000 to about 166 billion dollars in the global semiconductor market. It is estimated that the drop in sales in the Japanese semiconductor market will be relatively small, around 7.6% year-on-year, down to 39 billion dollars.

Figure 1. Changes in the Scale Semiconductor Market

Units: millions of dollars

		1999 Actual	2000 Actual	2001 Estimate	2002 Estimate	2003 Estimate
ICs/LSIs	World	130,220	176,950	150,850	172,670	205,000
	Japan	26,400	37,850	35,210	39,780	46,300
Discrete Components	World	13,070	16,920	15,260	16,750	18,600
	Japan	3,660	4,830	4,240	4,590	5,000
Total	World	143,290	193,870	166,110	189,420	223,600
	Japan	30,060	42,680	39,450	44,370	51,300

Source : WSTS 2001 (in Spring)
WSTS = World Semiconductor Trade Statistics

Note : Figures for 2001 – 2003 were estimated by the Fuji Chimera Research Institute in July 2001, based on interviews with marketing representatives of the semiconductor manufacturers.

B. Trends in the Japanese Semiconductor Market

The Japanese semiconductor market grew steadily from 1999 to 2000 due to the brisk demand for electronic products such as cellular phones, PCs, digital cameras and digital TVs. Despite heavy capital spending by the manufacturers, semiconductor products fell into short supply, especially in 2000.

ICs/LSIs, integrated for use in highly functional electronic equipment, and there quality, and production is increasing. The market for discretes, which form the elements of the IC, has also expanded due to the increase in the production of electronic equipment, especially cellular phones and other products

In 2000, the size of the semiconductor market reached 4,610 billion yen, a 34.5% increase from 1999. By product, sales of ICs/LSIs amounted to 522 billion yen and sales of discretes amounted to 4,088 billion yen, accounting for 11.3% and 88.7% of the market, respectively.

It is projected that in 2001 sales volumes will decrease and the price of semiconductors will go down due to the slowdown in demand for electronic equipment and increased stock from over-production. Sales are estimated to reach 4,339 billion yen, down by 5.9% from actual sales in 2000.

In 2002 and after, the semiconductor market is expected to make a recovery led by demand for next generation cellular phones, which will be fully on the market, and network related equipment for household use. Sales of semiconductors are estimated to reach 4,881 billion yen in 2002 and 5,643 billion yen in 2003.

Figure 2. Changes in the Scale of the Japanese Semiconductor Market in Japan

Units: 100 millions of yen

	1999 Actual	2000 Actual	2001 Estimate	2002 Estimate	2003 Estimate
ICs/LSIs	30,100	40,880	38,730	43,760	50,930
Discrete device	4,170	5,220	4,660	5,050	5,500
Total	34,270	46,100	43,390	48,810	56,430

Source : WSTS 2001 (in Spring)
Note 1 : Figures for 2001 – 2003 were estimated by the Fuji Chimera Research Institute in July 2001, based on the interviews with the marketing representatives of semiconductor manufacturers.
Note 2 : Exchange rate is set at 114 yen/dollar for 1999 and 108 yen/dollar for 2000.

C. Market Trends by Product Category (sales in 2000)

1. IC/LSI

In Japan, the IC/LSI market used to be composed mainly of products destined for household appliances such as AV equipment, but demand for information and communications equipment such as PCs and cellular phones began to increase in the late 1990s, resulting in a jump in the share of MOS devices which process digital signals. They accounted for 82.2% of the market in 2000.

It is expected that a market for network-related equipment for household use and digital household appliances will emerge, and thus the share of analog ICs in the market will increase slightly.

Figure 3. Sales of ICs/LSIs by Product Category (in 2000)

		Value (100 millions of yen)	percentage(%)
Analog ICs	General-Purpose and Standard	2,700	6.6
	For Specific Use	4,300	10.5
	Total	7,000	17.1
Digital Bipolar		300	0.7
MOS Micros	MPU	3,880	9.5
	MCU	4,500	11.0
	DSP	1,370	3.4
	Peripheral	1,450	3.5
	Total	11,200	27.4
MOS Memory	DRAM	4,670	11.4
	SRAM	1,810	4.4
	Flash Memory	3,450	8.4
	Others	1,500	3.7
	Total	11,430	28.0
MOS Logic	CMOS Standard Logic	850	2.1
	ASSP	6,600	16.1
	ASIC	3,500	8.6
	Total	10,950	26.8
Total		40,880	99.9

Source : WSTS 2001 (in Spring)
Figures are calculated by the Fuji Chimera Research Institute based on the data in the Statistics, setting the exchange rate at 108 yen/dollar.
Note : Total does not all ways add up to 100 due to rounding off.

The manufacture of mass-produced electronic equipment such as household AV equipment, PCs and peripheral devices, and cellular phones has mostly shifted to other Asian countries. These products are now produced by local subsidiaries of Japanese, U.S. and European manufacturers, local companies or EMS manufacturers.

Production in Japan is focused on products that cannot be produced in other Asian countries, and newly-developed or high value-added products. Specifically, these products include newly-developed digital AV equipment and network-related equipment with communications functions, mobile/portable electronic equipment such as smaller and higher-performance cellular phones and digital cameras backed with the mounting, and process technology which has long been the most advance of Japanese manufacturers.

ICs/LSIs must have low power consumption, high speed and large capacity for these applications. Demand for lower power consumption is especially strong in battery-operated mobile/portable equipment. As a result, demand is shifting from high-speed bipolar process devices

with high power consumption to CMOS process devices that are progressively increasing in speed. Similar changes are occurring with analog products. Bipolar process products used to account for a large part of the market, but since around 1998 a new analog devices market that use the CMOS process has evolved. The IC for the power supply for cellular phones is a typical example of these products. Because of the increases of microcomputer loading rate in electronic equipment and integration, the capacity and speed of memory is also improving. In Japan, there is much demand for RISC type MPUs/MCUs, high speed and large capacity DRAM, and flash memory.

In the future, an increase in demand is expected for the following products:
(1) DSPs with a built-in MPU core, flash memory, discretes for RF circuits and ICs for RF used for the next generation cellular phones; (2) RISC MPUs, flash memory, LCD drivers, ICs for various interfaces used for mobile PCs, and (3) ICs for digital or analog networking and communications, high-speed MPUs, and high speed and large capacity DRAM for networked home servers (STBs, digital TVs, game units and other applied equipment). It is also projected that the development of system LSIs (System on a Chip), which have a built-in IP core or macro cells that function as a CPU for various applications (systems), will be increasingly promoted due to progress in the LSI fine process and design technologies.

2. Discretes

In Japan, the need for analog functions used in consumer electronic equipment has been high and the market for discretes is relatively large. In particular, power transistors for power supplies, motors and communications-related equipment account for a large share of the market. While small signal transistors and diodes take a large share in volume base, power transistors for which the unit price is relatively high have a large share in volume base.

Figure 4. Sales of Discrete Components by Product Type (in 2000)

	Diodes	Small Signal Transistors	Power Transistors	Rectifiers	Thyristors	Others	Total
Sales (100 millions of yen)	820	1,310	2,130	640	180	140	5,220
Percentage of Total (%)	15.7	25.1	40.8	12.3	3.4	2.7	100.0

Source : Figures are calculated by the Fuji Chimera Research Institute based on the data in WSTS 2001 (in Spring), setting the exchange rate at 108 yen/dollar.

D. Market Shares of Domestic and Imported Products

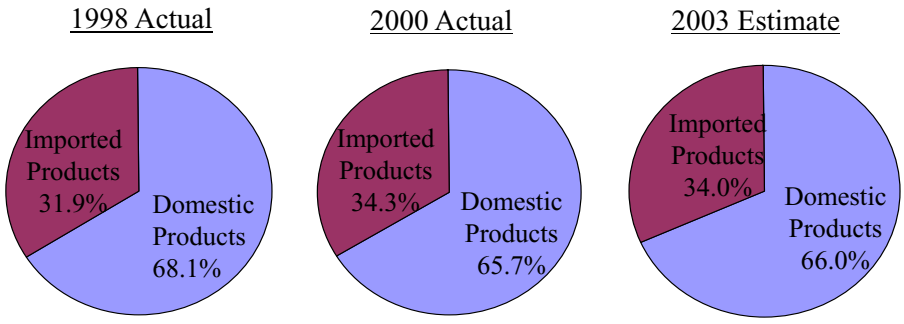
The main imports into the Japanese semiconductor market are Intel's MPUs and overseas DRAMs. Imports account for just over 30% of the whole market.

Figure 5. Change in the Market Size of Domestic and Imported Semiconductor Products

		1998 Actual	1999 Actual	2000 Actual	2001 Estimate	2002 Estimate	2003 Estimate
ICs/LSIs	Domestic	17,860	19,880	25,970	25,230	28,260	32,730
	Imported	9,310	10,220	14,910	13,500	15,500	18,200
	Total	27,170	30,100	40,880	38,730	43,760	50,930
Discrete Components	Domestic	3,310	3,400	4,310	3,870	4,160	4,500
	Imported	600	770	910	790	890	1,000
	Total	3,910	4,170	5,220	4,660	5,050	5,500
Semiconductors Total	Domestic	21,170	23,280	30,280	29,100	32,420	37,230
	Imported	9,910	10,990	15,820	14,290	16,390	19,200
	Total	31,080	34,270	46,100	43,390	48,810	56,430

Source : Estimation by the Fuji Chimera Research Institute (July 2000)
Note : Figures are based on interviews with marketing representatives of the semiconductor manufacturers and may differ from those in the Customs Statistics of the Ministry of Finance.

