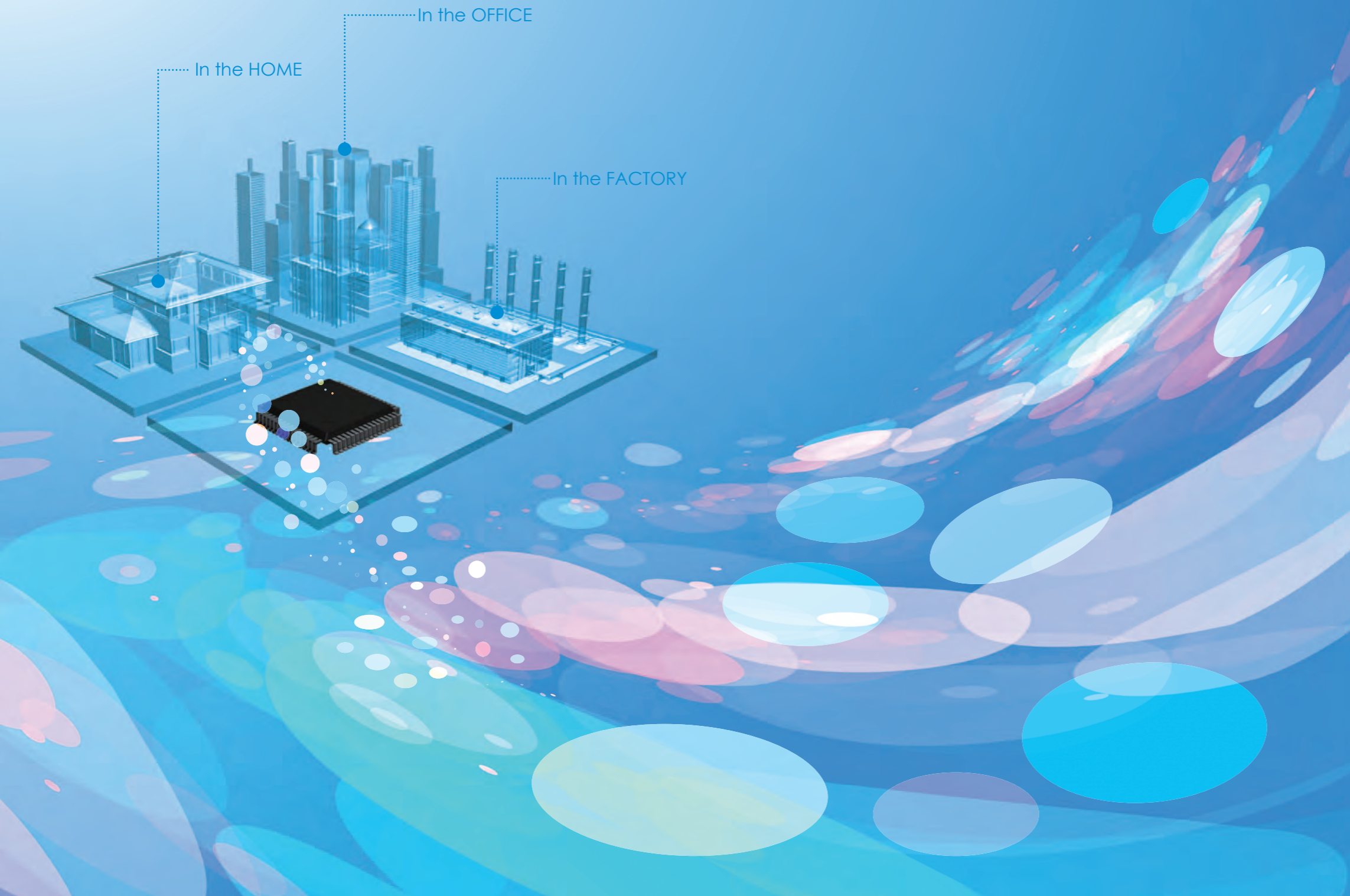


Renesas General-Purpose Microcontrollers/Microprocessors

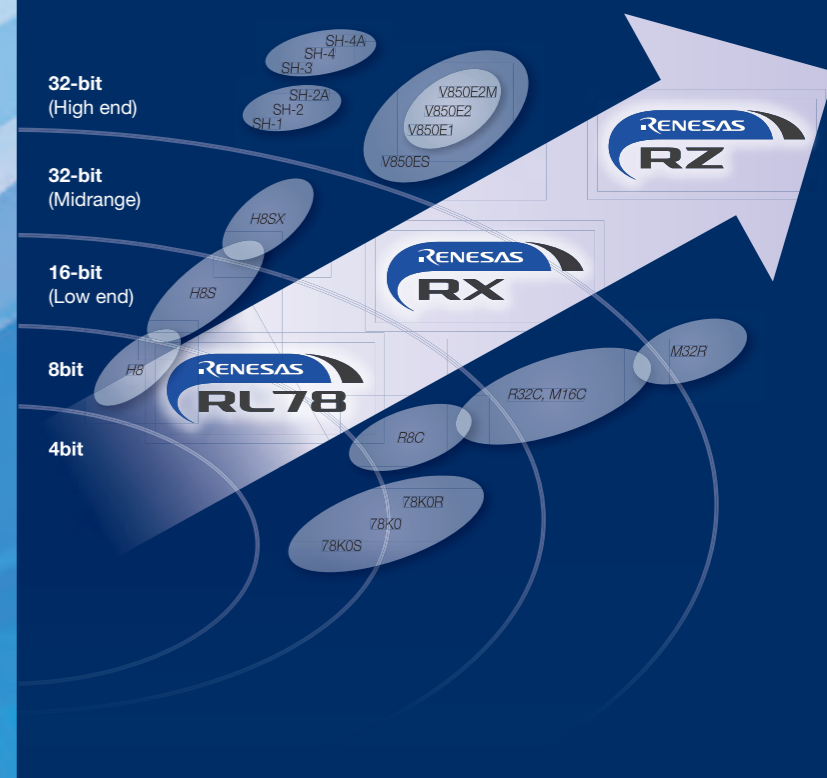
Lineup Catalog





Aggressively expanding an already extensive lineup with the addition of the new RL78 family, RX family, and RZ family.

- Broad lineup extending from the low end to the high end
Extensive range of MCUs and MPUs to choose from
- Continued supply of products currently in mass production



Moving forward, anytime, anywhere.

The reliability and track record of the world's No. 1 vendor.

In response to user requirements that are rapidly expanding in scope, Renesas Electronics offers microcontroller and microprocessor products that provide excellent expandability while allowing customers to make full use of existing resources. Available in a wide array of memory and package options, Renesas microcontrollers and microprocessors are fast, highly reliable, low in cost, and deliver eco-friendly performance. Incorporating the latest process technology, which enables integration of large-capacity flash memory, they are used in a wide array of applications, including demanding fields requiring high quality and high reliability, such as the

automotive industry. There is a robust support system in place to help reduce development costs and reduce the time required for development. It consists of a variety of development tools, including products from other companies, backed by extensive technical documentation, software libraries, and active user communities. As the world's No. 1 MCU/MPU vendor, Renesas Electronics provides the best and most powerful solutions based on a wide selection of microcontrollers (MCUs) and microprocessors (MPUs).

RZ family

Advanced embedded microprocessors to usher in the "smart society" 400MHz to 1.5GHz to support systems combining high performance and advanced functionality

RX family

32-bit microcontrollers built around a next-generation original CPU core Seamless coverage from 32MHz to 240MHz

RL78 family

Reliable and ultra-power-efficient microcontrollers suitable for a wide range of fields Support for systems that are more energy efficient, more compact, and lower in cost

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In the IoT era all aspects of our lives, including home appliances, industrial equipment, building management systems, power grids, and transportation, are gaining intelligence and are connected to networks. Demand is growing for processors that are faster and easier to use in areas difficult to accommodate with conventional microcontrollers, such as complex human-machine-interface applications and high-speed, high-precision, real-time control applications.

To meet the demands of this new era, the RZ family makes its debut as "a new generation of processors that are as easy to use as microcontrollers." These embedded processors from Renesas, the microcontroller experts, come in three series that each offer feature sets unmatched elsewhere. All are designed to provide new value for customers' applications.

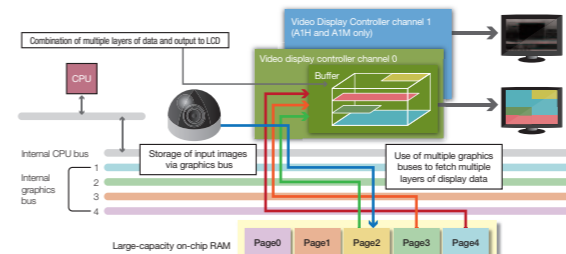
The zenith of Renesas micro.

Make sure to try out the ultimate processors, as envisioned by Renesas.

RZ Family

• RZ/A Series: Three Key Features

Graphics display and camera input functionality on a single chip



Independent bus configuration for graphics buses and hardware-based superimposition processing simplify the creation of graphics applications.

Rich peripheral functions and software

The many peripheral functions and abundant software allow a single-chip to support a wide range of fields, including display, camera input communication, and audio.

- Graphics**
 - Fast rendering by on-chip 2-D graphics accelerator
 - "Smooth and beautiful" graphics display by taking full advantage of large-capacity on-chip RAM
- Camera**
 - Support for direct connection of analog CMOS cameras
 - Ability to process imported images and extract information of various sorts
 - Real-time correction of distorted images
- Audio/voice**
 - Receiving of essential information over the network and voice readout
- Network**
 - Selection by RZ/A1 of only valuable information for transmission over the network
 - Support for reduced network data transfer volume/larger number of cameras

- Target fields:
- Intercoms • Barcode scanners • Home appliances (white goods) • Vending machines
 - Industrial panels • Office equipment • Monitoring cameras • Medical panels • Home audio
 - Display audio • Data communication modules (telematics, emergency communication)
 - Multifunction displays • Rear-view cameras • Handwriting recognition input devices, etc.

• RZ/A Series: Block Diagram

- Key IP
- Large-capacity on-chip RAM (3 to 10MB)
 - Display output
 - Analog/digital camera and CMOS sensor inputs
 - JPEG
 - Ethernet
 - USB/SDHI
 - Sampling rate converter

Note: ARM and Cortex are registered trademarks of ARM Limited (or its subsidiaries) in the EU and other countries.

