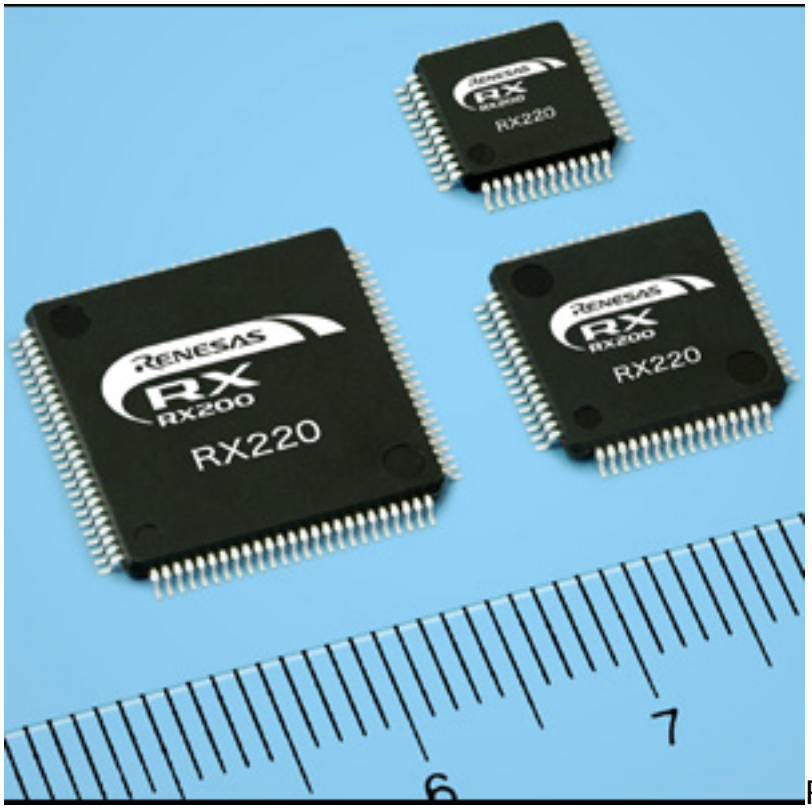
# MCU group delivers high performance of 50 DMIPS




Renesas Electronics Corporation expanded its RX200 Series of low-power mid-range microcontrollers (MCUs), introducing the RX220 Group of 11 entry-level devices to provide greater scalability for embedded designers moving from 8- and 16-bit to 32-bit applications. Based on the RX CPU core, the new RX220 general-purpose MCUs offer a combination of high performance and low power consumption for cost-conscious consumer and industrial applications, including electric household appliances, smartphones and digital cameras, industrial equipment, and measuring devices.

Changing user expectations continue to drive the trend toward higher performance and enhanced functionality in electric household appliances, portable devices such as digital cameras and smartphones, and industrial equipment. In addition, for systems incorporating 16-bit MCUs, there is a need to improve processing performance, reduce power consumption, and to boost functional safety without increasing the cost substantially. There is also deep-seated demand for MCU product lineups built around the same CPU core to allow designers to scale from the low-end to high-end of the marketmore easily.

Renesas launched the RX Family of 32-bit MCUs with high performance and low power consumption to cover a wide range of applications. Within the RX Family, the RX200 Series supports low-voltage operation and features ultra-low power characteristics. To further address the customers’ demands, Renesas has developed the RX220 Group of entry-level products thatsimplify the transition to the RX Family

and to 32-bit MCUs.

**Key Features of the RX220 Group of MCUs:**

(1) High performance and low power consumption at the price of a high-performance 16-bit MCU

The new RX220 Group of MCUs achieves processing performance of approximately 50 Dhrystone MIPS (DMIPS) (1.56 DMIPS/MHz) at 32 megahertz (MHz) while maintaining low power consumption. The power consumption is reduced to less than half that of the earlier RX200 Series when operating in the low-frequency range down to 8 MHz.

The RX CPU core delivers industry-leading performance of 1.56 DMIPS/MHz among mid-range MCUs. It is also possible to substantially reduce the processing time through intermittent operation in which processing and standby stages alternate, which helps significantly reduce overall system power consumption.

The new RX220 Group of MCUs achieves power consumption levels as low as 0.2 mA/MHz when only the CPU is operating and the peripheral functions are halted. When operating in software standby mode, in which the contents of the on-chip RAM and registers are maintained but other functions are halted, the RX220 devices achieve an ultra-low level of 2 µA, contributing to better system power efficiency and longer battery life.

(2) Compatibility with high-end MCUs in a broad product lineup covering a wide range of applications

The new RX220 Group maintains a high level of compatibility not only with the high-end RX210 Group, which features a maximum operating frequency of 50 MHz, but also with the RX Family's high-functionality RX630 Group, featuring a maximum operating frequency of 100 MHz, both of which are currently in mass production. This simplifies the process of upgrading existing systems and strengthens the overall product lineup.

(3) Wide operating voltage range

The new RX220 MCUs support a wide operating voltage range extending from an ultralow 1.62 V to 5.5 V, providing support for a broad range of applications, from portable devices operating on low voltage to electric household appliances and industrial equipment operating on 5 V. The maximum operating frequencies are: 4 MHz at 1.62 V to 1.8 V, 8 MHz at 1.8 V to 2.7 V, and 32 MHz at 2.7 V to 5.5 V. In addition, the on-chip flash memory can be overwritten throughout the entire operating voltage range, eliminating the need for a separate power supply to

rewrite the flash memory even for low-voltage operation at 1.8 V or less, simplifying system design.

(4) Enhanced safety functions

Similar to the RX210 Group of MCUs, the new RX220 offers several built-in safety functions, including:

- A clock frequency accuracy measurement circuit (CAC) that detects any rise or fall in the clock frequency
- An oscillator oscillation stop detection circuit
- A data operation circuit (DOC) that assists in RAM error testing
- A cyclic redundancy check (CRC) function for detecting communication errors
- An independent watchdog timer (IWDT) that operates on a clock separate from the system clock
- Self-diagnostic functions for detecting disconnection of the analog input to the A/D converter and detecting A/D converter malfunctions.

  This integration eliminates the need for the external circuits or software processing previously needed to implement fail-safe capabilities in a system, and simplifies compliance with the IEC 60730 international safety standard for electric household appliance. Renesas hasalso received the VDE certification for its IEC60335-compliant self-test software for the RX200 Series of MCUs.

  Additional peripheral functions include a 12-bit ADC,three-phase driver control timer, real-time clock and event-link controller. The RX220 devices are available in a wide range configurations, from versions with a 100-pin package and 256 KB of flash memory to low pin-count, small-memory capacity versions with a 48-pin package and 32 KB of flash memory (the latter not covered by the RX200 Series).

  Renesas intends to continue to extend the RX MCU lineup to meet the diverse requirements of a broad range of customers, for example with new RX200 Series products for meter applications.

Refer to the separate sheet for the main specifications of the RX220 Group of MCUs

**Availability**

Samples of the RX220 Group of MCUs are available now. Mass production of the RX220 devices is scheduled to begin in December 2012 and is expected toreach a

scale of 1,000,000 units per month in December 2013. (Availability subject to change without notice.)

More information can be found at www.renesas.com [1].

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[1] http://www.renesas.com/