Figure 6. Shares of Domestic and Imported Products in the Japanese Semiconductor Market



Source : Same as Figure 3.

E. Sales Breakdown of Domestic and Imported Products and Market Conditions (sales in 2000)

1. Market Size of Domestic and Imported ICs/LSIs

The size of the Japanese IC/LSI market in 2000 was 4,088 billion yen, out of which imported products amounted to 1,491 billion yen, or 36.5% of the market. Sales of domestic ICs/LSIs in the Japanese market were 2,597 billion yen.

Figure 7. Market Shares of Domestic and Imported ICs/LSIs

Units: 100 millions of yen

	Domestic Products		Imported Products		Total Sales	Share of Imported Products (%)
	Sales	Percentage of Total (%)	Sales	Percentage of Total (%)		
Analog ICs	5,000	19.3	2,000	13.4	7,000	28.6
Digital Bipolar	200	0.8	100	0.7	300	33.3
MOS Micros	7,420	28.6	3,780	25.4	11,200	33.8
MOS Memory	5,540	21.3	5,890	39.5	11,430	51.5
MOS Logic	7,810	30.1	3,140	21.1	10,950	28.7
Total	25,970	100.0	14,910	100.0	40,880	36.5

Source : Data for imported MOS micros and MOS memory is taken from the Customs Statistics of the Ministry of Finance.

Note : As products other than MOS micros and MOS memory are not included in the product items in the Customs Statistics, each import values for these products are estimated by the Fuji Chimera Research Institute based on interviews with marketing representatives of the semiconductor manufacturers.

Shares of imports are around 30% for all products except MOS memory, for which the share is over 50%. It is estimated that demands for imported MOS micros and MOS logic for specific applications such as next generation cellular phones and household network-related equipment will increase in future.

2. Scale of Domestic and Imported Discrete Component Market

The size of the Japanese discrete component market in 2000 was 522 billion yen, imported products accounting for 17.4%. The price of discretes is generally low. As it is becoming increasingly difficult to manufacture them in Japan, where production costs are high, Japanese manufacturers are relocating their production bases to Asia and other regions. However, expensive discretes such as those for communications equipment and special motors or power supplies are mostly designed, developed, and manufactured in Japan. Discretes imported to Japan are mainly those that are difficult to develop in Japan, such as transistor or automobile-related products.

Figure 8. Market Shares of Domestic and Imported Discrete Discrete

Units: 100 millions of yen

	Domestic Products		Imported Products		Total Sales	Import Ratio (%)
	Sales	Percentage of Total (%)	Sales	Percentage of Total (%)		
Diodes	560	13.0	260	28.6	820	31.7
Transistors	3,040	70.5	400	44.0	3,440	11.6
Rectifiers	460	10.7	180	19.8	640	28.1
Thyristors	150	3.5	30	3.3	180	16.7
Others	100	2.3	40	4.4	140	28.6
Total	4,310	100.0	910	100.0	5,220	17.4

Source : Data for imported diodes and transistors is taken from the Customs Statistics of the Ministry of Finance.

Note : As no specific breakdown for products besides diodes and transistors is provided in the product items in the Customs Statistics, each import values for these products are estimated by the Fuji Chimera Research Institute based on interviews with marketing representatives of the semiconductor manufacturers.

F. Market Shares by Manufacturer and Product (sales in 2000)

1. ICs/LSIs

a. General Purpose Analog ICs

General purpose analog ICs include regulators, operational amplifiers, and ADC/DAC devices and are used in various analog circuits such as power circuits. NS holds the largest share, followed by TI, Toshiba and On Semiconductor.

Figure 9. Shares of General Purpose Analog ICs by Manufacturer

	NS (U.S.)	TI (U.S.)	Toshiba	OnSemi (U.S.)	Maxim (U.S.)	Others	Total
Sales (100 millions of yen)	350	290	270	220	190	1,080	2,400
Percentage of Total (%)	14.6	12.1	11.3	9.2	7.9	45.0	100.0

Source : Estimated by the Fuji Chimera Research Institute.

Note : Countries in parentheses indicate the location of the company's head office.

b. Application Specific Analog

Application specific analog ICs include those for TVs and VCRs, communications equipment and automobiles. Toshiba, who are strong in analog ICs for TVs and VCRs, holds the largest share. U.S. and European manufacturers with large shares in overseas markets will probably increase their shares in Japan in the fields of analog ICs used for communications equipment and automobiles.

Figure 10. Shares of Analog Specific ICs by Manufacturer

	Toshiba	Sanyo Electric	Rohm	Sony	Philips (Holland)	Others	Total
Sales (100 millions of yen)	730	670	620	550	480	1,550	4,600
Percentage of Total (%)	15.9	14.6	13.5	12.0	10.4	33.7	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

c. Digital Bipolar ICs

While TI and NS are the leading manufacturers internationally, Toshiba holds the largest share in the Japanese market. Production and sales of digital bipolar ICs (standard logic ICs for bipolar processes such as TTL and ECL) are expected to decline in the future.

Figure 11. Shares of Digital Bipolar ICs by Manufacturer

	Toshiba	TI (U.S.)	Hitachi	Others	Total
Sales (100 millions of yen)	80	70	50	100	300
Percentage of Total (%)	26.7	23.3	16.7	33.3	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

d. MPUs (Micro Processing Units)

Intel, global leader in CPUs and PCs, also holds the largest share in the Japanese market, followed by AMD, who supply Intel-compatible chips.

Figure 12. Shares of MPUs by Manufacturer

	Intel (U.S.)	AMD (U.S.)	NEC	Motorola (U.S.)	Hitachi	Others	Total
Sales (100 millions of yen)	950	650	580	460	380	860	3,880
Percentage of Total (%)	24.5	16.8	14.9	11.9	9.8	22.2	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

e. MCUs (Microcontroller Units)

A market has emerged for single chip microcomputers used in household appliances, AV equipment and automobile-related products.The leading manufacture is NEC, producing a wide range of products from 8- to 32-bit, followed by Hitachi, who specialize in 32-bit devices.

Figure 13. Shares of MCUs by Manufacturer

	NEC	Hitachi	Mitsubishi Electric	Matsushita Electric Industrial	Motorola (U.S.)	Others	Total
Sales (100 millions of yen)	830	740	620	580	470	1,260	4,500
Percentage of Total (%)	18.4	16.4	13.8	12.9	10.4	28.0	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

f. DSPs (Digital Signal Processors)

TI, the global leader, also holds the largest share in the Japanese market. DSPs need an environment conducive to software development, so companies with appropriate infrastructures in place enjoy larger market shares.

Figure 14. Shares of DSPs by Manufacturer

	TI (U.S.)	NEC	Analog Devices (U.S.)	Agere (U.S.)	Others	Total
Sales (100 millions of yen)	900	180	90	50	150	1,370
Percentage of Total (%)	65.7	13.1	6.6	3.6	10.9	100.0

Source: Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

g. DRAM (Dynamic Random Access Memory)

Elpida Memory, established in 2000 as a joint venture between NEC and Hitachi, holds the largest share. The company is expanding its business by specializing in DRAMs. However, companies such as Samsung and Hynix (formerly Hyundai Electronics and LG of Korea), and Micron of the U.S. are also increasing their sales in Japan. Taiwanese manufacturers are also expected to enter the Japanese market in the future.

Figure 15. Shares of DRAM by Manufacturer

	Elpida Memory	Hynix (Korea)	Samsung (Korea)	Toshiba	Mitsubishi Electric	Others	Total
Sales (100 millions of yen)	1,050	1,020	930	400	280	990	4,670
Percentage of Total (%)	22.5	21.8	19.9	8.6	6.0	21.2	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

h. SRAM (Static Random Access Memory)

Similar to the DRAM market, Korean manufacturers are dominant in the SRAM market, holding the top two shares. As SRAMs are built into cellular phones with flash memory, manufacturers posted large sales growth in 2000 due to the expansion of this market.

Figure 16. Shares of SRAM by Manufacturer

	Samsung (Korea)	Hynix (Korea)	Toshiba	Mitsubishi Electric	NEC	Others	Total
Sales (100 millions of yen)	340	220	190	170	160	730	1,810
Percentage of Total (%)	18.8	12.2	10.5	9.4	8.8	40.3	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

i. Flash Memory

Fujitsu, in alliance with AMD, and Sharp, who have a tie-up with Intel, hold the first and second shares, respectively. However, the lower-ranking companies are catching up quickly. As with SRAM, demand for flash memory has increased rapidly due to the growth of the cellular phone market.

