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RENESAS CAPACITIVE TOUCH SOLUTION

2022.07

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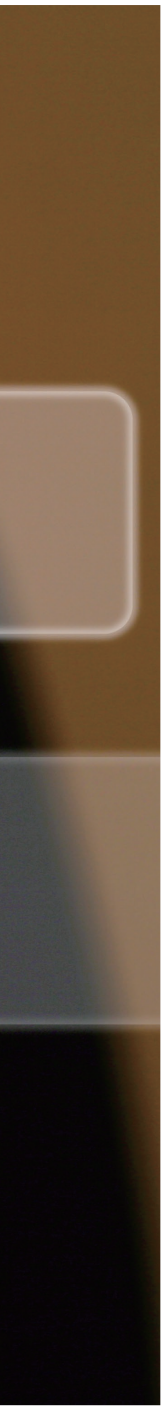


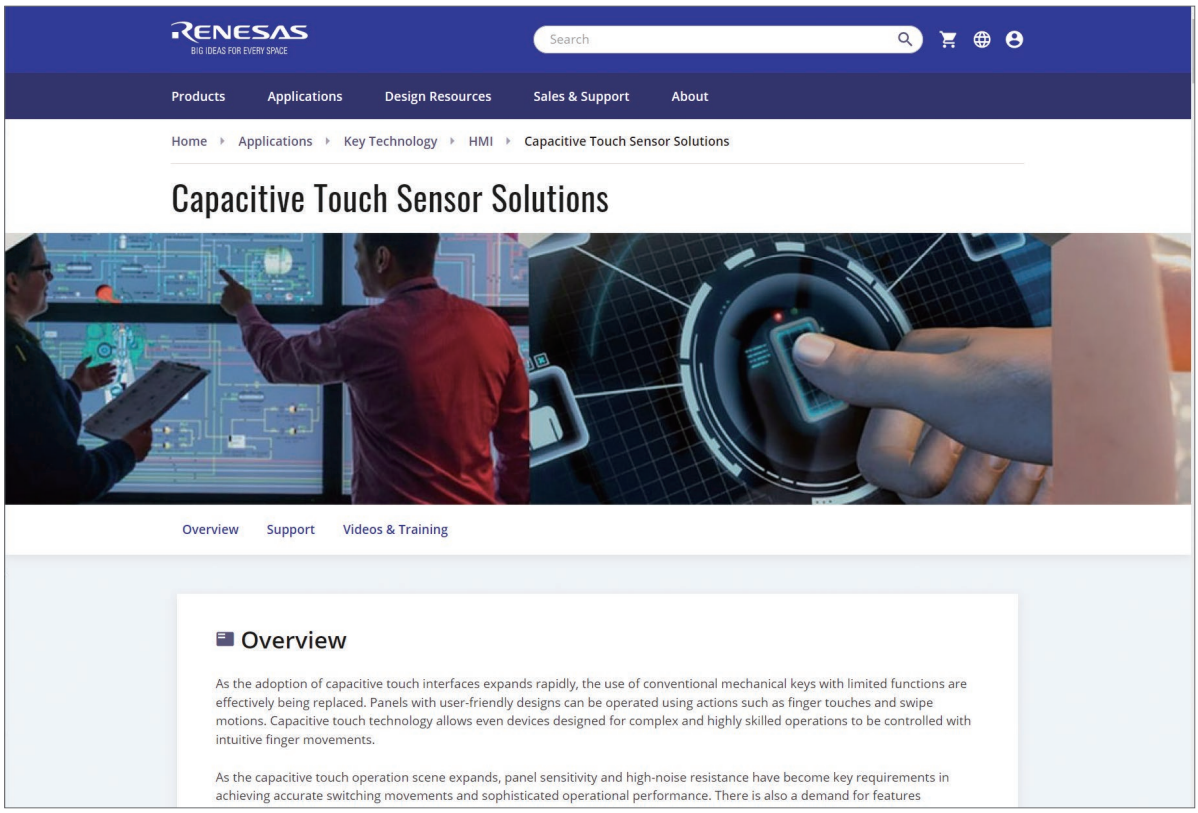
The second generation of capacitive touch solutions for the advanced capacitive touch HMIs that are becoming an essential part of our daily lives

Truly ubiquitous computing is rapidly becoming a reality as network capabilities find their way into every aspect of our daily lives, including household equipment such as electric home appliances. At the same time rapid advances are occurring in the human machine interfaces (HMIs) that link people and machines, and the use of capacitive touch panels is expanding quickly. By replacing the fixed functions of mechanical switches with capacitive touch panels it is possible to achieve more intuitive interfaces incorporating complex and sophisticated operations to match a variety of applications. For example, users can touch an overlay with their fingers or slide their fingers to specify the volume. Nevertheless, the time and cost of development can raise high hurdles to the realization of advanced usability due to the need to achieve greater sensitivity and noise tolerance, assure error-free operation even when the user's hands are wet, and so on. We at Renesas Electronics are developing second-generation solutions that lower the capacitive touch development hurdles for customers. We provide total support for the development of products with high added value.

INTRODUCING THE CAPACITIVE TOUCH SENSOR WEB SITE

https://www.renesas.com/solutions/proposal/touch-key.html

Here you will find timely, up-to-date information that you will find useful when selecting capacitive touch solutions.



ABOUT CAPACITIVE TOUCH INTERFACES

Utilization of capacitive touch interfaces in an ever wider range of fields

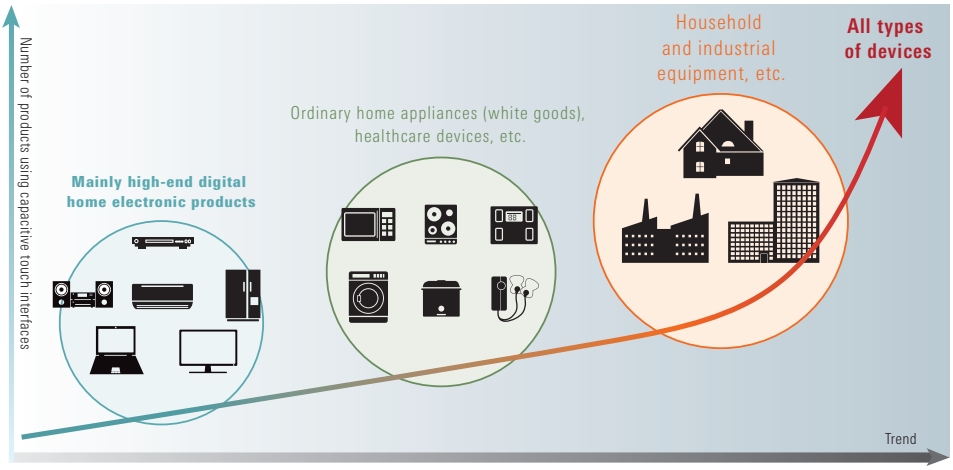
We rely on the functionality of a variety of electrical appliances and household equipment in our everyday lives. Most such products are becoming ever more advanced as they acquire added value and enhanced functionality. As a result, a superior HMI is necessary in order to make full use of this functionality. This is why much attention has come to be focused on capacitive touch interfaces. They enable the user to accomplish a variety of tasks in an intuitive way, bringing out the full potential of today's highly functional products.

High Hopes for Capacitive Touch Interfaces to Expand Markets by Pioneering New Applications

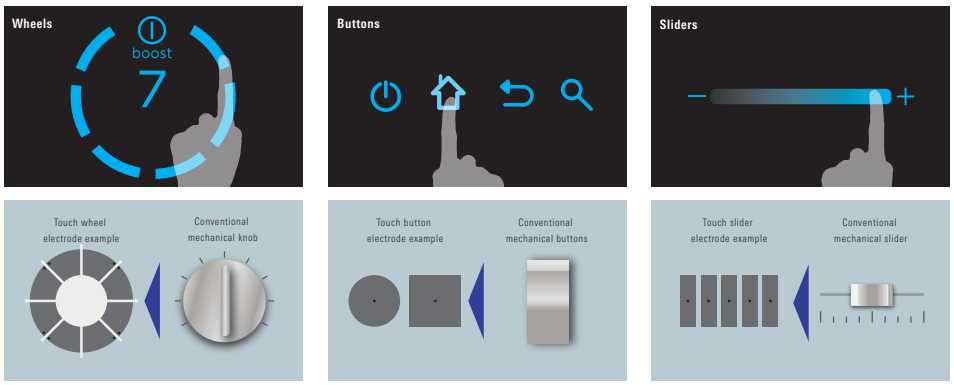
Applications for capacitive touch keypads have grown rapidly in recent years. Previously used mainly in high-end digital home electronic products requiring a high functionality and aesthetically appealing design, the use of touch keypads has expanded over the past few years to include ordinary home appliances known as "white goods" as well as healthcare-related devices.

The advantages of capacitive touch interfaces, such as durability and resistance to dust and moisture, make them attractive for use both in household and industrial equipment, and they are expected to achieve adoption in all types of devices moving forward.

Market trend toward rapid adoption of capacitive touch interfaces in embedded devices



As replacements for mechanical keys, touch keypads enable a variety of interface types



ADVANTAGES OF CAPACITIVE TOUCH INTERFACES

Capacitive touch interfaces as a way to reduce costs and boost added value

Incorporating capacitive touch systems into embedded devices provides support for advanced functionality and brings many other advantages as well. In addition to reducing the cost of production and providing excellent environmental tolerance, there are benefits that appeal to consumers such as attractive design and ease of cleaning.

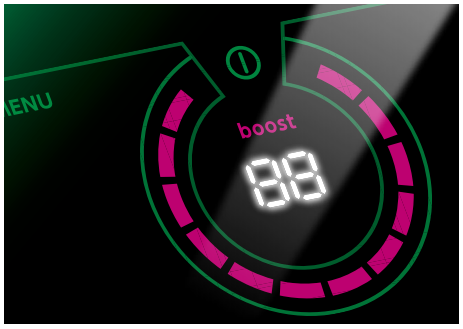
Cutting Costs by Reducing the Number of Components

As products gain advanced functionality the number of control related components increases, resulting in higher component costs and assembly costs. In contrast, touch keypads have a simpler structure the mechanical key assemblies. They eliminate the need for components such as springs, plastic parts, and metal electrodes.
This reduction in the total number of components helps reduce costs overall.

Simple structure and highly functional ease of operation

Hygenic and Less Prone to Malfunction

Mechanical key assemblies have physical gaps that allow dust and water to get inside. In contrast, touch keypads have a flat surface that can easily be wiped clean with a cloth. Their excellent resistance to dust and moisture make them more durable than mechanical key assemblies, and they are less prone to malfunction when used as frequently operated controls.



