32-bit MCU with Arm® Cortex®-M Core

RENESAS RA FAMILY

Delivering the Ultimate Promise of IoT with Software Flexibility

The Renesas RA Family is a new 32-bit MCU family built on the Arm® Cortex®-M core architecture. Offering a wide range of performance and features, the Renesas RA Family meet the scalability, power consumption and performance needs of nearly any embedded systems end-product.

**Strong Security**
- Secure Crypto Engine (SCE) IP
- An extra layer of embedded hardware security providing tamper detection and resistance to side-channel attacks
- All built on top of Arm’s v8-M TrustZone®

**Arm Core**
- Based on Arm’s next-generation Cortex-M23/M33 processor cores, and Cortex-M4 core

**Flexible Software Solution**
- Supported by an open and flexible ecosystem concept, the Flexible Software Package (FSP) uses FreeRTOS as a base
- Can be replaced and expanded by any other RTOS or middleware

**Best-in-Class Peripheral IP**
- Excellent HMI capacitive touch technology
- The industry’s highest code flash memory capacity
- Wide range of connectivity solutions

**Renesas RA Product Series**

The four Renesas RA Family MCU series are based on 32-bit Arm® Cortex®-M cores. All four Renesas RA Series have been designed on common DNA, making these products feature- and pin-compatible. This allows easy scalability and code reuse from one device to another.

<table>
<thead>
<tr>
<th>Performance Range</th>
<th>Feature</th>
<th>Series Memory Ranges</th>
<th>ASSP Extensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 200MHz</td>
<td>Highest Performance, HMI, Connectivity, Security, Analog</td>
<td>Highest Memory Integration: 2MB Flash, 1MB SRAM</td>
<td>HMI Analog</td>
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<tr>
<td>1.8-3.6V</td>
<td></td>
<td></td>
<td>Motor/Inverter Control</td>
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<td></td>
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<td></td>
<td>Wireless HMI</td>
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<tr>
<td>Up to 200MHz</td>
<td>Advanced Performance, Connectivity, Security</td>
<td>High Memory Integration: up to 2MB Flash, 640kB SRAM</td>
<td>Wireless Sensor</td>
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<tr>
<td>2.7-3.6V</td>
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<td></td>
<td>Rich Analog Wireless</td>
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<tr>
<td>Up to 100MHz</td>
<td>Excellent Power, High Performance Mix Paired with Security</td>
<td>Medium Memory Integration: up to 1MB Flash, 128kB SRAM</td>
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<tr>
<td>1.6V-5.5V</td>
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<tr>
<td>Up to 60MHz</td>
<td>Low Power</td>
<td>Medium memory integration: 512kB Flash, 64kB SRAM</td>
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<tr>
<td>1.6V-5.5V</td>
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Target Markets and Benefits

Industrial Automation
- Long product life
- Temperature up to 105°C
- Industrial quality grade
- Strongest robustness
- 24-bit \( \Sigma \Delta \) ADC for sensors

Security
- Isolated crypto subsystem
- Symmetric/asymmetric hardware acceleration
- True Random Number Generator (TRNG)
- NIST-certified algorithms
- Key isolation and management

Connectivity
- Large on-chip RAM suitable for stacks
- CAN/USB/Ethernet
- Large amount on serial interfaces
- QSPI interfaces
- Integrated crypto module

Building Automation
- High Flash/RAM ratio
- Wide range of connectivity
- Rich analog features
- Small packages

Metering
- Scalable lineup
- Industrial quality grade
- Long product life
- Integrated crypto module

Whitegoods
- Temperature up to 105°C
- Scalable lineup
- Motor control solutions
- Capacitive touch interface
- LCD control

Tools and Support

<table>
<thead>
<tr>
<th>IDE</th>
<th>Renesas e'studio</th>
<th>Keil MDK</th>
<th>IAR EWARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>GCC</td>
<td>Arm Compiler</td>
<td>IAR Arm Compiler</td>
</tr>
<tr>
<td>Debugger</td>
<td>Renesas E2/E2 Lite</td>
<td>SEGGER J-Link</td>
<td>IAR I-Jet</td>
</tr>
<tr>
<td>Programmer</td>
<td>Renesas PG-FP6</td>
<td>SEGGER J-Link</td>
<td>Third party solutions</td>
</tr>
</tbody>
</table>

Evaluation Kit
- Full MCU evaluation including on-chip debugger
- Individual kits for several products of each Renesas RA Series are available

For more information about the Renesas RA MCU family, please visit: [www.renesas.com/RA](http://www.renesas.com/RA)