

Renesas Electronics Industrial Ethernet Communication LSI with EtherCAT

R-IN32M3-EC



Highly Precise & Stable CPU Operation,

High speed real time response, low power consumption

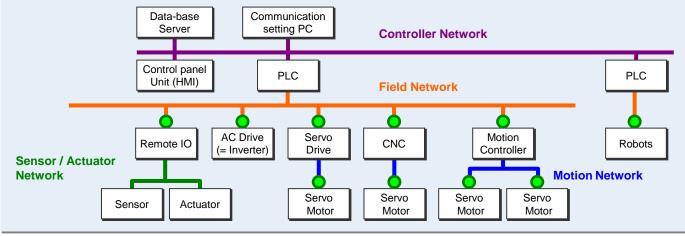
Introduction

R-IN32M3-EC is one of the Industrial Ethernet Communication LSI, which has R-IN32 Engine, EtherCAT Slave Core, 2port EtherPHY, Internal RAM and peripherals. R-IN32 Engine consists of 32bit RISC CPU " Cortex-M3 of ARM" , Real-Time OS Accelerator (Hardware Real-Time OS [HW-RTOS]), Ethernet Accelerator and EtherMAC 802.3 with 2port switch. R-IN32M3-EC achieves the high-speed real time response and low power consumption for Industrial Ethernet Communication with R-IN32 Engine. Especially Real-Time OS Accelerator makes high speed task changing and high speed interrupt response. As a result, R-IN32M3-EC can realize highly precise and stable CPU operation.

Specification **R-IN32 Engine** Cortex-M3 Cortex-M3 32bit RISC CPU CPU Core @100MHz Real-Time OS (operating frequency : 100MHz) Accelerator ■ 2Port EtherPHY(10/100-TX/FX) **Ethernet Accelerator** (HW-RTOS) SRAM-I/F : 32bit (max) Check Header Buffer Sum **ENDEC** Manager (Master / Slave) Non-Ethernet I/F CAN Timer (CAN, CSI, UART, etc...) **Internal Memory Ethernet Controller** 2-ch 4-ch 1.3MBvtes Large size memory (RAM) (RAM) 10M/100M Watchdog UART Multiprotocol support EtherMAC 802.3 Timer 1-ch 2-ch Instruction RAM + 2port Switch ■ GPIO : 96port(max) 768KB 10M/100M CSI Serial Flash Power supply voltage : EtherCAT 2-ch EtherPHY I/F Data RAM Slave $1.0V \pm 0.1V$ (Internal) 2port 512KB I2C SRAM 3.3V±0.3V (I/O) 2-ch I/F Buffer RAM Package ■ Operating temperature : -40~85°C CC-Link 64KB 324pin PBGA GPIO 1-ch (19mmSQ., 1.0mmPitch) **Application Image**

R-IN32M3-EC can be adapted to the communication unit of all FA slave devices at the field network and the motion network. () :Relevant parts)

■Recommend : PLC, Remote IO, CNC, AC Drive(Inverter), Robot, Servo drive, Servo Motor



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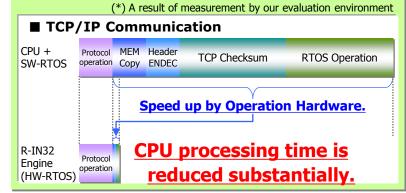


Feature

R-IN32M3 achieves high-performance communication rather than conventional "CPU+ Software RTOS" (SW-RTOS) by using the both of "R-IN32 engine" and high-speed real time communication by the effect of Ethernet Accelerator.

On the other hand, R-IN32M3 achieves highly precise, low latency communication and low power consumption by effect of Real-Time OS Accelerator .

Effect of Ethernet Accelerator



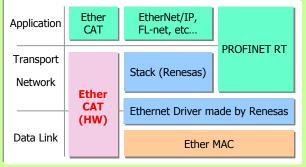
Effects of Real-Time OS Accelerator (*) A result of measurement by our evaluation environment ■Quick Interrupt Response Synchronous real time operation Measurement operation time (Interrupt insert ~ Task Start) Measurement the OS operation time operating various system calls ◆Task management functions ◆Event flag Cortex-M3 15.16 SW-RTOS **R-IN32** System Call (Dispatch) 1.84 8 times faster wai_fig **HW-RTOS** Interrupt response time [µs] @100MHz Operation time [µs] ♦Semapho e Operation time [µs] Real-time multi task operation ♦Mailbox Measurement of task change operation time. Notem Call (Dispatch) Cortex-M3 542 SW-RTOS **R-IN32** 165 3 times faster **HW-RTOS** Operation time [µs] Operation time [µs] SW-RTOS HW-RTOS (*) result of operation @100MHz CPU operation time [µs] @50MHz Low jitter Real-time OS operation

Protocols

R-IN32M3-EC corresponds the multi protocols as following not only Industrial Ethernet Protocols but also the conventional Open Network Protocols.

 Industrial Ethernet Protocols : EtherCAT, EtherNet/IP, PROFINET RT , Modbus TCP(TBD), POWERLINK(TBD), FL-net(TBD)
Conventional Open Network Protocols : CANopen, CC-Link, DeviceNet

Image of Protocol stack (Ethernet Protocol)



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