Dapu Technology Expands Its Automotive-Grade SPI Interface Wide-Temperature High-Precision RTC Lineup with the Launch of INS5A4000

Building on the successful launch of the automotive-grade I2C interface high-precision RTC chips INS5A8900 and INS5A8804, Dapu Technology is proud to introduce its latest product: the automotive-grade SPI interface ultra-wide temperature high-precision RTC series—INS5A4000. This series is powered by Dapu's independently developed chip design, proprietary high-precision temperature compensation algorithm, and fully automated testing system, delivering high precision, low power consumption, and high reliability to meet the stringent demands of next-generation automotive applications.

With superior quality and performance, the INS5A4000 series is designed to support the evolution of smart mobility, enabling safer, more reliable, and energy-efficient driving experiences.

High Precision, Low Power Consumption, and High Reliability

Dapu Technology's INS5A4000 automotive-grade RTC chip integrates a 32.768kHz Digital Temperature Compensated Crystal Oscillator (DTCXO). Its design fully considers temperature redundancy and impact resistance, significantly enhancing product performance and ensuring stable operation even in harsh environments.

The chip offers high precision, low power consumption, wide operating temperature range, compact size, and high reliability. It has successfully passed extreme reliability testing conducted by a CNAS-accredited laboratory and complies with the stringent AEC-Q100 automotive-grade standard. It is well-suited for various critical automotive subsystems, including central control, dashboard, audio systems, smart cockpit, in-vehicle T-BOX, Battery Management System (BMS), Driver Monitoring System (DMS), Advanced Driver Assistance Systems (ADAS), and smart Bluetooth keys.

Taking BMS, DMS, and autonomous driving as examples:

- BMS (Battery Management System): The RTC functions as one of the wake-up sources, triggering BMS mode management (sleep, operation) and enabling periodic State of Charge (SOC) correction. It also provides time references for historical data and fault information, facilitating data analysis and fault diagnosis.
- DMS (Driver Monitoring System): The RTC records vehicle speed, time, mileage, and driving video in real time, with its timestamp functionality playing a critical role in accident analysis and collision liability determination.
- Autonomous Driving: A high-stability RTC can correct abnormal data caused by satellite signal interference. Combined with local inertial navigation systems, it ensures sub-meter positioning accuracy in complex scenarios. Looking forward, autonomous vehicles will increasingly rely on RTC chips to achieve synchronization between vehicle sensors, GPS, and communication systems. This precise timing will be crucial for enabling instantaneous decision-making.

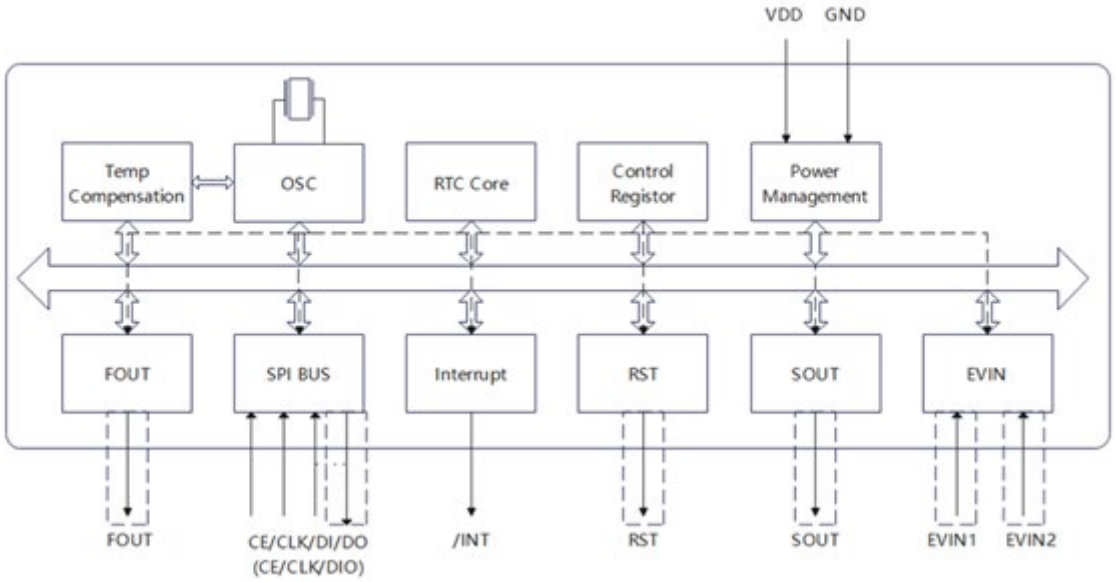
Compared with the INS5A8900 and INS5A8804, the INS5A4000 features a more comprehensive set of integrated functions:

- Timekeeping resolution reaches 1/1024 second.
- External event interrupts can be triggered by voltage drops, oscillator failures, or host commands.
- Timer wake-up functionality is supported, with configurable intervals ranging from 976.56µs to 32 years.
- Frequency calibration and self-monitoring diagnostics are integrated.

