

32-BIT MCU FAMILY

RENESAS RA6M5 GROUP

200MHz highest integration ARM® Cortex®-M33 with TrustZone®

The Renesas RA6M5 group uses the high-performance Arm® Cortex®-M33 core with TrustZone®. In concert with the Secure Crypto Engine it offers Secure Element functionality. The integrated Ethernet MAC with individual DMA ensures high data throughput. The RA6M5 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 RA6M5 is suitable for IoT applications requiring Ethernet, future proof security, large embedded RAM, and low active power consumption down to 107µA/MHz running the CoreMark® algorithm from Flash.

Renesas RA6 Series	RA6M1	RA6M2	RA6M3	RA6M4	RA6M5
Performance Range	120MHz, Arm® Cortex®-M4	120MHz, Arm® Cortex®-M4	120MHz, Arm® Cortex®-M4	200MHz, Arm® Cortex®-M33	200MHz, Arm® Cortex®-M33
Memory Range	512kB Flash, 256kB RAM	512kB-1MB Flash, 384kB RAM	1-2MB Flash, 640kB RAM	512kB-1MB Flash, 192kB RAM	1-2MB Flash, 512kB RAM
Package	64-100pin QFN/LQFP/LGA	100-145pin LQFP/LGA	100-176pin LQFP/BGA	64-144pin LQFP/LGA	100-176pin LQFP/BGA
USB, CAN	•	•	•	•	•
Security	•	•	•	TrustZone®	TrustZone®
HMI	•	•	TFT controller/ 2D accelerator/ JPEG decoder	•	•
Other Features	Low cost	Ethernet MAC with DMA	Ethernet MAC with DMA	Ethernet MAC with DMA	Ethernet MAC with DMA, CAN FD

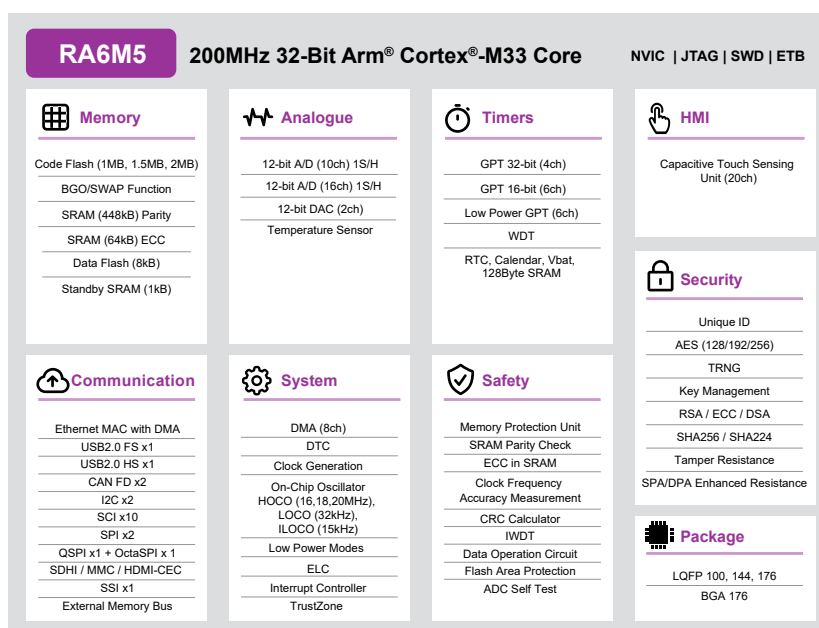
Target Applications

- Wired Ethernet applications
- Enhanced 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

- 200MHz Arm® Cortex®-M33 with TrustZone®
- Secure element functionality
- 1MB - 2MB Flash memory and 448kB SRAM with Parity and 64kB SRAM with ECC
- Dual-bank-Flash with background operation, and block swap functionality
- 8kB Data Flash to store data as in EEPROM
- Scalable from 100-pin to 176-pin packages
- Ethernet controller with DMA
- Capacitive touch sensing unit
- USB 2.0 High-Speed and Full Speed
- CAN FD (CAN 2.0B option)
- QuadSPI and OctaSPI
- SCI (UART, Simple SPI, Simple I2C)
- SPI/ I2C multimaster interface
- SDHI, MMC, HDMI-CEC

