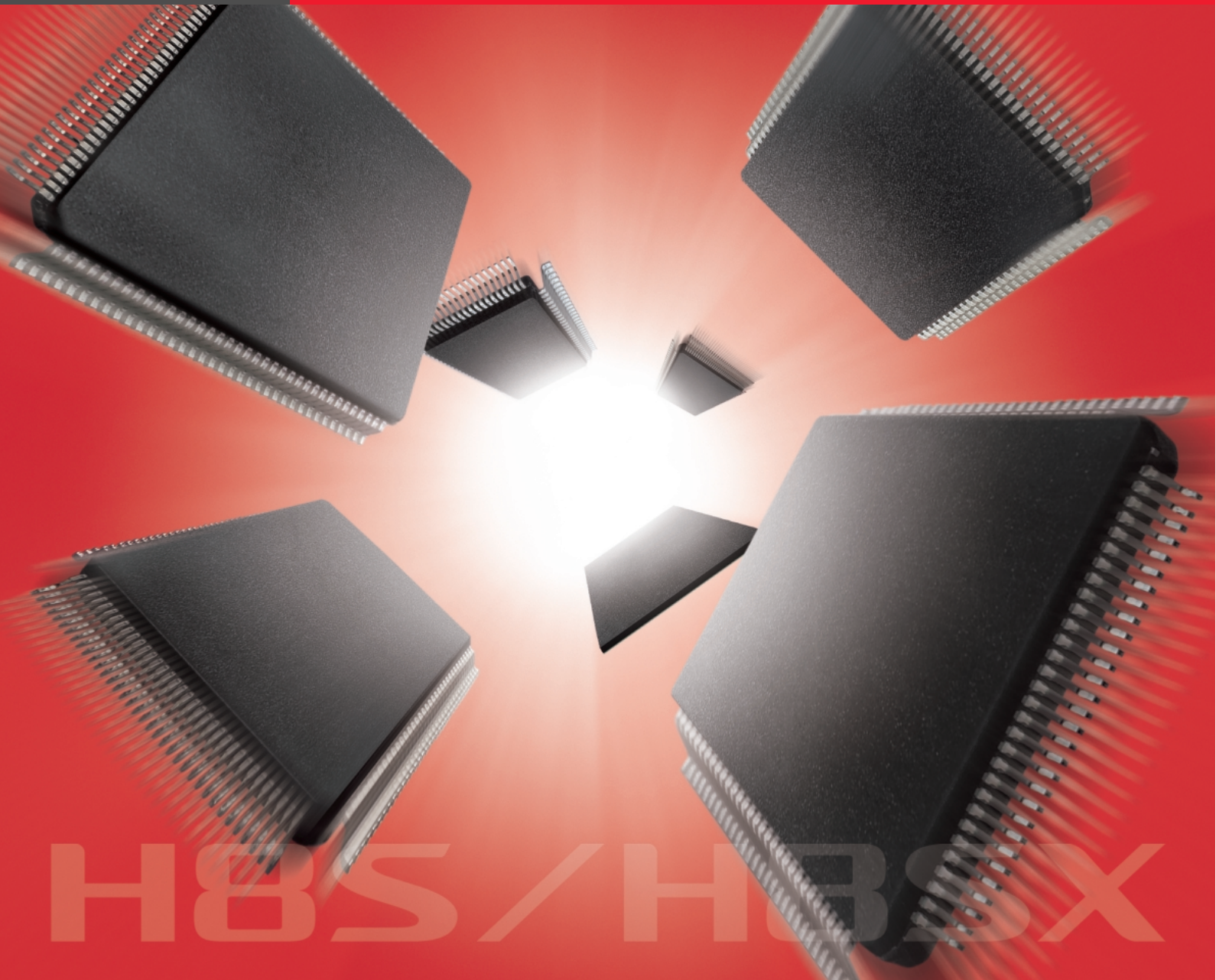


2008.03

Everywhere you imagine. **RENESAS**

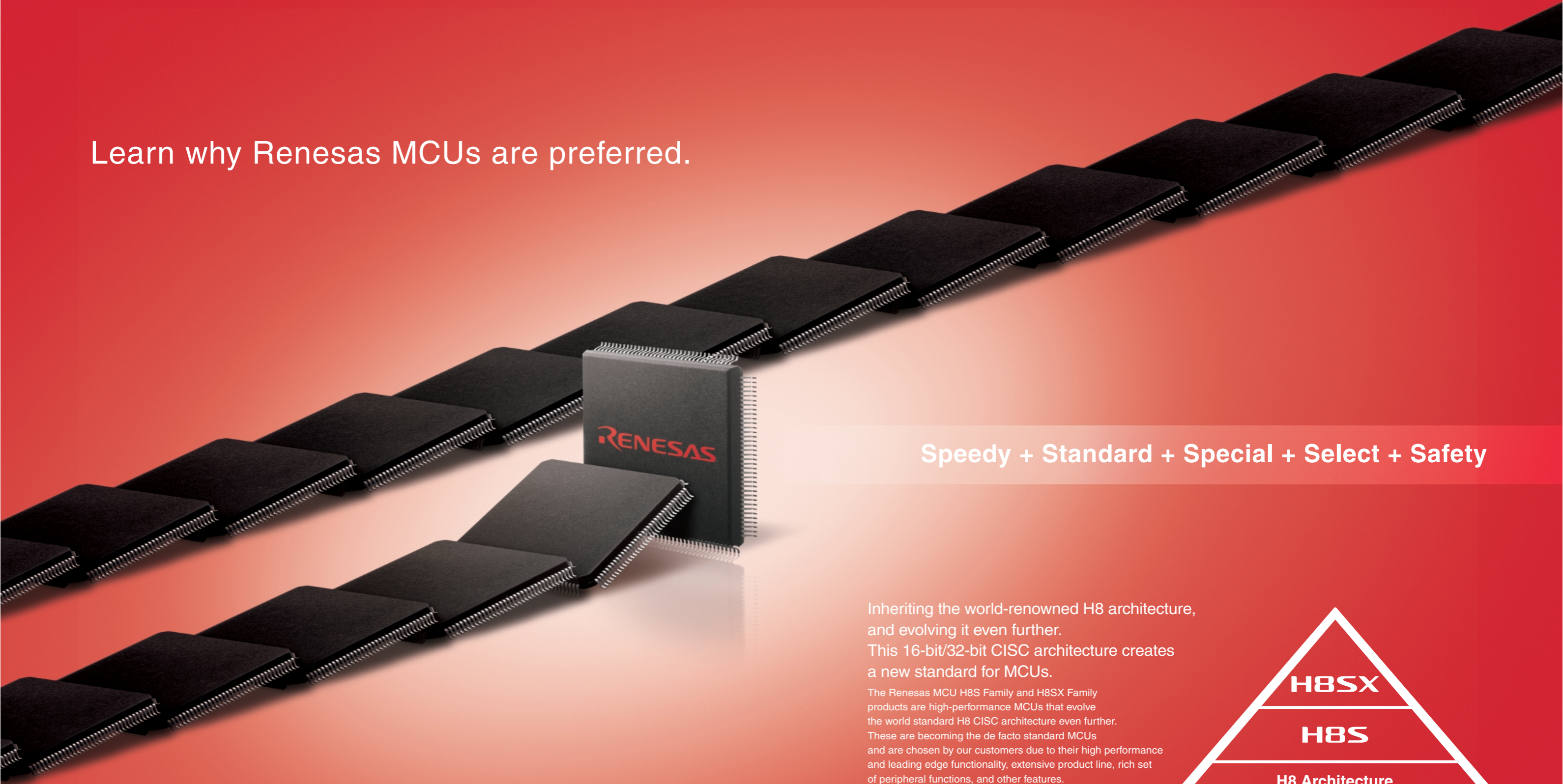


Renesas MCUs H8S Family H8SX Family



RenesasTechnology
www.renesas.com

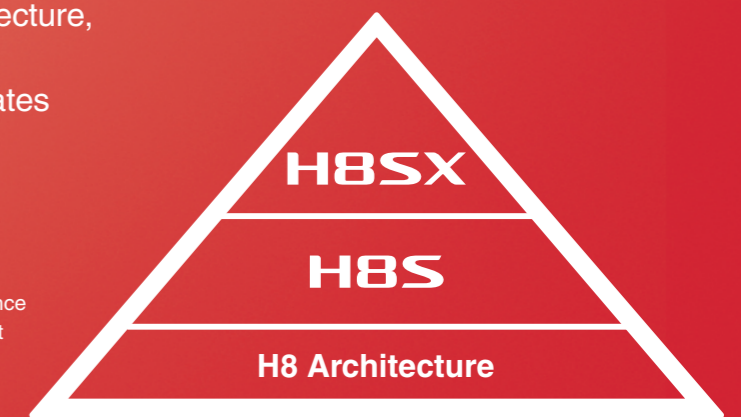
Learn why Renesas MCUs are preferred.



Speedy + Standard + Special + Select + Safety

Inheriting the world-renowned H8 architecture, and evolving it even further. This 16-bit/32-bit CISC architecture creates a new standard for MCUs.

The Renesas MCU H8S Family and H8SX Family products are high-performance MCUs that evolve the world standard H8 CISC architecture even further. These are becoming the de facto standard MCUs and are chosen by our customers due to their high performance and leading edge functionality, extensive product line, rich set of peripheral functions, and other features. Renesas provides a MCU product line that responds to customer needs based on the "5S" concept: Speedy, Standard, Special, Select, and Safety.



The H8S/H8SX Family meet our customer's need with the "5S" concept.

Speedy

The Speedy CISC architecture achieves the world's fastest access of 1 cycle. The H8SX achieves the high performance of 50 MHz, and the H8S achieves 35 MHz.

Standard

These MCUs inherit the world Standard H8 architecture. The H8SX adds high-speed multiply and divide instruction, and the H8S adds multiply/multiply and accumulate instructions.

Special

These MCUs provide Special peripheral functions to support all our users' needs. The basic functions, such as the timer, SCI, and A/D converter units are common to both the H8S and H8SX products.

Select

Users can Select a MCU optimal for their application from the extensive variations available. On-chip flash memory MCUs are available in every group, and diverse peripheral functions are available.

Safety

Renesas MCUs provide the Safety of knowing that a cumulative total of over one billion units have been shipped. A protection function, that prevents important programs from being read out illegally is also available.

Here is where you will find MCUs that perfectly match specific needs: the H8S/H8SX lineup.

★ : Under development



The 32-bit H8SX Family features high performance provided by the CISC architecture.

These MCUs take the maximum possible advantage of the merits of the CISC architecture: good code efficiency, low power, ability to make the most effective use of flash memory performance.

These MCUs achieve outstanding benchmark performance in automotive, digital home electronics, PC peripherals, and other application areas.

- Internal bus width: 32 bits
- Basic instruction execution states: 1 state
- Number of instructions: 87
- Maximum operating frequency: 50 MHz

H8SX/1700*

Internal 32-bit multiplier/divider unit

5.0V @ 80MHz
CAN

Featuring 80 MHz operation at 5V, these MCUs provide high reliability for automotive and industrial applications. Built-in special communication functions (CAN bus)

H8SX/1600

Internal 32-bit multiplier/divider unit

3.3V @ 50MHz	Low Power	ΔΣ/A/D
USB	High-speed SCI	

Featuring 50 MHz operation at 3.3V, these MCUs cover a wide range of applications from ASSP to general-purpose areas. They provide a rich set of basic peripheral functions. Built-in special communication functions (including USB and high-speed UART)

H8SX/1500

Internal 32-bit multiplier/divider unit

5.0V @ 40MHz	High-speed A/D converter
CAN	Sound Generator

Featuring 40 MHz operation at 5V, these MCUs provide high reliability for automotive and industrial applications. Built-in special communication functions (CAN bus and synchronous serial communications units) Improved peripheral functions (including timer, A/D converter, and sound generator units)

CPU upwards compatibility.

H8S/2600

Internal 16-bit multiplier

5.0V @ 20MHz	I ² C-Bus
3.3V @ 33MHz	CAN

Lineup of high-reliability products for automotive applications. Built-in special communication functions (CAN bus and I²C bus units) Extensive set of built-in peripheral functions (including 14-bit PWM timer and LCDC units)

High performance
High functionality

H8S/2500

Built-in 32 kHz oscillator, low power

5.0V @ 26MHz	Multi-voltage power supply	IEBus
3.3V @ 26MHz	CAN	

Extensive set of low-power modes. Support for both 3V and 5V interfaces. Built-in special communication functions (including IEBus and CAN Bus) IEBus is a trademark of NEC Corporation.

