

Hua Hong SEMI_(1347 HK)

To capture the trend of chip localization
Hong Kong | Technology | Initiation

18 Dec 2020

Investment Summary

Hua Hong Semiconductor Limited (the Company) is a global, leading pure-play foundry with specialty process platforms uniquely focused on embedded non-volatile memory ("eNVM"), power discrete, analog & power management, and logic & RF. Special note is the Company's outstanding quality control system that satisfies the strict requirements of automotive chip manufacturing.

National policy strongly supports chip localization

The Chinese government are giving huge policy support to the semiconductor industry. The Chinese government has set the "14th Five-Year Plan" (2021-2025) for national development, for the first time clarifying the core position of "innovation" in modernization and emphasizing technology self-reliance and self-reliance are the strategic support for national development and point out the direction for development in the next 15 years. This means that the Chinese government will fully support the development of the semiconductor industry. In addition, the National Integrated Circuit Industry Investment Fund of Mainland China takes long-term investment, and has invested in many leading semiconductor companies including Hua Hong Semiconductor. Moreover, the launch of the Sci-Tech Innovation Board also strengthened the participation of social funds in semiconductor industry investment.

The growth of new energy vehicles bring long-term investment opportunities

From the perspective of the market scale of power semiconductors in different industries, automotive electronics is the field with the highest growth in the semiconductor market. Hua Hong Semiconductor is a leader in the field of power semiconductors, and its performance has reached the international leading level. In addition to pursuing higher power density and lower loss required by high-voltage power devices, the Company is developing intelligent IGBT process technology with integrated sensors on chip and high-reliability new heat dissipation IGBT technology to better meet the explosive growth period of new energy vehicles.

8-inch wafers are in shortage, both price and volume to rise in the future

At the beginning of the outbreak of COVID-19 this year, driven by the "home economy", home office and class trends unexpectedly drove a surge in demand for PCs, tablets, game consoles, servers, etc., making the semiconductor industry the main beneficiary of the epidemic. In addition, 5G mobile phones require more semiconductors than in 4G, and the consumption of some chips has doubled. For example, in 4G, only 1-2 power management ICs are needed, but the consumption of 5G will increase to 3-4; in addition, the trend of large numbers of lenses and fingerprint recognition sensors being introduced into mobile phones and tablets has also stimulated more demand. These chips are mainly produced in 8-inch wafers. Given the limited supply, there is shortage in the market of 8-inch wafers.

Valuation and Investment Recommendation

As of the closing price on December 16, the Company's latest financial year P/B was 2.92x. We believe that based on the Company's sound fundamentals, the Company's capacity expansion coincides with rising industry demand. We give the Company a target price to book ratio of 2.50x in 2021. We expect the Company's 2020/2021/2022 book value per share to be US\$ 2.45/2.53/2.65, and a twelve-month target price of HK\$49.10, corresponding to the P/B ratio of the book value per share for 2020/2021/2022 is 2.57x/2.50x/2.42x. Accumulate rating is given for the first coverage. (Exchange rate: 7.78 USD/HKD) (Current price as at 16 December 2020)

Accumulate (Initiation)

Current market price HKD41.45
(Closing price as at 16 Dec 2020)
Target price HKD 49.10 (+28.24%)

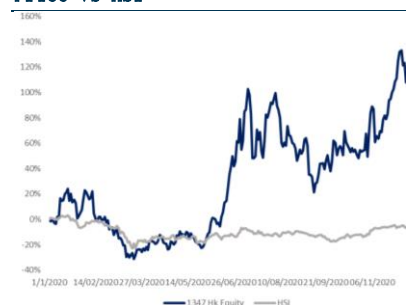
COMPANY DATA

O/S SHARES (MN) :	1,295
MARKET CAP(HKD MN) :	53,717
52- WK HI/LO (HKD) :	46.00/12.22

Major Shareholder %

Shanghai Hua Hong Int Ltd	27.05
Huaxin Investment Mgt Co., Ltd	18.71
Shanghai Alliance Investment Ltd	15.09

Price vs HSI



Source: Wind, PSHK

KEY FINANCIALS

USD'mm except per share data	FY19	FY20E	FY21E	FY22E
Net Sales	933	984	1,235	1,375
Net Profit	155	86	104	158
EPS, USD	0.12	0.07	0.08	0.12
P/E x	44.55	80.55	66.63	43.71
BVPS, USD	2.38	2.45	2.53	2.65
P/BV, x	2.24	2.18	2.11	2.01
ROE%	5.26	4.85	4.82	4.48
ROA%	4.49	3.90	3.74	3.43

Source: Company reports, PSHK

Closing price as of 16 December 2020

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Industry analytics

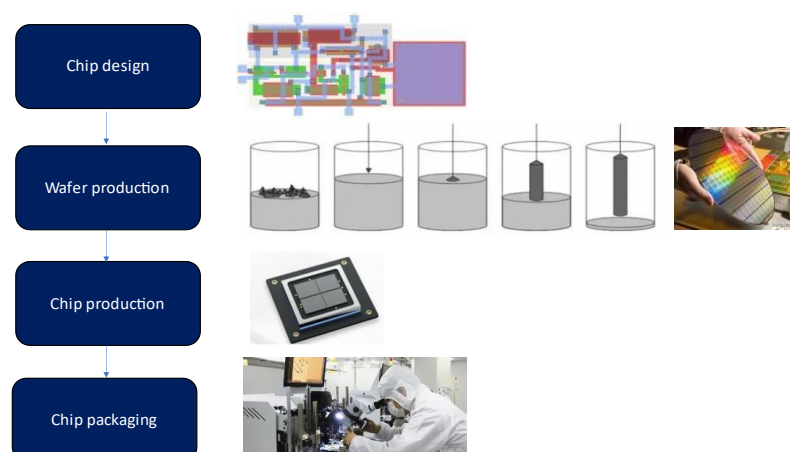
Semiconductors refer to materials with conductivity between conductors and insulators at room temperature and are the core of electronic products. According to IC Insights, semiconductors are divided by product, they are integrated circuits and discrete devices (including optoelectronic devices, sensors, and discrete devices). The above are collectively referred to as semiconductor components. The packaged integrated circuit is generally called a chip.