Figure 17. Shares of Flash Memory by Manufacturer

	Fujitsu	Sharp	NEC	Toshiba	Hitachi	Others	Total
Sales (100 millions of yen)	740	720	330	310	280	1,070	3,450
Percentage of Total (%)	21.4	20.9	9.6	9.0	8.1	31.0	100.0

Source : Estimated by the Fuji Chimera Research Institute.

j. Standard Logic

The market is dominated by the major manufacturers of bipolar digital products as CMOS standard logic is used as a substitute for these products.

Figure 18. Shares of Standard Logic by Manufacturer

	Toshiba	TI (U.S.)	Philips (Holland)	OnSemi (U.S.)	Hitachi	Others	Total
Sales (100 millions of yen)	170	140	80	50	40	370	850
Percentage of Total (%)	20.0	16.5	9.4	5.9	4.7	43.5	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

k. ASICs (Application Specific ICs)

ASICs include gate arrays, cell based LSIs, embedded LSIs and PLDs (Programmable Logic Devices). Gate arrays can be made quite easily by positioning the power supply and wire layouts in advance and designing the configuration to the client's specifications. However, market needs ASICs that has function by applications. So demand for macro/core cell based and embedded LSIs that are able to pack several functions onto a chip is increase and on the other hand the demand for gate array that is able to only expand their capacity is decreasing. The market for gate arrays has peaked and appears to be in decline. In their place, cell based and embedded LSIs are in greater demand. The market for SOCs (system LSIs) in particular is expected to expand in the future.

Figure 19. Shares of ASICs by Manufacturer

	NEC	Fujitsu	Toshiba	LSI Logic (U.S.)	Agere (U.S.)	Others	Total
Sales (100 millions of yen)	1,400	1,050	920	700	400	1,030	5,500
Percentage of Total (%)	25.5	19.1	16.7	12.7	7.3	18.7	100.0

Source : Estimated by the Fuji Chimera Research Institute.
Note : Countries in parentheses indicate the location of the company's head office.

l. Discretes

Toshiba, Rohm, Matsushita Electric Industrial, all leading makers of consumer appliances such as TVs and household appliances, hold large shares. NEC and Hitachi are strong in products used for communications equipment.

Figure 20. Shares of Discretes by Manufacturer

	Toshiba	NEC	Rohm	Matsushita Electric Industrial	Hitachi	Others	Total
Sales (100 millions of yen)	1,300	600	550	470	420	1,880	5,220
Percentage of Total (%)	24.9	11.5	10.5	9.0	8.0	36.0	100.0

Source : Estimated by the Fuji Chimera Research Institute.

Ⅱ. Import System and Related Regulations

A. Import Regulations and Supervising Government Agencies

There are no particular regulations concerning the import of semiconductor products.

B. Standards for Goods and Labeling Requirements

In Japan, the standards generally applied to semiconductor products are specified by JEDEC (Joint Electron Device Engineering Council) and JEITA (Japan Electronics and Information Technology Industries Association).

"Made in XXX" on the packages of imported semiconductor products indicates the country where they were assembled and shipped from. For example, the products of a Korean semiconductor manufacturer will be labeled "Made in Malaysia" if they were assembled and completed in Malaysia.

C. Tax System

The following are the HS codes of semiconductor products.

DRAM	HS854213210
SRAM	HS854213220
ROM	HS854213230
MPU	HS854213310
MCU	HS854213320
MPR	HS854213330
Diode (less than 100mA)	HS854110910
Diode (100mA or more)	HS854110920
Transistor (less than 1W)	HS854121910
Transistor (1W or more)	HS854129910

As of fiscal year 2001, no custom duties are imposed on semiconductor products. A consumption tax is imposed, which is 5% of the sales value.

Ⅲ. Distribution

A. Structure of the Japanese Semiconductor Market

1. System of Transactions with System Manufacturers

Japanese electronic equipment manufacturers have relocated mass-production to other Asian countries because of fierce price competition. They usually design products in Japan and produce overseas, and evaluate and purchased semiconductors at the design stage. Recently however, Japanese electronic equipment manufactures who design and purchase in overseas production plants is increasing.

In Japan, Japanese semiconductor manufacturers generally sell semiconductor products through distributors, but also sell directly certain strategic products or products for major clients. They also establish production bases abroad to supply products to Japanese electronic equipment manufacturers who have shifted production overseas, and local firms, as well as exporting products to third countries.

Overseas semiconductor manufacturers who have established subsidiaries in Japan sell products to electronic equipment makers through their subsidiaries and distributors. Overseas manufacturers with no Japanese subsidiaries consign the sale of their products to distributors in Japan. When overseas manufacturers supply overseas subsidiaries of Japanese electronic equipment makers, they sell products mainly through their local sales offices or local distributors, but some manufactures sell products through their Japanese subsidiaries.

Figure 21. Supply Route from Semiconductor Manufactures to Electronic Equipment Manufacturers

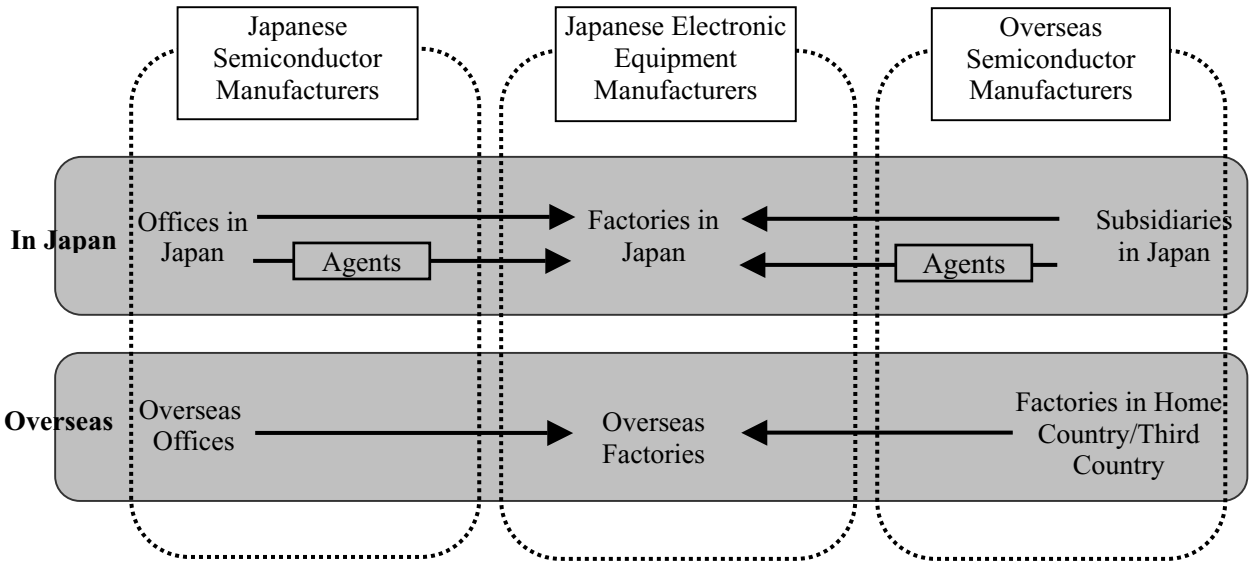
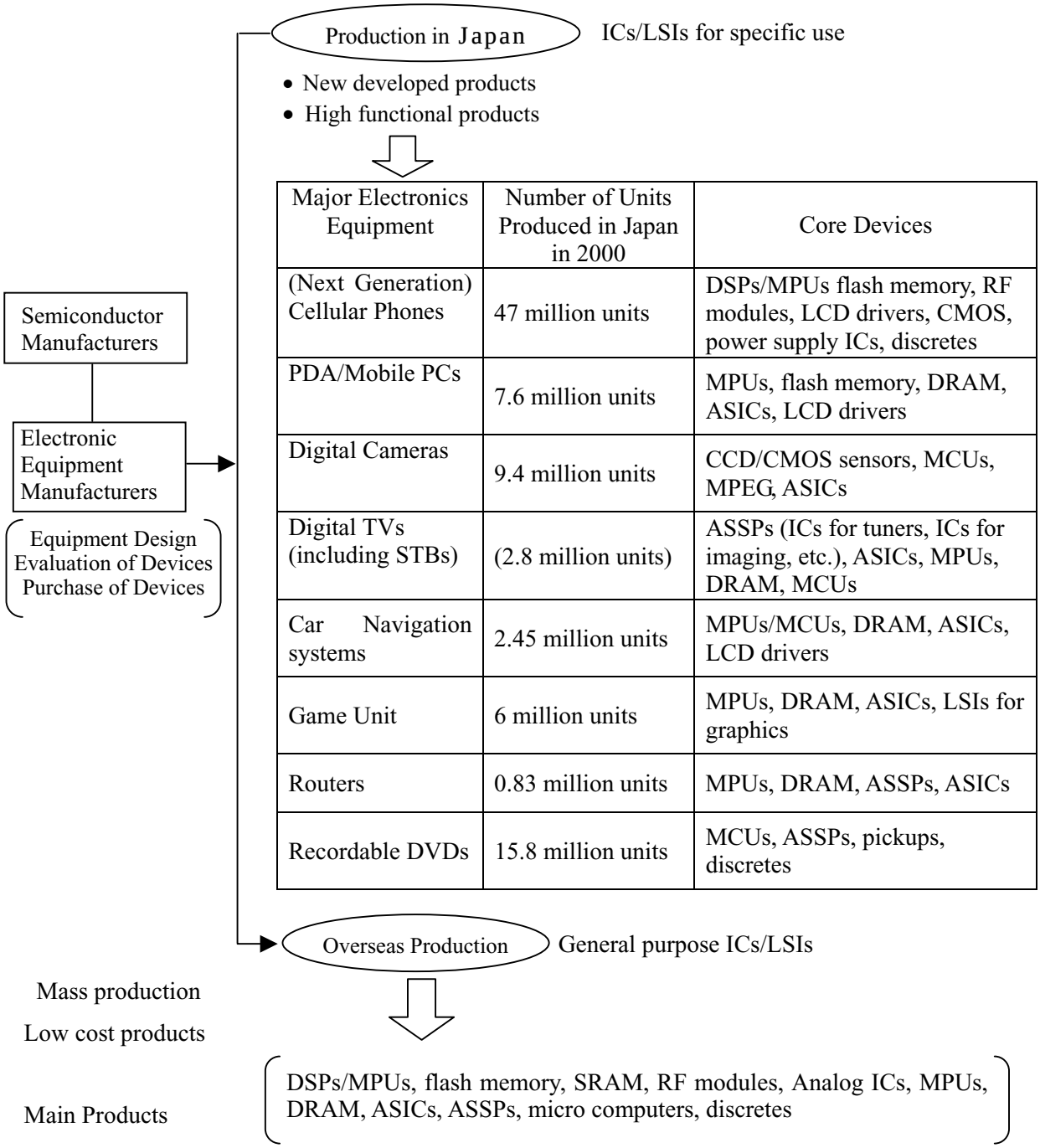