H8S/2400

Internal 16-bit multiplier

5.0V @ 33MHz	5V tolerant	I ² C-Bus
3.3V @ 34MHz*	USB*	

Enhanced I/F, USB, Ether PC/General

H8S/2300

Standard group in the H8S series

5.0V @ 20MHz	SDRAM-I/F	I ² C-Bus
3.3V @ 35MHz	EXDMAC	

Provides a rich set of built-in basic peripheral functions. Extensive set of variations (from 100 to 144 pins). High-speed operation (Maximum operating frequency: 35 MHz)

H8S/2200

Built-in 32 kHz oscillator, low-voltage operation

5.0V @ 20MHz	IEBus	I ² C-Bus
3.3V @ 35MHz	USB	

Low-voltage operation. Rich set of low-power modes. Special communication functions (USB, IEBus, I²C bus, and high-speed UART) IEBus is a trademark of NEC Corporation.

H8S/2100

Inherits the peripheral IP of the H8/300 Series.

5.0V @ 20MHz	ISA-Bus	LPC-Bus
3.0V @ 33MHz	USB	

Provides the standard PC interfaces (including I²C bus, LPC bus, ISA bus, and USB) Inherits the peripheral functionality of the H8/300 Series.

H8S/Tiny*

Single chip and low pin count versions of the H8S.

5.0V @ 20MHz
3.0V @ 20MHz

Lineup of 64 and 80-pin products. Rich set of peripheral functions (multifunction timers, I²C bus, and SCI)

Slimmed-down functionality
Lower pin counts

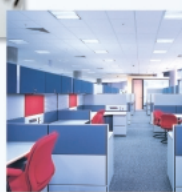


The 16-bit H8S Family features high performance provided by the CISC architecture.

The H8S Family of 16-bit CISC MCUs boasts superlative generality and superb ease of use. Along with a diverse set of functions, these MCUs include a variety of interfaces to match application needs. Renesas provides a product series lineup that is optimal for customers and responds to diverse needs.

- Internal bus width: 16 bits
- Basic instruction execution states: 1 state
- Number of instructions: 65 or 69*
- Maximum operating frequency: 35 MHz

*: H8S/2600 and 2400 Series



- Internal bus width: 16 bits
- Basic instruction execution states: 2 states
- Number of instructions: 62
- Maximum operating frequency: 25 MHz



The H8 Family is the standard for CISC architecture MCUs

- Internal bus width: 8 bits
- Basic instruction execution states: 2 states
- Number of instructions: 57
- Maximum operating frequency: 20 MHz

H8/300H

Standard model in the H8 Series

H8/Tiny

Single chip and low pin count H8

H8/300

The standard for 8-bit CPUs

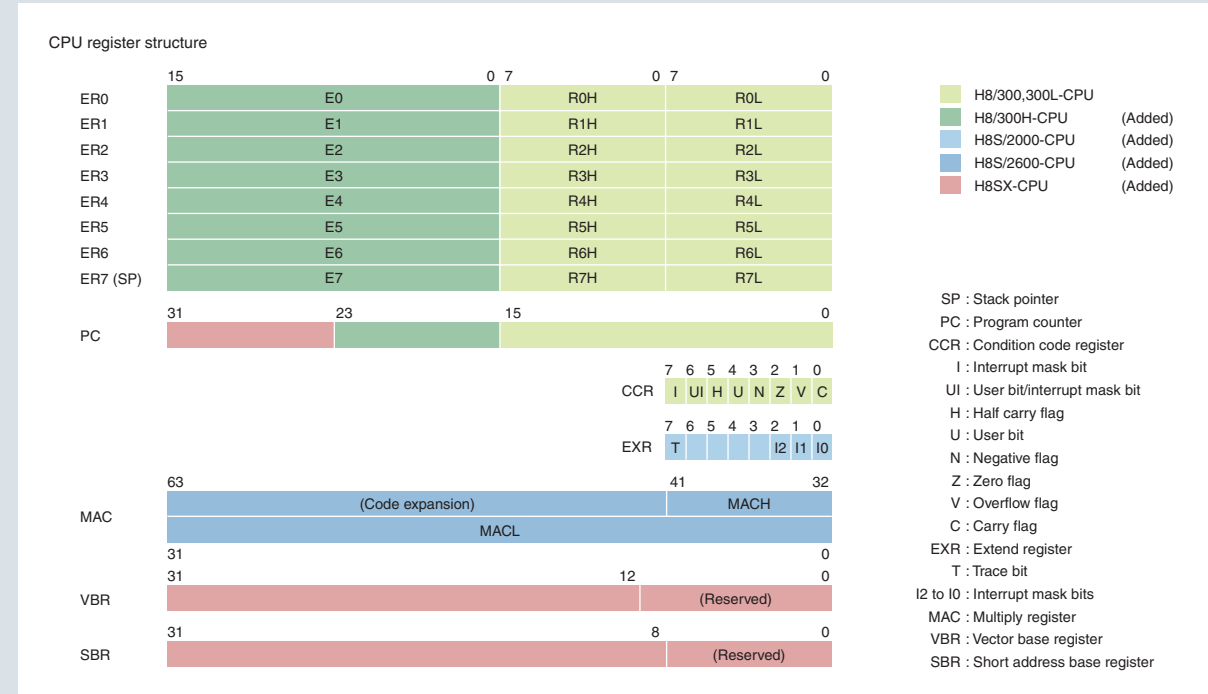
H8/300L

Built-in 32 kHz oscillator and LCD controller/driver units

Inheriting the respected H8 architecture and improving processing ability and speed.

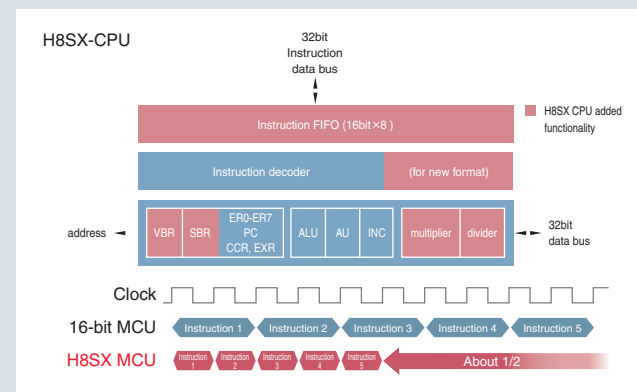
High-performance CISC architecture

Based on core development focused on compatibility, the H8S Family and H8SX Family also feature upward compatibility in register layout and functionality. This makes reuse of software resources easy. Furthermore, functions that improve ease of use are added to each family.



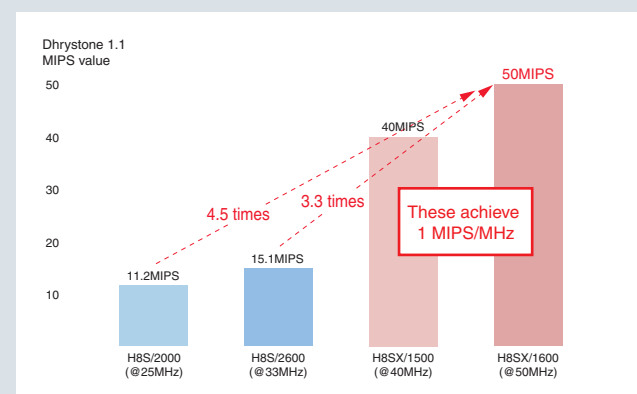
High-speed 32-bit processing for high performance

These CPUs use a 2-stage pipelined processing plus instruction FIFO structure to achieve high-speed processing at one instruction per clock cycle. Furthermore, by making the internal CPU bus 32 bits wide, the instruction fetch time is reduced significantly from earlier 16-bit MCUs.



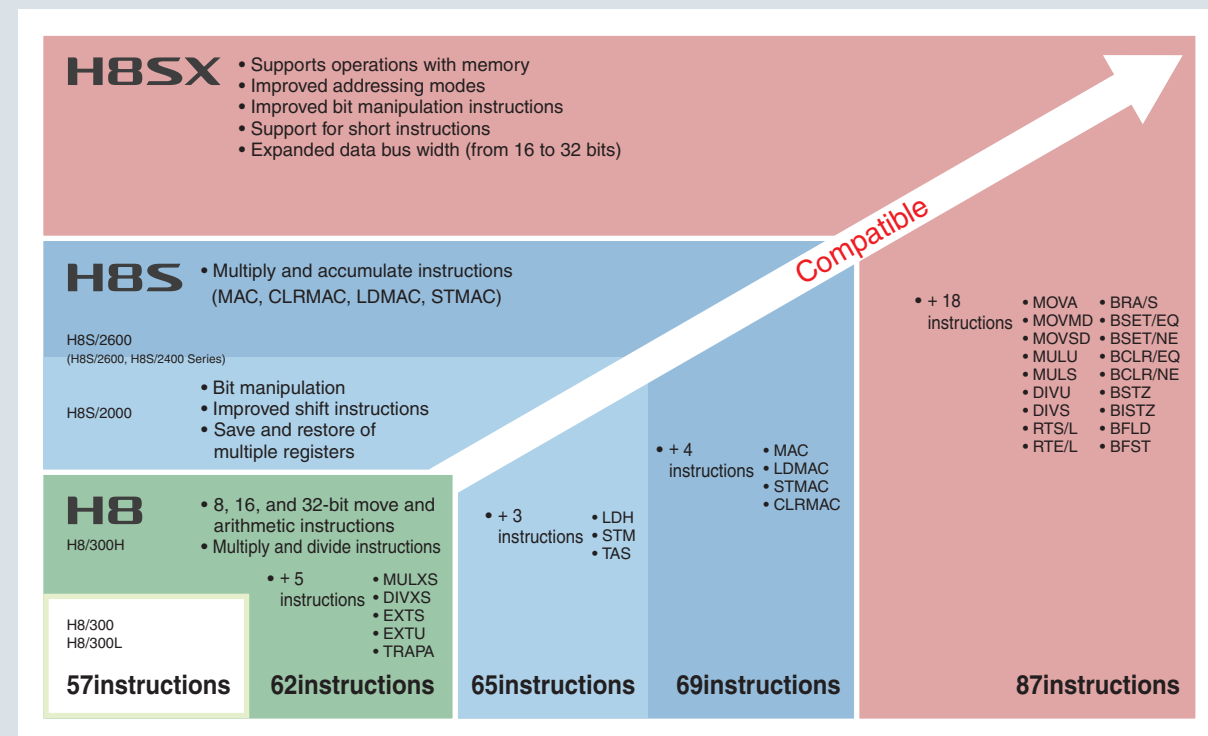
The H8SX inherits the whole H8S instruction set.

In addition to inheriting the whole H8S instruction set, which is ideal for embedded applications, the H8SX adds new instructions and new addressing modes to improve ease of use even further. Arithmetic performance is improved greatly by the provision of 32-bit multiply and divide instructions.



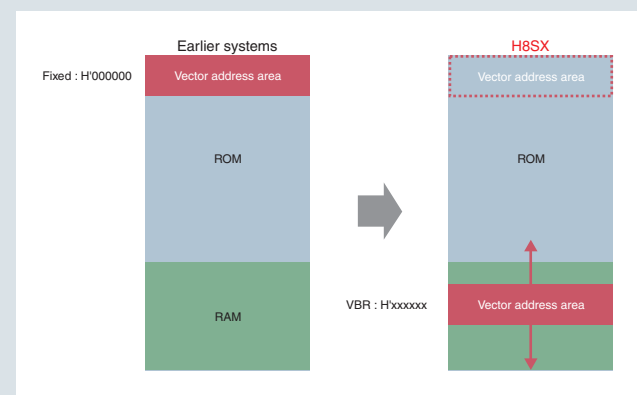
Assuring compatibility at the object level

Firmware developed for the H8 CPU can be used on the 16-bit H8S CPU and the 32-bit H8SX CPU as well.



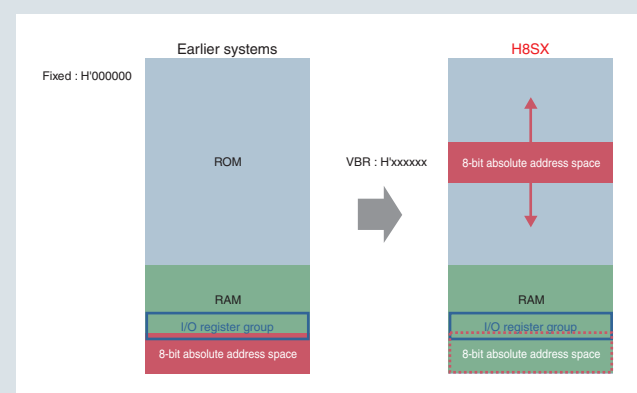
VBR reduces the interrupt response time significantly.

These MCUs feature a VBR (vector base register) function that can set up an arbitrary address in a vector table. By allocating the vector in RAM, even ROM-less versions can perform interrupt handling quickly.



