JAK: ADI low-power MCU accelerates the implementation of Internet of Things applications

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HONG KONG, CHINA, December 24, 2022 /EINPresswire.com/ -- Whether it is the orderly operation of equipment in a black light factory, the automatic sensing of appliances in a cozy home, or the data acquisition of physical signals in digital medical care, microcontrollers (MCUs) are the "universal key" to solving almost all scenarios with control needs. In recent years, as the Internet of Things has moved into a wider range of scenarios, such as wearable devices, remote measurement and control, wireless sensing, and many other applications, a large number of low-power data acquisition and control needs have arisen, and low-power MCUs have become an important market segment in the microcontroller category. According to JAK Electronics, in the global microcontroller market share, low-power microcontrollers account for about 15% to 20% of the market size of $4.4 billion in 2019, which is expected to grow to $12.9 billion by 2024, with a compound annual growth rate (CAGR) of up to 24.1%.

ADI has been strengthening the design and development of low-power MCU products since 2010. Combining its traditional high-performance signal chain technology and industry-leading power management technology, it has successfully created several series of ultra-low-power MCU products for a wide range of fields such as industrial, consumer electronics, and wearable medical.

Since the late 1960s and early 1970s, microcontroller products prototype appeared, for more than 50 years to date, consumer electronics, computer communications, industrial, automotive electronics, the Internet of Things electronic device innovation continues to empower. In the process, MCU performance has continued to advance, with 16-bit, 32-bit, and even 64-bit MCUs continuing to be iteratively updated, various application categories emerging. More and more functional components such as memory, I/O ports, clocks, A/D conversion, and data transfer interfaces such as SPI, I2C, and ISP have been integrated.

As a segment of microcontrollers, low-power MCUs are mainly aimed at portable devices, battery-powered, energy harvesting and other electronic products that require low-energy operation. They usually adopt different design methods and process choices from conventional microcontrollers in order to reduce the energy consumption and leakage current of MCUs so that they can operate for longer periods of time and provide a longer endurance for devices

powered by batteries or energy harvesting, etc. . For example, continuous blood glucose monitor requires more than 14 days of battery life, intelligent instruments require more than 6 years of battery life, geological disaster monitoring requires permanent environmental self - power supply permanent endurance, etc. , all of which require MCU to complete data acquisition, signal processing and other processes with very low power consumption.

In fact, low-power MCU involves a lot of key technology and design challenges, from how to define the system architecture, build the platform and MCU ecosystem to digital circuit design, from the choice of process to analog circuit design, from reliability design to low-power design, from application innovation to meet the various needs of customers, etc., each aspect has high requirements for design companies. Although there are a variety of low-power MCUs in the market, ADI has a strong market competitiveness with its unique advantages in low power consumption and high performance.

ADI attaches great importance to the important market of low-power MCU. At present, it has launched a series of products with excellent low-power performance for automotive, consumer, industrial, medical and other fields. ADI low-power MCU can keep the power consumption as low as possible in multiple working modes such as Active Mode or Deep Sleep Mode, and even the on-power consumption is very low when the SRAM serial port is expanded outside. A large number of differentiated design innovation ideas are adopted, such as: In active mode, MCU runs at full speed, and different functional modules can be turned off or activated independently to achieve the power-saving effect. Since the wearable device is in hibernation state most of the time, the main core of ADI low-power MCU can be closed in sleep mode, but the built-in intelligent DMA controller can still work normally, which ensures the flexibility of the system design while keeping the power consumption of the overall solution very low. To avoid high power consumption due to the high frequency of the clock source, the MCU chip integrates about 3-6 clock sources. Customers can control and turn off many peripheral modules to wake up outside the device without configuring an external crystal oscillator so that the MCU leakage current is as small as possible.

This is mainly because, in addition to the Cortex-M4 core, ADI's new series low-power MCU usually has a built-in RISC-V core, which is responsible for Bluetooth communication and I/O port sensor data transmission and monitoring, etc. Since the RISC-V core is usually of low power, it can achieve normal operation of the device without affecting it in sleep mode. And keep the power level low. Just like when the smartwatch is asleep, the watch face may not show any information because the Cortex-M4 core is asleep, but the RISC-V core is still doing sensor data acquisition.

In addition to the low power design of the core is critical, so is the power consumption from the memory's frequent data access. In wearable devices, MCU usually requires frequently data access to SRAM and cannot be turned off even in sleep mode. However, ADI low-power MCU can realize block-off to further optimize power consumption. For example, we only reserve 16k, 32k, or 64k SRAM space to store data. Even if we reserve 160k storage space, the operating current is

only 2μA, which is also a key parameter in MCU design, and the user can balance the power consumption design.

According to JAK Electronics, in addition to its outstanding performance in low power consumption, ADI low power MCU also has high performance, safety and reliability as its symbolic labels. Due to the adoption of a Cortex-M4 kernel with a higher mainframe frequency (around 100MHz) than its competitors, and the built-in large-capacity memory, ADI low-power MCU can support complex applications, complete some complex algorithms, and even some mini operating systems.

On the other hand, as people pay more and more attention to information security and program security in the embedded field, the MCU security level is also gradually improving, and more and more device applications require data information protection. We integrate ADI low-power MCU with a security algorithm, which can protect the data information of customers and customer code using security guidance and encryption algorithm, and even we can encrypt communication data to prevent hackers from obtaining it.

Moreover, Internet of Things applications are sensitive to power consumption, device size and cost. ADI Low power MCU integrates multiple functions to achieve a more compact product solution and lower overall BOM cost. This solution integrates different peripherals for some applications, such as Bluetooth, power management, and analog front end. Therefore, when customers practice some of their applications, they can even use a single chip to design and achieve a relatively low BOM cost, low power consumption, and small size. The upcoming MAX32690 integrates application processing kernel Cortex-M4 and Bluetooth dedicated core RISC-V on the same chip, the Bluetooth special purpose core also has its memory area, so that applications and Bluetooth code can run independently, achieving a perfect combination of high efficiency and low power consumption.

In conclusion, although many edge devices of the Internet of things have small sizes, they must support a series of complex sensing, communication, and processing tasks. Low-power MCU, as the core control device of the terminal node, is a vital factor that completes these tasks, which will accelerate the emergence of various innovative terminal products.

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