

Renesas Technology to Release R8C/Mx Series of Flash MCUs with Power Consumption Among the Lowest in the Industry and Powerful On-Chip Peripheral Functions

— Approximately half the power consumption of earlier Renesas Technology products and multiple functions in a 14-pin package —

Tokyo, January 19, 2010—Renesas Technology Corp. today announced the release of the R8C/Mx Series of low-pin-count MCUs with on-chip flash memory (flash MCUs) offering power consumption among the lowest in the industry and improved functions including timers for applications requiring low power consumption, such as electric shavers, electric toothbrushes, and other compact electrical household appliances.

The R8C/Mx Series is a new addition to the R8C Family of flash MCUs, which has an established track record based on low pin count and high performance. The new Series combines extremely low power consumption and a low pin count. The first products to appear will be the R8C/M11A, with a 14-pin package, and the R8C/M12A, with a 20-pin package. They will comprise a total of six types with 18 products, and sample shipments are scheduled to begin in March 2010 in Japan.

The features of the R8C/Mx Series are summarized below.

(1) Low power consumption that is among the best in the industry

Through improvements to the fabrication process and other enhancements, the current consumption during operation (active current) of the R8C/M11A and R8C/M12A is only 150 μA per 1 MHz, a reduction of approximately 60% from the 350 μA per 1 MHz of comparable earlier Renesas Technology products. This is ideal for battery powered compact electrical household appliances that require low power consumption.

In addition, the standby current is less than 1 μA , approximately half that of earlier Renesas Technology products, making R8C/Mx Series products suitable as sub-MCUs in larger systems with extensive standby time, such as consumer products and office equipment, where they can contribute to improved energy efficiency overall.

(2) Improved flexibility through enhanced peripheral functions for compact electrical household appliances

R8C/Mx Series MCUs are equipped with on-chip peripheral functions, including timers and comparators, required by compact electrical household appliances such as electric shavers, which require sensor detection and control functionality. This makes it possible for hardware to handle processing previously done by the CPU using software, for example, using a comparator for direct control of a timer based on sensor input. Bypassing the CPU in this way increases flexibility and improves real-time performance.

In addition, the on-chip timers support three-phase pulse output, simplifying motor control. The on-chip peripheral I/O mapping controller enables reassignment of pin functions. This can help reduce development time by eliminating the need to make changes to the wiring board.

(3) Data flash that can be reprogrammed, erased, and read using low voltage of 1.8 V

Data flash*¹ is a special type of on-chip flash memory exclusive to Renesas Technology that is intended for storing data. It eliminates the need for external EEPROM (Electrically Erasable and Programmable Read Only Memory) for data storage. The data flash of R8C/Mx Series MCUs supports a reprogramming/erasing voltage of only 1.8 V rather than the 2.7 V of earlier Renesas Technology products. This is suitable for applications requiring low-voltage operation, such as battery-powered products that must store data when the power supply is cut off.

(4) Variety of package options with low pin counts

The R8C/M11A is the first Renesas Technology MCU to feature a 14-pin package suitable for compact electrical household appliances requiring low-pin-count packages. It is available in either a compact TSSOP measuring 4.4 mm × 5 mm or an easy-to-mount DIP package. The 20-pin R8C/M12A is also available in either an LSSOP measuring 4.4 mm × 6.5 mm or a DIP package. Customers can choose the package that is the best matches the product under development, with options available that help reduce wiring board size and lower system cost.

< Product Background >

The R8C Family is a key product family in Renesas Technology's well-established line of MCUs for the consumer field, which have the top market share*² worldwide. With a variety of package options, memory configurations, and advanced on-chip peripheral functions, the R8C Family of MCUs have been widely adopted for system control in a broad range of products. In recent years, demand for reduced power consumption in compact electrical household appliances has risen along with concern for the environment. There is demand for lower current consumption both during system standby and during operation. In addition, the need to reduce system cost has spurred demand for low pin counts, compact packages, and on-chip peripheral functions to reduce the number of external devices.

