

New Productive Forces

Shanghai's Integrated Circuit Industry Development and Emerging Real Estate Trends

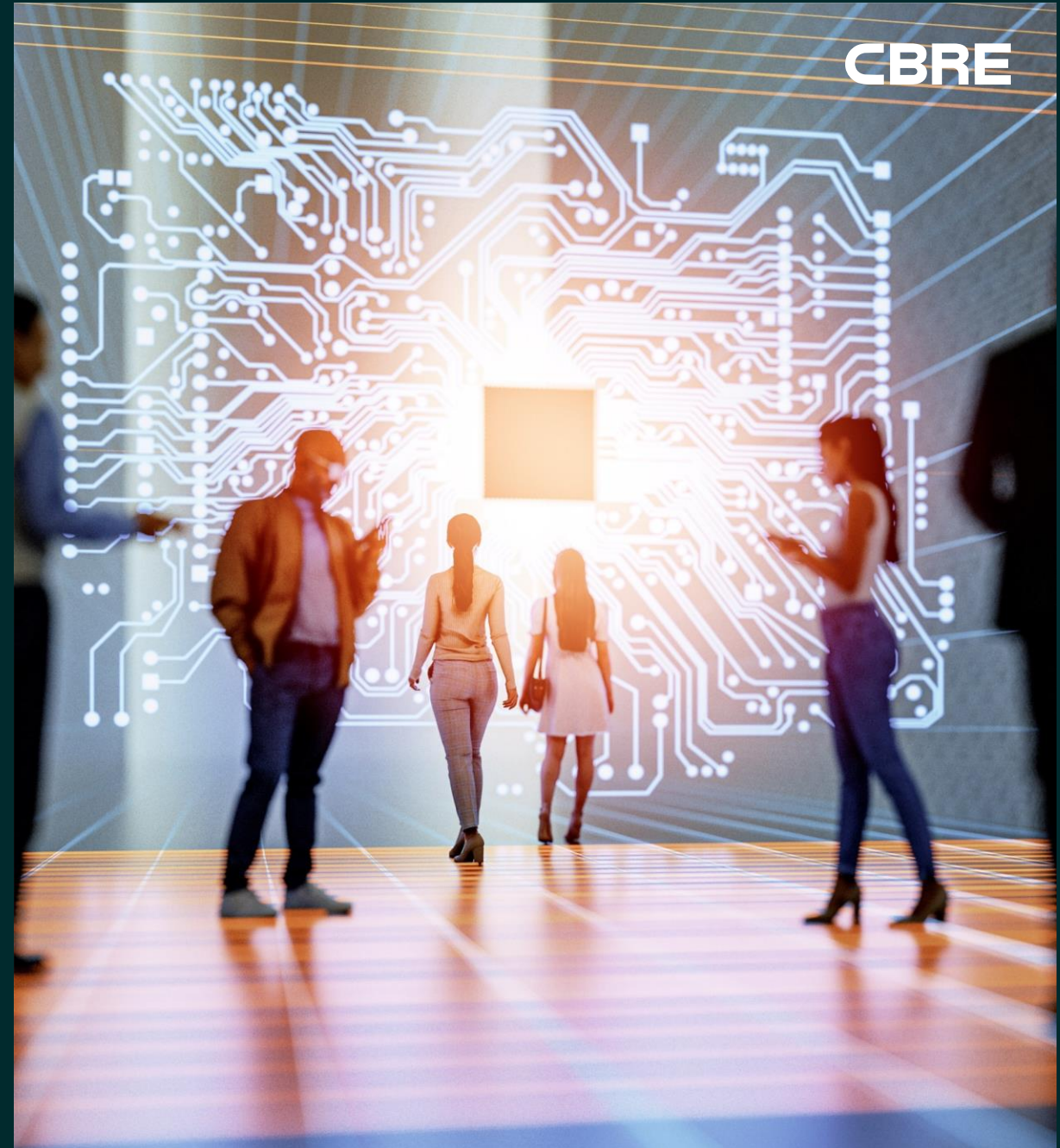
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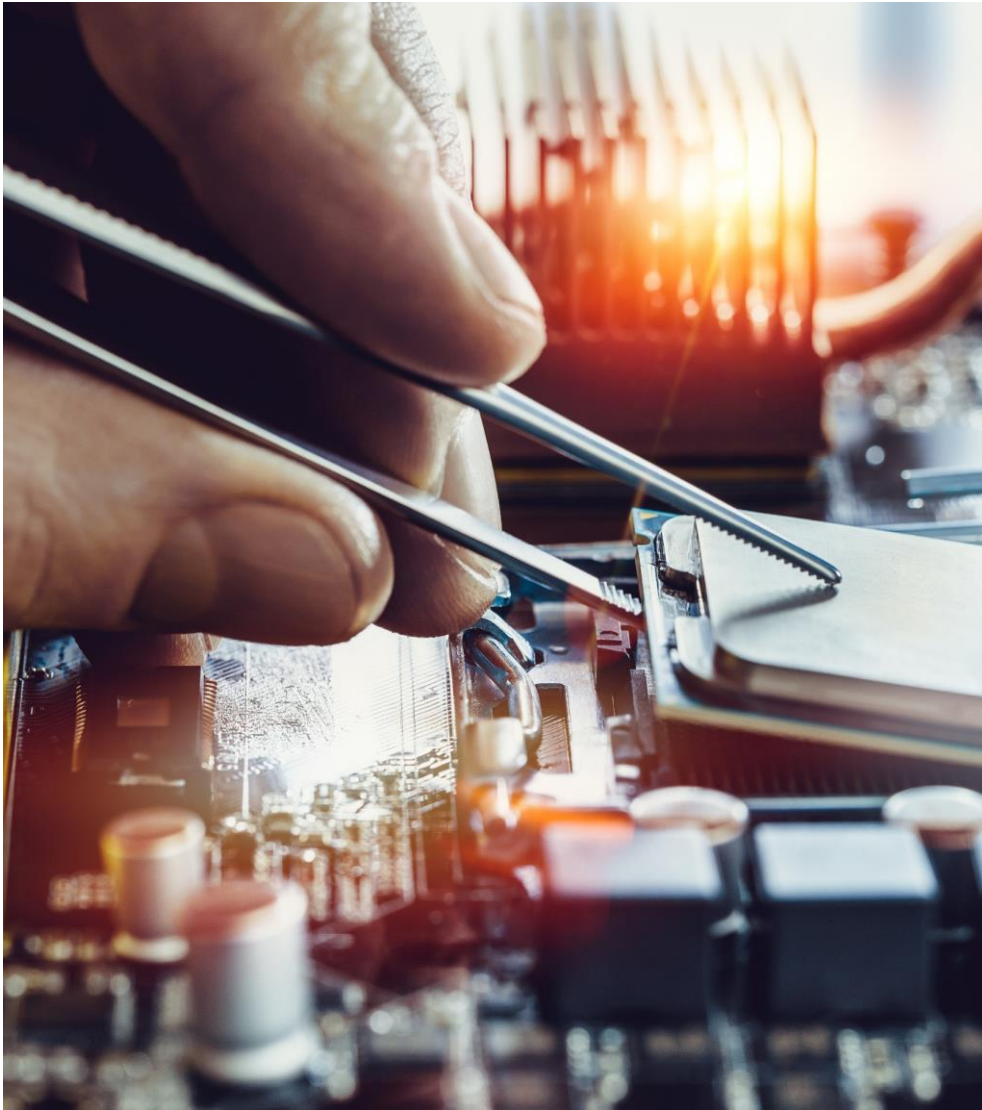
REPORT

CBRE Research

November 2024

CBRE





Preface

After experiencing considerable volatility over the past two years, the global semiconductor industry entered a recovery phase in 2024. Driven by breakthroughs in Artificial Intelligence (AI), China's integrated circuit industry displayed remarkable performance in H1 2024, with revenues from chip manufacturing and design companies improving significantly. With AI having become a key driver of industry growth, demand for semiconductor equipment remains robust. China has held the position of the world's largest semiconductor equipment market for several consecutive quarters this year, with multiple industry organisations expressing an optimistic view of the market outlook.

