Overview on

Taiwan Semiconductor Industry

(2009 Edition)

Taiwan Semiconductor Industry Association

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I. Preface

This ***Overview on Taiwan Semiconductor Industry*** is a translated excerpt from an ITIS (Industrial Technology Information Services) publication, which provides an overview of Taiwan semiconductor industry in 2008. Also included is a directory of Taiwan semiconductor companies. These data should be valuable to those who wish to establish business relationship in Taiwan.

ITIS is a market research project, which is supported primarily by the Taiwan government. For semiconductor portion of the project, research was conducted in Industrial Economics & Knowledge Center of Industrial Technology Research Institute (IEK/ITRI).

Since the establishment of the Electronics Research and Service Organization of the Industrial Technology Research Institute (ERSO/ITRI) in early 1970's and its successive spin-offs of UMC and TSMC in 1980's, the semiconductor industry in Taiwan has been growing at a very fast pace. Currently TSIA represents approximately 60% of worldwide IC foundry/package/testing revenue, around 25% of worldwide design revenue, and also around 25% of worldwide DRAM revenue. As the industry gains significant role in the global market place, information about Taiwan semiconductor industry is desirable worldwide. TSIA hopes this ***Overview on Taiwan Semiconductor Industry*** will serve as a useful reference for our global friends who seek to establish a closer connection with Taiwan semiconductor companies. We welcome your comments.

T.Y. Wu

President
Taiwan Semiconductor Industry Association

II. Taiwan Semiconductor industry in Year 2008

Overview of the Year

Semiconductor Market of Asia reached US$124 billion in 2008, a 0.4% increase from 2007. In line with the 2.8% decline of the global semiconductor market due to the economic downturn, Taiwan semiconductor market dropped 8.1% in 2008 due to the plummeted Taiwan IC design (by 6.2%) and manufacturing (by 11.2%) revenue, among which, foundry (1.1%) and DRAM sectors (27.2%) were the major attributions.

Taiwan IC revenue (including design, manufacturing, packaging, and testing) totaled NT$1,347.3 billion, down 8.1% from 2007, with NT$374.9 billion in design, a 6.2% decrease, NT$654.2 billion in manufacturing, an 11.2% drop, NT$221.7 billion in packaging, a 2.8% decline, NT$96.5 billion in testing, a 5.7% decrease.

Taiwan IC product revenue reached NT$582.2 billion in 2008, declined dramatically by 15% from 2007 due to the poor DRAM market. Memory products comprised 38.3%, declined sharply by 5.9% from the 44.2% of 2007 due to the DRAM price erosion to less than one US dollar. However, logic ICs, analog ICs, and micro-device ICs increased from 45.1% to 49.6%, 4.8% to 5.5%, and 5.8% to 6.6%, respectively. Communication ICs comprised 14.4%. Information and consumer ICs remained the two largest application areas in 2008. Information application comprised 52.9%, down 1.6% from 2007 and consumer application accounted for 31.6%, up 1%.

Table 1 Major Indices for Taiwan IC Industry

(NT$B)

	2004	2005	2006	2007	2008	08/07 Growth
Industry Revenue	1,099.0	1,117.9	1,393.3	1,466.7	1,347.3	-8.1%
IC Design	260.8	285.0	323.4	399.7	374.9	-6.2%
IC Manufacturing	623.9	587.4	766.7	736.7	654.2	-11.2%
Foundry	398.5	373.5	437.8	451.8	446.9	-1.1%
IC Packaging	156.6	178.0	210.8	228.0	221.7	-2.8%
IC Testing	57.7	67.5	92.4	102.3	96.5	-5.7%
Product Revenue	486.2	498.9	652.3	684.6	582.2	-15.0%
Domestic Sales (%)	44.5%	43.2%	39.1%	37.8%	36.9%	—
Domestic Market	558.9	580.3	611.4	574.7	463.7	-19.3%

Source：ITIS Project, IEK-ITRI, TSIA (April 2009)

By the end of 2008, Taiwan Semiconductor industry consisted of 256 IC fabless design houses, 8 wafer suppliers, 3 mask makers, 14 fabrication companies, 30 packaging houses, 37 testing houses, 15 substrate suppliers, 19 chemical suppliers, and 4 leadframes companies, etc. (Figure 1). The advantages of cost efficiency, flexibility, and speed resulted from the vertically integrated infrastructure and industry cluster have made Taiwan IC industry highly competitive in the global market. In 2008, the worldwide market share of Taiwan IC design houses was ranked number 2, foundry was number 1, and IC packaging and testing was number 1.