RZ/A1H&RZ/A1M



Memory	Timers	Communications
SRAM 10/10MB/10MB/10MB SRAM L2 Cache 128 KB Cache 32 KB x 32 KB	MTU2 16-bit x 5ch WDT 8-bit x 1ch OS Timer 32-bit x 2ch PWM Timer 1ch Real-Time CLK	10/100 Ether MAC USB2.0 HS 2ch H/F NAND Flash 1F External Bus 32-bit ROM, SRAM, PCMCIA SPI Multi 2ch SCIF 1ch PC IEbus 1ch SSIP(S) SPDIF 1ch SDHI 1ch CAN MOST50 1ch I2DA LIN Master 1ch Ethernet AVB
System	Graphics	Audio
DMAC 1ch Interrupt Controller Clock Generation with SSCG JTAG Debug Encryption Engine (option) Customer Unique ID (option)	Video Display Controller 2ch OpenVG 1.1 Enhanced eng. PAL/NTSC 1ch CMOS Camera I/F 1ch Fish Eye Correction 2ch JPEG Engine 1ch	SCUX 4ch ASRC Sound Generator
Asst/IO	Asst/IO	Asst/IO
SCUX 4ch ASRC Sound Generator	SCUX 4ch ASRC Sound Generator	SCUX 4ch ASRC Sound Generator
Analog	Analog	Analog
ADC 12-bit x 8ch	ADC 12-bit x 8ch	ADC 12-bit x 8ch

RZ/A1L



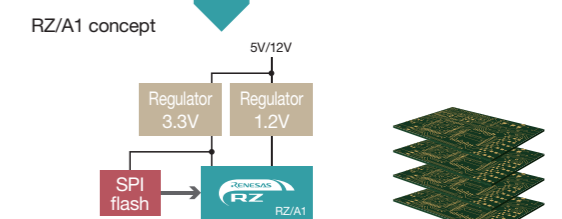
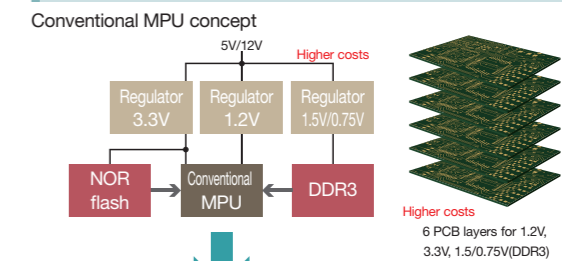
Memory	Timers	Communications
SRAM 3 MB SRAM L2 Cache 128 KB Cache 32 KB x 32 KB	MTU2 16-bit x 5ch WDT 8-bit x 1ch OS Timer 32-bit x 2ch Real-Time CLK	10/100 Ether MAC USB2.0 HS 2ch H/F External Bus 32-bit ROM, SRAM, PCMCIA SPI Multi 2ch SCIF 1ch RSPI 1ch IEbus 1ch SSIP(S) SPDIF 1ch SDHI 1ch CAN MOST50 1ch I2DA LIN Master 2ch
System	Graphics	Audio
DMAC 1ch Interrupt Controller Clock Generation with SSCG JTAG Debug	Video Display Controller 1ch CMOS Camera I/F 1ch	SCUX 4ch ASRC
Asst/IO	Asst/IO	Asst/IO
SCUX 4ch ASRC	SCUX 4ch ASRC	SCUX 4ch ASRC
Analog	Analog	Analog
ADC 12-bit x 8ch	ADC 12-bit x 8ch	ADC 12-bit x 8ch

RZ/A1LU



Memory	Timers	Communications
SRAM 3 MB SRAM L2 Cache 128 KB Cache 32 KB x 32 KB	MTU2 16-bit x 5ch WDT 8-bit x 1ch OS Timer 32-bit x 2ch Real-Time CLK	10/100 Ether MAC CAN 2ch USB2.0 HS 2ch H/F External Bus 32-bit ROM, SRAM, PCMCIA SPI Multi 1ch
System	Graphics	Audio
DMAC 1ch Interrupt Controller Clock Generation with SSCG JTAG Debug Encryption Engine (option) Customer Unique ID (option)	Video Display Controller 1ch CMOS Camera I/F 1ch JPEG Engine 1ch	SCUX 4ch ASRC
Asst/IO	Asst/IO	Asst/IO
SCUX 4ch ASRC	SCUX 4ch ASRC	SCUX 4ch ASRC
Analog	Analog	Analog
ADC 12-bit x 8ch	ADC 12-bit x 8ch	ADC 12-bit x 8ch

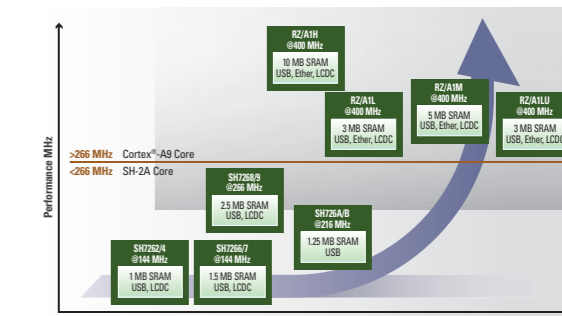
Large-capacity on-chip RAM: 10MB



- Advantages
- No need to design a high-speed interface
 - Reduced mounting area
 - Reduced PCB cost
 - No DRAM procurement issues
- The on-chip RAM takes the place of external DRAM, contributing to high performance, low power consumption, low noise, and reduced board cost.

• Large-Capacity On-Chip RAM Roadmap

Retains the peripheral functions of the SH-2A such as display functions while delivering faster performance and larger memory capacity.



• RZ/G Series: Three Key Features

Gigahertz-class dual-core CPU for high performance arithmetic processing

Two Cortex®-A15 cores running at up to 1.5GHz

	RZ/G1E	RZ/G1M
Cores	ARM® Cortex®-A7 Dual	ARM® Cortex®-A15 Dual
Operating frequency	1.0GHz	1.5GHz
Cache	L1cache I/32KB D/32KB L2cache 512KB	L1cache I/32KB D/32KB L2cache 1MB
MMU	Supported	Supported
NEON/VFP	NEON supported VFP supported	NEON supported VFP supported

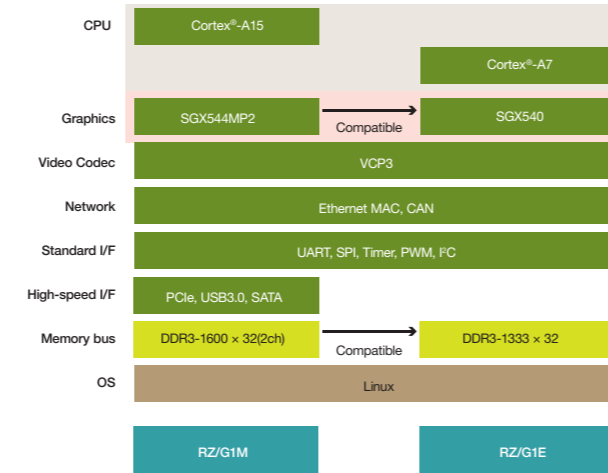
Stress-free handling of Full HD video and 3-D graphics

Built-in hardware video codec with Full HD support and 3-D graphics core (SGX)

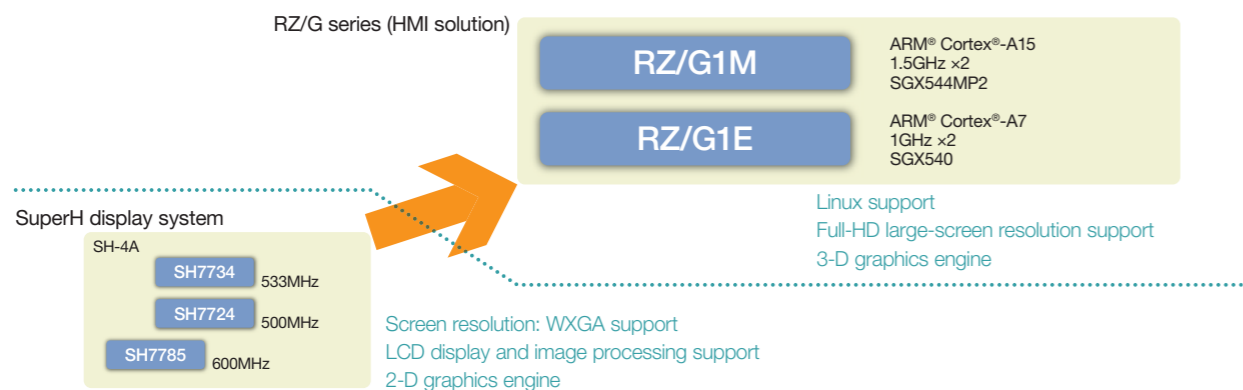
	RZ/G1E	RZ/G1M
3-D graphics	SGX540	SGX544MP2
Video functions	<ul style="list-style-type: none"> Video display interface x 2 channels (RGB888 x 2 channels) Video input interface x 2 channels VCP3 video codec (Full HD support) IP converter module Video image processing functions (color conversion, image enlargement/reduction, filtering) 	<ul style="list-style-type: none"> Video display interface x 2 channels (LVDS x 1 channel, RGB888 x 1 channel) Video input interface x 3 channels VCP3 video codec (Full HD support) IP converter module Video image processing functions (color conversion, image enlargement/reduction, filtering)

Maintenance of software backward compatibility through use of same architecture

Easy extension of product lineup by reusing existing software resources



• Evolution from Previous Products



• RZ/G Series: Block Diagram

HMI solution providing added value

- 3-D graphics
- Full HD video codec
- Video input
- USB 3.0
- PCI-express
- SATA
- SDHI
- Ethernet AVB

RZ/G1E

Package: FC-BGA2121-901

System: ARM® Debugger (CoreSight), DMAC, MMU, Interrupt Controller (3ch PLL/Module-standby)

Timers: Watchdog Timer, Timer pulse Unit (4ch/output PWM), Compare match Timer0 (2ch/16/32bit selectable), Compare match Timer1 (8ch/16/32/48bit selectable), Timer Unit (4sets of 3ch 32bit timer, 7ch PWM timer)

Network: 2ch CAN, Ethernet AVB (100 and 1000Mbps), Ethernet MAC (10 and 100Mbps)

RZ/G1M

Package: FC-BGA2727-831

System: ARM® Debugger (CoreSight), DMAC, MMU, Interrupt Controller (3ch PLL/Module-standby)

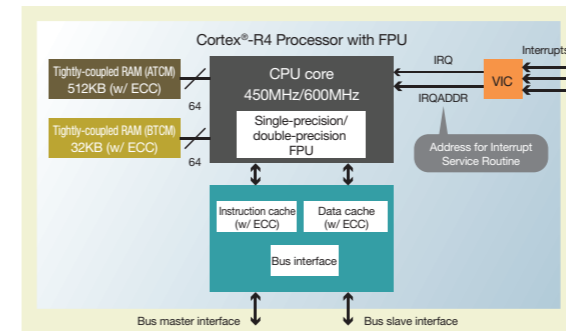
Timers: Watchdog Timer, Timer pulse Unit (4ch/output PWM), Compare match Timer0 (2ch/16/32bit selectable), Compare match Timer1 (8ch/16/32/48bit selectable), Timer Unit (4sets of 3ch 32bit timer, 7ch PWM timer)

Network: Ethernet AVB* (100 and 1000Mbps), Ethernet MAC* (10 and 100Mbps)

*1. Since PHY is used by both the USB 3.0 and SATA0 functions, it is necessary to select one or the other.
*2. Since PHY is used by both the PCI-e and SATA1 functions, it is necessary to select one or the other.
*3. Due to pin multiplexing it is necessary to select one or the other.
Note: Product information is subject to change without notice.