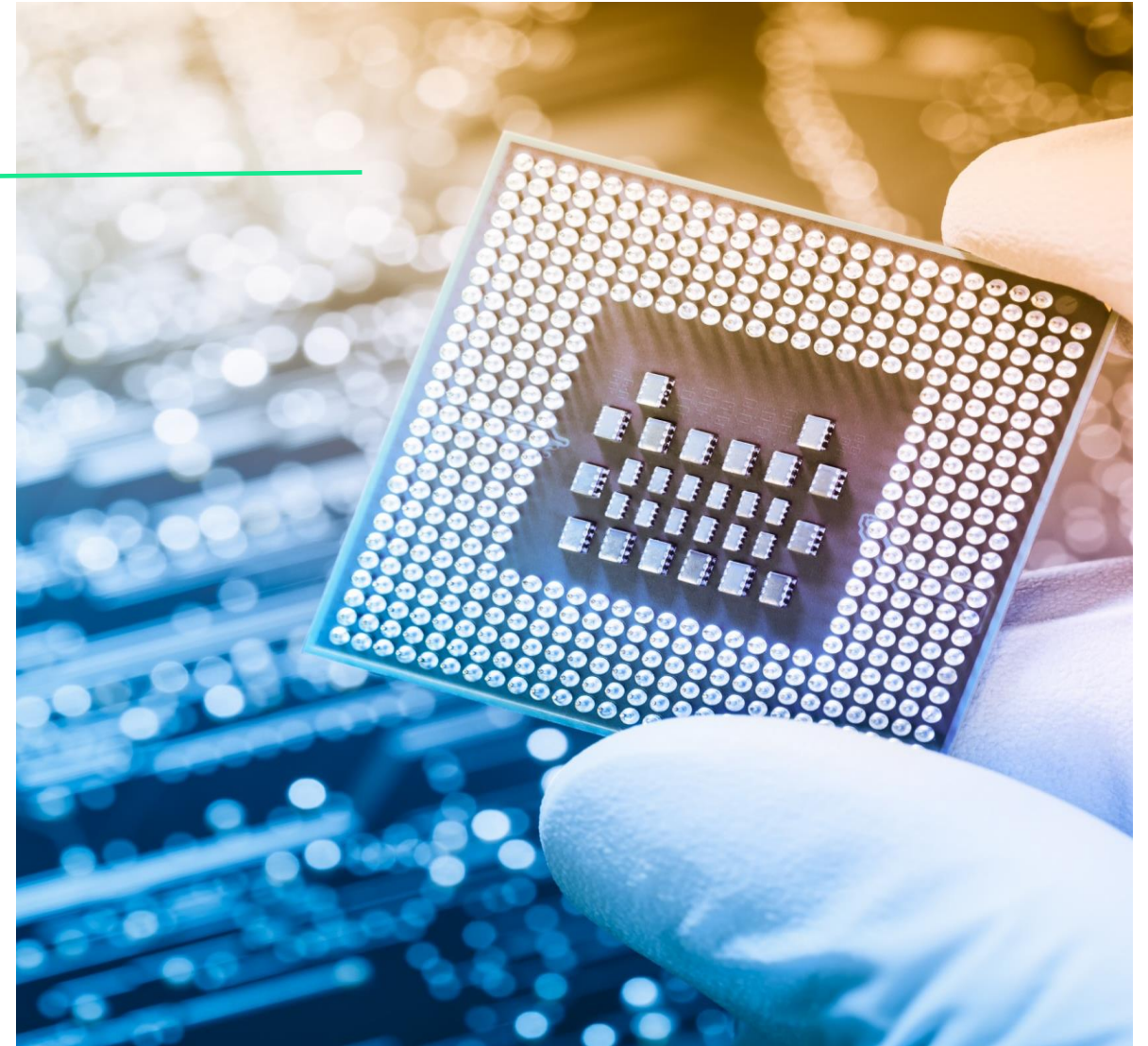
In 2023, advancements in AI triggered a new wave of productivity revolution, highlighting the critical importance of computing power, especially in augmenting national competition. The rapid development of Shanghai's emerging industries including New Energy Vehicles (NEVs); Internet of Things (IoT); and smart manufacturing has further fueled chip demand, ushering in a new growth cycle for the industry and providing strong momentum for national development.


Semiconductor products can be categorised into four main types: integrated circuits, discrete devices, sensors, and optoelectronic devices. Integrated circuits, commonly known as semiconductor chips, are the foundation of China's national information industry and a driving force for independent technological and economic development.

This report provides an overview of Shanghai's integrated circuit industry and features strategic real estate recommendations for occupiers and investors engaged in this sector.

Contents

- 01 Overview of the Integrated Circuit Industry
- 02 Site Selection Criteria for Integrated Circuit Companies
- 03 Factors and Strategies for R&D Office Site Selection
- 04 Outlook and Recommendations





Overview of the Integrated Circuit Industry

Bright Outlook for the Integrated Circuit Industry

In 2014, the central government elevated the development of China's integrated circuit industry to a national strategy, marking a new growth phase for the sector and significantly increasing its market size. With the rise of the digital economy, the maturation of big data, AI, and IoT technologies, along with the continuous improvement of digital infrastructure, the application scenarios for chips are expanding, leading to a new surge in related demand.

China has long faced a substantial trade deficit in integrated circuits, making it heavily reliant on imports of high-end chips. Due to trade conflict with the U.S. and the post-pandemic global economic slowdown, both import and export values have declined since 2020. However, the trade deficit has been narrowing, decreasing significantly by 18.3% in 2023. This change is closely tied to the development of the domestic semiconductor industry and a localisation effect resulting from China's growing technological independence.

While China's chip self-sufficiency rate is rising and expected to reach 23% in 2023, it remains well short of the long-term target of 70%. This indicates that there remains significant market potential in chip manufacturing levels and output capabilities. Nevertheless, continued steady progress will rest upon further industrial development and innovative breakthroughs in cutting-edge fields.

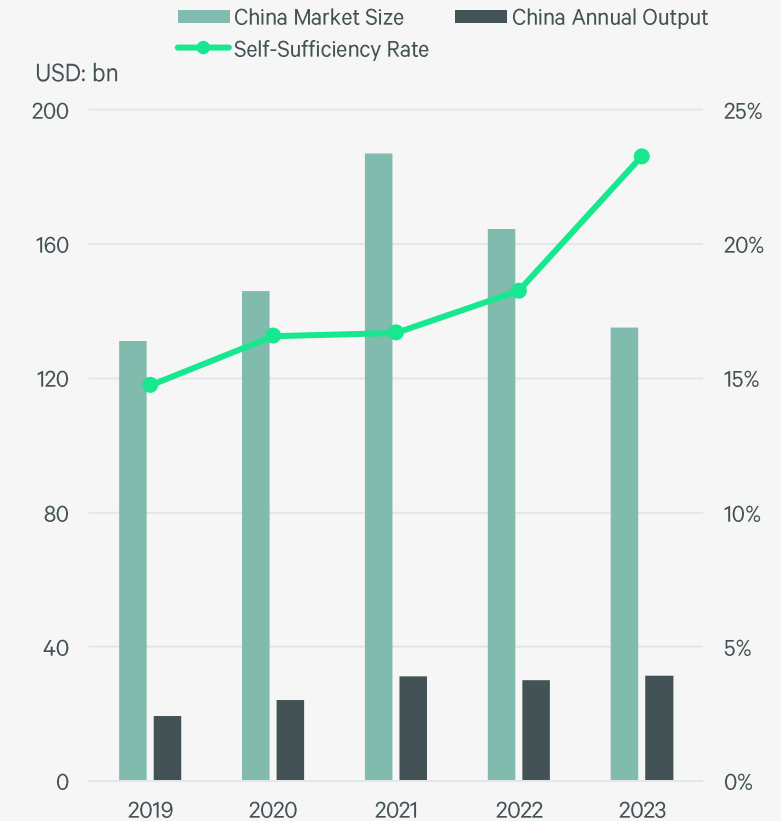
Figure 1: China Integrated Circuit Import and Export Volume



Source: Customs Bureau, CBRE Research, November 2024.

Note: Trade Deficit = Import Amount - Export Amount

Figure 2: China's Semiconductor Chip Self-Sufficiency Rate

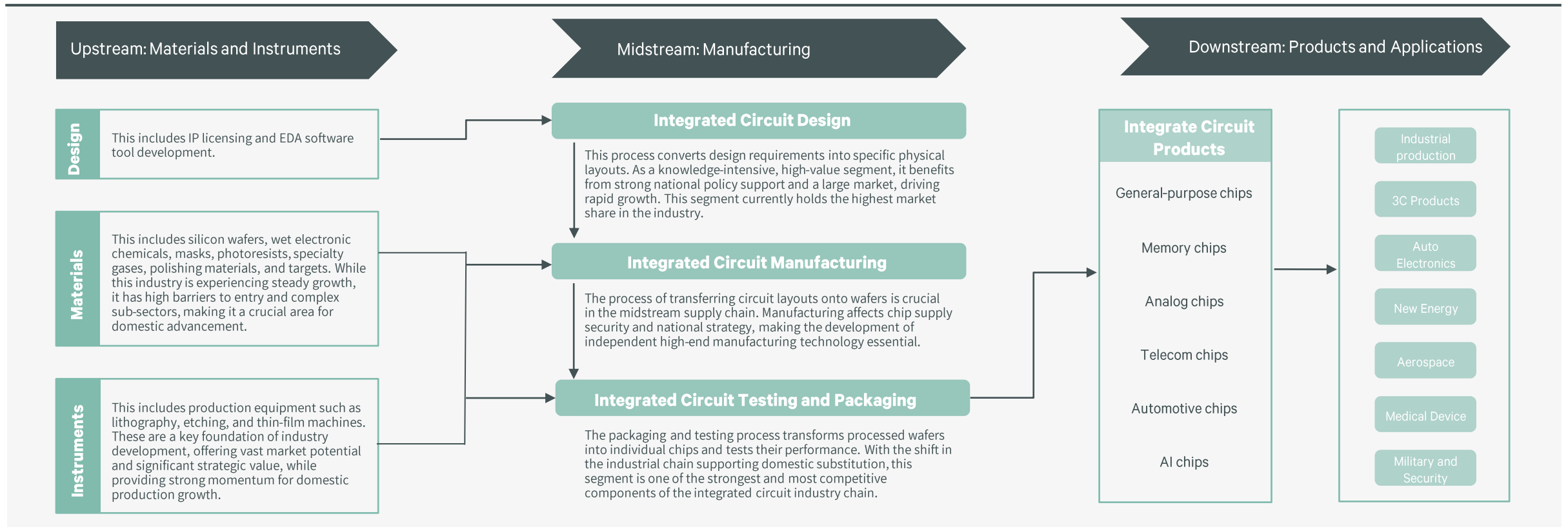


Source: Tech Insights, CBRE Research, November 2024.

