



GEEHY SEMICONDUCTOR CO.,LTD.

Professional MCU and IoT Security SoC
Design Enterprise
2021S1

Geehy
SEMICONDUCTOR

Geehy Semiconductor

- Founded in 2019, the wholly-owned subsidiary of Apexmic, formerly known as IoT Chip Division of Apexmic
- Has inherited 20 years of experience in IC chip design from Apexmic
- Main products: APM32 MCU, Security SoC and BLE SoC
- Four chip R&D centers: Zhuhai/Shanghai/Hangzhou/ USA
- Four central offices: Zhuhai/Shanghai/Shenzhen/Guangzhou



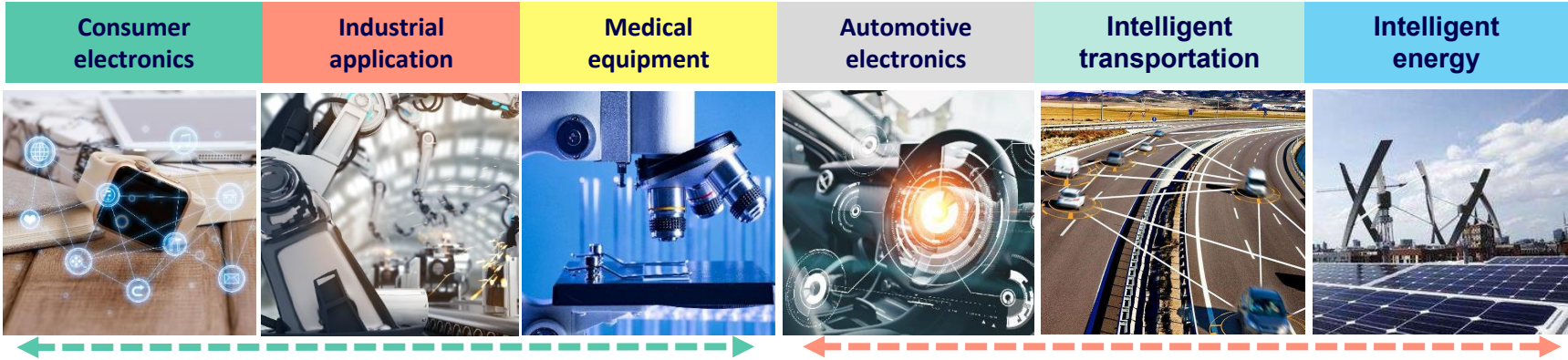
Parent company: Apexmic Microelectronics

- Full range of printer chip design companies from printer master SoC chip to consumables encryption chip
- Based on the largest Security SoC supplier with domestic CPU shipments (currently more than 500 million in total)
- Annual chip shipments are about 450 million

Head office: Ninestar Corporaton (SZSE002180)

- Leading company in the global general consumables industry
- 2020 China's Top 500 Listed Companies
- One of the top five global laser printer manufacturers
- 2019 revenue of about 23.3 billion yuan, profits of about 7.4 billion yuan, 1.3 billion yuan chip revenue

Application Field

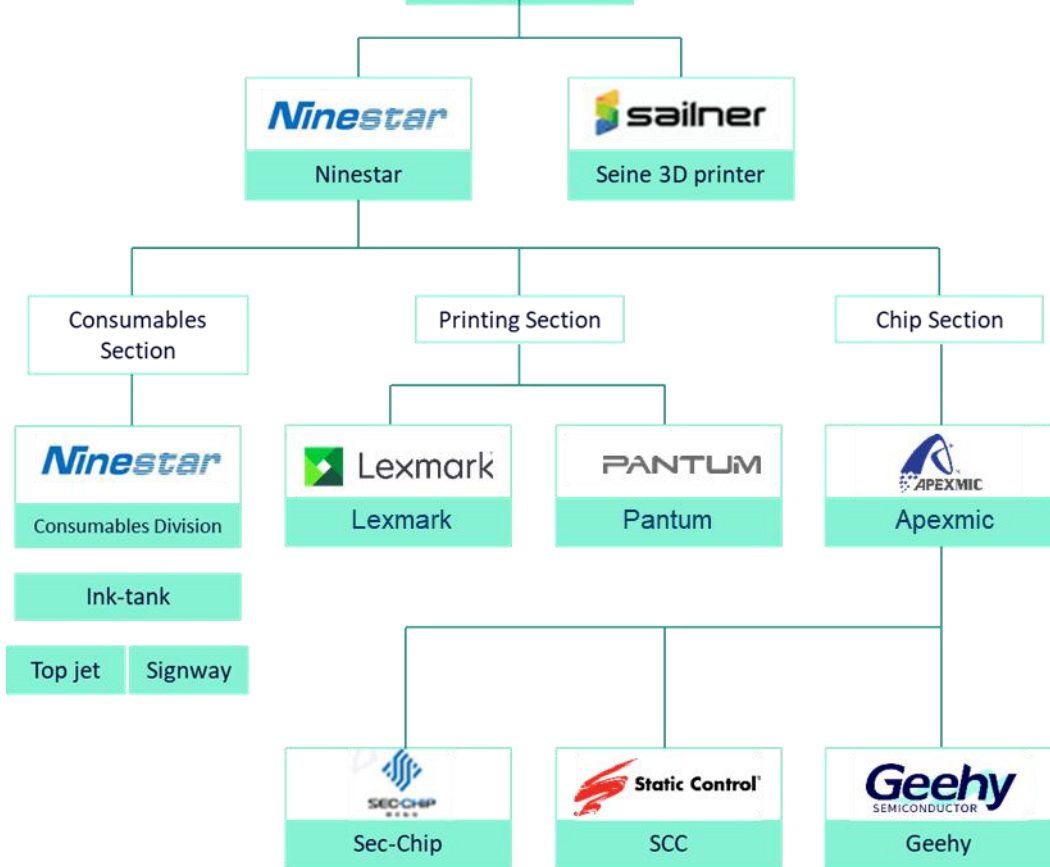


By 2019, Geehy has widely applied in the fields of industrial application, consumer and medical electronics

