

# Investment Opportunities in the IC Design Industry in Taiwan

## I. Ten major reasons Taiwan's IC design industry is attracting investment

1. Second largest output value in the global IC design industry.
2. Largest output value in the Asian IC design industry.
3. A global powerhouse in advanced IC design technology.
4. The second largest global SoC market share.
5. An innovative R&D hub of the global IC design industry.
6. The world's most complete upstream and downstream IC industry ecosystem.
7. The world's most effective industry cluster synergy.
8. World-famous model of the Hsinchu Science Park.
9. Taiwan is closest to and has the best understanding of China's IC market.
10. Taiwan is the best strategic partner for foreign firms wishing to enter the Chinese market.

## II. Taiwan's IC design industry today

The structure of Taiwan's IC design industry is weighted heavily toward SMEs, and the industry encompasses a large number of firms. In 2013, there are 250 IC design companies in Taiwan, of which 80 companies are listed or over-the-counter companies. The industry as a whole generated output value of NT\$481.1 billion in 2013, making it the world's second-largest IC design industry after the United States. The industry designs a wide range of products, including memory, microcomponents, logic, analog, ASIC, and ASSP products, along with such terminal applications as PC/NB, cell phones, and consumer system products. After Apple's products (such as the iPhone and iPad, etc.) took the world by storm, Taiwan's IC design industry has plunged into the development of 3C integrated applications such as smart handheld devices

(including smart cell phones and tablet computers, etc.).

Most companies in Taiwan's IC design industry are clustered in the technology corridor extending north from the Hsinchu area, and more than 60% are located in and around the Hsinchu Science Park. A total of 166 companies can be found in the Greater Hsinchu area. In 2013, the top ten companies consisted of MediaTek, Mstar, Novatek, Phison, RealTek, Himax, RichTek, Raydium, ILIETK and Global Unichip Corp, and the top five companies are also proudly ranked among the world's top 25 largest fabless companies. Taiwan's IC design industry has been constantly adjusting its structure and transforming itself; rivalry within the industry has created a highly competitive atmosphere, which constitutes a key force driving the industry forward.

### **III. Taiwan's IC design industry possesses the world's most highly developed industry ecosystem**

Taiwan's semiconductor industry has a uniquely well-developed upstream and downstream vertical integration, and the entire IC industry value chain has a finely differentiated division of labor. Here the upstream portion of the industry consists of chemicals and silicon wafers, the mid-stream portion consists of the IC design industry, IC manufacturers, and IC packaging and testing firms, and the downstream portion consists chiefly of systems firms producing end-user PCs/NBs, cell phones, and consumer electronics. In addition, Taiwan also has many administrative services and support firms and producers of instruments and equipment, substrate, and leadframes, etc. Taiwan thus possesses an all-encompassing IC design industry ecosystem, with upstream, midstream, and downstream segments that are developing in parallel. Not only is Taiwan's IC design industry the world's second-largest, the domestic wafer fab and IC packaging/testing segments are both world leaders in their categories. Vertical specialization and division of labor strengthen and foster mutual support among all segments of the industry. The industry enjoys a very strong clustering effect, and peripheral supporting industries are highly developed. Taiwan's IC design industry thus possesses the world's most extensive industrial ecosystem, and its upstream and downstream segments form an industrial community with

long-term stability. The industry has therefore become a model of industrial development much emulated by other countries (see Fig. 1 for a schematic view of Taiwan's IC industry ecosystem).