Integrated circuit refers to the use of a certain process to connect hundreds of millions of semiconductor devices such as transistors, transistors, diodes, and basic electronic components such as resistors, capacitors, and inductors, and integrate them on a small substrate, and then package them. Become a kind of micro electronic device or component with complex circuit function. As the foundation and core of the global information industry, integrated circuits have a wide range of applications and are widely used in electronic equipment (such as smart phones, televisions, computers, etc.), communications, and military applications.

The chip manufacturing process includes chip design, wafer production, chip packaging and testing.

1. Chip design: Chip design refers to the process of forming a design layout from the set specifications through system design and circuit design. After the IC completes the design process, it enters the IC manufacturing process.
2. Wafer production: During the wafer manufacturing process, photosensitive materials are first deposited on the wafer and exposed to light through a photomask to form transistors and other circuit components that make up semiconductors. The etching process is used to remove excess material, leaving only the required circuit patterns on the wafer.
3. Chip packaging: During the packaging process, each wafer is cut into dies, or individual semiconductors, and tested. The defective die will be discarded, and the die that passes the test will be encapsulated and packaged. Encapsulation helps protect the IC so that it can be integrated into an electronic system and can also provide heat dissipation or cold protection.
4. Chip test: It is to test the finished chip, test the function, voltage, current and timing of each chip.

Figure1: Chip manufacturing process



Source: Newzoo, PSHK

The business model of integrated circuit manufacturing enterprises

There are two main business models of integrated circuit manufacturing companies: one is the IDM model, that is, the vertically integrated manufacturing model, which covers all aspects of the industrial chain of integrated circuit design, manufacturing, packaging and testing; the other is the Foundry model, which is wafer. The foundry model only focuses on integrated circuit manufacturing.

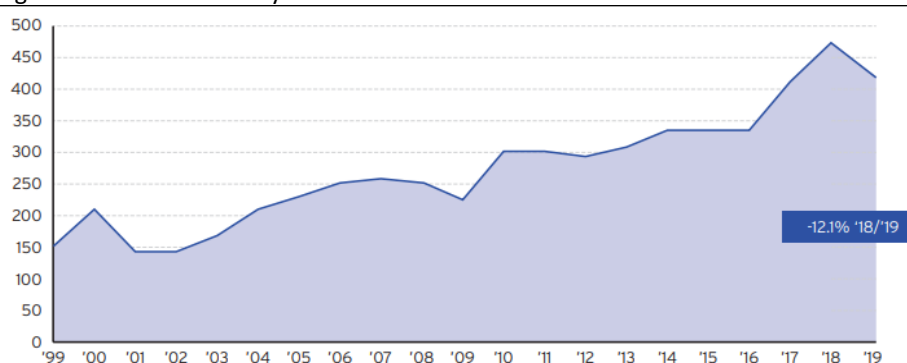
Integrated circuit companies under the vertically integrated manufacturing model have integrated circuit design departments, wafer fabs, and packaging and testing plants. This is a typical asset-heavy model. It has high requirements for R&D capabilities, financial strength and technical level, so vertical integration is adopted. Most of the manufacturing companies are traditional giants in the global chip industry, including Intel and Samsung Electronics.

The foundry model originated from the specialized division of labor in the integrated circuit industry chain, forming a fabless design Company, a foundry Company, and a packaging and testing Company. Among them, the fabless design Company serves the market demand and is engaged in the design and sales of integrated circuits. Foundry companies and packaging and testing companies serve this type of design Company. At present, the world's leading foundry companies include TSMC, GlobalFoundries, UMC, SMIC and Hua Hong Semiconductor.

The development of the integrated circuit industry is rising steadily

Semiconductor is the foundation of information technology, and the end user is computer car communication, so it has a high correlation with the macro economy. Therefore, the growth rate of the semiconductor industry is highly correlated with GDP. The World Semiconductor Trade Statistics Semiconductor Market Forecast released by the World Semiconductor Trade Statistics Association (WSTS) in June 2020 predicts that the sales of the global semiconductor industry will slightly increase to US\$ 426 billion in 2020. The forecast for 2020 has been lowered, mainly due to the impact of COVID-19 on the global economy and supply chain at the beginning of 2020. WSTS predicts that by 2021, the global semiconductor industry sales will rebound to US\$452 billion. It can be seen that the overall market scale of the global integrated circuit industry is still showing a growth trend.

Figure2. Global IC industry Sales

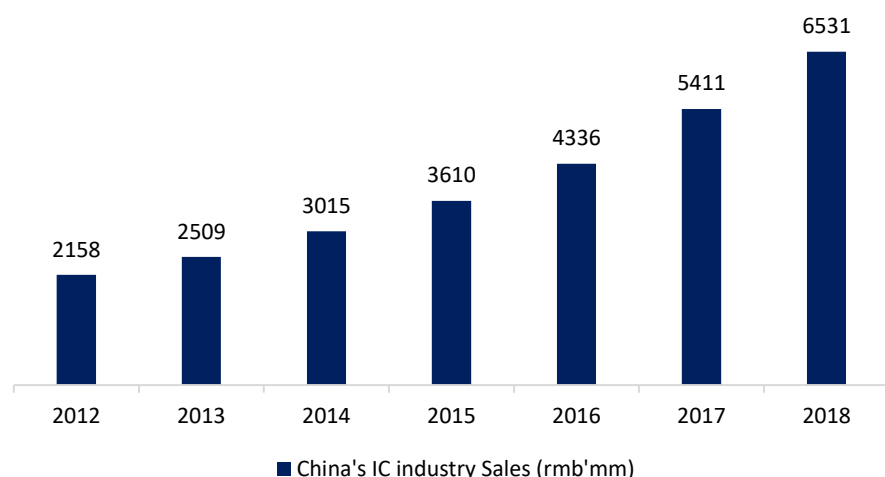


Source: WSTS, PSHK

In China, in recent years, relying on many good conditions such as abundant demographic dividend, stable economic growth and favorable industrial policy environment, China's integrated circuit industry has developed rapidly, and the market growth rate is higher than the global. According to China Semiconductor Industry Association, the sales of China's integrated circuit industry increased from RMB\$ 215.8 billion in 2012 to 653.1 billion in 2018, with an average annual compound growth rate of 20.27%. According to China Semiconductor Industry Association, the three largest application markets in China's integrated circuit industry in 2018 are network communications, computers and consumer electronics, accounting for 79% of the total.