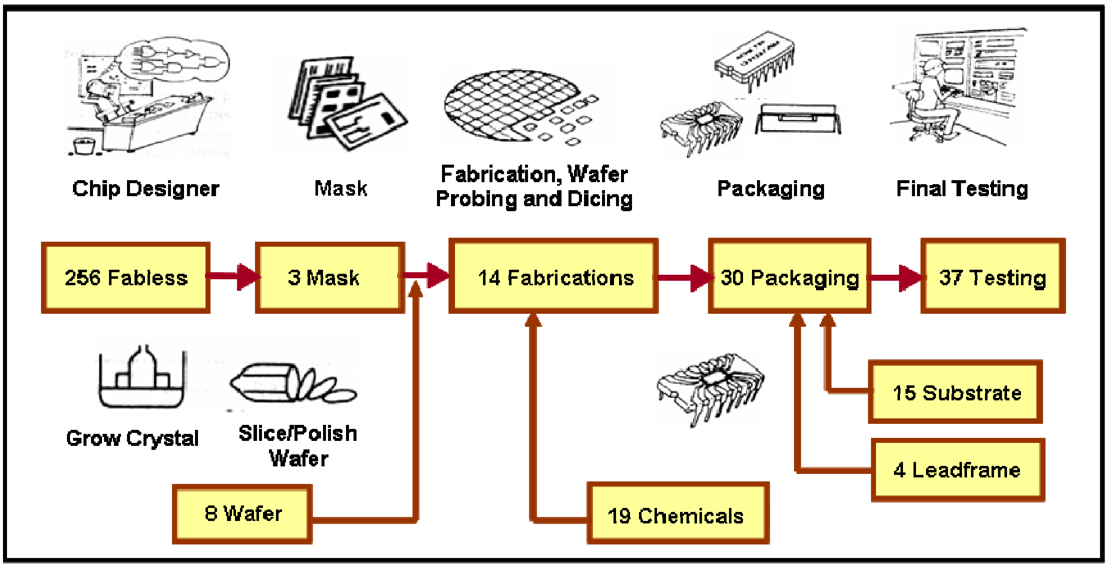

Fig. 1 Unique Disintegrated Infrastructure in Taiwan (2008)

IC Fabless Companies

Taiwan IC design revenue reached NT$374.9 billion in 2008, down 6.2% from 2007 due to financial crisis in the second half. Demand for LCD-related ICs and consumer ICs has slowed down. Notebook related ICs (driven by the strong demand for netbooks) and analog ICs were the out-performers. The forecasted 2009 revenue is NT$391.7 billion, a 4.5% increase from 2008.

1. Major Indices

In 2008, there were 256 design houses with revenue NT$374.9 billion (Table 2), which was 27.8% of the total Taiwan IC revenue (NT$1,347.3 billion per Table 1). The export ratio has been rising since 2002 (over 50%) while domestic sales has dropped to 32.5% in 2008 due to the direct shipment requests from large Taiwanese system assembly lines in China. R&D expense reached NT$47.23 billion, which represented 12.6% of total fables revenue, up from the 11.2% of 2007.

Table 2 Major Indices of Taiwan IC Fabless Business

	2004	2005	2006	2007	2008	2009(e)
# of Companies	260	268	267	272	256	250
Revenue (NT$B)	260.8	285.0	323.4	399.7	374.9	391.7
Growth	37.1%	9.3%	13.5%	23.6%	-6.2%	4.5%
Domestic Sales	37%	34%	34%	33%	32.5%	32%
Capital Investment/Revenue	2.5%	3.0%	3.2%	3.3%	3.1%	3.1%
R&D/Revenue	9.1%	10.0%	10.8%	11.2%	12.6%	12.9%
Revenue per Workforce (NT$M)	12.42	11.24	9.16	11.32	11.26	11.60

Source: ITIS Project, IEK-ITRI, TSIA (March 2009)

2. Application Types

ASSP (Application Specific Standard Product) remained the major application type (Table 3), comprising 90% of all applications and up from the 89.5% of 2007. ASIC (Application Specific Integrated Circuit) decreased from the 10.5% of 2007 to 10%.

Thanks to the strong demand for netbooks, information applications increased from the 42.1% of 2007 to 42.2%. Communication applications surged to 18.4% due to the steady growth of handset ICs. Consumer applications declined to 37.8%.

Table 3 Major Product Application of Taiwan IC Fabless Companies

	ASIC				ASSP				
	Information	Communication	Consumer	Others	Information	Communication	Consumer	Others	Total
2004	2.1	0.1	6.4	0.0	46.4	9.7	33.2	2.1	100
2005	2.5	1.0	6.8	0.0	43.1	11.6	33.1	1.9	100
2006	2.0	1.3	7.8	0.0	38.0	15.4	33.5	2.0	100
2007	2.1	1.4	7.0	0.0	40.0	16.0	32.0	1.5	100
2008	2.1	1.4	6.5	0.0	40.3	17.0	31.3	1.4	100
2009(e)	2.1	1.5	6.4	0.0	40.0	17.1	31.4	1.5	100

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

3. Major Product Types

The financial downturn of the second half has deteriorated the growth of TFT-LCD and logic-related ICs such as Optical disk drive, card reader, power supply, etc. Logic ICs grew slightly to 73.1% in 2008. Due to the over-supply of memory products, memory revenue dropped to comprise only 9.5% in 2008. Thanks to the growth of power management related products in consumer and communication applications and notebooks, analog ICs increased to 8.6%.

Table 4 Major Product Types by Taiwan IC Fabless Companies

	Memory	Micro Component	Logic IC	Analog IC	Total
2004	16.0	9.4	69.6	5.0	100
2005	10.8	12.8	68.5	7.9	100
2006	10.6	7.9	73.4	8.1	100
2007	10.7	8.2	72.9	8.2	100
2008	9.5	8.8	73.1	8.6	100
2009(e)	9.4	8.8	73.0	8.8	100

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

4. Market Distribution

China has become the largest market for Taiwan IC design companies, comprising 57.4%, up from the 56.7% of 2007.

Table 5 Market Distribution for Taiwan IC Fabless Companies

	Taiwan	HK/China	North America	Japan	South Korea	S-E Asia	Others	Total
2004	36.7	50.9	1.8	3.7	3.0	1.6	2.3	100
2005	34.0	54.8	1.3	3.0	2.4	2.5	2.0	100
2006	33.6	56.4	1.2	2.7	2.2	2.4	1.5	100
2007	32.9	56.7	1.4	1.4	2.8	2.5	2.1	100
2008	32.5	57.4	1.3	2.7	2.2	2.4	1.5	100
2009(e)	32.4	57.6	1.4	2.5	2.1	2.5	1.5	100

Source：IT IS Project, IEK-ITRI, TSIA (March 2009)

5. Top 10 Fabless Companies in Taiwan

Table 6 shows the top 10 Taiwan Fabless Companies in 2008. Mediatek remained the number one, with NT$90.4 billion in revenue, up 12.4%. Driver IC designers, Himax and Novatek, which suffered from the sharp decline of panel shipments, ranked the 2nd and the 3rd. Richtek, becoming the major supplier of power management ICs used for motherboard, reached NT$6.84 billion revenue, up 12.4% despite the economic downturn, and was ranked one of the top ten Taiwan IC fables companies.