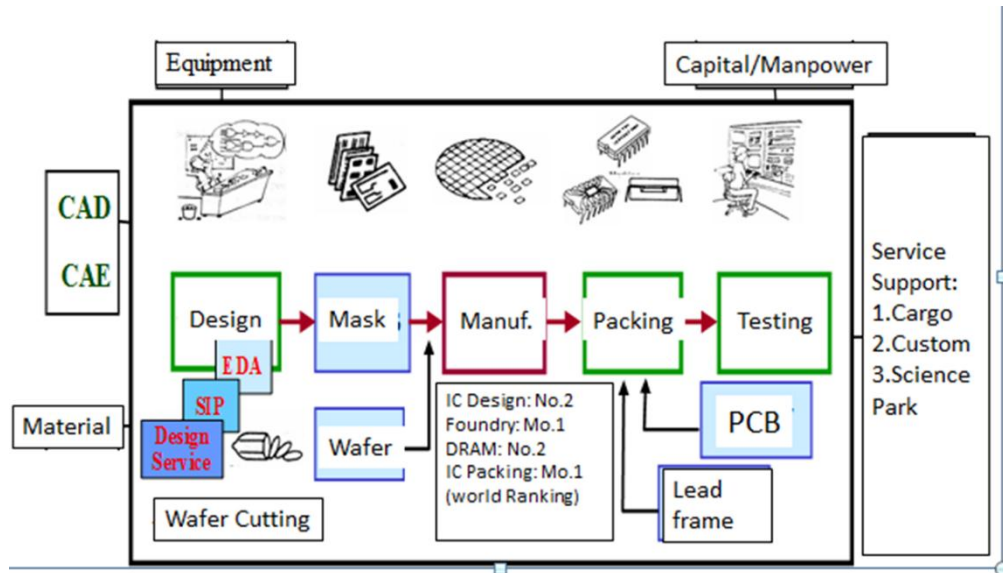


Fig. 1 Taiwan's IC industry ecosystem

#### IV. Taiwan is a global IC design stronghold, is ranked second globally, and has an output value behind only that of the US

After many product life cycles, Taiwan's IC design industry has achieved great importance, which is continuing to increase. The domestic IC design industry is undergoing constant structural adjustments and transformations. It has become a major pillar of overall IC industry growth, and makes a steadily growing contribution to domestic GDP. In 2013, Taiwan's IC design industry generated output value of NT\$481.1 billion. According to IC Insights, 5 Taiwan's IC design companies, includes MediaTek, Novatek, Mstar, RealTek and Himax, are ranked among the world's top 25 largest fabless companies, and account for 11.4% of total global shares.

Table 1 The global position of Taiwan's IC design industry

2013 Rank	2012 Rank	Company	Headquarters	2012 (US\$M)	2013 (US\$M)	Change (%)
1	1	Qualcomm	U.S.	13,177	17,211	30.61%
2	2	Broadcom	U.S.	7,793	8,219	5.47%
3	3	AMD	U.S.	5,422	5,299	-2.27%
4	5	MediaTek	Taiwan	3,366	4,587	36.27%
5	4	Nvidia	U.S.	3,965	3,898	-1.69%
6	6	Marvell	U.S.	3,144	3,352	6.62%
7	7	LSI	U.S.	2,506	2,370	-5.43%
8	8	Xilinx	U.S.	2,196	2,297	4.60%
9	9	Altera	U.S.	1,783	1,732	-2.86%
10	10	Avago	Singapore	1,479	1,619	9.47%
11	11	Novatek	Taiwan	1,256	1,398	11.31%
12	12	HiSilicon	China	1,178	1,355	15.03%
13	13	Mstar	Taiwan	1,271	1,136	-10.62%
14	18	Spreadtrum	China	725	1,070	47.59%
15	14	CSR	Europe	1,025	961	-6.24%
16	15	Realtek	Taiwan	836	951	13.76%
17	16	Dialog	Europe	774	903	16.67%
18	19	Cirrus Logic	U.S.	714	772	8.12%
19	17	Himax	Taiwan	737	771	4.61%
20	21	Silicon Labs	U.S.	563	580	3.02%
21	22	MegaChios	Japan	553	577	4.34%
22	24	Semtech	U.S.	518	555	7.14%
23	23	PMC-Sierra	U.S.	531	508	-4.33%
24	25	IDT	U.S.	497	475	-4.43%
25	26	Microsemi	U.S.	450	433	-3.78%
Top 25 Total				56,459	63,029	11.64%
Other Total				15,650	14,882	-4.91%
Total Fabless				72,109	77,911	8.0%
<b>Taiwan Companies Total</b>				<b>7,466</b>	<b>8,843</b>	<b>18.4%</b>
<b>Taiwan Companies Share of Total Fabless</b>				<b>10.4%</b>	<b>11.4%</b>	