In the future, with the continuous development of automotive intelligence, electronics, and automation, and the continuous expansion of emerging fields such as artificial intelligence, Internet of Things, and 5G, the market scale of integrated circuits and application will continue to expand. Because the more the chips, the faster it is. We believe that more generations of chips will be available in the next few years to meet the requirements of large amounts of data computing in the future.

Figure3. China's IC industry sales (RMB'mn)



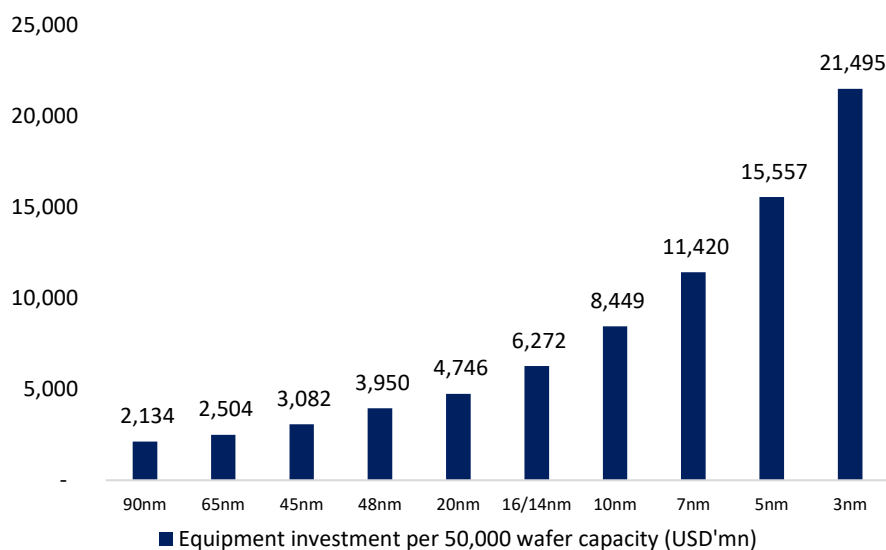
Source: CSIA, PSHK

Increasingly expensive integrated circuit production lines intensify the concentration trend of leading companies

Driven by Moore's Law, the substantial increase in the integration of components requires the continuous reduction of integrated circuit line widths. As a result, production technology and manufacturing processes have become more and more complex, and manufacturing costs have increased exponentially. When the technology node is upgraded to 5 nm or even smaller, ordinary lithography machines are limited by their wavelength, and their accuracy can no longer meet the process requirements. Therefore, the manufacture of integrated circuits requires the use of expensive extreme ultraviolet lithography machines or the use of multiple template processes, and repeated thin film deposition and etching processes to achieve a smaller line width, which significantly increases the number of thin film deposition and etching, which means Integrated circuit manufacturing companies need to invest more and more advanced lithography machines, etching equipment, and thin film deposition equipment, resulting in huge equipment investment.

According to the statistics of the market research organization IBS, with the continuous shrinking of technology nodes, the equipment investment for integrated circuit manufacturing has shown a significant upward trend. Take the 5nm technology node as an example, the investment cost is as high as tens of billions of dollars, which is more than twice that of 14nm and about four times that of 28nm. The huge investment in equipment can only be borne by head integrated circuit manufacturers with a certain scale, which further intensifies the trend of the integrated circuit manufacturing industry to concentrate on the head and creates good opportunities for the development of head integrated circuit manufacturing enterprises.

Figure 4. Equipment investment per 50,000 wafer capacity

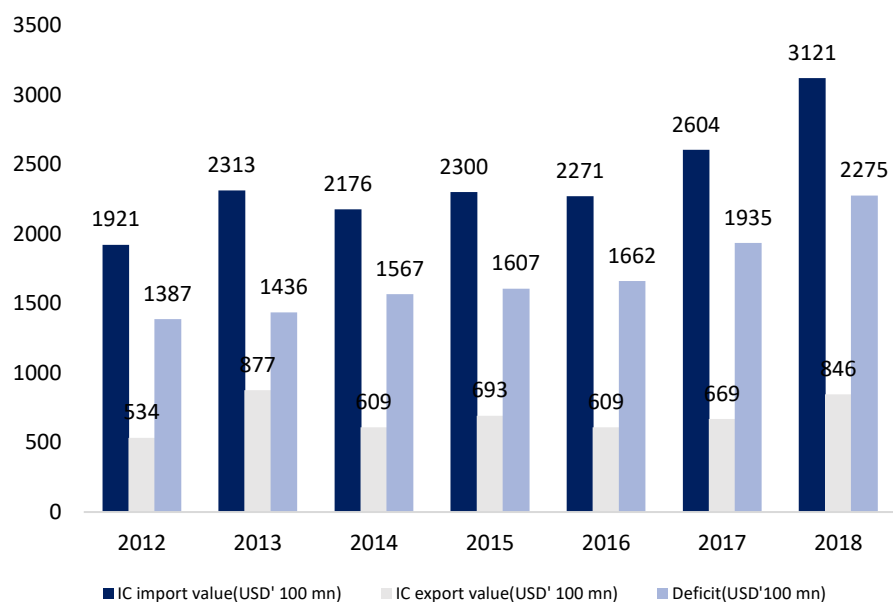


Source: Bloomberg, Amazon, PSHK

China's industrial policy will fully support integrated circuit production

At present, the rapid development of the integrated circuit industry in mainland China cannot fully meet the growing market demand. In 2018, China's integrated circuit imports amounted to US\$312.1 billion, which is currently the highest import value of commodities. During the same period, China's integrated circuit exports were US\$84.6 billion and the trade deficit reached US\$227.5 billion.

