RX MICROCONTROLLER FAMILY

The Core Difference in Your Design
32-BIT RX MCU FAMILY

COUNTLESS OPTIONS FOR YOUR DESIGN

Highest Performance on Class, broad Connectivity and largest Memory in the Market

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RX family of 32-bit high performance microcontrollers provide the core difference in your design. With more than 2.0 DMIPS/MHz performance and Renesas’ advanced single cycle MONOS flash technology, capable of operating at speeds up to 120 MHz with no wait states, the RX family brings with 240 MHz CPU frequency new levels of processing power to your application.

The 32-bit RX CPU core at the heart of every RX Microcontroller is designed to provide both the highest levels of CPU performance as well as compact and efficient code. Each core has a number of execution units both for integer arithmetic as well as a variety of DSP functions, supported by features such as Multiplyacumulator and a barrel shifter. The Rxv2 CPU core implemented on the latest RX200, RX600 and RX700 Series also comes with the additional on chip Floating Point Unit (FPU). The Core itself supports an Enhanced Harvard architecture with multiple data and instruction busses as well as a number of dedicated peripheral busses to maximise data throughput and peripheral performance. These together make the RX the highest performance and most efficient CPU core in its class, outperforming all of its competitors.

RX – 32-BIT MCU FAMILY

- Broad product line-up
- Flash Memory from 8 kB to 4 MB
- Compatibility
- Wide range of application coverage
- Low power consumption
- High data processing performance
RX – ONE CORE, COUNTELESS OPTIONS

Industry’s only 120 MHz on-chip Flash

Each member of the RX family is implemented on an optimised flash process for a particular range of applications, while using the same standard RX CPU core and common peripherals, allowing easy software reuse across the whole family.

From the advanced RX700 family aimed at high performance applications to the low power/low pin count RX100 the huge range of highly integrated microcontrollers in the RX family provides the ideal solution for your application. Renesas’ MONOS Flash technology allows the RX the ability to execute software without wait states to the maximum speed of the device, currently up to 120 MHz operating, leaving all other competing flash technologies behind MONOS flash technology. The combination of the powerful RX core and the high performance of the MONOS flash technology provide an unbeatable combination.

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX700</td>
<td>240 MHz</td>
<td>Highest performance, connectivity and largest memory in the market</td>
</tr>
<tr>
<td>RX600</td>
<td>120 MHz</td>
<td>Advanced performance, connectivity and largest memory in the market</td>
</tr>
<tr>
<td>RX200</td>
<td>54 MHz – 80 MHz</td>
<td>Low power high performance</td>
</tr>
<tr>
<td>RX100</td>
<td>32 MHz</td>
<td>Low power entry level</td>
</tr>
</tbody>
</table>

- Highest memory integration: 4 MB Flash, 512 k SRAM
- Strong encryption: AES, DES, SHA, TRNG
- Full connectivity: Dual Ethernet, USB HS and FS, CAN
- Unique peripherals: DOC, ELC, MPC, CRC, CAC
- 0-Wait state Flash: Up to 120 MHz Flash operation
- Full connectivity: Dual Ethernet, Dual USB, 3 x CAN
- Unique peripherals: DOC, ELC, MPC, CRC, CAC
- Low Power: 0.21 mA / DMIPS, 1.62 – 5.5V
- 0-Wait state Flash: Up to 80 MHz Flash operation
- High integration-lower BOM: 12-bit ADC, 24-bit ∑∆ ADC
- Unique peripherals: DOC, ELC, MPC, CRC, CAC
- High reliability touch
- Low Power: 100 µA / MHz, 350 nA Standby
- Connectivity: USB, LIN
- High integration for lower BOM: 12-bit ADC
RX – A solution for every application

The RX family provides a wide variety of solutions for many different applications, every device includes a range of powerful peripherals including motor control timers, up to 15 serial interfaces, powerful ADC’s and advanced on-chip safety features.

