

Continued Growth Expected in Duration of Automotive MCU Chip Shortage

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HONG KONG, CHINA, August 11, 2023 /EINPresswire.com/ -- The automotive market is currently the hottest in the semiconductor industry. The pace of "new four modernizations" in automobiles is getting faster, and the number of chips required in cars is increasing. Among them, the most noticeable is the [MCU](#), a major "chip shortage" player. Since 2020, the MCU has always been the protagonist of the "chip shortage". Up to now, after major manufacturers have continuously expanded production, has the chip shortage situation been alleviated?

High Requirements, Long Cycle, Large Investment, Difficult to Enter for Automotive MCU Chips

The chips used in automotive electronics mainly fall into four categories: master control chips (MCU/SoC), power chips (IGBT), image sensor chips (CIS), and storage chips (Flash). As the core chip for motion control, MCU has a very wide range of applications in automotive electronics and is an indispensable core component of automotive electronics.

With the rise of the "new four modernizations" in automobiles, MCU, as the key chip for the development of automobiles from electrification to intelligence, has an increasingly rich application field, such as window controllers, on-board diagnostic systems, radar applications, car light applications, car central control, vehicle power and safety, etc. On average, about 100 MCUs are used in a car. The total market of automotive MCUs in China is about 2 billion pieces, with a market size of tens of billions of yuan.

Facing such a broad market, more and more MCU chip manufacturers are beginning to transition to automotive chips. However, automotive-grade MCUs have the characteristics of high customer certification barriers and long supply cycles. After the downstream car manufacturers of automotive MCUs complete certification, they will not easily change suppliers, which makes it difficult for many MCU companies to enter the automotive-grade track in a short period.

In addition, in the process of the evolution of automobiles towards intelligent systems, not only are higher requirements put forward for the safety, stability, and consistency of MCUs, but MCUs also need to have higher computing power, stronger network interfaces, and lower power consumption. This leads to the need for automotive-grade MCUs to have a longer testing and

experimental time and higher investment before they can be used in cars and go into mass production.

Leading Manufacturers Increase Investments to Expand Production

The global automotive MCU market has long been dominated by leading companies, with Renesas, NXP, Microchip Technology, Infineon, STMicroelectronics, and Texas Instruments collectively holding over 90% of the market share, all operating under the IDM model. Therefore, the expansion of these six manufacturers has become a key factor in resolving the shortage of automotive-grade MCUs. The shortage of MCUs stems from a lack of 8-inch wafer production capacity on the supply side and a surge in the use of automotive MCUs on the demand side.

Renesas has announced plans to invest around 48 billion yen to introduce 40nm MCU manufacturing equipment at its Naka plant and 130nm MCU manufacturing equipment at its Kawashiri plant by February and March 2025, respectively, due to the rapid increase in demand for automotive-grade MCUs driven by the popularization of electric vehicles. In addition, the Kofu plant, which was closed in 2014, is planned to be reactivated in the first half of 2024 due to increased demand from electric vehicles and will introduce film manufacturing equipment by August 2026. The newly introduced manufacturing equipment at the Naka and Kofu plants will have a monthly capacity of 10,000 pieces (converted to 12-inch silicon chips), and the Kawashiri plant will have a monthly capacity of 29,100 pieces (converted to 8-inch silicon chips). The goal is to increase MCU production capacity by 10% by the end of 2026.

NXP has stated that the demand in the core automotive market was strong in 2022, exceeding the company's supply capacity, and expects the supply of automotive MCUs to remain tight in 2023. NXP's recent capital expenditure will remain high to ensure clients have sufficient production capacity support. Li Tingwei, Chairman of NXP Greater China, pointed out that NXP will continue to invest in 2023 and allocate and protect R&D investments to continue to promote accelerated growth in areas such as automotive and core industrial.