Table 6 Top 10 Fabless Companies in Taiwan, 2008

Company	2008		2007	Growth
	Ranking	Revenue (NT$B)	Revenue (NT$B)	
Mediatek	1	90.40	80.41	12.4%
Himax	2	27.37	30.12	-9.3%
Novatek	3	26.18	36.13	-27.5%
Phison	4	18.86	20.26	-6.9%
Realtek	5	16.74	15.71	6.6%
Global Unichip	6	9.28	6.99	32.8%
VIA	7	7.93	14.68	-46.0%
Etron	8	7.56	13.22	-42.8%
Richtek	9	6.84	6.09	12.4%
Sitronix	10	6.40	5.65	13.2%

Note：2008 exchange rate US$1=NT$31.5; 2007 US$1=NT$32.8

Source：ITIS Project, IEK-ITRI, TSIA (May 2009), Market Observation Post System

IC Fabrication

As of 2008, there were 14 IC wafer fabrication companies in Taiwan, including foundry companies such as tsmc, UMC, Vanguard, Episil, Mosel, ATC, and AMPI; IDMs such as Winbond and MXIC; and memory manufacturers such as Powerchip, Nanya, Promos, Inotera and Rexchip.

The increased 90nm and 65 nm productions and new product lines of foundry companies have helped the foundry revenue; however, the oversupply and intense competition of DRAM have deteriorated DRAM revenue. 2008 Taiwan manufacturing revenue decreased 11.2% from 2007 and reached NT$654.2 billion.

Capital investment, mainly in 12-inch fab capacity expansion, decreased over 20%, reaching NT$172.7 billion, which represented 26.4% of total manufacturing revenue (lower than the 47.7% of 2007). Despite of the economic downturn, R&D expense increased slightly to 8.7% of total revenue (Table 7).

Table 7 Major Indices of Taiwan IC Fabrication Business

Index/Year	2004	2005	2006	2007	2008	2009(e)
# of Companies	13	13	13	14	14	15
Revenue (NT$B)	623.9	587.4	766.7	736.7	654.2	549.7
Growth	32.7%	-5.9%	30.5%	-3.9%	-11.2%	-16.0
Line Width(μm)	0.09	0.065	0.065	0.045	0.045	0.040
Domestic:Export	49%:51%	43%:57%	41%:59%	42%:58%	44%:56%	46%:54%
Capital Investment/ Revenue	41.2%	35.0%	36.5%	47.7%	26.4%	25.0%
R&D/Revenue	5.4%	6.5%	7.6%	8.6%	8.3%	8.7%
Average revenue per workforce (NT$M)	12.05	11.08	13.14	12.58	12.18	10.80

Source：ITIS Project, IEK-ITRI, TSIA (April 2009)

1. Top 10 IC Fabrication Companies in Taiwan

tsmc and UMC remained the top 2 IC fabrication companies in 2008 (Table 8). Following its record high revenue of NT$322.6 billion in 2007, tsmc's revenue increased slightly by 3.3% in 2008. UMC's revenue declined 13.4% from 2007, reaching NT$92.5 billion. Revenue of Vanguard, the 3rd largest foundry in Taiwan, grew 0.6% from 2007 to reach NT$16.1 billion.

Revenue of Winbond, one of the major IDM companies, decreased 32.1% due to the down trend of DRAM market. Thanks to the increased demand for consumer electronics games, MXIC revenue reached NT$22.8 billion, declined only 6.2%.

The intense competition, the crushed ASP due to oversupply and the worldwide economic downturn have deteriorated DRAM demand and revenue. Except Inotera, which declined 18.3%, revenue of every DRAM makers dropped over 30% in 2008.

Table 8　Top 10 Fabrication Companies in Taiwan, 2008

(NT$B)

2007 Ranking	2008 Ranking	Company	2007 Revenue	2008 Revenue	Growth
1	1	tsmc	322.6	333.2	3.3%
2	2	UMC	106.8	92.5	-13.4%
3	3	Powerchip	77.6	52.8	-32.0%
6	4	Inotera	45.9	37.5	-18.3%
4	5	Nanya	52.9	36.3	-31.4%
5	6	Promos	47.6	30.7	-35.5%
8	7	MXIC	24.3	22.8	-6.2%
7	8	Winbond	32.1	21.8	-32.1%
9	9	Vanguard	16.0	16.1	0.6%
10	10	Episil	5.0	4.0	-20.0%

Source：ITIS Project, IEK-ITRI, TSIA (April 2009)

2. Business Types

Taiwan Foundry revenue outgrew DRAM revenue in 2008 and accounted for 64.1% of total Taiwan IC manufacturing revenue, up from the 60.7% of 2007. Worldwide market share of tsmc and UMC increased to 85% due to their advanced process technology capabilities. DRAM remained the major product type of Taiwan IDMs and accounted for 32.4% of total Taiwan IC manufacturing revenue, down from the high level of 40.4% in 2006. Further decline to 28.3% is anticipated in 2009 due to the restructure and production cut of Taiwan DRAM companies.

Table 9　Business Types of IC Fabrication in Taiwan

(%)

	Business Type (by revenue)						
	Standard Product, including ASSP				Customer Specific (ASIC)*	Foundry	Total
	Memory	Micro	Logic	Analog			
2004	34.1	0.5	1.7	0	0	63.7	100
2005	33.6	0.6	2.2	0	0	63.6	100
2006	40.4	0.5	2.0	0	0	57.1	100
2007	36.2	0.8	2.3	0	0	60.7	100
2008	32.4	0.9	2.6	0	0	64.1	100
2009(e)	28.3	1.3	2.9	0	0	67.5	100

*: Full Custom and Semi-Custom IC designed for specific customers.