SBR creates faster programs.

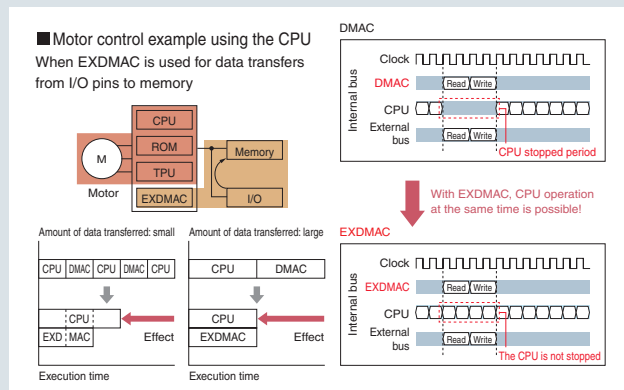
The SBR (short address base register) function makes it possible to set up a start address for an 8-bit absolute address space at an arbitrary location. Fast and efficient programs can be created by changing the start address of the 8-bit absolute address space.



A rich set of advanced functions that can completely support a wide range of applications.

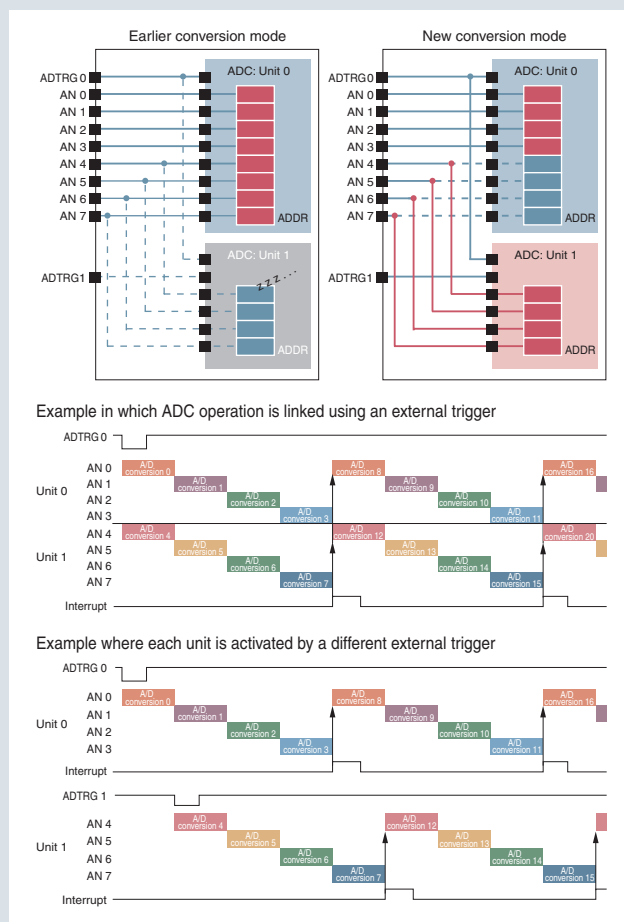
EXDMAC makes high-speed data transfers possible.

These MCUs include the EXDMAC direct memory access controller that proves its worth in high-speed transfers of data between two external data busses. System performance increases significantly since data is transferred without stopping CPU operation.



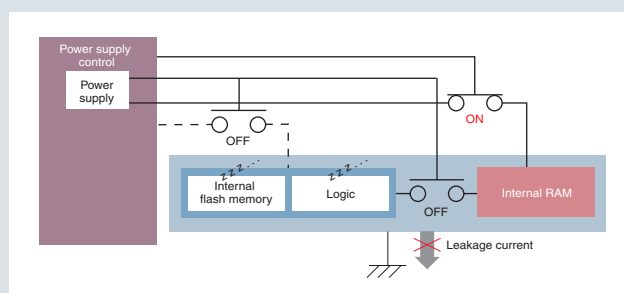
New A/D conversion mode that doubles conversion speed.

Conversion speed is effectively doubled since the units can convert at the same time, making high-speed conversion possible. (Units 0 and 1 can operate independently from the same external trigger (ADTRG0).) It is also possible to activate the units independently from different external triggers.



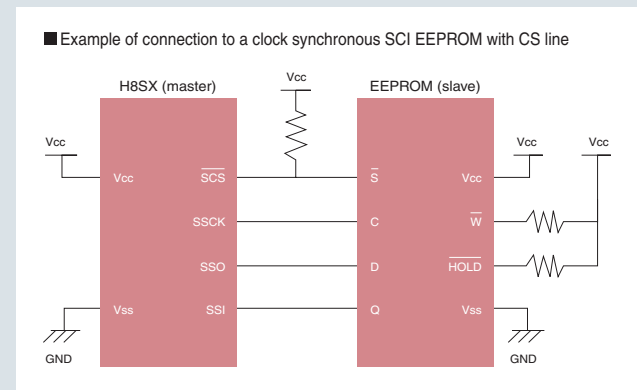
Deep software standby mode

These MCUs provide deep software standby mode, which can suppress standby mode power consumption even further. Power to unneeded modules can be cut with register settings and leakage current can be reduced greatly.



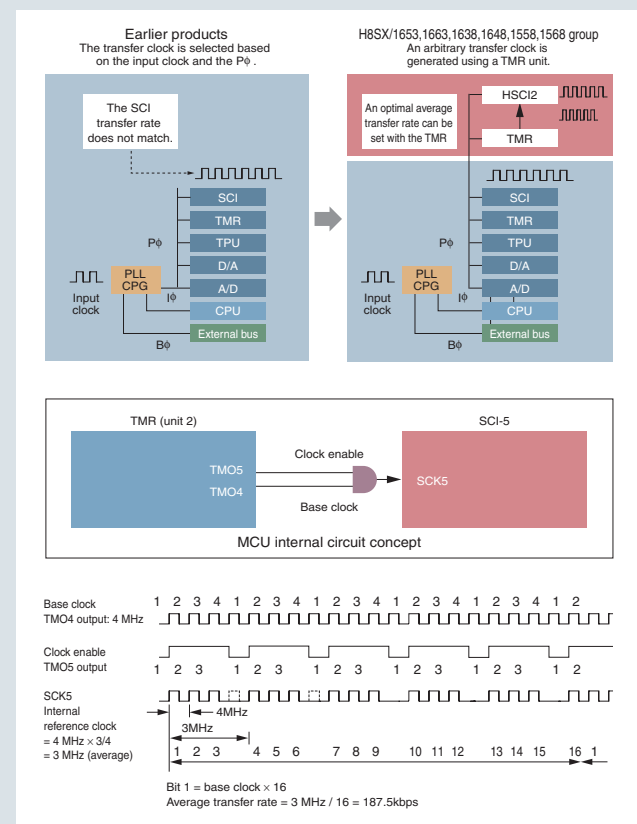
Synchronous serial communications unit that provides high-speed synchronous serial communications

These MCU provide a synchronous serial communications unit that supports both a clock synchronous communications mode and a 4-wire bus communications mode. This unit supports communications with a wide range of devices that have a clock synchronous CSI unit with CS signal by providing clock polarity reversal, LSB/MSB first selection, conflict error detection and other functions.



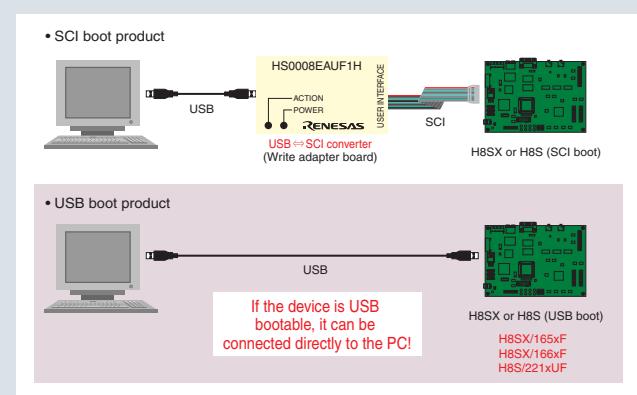
HSCI2 allows selection of an optimal transfer clock.

HSCI2 (high-speed serial communications interface 2) allows the selection of an optimal SCI transfer clock without depending on the frequency of an oscillator element. It generates the optimal average transfer rate clock source required for the SCI from the MCU's internal 8-bit timer (TMR unit). This obviates the need to select an oscillator element constrained by the SCI transfer clock, and allows an oscillator element optimal for the system to be selected.



USB boot function that can write to a connected flash memory.

The MCU's internal flash memory can be written directly from a PC using the USB boot function. Since this is a direct USB connection, high-speed writing is possible. Furthermore, on-site maintenance and other operations are quite and easy since no USB/SCI converter or other external circuits are required.



H8SX /1600

3V series that features a built-in 32-bit multiplier/divider.

Extensive lineup with operating frequencies up to 50 MHz and internal flash memory capacities from 256 KB to 1024 KB.

ROMless products support onboard writing to external flash ROM.*

Built-in functions include a high-precision 16-bit $\Delta\Sigma$ A/D converter and a high-speed 10-bit successive approximation A/D converter.

*: The user must provide write and erase programs for the specifications of the flash ROM actually used.

Application Areas

PC peripherals and OA equipment (PC, storage devices, printers, and scanners), consumer equipment (digital home electronics), and industrial equipment (FA equipment, POS peripherals, meters, test equipment, and games).

Features of the H8SX/1600 Series

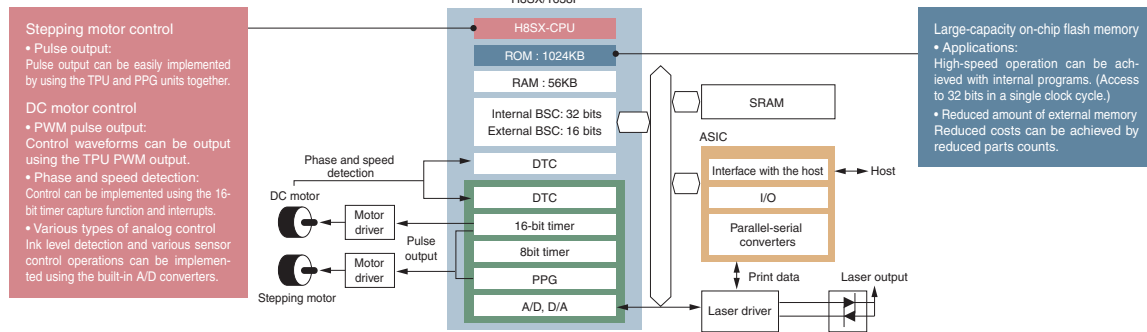
- Flash/ROM capacities from 256/24 KB to 1024/56 KB
- Improved peripheral functions, including dual TPU/PPG units, and high-speed SCI/I²C bus units
- Up to three high-speed 10-bit A/D converter units support simultaneous, independent, and continuous conversion.
- Built-in high-precision 16-bit $\Delta\Sigma$ A/D converter
- Support for a wide variety of communication formats including USB 2.0 (full speed) and I²C bus.
- Built-in EXDMAC can operate the internal and external busses independently.
- New standby mode added. Supports even finer-grained control of the power supply and provides standby mode operation with low power consumption.
- Available in a variety of miniature packages including BP-176V (13 x 13 mm) and TLP-145V (9 x 9 mm).