Block Diagram



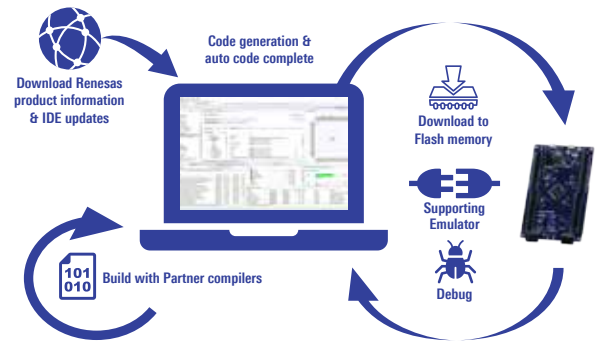
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Benefits

- Secure element functionality providing better performance, unlimited secure key storage, key management, and lower BOM cost
- High-performance and low-power with 107μA/MHz while running CoreMark from flash at 200 MHz
- High-integration up to 2 MB code flash memory with Dual-bank, Flash block swap, and background operation, 8 kB Data flash memory, and 512 kB SRAM with Parity/ECC
- Rich connectivity with Ethernet MAC controller, USB 2.0 High-Speed and Full-Speed, SDHI, Quad and Octa SPI, and advanced analog

Tools and Support

IDE	Renesas e²studio	Keil MDK	IAR EWARM
Compiler	<ul style="list-style-type: none"> ■ GCC ■ Arm Compiler 	<ul style="list-style-type: none"> ■ Arm Compiler 	<ul style="list-style-type: none"> ■ IAR Arm Compiler
Debugger	<ul style="list-style-type: none"> ■ Renesas E2/E2 Lite ■ SEGGER J-Link 	<ul style="list-style-type: none"> ■ SEGGER J-Link 	<ul style="list-style-type: none"> ■ IAR I-Jet ■ SEGGER J-Link
Programmer	<ul style="list-style-type: none"> ■ Renesas PG-FP6 ■ SEGGER J-Flash ■ Third party solutions 		



Evaluation Kit

- Full MCU evaluation including On-Chip debugger
- Part name: RTK7EKA6M5S00001BE



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Ordering References

Part name	Flash	2MB	R7FA6M5AH2CBG	R7FA6M5AH3CFC	R7FA6M5AH3CFB	R7FA6M5AH3CFP	R7FA6M5BH2CBG	R7FA6M5BH3CFC	R7FA6M5BH3CFB	R7FA6M5BH3CFP
		1.5MB	R7FA6M5AG2CBG	R7FA6M5AG3CFC	R7FA6M5AG3CFB	R7FA6M5AG3CFP	R7FA6M5BG2CBG	R7FA6M5BG3CFC	R7FA6M5BG3CFB	R7FA6M5BG3CFP
		1MB	-	-	-	-	R7FA6M5FG2CBG	R7FA6M5BF3CFC	R7FA6M5BF3CFB	R7FA6M5BF3CFP
RAM		512KB	512KB	512KB	512KB	512KB	512KB	512KB	512KB	512KB
Option		CAN	CAN	CAN	CAN	CAN FD	CAN FD	CAN FD	CAN FD	CAN FD
DataFlash		8KB	8KB	8KB	8KB	8KB	8KB	8KB	8KB	8KB
Operating Temperature		-40/+105°C	-40/+105°C	-40/+105°C	-40/+105°C	-40/+105°C	-40/+105°C	-40/+105°C	-40/+105°C	-40/+105°C
Package		BGA 176pin	LQFP 176pin	LQFP 144pin	LQFP 100pin	BGA 176pin	LQFP 176pin	LQFP 144pin	LQFP 100pin	LQFP 100pin
Package dimensions		13x13mm	24x24mm body; (26x26mm)	20x20mm body; (22x22mm)	14x14mm body; (16x16mm)	13x13mm	24x24mm body; (26x26mm)	20x20mm body; (22x22mm)	14x14mm body; (16x16mm)	14x14mm body; (16x16mm)
Pin pitch		0.8mm	0.5mm	0.5mm	0.5mm	0.8mm	0.5mm	0.5mm	0.5mm	0.5mm

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

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