RA4 Series 100MHz Arm® Cortex®-M33 Motor Control Microcontroller

The RA4T1 is based on the 100 MHz Arm® Cortex®-M33 core with TrustZone®.

The RA4T1 group offers optimized peripheral functions for motor control and inverter control with small 32-pin QFN and LQFP package options. These satisfy the needs of high-performance, cost-sensitive and space-constrained applications.

The RA4T1 integrates a wide range of communication interfaces including CAN FD, I3C, SCI and SPI covering all the connectivity needs of a wide range of motor control and consumer applications.

### Key Features

- 100MHz Arm® Cortex®-M33 with TrustZone®
- 128KB - 256KB Flash memory and 40KB SRAM
- 4KB Data Flash to store data as in EEPROM
- Scalable from 32-pin to 64-pin packages
- PWM timer
- 12-bit ADC
- Programmable gain amp
- High speed comparator
- 12-bit DAC
- Trigonometric Function Unit
- CAN FD
- I3C, SCI, SPI

### Target Applications

- Vacuum cleaner
- Washing machine
- Refrigerator
- IH cooker
- Fan
- Pump
- Thermal printer
- Power tools

### Block Diagram

[Diagram showing the block diagram of the RA4T1 microcontroller with various modules such as Memory, Communication, Analogue, System, Timers, Safety, Security, and Accelerator.

- Memory: Code Flash (128KB, 256KB), SRAM (8KB), Data Flash (4KB)
- Communication: CAN FD x1, I3C x1, SPI x2
- Analogue: 12-bit ADC (12ch, 1kΩ with 3ch S/H), 12-bit DAC (2ch)
- System: DMA (8ch), DTC, ELC, Clock Generation
- Timers: GPT16E (6ch), Low-power GPT (2ch)
- Safety: Memory Protection Unit, SRAM Parity Check, ECC SRAM
- Security: 128-bit Unique ID, TRNG
- Package: LQFP 32, 48, 64, QFN 32, 48]
RENESAS RA4T1 GROUP

Software Package

The Renesas Flexible Software Package (FSP) is designed to provide easy-to-use, scalable, high-quality software for embedded system designs using the Renesas RA family. The FSP is based on an open software ecosystem of production-ready drivers, supporting Azure® RTOS, FreeRTOS™ or bare-metal programming. It also includes a selection of other middleware stacks, providing great flexibility for migrating code from older systems or developing new applications from scratch.

Tools and Support

The e² studio IDE provides support with intuitive configurators and intelligent code generation to make programming and debugging easier and faster.

Evaluation Kit

- MCK-RA4T1 Renesas Flexible Motor Control Kit for RA4T1 MCU Group
- Includes CPU board, inverter board, PMSM motor, and accessories
- Documentation and more information: renesas.com/mck-ra4t1
- Orderable part number: RTK0EMA430S00020BJ

Ordering References

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For more details, please visit: renesas.com/ra4t1

renesas.com

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