■ H8SX/1648F Block Diagram

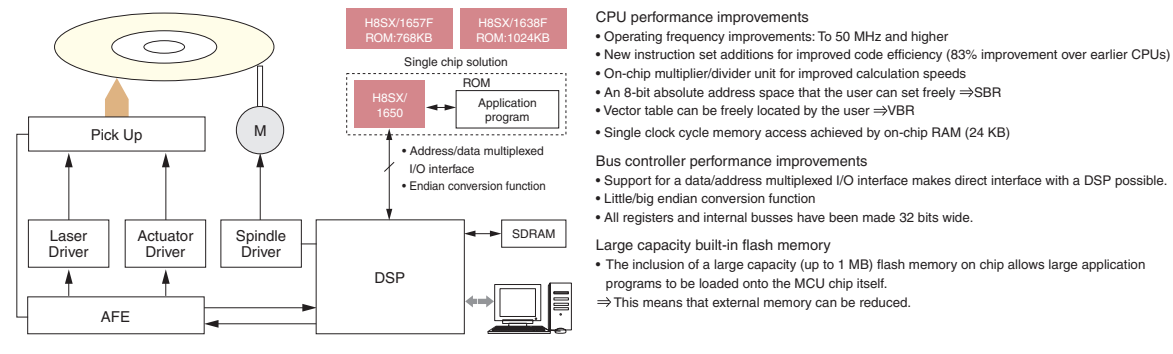
H8SX-CPU	Clock oscillator	ROM	RAM
		BSC	INTC
Multiplier and divider		TPU (16-bit timer): 12 channels	
UBC		TPU (16-bit timer): 8 channels	
DMAC		WDT	
DTC		I ² C-Bus: 4ch	
SCI: 7ch		PPG: 2Unit	
High-speed A/D converters: three 4-channel units		PLL	
D/A 8bit: 2ch		I/O port	
H-UDI			

Special functions

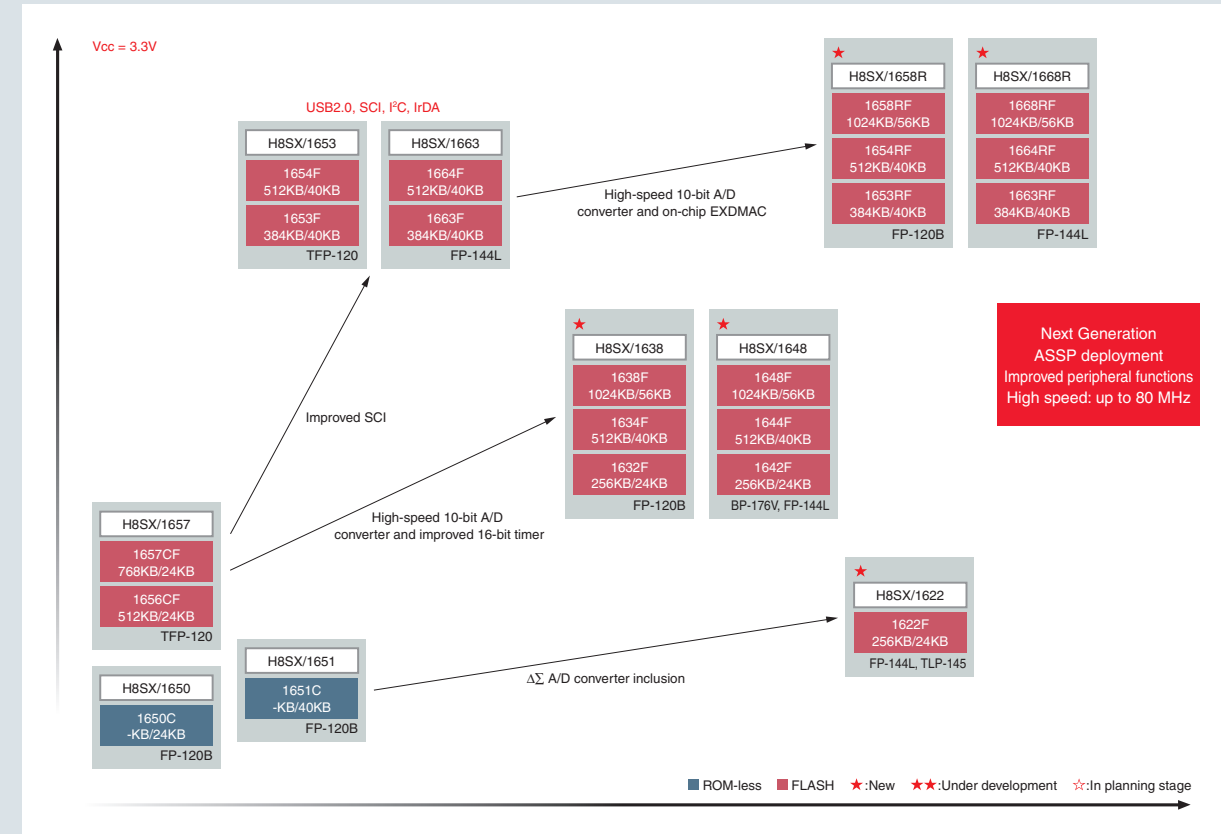
■ Laser Printer/Plain Paper Copier Engine System Structure Example



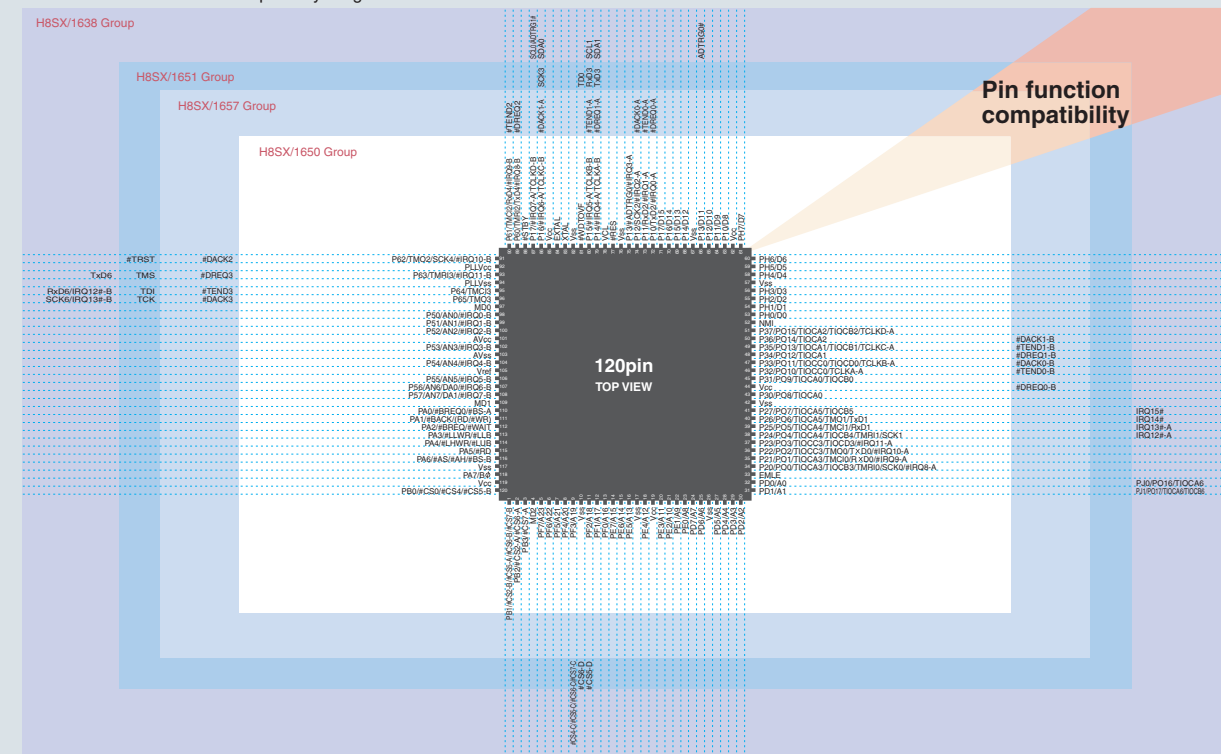
■ Optical Disc Drive System Structure Example



■ H8SX/1600 Series Product Development Chart



■ H8SX/1600 Series Pin Compatibility Diagram



H8SX /1500

5V series that features a built-in 32-bit multiplier/divider.

Lineup features operating frequencies up to 48 MHz and ASSP products for automotive applications.

This is an extensive line with, in addition to a lineup of models with 256 KB to 1024 KB of on-chip flash memory, high quality grade versions for dashboard and airbag systems.

Application Areas

Industrial equipment (FA control, HVAC, and vending machines) and automotive applications (dashboard and airbag systems).

Features of the H8SX/1500 Series

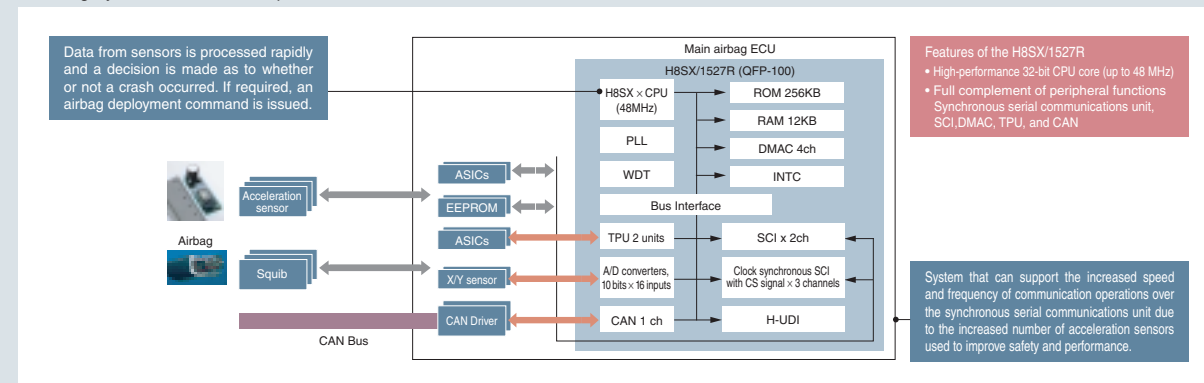
- Built-in PWM modules that provide 16 10-bit channels and 12 16-bit channels
- Extensive set of built-in communications functions, including synchronous serial communications unit, I²C bus, and CAN Bus.
- Sound generator function can produce sine waves in the range 31 Hz to 20 kHz with an accuracy of within 1%.
- Multi-signal pulse control can be implemented using up to two 16-bit PPG units and up to two 16-bit TPU units.
- Up to three high-speed 10-bit A/D converter units support simultaneous, independent, and continuous conversion.
- New standby mode added. Supports even finer-grained control of the power supply and provides standby mode operation with low power consumption.

H8SX/1544F Block Diagram

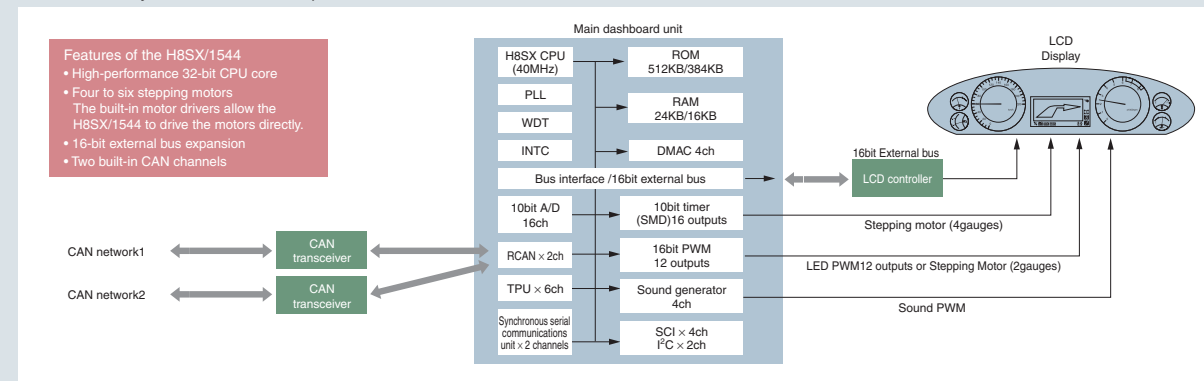
H8SX-CPU	Clock oscillator	ROM	RAM
BSC		INTC	
Multiplier and divider		TPU (16-bit timer): 12 channels	
Sound Generator: 4ch		16-bit PWM timer: 3 channels	
DMAC		10-bit PWM timer: 2 channels	
RCAN: 2ch		WDT	
SCI: 4ch		I ² C-Bus: 2ch	
A/D 10bit: 16ch		Synchronous serial communications unit: 2 channels	
D/A 8bit: 2ch		PLL	
		I/O port	