Against this background, Renesas Technology has developed the new R8C/Mx Series specifically with compact electrical household appliances in mind. Improvements to the fabrication process designed to reduce current consumption during both standby and operation have cut power consumption by about half compared with earlier Renesas Technology MCUs. The R8C/Mx Series also combines low pin counts with on-chip control functions for sensors, etc.

< Product Details >

The R8C/Mx Series is built around the R8C CPU core and delivers high-performance, powerful functionality, and excellent flexibility. The R8C is a 16-bit CPU, but the CPU and peripheral functions are linked by an 8-bit bus. Its maximum operating frequency is 20 MHz, and its wide operating voltage range extends from 1.8 V to 5.5 V. The package is compact and has a low pin count, and the data flash can be reprogrammed, erased, and read using a voltage of only 1.8 V. The many on-chip peripheral functions include a high-speed on-chip oscillator, a power-on reset function,*³ and a low-voltage detection function*⁴ (two on-chip circuits supporting two and eight setting levels, respectively). This reduces the number of external devices required, such as EEPROM, oscillators, reset chips, and pull-up resistors, contributing to reduced system cost and smaller wiring board size.

The E8a emulator, an on-chip debugger that uses a single-pin interface, will be offered as a development environment for the MCU. Since only a single pin is needed for connection, all of the I/O pins can be used during debugging, enabling efficient program development. The E8a emulator functions not only as an emulator, but can also be used as a flash memory programmer.

The future evolution of the R8C Family will include products with even smaller packages, lower power consumption, and on-chip functions selected for specific fields. Renesas Technology will continue to extend its MCU lineup in response to evolving market needs, contributing to the development of products that are more compact, operate on lower voltage, and consume less power.

< Notes >

- Notes: 1. Data flash: Proprietary Renesas Technology flash memory used mainly for data storage separate from flash memory normally used for software storage.
2. Source of sales figures: 2008 WW Microcontroller for Consumer Revenue market share
Source: Gartner, "Semiconductor Applications Worldwide Annual Market Share: Database" Gerald Van Hoy et al. 2 April 2009
3. Power-on reset function: A function that resets all of the MCUs internal circuits when the device is powered on. The power-on reset function of Renesas Technology MCUs is designed to respond flexibly even when the power supply voltage rise is gradual.
4. Low-voltage detection function: A function that issues an internal reset signal or an interrupt when the voltage drops below a specified level.

* Product names, company names, or brands mentioned are the property of their respective owners.

< Typical Applications >

- Compact electrical household appliances, consumer products, home appliances, mobile devices, industrial equipment, office equipment, etc.

< Prices in Japan > *For Reference

N version (operating temperature range: -20 to 85°C)

| Product Name | Product No. | Flash Memory /RAM | Data Flash | Package (Size) | Sample Price [Tax Included] (Yen) |
|----------------|--------------|-------------------|------------|--------------------------------|-----------------------------------|
| R8C/M11A Group | R5F2M110ANSP | 2 KB/256 B | 2 KB | 14-pin TSSOP (4.4 mm × 5.0 mm) | 100 |