The RX600/RX700 connectivity devices provide solutions for devices requirement features such as CAN, USB and Ethernet. Especially latest design like the RX65N and RX651 pushes the limits further in regards to integration and power efficiency. The RX62T & RX63T families provide true single chip cost effective, solutions for many motor control and inverter applications. For motor control applications where cost is one of the essential requirements the high integrated RX23T and RX24T serves the growing demand for efficient motor control. The low power RX21A with an on-chip high resolution 24-bit ADC provides an ideal solution both for power meters and for a range of other applications where the accurate measurement of analogue signals is required. The new RX230/RX231 product series offer a good mix of widely used peripherals and flash memory sizes, making it perfect fit for any general purpose requirement. The RX111/RX110/RX113 provides the entry level 32-bit performance devices in small packages with LCD, USB and lowest power consumption not only in active, but also in RTC mode. The RX family is available in a wide range of package and memory sizes, from 8 kbytes to 4 Mbytes of on-chip flash and a wide variety of LQFP, LGA and BGA package options, from space-saving 36-pin packages to 177-pin packages.

### Features

<table>
<thead>
<tr>
<th>HMI</th>
<th>RX100</th>
<th>RX200</th>
<th>RX600</th>
<th>RX700</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW POWER ENTRY LEVEL</td>
<td>LOW POWER PERFORMANCE</td>
<td>CONNECTIVITY PERFORMANCE</td>
<td>HIGHEST PERFORMANCE CONNECTIVITY</td>
<td></td>
</tr>
<tr>
<td>1.8 – 3.6 V</td>
<td>1.62 – 5.5 V</td>
<td>120 MHz</td>
<td>240 MHz</td>
<td></td>
</tr>
<tr>
<td>32 MHz</td>
<td>54 MHz - 80 MHz</td>
<td>4.55 Coremark / MHz</td>
<td>4.35 Coremark / MHz</td>
<td></td>
</tr>
<tr>
<td>3.08 Coremark / MHz</td>
<td>3.08 Coremark / MHz</td>
<td></td>
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</tbody>
</table>

- **HMI**: RX62N/RX621, RX63N/RX631, RX64M, RX651/RX65N
- **Motor Control Inverter**: RX111, RX23T, RX24T, RX220, RX62T, RX62G, RX63T
- **Analogue Metering**: RX113, RX21A
- **Connectivity**: RX231, RX62N/RX621, RX63N/RX631, RX64M, RX651/RX65N
- **Consumer**: RX111, RX113, RX130, RX220, RX610, RX630, RX651
- **General Purpose**: RX110, RX111, RX231, RX210, RX71M
RX – ECO-SYSTEM

Renesas Starter Kit – RSK

The starter kit includes everything that the customer needs to evaluate and develop with the RX microcontroller:

- CPU board with target microcontroller
- LCD panel for user/diagnostic interaction
- E1 or E2-lite JTAG On Chip Debugger
- Trial Renesas C compiler and IDE (60 days unlimited then 128 k limited)
- Tutorial session
- Renesas e2studio development environment
- Sample peripheral driver code

Application Development Tools

RX MCUs are supported by a comprehensive set of popular Renesas hardware and software tools that have been widely praised for their capabilities and ease of use. Additional support is provided by a dedicated community of third-party experts offering many helpful, time-saving products and services, including the development of optimised GNU compilers and IAR.

IAR Embedded Workbench, with full C and C++ support, MISRA C compliance checker  
www.iar.com/ewrx

Can be fully integrated into  
Renesas e2studio IDE  
www.gcc-renesas.com
On-chip debugging of an RX-based application is performed via JTAG and/or FINE (Single wire Interface) connection to the target and USB connection to the Windows-based IDE. E1, E2-Lite and J-Link offer thorough CPU control and visibility. E20 adds high-speed tracing.

**Debugging, Emulation and Programming**

Renesas E1
R0E00010KCE00

Renesas E2 Emulator Lite
RTE00020LKCE00000R

Renesas E20
R0E000200KCT00

SEGGER
J-Link

**RX Solution Kits**

Renesas provide a wide range of solution kits for the RX microcontrollers, this includes:
- TFT Control Solutions
- Motor Control Solutions
- Metering Solution
- DPS Solution
- Webserver Solution
- and several more ...

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Before purchasing or using any Renesas Electronics products listed herein, please refer to the latest product manual and/or data sheet in advance.