Infineon announced in its Q4 2022 earnings call that due to limited increases in the supply of mature processes, the company's automotive MCU business is expected to grow 2.5 times in the next few years. Therefore, it plans to continue expanding its 12-inch wafer manufacturing capacity to meet the accelerating demand for semiconductors. The new factory is planned to be located in Dresden, Germany, with a total investment of 5 billion euros, the largest single investment in Infineon's history. In addition, it has also signed a long-term strategic cooperation agreement with wafer manufacturer UMC to increase Infineon's automotive MCU production capacity. It is understood that its high-performance automotive-grade MCU products will be produced in UMC's Singapore wafer factory using a 40nm process. Wang Shi, co-general manager of UMC, said that Infineon's automotive-grade MCU products will be produced at UMC's FAB 12 in Singapore, and UMC's shipments of automotive-grade products have tripled compared to 2019.

Jean-Marc Chery, President and CEO of STMicroelectronics, said: "STMicroelectronics' revenue grew by 26.4% in 2022, reaching \$16.13 billion, with the automotive and discrete device products division (ADG) contributing more than 30% of total revenue. The automotive business is central to STMicroelectronics' goal of achieving \$20 billion in revenue." Julian Zhu, Vice President of STMicroelectronics Asia Pacific Microcontroller and Digital IC Product Division (MDG) IoT/AI Technology Innovation Center and Digital Marketing, said that STMicroelectronics will actively expand production capacity to ensure a safe and flexible supply chain. STMicroelectronics' capital expenditure reached \$3.5 billion in 2022. To continue supporting capacity growth, capital expenditure is expected to increase to \$4 billion in 2023. STMicroelectronics will combine various measures to expand production capacity, including actively investing to increase internal capacity, strengthening cooperation, and ensuring supply through external foundries, etc. By 2025, wafer production capacity will significantly increase. It is expected that 12-inch wafer production capacity will double by 2025.

Structural Shortages Will Continue

[Jak Electronics](#) claims that the current shortage of automotive-grade MCUs has improved, shifting from a comprehensive shortage in the past two years to a structural shortage. Automotive-grade MCUs can be divided into 8-bit, 16-bit, and 32-bit. The higher the bit number, the stronger the performance, and the higher the research and development difficulty and unit price. Among them, 8-bit MCUs can meet the needs of most scenarios and are widely used for basic functions, such as fans, wipers, sunroofs, seat controls, etc. 32-bit MCUs are used in high-end areas such as automotive intelligent cockpits, body control, assisted driving, and driving safety systems. Benefiting from its small size and excellent performance, and the trend of automobile intelligence, global MCU chip products are mainly 32-bit. According to the McClean Report, in 2021, over three-quarters of automotive MCU sales came from 32-bit MCUs. With the further development of automobile intelligence and electrification, the proportion of 32-bit MCU chips is expected to further increase.

Therefore, 8-bit MCUs are no longer in short supply, and the real shortage is high-end 32-bit MCUs. Yao Di, Vice President of Nanxin Microelectronics, told reporters: "This structural shortage mainly stems from the rapid growth in demand for specific chips in the new energy vehicle and pan-energy industries. In the short term, the expansion of production capacity for automotive chips at some specific process nodes cannot keep up with the growth in demand. From the perspective of the entire semiconductor industry, packaging and testing capacity has been fully relieved. At the same time, the demand for wafer production capacity has also diverged. For example, the supply shortage of low-voltage process wafer capacity used in automotive chips has been fully relieved, while the wafer capacity using high-voltage BCD processes and power device processes is still relatively lacking. Therefore, this structural shortage will continue for some time."

Meng Fanwei, Senior Market Manager of Jiefa Technology's Marketing Business Department, told the "China Electronics News" reporter that currently, some part numbers of high-end ASIL-D

products with safety features are still out of stock, such as Infineon's TCxx series and SBC products with safety features. Mid-to-low-end automotive MCUs are no longer in short supply, and OEMs, tier-1 suppliers, and distributors are beginning to build up inventory. Jiefa Technology is strengthening cooperation with vehicle manufacturers and tier-1 suppliers, planning and laying out products in advance, inviting vehicle manufacturers to join in product planning to avoid the problem of product homogenization and centralization. In addition, it is strengthening communication and cooperation with wafer factories, planning in advance, securing production capacity, and accelerating cooperation with the upstream and downstream of the domestic industry chain, from design, manufacturing, packaging, and testing to the entire industry chain.

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9140 9162

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