

RZ/T1

Industrial Drives Solution including Multi-Protocol Industrial Ethernet



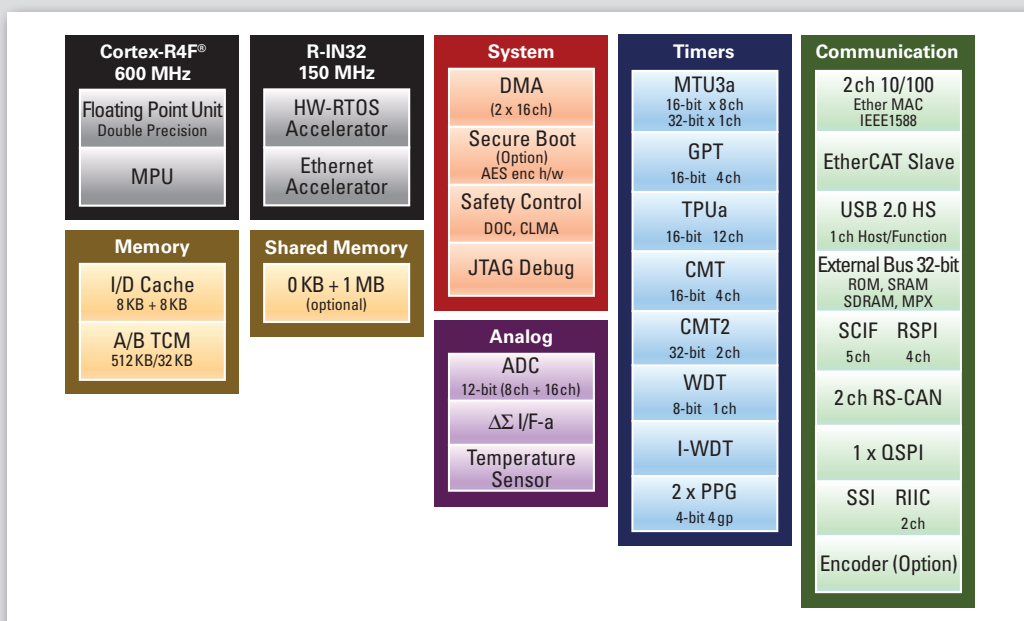
The RZ/T1 complements Renesas' industrial smart factory solution portfolio. It is a dedicated family for the industrial drives market. The RZ/T1 is available as a single core solution and in combination with Renesas R-IN Engine multi-protocol Industrial Ethernet core. Options are available with an integrated encoder interface like EnDat and BiSS. The main CPU core of the RZ/T1 is a 32-bit ARM Cortex®-R4F. This allows the acceleration of hard real-time control. Further performance enhancement can be realised by use of the R-IN Engine which supports HW-RTOS acceleration, which allows cutting-edge speeds for task switching and interrupt response.

The family is designed to give a compatible upgrade path to existing Renesas SuperH and RX solutions, as the main peripherals and sub-modules (e.g. timers) are backwards compatible. These IP blocks have also been further enhanced such that the hardware system timer implementation can offer an unmatched timer precision and determinism. Additionally the dedicated encoder can be directly triggered by the motor control timer unit allowing for a faster response and lower CPU load.

The family supports connection to the Ethernet network via MII or RMII or EtherCAT slave interface enabling the implementation of several Industrial Ethernet protocols such as EtherCAT, PROFINET-RT, EtherNet/IP, Modbus TCP, FL-net, all on the same device.