By 2020, Geehy has officially started the deployment of the fields of automotive electronics, intelligent transportation, and intelligent energy

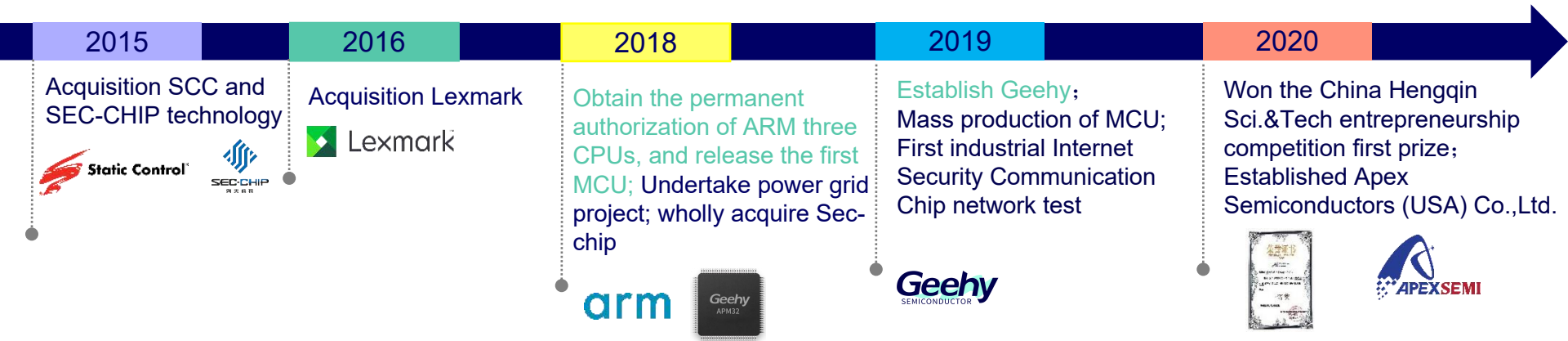
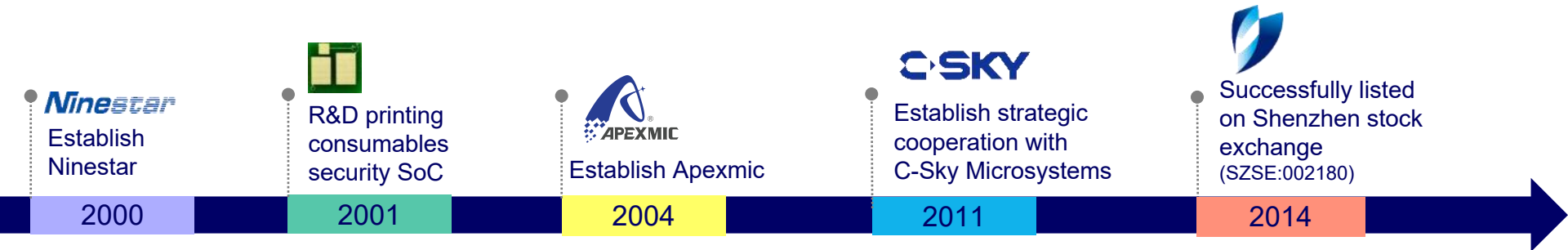
Future, Geehy will continue to focus on iterative updating technology and product research and innovation, is committed to providing more self-controlled, safe, and reliable chip products and solutions.

Group Structure



In the past 20 years, Ninestar's chip business has been engaged in the research and development of security SoC for a long time, firmly occupying a leading position in the global market of compatible consumables encryption chips, and successfully launched printers with independent intellectual property rights. At present, it is making every effort to enter industrial Internet security SoC.

Development Roadmap



Ninestar

Establish Ninestar



R&D printing consumables security SoC



Establish Apexmic



Establish strategic cooperation with C-Sky Microsystems



Successfully listed on Shenzhen stock exchange (SZSE:002180)

2015

Acquisition SCC and SEC-CHIP technology



2016

Acquisition Lexmark



2018

Obtain the permanent authorization of ARM three CPUs, and release the first MCU; Undertake power grid project; wholly acquire Sec-chip



2019

Establish Geehy; Mass production of MCU; First industrial Internet Security Communication Chip network test



2020

Won the China Hengqin Sci.&Tech entrepreneurship competition first prize; Established Apex Semiconductors (USA) Co.,Ltd.



Group Global Layout



- ▶ 18000 employees in 60 countries
- ▶ 9 R & D centers: Zhuhai, Shenzhen, Shanghai, Hangzhou, USA (North Carolina, Lexington, Kansas), India, Philippines
- ▶ Factories: China, Mexico, Philippines, Poland, USA
- ▶ Office: Zhuhai, Shanghai, Shenzhen, Guangzhou

- ★ Headquarters
- Related companies
- Associated factory
- R & D Center
- Sales network

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 - 03 **Product Intro**
 - 04 **Strategic Planning**

Four Chip Research And Development Centers

◆ Apexmic-Zhuhai

R & D headquarters, responsible for product definition, system simulation test, and terminal product application software development; be responsible for chip system software design

◆ Static Control Components

Over 30 years experience in chip design, responsible for chip simulation, digital/analog hybrid integrated circuit design, failure analysis, and IP design