Note: China's output value includes the output value of foreign-funded manufacturing and domestic-funded manufacturing
 Note: Self-Sufficiency Rate = Output Value / Market Size

Overview of the Integrated Circuit Industry Chain

The integrated circuit industry chain can be divided into three layers: upstream materials and equipment, midstream production, and downstream products and applications. The upstream layer consists of hardware and software materials and equipment, including design support such as EDA/IP and various semiconductor materials and equipment needed for production processes. The midstream production layer includes design, manufacturing, and packaging/testing processes. Common business models in this sector include Integrated Device Manufacturing (IDM), Fables, and Foundry models. This process results in the delivery of various chip products to downstream application fields through distributors or direct sales by original manufacturers.



Source: Public Resources, CBRE Research, November 2024.

Shanghai's Leading Position in the Integrated Circuit Industry

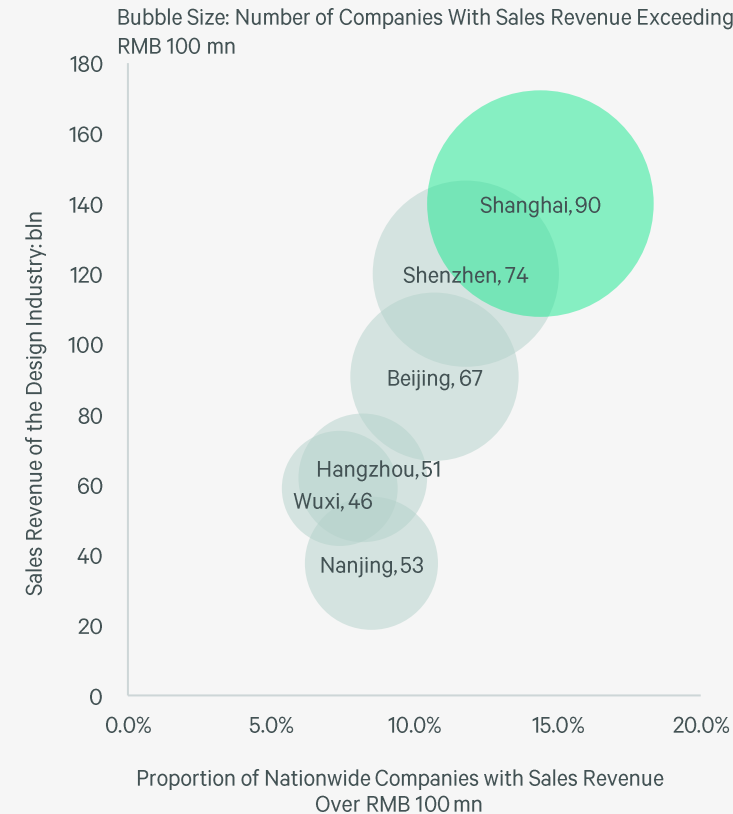
Shanghai's integrated circuit industry is robust, comprising a complete supply chain and boasting high technical standards, ensuring strong competitiveness. Designated as a key advanced manufacturing cluster in 2019, it is China's only full industry chain cluster named after integrated circuits.

Sales of Shanghai's integrated circuits reached RMB 325.2 billion in 2023, accounting for 26.5% of the national total. The city is home to significant portion of China's domestic chip design companies, with many well-known firms establishing headquarters or R&D centres in the city, leveraging local innovation policies and talent to drive technological advancement.

Shanghai produced 28.6 billion integrated circuits in 2023, about 8% of the national output, ranking fourth among China's provinces. The city is home to 20 production lines in operation or under construction, with 14 nanometer (14nm) process mass production already having been achieved.

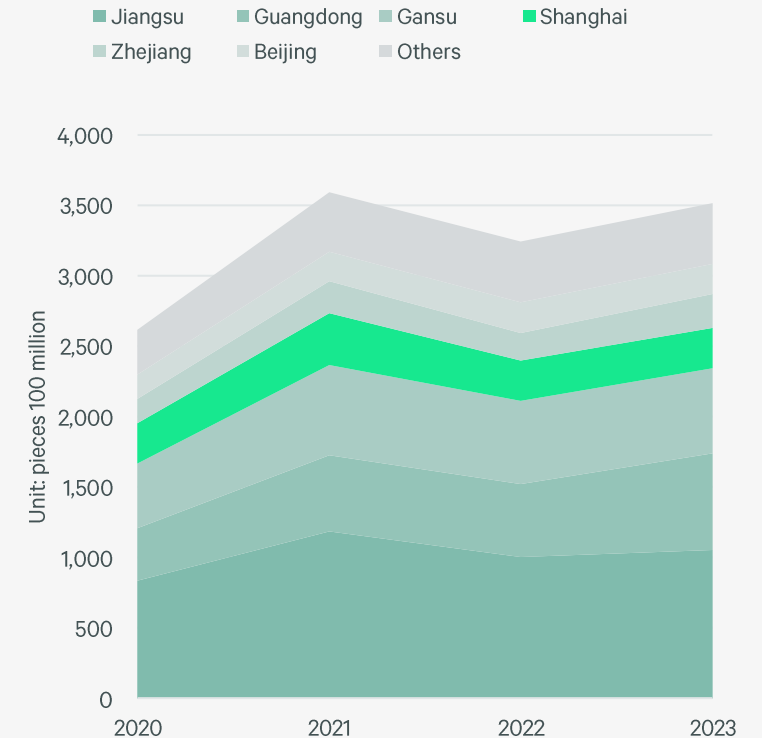
In the upstream sector, Shanghai has shown notable innovation, with Shanghai Microelectronics advancing to 22 nanometer (22nm) lithography technology and equipment for etching, and cleaning nearing global standards. In addition, the production of key materials such as large silicon wafers and photoresists is now in a trial production phase.

Figure 3: 2023 Integrated Circuit Design Industry Comparison



Source: 2023 China Integrated Circuit Design Industry Summit, 2023.

Figure 4: Comparison of Large-Scale Integrated Circuit Output



Source: China Bureau of Statistics, CBRE Research, November 2024.