Flat panel with excellent resistance to dust and moisture

Attractive Design Possibilities

Touch keypads can be configured to blend in visually with the exterior casing of products, providing a great deal of design flexibility. No longer is it necessary when adding new functions to a product to provide complex and diverse mechanical controls such as wheels, buttons and sliders. Capacitive touch interfaces provide an excellent HMI with high added value by combining ease of operation and aesthetically appealing design.

Neat design integration of function keys of different types

FEATURES OF NEW RENESAS CAPACITIVE TOUCH IP

Development support tools for high-level capacitive touch interface development

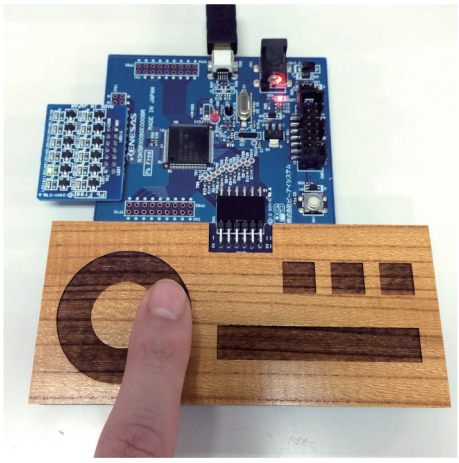
Renesas microcontrollers for capacitive touch applications feature contact detection circuits with improved sensitivity and noise tolerance, making it possible to create capacitive touch panel interfaces using a variety of cover materials, including acrylic, glass, fabric, or stone. The lack of limitations on the cover material means that touch panels can be used on a wide range of products, such as household and industrial equipment, in addition to home appliances (white goods). Examples include light switches recessed into the wall surface, glass switch panels with excellent resistance to environmental factors, control panels for machine tools requiring a high level of resistance to dust or moisture, and products used in the kitchen in wet areas near the sink.

High Sensitivity and Noise Tolerance

The new Renesas capacitive touch IP provides enhanced operability under a variety conditions. For example, it supports sensing through acrylic or wood panels up to 10 mm thick, enough for use in household equipment with thick doors or partitions. It also implements proximity sensing (hovering) distance of up to 30 cm. This accommodates limitations related to hygiene or safety. Noise tolerance meets the requirements of IEC 61000 4-3/4-6 level 3 with acrylic panels 5 mm thick. This assures reliable operation with minimal sensing errors.

Support for Both "Self-Capacitance" and "Mutual Capacitance" Detection Methods

The new Renesas capacitive touch IP supports the mutual capacitance detection method in addition to the self capacitance method available previously. Mutual capacitance uses one transmission node and one reception node, working as a pair, to generate an electromagnetic field, and changes in the electromagnetic field between the nodes are detected. With this detection method the electromagnetic field changes hardly at all when water gets on the panel surface, making it suitable for use in wet environments.



Wood panels also supported

Suitable for use as bathroom control panel

New overlay material with support for greater thickness

Overlay material	Previous capacitive touch system	New Renesas capacitive touch system
Glass	Yes	Yes
Acrylic	Yes	Yes
Wood (dry)	No	Yes
Air	No	Yes

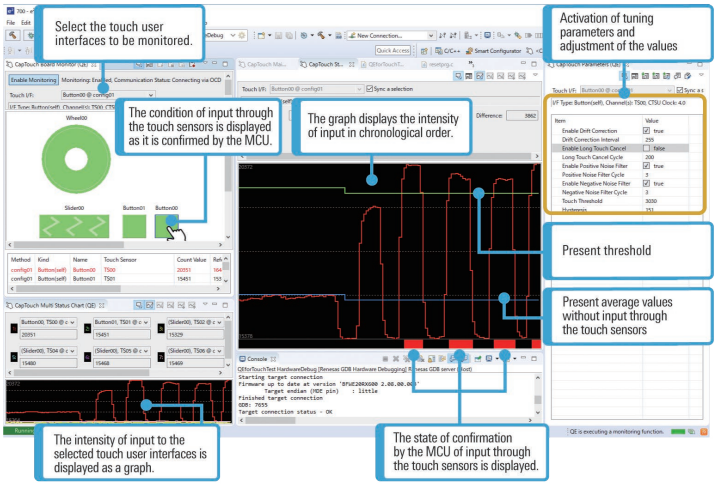
Features of self capacitance and mutual capacitance detection methods

	Self capacitance	Mutual capacitance
Electrode pattern	Good: Simple	Poor: More complex than self capacitance
Substrate cost	Good: Low	Poor: Higher than self capacitance
Water resistance	Poor: Weak	Good: Strong
Matrix	Poor: Subject to limitation	Good: Possible

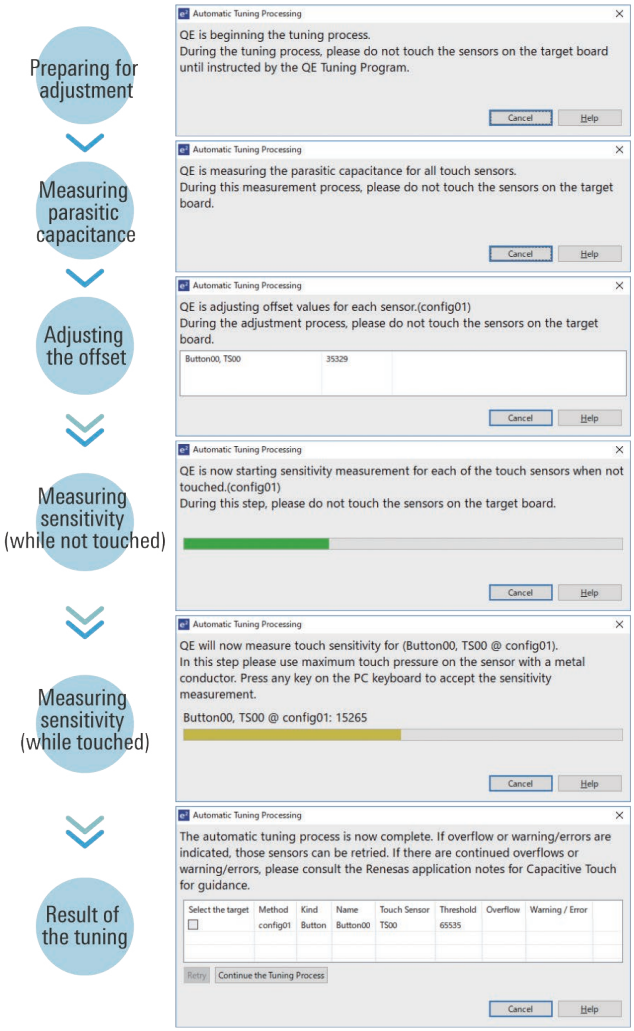
QE for Capacitive Touch: Development Assistance Tool for Capacitive Touch Sensors

QE for Capacitive Touch is a solution toolkit that runs in the e² studio integrated development environment. It speeds up the development of integrated systems utilizing capacitive touch sensors by simplifying tasks such as configuring initial settings or tuning the sensitivity of the touch interface.

Monitoring and parameter adjustment functions



Tuning functions



CAPACITIVE TOUCH EVALUATION SYSTEMS

Capacitive Touch Evaluation System for RX130

The capacitive touch evaluation system for RX130 includes an RX130 CPU board alongside a self-capacitance evaluation board and a mutual-capacitance matrix keys + self-capacitance proximity sensor evaluation board for use as touch application boards. It has everything you'll need to get started evaluating applications incorporating buttons, sliders, wheels, matrix keys, and proximity sensors.

For more information, visit https://www.renesas.com/rssk-touch-rx130

Capacitive Touch Evaluation System for RA6M2

The capacitive touch evaluation system for RA6M2 includes an RA6M2 CPU board and a self-capacitance evaluation board for use as a touch application board. It has everything you'll need to get started evaluating applications incorporating buttons, sliders, and wheels.

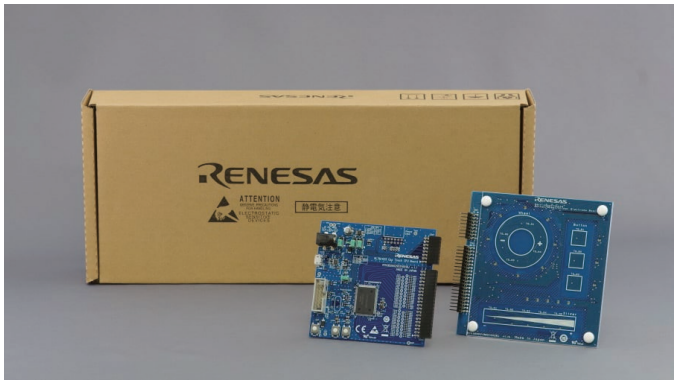
For more information, visit https://www.renesas.com/rssk-touch-ra6m2

Capacitive Touch Evaluation System for RA2L1

The capacitive touch evaluation system for RA2L1 includes an RA2L1 CPU board and a self-capacitance evaluation board for use as a touch application board. It has everything you'll need to get started evaluating applications incorporating buttons, sliders, and wheels.

For more information, visit https://www.renesas.com/rssk-touch-ra2l1

Capacitive Touch Evaluation System for RL78/G23



The capacitive touch evaluation system for RL78/G23 includes an RL78/G23 CPU board and a self-capacitance evaluation board for use as a touch application board. It has everything you'll need to get started evaluating applications incorporating buttons, sliders, and wheels.

For more information, visit https://www.renesas.com/rssk-touch-rl78g23

Capacitive Touch Evaluation System for RX140

The capacitive touch evaluation system for RX140 includes an RX140 CPU board and a self-capacitance evaluation board for use as a touch application board. It has everything you'll need to get started evaluating applications incorporating buttons, sliders, and wheels.

For more information, visit https://www.renesas.com/rssk-touch-rx140

Capacitive Touch Evaluation System for RX671

The capacitive touch evaluation system for RX671 includes an RX671 CPU board and a self-capacitance evaluation board for use as a touch application board. It has everything you'll need to get started evaluating applications incorporating buttons, sliders, and wheels.