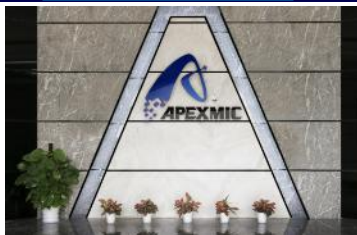


Zhuhai

Shanghai

USA

Hangzhou



◆ Apexmic-Shanghai

Analog IP, ASIC and NFC chip design, Digital and analog hybrid circuit, Memory circuit integrated design



◆ Sec-Chip Technology

- IC design team based on doctor and master
- First echelon of domestic kernel design
- 8/16/32-bit CPU and DSP independent design
- Design of high-performance multi-core heterogeneous SoC chips
- Encryption and decryption IP design and coprocessor design
- MCU and SoC design

More than 500 people chip design team

Chip design

Software development

Digital-analog hybrid

Failure analysis

Simulation test

One-stop SoC Technology Platform

Can be realized according to customer demand customized one-stop (including CPU instruction set custom) SoC chip design, supports self-controlled domestic CPU core.

■ Diversified CPU core design technology

- ARM/T-head / RISC-V/Independent core

■ Multi-core heterogeneous SoC design technology

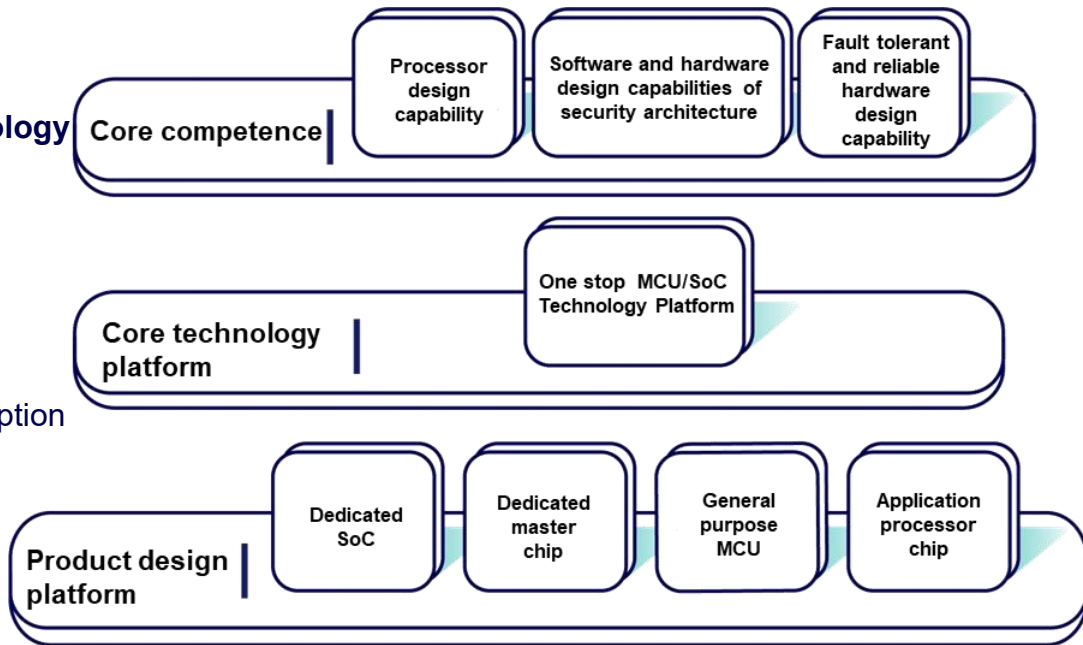
- Provide dual-core to seven-core SoC chip design
- Low power, high integration, high security

■ Security and encryption embedded eSE chip design technology

- 20 years of practical experience in security encryption
- Embedded-hardware level security protection

■ Hybrid architecture chip design technology

- Hybrid ARM core of C-SKY
- C-SKY hybrid RISC-V core



Technical Capability Based on Three CPU Cores

■ General-purpose MCU technology capability based on ARM CPU

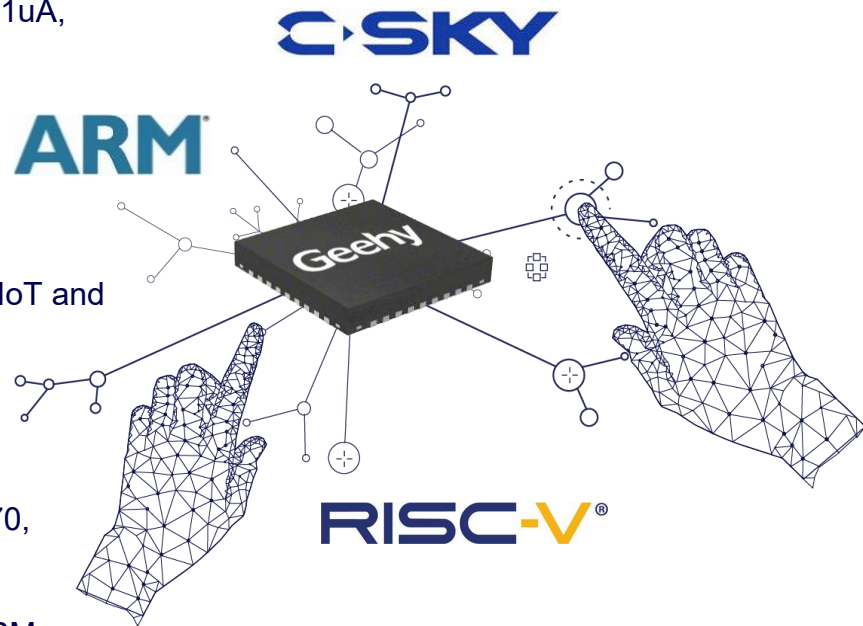
- Based on ARM Cortex-M0+, M3, M4, M7 cores
- Covering 66% of IoT applications, power consumption is less than 1uA, and central frequency is up to 1GHz