Special functions

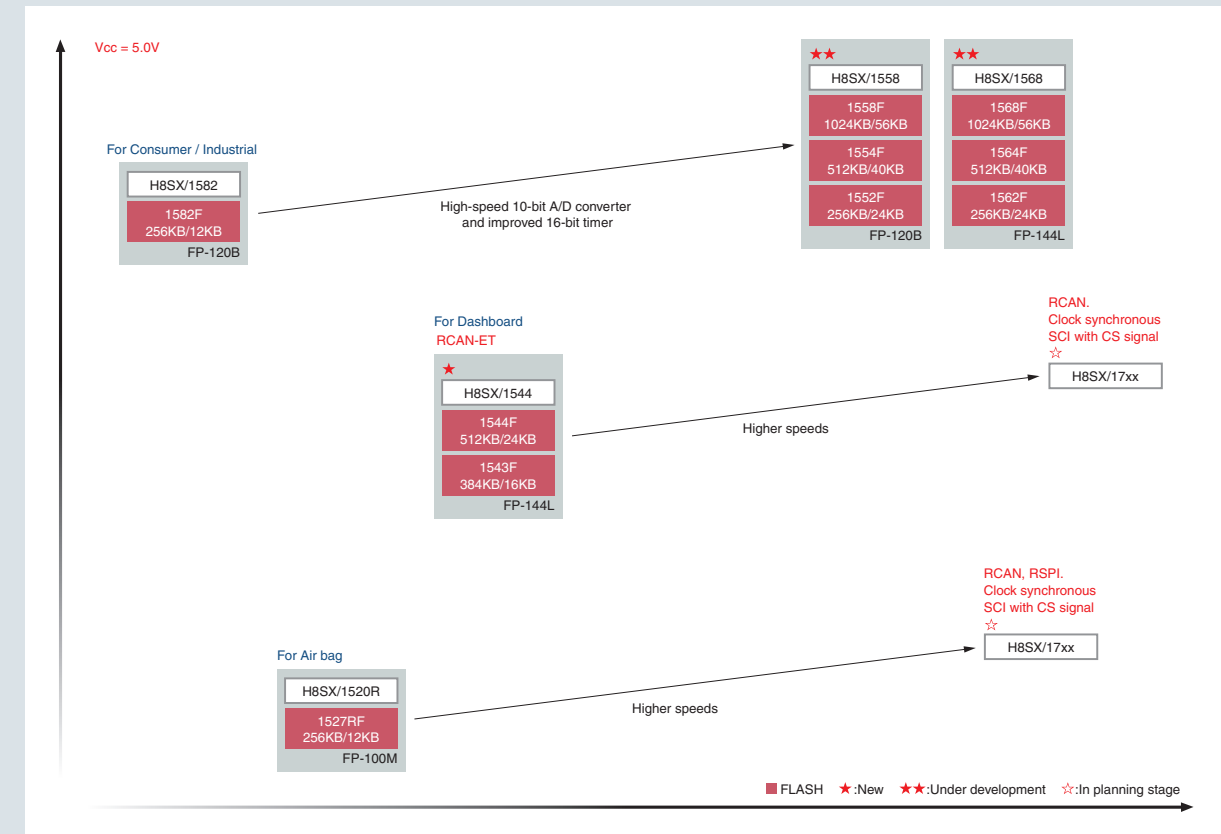
Airbag System Structure Example



Dashboard System Structure Example

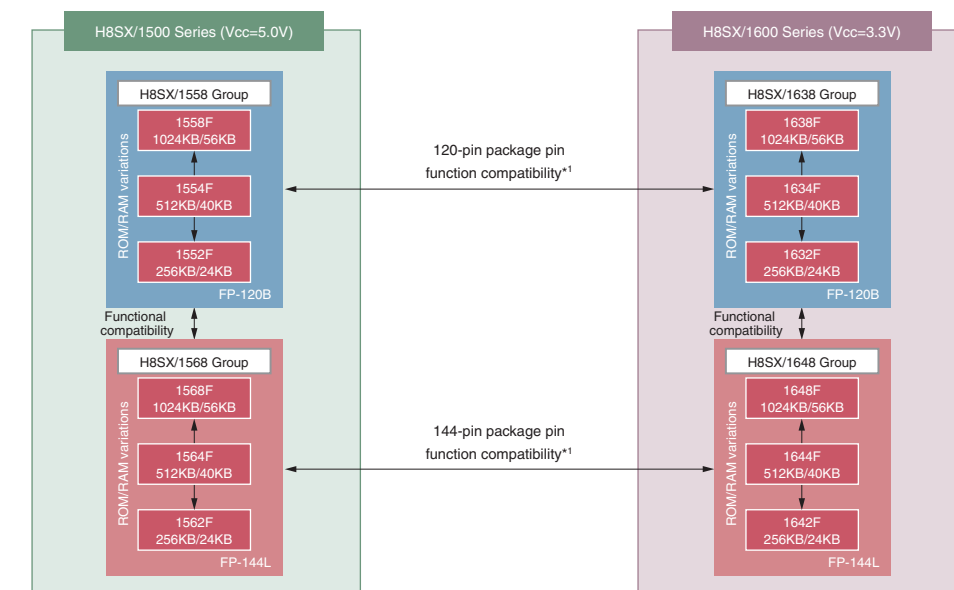


H8SX/1500 Series Product Development Chart



Compatibility with the Vcc = 3.3V H8SX/1600 Series

Even though the operating voltages differ between the H8SX/1500 Series and the H8SX/1600 Series, Renesas has emphasized pin compatibility when developing the product lines. Both the H8SX/1558 group and the H8SX/1638 group, and the H8SX/1568 group and the group, are pin function compatible*1 products. If, in the future, a Renesas customer changes from a Vcc = 5.0 V to a Vcc = 3.3V power supply system, Renesas provides a product lineup that allows the switch to the H8SX/1638 group or H8SX/1668 group to be made with confidence.



*1: The H8SX/1558 group and the H8SX/1568 group do not support external expansion. Also, their operating frequency range is 8 to 40 MHz.

H8S/2600

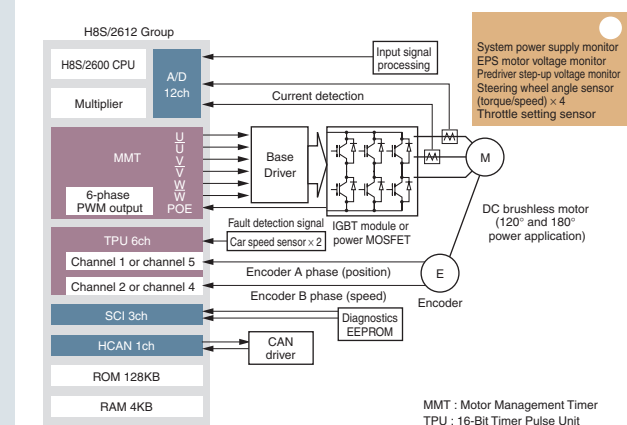
High-end H8S Family series that features a built-in 16-bit multiplier.

Product lineup includes wide temperature range high-reliability products (-40 to +105°C, -40 to +125°C) for automotive applications. This series features not only special communications functions (I²C bus, CAN Bus, and synchronous serial communications units) but also special peripheral functions (including motor control PWM output and LCD controller units).

Application Areas

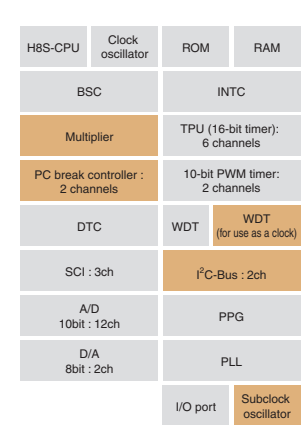
PC peripherals and OA equipment (printers), industrial equipment (FA control and inverter control), and automotive applications (dashboard, car air conditioning, gateways, EPS, ABS, and body control).

■ EPS System Structure Example



- 20 MHz, 5V operation
- Built-in multiplier
- Versions with 80, 100, 120, and 144 pins available.

■ H8S/2607 Group Block Diagram (under development)



Special functions

H8S/2500

Low-power 5V series that features a 32 kHz oscillator inherited from the H8S/2200 series.

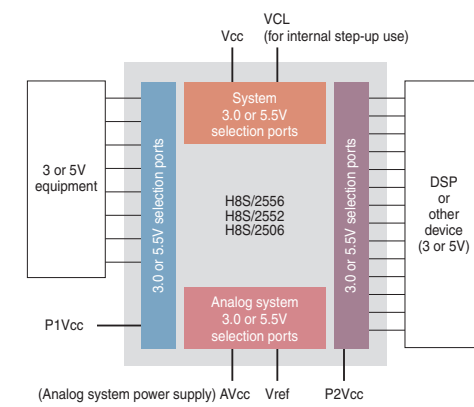
These MCUs include special communications functions (I²C bus, IEBus, and CAN bus) and support both 5V interface and 3V interface systems with a port pin power supply.

This series can also support 5V/3V mixed systems by supplying different port pin power supply voltages.

Application Areas

Industrial equipment (FA control and inverter control) and automotive applications (car audio).

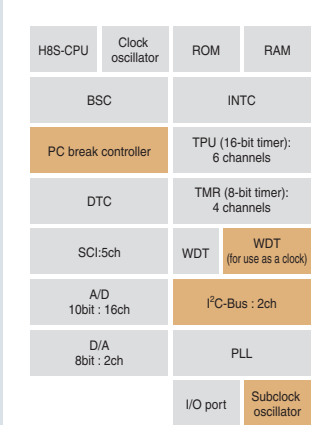
■ Pin Voltage Selection



*: ICE (E6000) is supported with the HS2556EP162H.

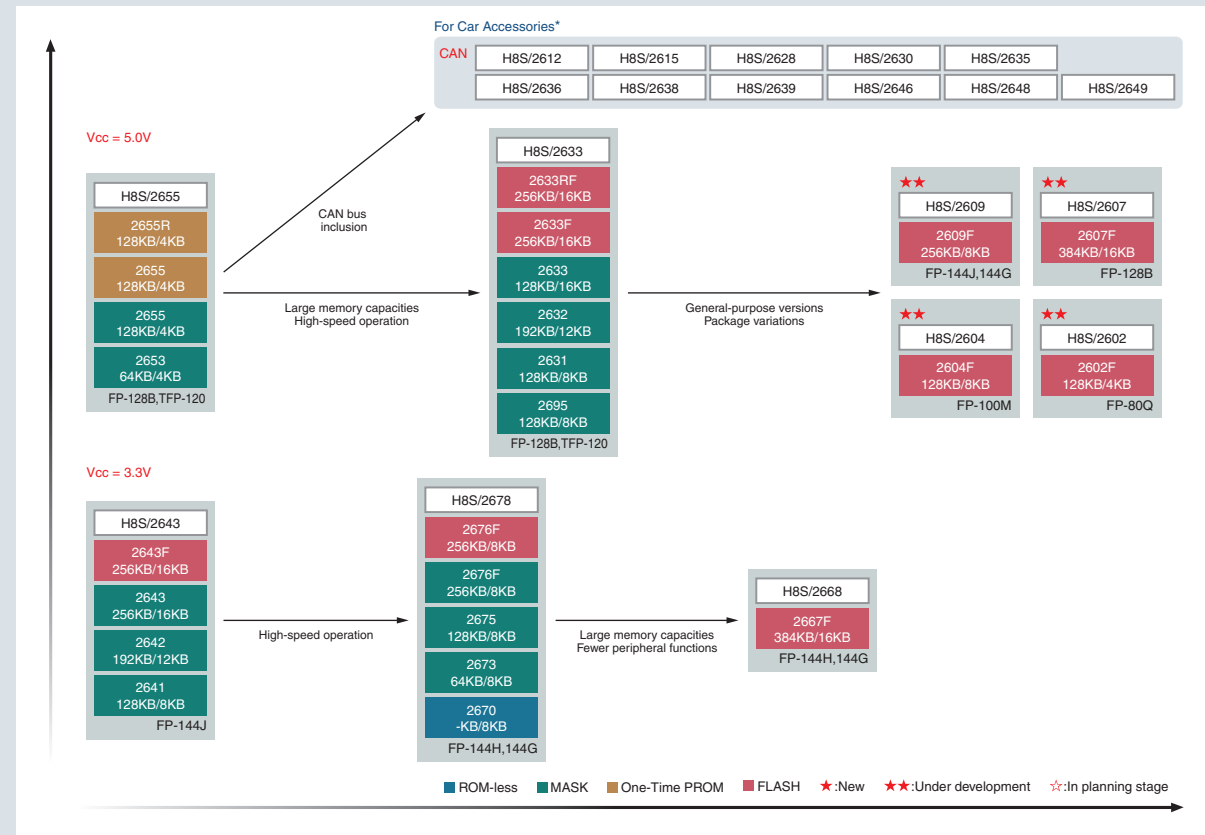
- Built-in 512 KB flash memory
- Built-in I²C bus interface
- A pin voltage of 3.0 or 5.5V can be selected.