Distinct Competitive Advantages of Shanghai's Integrated Circuit Industry

Figure 5: Shanghai Integrated Circuit Industry Output

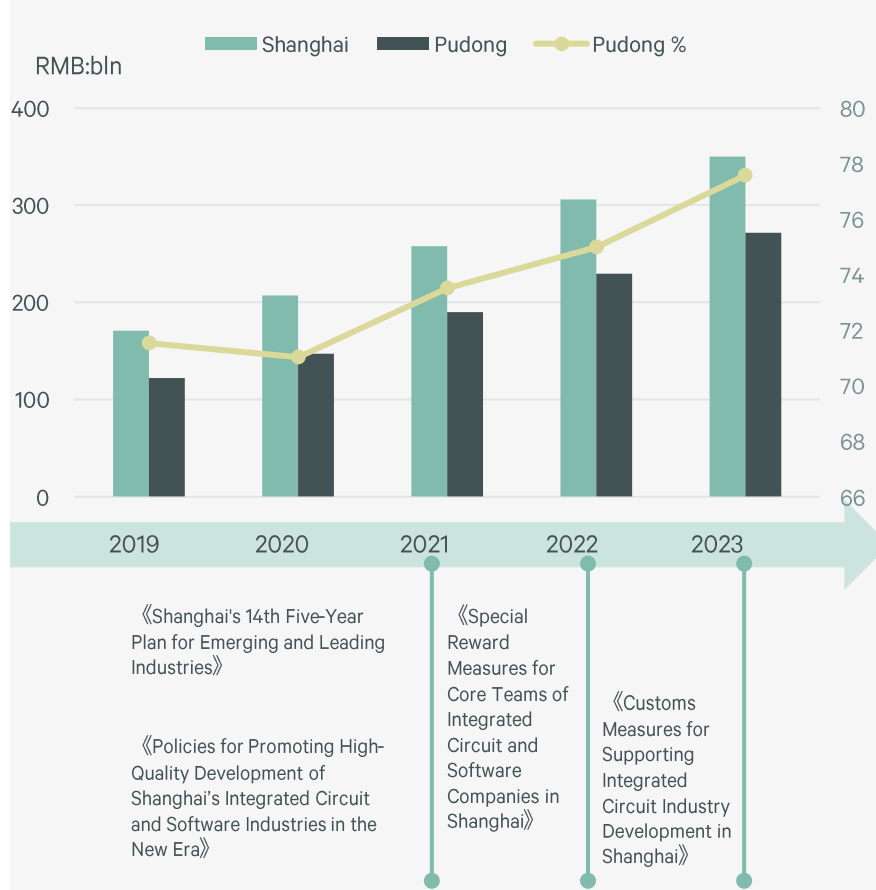
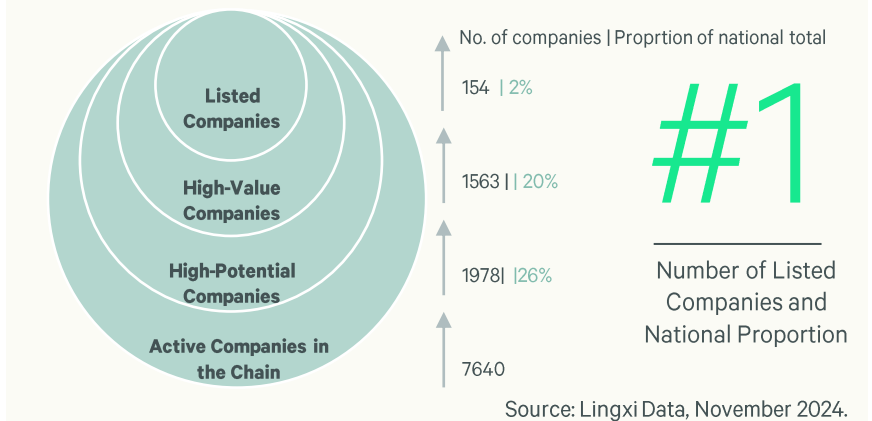
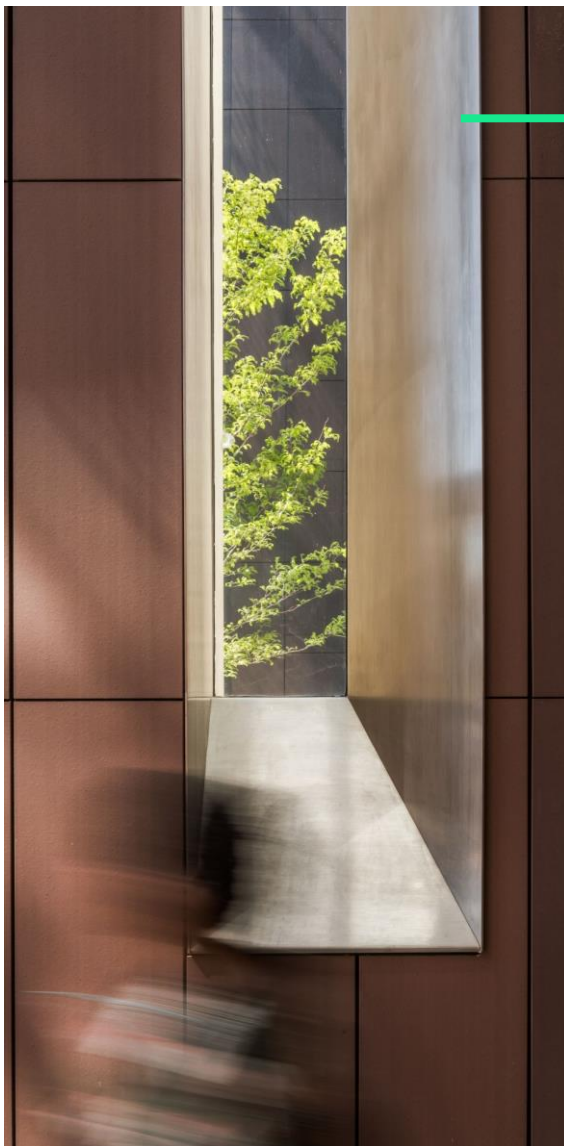
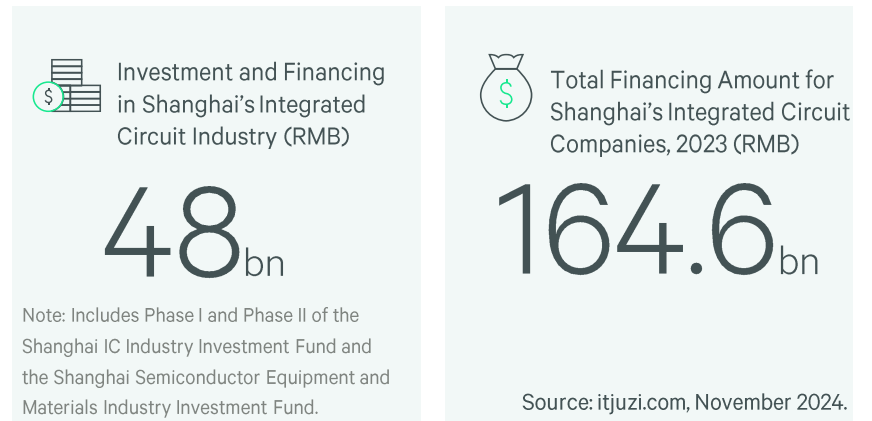


Figure 6: Structure of Integrated Circuit Companies in Shanghai



Investment and Financing in Shanghai's Integrated Circuit Industry



Measures to Attract Talent to Support Industry Development

40%

Shanghai's Share of National Integrated Circuit Talent

ATTRACTING TALENT

Talent Settlement

Talent employed in Shanghai's integrated circuit industry can shorten the time for residency conversion to just three years.

Foreign Talent

Foreign high-level talent can apply for permanent residency through streamlined entry and exit channels.

Talent Programmes

Various talent programmes are available, such as the "Pearl Plan" in Pudong and the "Zhangjiang Star" enterprise cultivation plan.

RETAINING TALENT

Talent Apartments

"The "14th Five-Year Plan" aims to complete the construction of 200,000 apartments for talented workers.

Subsidy Policy

As of H1 2024, three batches of municipal talent rental subsidies totalling RMB 300 million have been implemented and distributed to key and young talent.

Living Amenities

Authorities are constructing supporting facilities such as commercial, educational, and medical services in industrial parks.

CULTIVATING TALENT

Government-Enterprise Cooperation

Authorities are promoting the "Joint Talent Development" model in the integrated circuit industry to cultivate urgently needed master's and doctoral engineers in the design, manufacturing, packaging/testing, and materials fields.

Education Reform

The central government has initiated comprehensive reform of higher education through a policy of "One Principle + Ten Special Plans," and established a talent cultivation alliance for the amalgamation of industry and education in the integrated circuit sector.



Site Selection Criteria
for Integrated Circuit
Companies

Industry Landscape Moves Towards Concentration

Figure 7: Shanghai Integrated Circuit Industry Location Map



Source: CBRE Research, November 2024.



Shanghai's industrial districts are developing according to their various strengths, exhibiting a "one core, two wings" spatial layout. The core is comprised of Pudong New District, with a southern wing including Songjiang, Jinshan, Fengxian, and Qingpu, and a northern wing comprising Jiading, Xuhui, Putuo, and Baoshan. Key industrial zones include Zhangjiang Science City and the Lingang New Area, which enjoy strong synergies and feature specialised parks such as the Integrated Circuit Design Industrial Park and Oriental Chip Harbour.

Zhangjiang, Shanghai's earliest and most developed industrial area, has achieved significant industrial agglomeration. CBRE's 2022 Industrial Tenant Survey found that the district is home to 64% of the city's existing integrated circuit companies and accounted for 64% of new leasing demand from 2019 to 2023.

Figure 8: Distribution of Shanghai integrated Circuit Tenants, 2022

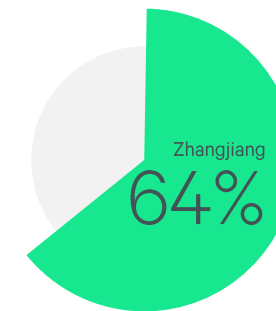
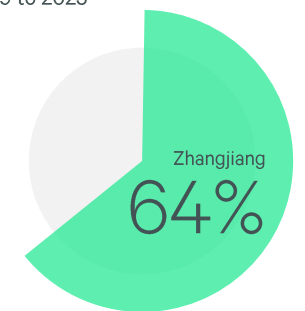


Figure 9: Distribution of Shanghai Integrated Circuit Tenants by New Leases, 2019 to 2023



Source: CBRE Research, November 2024.

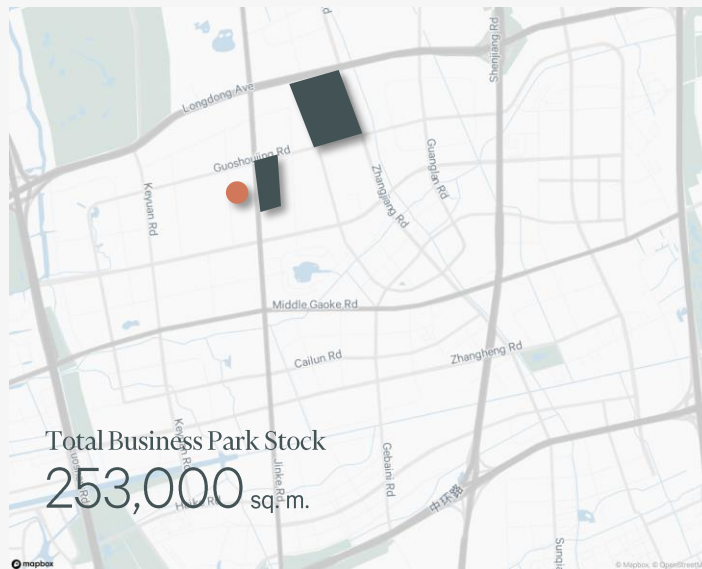
Influence of Leading Companies in Industry Site Selection

The Source Of Chips: The establishment of the wafer fab (a manufacturing plant that produces integrated circuits from raw silicon wafers) in 2003 laid a solid foundation for the growth of the Zhangjiang chip industry cluster as a key hub for industry chain development.