Figure 22. Major Products of Japanese Electronics Equipment Manufacturers' and their Core Devices



Major Electronics Equipment	Number of Units Produced in Japan in 2000	Core Devices
(Next Generation) Cellular Phones	47 million units	DSPs/MPUs flash memory, RF modules, LCD drivers, CMOS, power supply ICs, discretes
PDA/Mobile PCs	7.6 million units	MPUs, flash memory, DRAM, ASICs, LCD drivers
Digital Cameras	9.4 million units	CCD/CMOS sensors, MCUs, MPEG, ASICs
Digital TVs (including STBs)	(2.8 million units)	ASSPs (ICs for tuners, ICs for imaging, etc.), ASICs, MPUs, DRAM, MCUs
Car Navigation systems	2.45 million units	MPUs/MCUs, DRAM, ASICs, LCD drivers
Game Unit	6 million units	MPUs, DRAM, ASICs, LSIs for graphics
Routers	0.83 million units	MPUs, DRAM, ASSPs, ASICs
Recordable DVDs	15.8 million units	MCUs, ASSPs, pickups, discretes

Source : Fuji Chimera Research Institute, "2001 Comprehensive Research on the Worldwide Electronics Market"

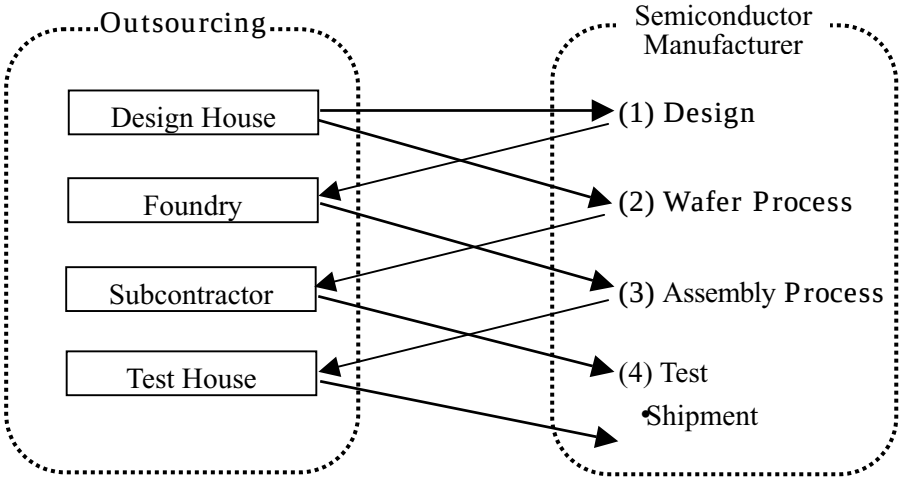
2. Specialization in the Production of Semiconductors

The production of semiconductors is divided into four processes. There is a global trend towards such out-sourcing by process. In particular, semiconductor companies in Taiwan, Korea and other Asian countries are actively developing the outsourcing production business. These manufacturers have produced a large quantity of semiconductor products under contract with U.S. and European makers. While Japanese semiconductor manufacturers used to run integrated operations from design to production and sales of their products, they have begun to outsource production to domestic and overseas specialist manufacturers in recent years. Japanese semiconductor manufacturers outsource mainly to reduce capital investment on specific technologies, and to avoid risks. Some manufacturers use outsourcing as a secondary source of production during active demand, or due to reduce production costs. There are also some manufacturers who outsource production and sales of their products to sell them in overseas markets.

Semiconductor manufacturers can expect business opportunities in designing semiconductors by obtaining IP licenses for LSI and system LSI design for specific applications (for major electronics equipment).

In the area of foundry and subcontracting, manufacturers with state-of-the-art production facilities can win orders for producing highly integrated and functional LSIs requiring copper wiring and micro circuit technologies. Manufacturers with older facilities that use a design rule of 1.0 micron or before can accept orders to produce LSIs of low or middle level integration and products with little variety and low production volumes. This is because Japanese semiconductor manufacturers, having already replaced old machinery, are no longer able to manufacture these products themselves. Any manufacturer with facilities of a similar size to Japanese semiconductor makers can supply products to them as second venders when the semiconductor market is booming.

Figure 23. Flow of Semiconductor Production and Outsourcing of Processes



B. Distribution Channel in Japan

It is common in this industry for several distributors to handle the products of one domestic manufacturer, and many of these distributors are companies affiliated with the manufacturer. At the distributors, sales representatives are put in charge of each device, application, and client.

There are two channels for the distribution of products for overseas semiconductor manufacturers: one is where a distributor deals with the products of two or more overseas and Japanese semiconductor manufacturers, the other is where the products of the overseas manufacturer are sold by specific distributors in the same way as those of Japanese manufacturers.

Mainstream distribution channel is through distributors. However , Semiconductor manufacturers directly sell specific products, or to major electronic equipment manufactures.

Most Japanese semiconductor manufacturers have set up e-business divisions enabling them to take orders directly from users over the Internet. Distributors too are trying to optimize supply and purchases with their know-how as trading companies.

At the first time to sell to a new client, semiconductor manufacturers or their distributors produce a sample according to the specifications given by the client's design or development section, and move on to mass production after evaluation and approval by the client. At this point, the liaison points on the client's side are the procurement and purchasing sections at the client's mass production factories. Initially, it is need for manufacturers to have the technical capability and R&D suggestion to comply with client's equipment. Cost, time of delivery, service, and technical support become important once the products go into mass production,

In many cases, clients place orders for semiconductors three to six months in advance based on their own forecasts of demand for their equipment.

Figure 24. Distribution Channels for Japanese Semiconductor Manufacturers

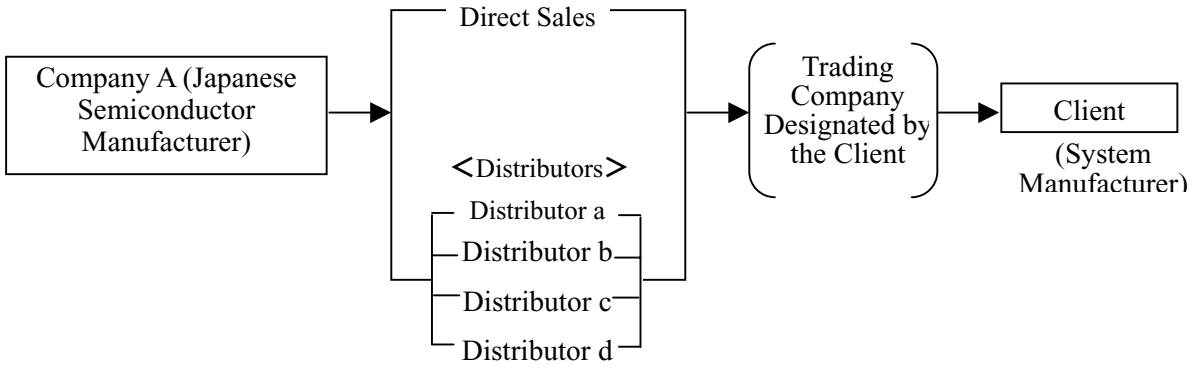
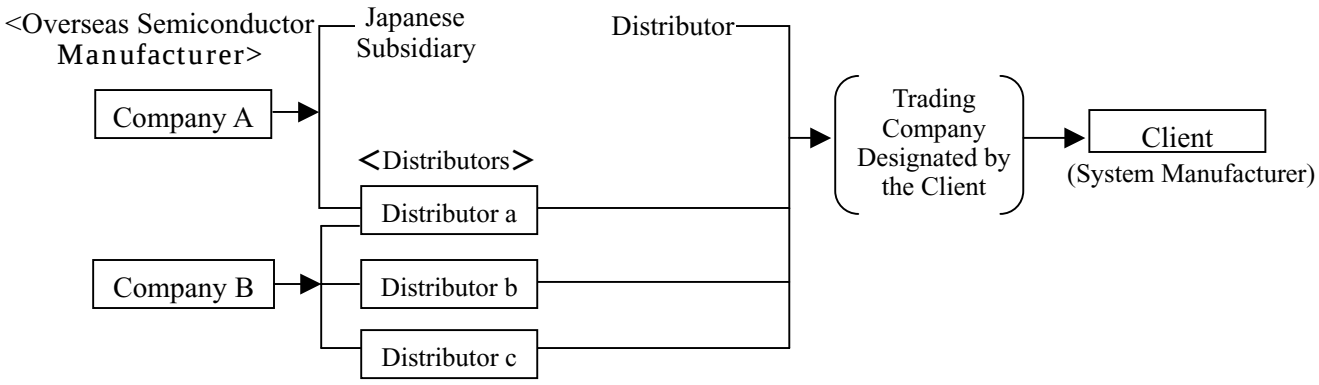