Source：ITIS Project, IEK-ITRI, TSIA (April 2009)

3. Application Market

Thanks to orders from large communication ICs designers such as Qualcomm, Broadcom, and MediaTek, communication application was the largest application area of Taiwan foundry market in 2008, comprising 40.6%. Information application, the second largest application area, accounted for 30.7% due to orders from large graphic IC designers such as Nvidia and AMD. Consumer application accounted for 22.9% and is expected to increase due to the increasing demand for game consoles and digital TV, etc.

Table 10 Major Product Application of Taiwan Foundry Companies

(%)

	Information	Communication	Consumer	Others	Total
2004	32.0	43.0	21.0	4.0	100
2005	30.3	45.1	21.2	3.4	100
2006	32.8	42.9	20.2	4.1	100
2007	33.3	41.8	20.8	4.1	100
2008	30.7	40.6	22.9	5.8	100
2009(e)	30.2	41.1	23.5	5.2	100

Source：ITIS Project, IEK-ITRI, TSIA (April 2009)

4. Geographical Market and Customers

North America remained the largest market for Taiwan foundry business in 2008, comprising 65.1% (Table 11). Domestic market, comprising 18.6%, declined a little bit from previous years due to the less-than-expected Taiwan IC design revenue. Asia-Pacific market is expected to increase due to the emerging China IC design business.

Table 11 Major Geographical Market for Taiwan Foundry Companies

(%)

	Taiwan	North America	Europe	Japan	Asia Pacific	Others	Total
2004	20.8	66.7	6.0	5.8	0.6	0.1	100
2005	20.5	67.0	6.0	5.9	0.5	0.1	100
2006	21.0	67.7	6.1	4.9	0.2	0.1	100
2007	21.0	66.8	6.9	5.1	0.1	0.1	100
2008	18.6	65.1	10.2	5.9	0.1	0.1	100
2009(e)	19.2	64.2	9.3	5.8	1.3	0.2	100

Source：ITIS Project, IEK-ITRI, TSIA (April 2009)

IC Packaging

As of 2008, there were 30 packaging companies in Taiwan. Total revenue reached NT$221.7 billion, a 2.8% decline from 2007. The IDMs remained conservative in outsourcing and capacity expansion due to the unclear economic outlook and risk management. It resulted in the export decline of Taiwan packaging companies to account for 56% of total packaging revenue. The cost down effort of Taiwan packaging companies is expected to continue in 2009 due to the still struggling consumer market.

Table 12 Major Indices of Taiwan Packaging Industry

	2004	2005	2006	2007	2008	2009(e)
# of Companies	37	33	31	30	30	30
Revenue (NT$B)	156.6	178.0	210.8	228.0	221.7	192.1
Growth (%)	33.2	13.7	18.4	8.2	-2.8	-13.4
Domestic: Export (%)	47:53	43:57	43:57	42:58	44:56	44:56
Capital Investment/ Revenue (%)	18.9	10.5	11.2	11.8	11.0	10.0
R&D/Revenue (%)	1.7	1.2	1.3	1.4	1.3	1.2
Average Revenue per workforce (NT$M)	3.52	3.92	3.95	3.97	3.66	3.01

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

1. Top 5 Packaging Companies

Table 13 shows the top 5 Taiwan packaging companies in 2008. Total revenue (NT$157.1 billion) of top 5 companies comprised 71% of total Taiwan packaging revenue, increased from 70% of 2007 (revenue of ASE group includes revenues from its overseas subsidiaries). Thus small companies are difficult to compete.

ASE and SPIL remained the top 2 packaging companies in Taiwan; however, revenue declined a bit due to the worldwide economic downturn. PTI (ranked number 3), with 30% strong growth in 2008, has been successful in its new product strategy, covering Flash, MCP product, wBGA DDP DRAM, logic IC, and Flip Chip.

Table 13　Top 5 IC Packaging Companies

NT$B

2007 Ranking	2008 Ranking	Company	2007 Revenue	2008 Revenue	Growth
1	1	ASE Group	78.52	73.39	-6.5%
2	2	SPIL	56.18	52.08	-7.3%
3	3	PTI	13.94	18.27	31.1%
4	4	Greatek	8.19	7.59	-7.3%
5	5	ChipMOS	8.02	5.80	-27.7%

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

2. Product Types and Market

BGA, with higher ASP, was the major packaging type of Taiwan packaging companies, comprising 53.7%. Flip Chip packaging increased due to the mature applications of chip sets and graphic ICs, etc. The growth is expected to continue in 2009. QFP and TSOP used for optical storage and handsets related products accounted for 33%.

Table 14　Product Distribution by Domestic Revenue

(%)

	DIP	SO*	QFP/ PLCC	BGA/CSP	Bare Chip*	Others (including Bump)	Total
2004	1.2	19.3	24.3	42.7	6.0	6.5	100
2005	0.7	20.3	16.8	48.0	7.9	6.3	100
2006	0.5	18.2	16.3	51.0	9.3	4.7	100
2007	0.4	17.5	16.5	52.5	9.5	3.6	100
2008	0.4	15.5	17.5	53.7	9.1	3.8	100
2009(e)	0.4	16.0	16.5	54.0	9.3	3.8	100

1. SO*including SOJ/SOP/TSOP
2. Bare Chip* including TCP/COF/COG/Flip Chip/SiP/Stacked
Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

Table 15　Product Distribution by Domestic Volume

(%)

	DIP	SO*	QFP/ PLCC	BGA/CSP	Bare Chip*	Others (including Bump)	Total
2004	3.4	35.4	18.1	16.1	7.7	19.3	100
2005	2.1	34.5	16.3	17.1	6.3	23.7	100
2006	1.4	30.1	16.4	17.5	8.5	26.1	100
2007	1.3	29.0	16.8	17.9	8.8	26.2	100
2008	1.4	26.0	17.4	19.9	9.4	25.9	100
2009(e)	1.4	27.8	16.9	19.1	9.2	25.6	100

1. SO*including SOJ/SOP/TSOP
2. Bare Chip* including TCP/COF/COG/Flip Chip/SiP/Stacked
Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

Taiwan and North America remained the major markets of Taiwan packaging companies, comprising 41.2% and 42%, respectively, of total Taiwan packaging revenue. (Table 16 and 17). The increased outsourcing from IDMs in North America due to conservative in capital investment has resulted in packaging revenue growth from this region.