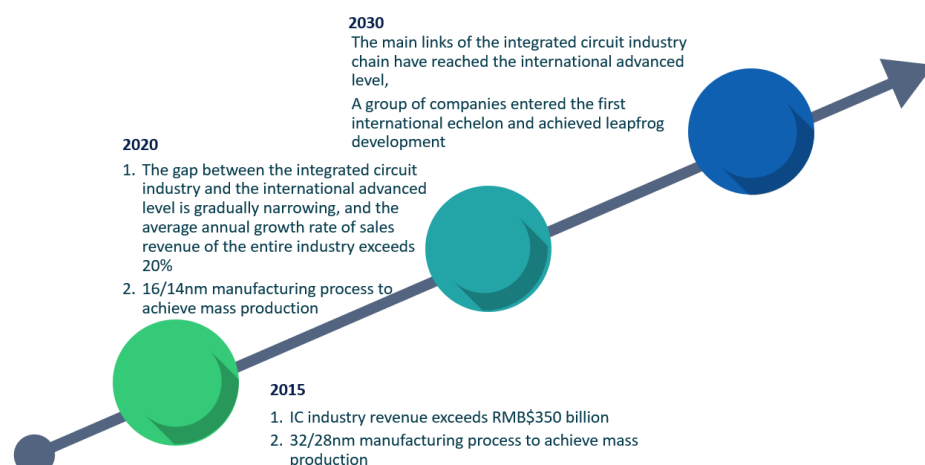
Figure 5. China's IC imports and exports (USD' 100mn)



Source: CISA, PSHK

The integrated circuit industry is a strategic industry for national economic and social development, and is the core of the electronic information industry. In recent years, the country has successively introduced industrial policies to promote the development of the integrated circuit industry in a market-oriented manner. In June 2014, the State Council issued the "National Integrated Circuit Industry Development Promotion Outline", which clarified the development goals of the integrated circuit industry in the next few years:

Figure 6. National IC industry development outline



Source: National IC industry development outline, PSHK

Comparison of IC foundry technology

In the integrated circuit manufacturing industry, the industry will measure the process technology in nanometer units (nm). The process of a few nm refers to the gate length of the transistor inside the chip. The higher the density of IC circuit design, means that in the same area of the IC, you can have a higher density, more complex circuit design. According to Moore's law, the number of transistors that can be accommodated on an integrated circuit will double about every two years, which means that the new generation of semiconductor computing will double every 18 months. Theoretically speaking, the smaller the process number, the higher the efficiency of the chip, the lower the energy consumption, and the higher the level of technology required. In other words, the number of chip manufacturing processes can be said to be as small as possible.

Table 1. Comparison of IC foundry industry

IC foundry Company	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TSM	28nm			20nm	16nm	10nm		7nm	7nm+	5nm
Samsung		28nm		22nm	14nm		10nm	8nm	7nm+	5nm
SMIC	40nm				28nm				14nm	
Hua Hong						65nm	55nm	28nm		

Source: Company data, PSHK

24 November 2020, IC Insights announced a research report. It is estimated that this year's top 15 semiconductor manufacturers will rank Intel first, Samsung second, and TSMC third. Regardless of income and process, Chinese companies are still far behind the world's top semiconductor companies.

Table 2. The world's top 15 semiconductor companies (Including foundries)

2020E Ranking	Company	HQ	2020E Revenue (\$US M)
1	Intel	USA	73,894
2	Samsung	South Korea	60,482
3	TSM	Tai Wan	45,420
4	SK Hynix	South Korea	26,470
5	Micron	USA	21,659

6	Broadcom	USA	19,374
7	Qualcomm	USA	17,066
8	Nvidia	USA	15,884
9	TI	Japan	13,088
10	Infineon	USA	11,069
11	MediaTek	Japan	10,781
12	Kioxia	Europe	10,720
13	Apple	USA	10,040
14	ST	Europe	9,952
15	AMD	USA	9,519
N/A	SMIC	China	3,762
N/A	Hua Hong	China	943

Source: Company data, IC Insight strategic reviews database, Wind, PSHK

Company profile

Hua Hong Semiconductor Limited is a global, leading pure-play foundry with specialty process platforms uniquely focused on embedded non-volatile memory (“eNVM”), power discrete, analog & power management, and logic & RF. Special note is the Company’s outstanding quality control system that satisfies the strict requirements of automotive chip manufacturing. The Company is part of the Huahong Group, an enterprise group whose main business is IC manufacturing, with advanced “8+12” production line technology.

Hua Hong Wafer Information

Hua Hong Semiconductor presently operates three 200mm wafer fabrication facilities within the Huahong Group (HH Fab1, HH Fab2, and HH Fab3) in Jinqiao and Zhangjiang, Shanghai, with a total monthly 200mm wafer capacity of approximately 180,000 wafers. There is also a 300mm wafer fabrication facility (HH Fab7) with the planned monthly capacity of 40,000 wafers/month in Wuxi's National High-Tech Industrial Development Zone, supporting applications in emerging areas such as 5G and the Internet of Things. Formal incorporation of and start of operations at HH Fab7 were achieved in 2019. In China, it has become a leading 300mm semiconductor production line devoted to specialty processes and is the first 300mm foundry devoted to power discrete semiconductors.