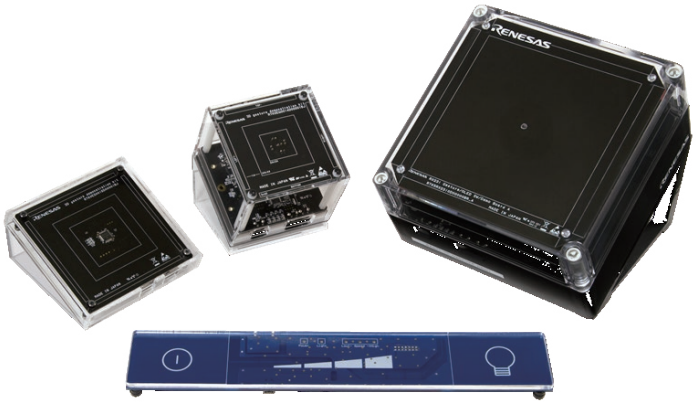
Scheduled to release at the end of December 2022
* Use the RX671-Starter-Kit-Plus until the touch evaluation system is available (supports 2 buttons and 1 slider).

TOUCH-FREE USER INTERFACE SOLUTION

This touch-free user interface solution includes a 3D gesture solution, which allows the user to control the product touch-free by detecting gestures in three-dimensional space, and a 2D gesture solution, which detects movement using two-dimensional coordinates. Both are intended for situations where the user needs to control the product without touching it, perhaps because their hands are wet, or because they can't reach the product, or because they don't want to touch the product. Such a system might allow the user to adjust the heat and volume of water at the kitchen sink by moving their hands, or adjust the fan setting or turn on the light of the exhaust hood above the range by holding their hand over it.

3D Gesture Reference Design

Hand positions are converted into coordinates up to a maximum height of 200mm above the sensor. Conversion is accurate and fast, making it possible to control devices by means of dynamic gestures or simple figure recognition.



2D Gesture Reference Design

By combining multiple capacitive proximity sensors, it is possible to detect when the user's hand is held over or near an electrode for a certain period of time as well as hand movements spanning multiple electrodes. This makes it a simple matter to implement gesture-based controls.

Features

Based on Renesas' high-sensitivity, noise-tolerant capacitive touch solutions.

- Recognition of hand position up to a height of 200mm above the sensor
- Maximum accuracy: 1mm

High tolerance for noise and obstructions.

- Sensing is possible through obstructions such as walls, windows, and paper.
- Support for IEC 61000 4-3 and IEC 61000 4-6 Level 3 Class B noise immunity standards*

* Class B: No false detection in a noisy environment when there are no objects nearby.

Suitable for use in a variety of products.

- High-performance and power-efficient 32-bit MCU and capacitive touch IP enable product system control and operation using 3D gestures.
- Can be combined with existing capacitive touch functions (gestures and capacitive touch buttons).

For more information, visit https://www.renesas.com/products/software-tools/boards-and-kits/eval-kits/3d-gesture-reference-design.html

SELF-CAPACITANCE WATERPROOF BUTTON SOLUTION

The demonstration of self-capacitance waterproof button compares the waterproof capabilities of GND shields and Active shields used in a self-capacitance button.

The Renesas capacitive sensor, CTSU2 can utilize an active shield without any external components. Active shielding is effective in improving water resistance and noise immunity of self-capacitance buttons. The Self-Capacitance Waterproof Button Solution reference design compares water resistance of traditional GND shields to active shield for the self-capacitance buttons.

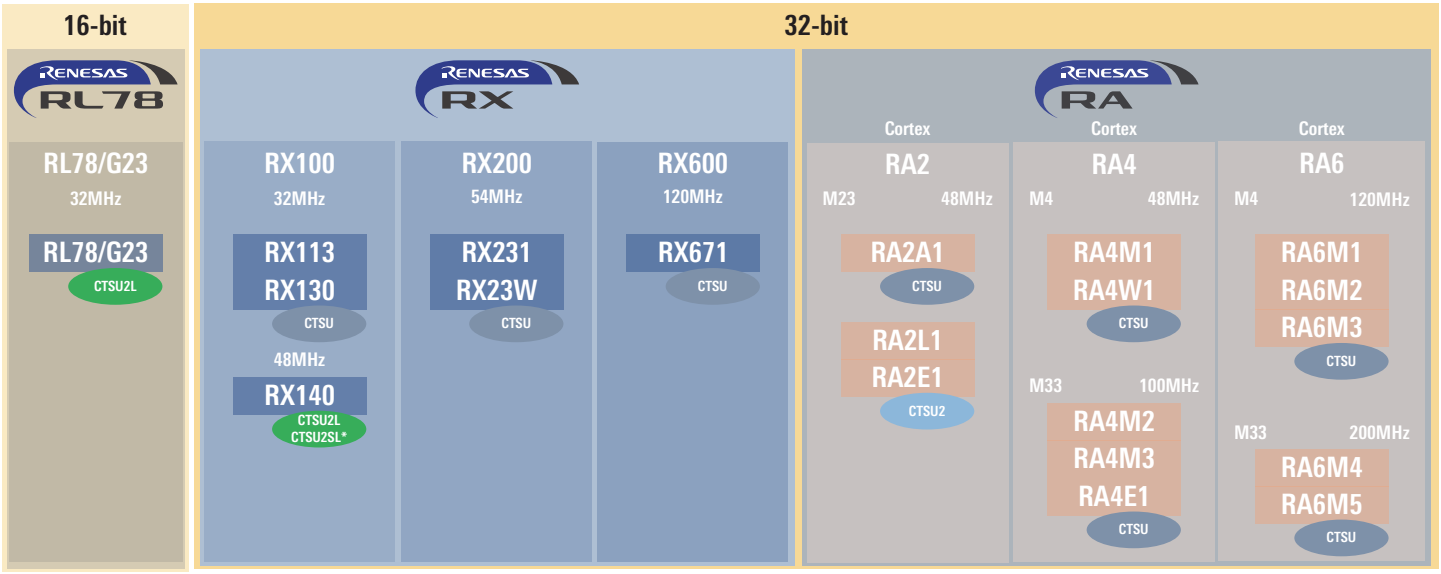
For more information, visit https://www.renesas.com/application/home-building/capacitive-touch-solutions/self-capacitance-waterproof-button-solution

TOUCHLESS-BUTTON REFERENCE DESIGN

The touchless button reference design can detect the approach of fingers and hands without physical contact using Renesas' capacitive touch solution. The electrode detects the proximity of the finger via self-capacitance and turns on the LED. The demo solution is compatible with all types of Renesas capacitive touch CPU boards.

For more information, visit https://www.renesas.com/application/home-building/capacitive-touch-solutions/capacitive-sensor-application-reference-design-touchless-button-solution-reference-design

MCU LINEUP



* CTSU2SL: Products with 128-Kbyte or larger ROM

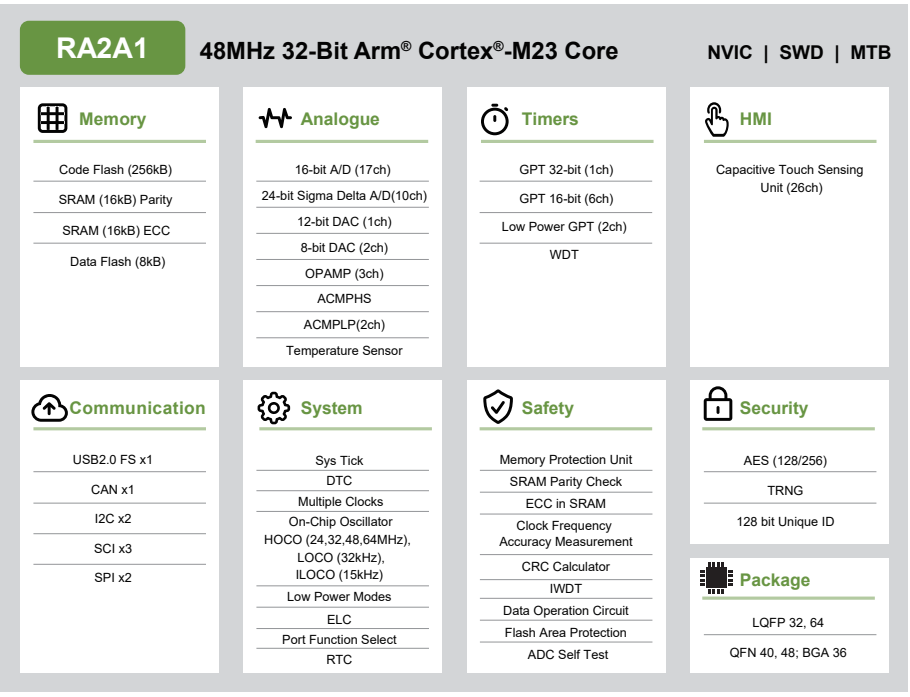
RELATED DEVICES

RA2A1

32-bit MCUs built around the 48MHz Arm® Cortex®-M23 core and incorporating a 24-bit A/D converter (32 to 64 pins, 256KB)

The RA2A1 group is built around the high-performance Arm® Cortex®-M23 core. The peripheral functions are tightly integrated, making these MCUs suitable for applications requiring highly accurate analog signal processing. The RA2A1 group also offers analog solutions for adjusting and measuring signals from sensors, so you are sure to find just the MCU to match your requirements. RA2A1 group MCUs support a wide range of power supply voltages from 1.6V to 5.5V. Peripheral functions include a 16-bit SAR A/D converter, 24-bit ΔΣ A/D converter, comparator, op-amp, and D/A converter. The high-resolution analog signal processing block in the RA2A1 group provides substantial cost advantages, making it ideal for industrial sensor applications with an emphasis on power efficiency and low cost.