■ SoC-eSE chip technology capability based on C-SKY CPU

- Based on C-SKY CK802, CK803, CK810, CK860 cores
- Obtained National Encryption Level 2, covering 100% of industrial IoT and innovative energy applications

■ Technology Capability based on RISC-V CPU

- Geehy independently developed RISC-V core SC-20, SC-30, SC-70, SC-E5, SC-E7
- Can fully replace the ARM Cortex M core and partly replace the ARM Cortex-A series core

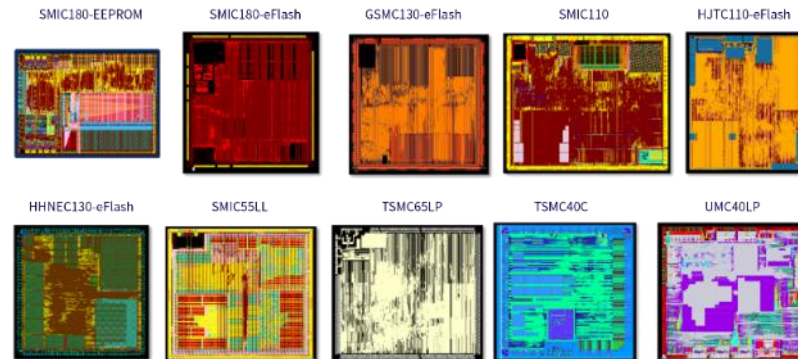


Soc Design Service Platform



◆ Provide customer SoC one-stop solution

- Reduce risks: deliver technical solutions on time and batch production
- Flexible business model: providing wafer fabrication and packaging services for customer GDS input projects
- Perfect supply chain/production management/quality control system: wafer fabrication, assembly, packaging, detection, final inspection and logistics
- Tape out >80 SoC project, process: 28~180nm



World Class Upstream and Downstream Supply Chain

First class development partner & top supply chain to ensure high quality ecology

- **Failure analysis:** MATEK, Fibtek, CELLIX, iST
- **IP supply chain:** IPGoal, Synopsys, ACTT
- **Development tool:** Synopsys, Cadence
- **Wafer:** TSMC, SMIC, UMC, Huahong, Powerchip
- **Close-test:** JCET, HT-Tech, TFME, Ganide
- **Test:** ProbeLogic, ABLE, Teradyne, Chroma, Verigy



We always pursue excellent product quality.
Strictly control every detail in the production process.
This is Jihai's eternal commitment to customers.

National Laboratory

■ National Laboratory Certification

- Five laboratories: Testing, Failure Analysis, Reliability, Electricity, Application
- Approved by national CNAS laboratory in 2019

■ International testing equipment

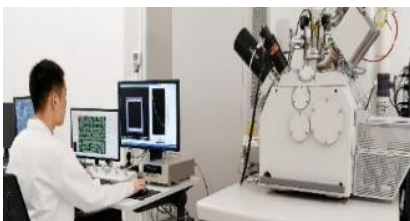
- Focused ion beam system, CP testing machine 3D X-ray
- Scanning electron microscope equipment, Tokyo precision probe, gold wire binding machine



National Laboratory Accreditation



Test Laboratory



FIB Laboratory



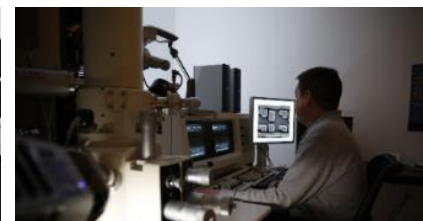
Kearns microscope



Wafer tester



3D X-ray



Failure analysis equipment

Reliability Assurance Platform

- The national CNAS laboratory covers over 2100m²
- The total value of advanced inspection and testing instruments is nearly 100 million yuan
- Support complete reliability project testing
- The product has passed IEC61508 and USB-IF certification
- The reliability test scheme can be customized according to customer requirements



Reliability test items	Reference standard
HTOL	JESD22-A108
HTST	JESD22-A103
Precondition (For THT, uHAST, PCT, TCT)	JESD22-A113
THT	JESD22-A101
uHAST	JESD22-A110
PCT	JESD22-A102
TCT	JESD22-A104
DR	MIL-STD-883E Method 1008.2
ETC	MIL-STD-883E Method 1033
ST	JESD22-A102
HBM	JESD22-A114
MM	JESD22-A115
CDM	JESD22-C101
Latch up	MIL-STD-78
EMC	EN 61000

First Class Operation Resources

From technology introduction to innovation complementation



Establish cooperative relationship with famous universities and scientific research institutions



■ Union Institute

- Establish joint laboratory of "VLSI" with Zhejiang University
- Establish "Institute of Integrated Circuit Design and Application" with Zhengzhou University
- Establish Zhuhai R&D Center with the Embedded System Ministry of Education Engineering Research Center
- Establish "Lanzhou University-Apexmic customized class" with Lanzhou University

■ Scientific research activities

We have carried out scientific research activities with Zhejiang University, Tsinghua University, Zhengzhou University, Xidian University, and Shanghai Institute of Microsystem and Information Technology.

■ National Science and technology project

Jointly undertake national science and technology projects with Dalian University of Technology, Wuhan University, Zhejiang University and Beijing Institute of Technology of Zhuhai College.