Figure 7. Hua Hong wafer fabrication facilities

			
HH Fab1	HH Fab2	HH Fab3	HH Fab7
200mm	200mm	200mm	300mm
Capacity:65,000 wafers/month	Capacity:60,000 wafers/month	Capacity:53,000 wafers/month	Capacity:10,000 wafers/month
China, Shanghai	China Shanghai	China Shanghai	China Jiangsu

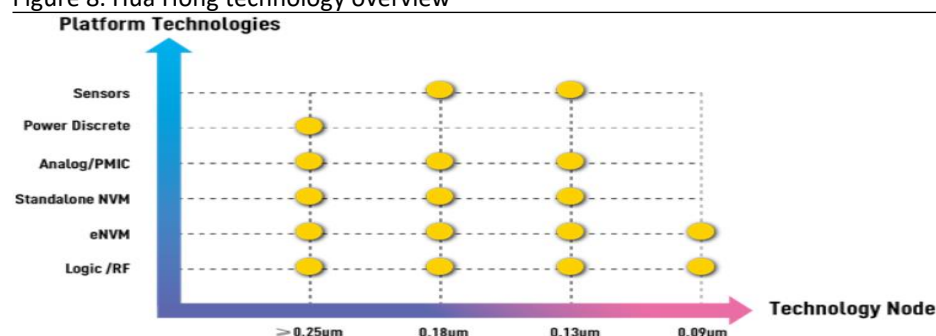
Source: Company website, PSHK

Hua Hong Technology overview

HHGrace provides professional and highly value-added foundry services covering technology solutions from 1.0 μ m ~ 90nm process nodes, focusing on differentiated technologies including eNVM (embedded Non-Volatile Memory), power management IC, power discrete, RF, as well as standard logic and mixed-signal.

HHGrace’s process offerings are supported by a comprehensive set of one-stop-shop solutions in design service, wafer testing and backend turn-key services, helping customers reduce overall cost and accelerate time to market in order to improve the product competitiveness.

Figure 8. Hua Hong technology overview

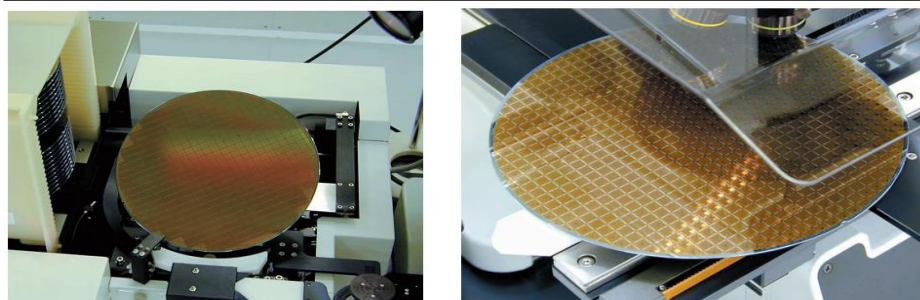


Source: Company website, PSHK

Hua Hong Products and Applications

Hua Hong Semiconductor focuses on the production of a wide range of semiconductors, and its products are manufactured using unique advanced wafer process technology that meets the specific needs of customers. Wafer is a carrier board used to manufacture integrated circuits, which is covered with crystal grains. After the crystal grains are cut, a chip is obtained. The chip is packaged and tested to make an integrated circuit. Generally, electronic products will use the conductivity changes of semiconductors to process information.

Figure 9. Wafer photo



Source: Company data, PSHK

Hua Hong Semiconductor is committed to the R&D, innovation and optimization of differentiated technologies, focusing on 1) Embedded non-volatile memory, 2) Discrete, 3) Simulation And power management (Analog and power management), 4) Logic (Logic) and radio frequency (Radio Frequency, RF) and other differentiated technologies

1) Embedded non-volatile memory products include microcontrollers and smart cards used in remote controls, home appliances, smart meters, etc. (such as SIM cards, social security cards, national ID cards, USB keys and bank chip cards)

2) Discrete device products include MOSFET, SJNFET and IGBT silicon chips, which are suitable for consumer products (home appliances), computers, industrial products (such as welding machines) and automotive products (such as steering controllers) and other different market segments.

3) Analog and power management products include audio amplifier ICs for mobile products, battery management ICs, AC-DC converter ICs for home appliances, computers and power adapters, and controller ICs for LED lighting bulbs.

4) Logic products include consumer audio products, memory card (SD) controllers; RF products include Bluetooth devices for wireless keyboards or mice, and electronic toll collection (ETC) devices.

Figure 10. Hua Hong Technology Platform

Technology Platform	Technology
Embedded non-volatile memory	0.25μm~0.13μm eFlash, 0.35μm~0.13μm EEPROM, 0.5μm~0.13μm eOTP/eMTP/eLogicEE
Discrete device products	MOSFET, IGBT
Analog and power management products	0.35μm BCD (BCD350G/BCD350GE), 0.18μm BCD (BCD180G), 0.35μm CDMOS (PMU350G), 0.13μm CDMOS, 1μm 700V CDMOS (BCD 700V), 0.8μm 5V/40V HVC MOS, 0.5μm/0.35μm 5V CMOS (CZ6H+/CZ6L+) & 0.35μm 7V CMOS (CZ6-7V), 0.18μm 5V CMOS
Logic products	90nm Low Power Logic and Mixed-Signal, 0.13μm and Shrink Standard Logic and Mixed-Signal, 0.18μm and Shrink Standard Logic and Mixed-Signal, 0.5μm 5V and 0.18μm 3.3V, 5V Mixed-Signal

Source: Company website, PSHK

Investment Highlights

National policies strongly support chip localization

The central and local governments are giving huge policy support to the semiconductor industry. The Chinese government has set the "14th Five-Year Plan" (2021-2025) for national development, for the first time clarifying the core position of "innovation" in modernization and emphasizing technology Self-reliance and self-reliance are the strategic support for national development and point out the direction for development in the next 15 years. As the cornerstone of the modern information society, semiconductors are the foundation for all technological innovations and upgrades, and are the key force leading a new round of technological revolution and industrial transformation, providing development possibilities for various emerging industries including Internet cars, artificial intelligence and the Internet of Things. This means that the Chinese government will fully support the development of the semiconductor industry. In addition, the National Integrated Circuit Industry Investment Fund of Mainland China takes long-term investment as its concept and has invested in many leading semiconductor companies, including Hua Hong Semiconductor. Moreover, the launch of the Science and Technology Innovation Board has also strengthened social funds to participate in investment in the semiconductor industry.