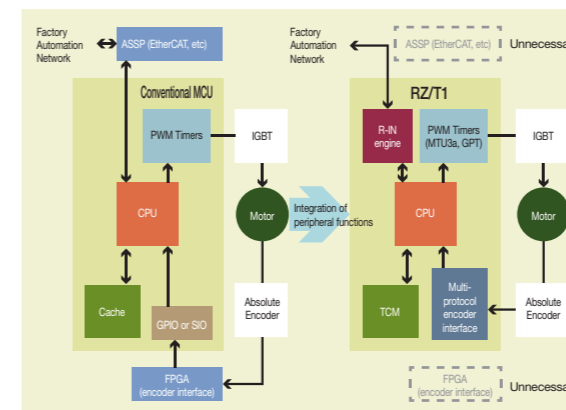
• RZ/T Series: Four Key Features

High performance and high-speed real-time control



- High-speed RAM directly connected to the CPU for high-speed processing and reliable real-time responses that bypass the cache
- ECC for enhanced reliability
- Vectored interrupt controller (VIC) for interrupt responsiveness suitable for embedded control

Integration of peripheral functions



- On-chip integration of encoder interfaces that previously had to be connected externally
- Single-chip AC servo solution for reduced component count and smaller space requirement

• RZ/T Series: Block Diagram

Key IP

- Tightly-coupled memory (TCM)
- R-IN engine
- Encoder interface
- ECC
- Support for high reliability
- On-chip RAM with ECC
- Register write protection
- Clock stop detection etc.

RZ/T1 (with R-IN engine) block diagram

Package: 320-pin BGA 17mmx17mmx0.8mm pitch

System: 2 x 16ch DMAC, I/O w/standby function, CGC

Timers: 8 x 16-bit 1x32-bit MPUAs, 4 x 16-bit CMT, 2 x 32-bit CMT2, 4 x 16-bit GPT, 1 x WDT, 12 x 16-bit TPU, 2 x 4gr 4-bit PPG

Memory: ATOM : 512KB with ECC, BTOM : 32KB with ECC, Cache: 8KB w/ ECC, D Cache: 8KB w/ ECC

Interfaces: 5 x SCIF, 2 x IFC, 2 x CAN, 1 x EthernetMAC (100Mbps), USB 2.0 HS (Host/Func), GPIO, ΔΣ I/F, EtherCAT Slave Controller, Memory Interfaces: 4 x SPI, OSPiFlash I/F with Direct Access from CPU, SRAM I/F (32-bit bus), SRAM I/F (32-bit bus), Burst ROM I/F (32-bit bus)

RZ/T1 (no R-IN engine) block diagram

Package: 376-pin QFP 20mmx20mmx0.4mm pitch

System: 2 x 16ch DMAC, I/O w/standby function, CGC

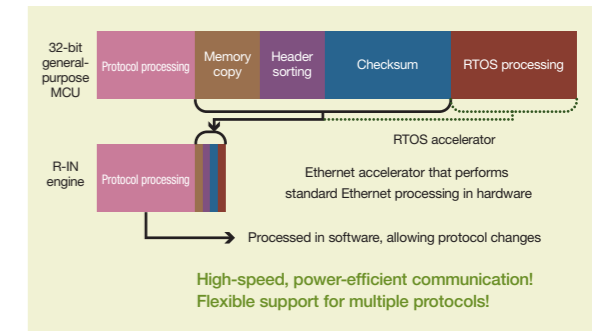
Timers: 8 x 16-bit 1x 32-bit MPUAs, 4 x 16-bit CMT, 2 x 32-bit CMT2, 4 x 16-bit GPT, 1 x WDT, 12 x 16-bit TPU, 2 x 4gr 4-bit PPG

Memory: ATOM : 512KB with ECC, BTOM : 32KB with ECC, Extended RAM : 1MB w/ ECC (option)

Interfaces: 5 x SCIF, 2 x IFC, 2 x CAN, 1 x EthernetMAC (100Mbps), USB2.0 HS (Host/Func), GPIO, ΔΣ I/F, EtherCAT Slave Controller, Memory Interfaces: 4 x SPI, CSPiFlash I/F with Direct Access from CPU, SRAM I/F (32-bit bus), SRAM I/F (32-bit bus), Burst ROM I/F (32-bit bus)

Note: 176-pin QFP version: 12-bit ADC x 8 channels, TPU x 6 channels, PPG x 1 unit, Ethernet x 1 port.

R-IN engine



- Standard Ethernet processing in hardware by R-IN engine accelerator for industrial Ethernet communication
- Four times faster network processing

Retention and expansion of peripheral functions of SH and RX microcontrollers

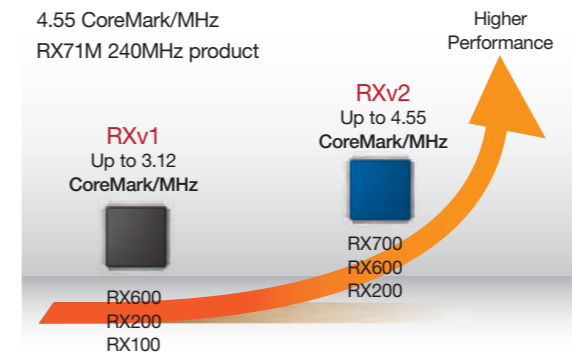
RENEASAS SuperH SH7216	RENEASAS RX RX64M	RENEASAS RZ RZ/T1
Renasant original CPU	Renasant original CPU	ARM® Cortex®-R4 CPU
Flash memory	Flash memory	Tightly-coupled memory
FPU (single-/double-precision)	FPU (single-precision)	FPU (single-/double-precision)
Ethernet	Multi-function timer	Multi-function timer
	Safety functions	Safety functions
	Industrial Ethernet (IEEE 1588)	R-IN engine integrated

- Retaining the peripheral functions of SH and RX microcontrollers to ensure scalability

RX Family

RX Family Microcontrollers Dominating the Market with Performance and Functionality

Steady Advances by the RX CPU



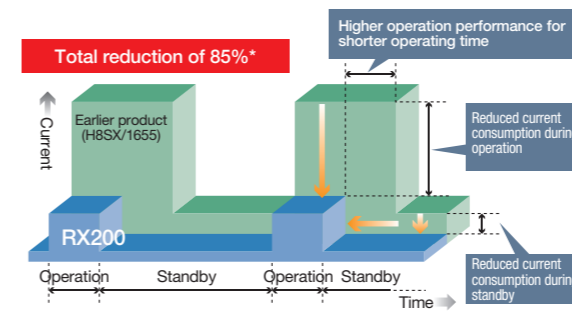
Scalable Product Range

Single architecture covering a wide performance range

Compatibility			
RX100 32MHz	RX200 54MHz	RX600 120MHz	RX700 240MHz
RX CPU		FPU	
Pin assignments: Compatible			
Functions: Common IP			
Integrated development environment: CS+/e ² studio			
Emulator: E1		E20	
Compiler: RX Compiler			

Fast and Eco-Friendly

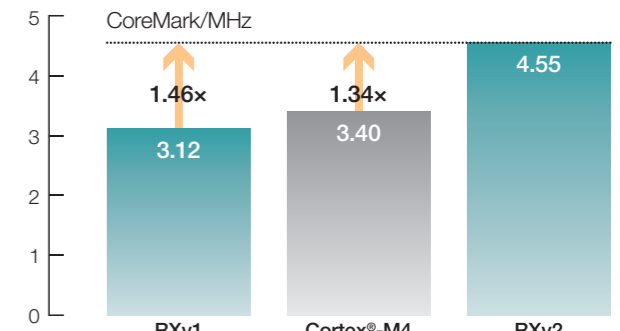
Fast code execution and immediate transition to low-power mode



* Calculation result based on one operation per second where earlier product's operation time was 10 msec., Vcc = 3.3V at 50MHz.

Renesas-Exclusive CPU (RXv2) for High Operation Efficiency

High operation efficiency is realized through improvements to the pipeline, FPU and DSP instructions, etc.