Source: IC Insight; STPI (2014/05)

## V. A global advanced IC design technology powerhouse

Taiwan's IC design industry possesses the world's finest design capabilities and technological standards. Concurrently with the United States, Taiwan's advanced IC design technology has entered the 45 nm stage. The most important product lines have gradually shifted from the past PC chipsets and optical storage chips to LCD chips, network communication chips, and cell phone chips. The last few years have seen a trend toward development of applications chips for smart handheld devices. Taiwan's IC design industry is a global leader in terms of technical capabilities, product development, and applications. Apart from being a global IC design industry stronghold, Taiwan is also dominant player in advanced design technology (see Table 2).

Table 2 Taiwan is the global advanced IC design technology country

	USA	Taiwan
Global Market Share	64%	24%
Position	Leader	The fast followers → innovative creative products
R&D	20%~30% (Global average 17%)	15%~20% (Global average 17%)
Product Grade Product application	High-end products Network/Communication/Graphic	Mid/high range products Information/Consumer/LCD →Communication
Design linewidth	90nm→65nm→45nm	0.18um→0.13um→90nm→65nm →45nm
SoC	3C integrate SoC/IP autonomous	3C integrate SoC
Product Features	Differentiated / high unit price	Cost-effective /Time-to-market

Source: ITRI/IEK(2012/08)

## VI. An innovative R&D hub of the global IC design industry

The government of Taiwan began implementing the National Si-Soft Project in 2002 in order to encourage the development of an iSoC service

industry boasting innovative intellectual property and high added value, promote the creation of an autonomous domestic industrial supply chain containing design, manufacturing, product, and service segments, ensuring that Taiwan possesses irreplaceable status in the global supply chain. The government implemented the National Science and Technology Program for Systems-on-Chip from 2003 to 2010; this program involved the funding of NT\$19.54 billion in two stages, and led to the establishment of the Si-Soft R&D Center. The National Program for Intelligent Electronics, which will be implemented from 2011 to 2015, will involve funding of NT\$12.0 billion, and is expected to propel the domestic IC design industry to the "MG+4C" stage. Over the past decade, the Si-Soft R&D Center has acquired intellectual property, platform, certification, training, and R&D services, and provides all-round high added value design services, making Taiwan an innovative R&D hub of the global IC design industry.

## **VII. Taiwan is closest to and has the best understanding of China's IC market**

Starting from 2005, China has overtaken Japan and the United States to become the world's largest semiconductor market (see Fig. 2). Sharing China's language and customs, and having a similar industry structure, Taiwan taking advantage of its close proximity and keen understanding of China's IC market. As a result, China accounts for more than one half of the domestic IC design industry's customer base; China's share is increasing steadily, reaching a peak of 58% in 2010. Taiwan's IC design industry possesses the world's finest design capability and technology, while China has the world's largest market. The strengths and weaknesses of China and Taiwan are mutually complementary; they are linked by close-knit industrial value chains. Taiwan has already become an important stepping stone for foreign firms wishing to enter the Chinese market, and serves as an ideal strategic partner for these firms.

