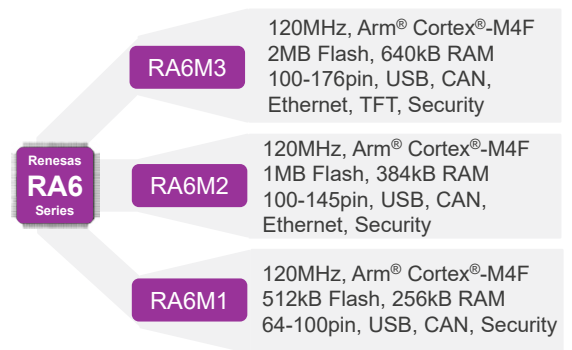RA

BIG IDEAS FOR EVERY SPACE

# 32-BIT MCU FAMILY
# RENESAS RA6M1 GROUP

## 120MHz Optimized entry point to RA6 Series

The Renesas RA6M1 is the entry point to the Renesas RA6 product series for applications that require a high-performance Arm® Cortex®-M4F core at a very attractive price point. The RA6M1 is built on a highly efficient 40nm process and is supported by an open and flexible ecosystem concept—the Flexible Software Package (FSP), built on FreeRTOS—and is expandable to use other RTOSes and middleware. The RA6M1 is suitable for IoT application requiring security, large embedded RAM and low power consumption.

**RA6M3** — 120MHz, Arm® Cortex®-M4F 2MB Flash, 640kB RAM 100-176pin, USB, CAN, Ethernet, TFT, Security

**Renesas RA6 Series**

**RA6M2** — 120MHz, Arm® Cortex®-M4F 1MB Flash, 384kB RAM 100-145pin, USB, CAN, Ethernet, Security

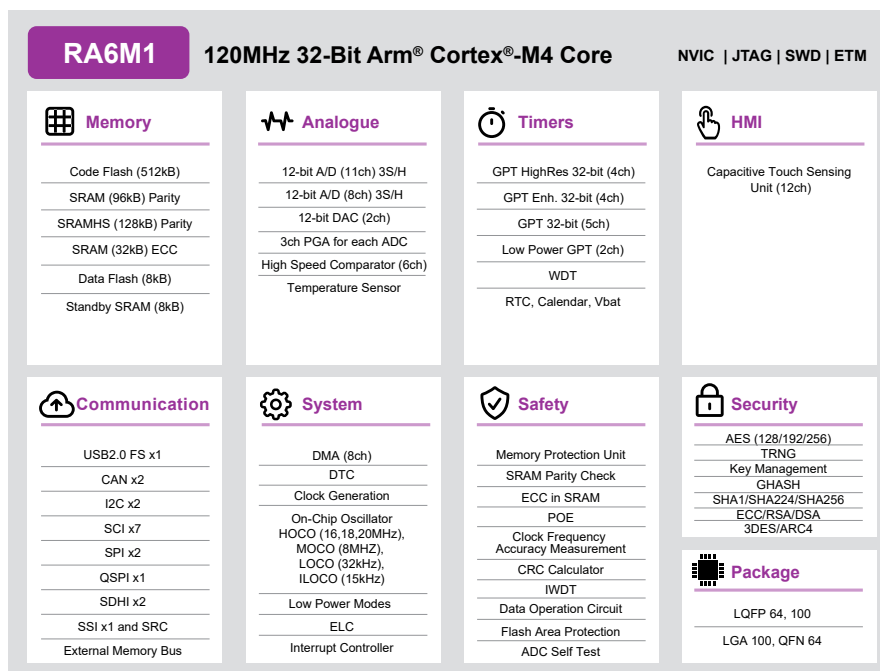**RA6M1** — 120MHz, Arm® Cortex®-M4F 512kB Flash, 256kB RAM 64-100pin, USB, CAN, Security

## Target Applications

- Security (Fire Detection, Burglar Detection, Panel control)
- Metering (Electricity, Automated Meter Reading)
- Industry (Robotics, Door Openers, Sewing Machines, Vending Machines, UPS)
- HVAC (Heating, Air Conditioning, Boiler Control)
- General purpose

## Key Features

- 120MHz Arm® Cortex®-M4F
- 512kB Flash Memory and 256kB SRAM
- 8kB DataFlash to store data as in EEPROM
- Scalable from 64pin to 100pin Packages
- Capacitive Touch Sensing Unit
- USB2.0 Full Speed
- CAN 2.0B
- SCI (UART, Simple SPI, Simple I²C)
- SPI/ I²C Multimaster Interface
- SDHI
- SSI/Serial Sound Interface