Note: CoreMark scores are publicly announced by EEMBC. (<http://www.eembc.org>)

RX Family Lineup

Single architecture extending from the low end to the high end

High Performance

Low Power

RXv2 Core

Up to 240MHz

Up to 120MHz

Up to 54MHz

RXv1 Core

Up to 100MHz

Up to 50MHz

Up to 32MHz

RX700 SERIES The RX flagship with high speed and advanced functionality
Max. 240MHz operation, 4MB flash, IEEE 1588, Ethernet x 2, USB, CAN, encryption

RX600 SERIES The RX mainstream with high performance and extensive lineup
Max. 120MHz operation, 4MB flash, IEEE 1588, Ethernet, USB, CAN, motor control

RX200 SERIES Best mix of low power consumption and high performance
Max. 54MHz operation, 1MB flash, 1.62 5.5V operating voltage, capacitive touch, USB, CAN, 24-bit ΔΣ A/D, motor control

RX100 SERIES Ultra-power-efficient entry-level series
Max. 32MHz operation, 8 to 512KB flash, capacitive touch, LCD, USB

Large-capacity memory
High performance

Ethernet

Connectivity

Security functionality

Motor control
Power control

Touch functionality

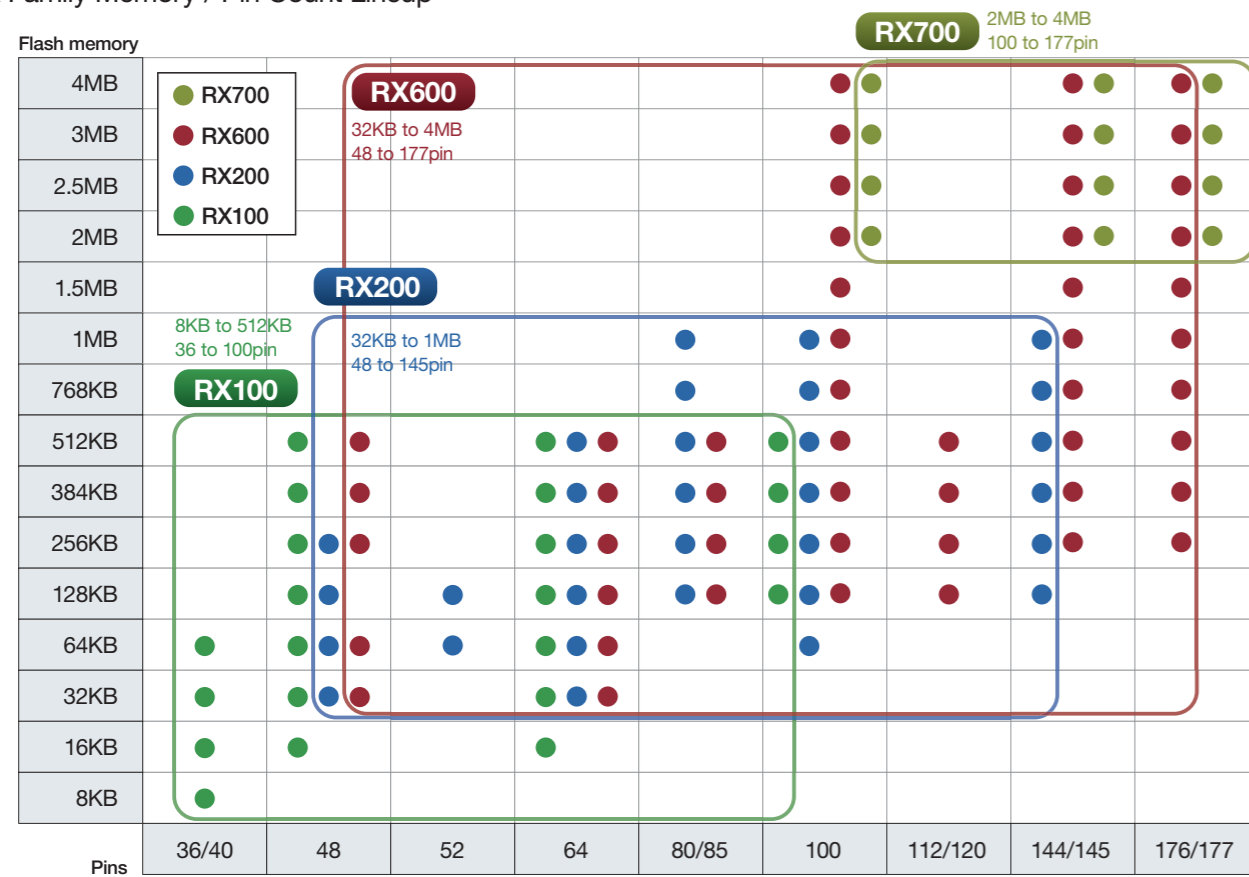
Power efficient

Hardware support for
safety functions

The RX family of 32-bit microcontrollers with on-chip flash memory are designed for use in the industrial, home appliance, and OA/ICT fields. Renesas' original high-performance CPU core combines the strengths of CISC and the high speed of RISC. Scalability is provided by the broad range of product series available, extending from the RX100 series (operating at up to 32MHz), optimized for low-leak current, small-current operation, and compactness, to the RX700 series (operating at up to 240MHz), which focuses on excellent real-time performance and advanced functionality. The product lineup has many memory and package options to choose from, providing seamless support for applications ranging from small to large in scale. Renesas' original CPU core provides unmatched compatibility in terms of peripheral functions, development environments, and pin assignments. This enables smooth transitions among a wide range of products and helps customers extend their product platforms.

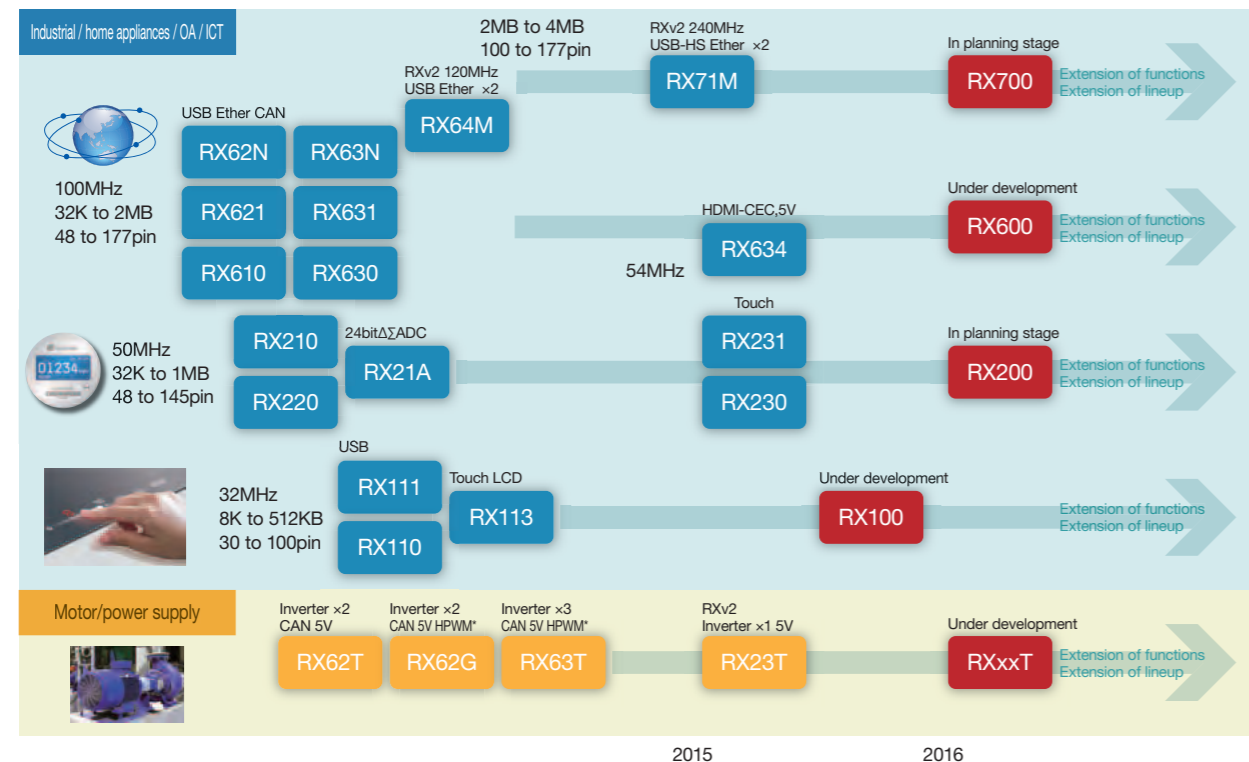


• RX Family Memory / Pin Count Lineup



• RX Family Roadmap

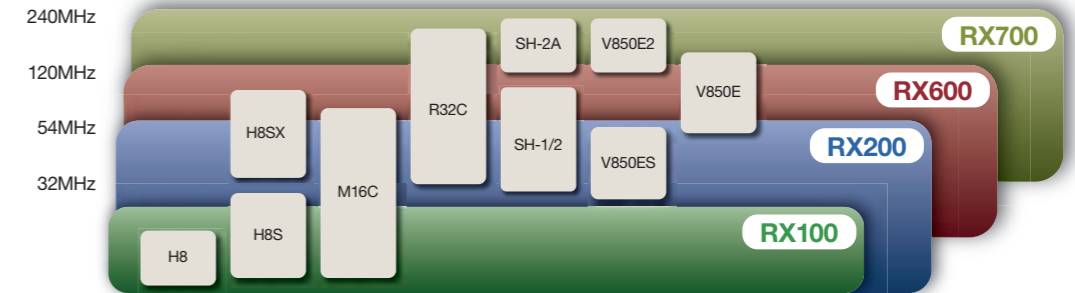
Further product development is planned for the RX100, RX200, RX600, and RX700 series.



Details of products in the development or design stage are subject to change without notice. * HPWM: High-resolution pulse width modulation

• Positioning of RX Relative to Earlier Products

With a single CPU core the RX family covers the performance range of a variety of previous CPU cores. This improves software reusability and allows integration of development tools. Seamless scalability is achieved from the low-end to the high-end models within the RX family.



• RX Solutions

Functional safety solution for industrial equipment

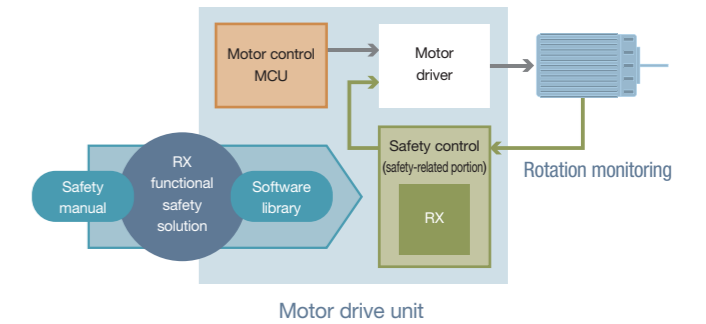
Solution overview
Safety awareness and emphasis on functional safety is rising in the industrial equipment field. This solution provides capabilities necessary for safety analysis with support for functional safety.

Description
Included are a safety manual and self-diagnostic software library.
Note: IEC 61508 SIL3 third-party certification completed.