Strive To Realize Self Control Of Domestic Products

- 2016, domestic printers SoC won “First prize of science and technology of China Electronic Society”
- 2018, CEO Mr Wang Dongjie won ICCAD entrepreneur of the Year Award
- 2019, 32-bit CPU security chip won “Second prize of Guangdong Province Science and technology progress”
- 2020, won “First Class Winner of China Hengqin Science and Technology Innovation Competition” (The bonus is RMB 50 million)
- SoC chip supplier with the largest volume of CPU shipments (cumulative over 500 million)
- Accumulate 8 times won the award of CSIP of MIIT and China Electronics “China core best market performance Product Award”

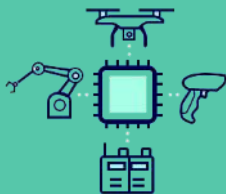


Professor **Wei Shaojun**, director of Institute of microelectronics, Tsinghua University, presented the entrepreneur of the year 2018 trophy to CEO Mr Wang Dongjie.

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Product Layout

**APM32 Industrial
Grade MCU**



**Bluetooth
Low Energy SoC**



**IoT SoC-eSE
Security SoC**



APM32: Focusing Long-life Cycle Domain



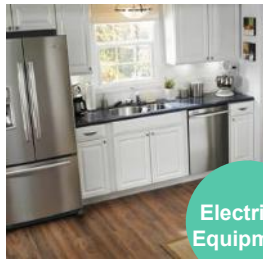
Industrial Control



Building



Medical



Electrical Equipment



Automobile

■ Challenges of long life cycle products

- Needs more than 10 years' life, and chips need to undergo rigorous testing
- Design and manufacturing require higher performance
- Calibration and testing require higher precision
- Temperature range needs to be enhanced and impact resistant.

Geehy APM32 series of general MCU has covered industries, consumption and medical equipment. In 2020, it formally laid out automotive electronics and other fields.

■ APM32 series of product

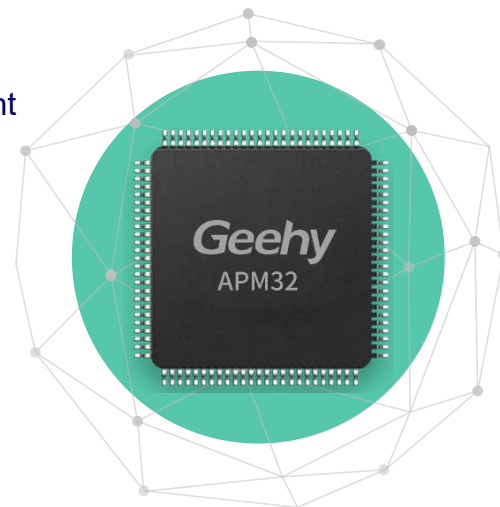
- IEC61508 and UCB-IF certification
- Temperature range is $-40\text{ }^{\circ}\text{C} \sim +105\text{ }^{\circ}\text{C}$
- ESD level up to 8KV



32-bit Industrial Grade General Purpose MCU

APM32 series industrial-grade general-purpose MCU is highly compatible, highly accepted by customers, and low cost of domestic replacement.

- Based on ARM® Cortex®-M0+/M3/M4/M7 cores
- Low power, high performance, high integration, stable and reliable, fast replacement
- Has passed IEC61508 and USB-IF certification
- Working temperature covers -40°C ~+105°C
- ESD>8KV, adapt to demanding work environment requirements
- The whole life cycle quality control, product consistency is high, reliability is stable