## Block Diagram

**RA6M1** — 120MHz 32-Bit Arm® Cortex®-M4 Core — NVIC | JTAG | SWD | ETM

### Memory
- Code Flash (512kB)
- SRAM (96kB) Parity
- SRAMHS (128kB) Parity
- SRAM (32kB) ECC
- Data Flash (8kB)
- Standby SRAM (8kB)

### Analogue
- 12-bit A/D (11ch) 3S/H
- 12-bit A/D (8ch) 3S/H
- 12-bit DAC (2ch)
- 3ch PGA for each ADC
- High Speed Comparator (6ch)
- Temperature Sensor

### Timers
- GPT HighRes 32-bit (4ch)
- GPT Enh. 32-bit (4ch)
- GPT 32-bit (5ch)
- Low Power GPT (2ch)
- WDT
- RTC, Calendar, Vbat

### HMI
- Capacitive Touch Sensing Unit (12ch)

### Communication
- USB2.0 FS x1
- CAN x2
- I2C x2
- SCI x7
- SPI x2
- QSPI x1
- SDHI x2
- SSI x1 and SRC
- External Memory Bus

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

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

### Security
- AES (128/192/256)
- TRNG
- Key Management
- GHASH
- SHA1/SHA224/SHA256
- ECC/RSA/DSA
- 3DES/ARC4

### Package
- LQFP 64, 100
- LGA 100, QFN 64

# RENESAS RA6M1 GROUP

## Benefits

- Integrated Crypto Module with several cryptography accelerators and key management support
- Highly power efficient with 100µA/MHz in active mode, 1.3µA in software standby mode and 900nA in VBAT mode with RTC running
- Large 256kB embedded SRAM suitable for handling communication stacks

## Tools and Support

### Integrated Development Environment (IDE)
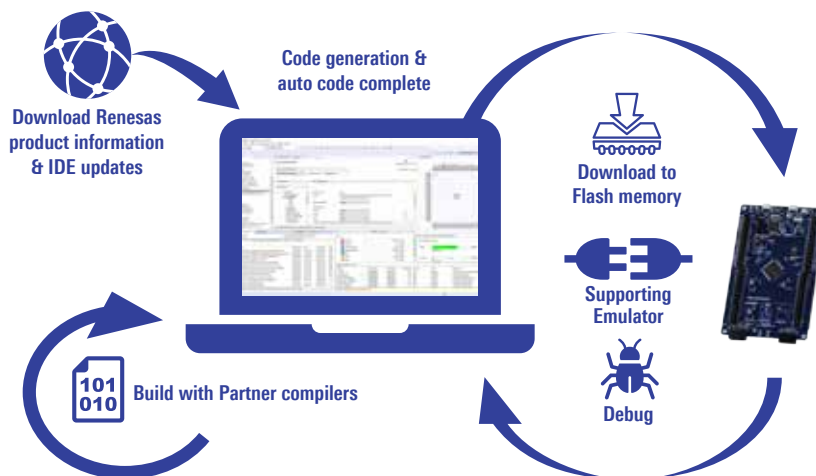
- Renesas e² studio
- Keil MDK

### Compiler

- GNU, Arm Compiler version 6

### Emulator

- Segger J-Link
- Renesas E2 emulator, E2 Lite emulator

### Flash Memory Programmer

- Renesas PG-FP6
- Third party solutions



Download Renesas product information & IDE updates

Code generation & auto code complete

Download to Flash memory

Supporting Emulator

Debug

Build with Partner compilers

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## Evaluation Kit

- Full MCU evaluation including On-Chip debugger
  – Part name: **RTK7EKA6M1S00001BU**



Evaluation Kit: EK-RA6M1

## Ordering References

| Part name | Flash | RAM | DataFlash | Operating Temperature | Package | Package Dimensions | Pin Pitch |
|---|---|---|---|---|---|---|---|
| R7FA6M1AD2CLJ | 512kB | 256kB | 8kB | -40/+85°C | LGA 100pin | 7x7mm body | 0.65mm |
| R7FA6M1AD3CFM | 512kB | 256kB | 8kB | -40/+105°C | LQFP 64pin | 10x10mm body; (12x12mm) | 0.5mm |
| R7FA6M1AD3CFP | 512kB | 256kB | 8kB | -40/+105°C | LQFP 100pin | 14x14mm body; (16x16mm) | 0.5mm |
| R7FA6M1AD3CNB | 512kB | 256kB | 8kB | -40/+105°C | QFN 64pin | 8x8mm | 0.4mm |

**For more details, please visit www.renesas.com/RA**

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## renesas.com

**Contact information**
For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/