Safety package (evaluation version)

Illustration of application using the solution



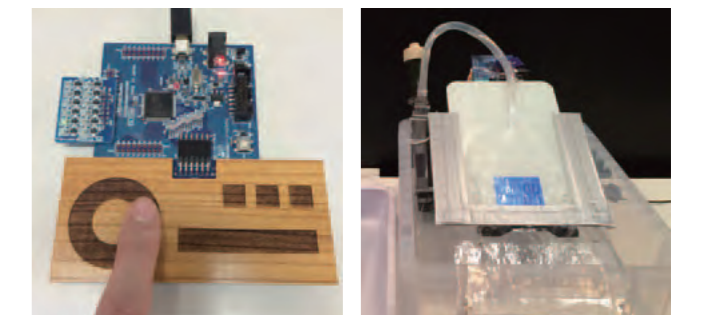
Capacitive touch solution

New capacitive touch technology for improved noise tolerance

- Accurate key operation even in high-sensitivity setting
- Improved design flexibility thanks to support for difficult-to-use materials and thick panels
- Accurate input even when covered with water droplets or if user is wearing gloves

Shorter capacitive touch system development time

- GUI-based capacitive touch development environment
- Automatic tuning of capacitive touch sensitivity and automated program code generation



Motor solution

Evaluation board

- Motor control evaluation kit compatible with synchronous motors employing permanent magnets (brushless DC motors)

Sample programs

- A variety of motor control sample programs are available to download free of charge.
- 120-degree voltage control using a Hall effect sensor, sensor-less 120-degree voltage control, encoder vector control, sensor-less vector control

Development support tools

- In Circuit Scope, a programmable waveform display tool, allows you to observe variable waveforms and parameters on a PC.



Renesas Solution Starter Kit

RL78 Family

• RL78 Family: Six Key Features

Rich development environment

- Integrated development environment for more efficient development
- Support from powerful tools from Renesas partners

Low power consumption

- 45.5µA/MHz operation*
- 0.57µA (RTC + LVD)
- New snooze mode

* Power supply current value during basic operation of RL78/G10

Broad extensibility

- 10 to 144 pins, 1 to 512KB
- Varied product lineup to cover a wide range of requirements
- Pin compatibility
- Ability to reassign peripheral function pins

Safety functions for peace of mind

- ECC memory
- Support for home appliance safety standard (IEC 60730)
- Operation at high temperatures (up to 150°C)
- Malfunction detection/avoidance functionality

Reduced system cost

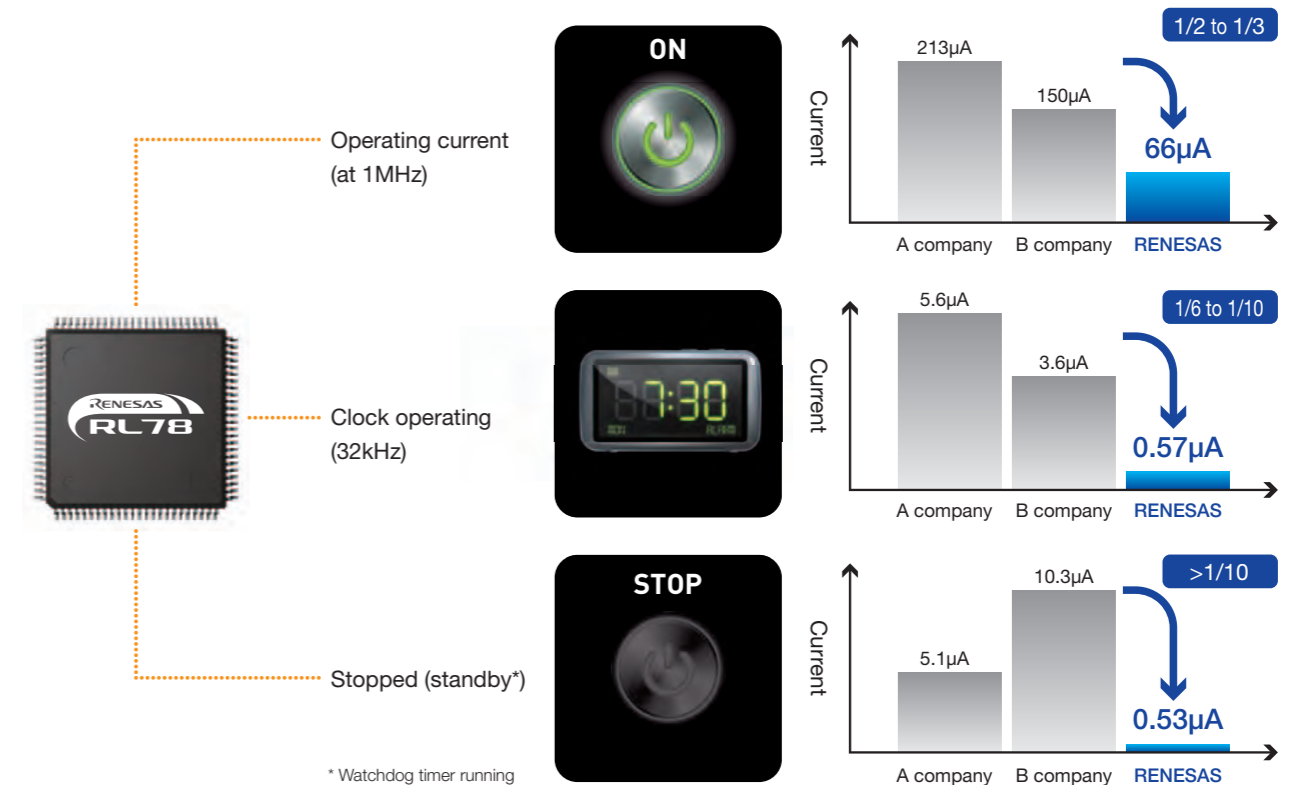
- On-chip oscillator with accuracy of 32MHz ±1%
- On-chip integration of power-on reset, voltage detection circuit, temperature sensor, data flash memory, and more

High performance

- High processing performance of 1.39DMIPS/MHz
- Support for power supply voltages from 1.6 to 5.5V
- Max. 32MHz operation

Pursuing extreme power efficiency

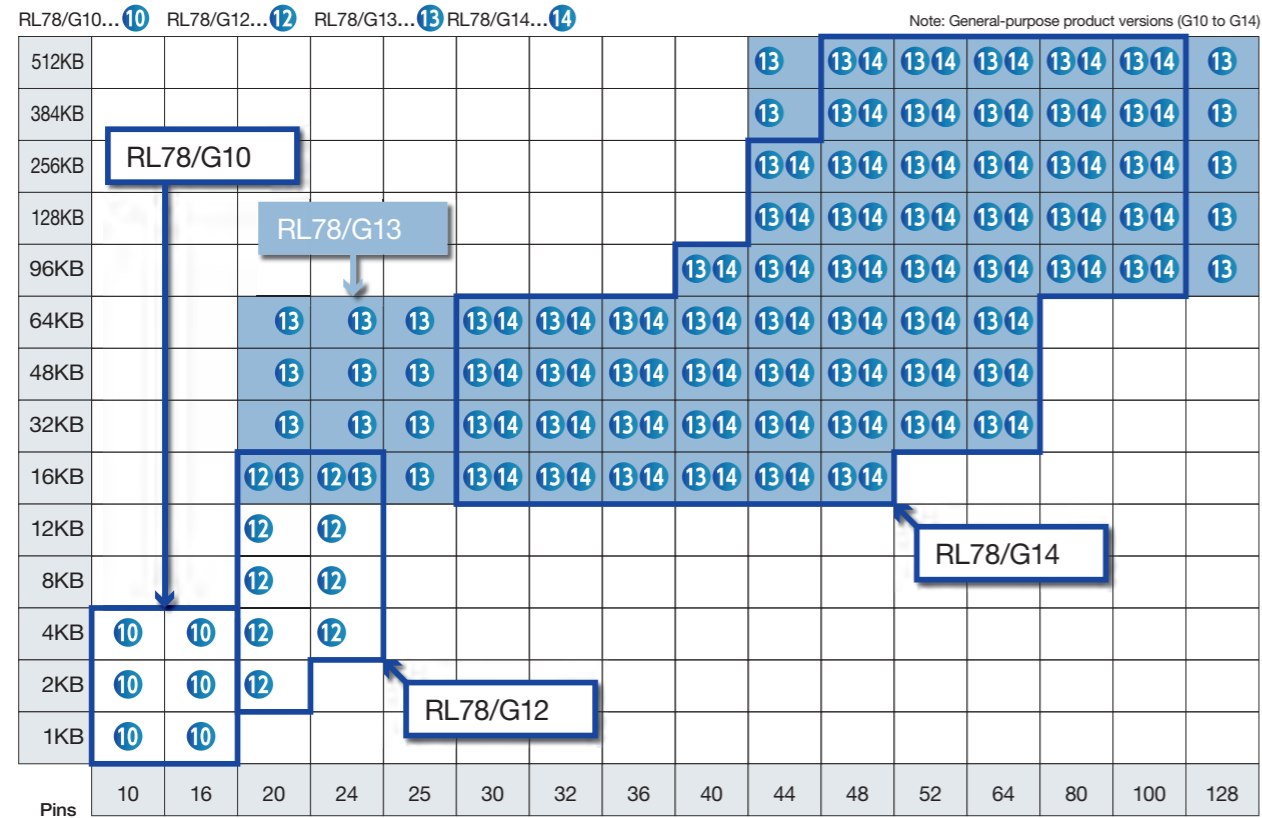
Superior power efficiency for low-power applications such as battery-powered devices.



RL78 microcontroller family delivers superior power efficiency. Although operating current is among the lowest in the industry (run current: 45.5µA/MHz, standby current: 0.57µA), the maximum CPU processing performance is 1.39DMIPS/MHz. The superb balance between power efficiency and CPU processing performance of the RL78 family is shown to particularly impressive effect in applications where the microcontroller operates intermittently. The RL78 family makes it possible for customers to design more power-efficient systems.