Smart Home



Consumer Electronic



Industrial Control

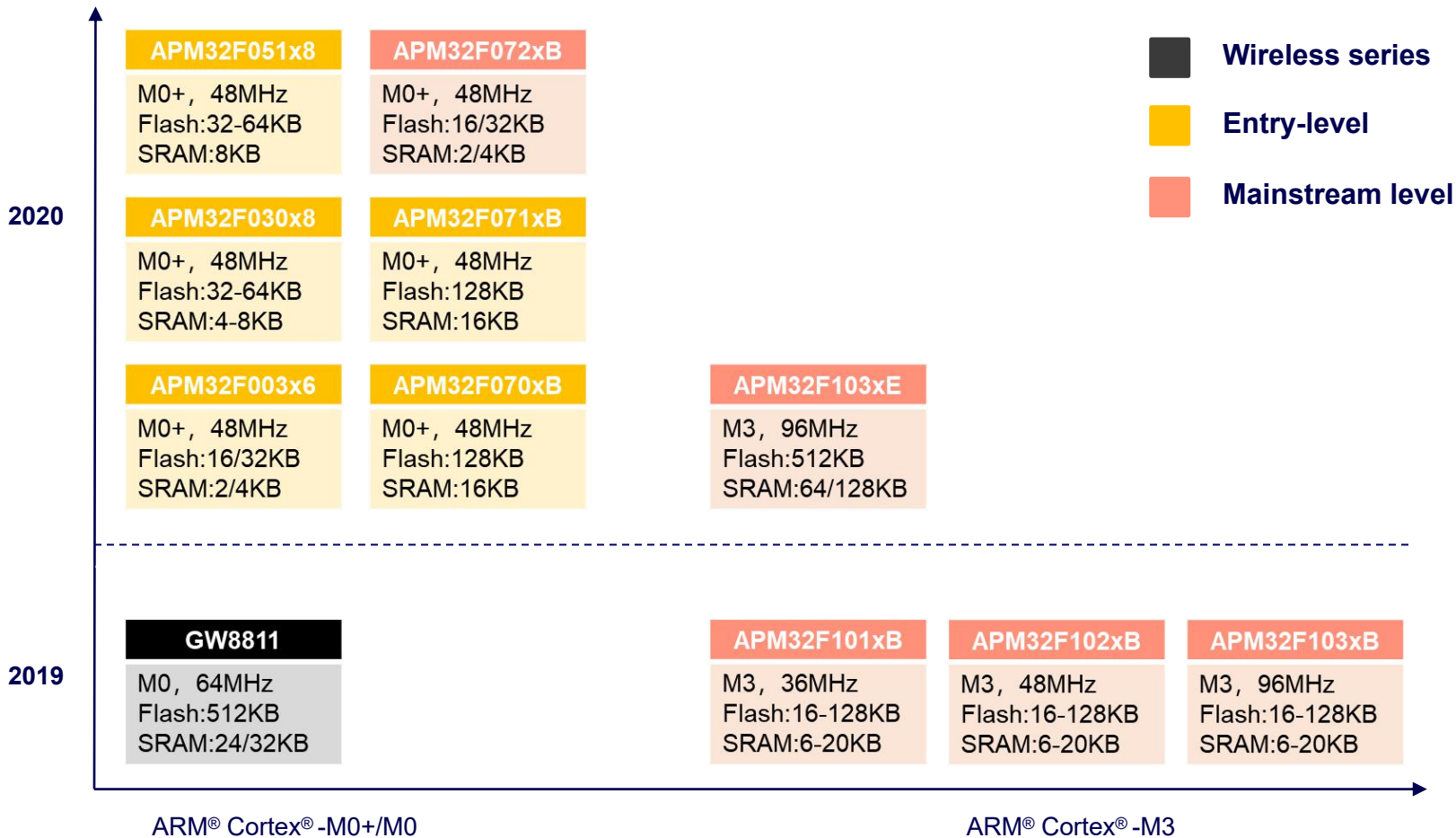


Medical Equipment

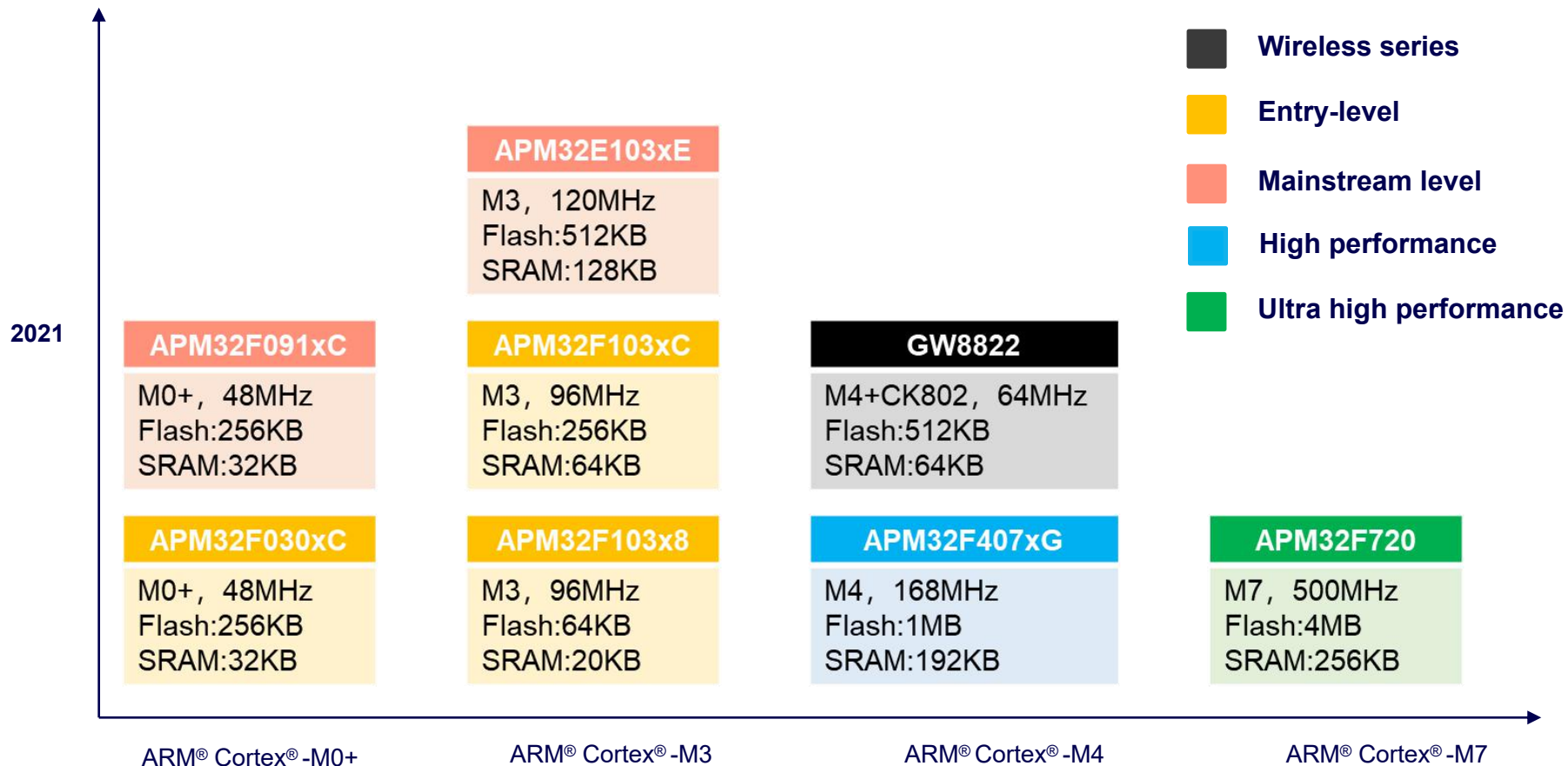


Automotive Electronic

Roadmap of 2019-2020 MCU



Roadmap of 2021 MCU



Bluetooth 5.1 Low Energy SoC

Ultra-low power consumption, high sensitivity and comprehensive connectivity effectively guarantee the stability and security of IoT data transmission and communication connection

- Based on ARM® Cortex® -M4
- Support complete BLE5.1 specification,
- Support AOA/AOD accurate positioning function
- Support BLE,MESH,OTA and other PROFILE
- Excellent radio frequency characteristics and anti-interference performance
- Compliance with National Encryption Level 2



