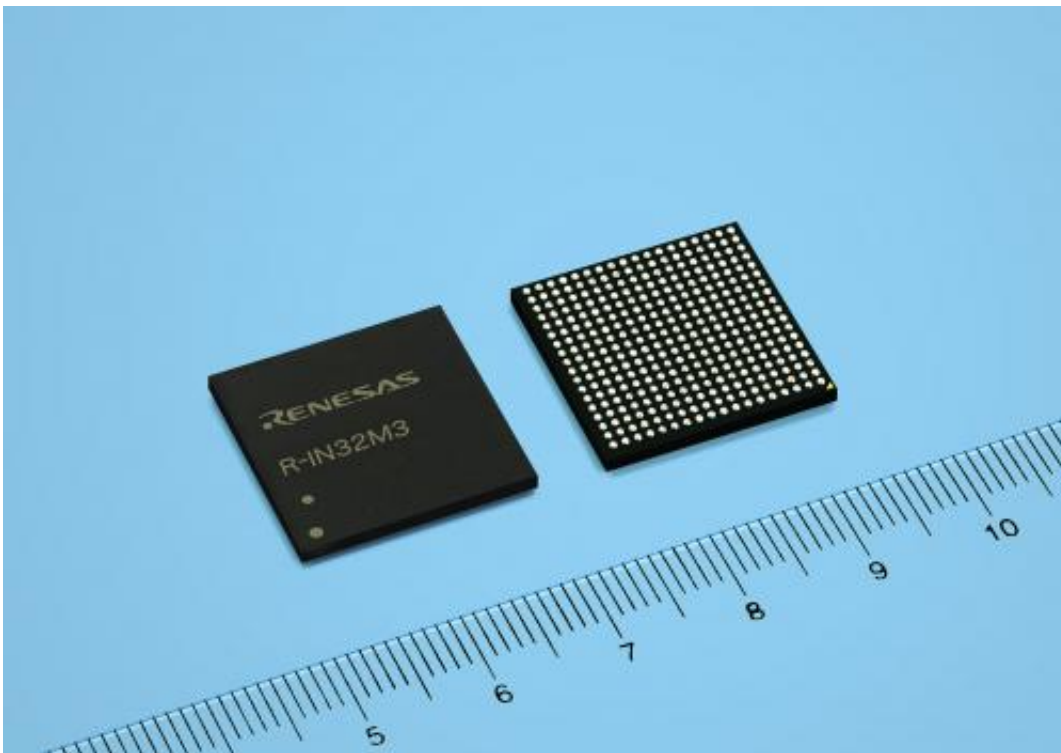


Low-power industrial ethernet communication chips with integrated real-time OS offload engine

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Renesas Electronics R-IN32M3 Series of LSIs for Industrial Ethernet Communication.

Renesas Electronics today announced the R-IN32M3 series of industrial Ethernet communication chips with support for multiple communication protocols in response to the rapid adoption of industrial Ethernet

communication technology.

One of the most distinctive features of the R-IN32M3 is the high-speed operation with the basic function of the real-time OS in hardware to implement high-speed real-time response and high-precision [communication](#) control for industrial Ethernet communication. Because the hardware in the new R-IN32M3 series covers heavy load operations for the CPU, the combination of the CPU and integrated real-time OS offload engine (HW-RTOS) result in ultra-high-speed real-time responsiveness five to ten times that of a conventional software real-time OS.

In addition, the fluctuation caused by inconsistencies in the operation time with conventional CPU processing is reduced substantially from one-fifth to one-tenth of the previous level. The new R-IN32M3 series include an integrated ARM Cortex-M3 CPU (100 MHz). The new Ethernet controllers accept protocols for industrial Ethernet communication such as CC-Link IE and EtherCAT and will accept the control area network (CAN) which is heavily used in industries and generic interface such as universal asynchronous receiver transmitter (UART). There are also plans to provide support for the SSCNET III/H [optical network](#) standard, which uses fully synchronous communication to deliver improved performance.

The industrial Ethernet communication market, which demands faster communication between devices and their efficient central control, is growing rapidly because there is increasing need to boost factory [production efficiency](#) and improve the precision of machine control. Increasing high-speed real-time responsiveness and reducing processing time deviation in communication and machine control are particularly important issues. Also, cutting costs, reducing [power consumption](#), and improving safety are much more important than in other markets. The newly developed R-IN32M3-CL and R-IN32M3-EC are designed to

meet the industrial network market requirements.

Key Features of the R-IN32M3 Series

(1) Integrated real-time OS offload engine (HW-RTOS) and Ethernet accelerator

Industrial Ethernet communication applications require support for a large number of tasks, high-speed time synchronization, and low power consumption. By implementing real-time OS processing in hardware, which previously imposed a substantial load on the CPU, and standard Ethernet communication protocol processing such as checksum calculation and header sorting, processing speed is increased five to ten times. The HW-RTOS driver is μ ITRON compliant. Plans call for support for additional OSs to be added in future.

(2) Multi-protocol support (CC-Link IE, EtherCAT, EtherNet/IP, etc.)

The R-IN32M3-CL with CC-Link IE support integrates a slave controller supporting CC-Link IE Field as a circuit. CC-Link is a 1 Gbps industrial Ethernet communication standard that is the industry's fastest and is promoted by the CC-Link Partner Association, a Japanese organization promoting open networks. The R-IN32M3-EC with EtherCAT support, on the other hand, integrates a slave controller supporting the EtherCAT industrial Ethernet communication standard. Both feature an ARM Cortex-M3 (100 MHz) 32-bit RISC CPU, a media access control (MAC) with low-latency 2-port switch function required by industrial Ethernet protocols, and large on-chip memory. Support by protocol software for EtherNet/IP, FL-net and some others are under final preparation. In addition to communication interfaces with industrial Ethernet support, communication interfaces such as CC-Link, CAN, serial peripheral interface (SPI), and UART can be implemented as well, allowing R-IN32M3 series products to be used as gateway modules to an industrial Ethernet network.

(3) R-IN32M3-CL with 1 Gbps MAC and R-IN32M3-EC with

10/100Mbps EtherPHY. The R-IN32M3-CL, which implements the CC-Link IE protocol in hardware, incorporates a 1 Gbps Ethernet MAC, so 1 Gbps Ethernet communication can be achieved by adding an external 1 Gbps EtherPHY. The R-IN32M3-EC, in contrast, integrates a 2-port 10/100Mbps EtherPHY, so no external PHY is required, which contributes to making a smaller module board. Note that the hardware purchase cost is roughly identical whether an external or an internal PHY is used.

Samples of the first products in R-IN32M3 series, the R-IN32M3-CL and R-IN32M3-EC, will be available in January 2013, priced at US\$25 per unit. Mass production of the R-IN32M3 series is scheduled to begin in June 2013 and is expected to reach a scale of 300,000 units per month in April 2015.

Source: Renesas Electronics

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