Figure 25. Distribution Channels for Overseas Semiconductor Manufacturers



C. Profit Margins

Product	Trends in Profit Margins
Linear/Standard Logic	10 – 20% Profit margin is relatively high as demand for price reduction is not strong.
Memory	5 – 10% Profit margin is low as it is for general purpose and cost is highly likely to fluctuate.
ASICs	5 – 20% Profit margin is low except for SOCs.
Micro Computers	5 – 10% Profit margin is low because of fierce price competition among manufacturers.
ASSPs	10 – 20% Profit margins are high for products with special functions.

* Profit margins listed here are the margins commonly achieved when distributors sell semiconductors to clients

In general, relatively new semiconductor products or those with a high unit price are subject to strong demands for price reductions from clients, and profit margins tend to decrease. When new semiconductor products are put on the market, existing products may be sold at lower profit margins to compete with new products. Products unique to the manufacturer or distinctly different from those of other manufacturers can expect higher profit margins.

The followings are trends in the profit margins for each product:

Linear ICs for general purpose and standard logic ICs such as TTL are not subject to demands for price reductions from clients as their unit prices are relatively low, and technologies and markets for these products have already been established. Therefore, profit margins for these products are high. However, the profit margin for general-purpose memory is relatively low because of stronger pressure for price reduction and higher fluctuations in price.

Semiconductor manufacturers achieve low profit margins from ASICs products in which they merely assemble the logics specified by electronic equipment makers. On the other hand, profit margins are high for products with special functions not found in other products. The price for

dedicated-use products to the client can be four or five times higher than the trade price from the manufacturer.

Although microcomputer manufacturers emphasize the functions of their products, there are not really any significant differences from the consumer's point of view. In addition it cause price competition and low profit margins.

ASSPs produce high profit margins for small orders from specific clients, but profits for large orders that will be purchased by many clients tend to be low.

D. Business Case Studies for the Major Semiconductor Companies

1. NEC Electron Devices

NEC's semiconductor business is run by NEC Electron Devices, a spin-off company mainly selling NEC's products to external users. The company has sales subsidiaries in the U.S., U.K., France, Germany, Italy, Hong Kong, Korea, Taiwan, Singapore and other countries for overseas distribution.

NEC sells products directly to some major clients, but mainly through distributors. In Japan, 10 distributors (Ryosan, Sanshin Electric, Sajima Electric, Shinko Trading, Mikasa, Shimizu Shintech, Nakamatsu Trading, Hagiwara Electric, Numata and Taiyo Electric) sell NEC's semiconductors to users throughout the country. Distributors coordinate sales territories for each company in order to avoid overlapping of sales. There are distributors for each business establishment of clients. New client accounts are open to all distributors.

2. Texas Instruments Japan

Texas Instruments (TI) established its Japanese subsidiary in 1968, and develops and manufactures products in addition to sales. TI Japan has business divisions for each device, such as a DSP department. While the company sells products directly to some major clients, it generally consigns sales to distributors.

TI Japan has selected the following distributors with strong business records in both sales to Japanese electronic equipment manufacturers and purchases from U.S. makers: Nissei Electronics, Fuji Electronics, Matsubo Electronic Components, Marubun, Unidax, NCM Japan, Amsk Unitus, Komatsu Semicon, Japan Electronic Element Engineering and Shinko Trading.

Following TI's acquisition of Burr-Brown in 2000, TI Japan started handling the products of Burr-Brown Japan (in Yokohama), and expanded it's distribution network.

IV．Japanese Market Advice Access

A. Successful Cases of Overseas Companies in the Japanese Market

The following are examples of business successes by overseas companies in the Japanese semiconductor market.

Company Name	Device	Factor Contributed to its Success	Application
Intel	MPUs	differentiation	PCs
AMD	MPUs	compatibility to Intel's products	PCs
TI	DSPs	differentiation	cellular phones
Micron	DRAM	low price	PCs
Samsung	DRAM	low price	PCs
Hynix	DRAM	low price	PCs
Altera	FPGAs	differentiation	communications equipment
ST Micro	MPEG	differentiation	IPs, SOCs
Infineon	ASSPs	specialization	automobiles, communications equipments
ARM	MPU cores	diffe same rentiation	cellular phones
Amkor Technology	assembly	low price	production for IC manufacturers under contract
TSMC	foundry	low price	production for IC manufacturers under contract

B. Keys of Success in the Japanese Market

1. Understanding Japanese Business Practices and Their Characteristics

Those who plan to enter the Japanese market should be aware of the following business practices in Japan.

Suppliers of semiconductors usually hold bank accounts for each user. Suppliers who have accounts for a user are at an advantage in receiving orders, and this is sometimes the decisive factor in winning orders. Some users purchase semiconductors exclusively from fixed suppliers.

Semiconductor manufacturers under the user corporate umbrella gain orders under favorable conditions. However, in recent four or five years users hand an order to manufactures who can give lower price, quicker delivery and better after-sales services no matter corporate group.

Semiconductors are sold to users mainly through distributors rather than directly by the manufacturer.

In many cases, users forecast demand for semiconductors and place orders three months ahead of the delivery date.

It is important for suppliers to make regular visits to the user's procurement and purchasing divisions or engineering and design sections in order to get to know the user's requests, to explain the characteristics and advantages of their products, and to suggests possible applications.

According to their current sale strategies, distributors may offer discounts to targeted users and individual applications.

2. Merchandizing that Meets the Demand of the Japanese Market

Over the years Japanese semiconductor manufacturers have developed and offered a wide range of products. However, the main applications in the domestic market are shifting from AV equipment and household appliances to information and communications equipment and household digital appliances, so it is difficult for the products of Japanese semiconductor manufacturers to fit into the needs of users. In particular, there is heavy demand in Japan for high speed CPUs, larger-capacity DRAMs with higher speed and greater cost performance, FPGAs with a well-established environment for programming and design, and DSPs with readiness software, and overseas products are being sold in these areas. Demand is more active for application-compliant IPs, and cells and cores with dedicated functions.

3. Sales Targets and Promising Products

It is difficult to sell general-purpose products in the Japanese market unless they are priced lower than the prevailing market prices. Major application-specific products with positioning themselves apart from other manufactures may success. Promising applications are: (a) next generation cellular phones, (b) PDAs/mobile PCs, (c) digital cameras, (d) digital TVs, (e) car navigation systems, (f) game units, (g) routers, (h) DVD R/W drivers.

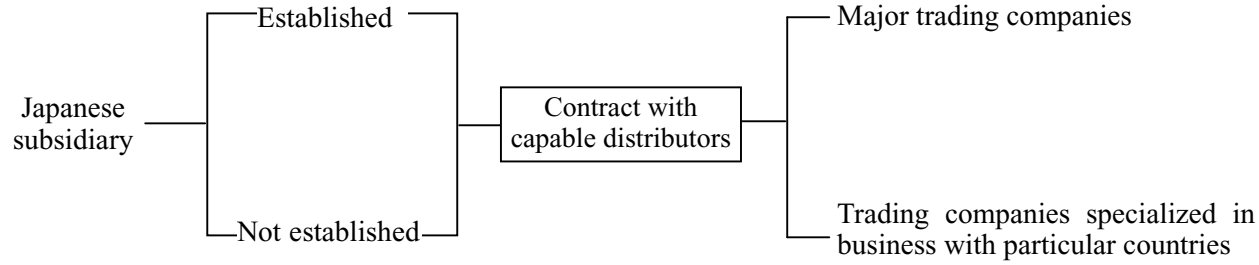
As products (a) to (c) are battery-operated, lower electric power consumption demand is active. However, US and European producers already accessed to the Japanese market. Among Flash, DRAM, SRAM, CMOS power supply ICs and LCD drivers market, other overseas manufacturers may break into these market with low price and stable supply in large volumes.