Smart Home



Smart Wear



Medical Equipment



Location Service

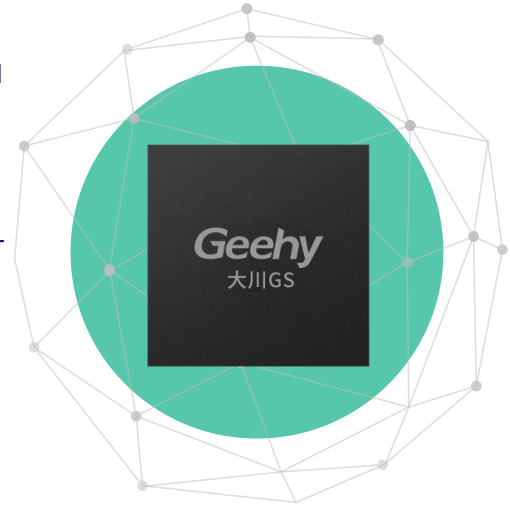


HID Device

Dachuan Industrial Internet SoC-eSE Security Chip

The whole series of products is based on the T-head CPU core, rated as international advanced and domestic leading by experts.

- Based on T-head CPU multi-core security encryption architecture, integrated with advanced physical non-cloning technology and more than 30 anti-attack patent designs, it has obtained National Encryption Level 2
- Industry-leading embedded eSE security unit technology enables a single chip to have security and master control functions simultaneously, which can realize multi-in-one security protection and effectively resist the security threats of the IoT such as side-channel attacks, error injection and physical attacks
- It has been widely used in intelligent energy, high-end industry, numerical control devices and other essential security fields and industrial control core equipment
- In the future, it will expand to more important industries with an urgent demand for independent control, such as energy, transportation, nuclear power, communication, finance, etc



Industrial
Control



Intelligent
Building



AMI
System



SCADA
System



Smart
Energy

Promote industry 4.0 technology and service landing

Industrial network security

Industrial automation

Industrial Internet

Industrial robot



Application

Smart energy project—Dachuan GS300 series security chip

- Successfully applied to distribution network equipment.
- The power supply bureau has achieved the demonstration of a hanging network.
- During the operation of the project, it will remain stable.

Industrial servo motor—APM32F103 series MCU

- Entered the supply chain of well-known domestic industrial automation listed companies.
- With powerful operational processing capability, highly integrated and efficient real-time response, industrial equipment's safety and reliability can be ensured.

Intelligent manufacturing creates higher quality life

Smart home

Communication equipment

Smart wear

Mobile terminal



Application

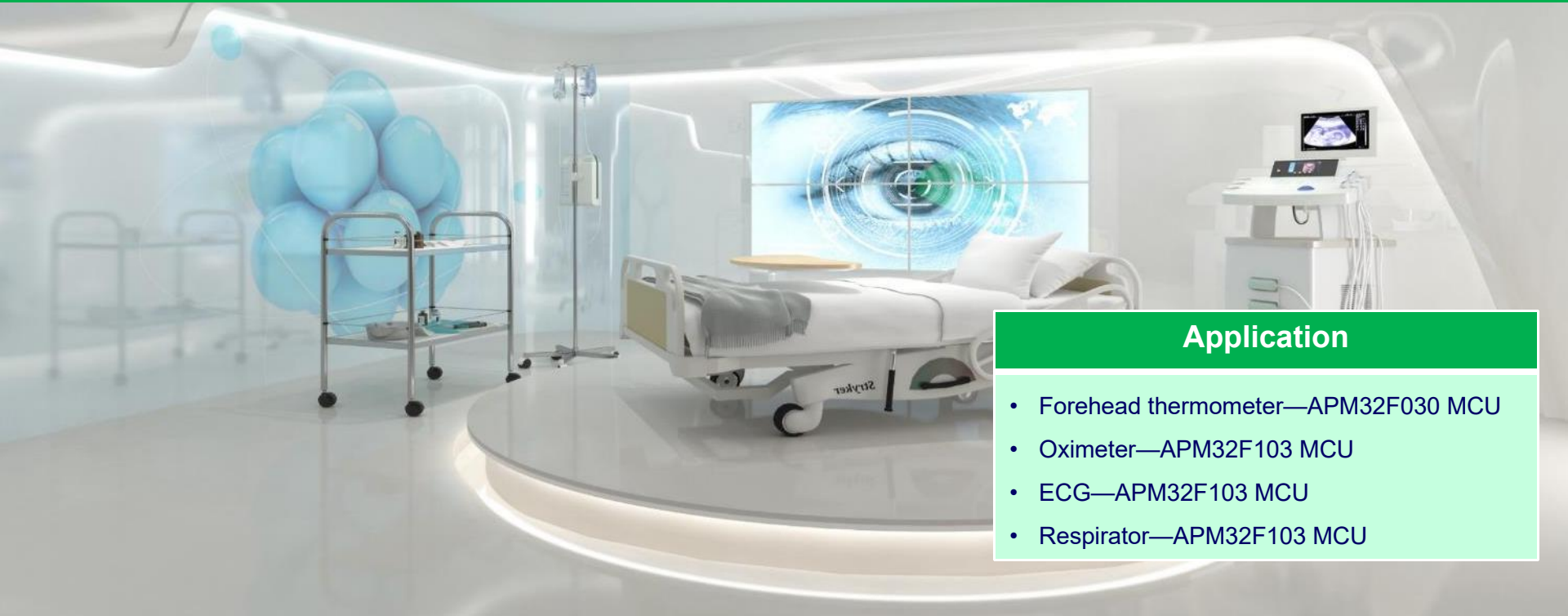
- Receipt printer—APM32F103 MCU
- Sweeping machine—APM32F103/F051 MCU
- Mechanical keyboard - APM32f072 MCU
- Intelligent light control - APM32f003 MCU
- Handheld ptz-APM32f103 MCU
- Intelligent door lock -- APM32f072 / f051 / f030 MCU
- Transmission module—GW8822 low-power Bluetooth 5.1 chip

