

CAN Newsletter Online

MCU GROUP

For design of secure IoT systems

Renesas completes the RA6 series of the Arm Cortex M33-based micro-controllers (MCUs) with the RA6M5 group. Each MCU supports two CAN (FD) interfaces.



The group is dedicated for IoT, security, metering, and industrial applications (Source: Renesas)

The chips employ the 200-MHz Arm Cortex-M33 processor and feature the Arm Trustzone technology. The implemented Renesas' Secure Crypto Engine incorporates symmetric and asymmetric cryptography accelerators, key management, security lifecycle management, power analysis resistance, and tamper detection. The introduced group offers the same security features and software support as the RA6M4 MCUs, which recently achieved the [PSA certified level 2](#) and [Sesip1](#) certification. These features enable designers to realize secure and safe IoT (Internet of Things) systems, said the company.

The MCUs integrate an up to 2-MiB on-chip flash and a 512-KiB RAM on-chip, which can be extended. The error correction code (ECC) is supported in the RAM. The memory block swap feature in conjunction with the intrinsic security, makes the group suitable for applications where in-field firmware updates are required. After a new firmware was written to the flash using the background operation (BGO), a selectable amount of 32-KiB flash blocks can be swapped to the new firmware.

**Memory**

Code Flash (1MB, 1.5MB, 2MB)
 BGO/SWAP Function
 SRAM (448kB) Parity
 SRAM (64kB) ECC
 Data Flash (8kB)
 Standby SRAM (1kB)

**Analogue**

12-bit A/D (10ch) 1S/H
 12-bit A/D (16ch) 1S/H
 12-bit DAC (2ch)
 Temperature Sensor

**Timers**

GPT 32-bit (4ch)
 GPT 16-bit (6ch)
 Low Power GPT (6ch)
 WDT
 RTC, Calendar, Vbat,
 128Byte SRAM

**HMI**

Capacitive Touch Sensing
 Unit (20ch)

**Communication**

Ethernet MAC with DMA
 USB2.0 FS x1
 USB2.0 HS x1
 CAN FD x2
 I2C x2
 SCI x10
 SPI x2
 QSPI x1 + OctaSPI x 1
 SDHI / MMC / HDMI-CEC
 SSI x1
 External Memory Bus

**System**

DMA (8ch)
 DTC
 Clock Generation
 On-Chip Oscillator
 HOCO (16,18,20MHz),
 LOCO (32kHz),
 ILOCO (15kHz)
 Low Power Modes
 ELC
 Interrupt Controller
 TrustZone

**Safety**

Memory Protection Unit
 SRAM Parity Check
 ECC in SRAM
 Clock Frequency
 Accuracy Measurement
 CRC Calculator
 IWDT
 Data Operation Circuit
 Flash Area Protection
 ADC Self Test

**Security**

Unique ID
 AES (128/192/256)
 TRNG
 Key Management
 RSA / ECC / DSA
 SHA256 / SHA224
 Tamper Resistance
 SPA/DPA Enhanced Resistance

**Package**

LQFP 100, 144, 176
 BGA 176

RA6M5 MCU block diagram (Source: Renesas)

The communication interfaces include two CAN (FD), Ethernet, USB, etc. A capacitive touch sensing unit and two ADCs (analog-to-digital converter) are provided. The power consumption in the active mode is 107 $\mu\text{A}/\text{MHz}$. A 30- μs wakeup time is supported. The MCU group is supported by the Flexible Software Package (FSP) with a graphical user interface (GUI). The Arm ecosystem tools are offered as well. The components can be deployed in wired IoT applications, security solutions, metering applications, robotics, vending machines, heating, and air conditioning, etc. The chips packaged in 100-pin to 176-pin LQFP or in 176-ball BGAs as well as the EK-RA6M5 evaluation kit are now available.

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