For products (d) to (g), an increase in demand is expected for image processors, micro controllers, large capacity and high volume DRAM at low prices, ASICs and ASSPs such as ICs exclusively used for communications.

Among field of DVD R/W drivers (h), it is better for overseas manufactures to access to the market of low cost pickup modules and discretes, analog ASSPs (such as amplifiers), and micro controllers, etc.

4. Distribution Strategy

An overseas company that establishes a subsidiary in Japan needs to appoint distributors, provide sales and technical support to them, and supervise their operations. If there is enough manpower, direct sales to major clients should be practiced. If an overseas company does not establish a subsidiary in Japan, it needs to appoint distributors in Japan, provide sales and technical support to them, and supervise their operations from headquarters or a branch office located in another Asian country.



5. Delivery Times and After-Sales Services

Price and delivery time (including the period for product development) must be set carefully. While suppliers compete in price and delivery times for general-purpose products such as DRAMs, analog ICs and standard logic, development capacity and technical support skills are regarded as more important for custom products such as micro computers, ASSPs and ASICs. Therefore, to supply these products, a system is required which enables stable supply, in terms of delivery time, quantity and price, etc. regardless of market conditions.

With after-sales service, technical support is very important. Some users regard the supplier's service, from sales presentation to quick action in responding to claims, as more important than price.

Ⅴ. Reference

A. Related Trade Organizations and Supervising Government Agencies

Name	address	TEL / FAX / URL
Ministry of Finance Customs and Tariff Bureau	3-1-1 Kasumigaseki, Chiyoda-ku, Tokyo, 100-8940	TEL: 03-3581-4111 http://www.mof.go.jp/
Ministry of Economy, Trade and Industry Commerce and Information Policy Bureau	1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo, 106-8901	TEL: 03-3501-6944 http://www.meti.go.jp/
Distributors Association of Foreing Semiconductors	1-19-12 Yoyogi, Shibuya-ku, Tokyo, 151-0053	TEL: 03-5350-6860 FAX: 03-5350-6828 http://www.dafs.or.jp
European Electronic Component Manufacturers Association Semiconductors Japan Office	2-13-37 Konan, Minato-ku, Tokyo, 102-0081	TEL: 03-3740-5120 FAX: 03-3740-5057 http://www.eeca.org/home.htm
Japan Electronics and Information Technology Industries Association (JEITA)	3-11 Kanda Surugadai, Chiyoda-ku, Tokyo 101-0062	TEL: 03-3518-6430 http://www.jeita.or.jp
The Semiconductor Industry Association Asia Office	1-2-9 Nishi-Shimbashi, Minato-ku, Tokyo, 105-0003	TEL: 03-5532-7265 http://www.siaj.org/japanese/index.html

B. Distributors of Semiconductors in Japan

Company Name	Address	TEL / FAX / URL	Manufacturers of Major Dealing Products
Asahi Glass Co.,Ltd., (Semiconductor and Circuit Department)	2-26 Shimomiyabi-cho, Shinjuku-ku, Tokyo, 162-0822	TEL: 03-5228-5911 FAX: 03-52285921 http://www.agc.co.jp	National Semiconductor, Agere, Fairchild Semiconductor, etc.
Fujitsu Device Inc.	2-8-8 Osaki, Shinagawa-ku, Tokyo, 141-8583	TEL: 03-3490-7396 FAX: 03-5496-4295 http://www.fdi.co.jp	Infineon Technology, Integrated Circuit System, etc.
Hakuto Co.,Ltd.	1-1-13 Shinjuku, Shinjuku-ku, Tokyo, 160-8910	TEL: 03-3225-8910 FAX: 03-3225-9001 http://www.hakuto.co.jp	Hynix
Internix Inc.	6-5-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo, 163-1378	TEL: 03-5322-1700 FAX: 03-5322-1717 http://www.internix.co.jp	Adaptive Networks, Maxim, Zilog Triscend, Cirrus Logic, etc.
Iseco Co.,Ltd.	2-26-3 Kita-Magome, Ota-ku, Tokyo, 143-0021	TEL: 03-3777-3611 FAX: 03-3777-3614 http://www.iseco.co.jp	Samsung Electronics
Kanematsu Devices Corporation	2-3-4 Tsukiji, Chuo-ku, Tokyo, 104-0045	TEL: 03-3594-6531 FAX: 03-5565-0080 http://www.kdcjp.co.jp	IBM Microelectronics, Conexant System, General Semiconductor
Komatsu Semiconductors Corporation	2-21-1 Nishi-Shimbashi, Minato-ku, Tokyo, 105-0004	TEL: 03-3573-6828 FAX: 03-3573-6830 http://www.komatsu.co.jp/semicon	Hynix

Macnica Inc.	1-22-2 Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8505	TEL: 045-939-6123 FAX: 045-939-6124 http://www.macnica.co.jp	Linear Technology, LSI Logic, TI, RF Microdevices, Lattice
Marubun Corporation	8-1 Nihonbashi Otenma-cho, Chuo-ku, Tokyo, 103-0001	TEL: 03-3639-9801 http://www.marubun.co.jp	TI, Motorola, Xilinx, Maxim, On Semiconductor, etc.
Rikei Semiconductor Corporation	1-21-8 Nishi-Gotanda, Shinagawa-ku, Tokyo, 141-0031	TEL: 03-3490-2173 FAX: 03-3490-2179 http://www.rsc.co.jp/ (Japanese only)	Samsung Electronics
Ryoden Trading Co.,Ltd.	3-15-15 Higashi-Ikebukuro, Toshima-ku, Tokyo, 170-8448	TEL: 03-5396-6119 FAX: 03-5396-6448 http://www.ryoden.co.jp (Japanese only)	Agilent Technology, National Semiconductor, Microchip, etc.
Shinden Hightex Corporation	1-6-1 Higashiyama, Meguro-ku, Tokyo, 153-0043	TEL: 03-3719-8585 http://www.shinden.co.jp (Japanese only)	Hynix
Tachibana Eletech Co.,Ltd.	1-13-25 Nishi Honmachi, Nishi-ku, Osaka-shi, Osaka-fu, 550-8555	TEL: 06-6539-8800 FAX: 06-6539-8821 http://www.tachibana.co.jp	Agilent Technology, Atmel, Altera, Macronix International
Tokyo Electron Device Ltd.	1 Higashikata, Tsuzuki-ku, Yokohama-shi, Kanagawa, 224-0045	TEL: 045-474-7000 FAX: 045-474-7092 http://www.teldevice.co.jp	AMD, Agilent Technology, Conexant System, etc.
Tomen Electronics Corporation	1-8-27 Konan, Minato-ku, Tokyo, 108-8510	TEL: 03-5462-9611 http://www.tomen-ele.co.jp	Philips, Linear Technology, ST Micro, Infineon, Atmel
Tryster System	1-7-18 Nakamachidai, Tsuzuki-ku, Yokohama-shi, Kanagawa, 224-0041	TEL: 045-941-3057 FAX: 045-941-3097	Samsung Electronics
Vitec Co.,Ltd.	1-31-5 Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002	TEL: 03-3458-4611 http://www.vitec.co.jp (Japanese only)	Korea Electronics

C. Major Semiconductor Manufacturers (* overseas manufacturer)

Company Name	Address	TEL/ FAX/ URL
* Agere Systems Japan Ltd.	2-7-18 Higashi-Gotanda, Shinagawa-ku, Tokyo 141-0022	TEL: 03-5421-1600 FAX: 03-5421-1616 http://www.agere.com/
* Agilent Technology	9-1 Takakura-cho, Hachioji-shi, Tokyo 192-0033	TEL: 0426-60-3111 http://www.agilent.co.jp/
* Altera Corporation.	Shinjuku I-land Tower 32F, 6-5-1 Nishishinjuku, Shinjuku-ku, Tokyo 163-1332	TEL: 03-3340-9480 FAX: 03-3340-9487 http://www.altera.co.jp
* AMD Japan	Shinjuku Nissei-Sumitomo Bldg.5F, 2-4-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 163-0839	TEL: 03-3346-7550 FAX: 03-3346-5196 http://www.amd.co.jp