RA2A1 block diagram

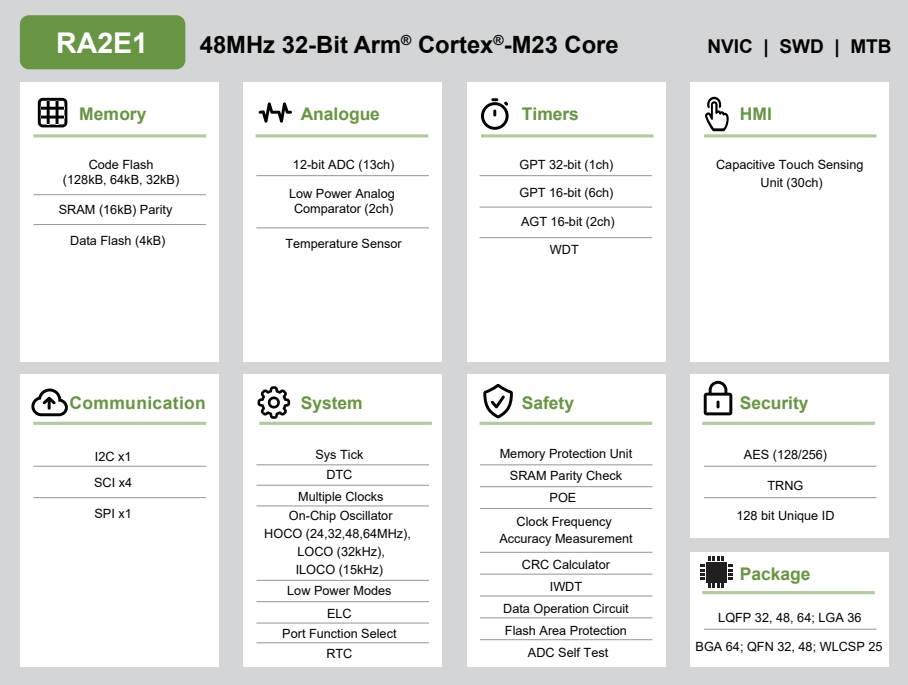


RA2E1

48MHz Arm® Cortex®-M23 Entry Line General Purpose Microcontroller

The RA2E1 group is RA Family's entry line single-chip microcontroller based on the 48-MHz Arm® Cortex®-M23 core and up to 128-KB code flash and 16-KB SRAM memory. The optimized processing and Renesas MF4 (110nm) process technology make it the industry's most energy-efficient, ultra-low power microcontroller. The RA2E1 group supports a wide operating voltage range of 1.6V to 5.5V and a large selection of packages such as LQFP, QFN, LGA, BGA and WLCSP. The RA2E1 provides pin and peripheral compatibility with RA2L1 group and is ideal for battery-operated applications and other systems requiring high performance and low-energy consumption.

RA2E1 block diagram

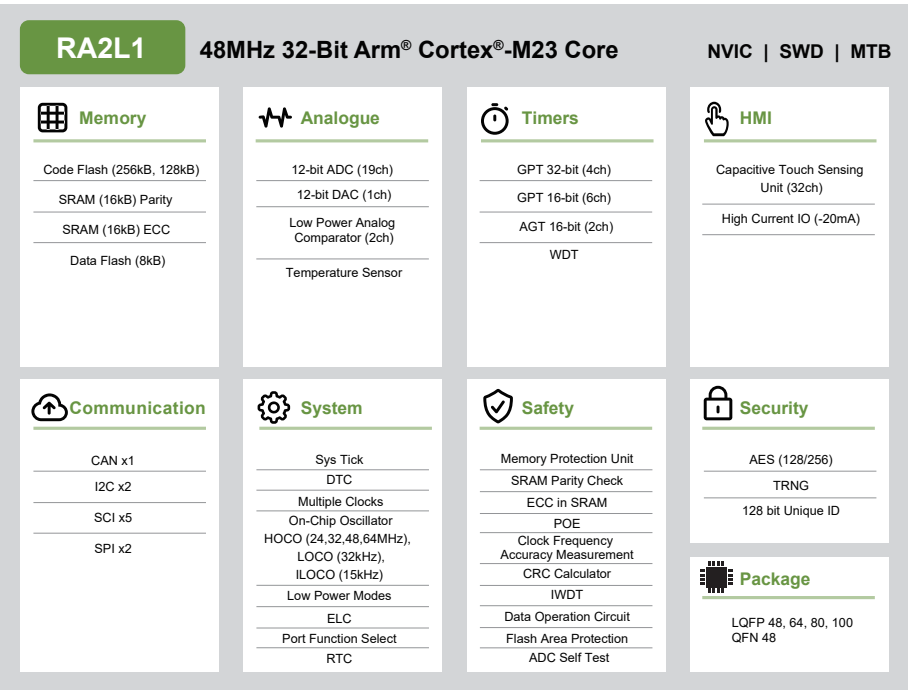


RA2L1

48MHz Arm® Cortex®-M23 Ultra-Low power General Purpose Microcontroller

The RA2L1 group is based on the Arm® Cortex®-M23 core, the most energy-efficient CPU among Arm Cortex-M today. The optimized processing and Renesas MF4 (110nm) process technology make it the industry's most energy-efficient, ultra-low power microcontroller. The RA2L1 group supports a wide operating voltage range of 1.6V to 5.5V, and a maximum CPU clock frequency of 48MHz, lower active mode current and standby mode current. The RA2L1 group also features an enhanced Capacitive Touch Sensing Unit (CTSU2), a set of serial communications, highly accurate Analogs and Timers. The products are available with pin counts ranging from 48-pin to 100-pin.

RA2L1 block diagram

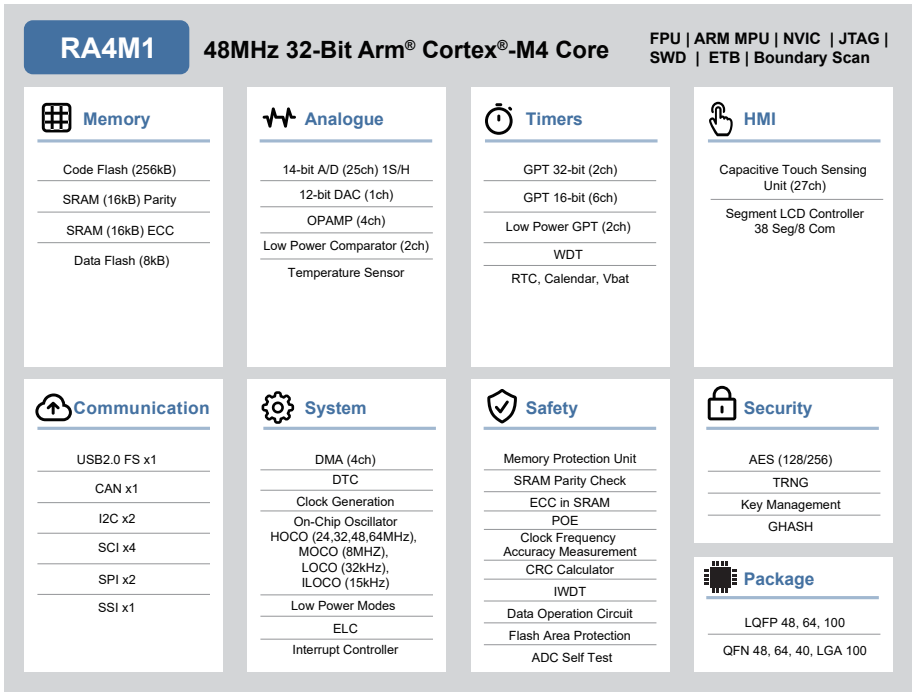


RA4M1

32-bit MCUs built around the 48MHz Arm® Cortex®-M4 core and incorporating LCD controller and HMI capacitive touch system capabilities (40 to 100 pins, 256KB)

The RA4M1 group is built around the high-performance Arm® Cortex®-M4 core, and provides a segment LCD controller and input via a capacitive touch sensing unit to enable HMI design for centralized control applications. Fabricated using a highly efficient process that achieves minimal power consumption, these MCUs support open and flexible ecosystems (FSP and FreeRTOS). Naturally, they can also be extended to support other RTOSes and middleware. The RA4M1 group is suitable for applications requiring large-capacity capacitive touch channels and segment LCD controller capabilities.

RA4M1 block diagram

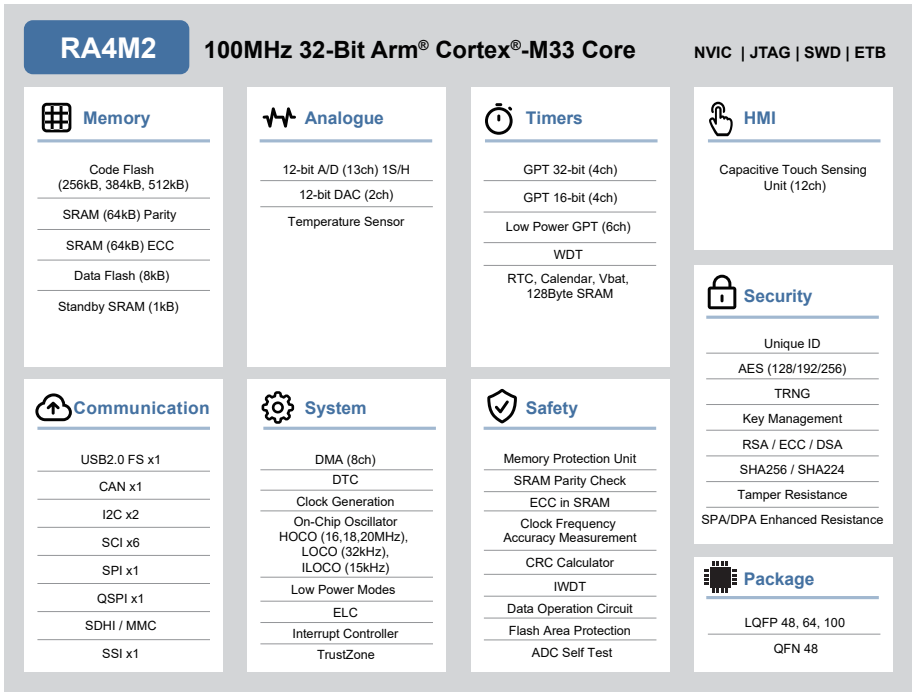


RA4M2

100MHz Arm® Cortex®-M33 TrustZone®, High Integration With Lowest Active Power Consumption

The Renesas RA4M2 group of 32-bit microcontrollers (MCUs) uses the high-performance Arm® Cortex®-M33 core with TrustZone. In concert with the secure crypto engine, it offers secure element functionality. The RA4M2 is built on a highly efficient 40nm process and is supported by an open and flexible ecosystem concept called Flexible Software Package (FSP), built on FreeRTOS and is expandable to use on any other RTOS and middleware preferred. The RA4M2 is suitable for IoT application requiring vast communication options, strong security, large embedded RAM with parity/ECC and low power consumption.

