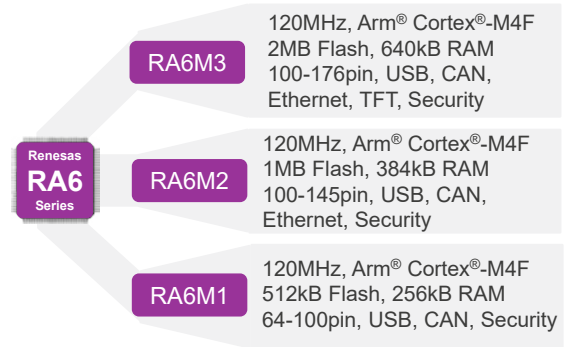# RENESAS

BIG IDEAS FOR EVERY SPACE

RENESAS RA

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
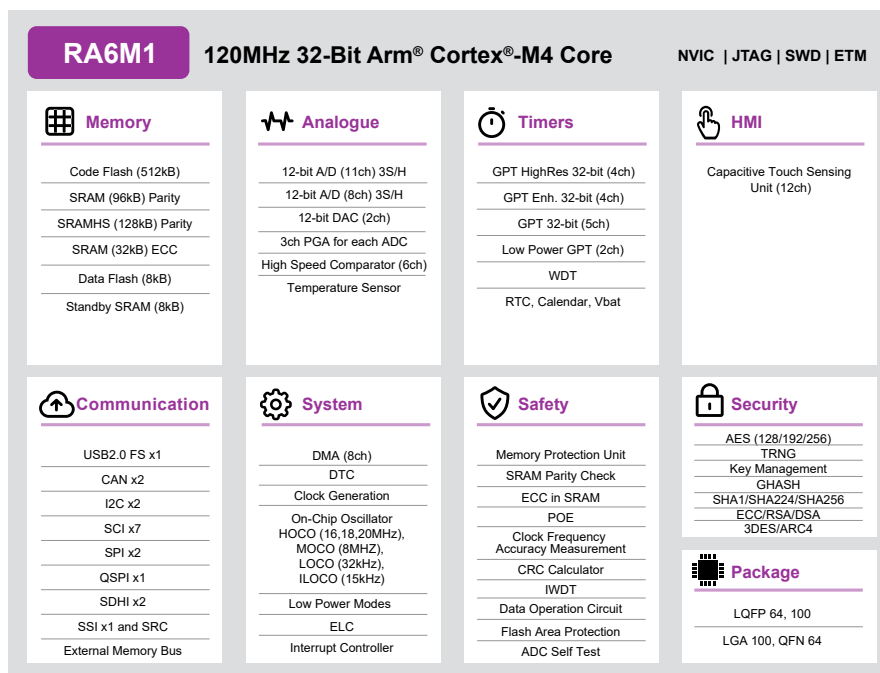
Target Applications

- 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)
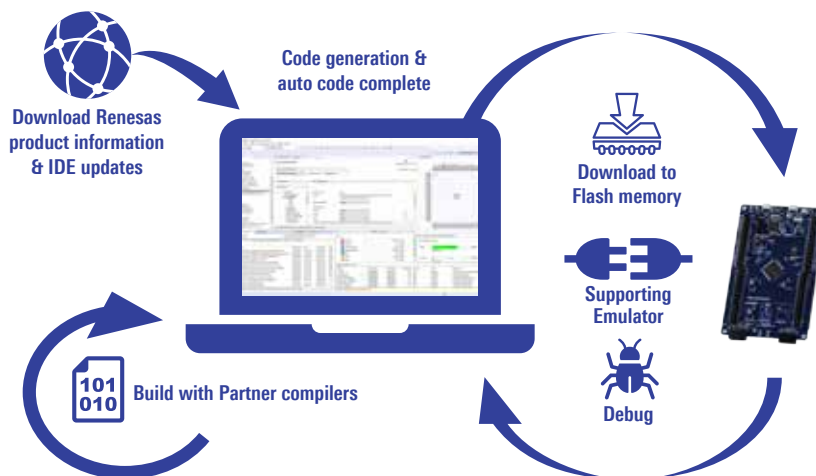
- Renesas e² studio
- Keil MDK

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

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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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/