Application innovation of enabling portable medical equipment

Portable instrument

Diagnosis and monitoring

Equipment family nursing instrument



Application

- Forehead thermometer—APM32F030 MCU
- Oximeter—APM32F103 MCU
- ECG—APM32F103 MCU
- Respirator—APM32F103 MCU

Accelerating the development and innovation of intelligent driving core

Body control

Internet of vehicles

On board equipment

Lighting



Application

- Automobile Reversing Radar—APM32F103 MCU
- Touch panel—APM32F072 MCU
- Window lifter—APM32F103 MCU
- Boot start control—APM32F103 MCU
- CAN protocol converter—APM32F103 MCU

Service System and Mechanism

Timely response to customer feedback to effectively solve customer needs.

Customer oriented
Service first

■ Sales and FAE localization support

- Professional sales and FAE team, provide localization service support
- There are offices in Shanghai, Shenzhen and Guangzhou
- Perfect service system and mechanism



Brand marketing
Comprehensive
promotion

■ Brand marketing support

- Media channels: electronic fancier, Aspencore, big bit, EEPW,
- Regular participation in highly renowned and influential industry exhibitions and forums.
- The industry association's quality member units: China semiconductor industry, CCIAIOT, RISC-V , Bluetooth technology alliance, Information security and communication secrecy, and IoT Association.



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Future Trend of The Industry

Industry development: bring unprecedented demand

Industrial Application 2017~2024



Consumer Electronics 2018~2023



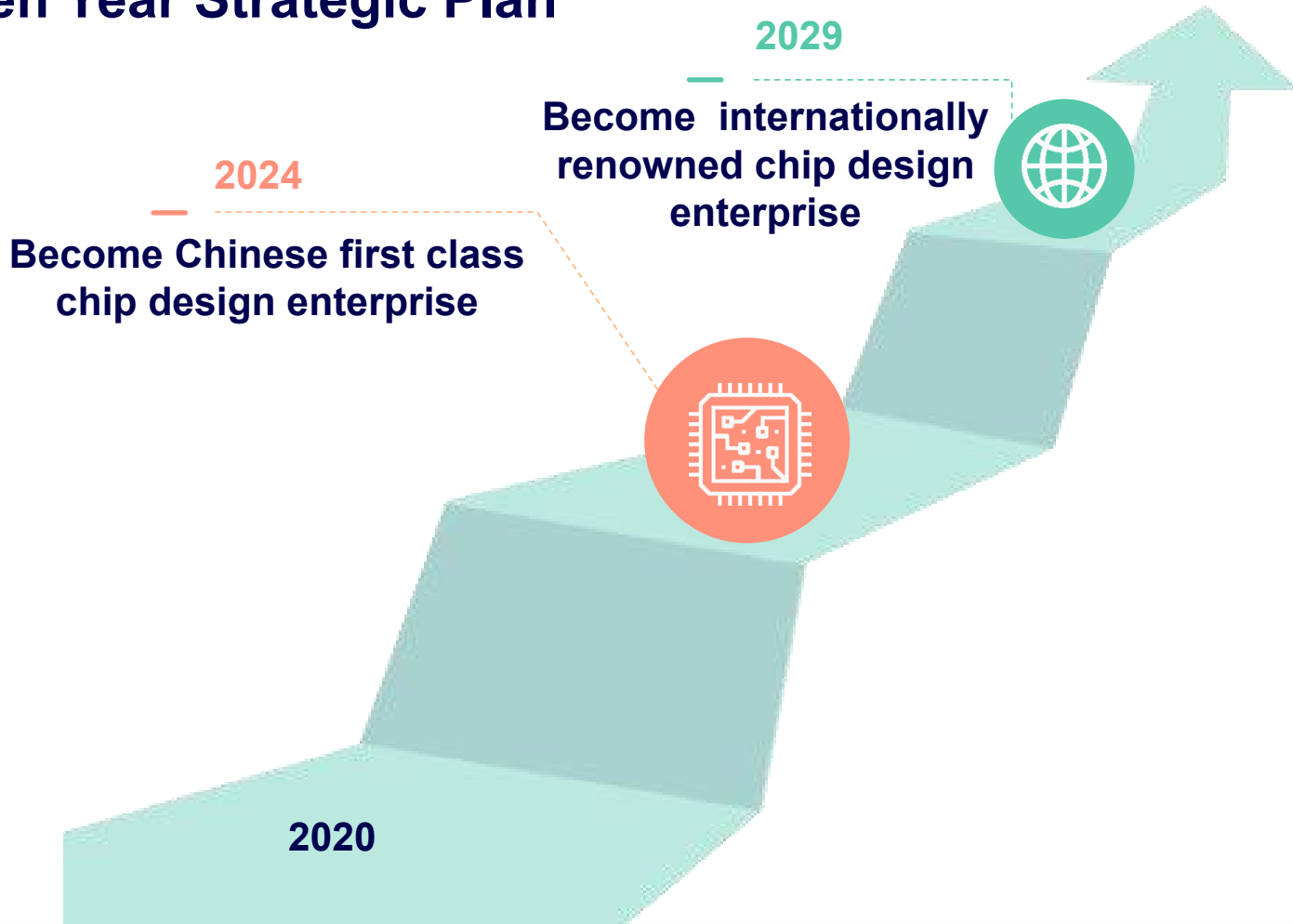
Medical Equipment 2017~2024



Automotive Electronics 2017~2024



Ten Year Strategic Plan



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