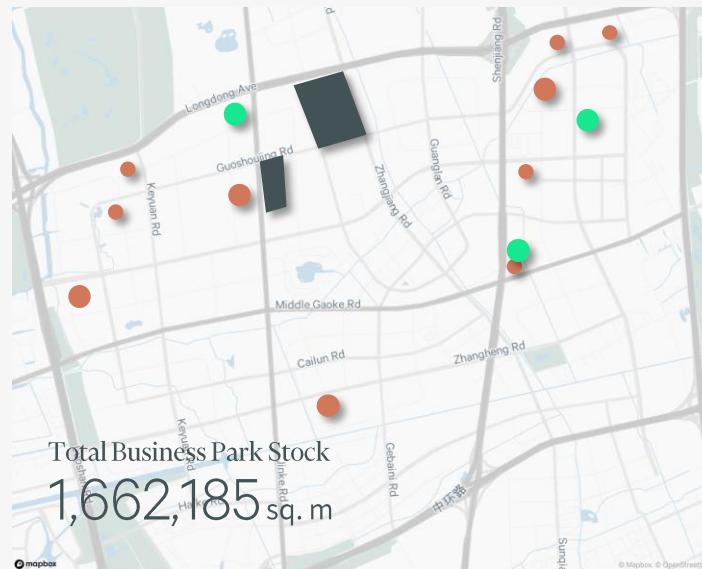
Period of Rapid Growth: The next decade saw industrial parks supporting the information industry established around the wafer fab, attracting domestic and foreign companies to set up headquarters or R&D centres.

City Of Chips: As of 2023, Zhangjiang was home to 60 materials and equipment companies; more than 20 manufacturing and packaging/testing firms; and over 400 chip design companies, including seven of the top 10 global chip design firms and six of the top 10 in China.

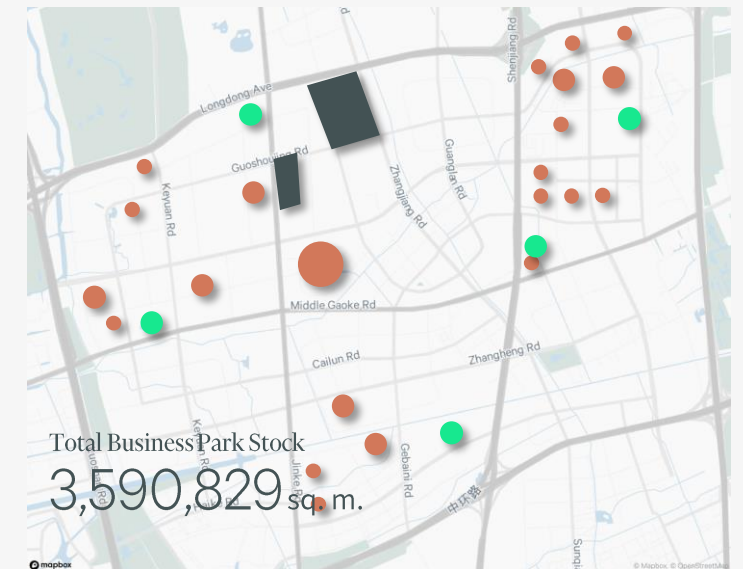
Wafer fab
 BP Projects
 Headquarters of leading companies.



Total Business Park Stock
253,000 sq. m.



Total Business Park Stock
1,662,185 sq. m.



Total Business Park Stock
3,590,829 sq. m.

2003 Dot

2013 Tech Zone

2023 Tech City

Business Park stock grows to 1,662,185 sq. m.

Business Park stock expands to 3,590,829 sq. m.

Source: CBRE Research, November 2024.

Note: Yellow dots represent key industrial park projects, with size indicating scale and land area.
Note: The total stock of business parks is based on CBRE Research coverage.

Steady Growth in R&D Office Leasing Demand

CBRE's analysis of leasing demand from integrated circuit companies in Shanghai over the past five years shows that requirements for new leases and relocations in industrial parks has been rising steadily.

2019 and 2020 saw steady expansion by foreign integrated circuit companies. At the same time, growing domestic production and the emergence of successful business incubators supported the growth of local and domestic enterprises, leading to increased demand for new setups. Amid the growing popularity of ChatGPT, global competition in chip development has intensified, with local chip companies experiencing a new wave of growth in 2023, resulting in strong demand for relocations and new setups.

CBRE's analysis of industry segments reveals that chip design companies spanning key areas such as CPU/GPU, automotive electronics chips, analogue chips, communication chips, storage chips, and artificial intelligence chips, are exhibiting robust demand for R&D office space.

As data volume and AI applications increase, the need for data storage, transmission, and processing is growing exponentially, making high-performance computing resources a crucial part of national infrastructure. The development of independently researched computing chips has therefore become a key focus area. This is driving the demand for R&D office leasing, facilitating the formation of integrated circuit industry clusters in Shanghai's industrial parks.

Figure 10: Integrated Circuit Tenant Leasing Demand Analysis by Segment, 2019-2023

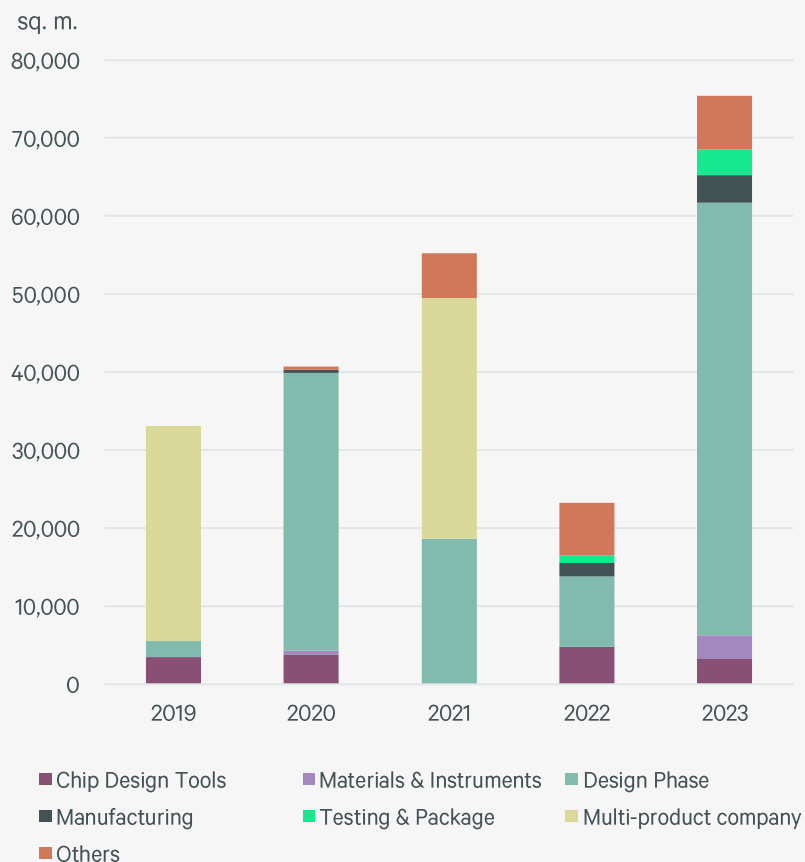


Figure 11: Integrated Circuit Tenant Leasing Demand Analysis by Nationality, 2019-2023

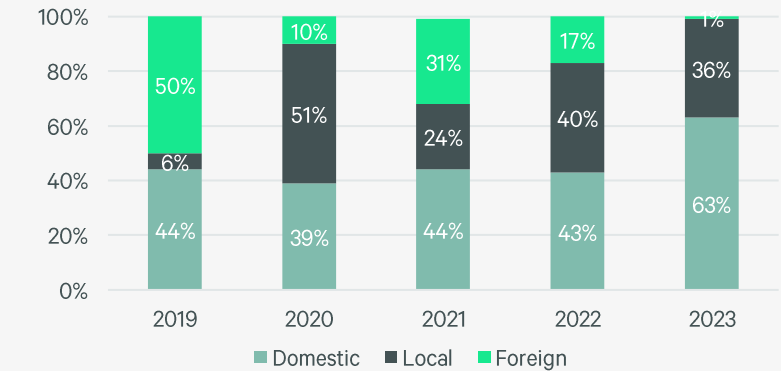
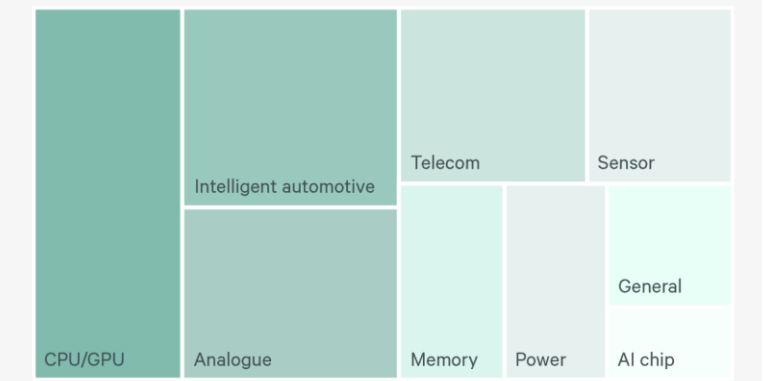


Figure 12: Integrated Circuit Tenant Leasing Demand Analysis by Product, 2019-2023



Source: CBRE Research, November 2024.