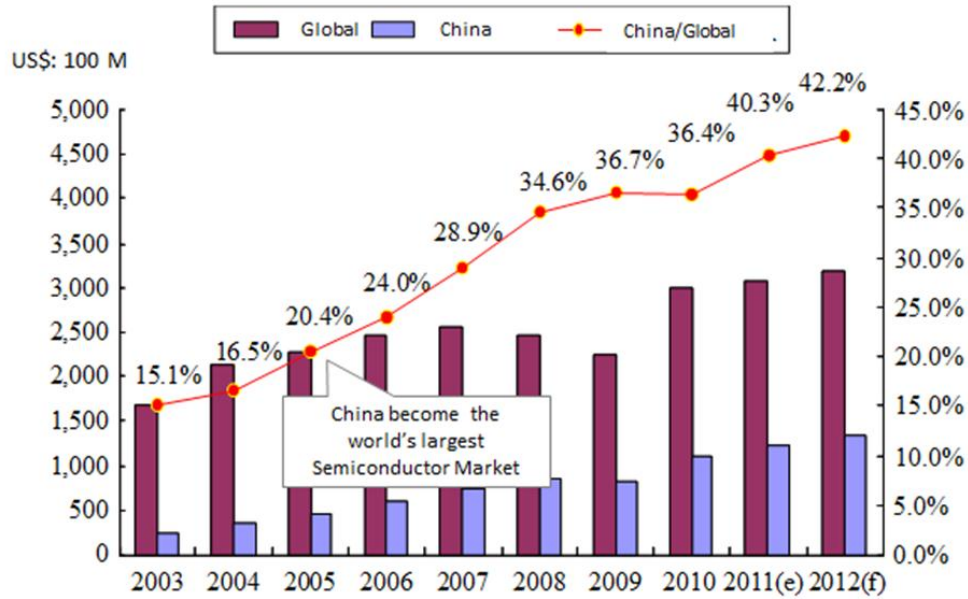


Fig. 2 China semiconductor market growth trend of the global ratio

## VIII. Introduction to Taiwan's best-performing companies

In terms of size, sales growth, and profit margin, we can see that Taiwan has many superior IC design companies, including Mstar, RichTek, Raydium, GMT, PixArt, SONiX, HOLTEK, and Macroblock (Table 3). Among the many important, outstanding companies in IC design, **Mstar, RichTek and Raydium, have annual sales revenue exceed NT\$10 billion.** This reveals that Taiwan's IC design industry is continuously adjusting and transforming its structure. The foregoing leading firms have become important mainstays of overall industrial growth.

Table 3 Taiwan's IC design industry Major Company List

	2013		2012		2011	
	Revenue (NT\$100million)	Net income ratio (%)	Revenue (NT\$100million)	Net income ratio (%)	Revenue (NT\$100million)	Net income ratio (%)
Mstar	336.53	N/A	374.95	12.09	356	17.40
RichTek	107.3	12.70	110.1	15.50	106	14.40
Raydium	109	7.29	105.6	7.62	90	8.50
GMT	38.97	13.60	46.66	15.20	47	14.60

	2013		2012		2011	
	Revenue (NT\$100million)	Net income ratio (%)	Revenue (NT\$100million)	Net income ratio (%)	Revenue (NT\$100million)	Net income ratio (%)
PixArt	46.29	5.79	33.03	8.48	32	15.40
SONiX	36.42	14.10	33.21	16.20	33	16.50
HOLTEK	38.94	19.20	33.66	16.60	33	15.80
Macrobloc	21.55	6.50	23.83	12.40	20	14.50

Source: Market Observation Post System (2014/05)

## IX. A bright future within the industry's grasp

To summarize, Taiwan's IC design industry currently enjoys significant competitive advantages over its rivals in other countries in terms of industry clusters, industry size, R&D capabilities, and technological levels. Taiwan's IC design industry relies on vertical integration between up-, mid-, and downstream segments, while also taking advantage of Taiwan's superior information and communications technology in charting a unique industrial development path. Thanks to its cost advantages, technological edge, and nimble production capabilities, the IC design industry plays a pivotal role in the global IC industry.

In the wake of the Economic Cooperation Framework Agreement (ECFA), China and Taiwan enjoy cordial governmental and commercial ties, and the two sides have embarked on the "Cross-Strait Bridge Building Project." In addition, the government of Taiwan has dissolved restrictions on investment in China by IC design firms, which has eased barriers to the flow of technology, manpower, and funds. Looking ahead to the future, the linkage of cross-strait value chains is sure to give the industry a prosperous future. Because of this, Taiwan's IC design industry offers tremendous investment value and potential.