■ H8S/2506F Block Diagram



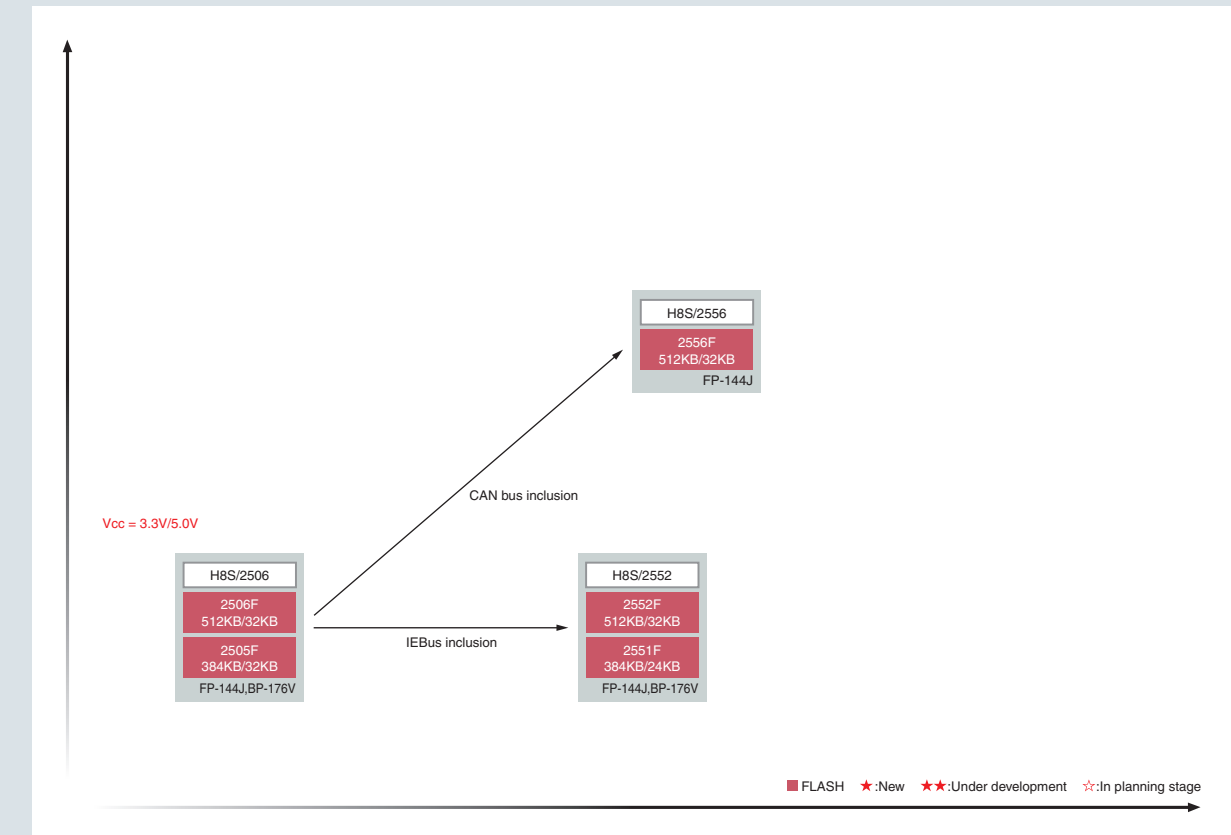
Special functions

■ H8S/2600 Series Product Development Chart



*: See the Renesas Microcomputer Automotive LAN Microcomputer Catalog for details.

■ H8S/2500 Series Product Development Chart



H8S /2400

H8S /2300

New H8S series that provides an extensive set of peripheral functions and a 16-bit multiplier.

Adopts the CPU from the H8S/2600 H8S Family high-end model for powerful arithmetic processing.

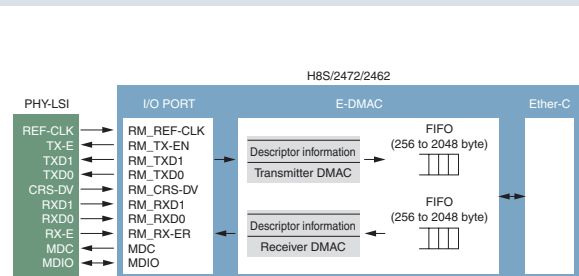
New models with built-in USB and Ethernet functions are under development.

This new series features low-voltage operation (3.3V@34 MHz) and a rich set of low-power modes.

Application Areas

PC peripherals and OA equipment (POS terminals, printers, and USB equipment) and industrial equipment (card readers and wireless equipment)

PHY LSI Connection Example



- Conforms to the Ethernet/IEEE 802.3 MAC layer (Media Access Control) standards.
- Supports both 10 Mbps and 100 Mbps transfers.
- Supports both full and half-duplex modes.
- Supports the IEEE 802.3u standard RMII (Reduced Media Independent Interface).
- Magic packet detection and Wake-On-LAN (WOL) signal output
- Connection to a physical layer LSI (PHY LSI) makes Ethernet/IEEE 802.3 transmission/reception possible.

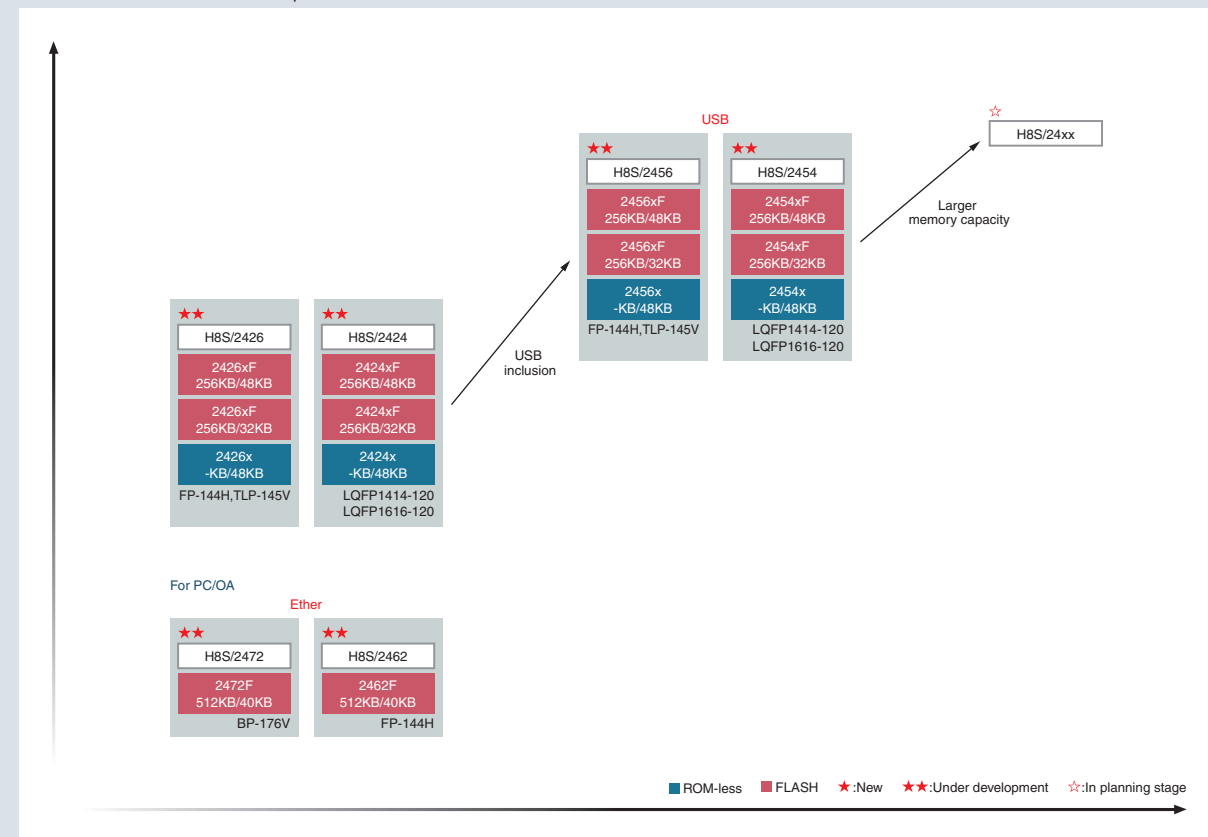
- Built-in multiplier
- Built-in CRC circuit
- Improved communications functions
- USB
- EtherC
- I²C bus: 6 channels
- Synchronous serial communications unit: 1 channel
- SCI with FIFO: 1 channel
- Miniature package
- BP-176V (13mm□)

H8S/2472 Group Block Diagram (under development)

H8S-CPU	Clock oscillator	ROM	RAM
BSC		INTC	
Multiplier		TPU (16-bit timer): 12 channels	
CRC calculation circuit		TMR (8-bit timer): 2 channels	
DTC		14-bit PWM timer: 4 channels	
SCI : 2ch		WDT : 2ch	
SCI with FIFO: 1 channel		I ² C-Bus : 6ch	
Synchronous serial communications unit: 1 channel		EtherC	
A/D 10bit : 8ch		LPC	
Boundary scan		USB	PLL
PLL		I/O port	

Special functions

H8S/2400 Series Product Development Chart



H8S Family standard series that provides optimal support for a wide range of application areas.

This general-purpose series features the world's highest level of 16-bit CPU performance (H8S/2378 group: 28.6 ns at 35 MHz),

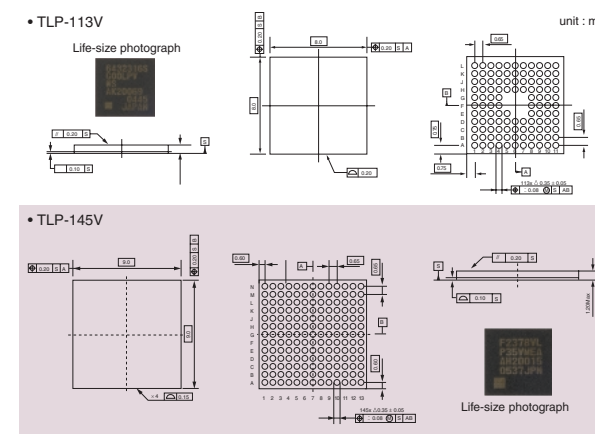
the smallest package in the H8S Family (TLP-112: 8 × 8 mm□), and an extensive memory lineup, from 32 KB/2 KB to 512 KB/32 KB,

and is optimal for a wide range of application areas.

Application Areas

PC peripherals and OA equipment (printers and POS terminals), industrial equipment (card readers and FA control), and consumer products (LCD TVs and electronic musical instruments).

Miniature Packages (8mm□:TLP-113V / 9mm□:TLP-145V)



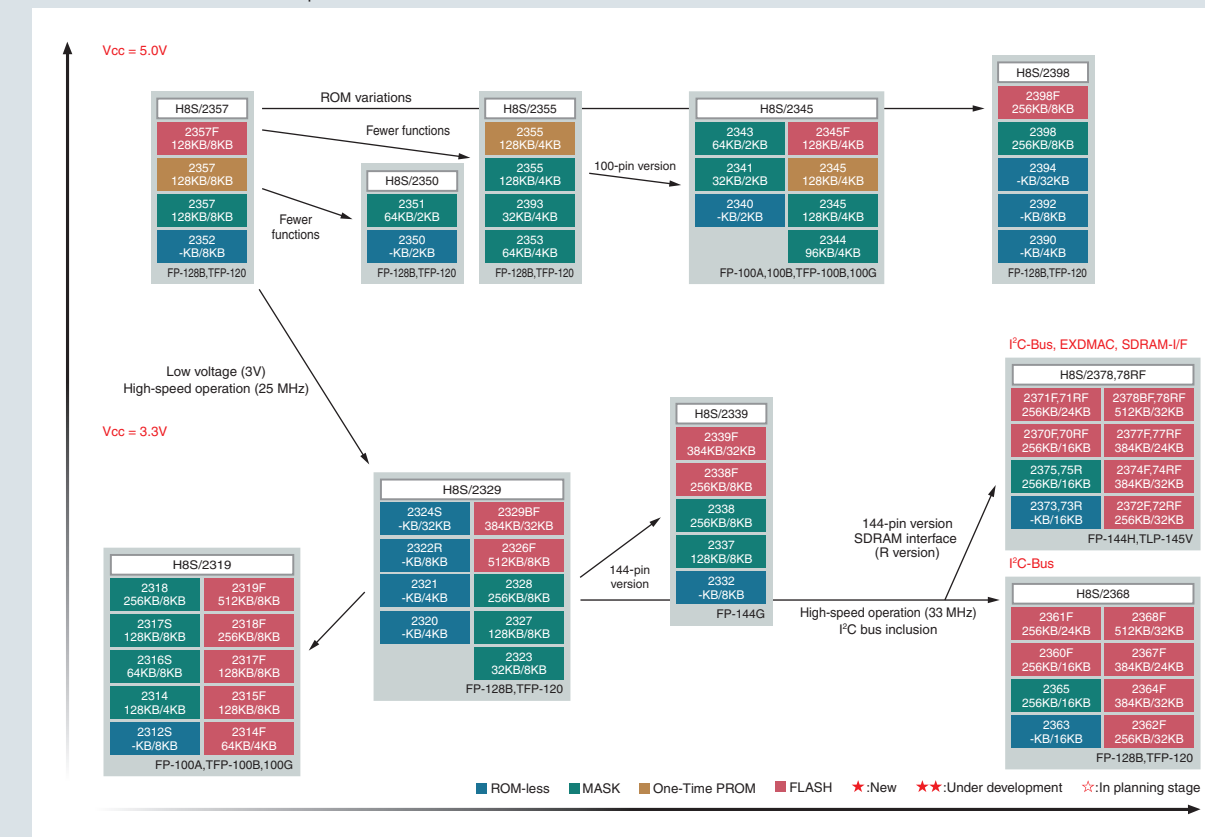
- 3.3V single power supply
- Built-in 384 KB flash memory
- Low-voltage/high-speed operation (35 MHz/3.3V)
- Improved peripheral functions
- Serial interfaces: 5 channels (I²C bus: 2 channels)
- A/D converters: 16 channels, and other units
- Built-in SDRAM interface¹ (H8S/2378R group)
- On-chip debugging functions (with E10A-USB support)
- Miniature package: TLP-145V(9mm□)

Special functions

H8S/2378, 78R Group Block Diagram

H8S-CPU	Clock oscillator	ROM	RAM
BSC (SDRAM-I/F ¹)		INTC	
EXDMAC		TPU (16-bit timer): 6 channels	
DMAC		10-bit PWM timer: 2 channels	
DTC		WDT	
SCI : 5ch		I ² C-Bus : 2ch	
A/D 10bit : 16ch		PPG	
D/A 8bit : 6ch		PLL	
H-UDI ^{1,2}		I/O port	

H8S/2300 Series Product Development Chart



H8S /2200

H8S series that aims for low power consumption by including a 32 kHz oscillator.