RA4M2 block diagram

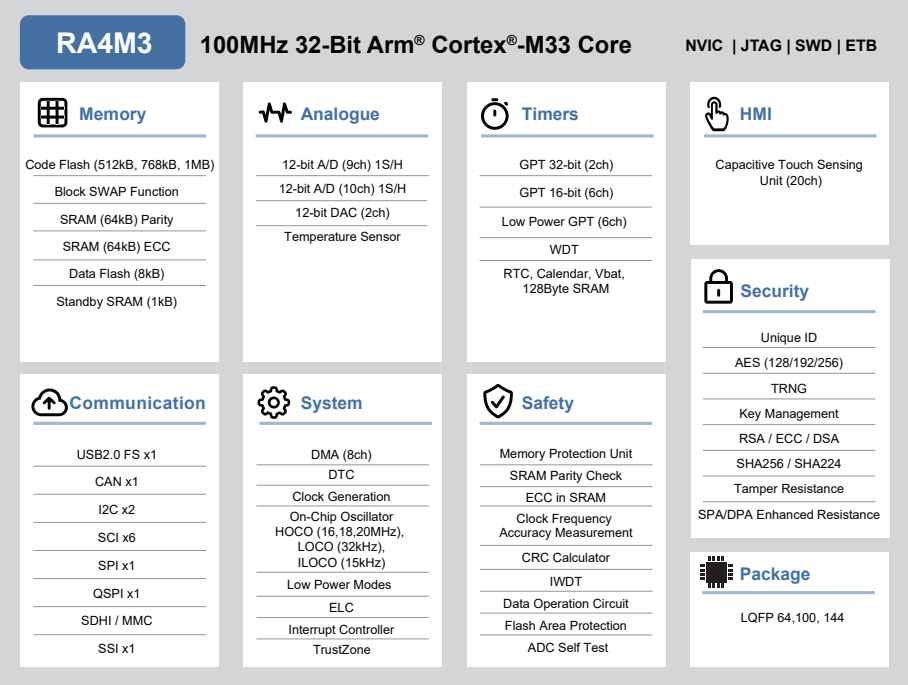


RA4M3

100MHz Arm® Cortex®-M33 TrustZone®, High Integration with Rich Connectivity

The Renesas RA4M3 group of 32-bit microcontrollers (MCUs) uses the high-performance Arm® Cortex®-M33 core with TrustZone. In concert with the secure crypto engine, it offers secure element functionality. The RA4M3 is built on a highly efficient 40nm process and is supported by an open and flexible ecosystem concept called Flexible Software Package (FSP), built on FreeRTOS and is expandable to use on any other RTOS and middleware preferred. The RA4M3 is suitable for IoT application requiring vast communication options, strong security, large embedded RAM with parity/ECC and low power consumption.

RA4M3 block diagram

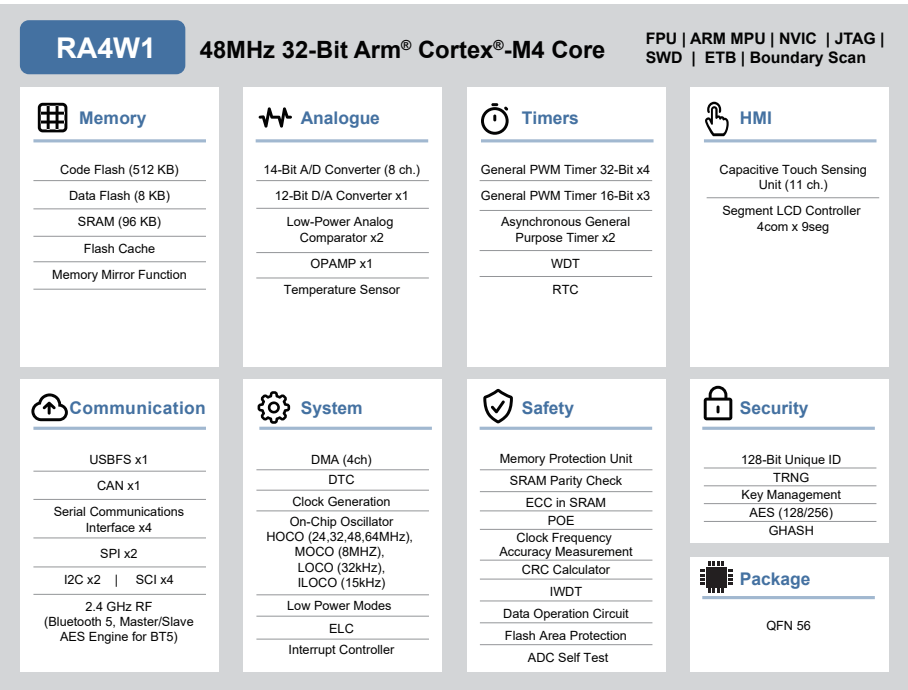


RA4W1

32-bit MCUs built around the 48MHz Arm® Cortex®-M4 core and incorporating Bluetooth® 5.0 Low Energy support (56 pins, 512KB)

The RA4W1 group MCUs belong to the highly power efficient RA4 series, and they are the first products in the RA family to support Bluetooth® 5.0 Low Energy. In addition to Bluetooth 5.0 Low Energy and the Arm® Cortex®-M4 core, these MCUs provide an ample array of on-chip peripheral functions, including security functionality essential to IoT devices, capacitive touch, USB, and CAN. This makes them an effective way to reduce the power consumption and cost of the system overall. In addition, source code is provided for the Flexible Software Package (FSP), which is based on FreeRTOS and can be freely used for a range of applications.

RA4W1 block diagram

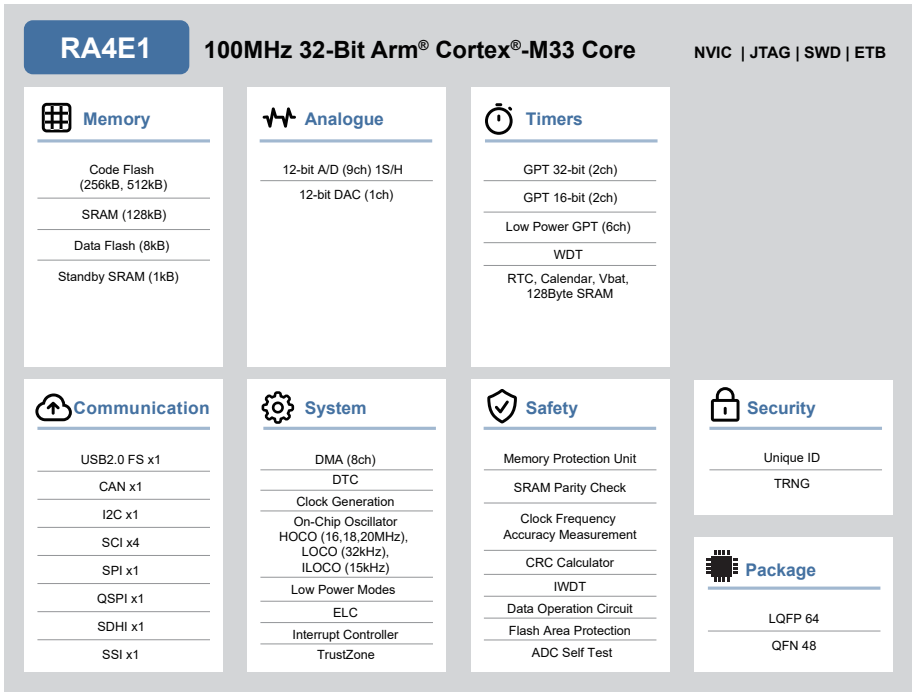


RA4E1

100MHz Arm® Cortex®-M33, Entry-Line with Balanced Low Power Consumption & Optimized Feature Integration

The Renesas RA4E1 group of 32-bit microcontrollers (MCUs) uses the high-performance Arm® Cortex®-M33 core with TrustZone. The RA4E1 is built on a highly efficient 40nm process and is supported by an open and flexible ecosystem concept—the Flexible Software Package (FSP) —and is the perfect entry point into the RA Family of microcontrollers. The RA4E1 is suitable for entry IoT applications requiring value optimized feature and connectivity integration, total system cost reduction and an optimized mixture of high performance with 100 MHz Cortex-M33 Core in combination with lowest active power consumption down to 81µA/MHz running the CoreMark® algorithm from Flash.

RA4E1 block diagram

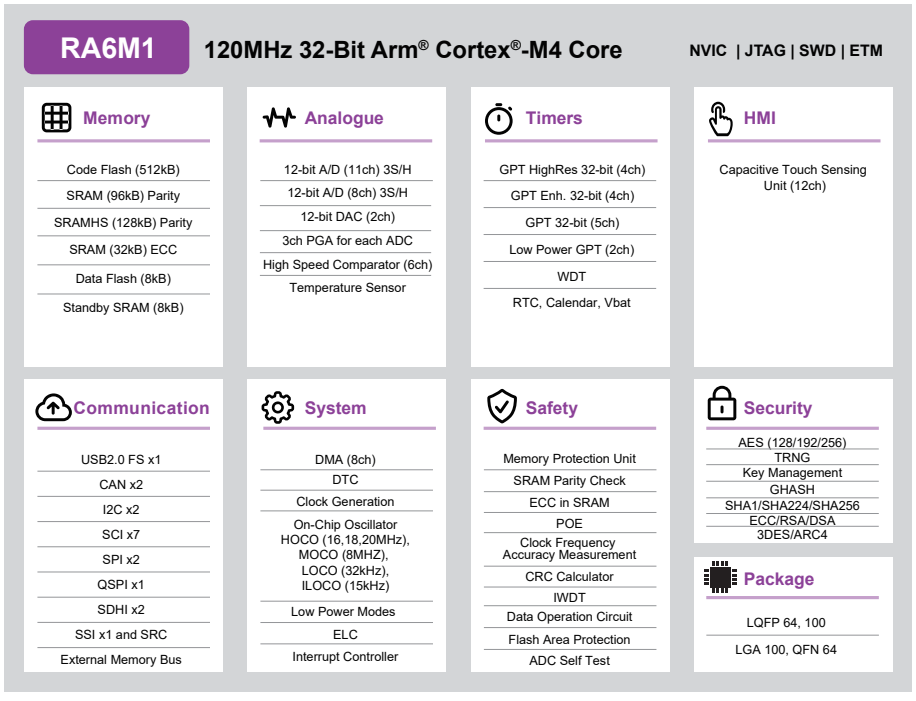


RA6M1

32-bit MCUs built around the 120MHz Arm® Cortex®-M4 core as entry-level models optimized for the RA6 series (64 to 100 pins, 512KB)

The RA6M1 group of entry-level MCUs brings a superior cost-performance ratio to the RA6 series, which is intended for applications requiring the high-performance Arm® Cortex®-M4 core. Fabricated using a highly efficient 40nm process, these MCUs support open and flexible ecosystems (FSP and FreeRTOS). Naturally, they can also be extended to support other RTOSes and middleware. The RA6M1 group is suitable for embedded systems equipped with security functions and large-capacity RAM, as well as for IoT applications demanding power efficiency.