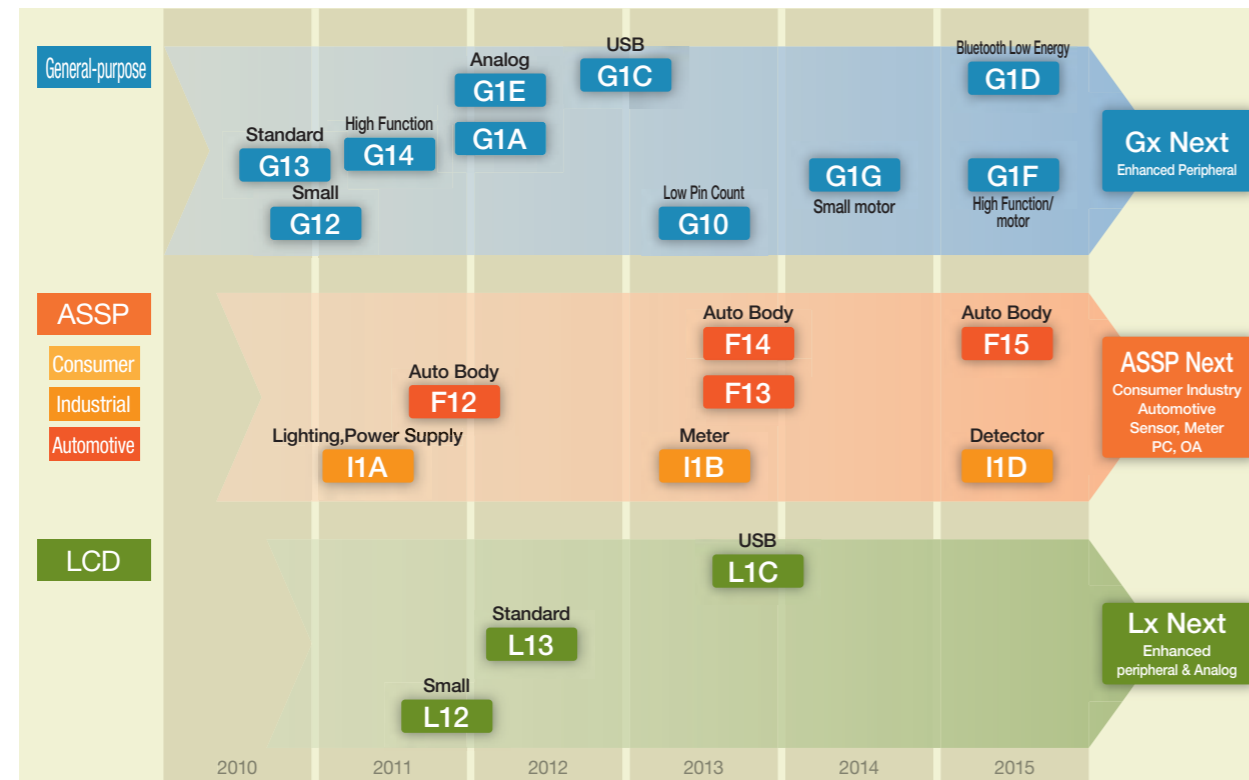
• RL78 Family G Series: Memory Configuration and Pin Count Lineup

Broad expandability to match a variety of system requirements.



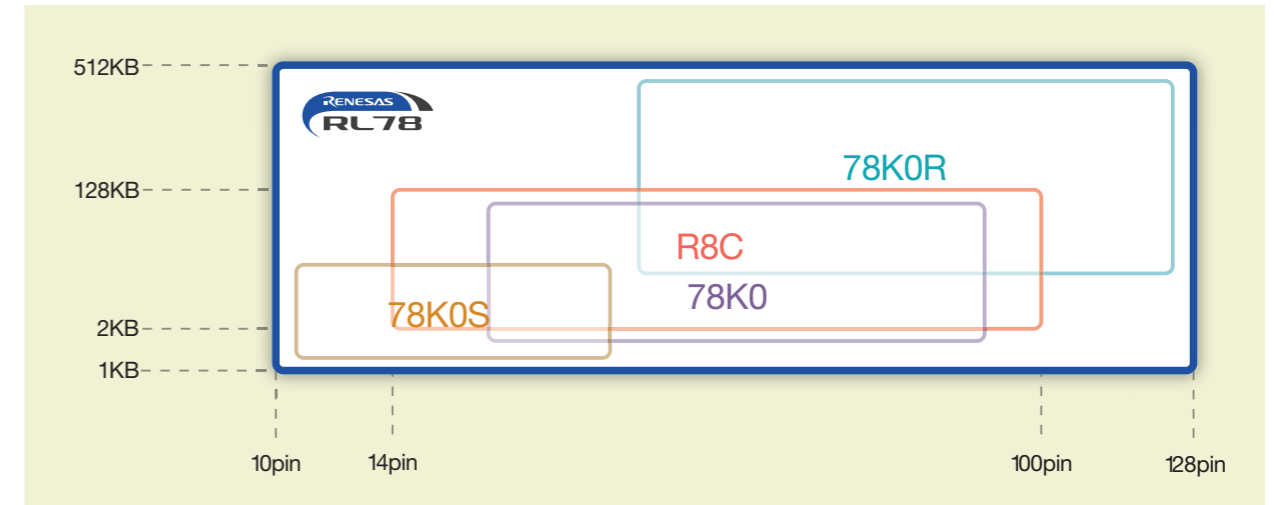
• RL78 Family: Roadmap

Renesas is developing new general-purpose devices, LCD controllers, and ASSPs crammed with RL78 family features. This extensive lineup of microcontrollers includes products to match a wide variety of system requirements.

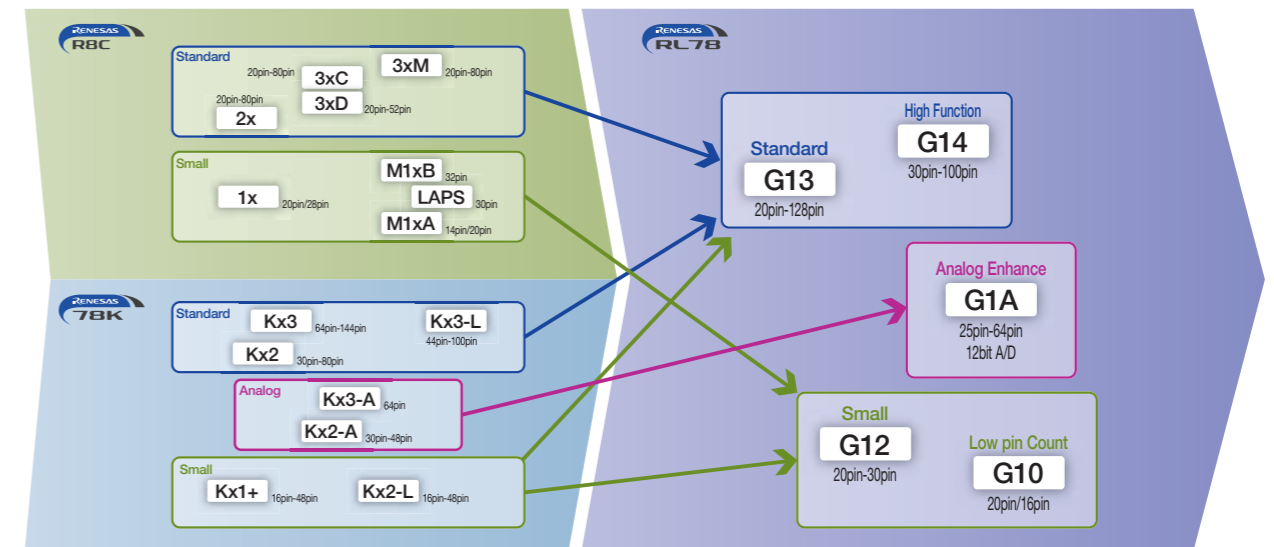


• Many Memory Sizes and Packages

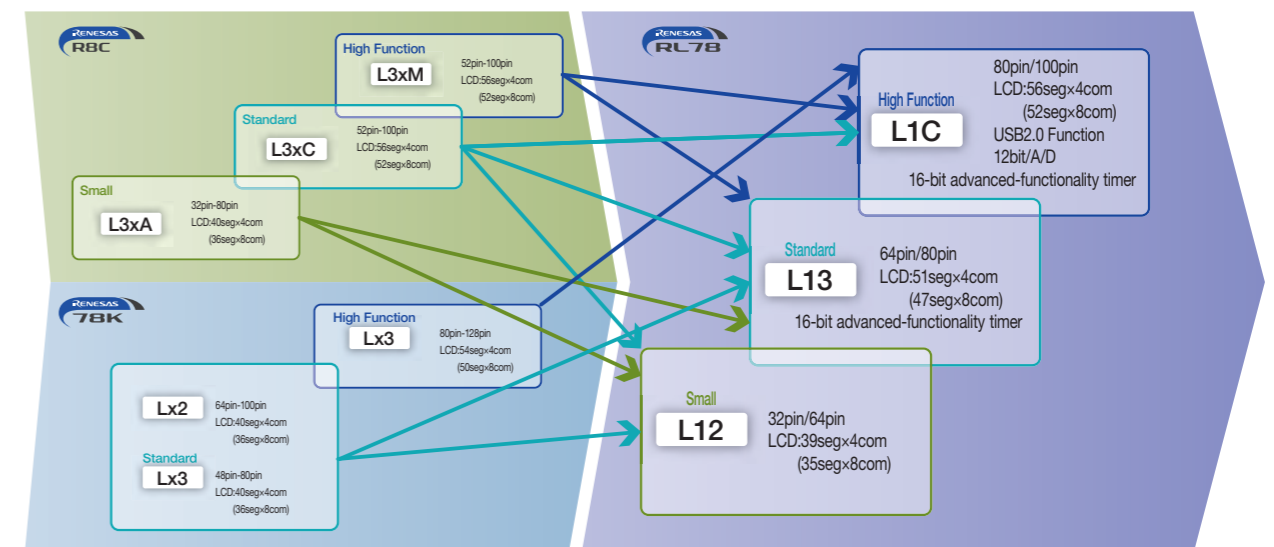
A single family overlapping the earlier R8C and 78K lineups.