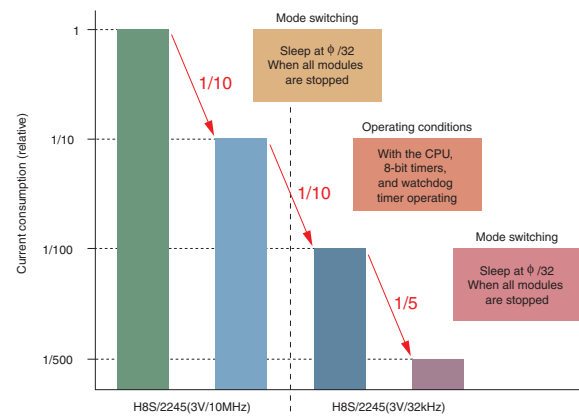
In addition to versions with a lowest guaranteed operating voltage of 2.2V, this series also features powerful communications functions (SCI: 4 channels, I²C bus: 2 channels, IEBus, high-speed SCI, and USB 2.0).

This is a microcomputer series that aims for low power consumption by providing a 32 kHz oscillator.

Application Areas

PC peripherals and OA equipment (POS terminals, printers, and USB equipment), industrial equipment (card readers and wireless equipment), and consumer products (electronic health-related product)

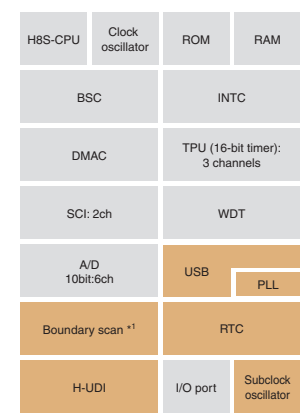
H8S/2200 Series Low Power Modes



- Built-in high-speed SCI, DMAC, and DTC
- Built-in USB interface
- Flash memory can be programmed over a USB connection.
- On-chip debugging functions (with E10A USB support)
- Miniature packages
BP-112 (10mm □)
TBP-112A (10mm □)

*1: Flash memory versions only
Special functions

H8S/2218 Group Block Diagram



H8S /2100

16-bit MCU series that inherits the peripheral functions of the H8/300 8-bit microcomputers.

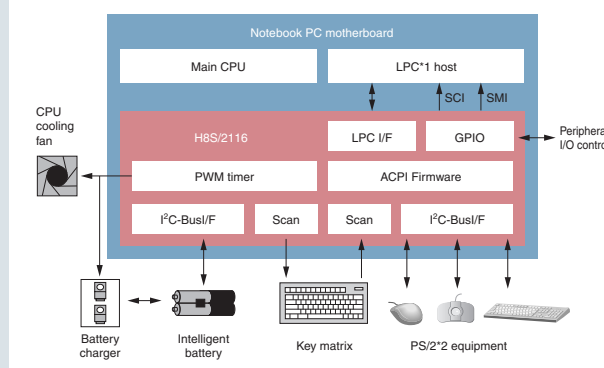
These devices maintain the same pin arrangements as the H8/300 Series to allow smooth replacement and include a wide range of PC-related peripheral functions, such as I²C bus, keyboard buffer controller, ISA bus, and LPC units.

This series also features an extensive set of memory options (ROM: 32 KB to 1 MB, RAM: 2 KB to 40 KB).

Application Areas

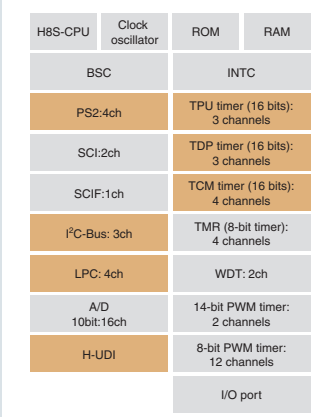
PC peripherals and OA equipment (PC servers, keyboard controllers, and battery control) and industrial equipment (card readers and meters).

Notebook PC Keyboard/Battery Control System Structure Example



*1: LPC: Low pin count. A new PC internal bus proposed by Intel.
*2: PS/2 is a trademark of International Business Machines, Inc.

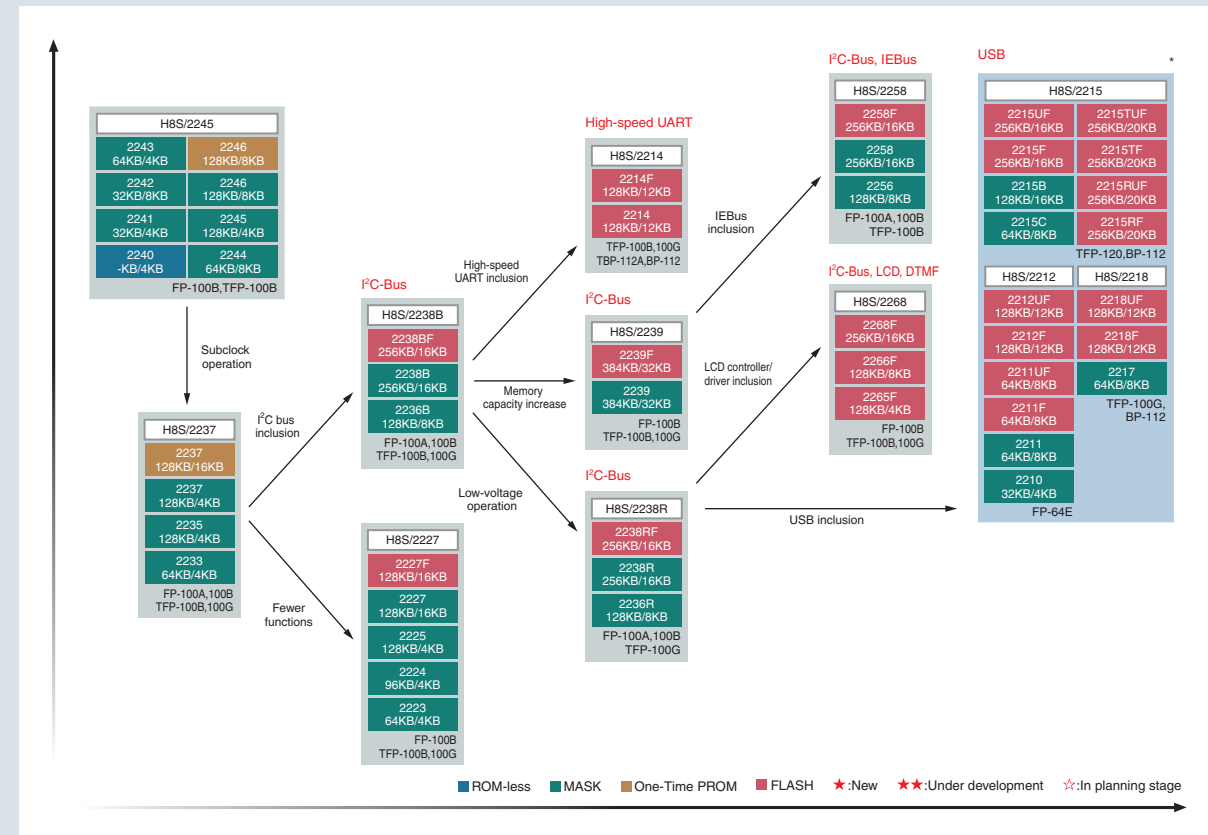
H8S/2117 Group Block Diagram



- 3.3V single power supply
- On-chip flash memory: 160 KB
- Built-in LPC interface
- Built-in I²C bus interface
- Built-in PS/2 interface
- Improved timer functions
- On-chip debugging functions (with E10A USB support)

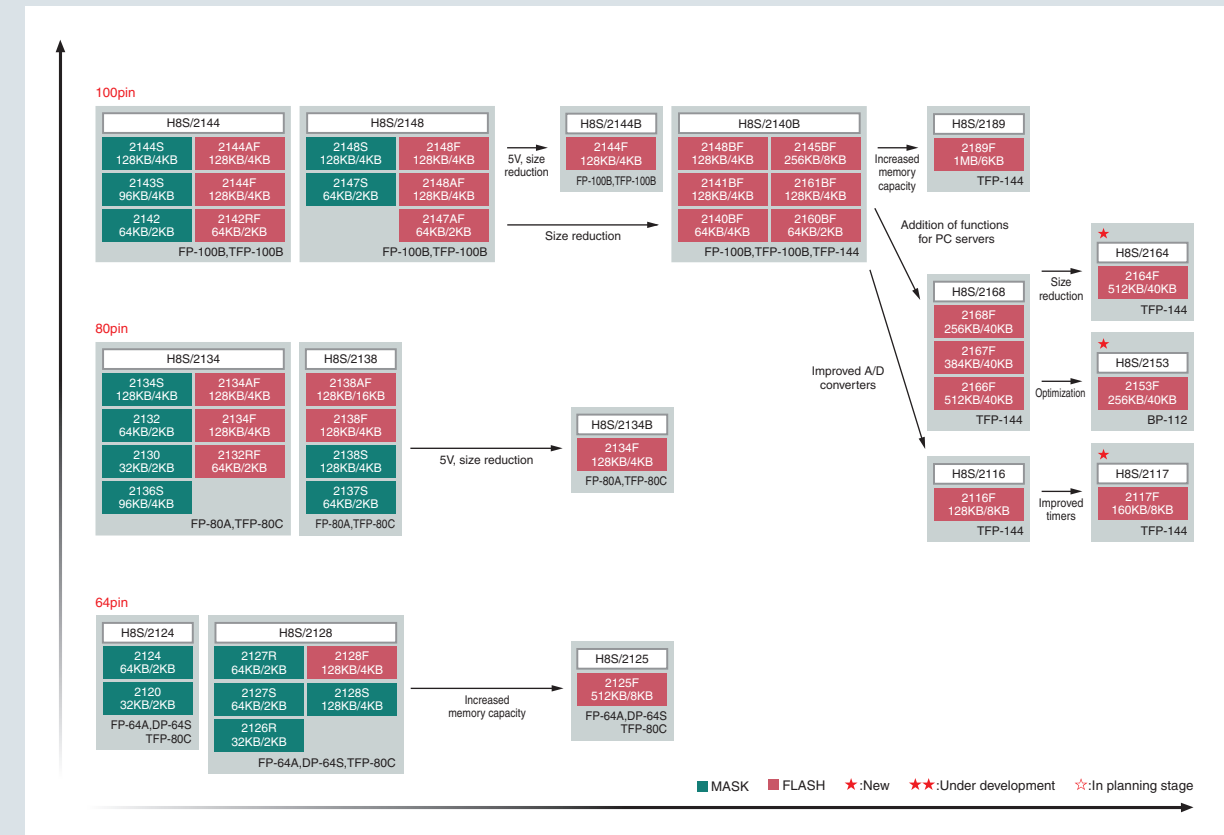
Special functions

H8S/2200 Series Product Development Chart



*: See the Renesas USB Device Catalog for details.