RA6M1 block diagram

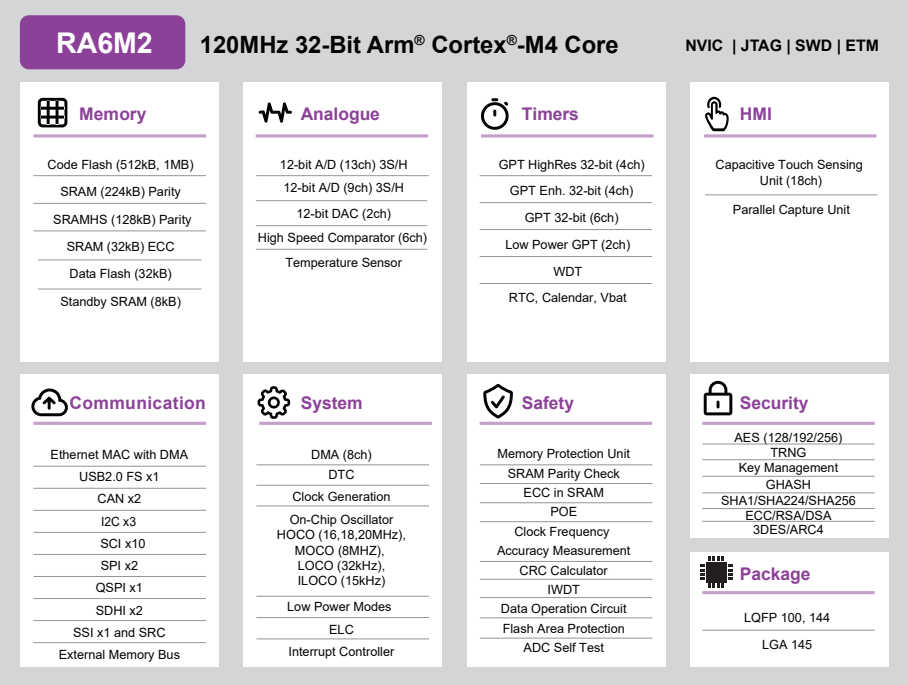


RA6M2

32-bit MCUs built around the 120MHz Arm® Cortex®-M4 core and incorporating midrange memory capacity and Ethernet support (100 to 145 pins, 512KB to 1MB)

The RA6M2 group is built around the high-performance Arm® Cortex®-M4 core, and its Ethernet MAC with DMA on each channel delivers outstanding data throughput. Fabricated using a highly efficient 40nm process, these MCUs support open and flexible ecosystems (FSP and FreeRTOS). Naturally, they can also be extended to support other RTOSes and middleware. The RA6M2 group is suitable for embedded systems equipped with Ethernet, security functions, and large-capacity RAM, as well as for IoT applications demanding power efficiency.

RA6M2 block diagram

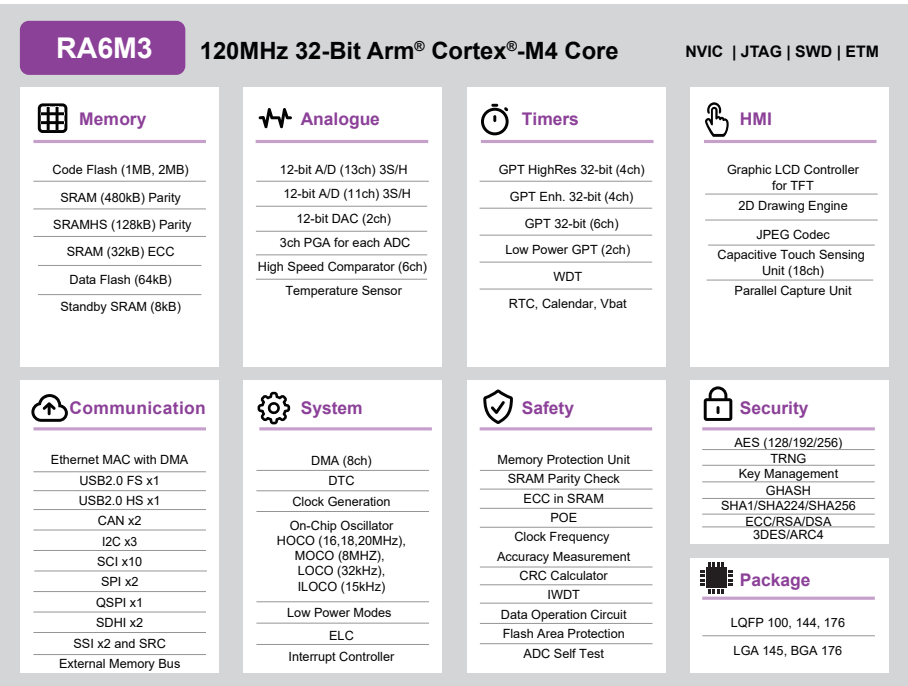


RA6M3

32-bit MCUs built around the 120MHz Arm® Cortex®-M4 core and incorporating USB High-Speed, Ethernet, and TFT controller capabilities (100 to 176 pins, 1MB to 2MB)

The RA6M3 group is built around the high-performance Arm® Cortex®-M4 core, and incorporates a TFT controller with a 2D graphic accelerator and JPEG decoder. An Ethernet MAC with DMA on each channel and USB high-speed interface deliver outstanding data throughput. Fabricated using a highly efficient 40nm process, these MCUs support open and flexible ecosystems (FSP and FreeRTOS). Naturally, they can also be extended to support other RTOSes and middleware. The RA6M3 group is suitable for IoT applications demanding TFT panel, Ethernet, and security capabilities, large-capacity RAM, and USB High Speed (HS).

RA6M3 block diagram

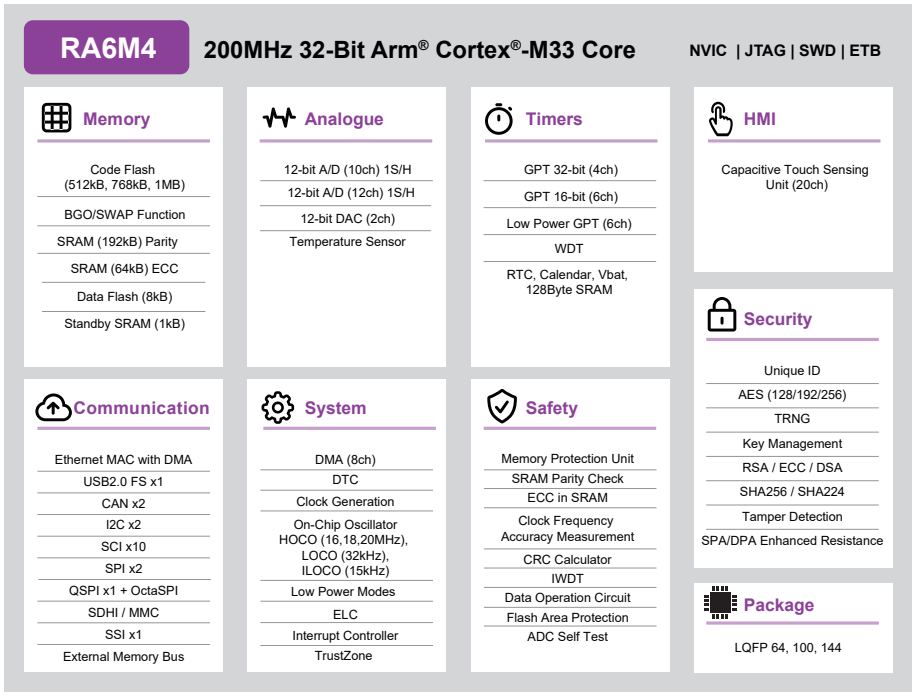


RA6M4

200MHz Arm® Cortex®-M33 TrustZone®, High Integration with Ethernet and OctaSPI

The Renesas RA6M4 group of microcontrollers (MCUs) 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 RA6M4 is built on a highly efficient 40nm process and is supported by an open and flexible ecosystem concept called Flexible Software Package (FSP), built on FreeRTOS and is expandable to use on any other RTOS and middleware preferred. RA6M4 is suitable for IoT application requiring strong security, rich connectivity, large embedded RAM with parity/ECC and low power consumption.

RA6M4 block diagram

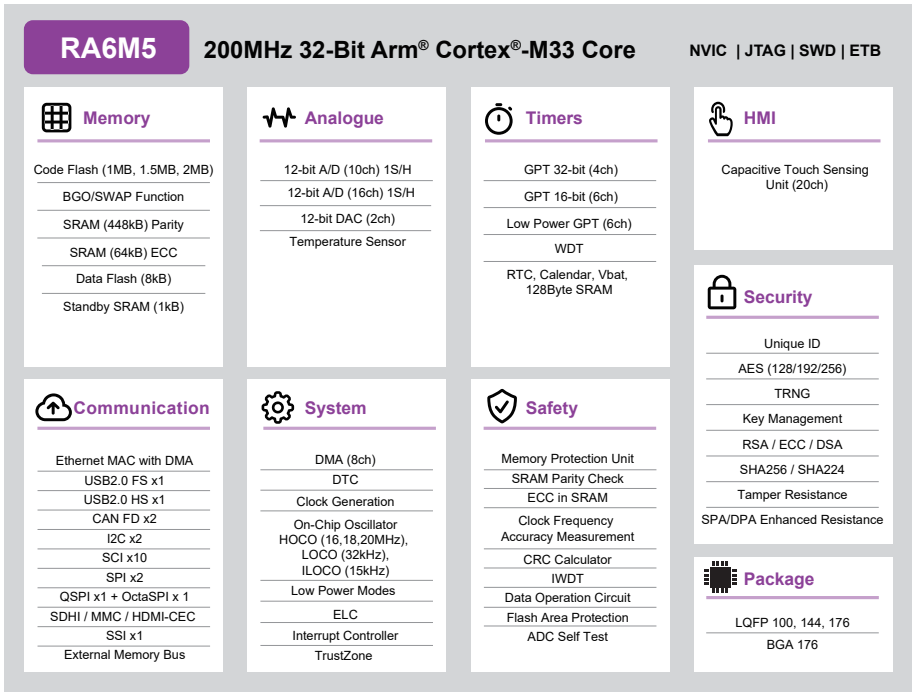


RA6M5

200MHz Arm® Cortex®-M33 TrustZone®, Highest Integration with Ethernet and CAN FD

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 called Flexible Software Package (FSP), built on FreeRTOS and is expandable to use on any other RTOS and middleware preferred. RA6M5 is suitable for IoT application requiring strong security, rich connectivity, large embedded RAM with parity/ECC and low power consumption.