• General-purpose microcontrollers enabling transition from R8C and 78K to RL78



• LCD microcontrollers enabling transition from R8C and 78K to RL78

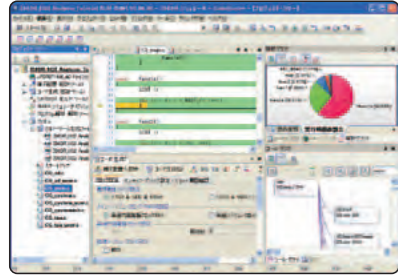


Renesas Microcontroller Development Environments

<http://www.renesas.com/tools>

Renesas Integrated Development Environments

Powerful support for speedy system development



CS+ integrated development environment from Renesas



e2 studio (Eclipse) integrated development environment from Renesas



Software tool evaluation version download page
http://www.renesas.com/tool_evaluation

Renesas Starter Kits

Low-cost development toolkits for evaluation

User-friendly platforms for evaluation of Renesas microcontrollers



Lineup

http://www.renesas.com/renesas_starter_kits

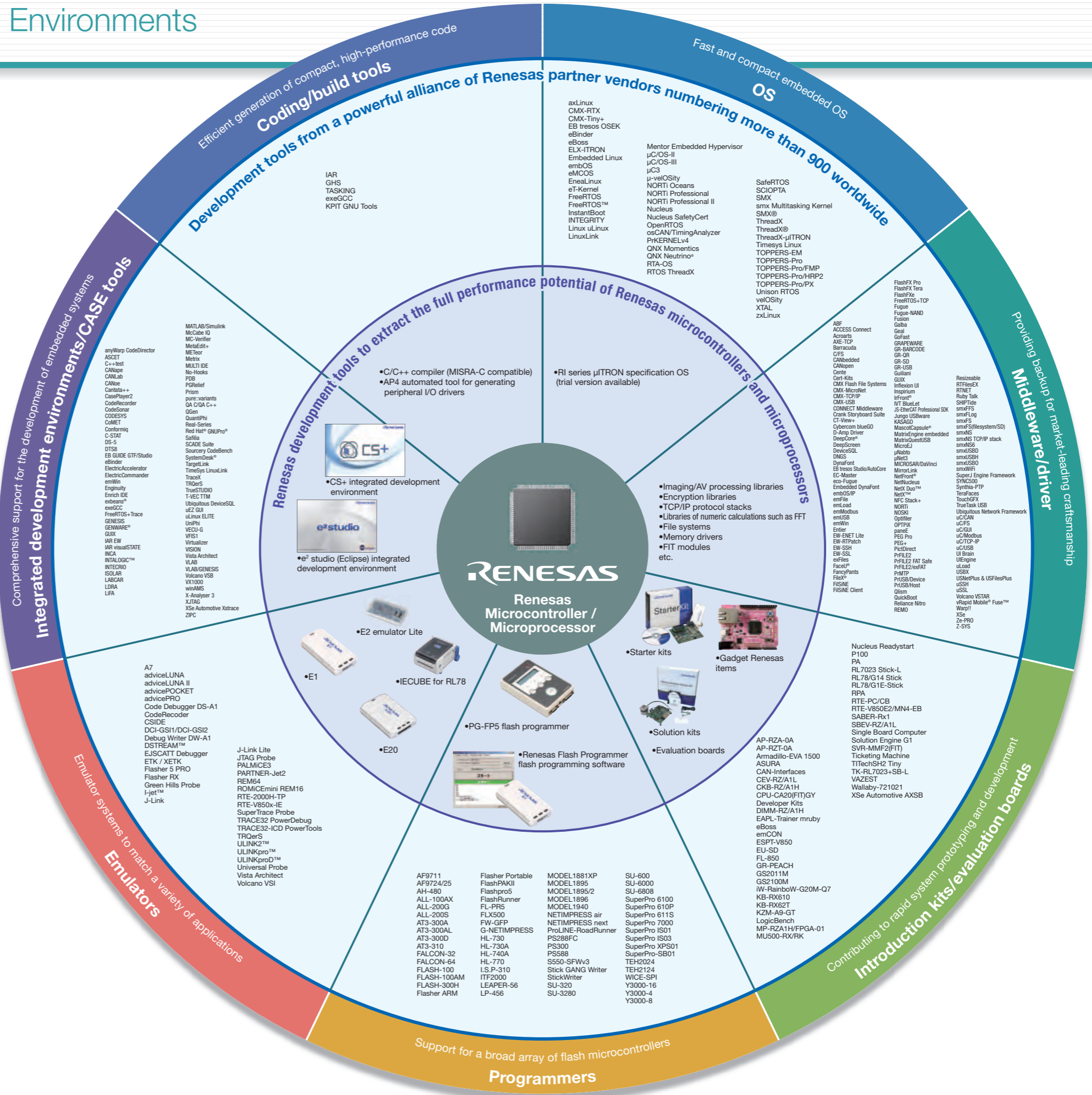
Extensive Support Services

Comprehensive support services to back up your system development work

- Speedy technical support via email
- Downloads of latest versions and extensive FAQs available on the web
- Latest product information distributed by direct mail
- Seminars on a variety of topics



Renesas development environment web site
<http://www.renesas.com/tools>



Development Tool Lineup

Tools Optimized for Each Microcontroller / Microprocessor

Renesas development environments are constantly being improved through the incorporation of customer suggestions and the latest technology, and the lineup includes versions optimized for each microcontroller / microprocessor model. Using the CS+ or e² studio integrated development environment makes it possible to use related tools, such as compilers and emulators, seamlessly.

•RZ Family Development Environments (RZ/A Series and RZ/T Series)

Item	ARM Ltd.	IAR Systems	eSOL Co., Ltd.	Renesas Electronics Corporation	Notes
Integrated development environments	• DS-5 (development studio 5)	• IAR Embedded Workbench® for ARM®	• eBinder	• e ² studio ³	In addition to the products listed at right, a large number of tools from various vendors support the RZ family. See RZ Family Solutions from Renesas Partners.
Compilers	• ARM CC ¹	• IAR C/C++ Compiler™ ²	• ARM CC ¹	• KPIT GNU tools ⁴	
ICEs	• DSTREAM™ • ULINKpro™ • ULINKproD™ • ULINK2™	• I-jet™ • JTAGjet-Trace	• PARTNER-Jet2 from Kyoto Microcomputer Co., Ltd. • adviceLUNA II from Yokogawa Digital Computer Corporation	• J-Link LITE from Segger • J-Link series from Segger ⁵	

¹. ARM CC is available in a free evaluation version that provides full functionality but is limited to 30 days of use. For the RZ/A series, it is included in the DS-5 Starter Kit for RZ, which is available free of charge, and in the popularly priced DS-5 RZ Edition. Contact a DS-5 sales agent for details.

². The IAR C/C++ Compiler™ is available in two free evaluation versions: one is limited to a code size of 32KB but has no time limit, and the other provides full functionality but is limited to 30 days of use.

³. Eclipse-based development environment from Renesas (<http://japan.renesas.com/e2studio>)

⁴. GNU tools and technical support are provided by KPIT Technologies Ltd. (<http://www.kpitnutools.com/index.php>)

⁵. Renesas does not handle ICEs from Segger. Contact a sales agent for details.

•Solutions From Partner Vendors for RZ Family

RZ/A Series: Solutions from Partner Companies

Development environments, compilers, code generation and evaluation support	
ARM Ltd.	DS-5 (development studio 5) development environment, ARM CC
Atollic AB	TrueSTUDIO development environment
eSOL Co., Ltd.	eBinder development environment
IAR Systems	EWARM (development environment, compiler, C-SPY debugger)
KPIT Technologies Ltd.	GNU tool C compiler
Emulators and related products	
ARM Ltd.	DSTREAM™, ULINKpro™, ULINKproD™, and ULINK2™ JTAG emulators
Bitran Corporation	Code Debugger DS-A1 JTAG emulator, Debug Writer DW-A1
CompuX Co., Ltd.	PALMCE3 JTAG emulator, CSIDE, CodeRecorder dynamic text tool
IAR Systems	I-jet™ JTAG emulator
Kyoto Microcomputer Co., Ltd.	PARTNER-Jet2 JTAG emulator
Laerlebach GmbH	TRACE32 PowerDebug JTAG emulator
SEGGER Microcontroller GmbH & Co. KG	J-Link and J-Link Lite JTAG emulators
Yokogawa Digital Computer Corporation	adviceLUNA II JTAG emulator, TRDeS dynamic text/analysis tool
Starter kits, evaluation boards, platforms, etc.	
AlphaProject Co., Ltd.	AP-RZ-A0 (RZ/A1H) evaluation board
CompuX Co., Ltd.	CEV-RZ/A1L (RZ/A1L) evaluation board, CKB-RZ/A1H (RZ/A1H) embedded board
Core Corporation	Kiri ASURA (RZ/A1H) evaluation board
emtron GmbH	DIMM-RZ/A1H evaluation board
Mobivel, Inc.	Ticketing Machine evaluation board
Shimafuji Electric Inc.	SBEV-RZ/A1L (RZ/A1L) and Wallaby-T2121 (RZ/A1L) evaluation boards
A-ONE Co., Ltd.	MP-RZ/A1H-FPGA-01 (RZ/A1H) embedded board
Wakamatsu Tsuayo Co., Ltd.	GR-PEACH (mbed) evaluation board
OS	
A.I. Corporation	RTOS TOPPERS-Pro, Pro/PX, Pro/HRP2, SafeG
eForce Co., Ltd.	RTOS µC3/Standard for RZ/A
Embitek Co., Ltd.	RTOS TOPPERS-EM
Enea KK	EneaLinux embedded Linux distribution
eSOL Co., Ltd.	RTOS eT-Kernel
Express Logic, Inc.	RTOS ThreadX
Grape Systems Inc.	ThreadX µTRON
Micrium, Inc.	RTOS µC/Os-III
Micro Digital Inc.	RTOS SMX RTOS
MISPO Co., Ltd.	RTOS NORTI Professional (RZ/ADS), NORTI Professional(RZ/EW)
Real Time Engineers Ltd.	RTOS FreeRTOS
SEGGER Microcontroller GmbH & Co. KG	RTOS embOS
TimeSys Corporation	Embedded Linux
Middleware, tools	
Access Co., Ltd.	paneE™ UI engine for embedded devices
Atix, Inc.	DeepScreen GUI development environment for embedded devices
Consilient Technologies Pvt. Ltd.	H.264 decoder middleware
Consistent Technology, Inc.	CT-View+ embedded software
Crank Software Inc.	Crank Storyboard Suite GUI development environment for embedded devices
Data Technology Inc.	Certe series embedded middleware
DynaComware Corporation	DynaFont fonts
eForce Co., Ltd.	µNet3 standard TCP/IP stack
eSOL Co., Ltd.	Middleware file system, USB, network, graphics)
Express Logic, Inc.	GLUX embedded GUI development environment, USBX, FlaX (file system/SD), and NetX middleware
Grape Systems Inc.	UI Brain GUI development environments for embedded devices GR-OR, GR-BARCODE, GR-USB, GR-SD, and RT BlueAI middleware
International Laboratory Corporation	GENWARE3 and GENWARE4 GUI development environments for embedded devices, INTRLOGIC control engine for embedded devices
ISIT S.A.	MicroEJ GUI development environment for embedded devices
IT Access Corporation	Geal GUI development environment for embedded devices
Kyoto Software Research, Inc.	Fugue-NAND and eco-Fugue high-reliability flash file system, Galba high-reliability file system
MCC Corporation	TrueTask USB middleware
Micrium, Inc.	µC/GUI embedded GUI development environment, µC/USB, µC/FIS (file system/SD), and µC/TCP-IP middleware smxUSB/USB, smxFS (file system/SD), and smxNS TCP/IP stack middleware
Micro Digital Inc.	FaceUP face recognition software, human detection software, Rakuhira® handwriting recognition software
PULX Corporation	emWin GUI development environment for embedded devices, emUSB middleware
SEGGER Microcontroller GmbH & Co. KG	emWin GUI development environment for embedded devices
Serious Integrated, Inc.	SHPTide GUI development environment for embedded devices
Techno Mathematical Co., Ltd.	H.264 BP_SD encoder/decoder and hands-free video middleware
Tera Probe, Inc.	TeraFaces™ facial verification software
TES Electronic Solutions GmbH	Guiliani GUI development environment for embedded devices
Ubiquitous Corporation	Ubiquitous Network Framework, DeviceSQL, QuickBot, DTCP-P/W/WiFi/Wi-Fi Direct, ECHONET Lite embedded middleware
Uquest, Ltd.	MatrxQuest/USB series middleware
Zuken Elmec, Inc.	MinotLink, Ethernet AVB, ONVIF, RTP, and TCP/IP (IPv4, IPv6) middleware

RZ/G Series: Solutions from Partner Companies

Partner companies provide a variety of services to support developers using the RZ/G series, including GUI frameworks, middleware, OS support, board design support, and sales of evaluation and mass production boards.