Table 16 Geographical Distribution of Packaging Revenue

(%)

	Taiwan	North America	Japan	Europe	HK/China/ S-E Asia/Others	Total
2004	42.1	41.9	7.4	4.5	4.1	100
2005	41.3	42.0	7.5	4.6	4.6	100
2006	42.4	41.3	7.2	3.9	5.2	100
2007	42.6	41.1	7.1	3.8	5.4	100
2008	41.2	42.0	7.0	3.9	5.9	100
2009(e)	42.1	41.2	6.9	3.8	6.0	100

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

Table 17 Geographic Distribution of Packaging Volume

(%)

	Taiwan	North America	Japan	Europe	HK/China/ S-E Asia/Others	Total
2004	52.6	32.0	8.6	3.9	2.9	100
2005	50.0	32.5	8.9	4.0	4.6	100
2006	49.3	32.9	6.9	3.9	7.0	100
2007	49.6	33.0	6.8	3.8	6.8	100
2008	49.3	32.7	6.9	3.7	7.4	100
2009(e)	49.5	32.6	7.0	3.7	7.2	100

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

3. Packaging Industry Development

The increasing demand for portable, mini, and multifunctional system end products is expected to boost the growth of SiP. In the foreseeable future, 3D IC is going to play an important role in Taiwan packaging business. The IEK of ITRI estimated that 2009 Taiwan packaging revenue will reach NT$192.1 billion, a 13.4% decline from 2008.

IC Testing

As of 2008, there were 37 testing companies in Taiwan. Revenue reached NT$96.5 billion, down 5.7% from 2007. Export remained flat due to the memory market slowdown and the multinational memory companies' order switch to other countries. Capital investment of Taiwan testing companies has dropped from the high level of 50% to 30%. Most companies have a conservative outlook and would only invest capital to meet the short-term demand.

Table 18 Major Indices of Taiwan IC Testing Business

	2004	2005	2006	2007	2008	2009(e)
# of Companies	39	35	37	37	37	37
Revenue (NT$B)	57.7	67.5	92.4	102.3	96.5	85.1
Growth (%)	41.0	17.0	36.9	10.7	-5.7	-11.8
Domestic: Export (%)	55:45	59:41	58:42	57:43	57:43	57:43
Capital Investment/ Revenue (%)	50.3	35.6	38.0	36.0	35.0	34.0
R&D/Revenue (%)	1.8	2.0	2.2	2.3	2.2	2.1
Revenue per Workforce (NT$M)	3.84	4.50	4.88	4.85	4.31	3.59

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

1. Top 5 Testing Companies

ASE Group, although revenue dropped 4.9% to reach NT$19 billion, remained the number one in Taiwan testing business. KYEC revenue decreased 5.6% due to the economic downturn. ChipMOS revenue dropped even more by 25% due to the production cut of DRAM and NAND Flash and the soft LCD driver IC market. Focusing on memory testing, PTI jumped to the second in 2008 with high growth rate of 22.2%.

Table 19 Top 5 IC Testing Companies

(NT$B)

2007 Ranking	2008 Ranking	Company	2007 Revenue	2008 Revenue	Growth
1	1	ASE Group*	200.1	190.2	-4.9%
4	2	PTI	107.2	131.0	22.2%
2	3	KYEC	124.1	117.1	-5.6%
3	4	Chipmos	115.6	87.0	-24.7%
5	5	SPIL	58.8	52.8	-10.2%

*: including ASE Test and ASE Inc

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

2. **Product Types and Market**

Memory (mainly DRAM and Flash) remained the major product in 2008, and accounted for 53.1% of total testing revenue, down from the 60.1% of 2007 (Table 20). Mainstream process technology of DRAM has shifted to 70nm, DRAM capacity per chip has increased to 1Gb and DDR3 production has been growing. Flash has become one of the major testing products due to the higher storage needs for handsets, MP3 Players and digit cameras. However, the over capacity and eroding ASP due to the sharp downturn in the 3rd quarter still hurt the memory revenue.

Domestic market remained the major market for the Taiwan testing business, comprising 56% (Table 21). North America, comprising 30%, was the second largest market due to the increasing orders form IDMs in this region. Due to the investment of multinational testing companies in China, orders from China have slowed down.

Table 20 Product by Domestic Revenue

(%)

	Memory	Logic & Micro-component	Mixed Signal	Linear	RF	Others	Total
2004	54.5	20.3	22.3	0.9	1.2	0.8	100
2005	59.0	21.0	17.4	0.4	1.1	1.2	100
2006	59.9	21.3	16.4	0.2	1.1	1.0	100
2007	60.1	21.2	16.5	0.2	1.3	0.7	100
2008	53.1	24.9	18.2	1.2	1.7	0.9	100
2009(e)	56.5	23.8	16.9	0.8	1.3	0.7	100

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

Table 21　Market Distribution for Taiwan IC Testing Revenue

(%)

	Taiwan	North America	Japan	Europe	HK/China/ S-E Asia/Others	Total
2004	55.6	31.6	8.4	2.2	2.2	100
2005	58.5	29.0	5.6	1.1	5.8	100
2006	57.9	28.8	5.7	1.1	6.4	100
2007	57.5	28.7	5.6	1.2	7.0	100
2008	56.0	29.7	5.9	1.9	6.5	100
2009(e)	58.0	28.3	5.5	1.3	6.9	100

Source：ITIS Project, IEK-ITRI, TSIA (March 2009)

III. Taiwan IC Market

In 2008, Taiwan IC market reached NT$463.7 billion, a 19.3% decline from the NT$574.7 billion of 2007. Imported ICs decreased 21.3% to NT$248.9 billion and exported ICs decreased 7.9% to NT$496.1 billion. Major products included down-stream PCs, DRAM modules, internet and communication products, and LCD monitors, etc.