Block Diagram



Benefits

- High-performance ARM Cortex® R4F CPU core 600 MHz max. clock frequency
 - » Harvard architecture with 8-stage pipeline
 - » I/D 8KB/8KB L1 cache memory
 - » A/B TCM 512KB/32KB memory
 - » 0KB/1MB shared memory with ECC
- R-IN Engine 150MHz max. clock frequency
- 2 DMACs and 1ch DMAC for the Ethernet controller
- Event link controller
- EtherCAT slave support
- Encoder interface (optional)
- Double Floating Point Unit compliant with IEE754
- Vectored interrupt controller (VIC)
- Hardware Real-time OS Accelerator
- Ethernet Accelerator
- Integrated 2-port Gigabit Ethernet Switch
- Safety control (ECC RAM support, CRC (32-bit), clock monitor, independent WDT)
- Secure boot (optional)
- 2 12-bit ADC, 4 $\Delta\Sigma$ I/F interface
- 1ch QSPI Flash interface
- 16/32-bit SRAM interface
- Multi-channel real-time DMA controller
- 2 I²C interfaces, 4 UART interfaces, 2 CAN interfaces
- 1 USB 2.0 host interface
- Support for a wide range of Industrial Ethernet protocols including but not limited to PROFINET RT, EtherNet/IP, Modbus TCP, FL-net
- All clocks generated (via PLL) with 25 MHz crystal oscillator
- 4 standard timers, Watchdog timer
- Several dedicated timers (9 MTUa, 4 GPTa, 2 TPUa, ...), compatible to Renesas SH and RX timers
- Temperature sensor, Sleep mode and module stop function
- Boundary scan support
- 320-pin FBGA, 17 × 17 mm, 0.8 mm pitch
176-pin HLQFP, 20 × 20 mm, 0.4 mm pitch
- Power supply: 1.2 V (Core), 3.3 V (IO)
- Temperature range: T_J -40°C to +125°C

RZ/T1 Product Table

Part Number	Main CPU	Sub CPU / R-IN Engine	TCM for Cortex-R4F	Extended internal RAM	EtherCAT Slave	Encoder I/F	Security Module	Package
R7S910001	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	–	–	–	No	176QFP
R7S910101	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	–	–	–	Yes	176QFP
R7S910002	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	–	–	–	No	320BGA
R7S910102	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	–	–	–	Yes	320BGA
R7S910006	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	–	No	320BGA
R7S910106	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	–	Yes	320BGA
R7S910007	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	–	No	320BGA
R7S910107	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	–	Yes	320BGA
R7S910011	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	EnDat2.2, BiSS-B, BiSS-C	No	320BGA
R7S910111	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	EnDat2.2, BiSS-B, BiSS-C	Yes	320BGA
R7S910013	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	EnDat2.2, BiSS-B, BiSS-C	No	320BGA
R7S910113	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	–	EnDat2.2, BiSS-B, BiSS-C	Yes	320BGA
R7S910015	450 MHz	R-IN Engine 150 MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	–	No	320BGA
R7S910115	450 MHz	R-IN Engine 150 MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	–	Yes	320BGA
R7S910016	450 MHz	R-IN Engine 150 MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	EnDat2.2, BiSS-B, BiSS-C	No	320BGA
R7S910116	450 MHz	R-IN Engine 150 MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	EnDat2.2, BiSS-B, BiSS-C	Yes	320BGA
R7S910017	600 MHz	R-IN Engine 150MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	–	No	320BGA
R7S910117	600 MHz	R-IN Engine 150MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	–	Yes	320BGA
R7S910018	600 MHz	R-IN Engine 150MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	EnDat2.2, BiSS-B, BiSS-C	No	320BGA
R7S910118	600 MHz	R-IN Engine 150MHz	512 KB (ATCM) + 32 KB (BTCM)	1 MB for R-IN Engine	Yes	EnDat2.2, BiSS-B, BiSS-C	Yes	320BGA
R7S910025	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	–	No	320BGA
R7S910125	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	–	Yes	320BGA
R7S910026	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	EnDat2.2, BiSS-B, BiSS-C	No	320BGA
R7S910126	450 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	EnDat2.2, BiSS-B, BiSS-C	Yes	320BGA
R7S910027	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	–	No	320BGA
R7S910127	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	–	Yes	320BGA
R7S910028	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	EnDat2.2, BiSS-B, BiSS-C	No	320BGA
R7S910128	600 MHz	–	512 KB (ATCM) + 32 KB (BTCM)	1 MB	Yes	EnDat2.2, BiSS-B, BiSS-C	Yes	320BGA

Before purchasing or using any Renesas Electronics products listed herein, please refer to the latest product manual and/or data sheet in advance.