H8S/2100 Series Product Development Chart

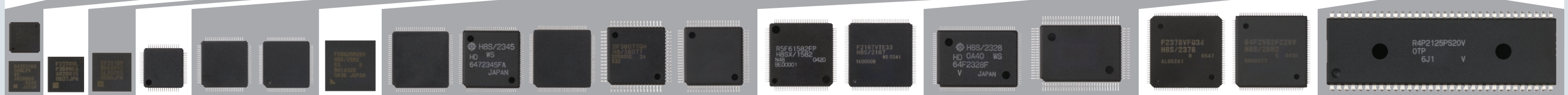


H8S/2200 - H8S/2100

Products

H8S Family and H8SX Family Selection by Package

Family	Series	Package Options																				Series	Family																														
		8mm × 8mm					9mm × 9mm					10mm × 10mm					12mm × 12mm							13mm × 13mm					14mm × 14mm					16mm × 16mm					14mm × 20mm					20mm × 20mm					17mm × 57.6mm				
		PVQ0064LB-A	PTLG0113JA-A	PTLG0145JB-A	PLBG0112GA-A TTBG0112GA-A	PLOP0064KC-A	PTQP0080KC-A	PTQP0100LC-A	PLBG0176GA-A	PTQP0100KA-A	PRQP0100KA-A PRQP0100KB-A	PTQP0120LA-A	PRQP0064GB-A	PRQP0080JB-A PRQP0080JD-A	PLOP0120LA-A	PTQP0144LC-A	PRQP0128KB-A	PRQP0100JE-B	PLOP0144KC-A PLOP0144KA-A	PRQP0144KA-A PRQP0144KB-A	PRD0064BB-A																																
H8SX Family	H8SX1600 Series	TNP-64B	TLP-113V	TLP-145V	BP-112 TBP-112A	FP-64E	TFP-80C	TFP-100G	BP-176V	TFP-100B	TFP-120	FP-64A	FP-80A FP-80Q	FP-120B	TFP-144	FP-128B	FP-100A	FP-144G FP-144J	FP-144G FP-144J	DP-64S	H8SX1600 Series	H8SX Family																															
	H8SX1500 Series																				H8SX1500 Series	H8SX Family																															
	H8S/2600 Series																				H8S/2600 Series	H8S Family																															
	H8S/2500 Series																				H8S/2500 Series	H8S Family																															
	H8S/2400 Series																				H8S/2400 Series	H8S Family																															
H8S Family	H8S/2300 Series																				H8S/2300 Series	H8S Family																															
	H8S/2200 Series																				H8S/2200 Series	H8S Family																															
H8S Family	H8S/2100 Series																				H8S/2100 Series	H8S Family																															
	H8S/2000 Series																				H8S/2000 Series	H8S Family																															



Life-size package photographs

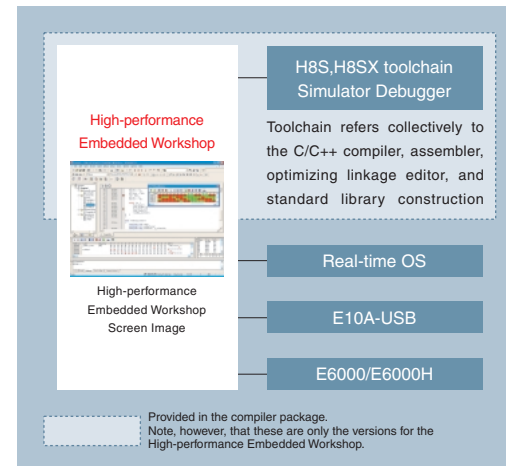
Powerful development environment makes it possible to take maximum advantage of the H8SX and H8S MCU performance.

Integrated Development Environment

High-Performance Embedded Workshop

This integrated development environment provides the tools needed for application development, including compilers and debuggers (emulator software) and implements the development process from coding through evaluation and verification in a single application.

- Automatic generation of startup programs for each MCU
- Integration and unified management of tools from editor through debugger
- Automatic execution of the compile, assemble, and link sequence
- Source file management in project units
- Windows based easy-to-use GUI
- Registration and startup of external tools
- Network environment project management
- Macro generation support functions: test support functions
- Latest information provided over the internet (network update function for the software tools, document update function)
- Flexible expansion functions that match the environment used (unique GUI environment construction using TCL/TK version 8.4.1, simple connection with external tools using a target server function (COM))
- Collaboration with partner vendors (Linking with CASE tools, linking with version control tools)



E10A-USB

H8S/H8SX Family E10A-USB Emulator

Ease of use is improved significantly by adopting USB (full speed) as the PC interface.

The hardware is common, and can support multiple debugging platforms. The High-performance Embedded Workshop is adopted as the emulator/debugger, and program construction, building, and debugging are supported in a single window.

- OCD emulator with superb cost-performance characteristics
- Achieves real-time emulation at the CPU's highest operating frequency.

*: Only supports MCUs with on-chip debugging functions.



Compilers

H8SX, H8S, and H8 Family C/C++ Compiler Package

These compilers include an optimization function that generates compact code while eliciting the maximum possible performance from the MCU.

- Support for H8SX, H8S, and H8 Family CPUs
- Support for ANSI/ISO standard C and C++
- ROM capacity is reduced and execution speed improved by the latest optimization technologies and an extensive set of optimization options.
- Provision of an extensive set of embedded functions and extended functions to take advantage of the special functions provided by the MCU used.
- Simulator/debugger for efficient debugging of programs created in either C/C++ or assembler

E6000/E6000H

H8S/H8SX Family Full-Spec Emulators: E6000/E6000H

The E6000/E6000H full-spec emulators implement real-time emulation at the CPU's top operating frequency. User programs can be debugged using a mouse and GUI with the High-performance Embedded Workshop. Rapid downloading of load module files is also supported.

- Powerful debugging functions (including trace, RAM monitor, conditional break and trace, and performance analysis)
- Source level debugging of C/C++ programs

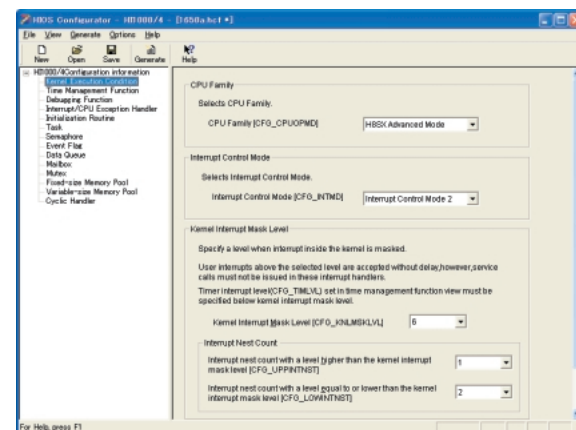


Real-Time OS

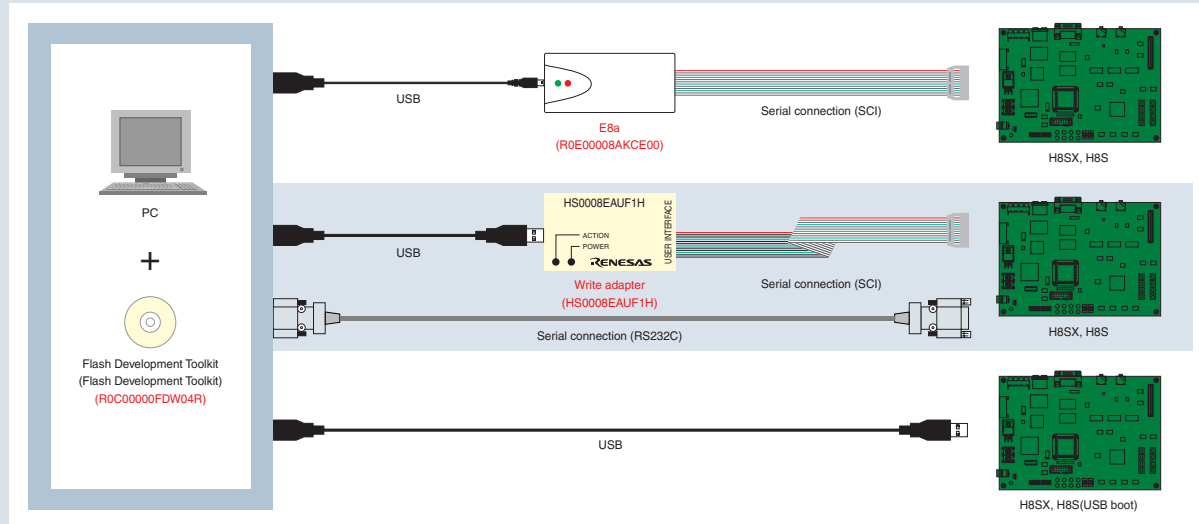
This OS allows large-scale complex applications to be implemented simply and with real time control. It also reduces program development times and promotes reusability and maintainability.

- Conforms to the μ ITRON 4.0 standard*
- Superlative real-time characteristics (interrupt response time and task switching time)
- A configurator is provided
- Extensive set of OS debugging functions provided by embedding the Renesas debugger.

*: The copyrights to the μ ITRON specifications are held by the TRON Association. TRON, ITRON, and μ ITRON are names of specifications, and are not names of any specific product or groups of products.



Renesas Flash Memory Programming Environment



Onboard Programmers

Onboard programmer	URL
Renasant Technology Corp. <ul style="list-style-type: none"> E8a adapter board Programming software 	http://www.renesas.com/flash_programming_tools
Hokuto Denshi Co., Ltd. <ul style="list-style-type: none"> Flash2 Flash Mate5V1 FM-ONE 	http://www.hokutodenshi.co.jp/
Yokogawa Digital Computer Corporation <ul style="list-style-type: none"> MegaNETIMPRESS C'anNETIMPRESS G-NETIMPRESS 	http://www.yokogawa-digital.com/en/

PROM Programmers

PROM Programmer Manufacturer	URL
Wave Technology Inc. <ul style="list-style-type: none"> Y3000-8 	http://www.y1000.com/english/
Data I/O Corporation <ul style="list-style-type: none"> FLX500 FlashPAKII Optima Dual Octal Plus48 	http://www.dataio.com/
Hi-Lo Systems Co., Ltd. <ul style="list-style-type: none"> ALL-100Family 	http://www.hilosystems.com.tw/
Flash Support Group, Inc. <ul style="list-style-type: none"> AF9710 AF9723 	http://www.j-fsg.co.jp/e/shop/index.html
Hokuto Denshi Co., Ltd. <ul style="list-style-type: none"> PROM401F 	http://www.hokutodenshi.co.jp/
Minato Electronics, Inc. <ul style="list-style-type: none"> M1940 M1896 M1895 M1895/2 M1881UXP 	http://www.minato.co.jp/index_e.html

If a PROM programmer is used, the appropriate socket adapter must be purchased separately for each MCU used. See the "Renesas Development Environment Products List (Renesas and partner vendor products)", which is a separate document, for details.

*: Company names are listed in Japanese alphabetic order.

Renesas Software and Tools Web Page <http://www.renesas.com/tools>

This page provides detailed functional overviews of the development tools, trial versions of the software, and other information. It also provides the latest information in a timely manner.

- Application Notes**: This link displays a page containing application examples and sample program listings.
- FAQs**: This link displays a page providing answers to questions about the main Renesas tool products in Q&A format.
- Downloads (Upgrades and sample programs)**: This link displays a page where customers who have purchased software tools can download upgrades free of charge.
- Technical Updates**: This link displays a page containing important usage information on Renesas MCUs and tools.
- Tool News**: This link displays the latest information on Renesas tools, updated twice a month.
- Evaluation Software**: Evaluation versions of software are provided free of charge to enable customers to assess product functions and performance.
- Product Information**: These links display pages containing datasheets providing overviews, features, and functions of the main Renesas tool products.
- Accessory Information**: This link displays a page with information such as patterns for connecting emulators and user systems and details of accessories used to make connections.

Partner Information

Alliance Search
Search alliance partners in your region.

Americas
<http://america.renesas.com/alliance>

Europe
<http://eu.renesas.com/alliance>

Japan
<http://japan.renesas.com/alliance>

Alliance Partner Program
The Alliance program provides online tools to increase the synergy between our Customers, 3rd Party Partners, and Renesas.

Customers can search our online database to quickly find qualified Design Consultants, Programming Houses, 3rd Party Development Tools, and Manufacturing Companies that provide services or products that support Renesas products and customers.

Web Site Introduction

The Renesas web site provides comprehensive support for our customers' development efforts.

H8S Family <http://www.renesas.com/en/h8s> H8SX Family <http://www.renesas.com/en/h8sx>

■ Display limited to related information

Technical Updates

This section provides usage notes, additional information for the documentation, and other information in .PDF format.

Documents

Manuals, datasheets, catalogs, and other documents can be downloaded in .PDF format.

Application Notes

These provide information on the use of internal peripheral functions and application technologies in .PDF format.

Frequently Asked Questions

This section presents questions and their answers in a Q&A format.

Series Page

This section presents outlines of the specifications of the different series and the group deployment.

Group Page

This section presents details specifications for each group, and lists of models. You can find sample programs, oscillator circuit constants for reference purposes, and other information here.

Search

Diverse search functions are provided for your use.
 Model name search: Detailed specifications can be verified for specific models.
 Function/feature search: This function is useful for finding products that match desired specifications.

Inquiries

Renesas accepts technical questions from this section. We also accept inquiries by email.
 Email : csc@renesas.com

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