RA6M5 block diagram



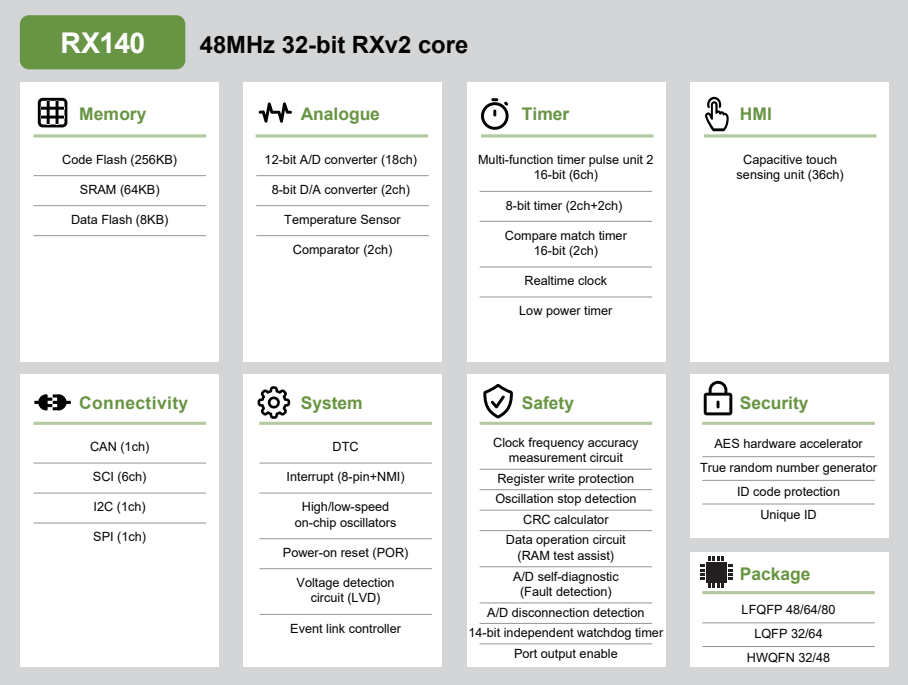
RX140

48MHz RXv2 core, 32-bit MCUs with 3rd generation touch IP (32-80pin, 64-256KB)

The RX140 group microcontrollers combine the highest processing performance and low supply current in the RX100 series. The RXv2 core achieves a 48MHz maximum operating frequency, with about twice the performance, and 30% lower power consumption of RX130. Snooze mode also further lowers power consumption for applications that require intermittent operation.

The improved noise immunity and water resistance of third generation touch IP enables adoption in a wider range of applications than ever before, including noisy or wet surroundings.

RX140 block diagram

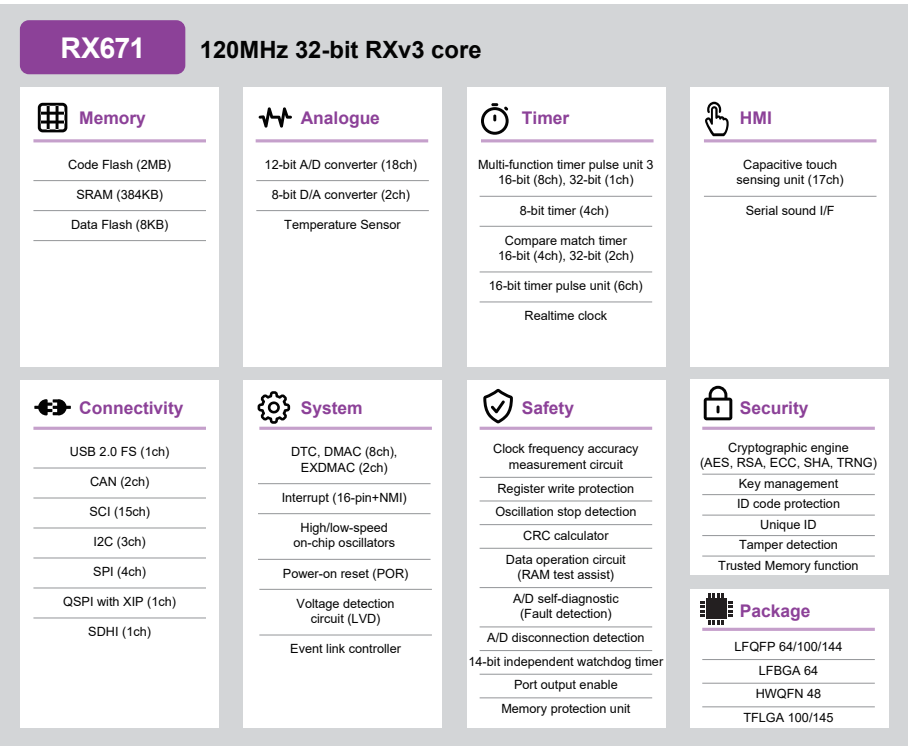


RX671

120MHz RXv3 core, 32-bit MCUs for high-speed real-time control and non-contact HMI (48-144pin, 1-2MB)

The RX671 group microcontrollers deliver superior real-time performance with the RXv3 core running at 120MHz. The HMI functions enable contactless operation through proximity switches and voice recognition, making it possible to realize hygienic HMI suitable for the new normal. A wide variety of packages, including the 4.5mm x 4.5mm 64-pin TFBGA, are all equipped with 2MB flash memory and 384KB SRAM to meet a wide range of needs using a single chip.

RX671 block diagram

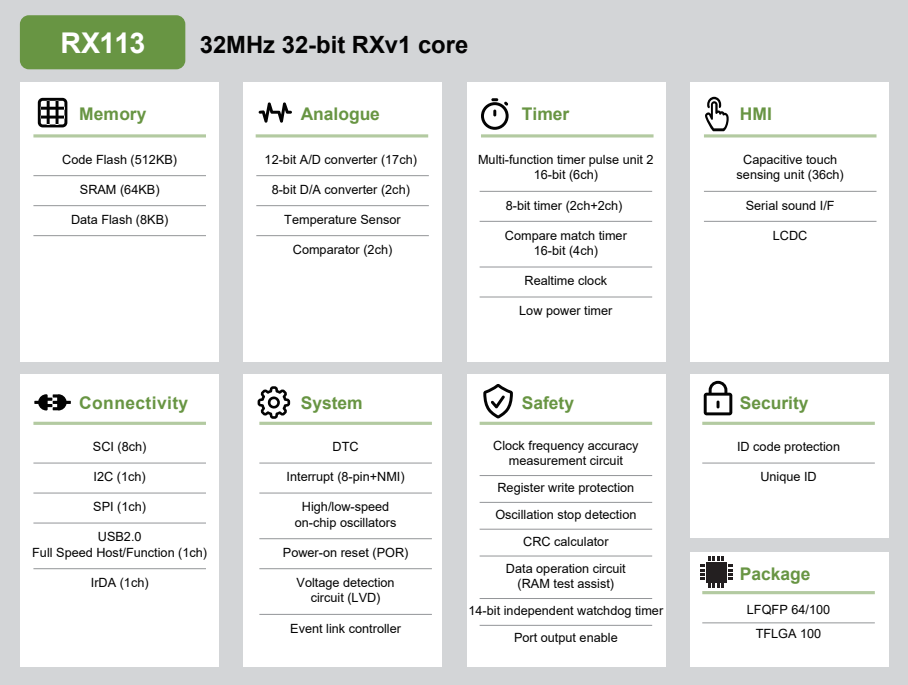


RX113

32MHz RXv1 core, 32-bit MCUs with segment LCD controller and USB (64-100pin, 128-512KB)

The RX113 group microcontrollers have built-in communications functions such as USB and IrDA, a capacitive touch sensing unit (CTSU), a segment LCD, and a serial sound interface (SSI). They offer a single-chip solution for industrial and measuring devices that have low current supply capabilities, or for user interfaces for system control in home appliances, healthcare devices, and more.

RX113 block diagram

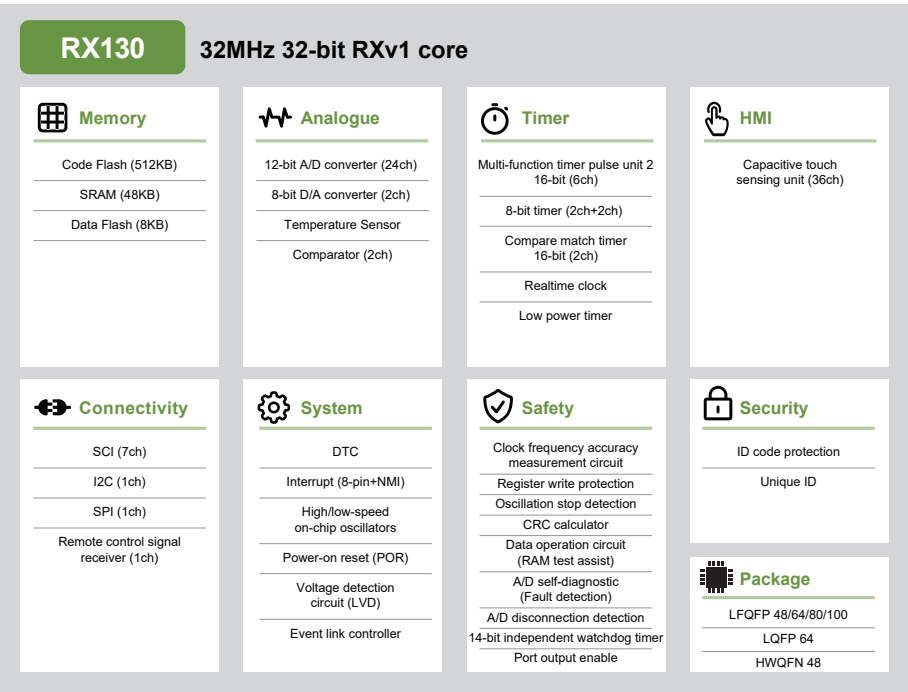


RX130

32MHz RXv1 core, 32-bit MCUs with a wide range of memory lineup (48-100pin, 64-512KB)

The RX130 group microcontrollers integrate a built-in max. 36-channel capacitive touch sensor. The capacitive touch sensor uses an improved detection method compared to previous products and so has vastly improved noise immunity, sensitivity and water resistance. As a result, malfunctions have been reduced, and touch keys are now able to be applied to a variety of materials like e.g. wood, other than the typical acrylic or glass. The RX130 touch feature is an ideal fit to consumer electronics products that are used in wet environments such as in the kitchen or bath. The RX130 group has a lot of built-in functional safety hardware, and can easily support the IEC/UL60730 safety standard for consumer electronics. The RX130 operates at a maximum voltage of up to 5.5 V. So it is suitable for applications such as home appliances (washing machine, IH cooking heater) with touch panel function.