South Korea, comprising 35.7%, remained the largest importing region (mainly memory products including Flash and DRAM) for local demand (Table 22), followed by China, Japan, Malaysia, and Philippines. With multinationals such as Intel and Samsung setting up packaging lines and Taiwan companies such as ASE and OSE setting up branches for serving local customers and shipping products to Taiwan, these countries have been the major import countries for Taiwan IC market these years.

In export, most IC product exported in half-finished or transferring goods. It tends to overstate the export value due to the custom report showing finished goods value. As in Table 23, the export value will be higher than the actual IC export value.

Table 22 top 10 Import Regions of Taiwan IC Market

NT$B

2007				2008			
Ranking	Country	Amount	Market Share	Ranking	Country	Amount	Market Share
1	South Korea	1,252.3	39.8%	1	South Korea	860.7	35.7%
2	China	293.2	9.3%	2	China	2,93.8	12.2%
3	Thailand	274.7	8.7%	3	Japan	250.0	10.4%
4	Japan	256.5	8.1%	4	Malaysia	177.9	7.4%
5	Malaysia	205.0	6.5%	5	Philippines	159.9	6.6%
6	Philippines	193.9	6.2%	6	Thailand	113.8	4.7%
7	US	109.9	3.5%	7	Singapore	64.2	2.7%
8	Singapore	104.5	3.3%	8	US	43.0	1.8%
9	Germany	24.9	0.8%	9	Costa Rica	22.6	0.9%
10	Costa Rica	19.1	0.6%	10	Germany	15.6	0.6%
	Others	415.0	13.2%		Others	406.0	17.0%
	Total	3,149.0	100.0%		Total	2,407.5	100.0%

Source：Taiwan Customs；ITIS Project, IEK-ITRI, TSIA (April 2009)

Table 23　Top 10 Export Regions of Taiwan IC Market

NT$B

2007				2008			
Ranking	Country	Amount	Market Share	Ranking	Country	Amount	Market Share
1	HK	1,512.6	28.1%	1	HK	1,185.0	24.6%
2	Japan	1,002.7	18.7%	2	Japan	1,063.9	22.1%
3	China	841.2	15.6%	3	China	788.8	16.4%
4	Singapore	675.6	12.6%	4	Singapore	745.9	15.5%
5	Thailand	328.9	6.1%	5	US	248.1	5.1%
6	US	265.4	4.9%	6	South Korea	199.3	4.1%
7	Malaysia	226.9	4.2%	7	Malaysia	176.7	3.7%
8	South Korea	159.4	3.0%	8	Netherlands	93.8	1.9%
9	Netherlands	112.1	2.1%	9	Philippines	76.8	1.6%
10	Philippines	71.0	1.3%	10	Thailand	75.1	1.6%
	Others	180.3	3.4%		Others	167.3	3.4%
	Total	5,376.1	100.0%		Total	4,820.8	100.0%

Source：Taiwan Customs；ITIS Project, IEK-ITRI, TSIA (April 2009)

IV. Outlook

2009 Taiwan IC revenue is expected to reach NT$1,218.6 billion, a 9.6% decline from 2008. In line with the recovery of global market, Taiwan semiconductor industry is expected to grow in 2010. The estimated revenues for Taiwan IC market in 2010 and 2011 are NT$1,335.2 billion (up 9.6%) and NT$1,498.1 billion (up 12.2%), respectively.

V. Directory of Taiwan Semiconductor Companies

Fabless

5V Technologies Ltd.
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www.5vtechnologies.com