Strong Investment and Financing Boost Leasing Demand

Favourable industrial policies and China's push for domestic self-sufficiency have made the integrated circuit industry increasingly attractive to investors. In 2021, the launch of the Sci-Tech Innovation Board, also known as the STAR Market, sparked a new wave of investment. After a brief market adjustment in 2022, sectors with competitive advantages in hard technology emerged as hotspots for capital. By 2023, investment and financing in the integrated circuit industry rebounded significantly, driving leasing demand.

Industry data show financing for Shanghai's integrated circuit firms cover various development stages, indicating strong confidence from industrial capital and venture funds in the sector's long-term prospects. As a result, new leasing demand is being seen from companies at different stages of growth.

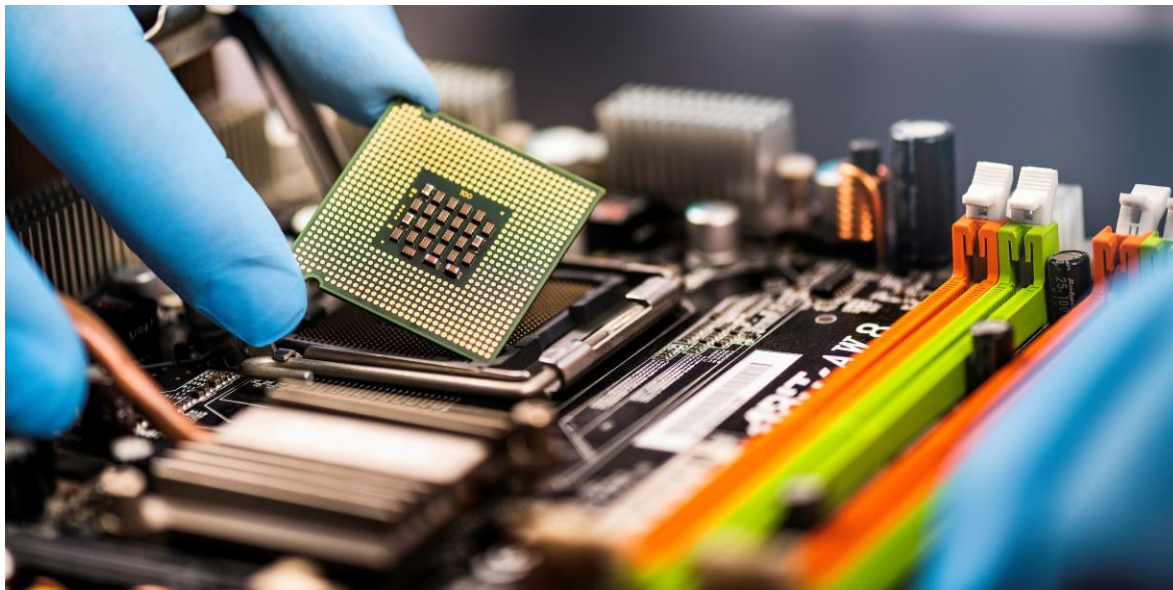
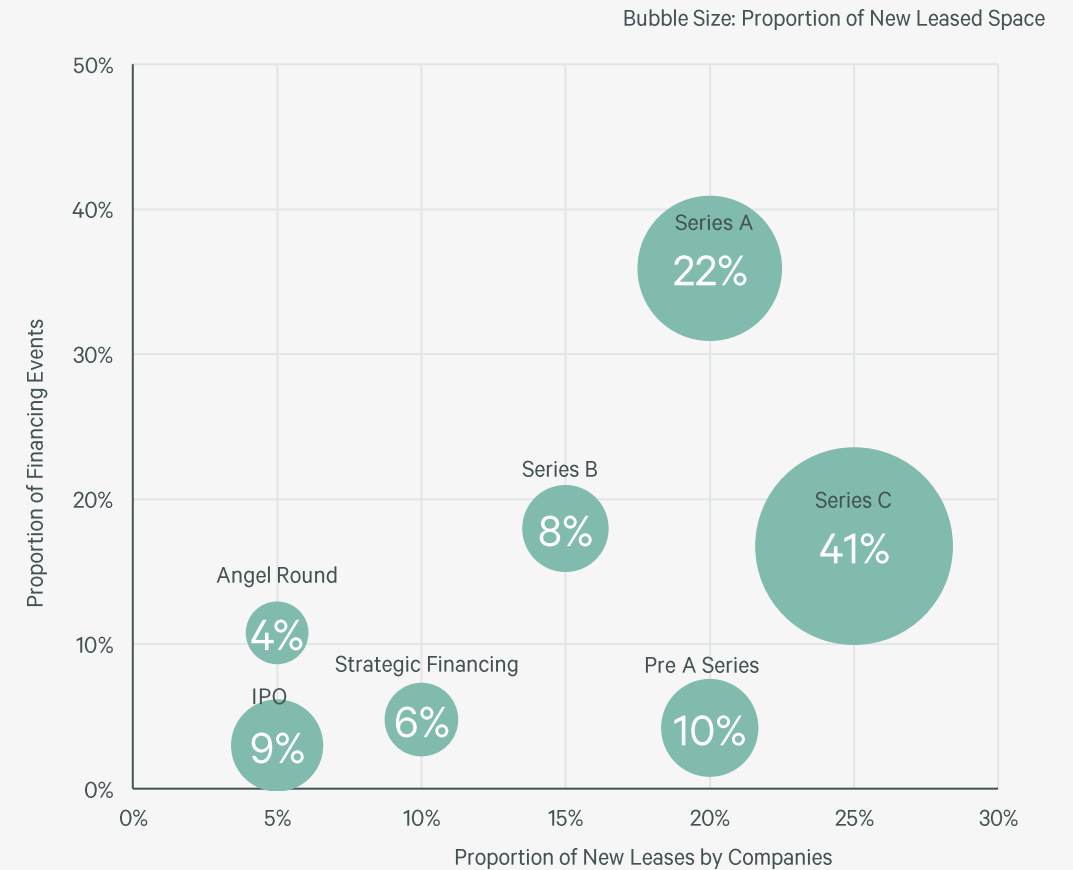
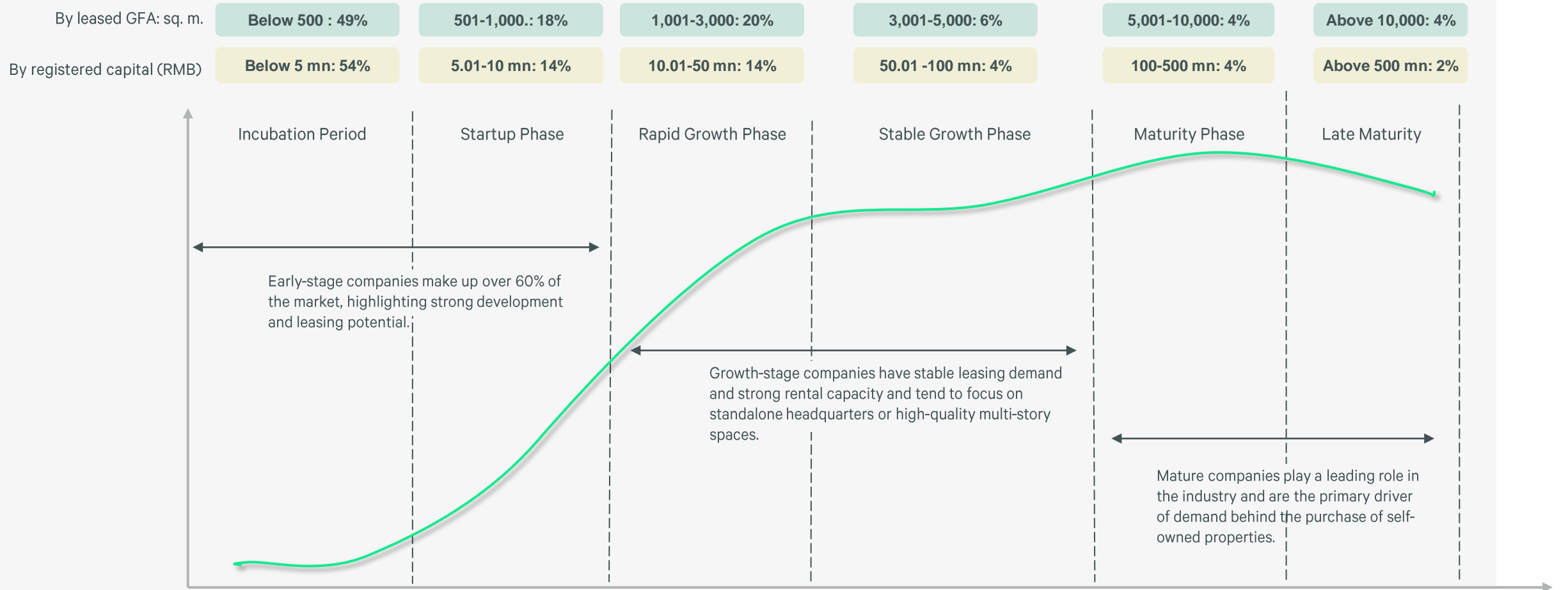


Figure 13: 2023 Integrated Circuit Companies' Leasing Demand by Financing Round



Source: cyzone.cn, CBRE Research, November 2024.