RX130 block diagram

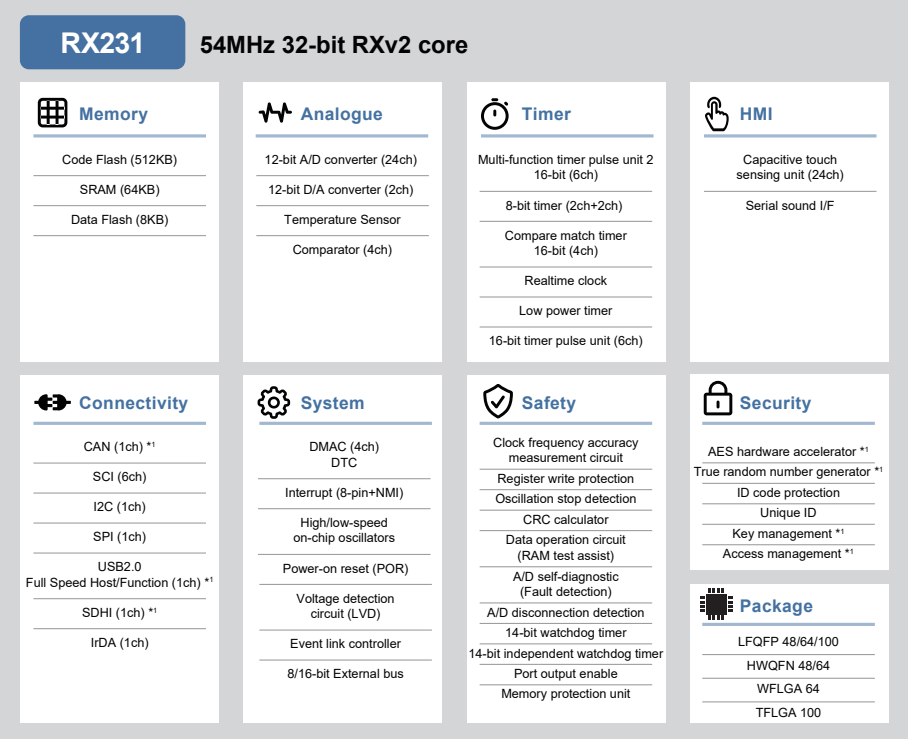


RX231/RX230

54MHz RXv2 core, 32-bit MCUs with enhanced communication functions and security (48-100pin, 128-512KB)

The RX231 group microcontrollers leverage an optimal combination of RXv2 CPU core with improved DSP/FPU and low-power consumption technology to realize extreme power efficiency. High-performance digital filtering, floating-point operations, and other processing can be performed even in environments with low current supply capacity. The RX231 implements the industry's top level communication security and encryption functions, high sensitivity level of noise tolerance capacitive touch sensor capabilities, as well as SD host interface, USB, and CAN communication functionality. These products are suitable for applications in industrial, home appliance, healthcare, smart meter, IoT, and other fields.

RX231 block diagram



*1: Only RX231

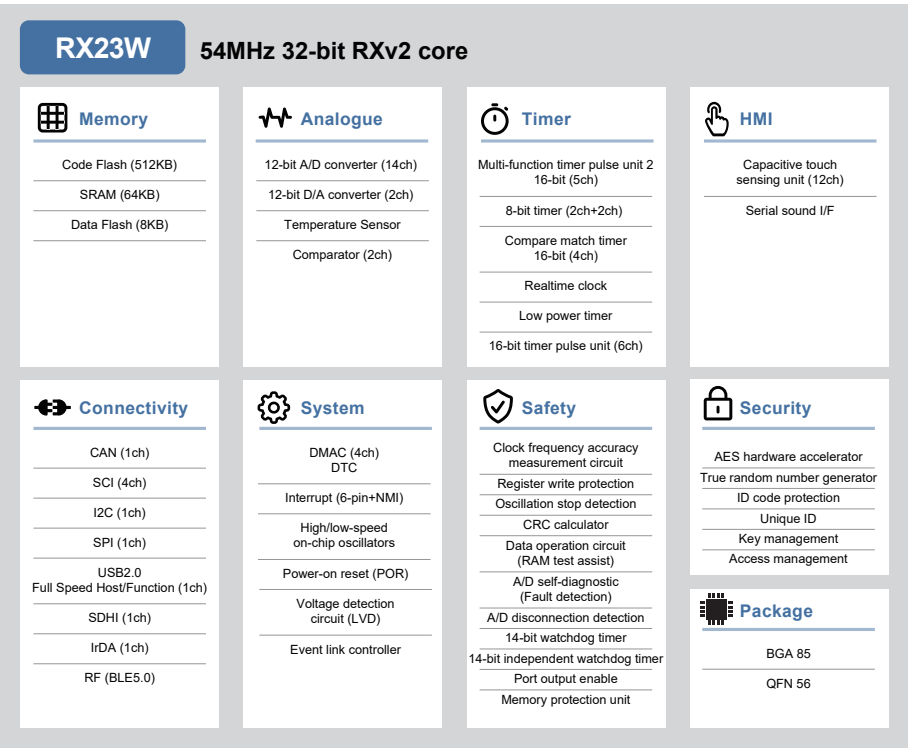
RX23W

54MHz RXv2 core, 32-bit MCUs supporting Bluetooth® 5 wireless communication (56-85pin, 384-512KB)

The RX23W group microcontrollers incorporate security functions that are vital for Bluetooth® 5.0 Low Energy (BLE) and IoT devices, as well as a wealth of peripheral functions such as touch keys, USB and CAN, enabling system control and wireless communication with devices using a single chip. The RX23W have full function support for Bluetooth 5.0 Low Energy long range and mesh networking, and provide excellent reception performance.

In addition to the microcontrollers, the RX23W lineup includes a module with a built-in antenna and oscillator enabling the use of many MCU peripheral function pins in the industry's smallest footprint for a module. This module has obtained Radio Law (Japan), FCC/ISED (North America), and CE (Europe) certifications, saving users the trouble of designing an RF circuit or obtaining certifications on their own, shortening time to market.

RX23W block diagram

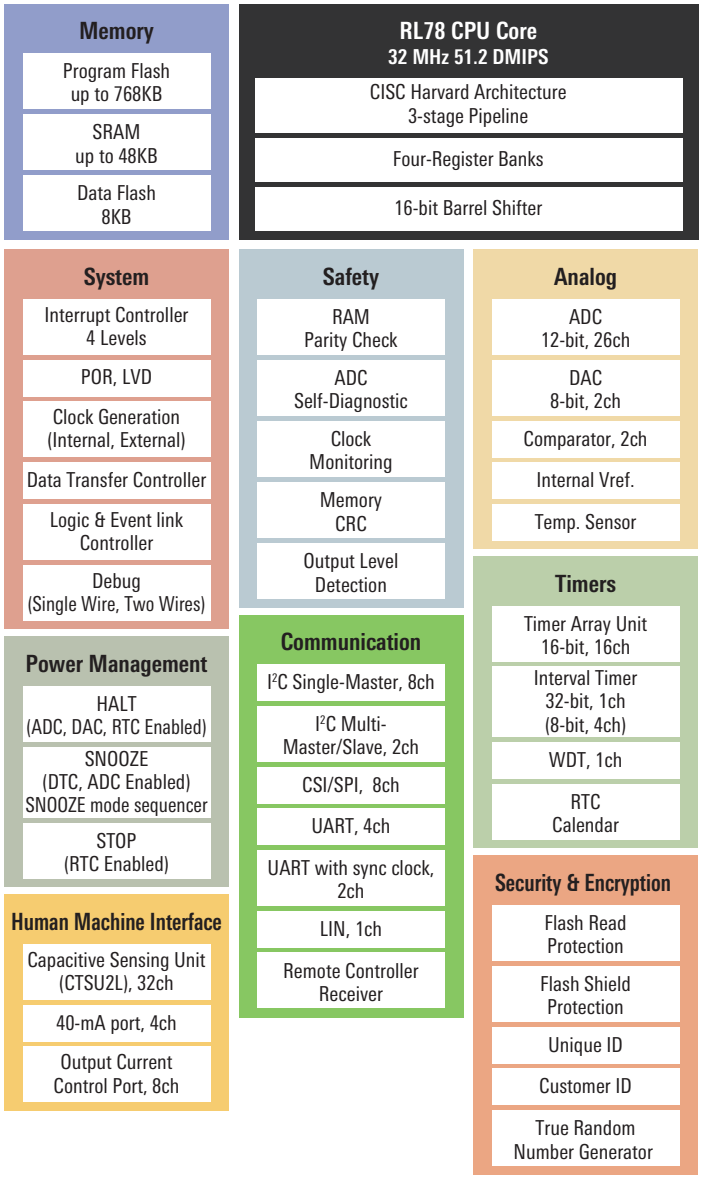


RL78/G23

16-bit MCUs built around the 32 MHz RL78 CPU core and the first capacitive touch sensor in the RL78 family with pin count from 30 to 128 pins, ROM: 96 to 768 KB, and RAM: 12 to 48 KB.

The RL78/G23 microcontroller group is a new generation of the RL78 family of microcontrollers, with 41 µA/MHz CPU operation. The RL78/G23 group has the industry's lowest power consumption with 210 nA at stop (4 KB SRAM retention), and a snooze mode sequencer which significantly reduces power consumption during intermittent operation. The RL78/G23 group features a wide operating voltage range of 1.6 V to 5.5 V at up to 32 MHz, a broad range of package pin counts from 30 pins to 128 pins, and up to 768 KB of flash memory. In addition to enhanced analog and security features, it also incorporates logic and event link controllers (ELCL) and the first capacitive touch sensor (Capacitive Sensing Unit: CTSU2L) in the RL78 family.

RL78/G23 block diagram



Note: The condition for operating voltage of CTSU2L is VDD = 1.8V to 5.5 V.
When using the CTSU2L, use it within the voltage range of VDD = 1.8 V to 5.5 V.

MEMO

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