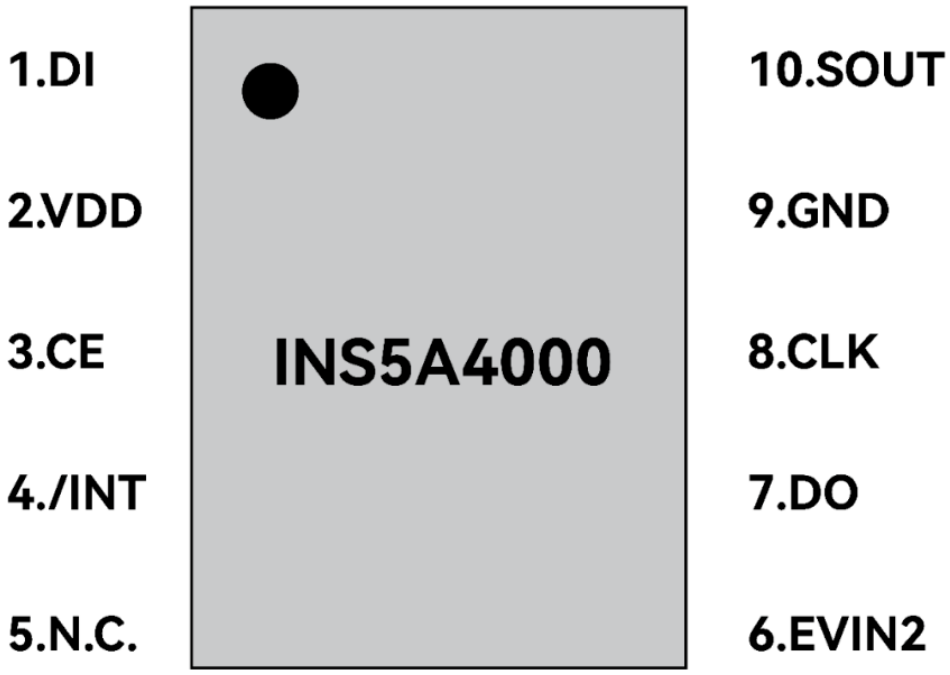
The INS5A4000CE is no longer merely a real-time clock chip; it has been designed with enhanced system-level functionalities, improving the overall performance of electronic systems. It is suitable for a wide range of applications, including automotive electronics, industrial automation, medical devices, and security systems, providing customers with exceptional user experience and long-term reliability assurance.

Key Features of INS5A4000:

- Integrated 32.768kHz DTCXO (Digital Temperature Compensated Crystal Oscillator)
- Low Power Consumption: 0.4μA
- High Precision: ±5ppm @ -40 to 85°C ±8ppm @ 85 to 105°C ±50ppm @ 105 to 125°C
- Wide Operating Temperature Range: -40 to 125°C
- Communication Interface: SPI
- Self-Monitoring and Diagnostics
- Timer (24-bit)
- Minimum Timing Resolution: 1/1024 second
- SRAM: 32 bytes
- Supports Dual Event Recording (EVIN1 / EVIN2)
- Operating Voltage: 1.6V to 5.5V
- LGA Package: 3.2 × 2.5 × 1.0 mm



INS5A4000 Functional Block Diagram



INS5A4000 (Option D) Package

A Full Range of RTC Products Empowering Diverse Industries

The operating mechanism of an RTC is similar to the human brain during sleep. Even when the system is in low-power or sleep mode, the RTC continues to function. When a person sleeps, their perception of the external environment diminishes, but the brain still evaluates the surroundings and performs critical functions, such as waking the body at a set time. Similarly, the RTC keeps running during system sleep, accurately recording time and waking the system to perform tasks as scheduled.

With the development of IoT and artificial intelligence, the importance of precise time management is becoming increasingly evident across various industries and sectors. According to market research data, the RTC chip market experienced significant growth in 2024 and is expected to maintain a steady compound annual growth rate (CAGR) of 6.4% over the next three years.

In response to market demand, Dapu RTC has achieved a comprehensive product lineup, covering ultra-high precision, low power consumption, wide temperature range, compact size, fast startup, and high vibration resistance. The products span automotive-grade, industrial-grade, and consumer-grade categories, and are widely applied in communication equipment, power systems, industrial control, automotive electronics, instrumentation, smart healthcare, smart homes, smart appliances, consumer electronics, AIoT, and many other

fields. This broad product portfolio is designed to meet the diverse and customized needs of customers across various industries.

Dapu Technology will continue to focus on product innovation and technological advancement, fully embracing the AI era. We are committed to launching more diversified, high-performance, and highly integrated product lines, offering one-stop solutions to meet the evolving market demands and providing customers with superior products and services.