RENESAS

RENESAS RA

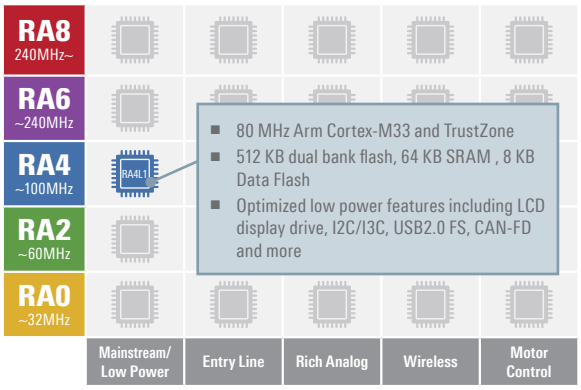
32-BIT MCU FAMILY

RENESAS RA4L1 GROUP

80 MHz Arm® Cortex®-M33® Low Power Microcontroller with Segment LCD Controller

The Renesas RA4L1 MCU group feature low-power 32-bit microcontrollers based on the Arm® Cortex®-M33 (CM33) core with TrustZone®, delivering an ideal balance of low-voltage operation, low-power consumption and high performance.

RAL1 MCUs offer operation down to 1.6V combined with low power standby current of as little as 1.65 µA and many low power features enabling users to dynamically optimize power/performance to meet their application requirements. Low power features such as segment LCD drive, RTC, ADC and timers, as well as integrated communications interfaces such as CAN FD, USB 2.0 FS, I2C/I3C and low-power UARTs make these devices ideal for many industrial, consumer, and healthcare applications.



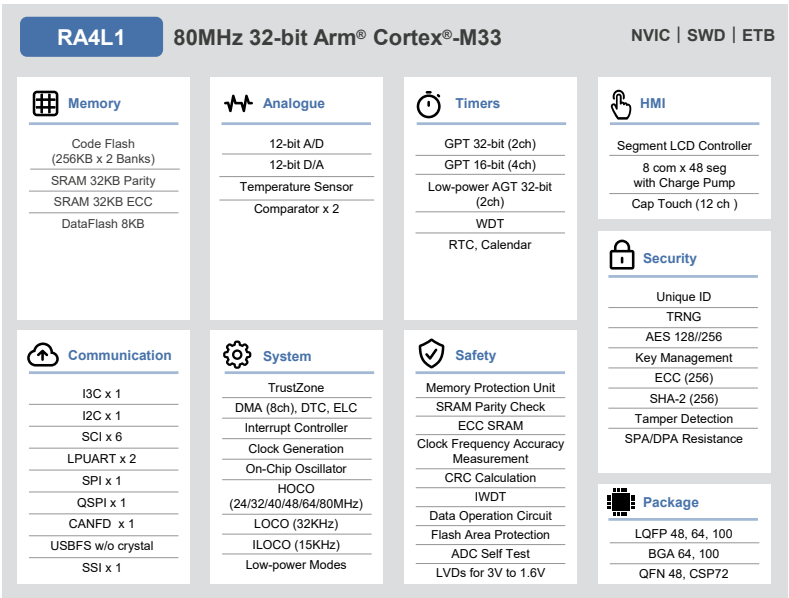
Key Features

- 80 MHz Arm Cortex-M33 with TrustZone
- 512 KB dual bank Flash , 8 KB Data Flash
- 64 KB SRAM with 32 KB parity and 32 KB ECC
- 168 µA / MHz Active current, 1.65 µA standby with fast wake-up <3.5 µS (from MOCO)
- Compact QFN, LQFP, BGA, and CSP package options
- Segment LCD controller and Capacitive Touch Sensing Unit
- 2 low power UARTs with 32 kHz support
- SCI, IrDA, LIN, I2C, I3C and SSI interfaces
- USB 2.0 FS, CAN FD, QSPI
- Advanced security engine with support for: TRNG, Unique Id, AES, ECC, SHA
- 32-bit & 16-bit timers, 32-bit ultra-low-power timers

Target Applications

- Industrial applications
- Consumer products
- Smart home, building automation
- Office automation
- Healthcare and medical systems
- Voice AI applications
- IoT sensors

Block Diagram



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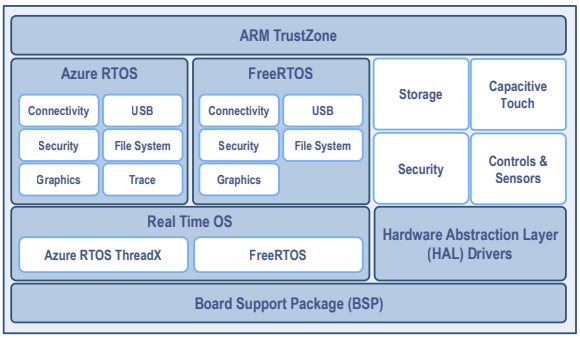
Software Package

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. FSP includes best-in-class HAL drivers with high performance and low memory footprint.

Based on an open software ecosystem, FSP provides customers with flexibility in product development, including the use of existing software assets and partner ecosystem solutions.



Tools and Support

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

IDE	Renesas e²studio	Keil MDK	IAR EWARM
Compiler	• GCC • LLVM • Arm Compiler* • IAR Arm Compiler*	• Arm Compiler*	• IAR Arm Compiler*
Debug Probe	• Renesas E2/E2 Lite • SEGGER J-Link	• SEGGER J-Link • Keil ULINK / CMSIS-DAP (limited support)	• IAR I-jet • SEGGER J-Link • Renesas E2/E2 Lite • CMSIS-DAP (limited support)
Production Programmer	• Renesas PG-FP6 • SEGGER J-Flash • Partner solutions		

* Compiler must be purchased and licensed directly from third party

Evaluation Kits

- RA4L1 evaluation kit enables users to evaluate the features of the MCU using rich onboard features along with popular ecosystem expansion connectors
- Order the evaluation kit and download documentation and files at: renesas.com/ek-ra4l1

- RA4L1 capacitive touch evaluation system makes it easy to evaluate touch solutions enabled by the MCU
- Order the solution kit and download documentation and files at: renesas.com/rssk-ra4l1

Ordering References

Flash/RAM							
512kB / 64kB	R7FA4L1BD4CDB	R7FA4L1BD4CFL	R7FA4L1BD4CNE	R7FA4L1BD3CAH	R7FA4L1BD4CFM	R7FA4L1BD4CFP	R7FA4L1BD3CAG
256KB / 64KB	R7FA4L1BB4CDB	R7FA4L1BB4CFL	R7FA4L1BB4CNE	R7FA4L1BB3CAH	R7FA4L1BB4CFM	R7FA4L1BB4CFP	R7FA4L1BB3CAG
Pin Count	72-pin	48-pin	48-pin	64-pin	64-pin	100-pin	100-pin
Package	CSP	LQFP	QFN	BGA	LQFP	LQFP	BGA
Package size	3.64 x 4.28 mm	7 x 7 mm	7 x 7 mm	5.5 x 5.5 mm	10 x 10 mm	14 x 14 mm	7 x 7 mm
Pitch	0.4 mm	0.5 mm	0.5 mm	0.5 mm	0.5 mm	0.5 mm	0.5 mm
Temp range	-40 to 125 °C	-40 to 125 °C	-40 to 125 °C	-40 to 105 °C	-40 to 125 °C	-40 to 125 °C	-40 to 105 °C

For more details, please visit: renesas.com/ra4l1

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www.renesas.com/contact/

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