* Analog Devices Inc.	1-16-1 Kaigan, Minato-ku, Tokyo 105-6891	TEL: 5402-8200 http://www.analog.co.jp/
Asahi Kasei Microsystems Co.,Ltd.	Shinjyuku Park Tower 31F, 3-7-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 163-1031	TEL: 03-5908-2701 FAX: 03-5908-2720 http://www.asahi-kasei.co.jp/akm/japanese/
* Atmel Japan K.K.	Tonetsu Shinkawa Bldg. 9F, 1-24-8 Shinkawa, Chuo-ku, Tokyo 104-0033	TEL: 03-3523-3551 FAX: 03-3523-7581 http://www.atmel.com/
* Conexant Systems Co.,Ltd.	1-46-3 Hatsudai, Shibuya-ku, Tokyo 151-0061	TEL: 03-5371-1520 FAX: 03-5371-1501 http://www.conexant.co.jp
Denso Corporation	1-1 Showa-cho, Kariya-shi, Aichi 448-8661	TEL: 0566-25-5511 http://www.denso.co.jp/
Elpida Memory Inc.	2-2-1 Yaesu, Chuo-ku, Tokyo 104-0028	TEL: 03-3281-1500 FAX: 03-3281-1571 http://www.elpida-memory.com/ja/
* Fairchild Semiconductor Japan Ltd.	Bancho-Kaikan 6F, 12-1 Goban-cho, Chiyoda-ku, Tokyo 102-0076	TEL: 03-5275-8380 FAX: 03-5275-8390 http://www.fairchildsemi.com/
Fuji Electric Co.,Ltd.	1-11-2 Osaki, Shinagawa-ku, Tokyo 141-0032	TEL: 03-5435-7111 http://www.fujielectric.co.jp/
Fujitsu	50 Fuchigami, Akiruno City, Tokyo	TEL: 042-532-1400 http://www.jp.fujitsu.com/
* General Semiconductor Japan Ltd.	Silk Bldg. 5F, 3-31-11 Honcho, Nakano-ku, Tokyo 164-0012	TEL: 03-5302-2565 FAX: 03-5302-2573 http://www.gensemi.com/
Hitachi Ltd., (Semiconductor & integrated gcircuits)	2-6-2 Otemachi, Chiyoda-ku, Tokyo 100-0004	TEL: 3279-2111 http://www.hitachisemiconductor.com/
* Hynix Semiconductor Japan Inc.	Yurakucho Denki Bldg. 9F, 1-7-1 Yurakucho, Chiyoda-ku, Tokyo 100-0006	TEL: 03-3211-1911 FAX: 03-3211-5447 http://www.hea.com/
* IBM Japan, Ltd.	3-2-12 Roppongi, Minato-ku, Tokyo 106-8711	TEL: 03-3586-1111 http://www-6.ibm.com/jp/
* Infineon Technologies Japan K.K.	3-20-14 Higashi-Gotanda, Shinagawa-ku, Tokyo	TEL: 03-5449-6422 http://www.infineon.com/jp/
* International Rectifiers	Sunshine 60 51F, 3-1-1 Higashi-Ikebukuro, Toshima-ku, Tokyo 170-6051	TEL: 03-3983-0086 FAX: 03-3983-0642 http://www.irf.com/japan/
* Intel Corporation	3-1-1 Marunouchi, Chiyoda-ku, Tokyo 100-0005	TEL: 03-5223-9100 http://www.intel.co.jp/
* LSI Logic Japan Semiconductor, Inc.	4-1-8 Konan, Minato-ku, Tokyo	TEL: 03-5463-7821 http://www.lsilogic-japan.co.jp
Matsushita Electric Industrial Co.,Ltd., Semiconductor Company	1 Kotariyaki-cho, Nagaokakyo-shi, Kyoto-fu 617-8520	TEL: 075-951-8151 http://www.panasonic.co.jp/semicon/
* Microchip Technology Japan K.K.	Benex S-1 6F 3-18-20 Shinyokohama, Kohoku-ku, Yokohama-shi, Kanagawa 222-0033	TEL: 045-471-6160 FAX: 045-471-6122 http://www.microchip.co.jp/

* Micron Technology Japan Inc.	3-4-30 Shibakoen, Minato-ku, Tokyo 105-0011	TEL: 03-3436-5666 FAX: 03-3436-1444 http://www.micron.com
Mitsubishi Electric Corporation	2-2-3 Marunouchi, Chiyoda-ku, Tokyo 100-8310	TEL: 03-3218-2346 FAX: 03-3218-2431 http://www.melco.co.jp/
Mitsumi Electric Co.,Ltd.	8-8-2 Kokuryo-cho, Chofu-shi, Tokyo 182-8557	TEL: 03-3489-5333 FAX: 03-3488-3031 http://www.mitsumi.co.jp/
* Motorola Japan Ltd.	3-20-1 Minami-Azabu, Minato-ku, Tokyo 106-8573	TEL: 03-3440-3311 http://www.mot.co.jp/
* National Semiconductor Japan Ltd.	2-17-16 Kiba, Koto-ku, Tokyo 135-0042	TEL: 03-5639-7300 FAX: 03-5639-7502 http://www.national.com/JPN/
NEC (Electron Device)	5-7-1 Shiba, Minato-ku, Tokyo	TEL: 03-3454-1111 http://www.ic.nec.co.jp/
New Japan Radio Co.,Ltd.	3-10 Nihonbashi Yokoyama-cho, Chuo-ku, Tokyo 103-8456	TEL: 03-5642-8222 FAX: 03-5642-8220 http://www.njr.co.jp
Nihon Inter Electronics Corporation	1204 Soya, Hadano-shi, Kanagawa 257-8511	TEL: 0463-82-1111 FAX: 0463-81-2709 http://www.niec.co.jp/
Nippon Precision Circuits Inc.	2-4-3 Fukuzumi, Koto-ku, Tokyo 135-8430	TEL: 03-3642-6661 FAX: 03-3642-6698 http://www.npc.co.jp
Oki Electric Industry Co.,Ltd.	550-1 Higashi Asakawa-cho, Hachioji-shi, Tokyo 193-0834	TEL: 0426-63-1111 http://www.oki.co.jp/
* On Semiconductor	4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo 141-0031	TEL: 03-5740-2737 FAX: 03-5740-2744 http://www.onsemi.com/
Origin Electric Co.,Ltd.	1-18-1 Takada, Toshima-ku, Tokyo 171-8555	TEL: 03-3983-7111 FAX: 03-3988-6369 http://www.origin.co.jp/
* Philips Japan, Ltd.	2-13-37 Konan, Minato-ku, Tokyo 108-8507	TEL: 03-3740-5167 http://www.philips.co.jp
Ricoh Company, Ltd.	13-1 Himemuro-cho, Ikeda-shi, Osaka-fu 563-8501	TEL: 0727-53-1111 http://www.ricoh.co.jp/
Ricoh Company, Ltd.	13-1 Himemuro-cho, Ikeda-shi, Osaka-fu 563-8501	TEL: 0727-53-1111 http://www.ricoh.co.jp/
Rohm Co.,Ltd.	21 Saiin Mizosaki-cho, Ukyo-ku, Kyoto-fu 615-8585	TEL: 075-311-2121 FAX: 075-315-0172 http://www.rohm.co.jp/
* Samsung Japan Corporation	2-31-1 Nihonbashi Hama-cho, Chuo-ku, Tokyo 103-8488	TEL: 03-5641-9820 FAX: 03-5641-9821 http://www.samsung.co.jp
Sanken Electric Co.,Ltd.	3-6-3 Kitano, Niiza-shi, Saitama 352-0003	TEL: 048-472-1111
Sansha Electric Mfg.	3-1-56 Nishi-Awaji, Higashi Yodogawa-ku, Osaka-shi, Osaka-fu 533-0031	http://www.sansha.co.jp/

Sanyo Electric Co.,Ltd. Semiconductor	180Sakata Oizumi-cho, Oura, Gunma 370-0596	TEL: 0276-61-8287 FAX: 0276-61-8882 http://www.semic.sanyo.co.jp/
Seiko Epson Corporation	3-3-5 Yamato, Suwa-shi, Nagano	TEL: 0266-52-3131 http://www.epson.co.jp
Seiko Instruments Inc.	1-8 Nakase, Mihama-ku, Chiba-shi, Chiba 261-8507	TEL: 043-211-1111 http://www.sii.co.jp/
Sharp Corporation Advanced Development and Planning Center (Tenri)	2613-1 Ichinomoto-cho, Tenri-shi, Nara 623-8567	TEL: 07436-5-4321 http://www.sharp.co.jp
Shindengen Electric Manufacturing Co.,Ltd.	2-2-1 Otemachi Chiyoda-ku, Tokyo 100-0004	TEL: 03-3279-6478 FAX: 03-5951-8240 http://www.shindengen.co.jp/
Sony Semiconductor Company	6-7-35 Shinagawa, Shinagawa-ku, Tokyo	TEL: 03-5448-2111 http://www.sony.co.jp
* ST Microelectronics K.K.	2-15-1 Konan, Minato-ku, Tokyo 108-0075	TEL: 03-5783-8200 FAX: 03-5783-8216 http://www.st-japan.co.jp/
* Texas Instruments Japan Ltd.	6-24-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 160-8366	TEL: 03-4331-2000 http://www.tij.co.jp/
Toko Inc.	2-1-17 Higashi Yukigaya, Ota-ku, Tokyo 145-8585	TEL: 03-3727-1161 FAX: 03-3727-1176 http://www.toko.co.jp
Toshiba Semiconductor	1-1-1 Shibaura, Minato-ku, Tokyo 105-8001	TEL: 3457-1111 http://www.semicon.toshiba.co.jp/
Xilinx K.K.	Shinjuku Square Tower 18F, 6-22-1 Nishishinjuku, Shinjuku-ku, Tokyo 163-1118	TEL: 03-5321-7711 FAX: 03-5321-7765 http://www.xilinx.co.jp
Yamaha Corporation	203 Matsunokijima Toyooka-mura, Iwata-gun, Shizuoka 438-0192	TEL: 0539-62-4918 FAX: 0539-62-5054 http://www.yamaha.co.jp/