< Specifications >

Item

R8C/Mx Series Specifications

| Group name | R8C/M11A Group | | | R8C/M12A Group | | | | | | |
|--|---|---------------------|---------------------|---------------------|---------------------|---------------------|---|---|--|--|
| Product No.: | R5F2M110 | R5F2M111 | R5F2M112 | R5F2M120 | R5F2M121 | R5F2M122 | | | | |
| Operating temperature range | ANSP (TSSOP) | ANSP (TSSOP) | ANSP (TSSOP) | ANSP (LSSOP) | ANSP (LSSOP) | ANSP (LSSOP) | | | | |
| –20 to 85°C version (package) | R5F2M110 ANDD (DIP) | R5F2M111 ANDD (DIP) | R5F2M112 ANDD (DIP) | R5F2M120 ANDD (DIP) | R5F2M121 ANDD (DIP) | R5F2M122 ANDD (DIP) | | | | |
| Product No.: | R5F2M110 | R5F2M111 | R5F2M112 | R5F2M120 | R5F2M121 | R5F2M122 | | | | |
| Operating temperature range | ADSP (TSSOP) | ADSP (TSSOP) | ADSP (TSSOP) | ADSP (LSSOP) | ADSP (LSSOP) | ADSP (LSSOP) | | | | |
| –40 to 85°C version (package) | | | | | | | | | | |
| CPU core | R8C 16-bit CPU core | | | | | | | | | |
| Max. operating frequency/power supply voltage | 20 MHz/2.7 to 5.5 V 5 MHz/1.8 to 5.5 V | | | | | | | | | |
| Operating temperature range | -20 to 85°C (N version) or –40 to 85°C (D version) | | | | | | | | | |
| Flash memory | 2 KB | 4 KB | 8 KB | 2 KB | 4 KB | 8 KB | | | | |
| Data flash | 1 KB × 2 blocks | | | | | | | | | |
| RAM | 256 B | 384 B | 512 B | 256 B | 384 B | 512 B | | | | |
| On-chip peripheral functions | <p>Timer</p> <ul style="list-style-type: none"> • 16-bit timer: 3 channels <ul style="list-style-type: none"> Input capture/output compare function Event counter <p>Watchdog timer: 14-bit × 1 channel</p> <p>Serial interface</p> <ul style="list-style-type: none"> • UART (clock synchronous/asynchronous I/O): 1 channel <table border="1"> <tr> <td> <p>Programmable I/O ports</p> <ul style="list-style-type: none"> • CMOS I/O ports: 11 (with selectable pull-up resistance) • Large-current-drive ports: 5 </td> <td> <p>Programmable I/O ports</p> <ul style="list-style-type: none"> • CMOS I/O ports: 17 (with selectable pull-up resistance) • Large-current-drive ports: 8 </td> </tr> </table> <p>Power-on reset circuit</p> <p>Low-voltage detection circuit: 2 channels (with selectable detection level)</p> <p>Oscillator circuits</p> <ul style="list-style-type: none"> • Main clock oscillator circuit (incorporating main clock oscillation-stop detection function) • High-speed on-chip oscillator • Low-speed on-chip oscillator • Low-power mechanism (standard mode [high-speed clock, high-speed on-chip oscillator, low-speed on-chip oscillator], wait mode, stop mode) <table border="1"> <tr> <td> <p>Interrupts</p> <ul style="list-style-type: none"> • Interrupt vectors: 69 • External interrupt inputs: 6 (INT × 3, key input × 3) • Interrupt priority levels: 2 </td> <td> <p>Interrupts</p> <ul style="list-style-type: none"> • Interrupt vectors: 69 • External interrupt inputs: 8 (INT × 4, key input × 4) • Interrupt priority levels: 2 </td> </tr> </table> | | | | | | <p>Programmable I/O ports</p> <ul style="list-style-type: none"> • CMOS I/O ports: 11 (with selectable pull-up resistance) • Large-current-drive ports: 5 | <p>Programmable I/O ports</p> <ul style="list-style-type: none"> • CMOS I/O ports: 17 (with selectable pull-up resistance) • Large-current-drive ports: 8 | <p>Interrupts</p> <ul style="list-style-type: none"> • Interrupt vectors: 69 • External interrupt inputs: 6 (INT × 3, key input × 3) • Interrupt priority levels: 2 | <p>Interrupts</p> <ul style="list-style-type: none"> • Interrupt vectors: 69 • External interrupt inputs: 8 (INT × 4, key input × 4) • Interrupt priority levels: 2 |
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| On-chip peripheral functions | 10-bit A/D converter x 5 channels, sample-and-hold, sweep mode | 10-bit A/D converter x 6 channels, sample-and-hold, sweep mode |
| Package | <ul style="list-style-type: none"> •14-pin TSSOP (4.4 mm x 5 mm, 0.65 mm pin pitch) •14-pin DIP (6.3 mm x 19.2 mm, 2.54 mm pin pitch) *Operating temperature range -20 to 85°C version (N version) only | <ul style="list-style-type: none"> •20-pin LSSOP (4.4 mm x 6.5 mm, 0.65 mm pin pitch) •20-pin DIP (6.3 mm x 24.5 mm, 2.54 mm pin pitch) *Operating temperature range -20 to 85°C version (N version) only |

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*** Information contained in this news release is current as of the date of the press announcement, but may be subject to change without prior notice. ***