AAT
TEL:886-3-5633125
FAX:886-3-5633126
www.aatech.com.tw

ACARD
TEL:886-2-85122290
FAX:886-2-85122548
www.acard.com

AccFast
TEL:886-3-6662756
FAX:886-3-6662758
www.accfast.com.tw

Acute
TEL:886-3-5790680
FAX:886-3-5775606
www.acutecomm.com.tw

AIC
TEL: 886-3-5772500
FAX:886-3- 5772510
www.analog.com.tw

AIT
TEL:886-3-6560528
FAX:886-3-6565051
www.a-i-t.com.tw

Airoha
TEL: 886-3-6128800
FAX:886-3- 6116680
www.airoha.com.tw

Alchip Technologies
TEL: 886-2-27992318
FAX:886-2-66065876
www.alchip.com

Alcor Micro Corp.
TEL:886-2-87511984
FAX:886-2-26597723
www.alcormicro.com

AlfaPlus
TEL:886-3-5163270
FAX:886-3-5163267
www.alfaplus.com.tw

ALI
TEL:886-2-87522000
FAX:886-2-87511003
www.ali.com.tw

Alpha
TEL:886-3-5736660
FAX:886-3-5736661
www.ealpha.com.tw

Altus
TEL:886-3-7587888
www.altus-tech.com

Ambarella
TEL:886-3-6668828
FAX:886-3-6661282
www.ambarella.com

AMIC
TEL:886-3-5679966
FAX:886-3-5679965
www.amictechnology.com

AMIC Communication
TEL:886-3-5785818
FAX:886-3-5785819
www.amiccom.com.tw

AMPI
TEL:886-3-5770033
FAX:886-3-5778211
www.ampi.com.tw

Ampson
TEL:886-3-5725527
FAX:886-3-5725529
www.ampson.com.tw

Amtek
TEL:886-2-29998989
FAX:886-2-29992929
www.amtek-semi.com

ANA
TEL:886-2-26558628
FAX:886-2-26558676
www.anatek.com.tw

AnaGlobe
TEL:886-3-6668001
FAX:886-3-6661976
www.anaglobe.com.tw

ANDES
TEL:886-3-6668300
FAX:886-3-6668322
www.andestech.com

AnMO
TEL:886-3-5357868
FAX:886-3-5358098
www.anmo.com.tw

ANPEC
TEL:886-3-5642000
FAX:886-3-5642050
www.anpec.com.tw

APEC
TEL:886-3-5750576
FAX:886-3-5737701
www.a-power.com.tw

APLUS
TEL:886-2-27829266
FAX:886-2-27829255
www.aplusinc.com.tw

Arques Technology
TEL:886-2-89131333
FAX:886-2-89131366
www.arquestech.com

ASIX
TEL:886-3-5799500
FAX:886-3-5799558
www.asix.com.tw

Asmedia
TEL:886-2-28936345
FAX:886-3-28937363
www.asmedia.com.tw

ASPEED
TEL:886-3-5789568
FAX:886-3-5789586
www.aspeedtech.com

Astel
TEL:886-3-5781730
FAX:886-3-5781535

ASUKA
TEL:886-3-6667117
FAX:886-3-6667104
www.asuka-semi.com.tw

Atech
TEL:886-2-82215488
FAX:886-2-82215489
www.8tec.com

AuMOS
TEL:886-3-5790567
FAX:886-3-5775909
www.aumos.com.tw

AverLogic
TEL:886-2-87523988
FAX:886-2-87523989
www.averlogic.com

AVID
TEL:886-3-5795222
FAX:886-3-5771011
www.avid.com.tw

Avisonic Technology
TEL:886-3-5778077
FAX:886-3-6661301
www.avisonic.com

Aviq
TEL:886-3-5633766
FAX:886-3-5633761
www.aviqtech.com

Beyond Innovation
TEL:886-2-27785939
FAX:886-2-27781050
www.bitek.com.tw

BSI
TEL:886-3-5770398
FAX:886-3-5787439
www.bsi.com.tw

Capella
TEL:886-2-82186600
FAX:886-2-82186602
www.capellamicro.com

CFP
TEL:886-3-5770755
FAX:886-3-5770756
www.cfpt.com.tw

Champion
TEL:886-3-5679979
FAX:886-3-5679909
www.championmicro.com.tw

CHESEN
TEL:886-2-82265589
FAX:886-2-82265181
www.chesen.com.tw

Chingis
TEL:886-3-5633616
FAX:886-3-5633696
www.chingistek.com

Chip Design
TEL:886-2-22994908
FAX:886-2-22990133
www.cdt.com.tw

Chip Hope
TEL:886-2-82271166
FAX:886-2-82271296
www.chiphope.com.tw

CHiPLUS
TEL:886-3-5637887
FAX:886-3-5637877
www.chiplus.com

Cion
TEL:886-3-6003888
FAX:886-3-6002888
www.cion.com.tw

CMSC
TEL:886-3-5634866
FAX:886-3-5634863
www.cmsc.com.tw

C-Media
TEL:886-2-87731100
FAX:886-2-87732211
www.cmedia.com.tw

CoAsia
TEL:886-2-26557699
FAX:886-2-26557189
www.coasia.com.tw

Conwise
TEL:886-3-5779880
FAX:886-3-5779870
www.conwise.com.tw

CTC
TEL:886-3-5311161
FAX:886-3-5338403
www.ctcasic.com.tw

CYRUSTEK
TEL:886-3-5910216
FAX:886-3-5910217
www.cyrustek.com.tw

D&W Technologies
TEL:886-2-27857796
FAX:886-2-27859416
www.dwtech.com.tw

DATARiT
TEL:886-3-5169089
FAX:886-3-5169087
www.ritdata.com

Davicom
TEL:886-3-5798797
FAX:886-3-5646929
www.davicom.com.tw

DenMOS
TEL:886-3-6669777
FAX:886-3-5667766
www.denmos.com.tw

Digimove
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FAX:886-2-26551698
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Dorado
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FAX:886-3-5169162
www.dorado-da.com

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FAX:886-3-5783630
www.ecmos.com.tw

E-COM
TEL:886-2-23970618
FAX:886-2-23979888
www.eecom.com.tw

EE Solutions
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EETI
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eFortuneTechnology Corp.
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www.eftech.com.tw

ELAN
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www.emc.com.tw

ELANsat
TEL:886-3-5635105
FAX:886-3-5635107
www.elansat.com.tw

eMemory
TEL:886-3-5631616
FAX:886-3-5632525
www.ememory.com.tw

ENABLE
TEL:886-3-5525233
FAX:886-3-5525236
www.enable-semi.com

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TEL:886-3-6662888
FAX:886-3-6662999
www.ene.com.tw

EON
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EOREX
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FAX:886-3-5585139
www.eorex.com

Epicom
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www.epic.com.tw

ESMT
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Etoms
TEL:886-3-6661766
FAX:886-3-6661765
www.etomscorp.com

Etrend
TEL:886-6-5050170
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Etron
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FAX:886-3-5784949
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FAX:886-3-5643596
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www.faraday-tech.com/index.html

Feature Integration Technology
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FAX:886-3-5600166
www.fintek.com.tw

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TEL:886-3-7587199
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www.fitipower.com.tw

FocalTech Systems
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FAX:886-2-27854727

Fortune
TEL:886-2-28094742
FAX:886-2-28094874
www.ic-fortune.com

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Generalplus
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Genesys Logic, Inc.
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www.genesyslogic.com.tw