Development environments, emulators	
ARM Ltd.	DS-5 (development studio 5) development environment, ARM CC DSTREAM™ JTAG emulator
CompuX Co., Ltd.	PALMCE3 JTAG emulator
Kyoto Microcomputer Co., Ltd.	PARTNER-Jet2 JTAG emulator, internal bus load, Linux debugging and dynamic analysis tool
Yokogawa Digital Computer Corporation	adviceLUNA II JTAG emulator, dynamic text/analysis tool, CAN logger, flash programmer
Starter kits, evaluation boards, platforms, etc.	
Atmark Techno, Inc.	Amadillo-EVA 1500 RZ/G1M evaluation board
Hitachi LSI Systems Co., Ltd.	Solution Engine G1, T-Kernel support, middleware
OS, middleware, tools	
Access Co., Ltd.	ACCESS Connect and HTML browser for IoT
eSOL Co., Ltd.	TRON real-time OS, tools, and middleware with functional safety support
Lineo Solutions, Inc.	*Ultra* high-speed activation and Linux support
Miracle Linux Corporation	Custom Linux distributions and support
Software Research Associates, Inc.	*Qt* GUI framework support, development support

RZ/T Series: Solutions from Partner Companies

An extensive selection of solutions is available for the RZ/T series from tool vendors, including compilers, emulators, evaluation boards, and industrial Ethernet protocols. This provides support for a wide range of customer requirements.

Development environments, compilers, code generation and evaluation support	
ARM Ltd.	DS-5 (development studio 5) development environment, ARM CC
Atollic AB	TrueSTUDIO development environment
eSOL Co., Ltd.	eBinder development environment
IAR Systems	EWARM (development environment, compiler, C-SPY debugger)
KPIT Technologies Ltd.	GNU tools, C compiler
Emulators and related products	
ARM Ltd.	DSTREAM™, ULINKpro™, ULINKproD™, and ULINK2™ JTAG emulators
Bitran Corporation	Code Debugger DS-A1 JTAG emulators, Debug Writer DW-A1
CompuX Co., Ltd.	PALMCE3 JTAG emulator, CSIDE, CodeRecorder dynamic text tool
IAR Systems	I-jet™ JTAG emulator
Kyoto Microcomputer Co., Ltd.	Partner-Jet2 JTAG emulator
SEGGER Microcontroller GmbH & Co. KG	J-Link and J-Link Lite JTAG emulators
Yokogawa Digital Computer Corporation	adviceLUNA II JTAG emulator, TRDeS dynamic text/analysis tool
Starter kits, evaluation boards, platforms, etc.	
AlphaProject Co., Ltd.	AP-RZ-T0A (RZ/T1) embedded board
Core Corporation	Evaluation board and application development
Shimafuji Electric Inc.	Contract development and mass production: Evaluation board development, middleware
OS	
A.I. Corporation	TOPPERS specification RTOS
eForce Co., Ltd.	RTOS µC3
eSOL Co., Ltd.	RTOS eT-Kernel
Micrium, Inc.	RTOS µC/Os-III
MISPO Co., Ltd.	RTOS NORTI Professional (RZ/ADS), NORTI Professional(RZ/EW)
Middleware, tools	
acontis technologies GmbH	EC-Master EtherCAT master stack
Data Technology Inc.	Certe series embedded middleware
eForce Co., Ltd.	µNet3 standard TCP/IP stack
eSOL Co., Ltd.	Middleware file system, USB, network)
JSL Technology Co., Ltd.	JS-EtherCAT Professional SDK for RZ/T1 EtherCAT slave stack
Molix Inc.	Protocol sales (EtherNet/IP, PROFINET RT)
Synopsys, Inc.	Software verification tools and simulation tools

•RX Family Development Environments

For additional product information on middleware and boards, visit: http://www.renesas.com/rx_tools

Microcontroller unit	Real-time OS	Software tools	Emulators	Programming tools	
RX	RX100 series	RI600V4	C/C++ Compiler and IDE for RX Family ¹	E2 emulator Lite ⁷ , E1 ¹⁴	PG-FP5 ⁵ Renesas Flash Programmer ⁶
	RX200 series	RI600V4, RI600PX ³	*Supported integrated development environment: CS+	E2 emulator Lite ⁷ , E1 ¹⁴	
	RX600 series	RI600V4, RI600PX ³	RX Family C/C++ Compiler Package (without IDE) ²	E2 emulator Lite ⁷ , E1, E20	
	RX700 series	RI600V4	*Supported integrated development environment: e ² studio	E2 emulator Lite ⁷ , E1, E20	

¹. Includes CS+ integrated development environment, compiler (CC-RX), simulator, and debugging GUI for emulators. An evaluation version is available free of charge.

². The compiler is CC-RX. Does not include an integrated development environment, simulator, or debugging GUI for emulators. Intended to be used in combination with e² studio (which must be installed separately).

³. Only devices equipped with a memory protection unit are supported.

⁴. The E20 can also be used, but in this case the usable functionality is identical to that of the E1.

⁵. Flash programmer with support for standalone programming. A dedicated programming GUI is available for download on the web (free of charge).

⁶. Programming software. Supports programming using the E1 emulator or E20 emulator, and serial or USB connection. An evaluation version is available free of charge.

⁷. Supported integrated development environment: e² studio, IAR Embedded Workbench[®].

•Solutions from Partner Vendors for RX Family

Compilers	
KPIT Technologies Ltd.	
IAR Systems AB	
OS	
CMX Systems, Inc.	
Express Logic, Inc.	
FreeRTOS.org	
Micrium	
MISPO Co., Ltd.	
SEGGER Microcontroller	
Emulators	
SEGGER Microcontroller	
Sohwa & Sophia Technologies Inc.	
Programmers	
Data I/O Corporation	
E-Globaledge Corporation	
Falcon Denshi K.K.	
Flash Support Group Company	
HOKUTO DENSHI CO., LTD	
Kyoei Co., Ltd.	
MINATO ELECTRONICS INC.	
NAITO DENSEI MACHIDA MFG. CO., LTD	
SMH Technologies ¹¹	
SUISEI ELECTRONICS SYSTEM CO., LTD.	
Sunny Giken Inc.	
TESSERA TECHNOLOGY INC.	
Wave Technology Co., Ltd.	
Yokogawa Digital Computer Corporation	
Programming Services	
Falcon Denshi K.K. (Exclusive distributor of HI-LO SYSTEMS for Japanese customers)	
Flash Support Group Company	

¹¹. Under development

Get the latest information here. http://www.renesas.com/rx_partners

•RL78 Family Development Environments

For additional product information on middleware and boards, visit: http://www.renesas.com/rl78_tools

Microcontroller unit	Real-time OS	Software tools	Emulators	Programming tools
RL78	RI78V4(V2)	C Compiler and IDE for RL78 Family ¹ *Supported integrated development environment: CS+	E2 emulator Lite ⁷	PG-FP5 ⁵
	—	RL78 Family C Compiler Package(without IDE) ² *Supported integrated development environment: e ² studio	E1 ⁴	Renesas Flash Programmer ⁶
	RI78V4(V1)	C Compiler and IDE for RL78/78K Family ³ *Supported integrated development environment: CS+	IECUBE	

¹. Includes CS+ integrated development environment, compiler (CC-RL), simulator, and debugging GUI for emulators. An evaluation version is available free of charge.
². The compiler is CC-RL. Does not include an integrated development environment, simulator, or debugging GUI for emulators. Intended to be used in combination with e² studio (which must be installed separately).
³. Includes CS+ integrated development environment, compiler (CA78K0R for RL78), simulator, and debugging GUI for emulators.
⁴. The E20 can also be used, but in this case the usable functionality is identical to that of the E1.
⁵. Flash programmer with support for standalone programming. A dedicated programming GUI is available for download on the web (free of charge).
⁶. Programming software. Supports programming using the E1 emulator or E20 emulator, and serial or USB connection. An evaluation version is available free of charge.
⁷. Supported integrated development environment: e² studio, IAR Embedded Workbench[®].

•Solutions from Partner Vendors for RL78 Family

Compilers
IAR Systems AB
RTOS
CMX Systems, Inc.
FreeRTOS.org
Micrium
SEGGER Microcontroller
Programmers ¹
Data I/O Corporation
E-Globaledge Corporation
Falcon Denshi K.K.
Flash Support Group Company
HI-LO System Research Co., Ltd. ²
HOKUTO DENSHI CO.,LTD
Kyoei Co., Ltd.
MINATO ELECTRONICS INC.
NAITO DENSEI MACHIDA MFG. CO., LTD
SMH Technologies ³
SUISEI ELECTRONICS SYSTEM CO., LTD.
TESSERA TECHNOLOGY INC.
Wave Technology Co., Ltd.
Yokogawa Digital Computer Corporation
Programming Services ³
Falcon Denshi K.K.
(Exclusive distributor of HI-LO SYSTEMS for Japanese customers)
Flash Support Group Company
SYNCHRO-WORK CORPORATION

¹. Contact the manufacturer to determine if use on a mass production line is supported.
². Under development or to be developed.
³. Currently supported or support planned.
 Get the latest information here. http://www.renesas.com/rl78_partners

<https://www.youtube.com/user/RenesasPresents>

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