The US's export ban on Huawei has warned the entire Chinese technology industry and understood the importance of China's independent semiconductor supply, prompting China to accelerate the establishment of its own semiconductor supply chain. We believe that in the coming days, Chinese companies will gradually increase the proportion of domestic supply chain procurement in order to reduce supply risks brought by geopolitics. This means that in the trend of localization in the semiconductor industry, foundry is one of the core industries that benefit from it.

The Company's production base is located in Shanghai, which is geographically close to these leading fabless semiconductor companies in China and has established long-term relationships with them. As of December 31, 2019, the Company recorded sales revenue from Chinese customers of US\$546 million, accounting for approximately 59% of the Company's total sales revenue. As of September 30, 2020, the Company recorded sales revenue of US\$427 million from Chinese customers, accounting for approximately 63% of the Company's total sales revenue. It can be seen that the Company's turnover in China will continue to rise further. We believe that the Company can rely on its multiple process technologies, strong design service capabilities and excellent customer service to grasp the continuous growth of China's semiconductor industry.

The explosive growth of new energy vehicles brings medium and long-term investment opportunities

According to WSTS (World Semiconductor Trade) statistics, the global semiconductor market in 2019 is expected to be US\$424 billion. In 2017, the market share of automotive electronics was 23%, and in 2019 it accounted for 35%. At the same time, the market share of the industrial and consumer electronics sectors has declined. From the perspective of the market scale of power semiconductors in different industries, automotive electronics is the field with the highest growth in the semiconductor market.

On November 2 2020, the General Office of the State Council issued the "New Energy Automobile Industry Development Plan (2021-2035)". According to the plan, by 2025, the sales volume of new energy vehicles in the Mainland will reach about 20% of the total sales volume. According to market estimates, to meet 20% target, sales of new energy vehicles in the Mainland are expected to reach about RMB5.8 million in 2025, with a compound growth rate of 37% in the next five years. The explosive growth of new energy vehicles will also result in explosive growth of chips.

The chip of a new energy vehicle can be divided into main control chip, MCU function chip, power semiconductor, sensor and others (such as analog IC, memory chip, etc.). The main increase in the new energy vehicle business is power semiconductors. IGBTs (Insulated Gate Bipolar Transistors) are mainly used in battery management systems, motor control systems, electric air conditioning control systems, charging systems, and PTC. IGBT is the core device for energy conversion and transmission. With the continuous growth of new energy vehicles, it will continue to promote the rapid growth of the IGBT market. Hua Hong Semiconductor is a leader in the field of power semiconductors, and its performance has reached the international leading level. In addition to pursuing higher power density and lower loss required by high-voltage power devices, the Company is developing intelligent IGBT process technology with on-chip integrated sensors. And high-reliability new heat dissipation IGBT technology to better meet the explosive growth period of new energy vehicles.

The structural supply of 8-inch foundry is in short supply, bringing opportunities for both price and volume to rise in the future

At the beginning of this year's COVID-19 outbreak, driven by home economy, home office and class trends unexpectedly drove a surge in demand for PCs, tablets, game consoles, servers, etc., making the semiconductor industry the main beneficiary of the epidemic. In addition, the semiconductor content required by 5G mobile phones is much higher than that in the 4G, and the consumption of some chips has doubled. For example, the power management IC only needs 1-2 in the 4G, and the amount of 5G will increase to 3-4; in addition, the trend of multi-lens and fingerprint recognition sensors being introduced into mobile phones and tablets in large numbers has also stimulated more demand. These chips are mainly produced on 8-inch wafers. There is shortage of 8-inch wafers.

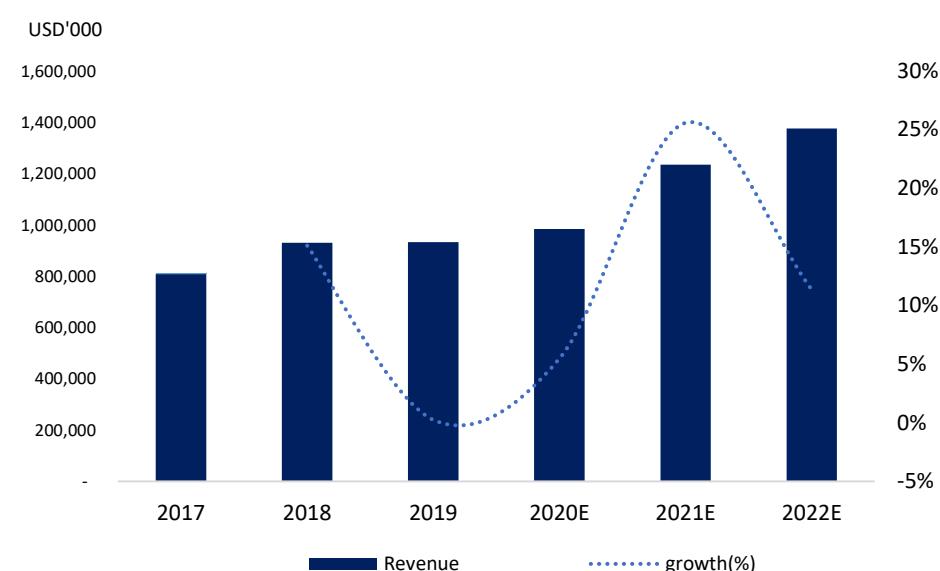
Hua Hong Semiconductor has three 8-inch (200mm) wafer fabs (HH Fab1, Fab2 & Fab3) in Shanghai Jinqiao and Zhangjiang, with a monthly capacity of approximately 180,000 wafers. Currently, 8-inch wafer production capacity is in short supply globally. Hua Hong's 8-inch capacity utilization rate in the first, second, and third quarters of 2020 is as high as 91.9%/100.4%/102.0%. The Company's management said that the market has improved from the first half of the year, the demand is very strong, and the average selling price of 8-inch wafers keep rising. The production capacity of the 12-inch special craft factory will increase from current 20,000 pieces per month to 40,000 pieces at the end of this year or early next year. Reaching 40,000 by the end of next year. When the utilization rate is increased, the fixed cost per unit can be reduced, and the increase in revenue will improve profitability. Since Hua Hong is one of the largest 8-inch wafer fabs operating in China, we expect to benefit from the above explosive demand.