G-Link
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FAX:886-3-5631052
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FAX:886-3-5643838
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FAX:886-4-23550022
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FAX:886-3-5632886
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Holtek
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Holylite
TEL:886-3-5734589
FAX:886-3-5734690
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Iatec
TEL:886-2-27311335
FAX: 886-2-27311336
www.iatec.com.tw

ICARTiS
TEL:886-2-26547688
FAX:886-2-26549188
www.icartisusa.com

ICNexus
TEL:886-2-27891200
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www.icnexus.com.tw

ICPlus
TEL:886-3-5750275
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www.icplus.com.tw

IdeaCom
TEL:886-2-29110868
FAX:886-2-29110828
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ILITEK
TEL:886-3-5670095
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Imagiatek
TEL:886-2-26961026
FAX:886-2-26968411
www.imagiatek.com

Incentia
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FAX:886-3-5785028
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InCOMM
TEL:886-2-26599609
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www.incomm.com

InfoMax
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FAX:886-2-87510165
www.initio.com

Inmax
TEL:886-2-89131300
FAX:886-2-89131301
www.inmax.com.tw

Innochip
TEL:886-3-6663077
FAX:886-3-6661339
www.innochip.com.tw

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IPLIB
TEL:886-3-5169288
FAX:886-3-5169283
www.iplib.com

ISSC
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FAX:886-3-5778501
www.issc.com.tw

ISSI
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FAX:886-3-5783000
www.issi.com.tw

IST
TEL:886-2-87977911
FAX:886-2-87977915
www.ist4u.com

ITE Tech. Inc.
TEL:886-3-5798658
FAX:886-3-5794535
www.ite.com.tw

Jeilin
TEL:886-2-82215466
FAX:886-2-82215456
www.jeilin.com.tw

Jmicron Technology
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www.jmicron.com

King Billion
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FAX:886-3-5526188
www.kingb.com.tw

Kolorific
TEL:886-2-26558289
FAX:886-2-26558755
www.kolorific.com

KTC
TEL:886-3-5798608
FAX:886-3-6663464
www.ktc.com.tw

Leadtrend
TEL:886-3-6118686
FAX:886-3-6118688
www.leadtrend.com.tw

Legend Design
TEL:886-3-6111888
FAX:886-3-6111889
www.legendDesign.com

Linear-Artwork
TEL:886-2-29125816
FAX:886-2-29125826
www.linear-artwork.com

Lionic
TEL:886-3-5789399
FAX:886-3-5789595
www.lionic.com

Macroblock
TEL:886-3-5790068
FAX:886-3-5790069
www.mblock.com.tw

MacroTech
TEL:886-3-5636090
FAX:886-3-5785545
www.macrotechnic.com.tw

Magellan Discovery
TEL:886-2-87510388
FAX:886-2-87510399
www.magellandiscovery.com

Magic Pixel Inc.
TEL:886-3-6668822
FAX:886-3-6668811
www.magicpixel.com.tw

Mdtic
TEL:886-2-27986189
FAX:886-2-26586184
www.mdtic.com.tw

Media Scope
TEL:886-2-82276582
FAX:886-2-22286833
www.mstcweb.com

MediaTek
TEL:886-3-5670766
FAX:886-3-5787610
www.mtk.com.tw

Megawin
TEL:886-3-5750050
FAX:886-3-5750070
www.megawin.com.tw

Memes Technology
TEL:886-2-55590500
FAX:886-2-55556622
www.memes.com.tw

MemoCom Corp.
TEL:886-3-5730808
FAX:886-3-5720518
www.memocom.com.tw

Metanoia
TEL:886-3-5776123
FAX:886-3-5776132
www.metanoia-comm.com

MicroLinks
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FAX:886-7-6579561
www.mltc.com.tw

MicroMedia
TEL:886-3-5786000
FAX:886-3-5641899
www.micromedia.com.tw

Mobile Devices
TEL:886-3-5586589
FAX:886-3-5586582
www.mdv.com.tw

Mobile Magic Design
TEL:886-3-6668188
FAX:886-3-5635888
www.mobilemagic.info

Modiotek
TEL:886-3-6668881
FAX:886-3-6668883
www.modiotek.com.tw

MosArt
TEL:886-2-29599180
FAX:886-2-29599323
www.mosart.com.tw

MOS Design
TEL:886-2-22783733
FAX:886-2-22783633
www.mosdesign.com.tw

Motorola
TEL:886-2-27058000
FAX:886-2-23254957
www.motorola.com.tw

Msilicon Electronics
TEL:886-3-5613118
FAX:886-3-5613112
www.silicon.com.tw

Mstar Semiconductor
TEL:886-3-5526006
FAX:886-3-5526009
www.mstarsemi.com

MuChip
TEL:886-3-6668000
FAX:886-3-6668060
www.muchip.com

Mxtran Inc
TEL:886-3-6661778
FAX:886-3-6662568
www.mxtran.com

Myson-Century
TEL:886-3-5784866
FAX:886-3-5772058
www.myson.com.tw

Neotec
TEL:886-3-5525989
FAX:886-3-5525789
www.neotec.com.tw

nFore
TEL:886-2-87683983
FAX:886-2-87872284
www.nforetek.com.tw

NIKO-SEM
TEL:886-2-26953467
FAX:886-2-26952281
www.niko-sem.com

Novatek
TEL:886-3-5670889
FAX:886-3-5773376
www.novatek.com.tw

Orise Technology
TEL:886-3-6661660
FAX:886-3-6661800
www.orisetech.com

OTI
TEL:886-3-5537511
FAX:886-3-5555804
www.oti.com.tw

Padauk
TEL:886-3-5327598
FAX:886-3-5333217
www.padauk.com.tw

Pan Signal
TEL:886-3-5545370
FAX:886-3-5516479
www.pansignal.com.tw

Pericom
TEL:886-2-66160588
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