D. Other Related Manufacturers (design houses, etc.)

Business Category	Company Name	Address	Telephone / URL
Design House	Axell Corporation	4-8-13 Idabashi, Chiyoda-ku, Tokyo 102-0072	TEL: 03-3511-1861 FAX: 03-3511-1862 http://www.axell.co.jp
	* Cadence	3-17-6 Shin Yokohama, Kohoku-ku, Yokohama	TEL: 045-475-2221 FAX: 045-475-2451 http://www.cadence.co.jp
	* Faraday Technology Corporation	11-3 Nibancho, Chiyoda-ku, Tokyo 102-0084	TEL: 03-5214-0070 FAX: 03-5214-0076 http://www.faraday.com.tw
	Logic Research	1-22-20 Hakata Ekimae, Hakata-ku, Fukuoka	TEL: 092-452-1321 GFA02306@niftyserve.or.jp

	* Mentor Graphics Japan Co.,Ltd.	4-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 140-0001	TEL: 03-5488-3001 FAX: 03-5488-3004 http://www.mentorg.co.jp
	Spinnaker Systems Inc.	3-12-8 Hacchobori, Chuo-ku, Tokyo 104-0032	TEL: 03-3551-2275 FAX: 03-3551-2614 http://www.spinnaker.co.jp
	THine Electronics Inc.	1-10-7 Hacchobori, Chuo-ku, Tokyo 104-0032	TEL: 03-3555-0666 Fax: 03-3555-0677 http://www.thine.co.jp
Foundry	Phenitec Semiconductor Corp.	150 Kinoko-cho, Ihara -shi, Okayama 715-0004	TEL: 0866-62-4121 http://www.phenitec.co.jp
	* TSMC Japan K.K.	Queen's Tower C 21F, 2-3-5 Minato Mirai, Nishi-ku, Yokohama-shi, kanagawa 220-0012	TEL: 045-682-0670 FAX: 045-682-0649 http://www.tsmc.com
	* UMC Japan	Nikura Bldg. 7F, 2-2 Kanda Tsukasa-cho, Chiyoda-ku, Tokyo 101-0048	TEL: 03-5294-2701 FAX: 03-5294-2707 http://www.umc.com
	* Winbond Electronics Corporation Japan	Daini-ueno Bldg. 7F 3-7-18 Shinyokohama, Kohoku-ku, Yokohama-shi, Kanagawa 222-0033	TEL: 045-478-1882 FAX: 045-478-1800 http://www.winbond.com
Subcontractor	* Amkor Technology Japan K.K.	Shinjuku Daiichi Seimei Bldg. 12F 2-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 163-0712	TEL: 03-5321-6470 FAX: 03-5321-6471 http://www.amkor.com
	Aoi Electronics Co.,Ltd.	455-1 Kohzai Minamimach, Takamatsu -shi, Kagawa 761-8014	TEL: 087-882-1131 FAX: 087-881-5575 http://www.aoi-electronics.co.jp
	Citizen Watch Co.,Ltd.	6-1-12 Tanashi-cho, Nishitokyo-shi, Tokyo 188-8511	TEL: 0424-66-1231 FAX: 0424-66-1280 http://www.citizen.co.jp
	Hitachi Cable Ltd.	3-1-1 Sukegawa-cho, Hitachi-shi, Ibaraki 317-0065	TEL: 0294-21-1151 FAX: 0294-24-0517 http://www.hitachi-cable.co.jp
	Mitsui High-tec Inc.	2-10-1 Komine Yahatanishi-ku, Kitakyushu-shi, Fukuoka 806-0081	TEL: 093-614-1111 FAX: 093-614-1200 http://www.mitsui-high-tec.com
	Shinko Electric Industries Co.,Ltd.	80 Oshimada-machi, Nagano-shi, Nagano 381-2212	TEL: 026-283-1000 http://www.shinko.co.jp/
Test House	Genesis Technology	75 Wada-cho, Nishiwaki-shi, Hyogo 677-0052	TEL: 0795-23-6840 FAX: 0795-23-6848 http://www.gti.co.jp

* overseas company
Country name in ( ) stands for the nationality of the company's head office.

E. Major System Manufacturers in Japan

Company Name	Major Products	Main Factories in Japan
Aiwa	Audio equipment, VTRs, TVs	Utsunomiya
Canon	Copy machines, printers, digital cameras	Toride
Casio	Audio equipment, PDAs	Oume
Crarion	Car audio equipment, car navigation systems	Saitama
Fuji Xerox	Copy machines, printers	Kanagawa
Fujitsu	Cellular phones, base stations, switchboards, PCs, peripheral devices, large scale computers, LAN-related equipment	Oyama, Nasu
Hitachi	Audio equipment, VTRs, TVs, PCs, peripheral devices, cellular phones, large scale computers, switchboards	Tokai, Totsuka
Japan Radio	Communications equipment for industrial use	Mitaka
JVC	Audio equipment, VTRs, TVs	Okurayama
Kenwood	Car audio equipment, car navigation systems	Hachioji, Yokohama
Kyocera	Cellular phones	
Matsushita Communication Industrial	Cellular phones, base stations	Saedo
Matsushita Electric Industrial	Audio equipment, VTRs, TVs, household appliances, game units, PCs, peripheral devices, BS receiving systems, car navigation systems	Kadoma, Moriguchi, AVC, Denka Jukensetsu, Aircon, Motor
Matsushita Kotobuki Electronics Industries	PCs, peripheral devices	Takamatsu, Ipponmatsu
Mitsubishi Electric	Audio equipment, VTRs, TVs, household appliances, cellular phones, PCs, peripheral devices	Kyoto, Himeji, Ofuna
Mitsubishi Heavy Industries	Air conditioners	Nagasaki, Nagoya
NEC	PCs, WSs, large scale computers, cellular phones, base stations, switchboards, LAN-related equipment, PCs, peripheral devices	Yokohama, Abiko, Fuchu, Shizuoka, Yamagata, Gunma
Pioneer	Audio equipment	Shizuoka, Tokorozawa
Ricoh	Copy machines, printers	Ikeda
Sanyo Electric	Audio equipment, VTRs, TVs, household appliances	Gunma, Osaka
Seiko Epson	PCs, peripheral devices	Suwa
Sharp	Audio equipment, VTRs, TVs, PCs, peripheral devices, household appliances, PDAs	Higashi Hiroshima, Tochigi

Sony	Audio equipment, VTRs, TVs, game units, PCs, peripheral devices, data media, BS receiving systems, cellular phones, car navigation systems	Ichinomiya, Koda, Hamamatsu
Toshiba	Audio equipment, VTRs, TVs, PCs, peripheral devices, cellular phones, household appliances	Hino, Oume, Fukaya

F. Related Trade Fairs and Exhibitions

	Date	Organizer and Contact	Place	Frequency of the Event
CEATEC Japan	October 2 – 6, 2001 October 1 – 5, 2002	Japan Electronics Information Technology Industries Association (JEITA) 3-11 Kanda Surugadai, Chiyoda-ku, Tokyo 101-0062 TEL: 03-3518-6421 FAX: 03-3295-8721 http://www.jeita.or.jp	Makuhari Messe	Annually (early October)
Data Storage EXPO	June 26 – 28, 2002	Reed Exhibition Japan Ltd. 1-26-2 Nishishinjuku, Shinjuku-ku, Tokyo 163-0570 TEL: 03-3349-8502 FAX: 03-3349-8599 http://web.reedexpo.co.jp	Tokyo Big Site	Annually (end of June)
Internepcon Japan	January 16 – 18, 2002	Reed Exhibition Japan Ltd. 1-26-2 Nishishinjuku, Shinjuku-ku, Tokyo 163-0570 TEL: 03-3349-8502 FAX: 03-3349-8599 http://web.reedexpo.co.jp	Tokyo Big Site	Annually (middle of January)
Microwave Exhibition	December 12 – 14, 2001	Institute of Electronics, Information and Communication Engineers 3-5-8 Shibakoen, Minato-ku, Tokyo 105-0011 TEL: 03-3433-6691 http://www.apmc-mwe.org	Pacifico Yokohama	Annually (December)
Semicon Japan	December 1 – 7, 2001	SEMI Japan 4-7-15 Kudanminami, Chiyoda-ku, Tokyo 102-0074 TEI: 03-3222-5755 http://www.semi.org/semiconjapan	Makuhari Messe	Annually (early December)
Wireless Japan	July 17 – 19, 2001	Ric Telecom 3-7-7 Yushima, Bunkyo-ku, Tokyo 113-0034 TEL: 03-3834-8134 http://www.ric.co.jp/expo	Tokyo Big Site	Annually (July)

World PC EXPO	September 19 – 22, 2001	Nikkei Business Publications Inc. 2-7-6 Hirakawa-cho, Chiyoda-ku, Tokyo 102-8622 TEL: 03-5210-8011 FAX: 03-5210-8500 http://www.wpc-bp.com/ja	Makuhari Messe	Annually (September)