Diverse Real Estate Demand Driven by Companies at Different Life Cycle Stages



Source: Lingxi Data, CBRE Research, November 2024.

Note: Statistics are based on CBRE's 2022 Industrial Tenant Profile Study
 Note: Sample of Shanghai integrated circuit companies is from Lingxi.com



Factors and Strategies for R&D Office Site Selection

Five Key Factors for R&D Office Site Selection

1

TALENT

- Abundant high-end research talent
- Skilled technical personnel
- Strong university resources

2

INDUSTRY CLUSTERING

- Presence of upstream and downstream companies
- Large leading enterprises
- Industry development funds

3

AMENITIES

- Convenient transportation by metro
- Support services such as cafeterias and rental housing
- High-end hotels and conference centres
- Incubation space
- Public service platforms

4

BUSINESS ENVIRONMENT

- Government support
- Policy implementation and customs efficiency
- Production permit and policy approval efficiency

5

PROPERTY CONDITIONS

- Environmental and discharge requirements
- Ceiling height, load, ventilation, electrical specifications
- Laboratory and equipment space



Multi-Level Regional Advantages and Innovation Resources Attract Startups

Office location Selection

One-Stop Service Platform

- Eco-Friendly Environment with High Green Coverage
- Online Public Service Platform
- Diverse Offline Policy and Talent Services

Within a 1 km Radius of a Business Park

Meeting Basic Living Amenities

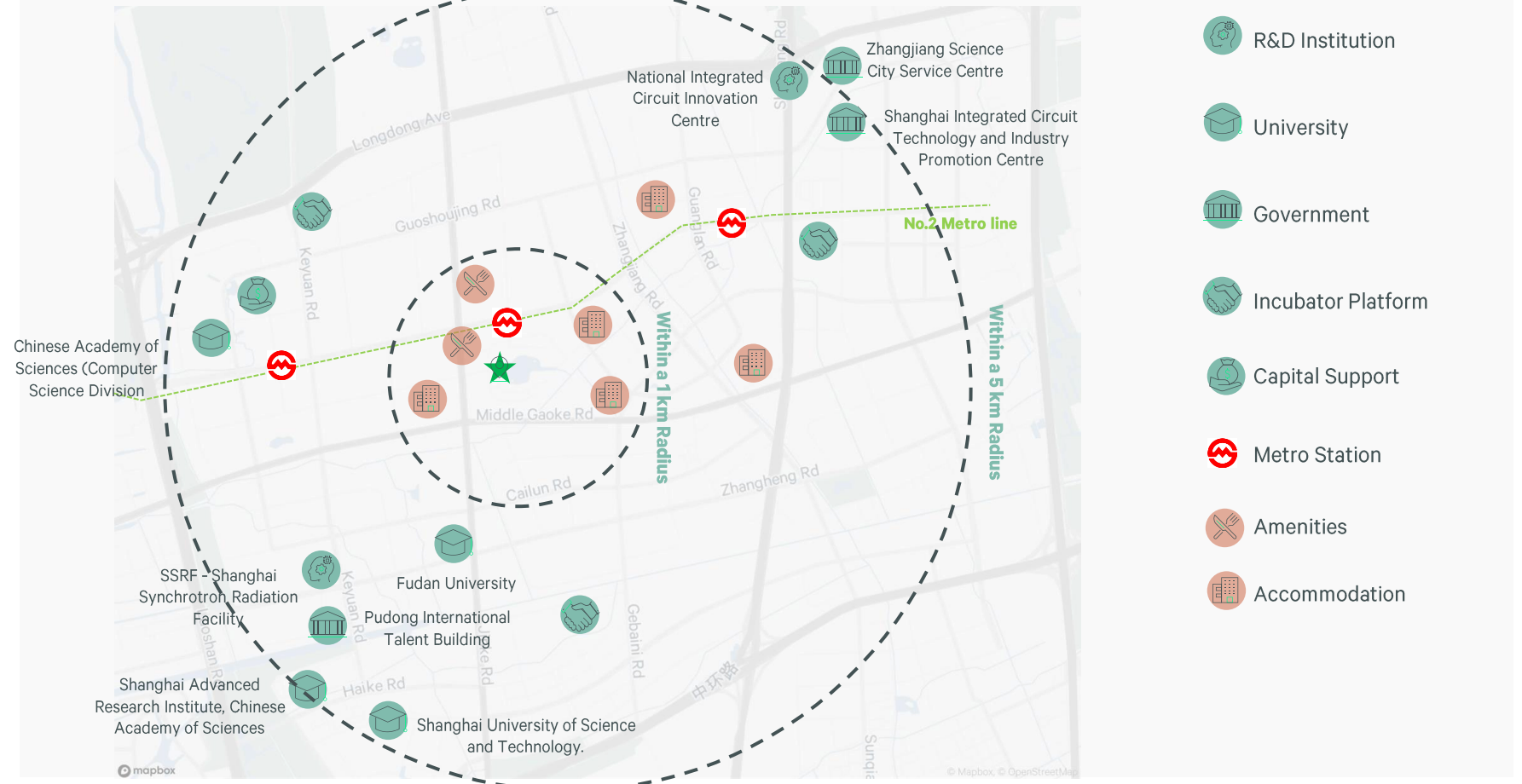
- Rich Commercial Amenities and Diverse Dining Options
- Convenient Transportation and Subway Stations
- Variety of Residential Facilities, Including Apartments for Talent

Within a 5 km Radius of a Business Park

Collaborative Innovation and Entrepreneurship System

- Government: Government Agencies and Industry Service Centres
- Industry: Incubator Platforms Leveraging Park Resources
- Capital: Capital Support Represented by Industry Investment Funds
- Academia: Research Institutes from Fudan University, Chinese Academy of Sciences, and Others
- Research: National and Municipal Innovation Research Institutions

Figure 14: Case Study of Site Selection by an Integrated Circuit Company



Source: Public Resources, CBRE Research, November 2024.

Medium-Sized Enterprises Require Multifunctional Real Estate

Office Space

65%

- Office: Features a combination of fixed and flexible workstations, with each individual workstation covering an area of approximately 4 sq. m.
- Collaboration Space: Includes areas to facilitate teamwork and communication between engineers.
- Meeting Room: Designed to accommodate a variety of meeting scenarios.

R&D Space

15%

- Laboratory and Equipment Room:
 - Clean Room: Class 100,000 cleanliness standard
 - Load Capacity: >500 kg/m²
 - Power Supply: 120-200 W/m², with capacity for expansion
 - Ventilation and Air Conditioning: Must meet additional installation conditions
 - Waste Disposal: Systems for wastewater, waste liquid, and waste treatment
 - Flooring: Preferably epoxy flooring

Leisure Amenities

15%

- Pantry: Research shows that a high proportion of engineers eat at the office, necessitating the inclusion of space for dining.
- Gym/Shower Room: Includes a variety of fitness facilities to enhance employee well-being.
- Terrace Space: The availability of outdoor space is an important advantage in site selection for businesses.

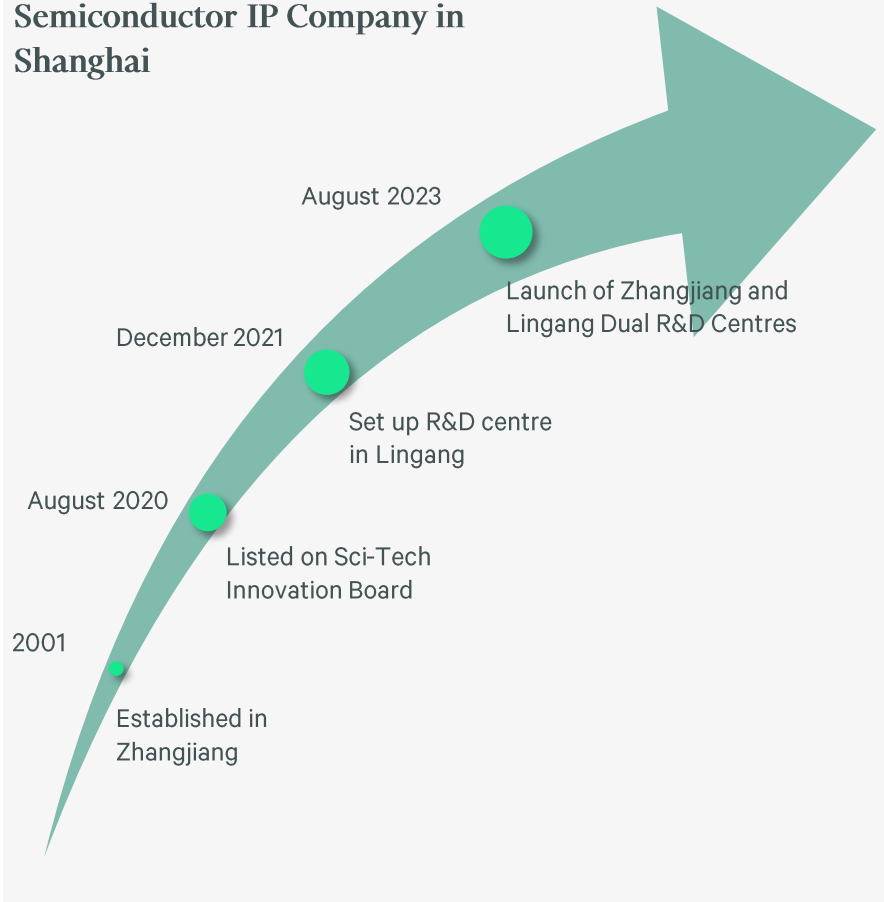
Reception & Display Area

5%

- Reception Area and Showroom:
 - Typically features a clean and straightforward design and includes dedicated areas for product and technology displays.