Financial Analysis

Revenue analysis

The Company's source of income is mainly the sale of semiconductor products. The Company's 2017/2018/2019 revenue was US\$808/930/933 million, with an average annual compound growth rate of 7.4%. We believe that based on the above-mentioned imbalance between supply and demand, the Company's three 8-inch wafer fabs continue to have full capacity, while 12-inch production capacity continues to expand, management expects that the Wuxi factory will begin to contribute positive profits after reaching full capacity at the end of next year. The current 8-inch wafer capacity is in short supply globally, and Hua Hong's 8-inch capacity utilization rate in the second quarter to the third quarter of this year is as high as 102%. Based on the current strong demand, the average selling price of 8-inch wafers continues to rise. In summary, we expect the Company's 2020/2021/2022 revenue to be US\$983/1,235/1,375 million, an increase of 5.5%/25.6%/11.4% year-on-year.

Figure11. Company income and forecast



Source: Company reports, PSHK

Costs and expenses analysis

The main cost of the Company is the cost of sales, and main expenses are sales and marketing expenses, and general and administrative expenses. In 2019, they were US\$ 650/8/169 million, accounting for 69.5%/0.9%/18.2% of revenue. In terms of gross profit, due to the high level of capacity utilization, its unit fixed costs can be shared, and the average selling price of wafers rises, we expect the Company's gross profit margin to be 23.6%/24.0%/25.0% in 2020-2022. We believe that sales and marketing expenses and general and administrative expenses will remain at a certain level. Based on the above, we estimate that the operating costs of the Company in 2020-2022 will be US\$940/1175/1269 million.

Valuation

As of the closing price on December 16, the Company's latest financial year P/B was 2.92x. We believe that based on the Company's sound fundamentals, the Company's capacity expansion coincides with rising industry demand. We give the Company a target price to book ratio of 2.50x in 2021.

We expect the Company's 2020/2021/2022 book value per share to be US\$ 2.45/2.53/2.65, and a twelve-month target price of HK\$49.10, corresponding to the P/B ratio of the book value per share for 2020/2021/2022 is 2.57x/2.50x/2.42x. Accumulate rating is given for the first coverage. (Exchange rate: 7.78 USD/HKD) (Current price as at 16 December 2020)

Peer comparison

Company	Stock code	Closing Price	Market Cap	P/E			P/B			
				TTM	2020	2021	TTM	2020	2021	
(listed currency) (million RMB)										
华虹半导体	1347 hk equity	40.35	45,249	83.5x	84.9x	60.8x	2.92x	2.97x	2.67x	
中芯国际	981 hk equity	21.25	205,038	31.5x	40.7x	60.6x	1.01x	1.35x	1.36x	
台积电	2330 tt equity	504.00	3,082,000	27.0x	25.9x	23.8x	7.43x	6.98x	6.04x	
联华电子股份有限公司	2303 tt equity	44.00	129,484	24.7x	23.6x	21.4x	2.52x	2.48x	2.39x	
				Average	41.7x	43.8x	41.6x	3.5x	3.4x	3.1x
				Median	29.3x	33.3x	42.2x	2.7x	2.7x	2.5x

Closing price as of 15 December 2020

Source: Bloomberg, PSHK

Risks

- 1) U.S. export control risks
- 2) The Company's capacity growth and order prices fell short of expectations
- 3) Global economic development is not as expected

Financial statements

Key financial data

FYE DEC	FY18	FY19	FY20E	FY21E	FY22E
Valuation Ratio					
P/E ratio	37.20	44.55	80.55	66.63	43.71
P/B ratio	2.55	2.24	2.18	2.11	2.01
Per share data (USD)					
EPS	0.14	0.12	0.07	0.08	0.12
Book value per share	2.09	2.38	2.45	2.53	2.65
Growth & Margin					
Revenue growth	15%	0%	5%	26%	11%
Net profit growth	28%	-16%	-45%	21%	52%
Net profit margin	20%	17%	9%	8%	11%
Key Ratios					
ROE	6.8%	5.3%	4.9%	4.8%	4.5%
ROA	6.0%	4.5%	3.9%	3.7%	3.4%

Closing price as at 16 December 2020

Source: Company data, PSHK

Consolidated Statement of Profit or Loss and Other Comprehensive income

(USD'000)						
Fiscal year	2017A	2018A	2019A	2020E	2021E	2022E
Fiscal year end date	12/31/17	12/31/18	12/31/19	12/31/20	12/31/21	12/31/22
Revenue	808,148	930,268	932,567	983,710	1,235,310	1,375,480
Cost of Sales	(540,971)	(619,114)	(650,107)	(751,605)	(938,861)	(1,032,986)
Gross Profit	267,177	311,154	282,460	232,105	296,449	342,495
Other income and gains	24,394	43,613	69,091	50,812	50,812	50,812
Fair value gain on an investment property	89	247	163	-	-	-
Selling and distribution expenses	(7,232)	(7,771)	(8,828)	(9,312)	(11,694)	(12,429)
Administrative expenses	(108,673)	(122,323)	(169,796)	(179,108)	(224,918)	(223,203)
Other expenses	(10,712)	(11,106)	(406)	(7,408)	(6,307)	(4,707)
Share of profit of an associate	9,622	9,444	10,131	14,516	25,000	40,000
Income from operations	174,665	223,258	182,815	101,605	129,343	192,968
Other income (expenses):						
Finance costs	(2,178)	(2,203)	(1,242)	(1,236)	(8,000)	(8,000)
profit before income tax	172,487	221,055	181,573	100,369	121,343	184,968
Income tax benefits (expenses)	(27,225)	(35,447)	(26,588)	(14,654)	(17,716)	(27,005)
Profit for the year	145,262	185,608	154,985	85,715	103,627	157,963
Net profit attributable to ordinary shareholders	239,739	183,158	162,237	153,983	158,027	153,963
Net profit(loss) attributable to non-controlling interests	-	2,450	(7,252)	(68,268)	(54,400)	4,000

Source: Company data, PSHK

Consolidated Statement of Financial Position

(USD'000)						
Fiscal year	2017A	2018A	2019A	2020E	2021E	2022E
Fiscal year end date	12/31/17	12/31/18	12/31/19	12/31/20	12/31/21	12/31/22
Non-current assets						
Property, plant and equipment, net	733,462	773,180	1,558,283	2,355,460	2,704,914	2,704,423
Investment property	179,586	171,225	168,615	172,727	172,727	172,727
Prepaid land use rights, net	20,634	58,989	-	-	-	-
Right-of-use assets	-	-	74,526	75,810	75,810	75,810
Intangible assets	7,411	9,571	13,322	33,603	33,603	33,603
Investment in an associate	57,577	64,005	73,142	86,593	111,593	151,593
Available-for-sale investments	215,864	-	-	-	-	-
Equity investments	-	208,357	207,689	212,754	212,754	212,754
Long term prepayments	3,266	12,509	13,548	44,094	55,372	61,655
Deferred tax assets	7,074	6,363	7,567	7,982	10,024	11,161
Current assets						
Inventories	115,578	129,629	142,087	149,879	188,213	209,570
Trade and notes receivables	112,372	176,797	164,968	174,015	218,522	243,318
Prepayments, other receivables and other assets	10,074	12,479	113,453	119,675	150,284	167,336
Due from related parties	46,988	10,800	9,262	9,770	12,269	13,661
Financial assets at fair value through profit or loss	-	667,033	519,779	84,759	84,759	84,759
Restricted and time deposits	193,530	337	70,776	766	766	766
Cash and cash equivalents	374,890	777,000	476,286	423,232	197,748	341,463
Total assets	2,078,306	3,078,274	3,613,303	3,951,119	4,229,358	4,484,598
Non-current liabilities						
Interest-bearing bank borrowings	32,139	26,227	21,502	19,823	19,823	19,823
Lease liabilities	-	-	16,694	17,311	17,311	17,311
Deferred tax liabilities	14,123	18,146	17,176	18,118	22,752	25,334
Current liabilities						
Trade payables	68,124	79,470	86,119	90,842	114,076	127,020
Other payables and accruals	129,908	165,370	303,614	320,265	402,177	447,812
Interest-bearing bank borrowings	60,751	4,371	4,300	223,844	281,096	312,992
Lease liabilities	-	-	1,922	3,757	3,757	3,757
Government grants	40,523	44,406	40,641	40,105	40,105	40,105
Due to related parties	10,885	5,838	10,655	13,467	13,467	13,467
Income tax payable	26,648	30,114	28,088	29,628	37,206	41,428
Total liabilities	383,101.00	373,942.00	530,711	777,160	951,771	1,049,049
Share capital	1,554,870	1,960,159	1,966,095	1,971,748	1,971,748	1,971,748
Reserves	140,335	195,097	279,146	433,129	591,156	745,118
Total equity attributable to owners of the parent	1,695,205	2,155,256	2,245,241	2,404,877	2,562,904	2,716,866
Non-controlling interests	-	549,076	837,351	769,083	714,683	718,683
Total equity	1,695,205	2,704,332	3,082,592	3,173,960	3,277,587	3,435,549

Source: Company data, PSHK

Consolidated Cash Flow Statement

(USD'000)						
Fiscal year	2017A	2018A	2019A	2020E	2021E	2022E
Fiscal year end date	12/31/17	12/31/18	12/31/19	12/31/20	12/31/21	12/31/22
Profit before tax	172,487	221,055	181,573	100,369	121,343	184,968
Adjustment for:						
Depreciation and amortization	103,976	119,193	126,074	204,823	300,546	300,491
Others	(7,963)	(23,707)	(37,293)	(22,988)	(27,996)	(29,426)
Decrease/(Increase) in working capital assets	(35,813)	(46,031)	(100,313)	411,451	(115,949)	(64,597)
Increase/(Decrease) in working capital liabilities	41,795	30,301	21,229	244,293	169,977	94,697
Decrease/(Increase) in other non-current assets	2,331	6,011	(2,380)	(30,546)	(11,278)	(6,283)
Increase/(Decrease) in other liabilities	1,196	(5,047)	4,817	322	31	1,723
Cash generated from operations	278,009	301,775	193,707	907,723	436,674	481,574
Income tax paid	(19,709)	(27,375)	(30,773)	(14,654)	(17,716)	(27,005)
Net cash flows generated from operating activities	258,300	274,400	162,934	893,070	418,958	454,568
Capital expenditures	(138,087)	(229,837)	(922,281)	(1,000,000)	(650,000)	(300,000)
Others	(58,916)	(487,402)	199,694	(115,541)	(134,416)	(16,755)
Cash from investing activities	(197,003)	(717,239)	(722,587)	(1,115,541)	(784,416)	(316,755)
Cash from financing activities	(41,096)	865,010	262,898	169,418	139,974	5,901
Net change in cash during period	20,201	422,171	(296,755)	(53,054)	(225,484)	143,715
Cash and cash equivalents at beginning of year	341,255	374,890	777,000	476,286	423,232	197,748
Effect of changes in foreign exchange rates on cash and cash equivalents	13,434	(20,061)	(3,959)	-	-	-
Cash and cash equivalents at end of year	374,890	777,000	476,286	423,232	197,748	341,463

Source: Company data, PSHK

PHILLIP RESEARCH STOCK SELECTION SYSTEMS

Total Return	Recommendation	Rating	Remarks
>+20%	Buy	1	>20% upside from the current price
+5% to +20%	Accumulate	2	+5% to +20% upside from the current price
-5% to +5%	Neutral	3	Trade within $\pm 5\%$ from the current price
-5% to -20%	Reduce	4	-5% to -20% downside from the current price
<-20%	Sell	5	>20% downside from the current price

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