Mature Enterprises Have Assembled Diverse and Flexible Real Estate Portfolios

Case Study: Growth Trajectory of a Semiconductor IP Company in Shanghai



Mature integrated circuit enterprises are scaling up, backed by stable revenue growth and ample cash flow, leading to a focus on mid- to long-term strategic planning. As their investment in R&D increases, so is their demand for office space. Such firms typically prefer a dual approach combining leasing and purchasing. This page explores the development of a semiconductor IP company, illustrating how its investment in building dual R&D centres will drive it to a higher stage of development:

- ◆ **Talent System Development:** The company has significantly increased its workforce, especially in R&D, benefiting from favourable policies and the appeal of the Lingang New Area, enabling it to attract top talent.
- ◆ **R&D Platform Implementation:** Supported by its strong talent base, the company is boosting R&D investment, achieving notable progress in various projects, laying a solid foundation for future product launches.
- ◆ **Industrial Ecosystem Development:** Leveraging regional industry clusters, the company is enhancing international collaboration and driving industry growth.

Figure 15: Changes in Staffing Levels of the Company

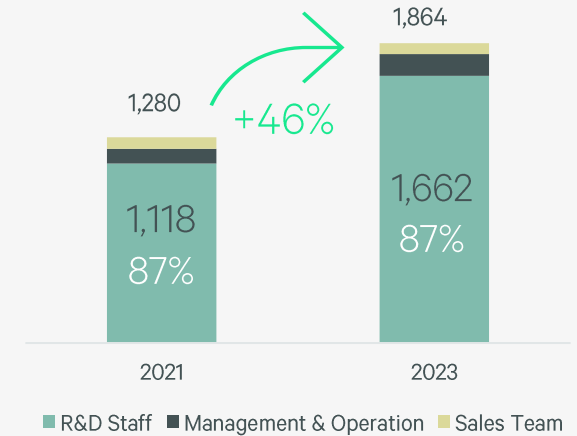
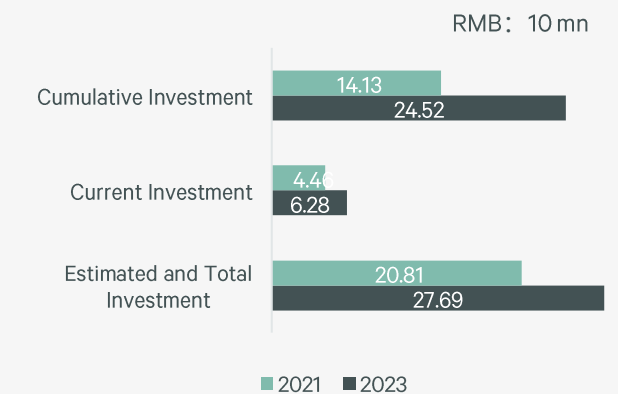


Figure 16: Changes in R&D Expenditure of the Company




Source: Annual Reports, Public Resources, CBRE Research, November 2024.

Recent En-Bloc Property Acquisitions for Self-Use by Integrated Circuit Companies

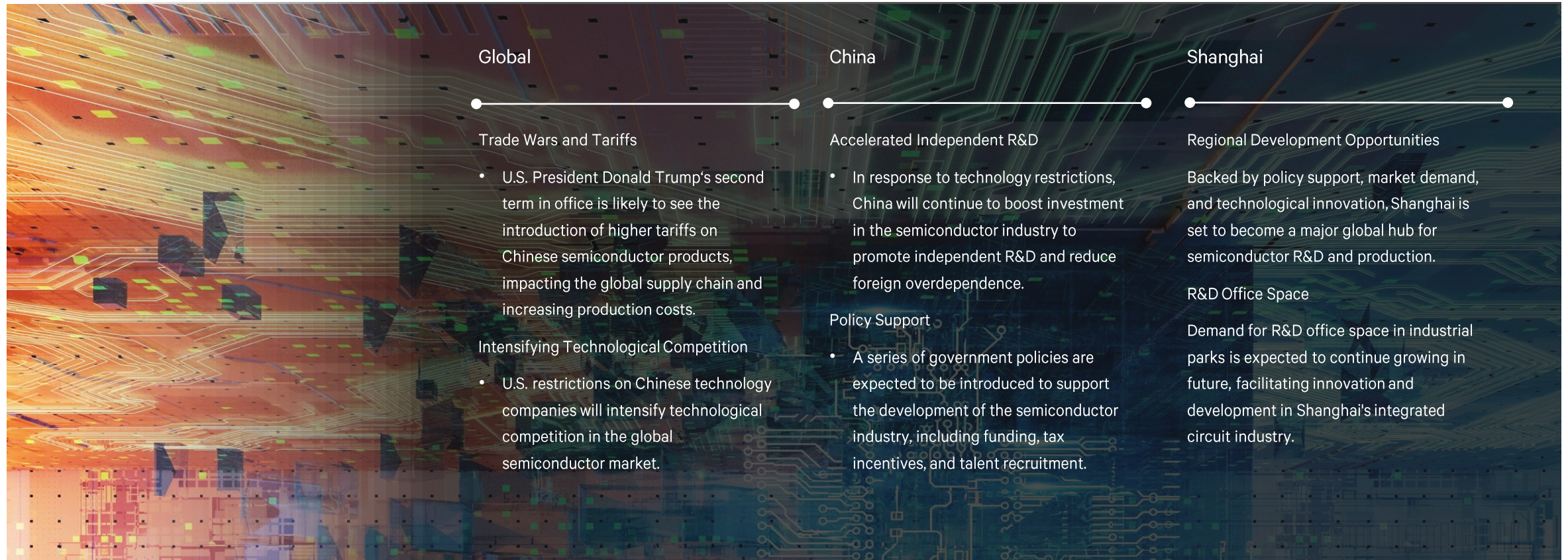
	Project	Location	GFA sq.m.	Total Amount mln RMB	Unit Price RMB per sq. m.	Buyer	Seller
Q3 2020	No.181 Caobao Road	Caohejing	24,803	1,089	43,905	Montage Technology Co., Ltd.	Dinghe Int'l & Kunlun Insurance
Q2 2021	Shanghai Bay Valley Bldg 16 & 17	New Jiangwan Town	6,772	210	31,000	Shanghai Fudan Microelectronics Group Co., Ltd	Shanghai Yuxia Business Consulting Co., Ltd
Q4 2021	Jixian business Center Bldg 3	Zhangjiang	29,473	994	33,738	VIVO Aiku software Technology	Zhangjiang IC Industrial Park Development Co.,Ltd
Q4 2021	CIT Tower 1 Floor 4 to 17	Lingang	20,000	500	25,000	Veri Silicon Group (Shanghai)	Shanghai Lingang Economic Development (Group) Co., Ltd
Q1 2022	Shanghai Bay Valley Bldg #12 & 15	New Jiangwan Town	6,772	220	32,800	Shanghai Fudan Microelectronics Group Co., Ltd	Tianyu Ecology&Landscape Co.,Ltd.
Q1 2023	E Park Ph 3	Zhangjiang	4,012	160	39,881	Guangdong Saiweiwei Electronics Co., Ltd	Zhangjiang Hi-Tech
Q3 2023	Galaxy MidtownT3	Caohejing	2,984	161	53,800	Shanghai New Vision Microelectronics Co., Ltd.	Vanke & Hongkong Land
Q4 2023	Chuangxin Space T4	Zhangjiang	16,254	507	31,215	Shanghai Nasi Microelectronics Co., Ltd	Zhangjiang Hi-Tech
Q2 2024	Jixian business Center Bldg 54 Floor 12/15/16/17F	Zhangjiang	8,021	256	31,900	Southchip Semiconductor Technology Co., Ltd.	Zhangjiang IC Industrial Park Development Co.,Ltd

Source: CBRE Research, November 2024



Outlook and Recommendations

Outlook



Recommendations

Site Selection

- Integrated circuit companies should conduct their own assessments or hire professional agencies to evaluate options based on factors such as the semiconductor industry chain, talent resources, sales targets, and parks' industrial platforms before making location decisions.
- Companies need to foster a strong understanding of policies and support for high-tech industries and innovative sectors in each district, comparing available financial, tax, and other incentives.
- Some business parks may provide funding or subsidies for research projects to encourage greater R&D investment and facilitate resource connections within the park. This can boost innovation through collaboration with both upstream and downstream companies.

Real Estate Strategies

- When leasing a property, companies must ensure that factors such as load-bearing capacity, ceiling height, high-speed internet access, and power supply meet the needs of production, R&D testing, and warehousing logistics.
- Safety is a critical consideration. Intelligent management features like access control systems and surveillance facilities can help protect company assets and data. Additionally, the property should have robust cybersecurity measures to ensure the safety of information transmission.
- Given that employees in this industry often work long hours, having comprehensive amenities is especially important. Facilities such as convenience stores, restaurants, gyms, and good access to public transportation, like subway connections, can significantly enhance the overall employee experience.

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