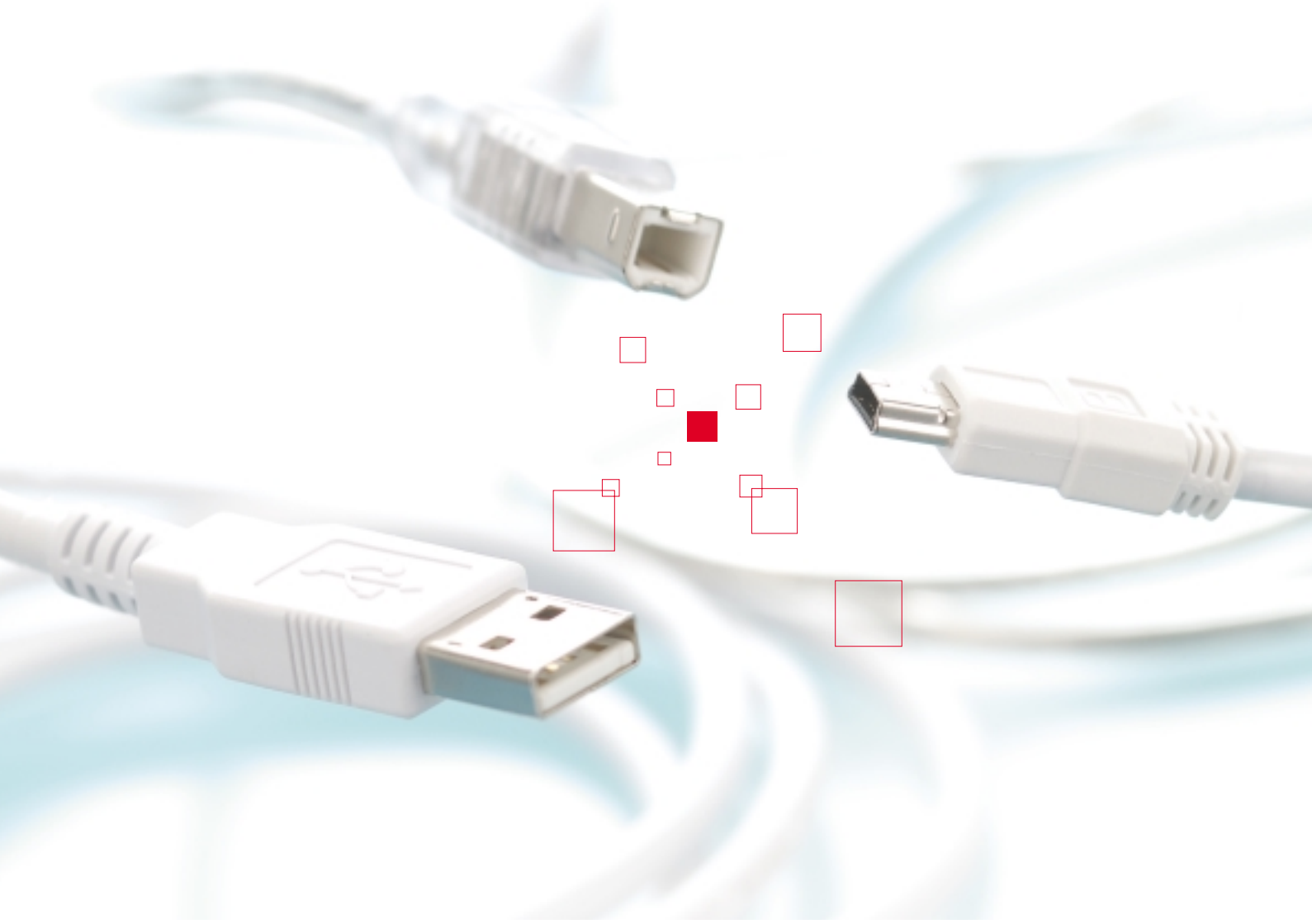
2007.10

Everywhere you imagine. RENESAS

Renesas USB Device



Renesas Technology
www.renesas.com

RENESAS USB Devices

Hub

Hub

Hub

Hub

Ricoh Company, Ltd.
Digital Camera (GR DIGITAL)
using M66592

Hitachi-Omron Terminal Solutions, Corp.
Finger Vein Authentication device
using M66291

Sony Corporation
IC Recorder (ICD-SX77/66)
using M66592

Pioneer Corporation
Plasma TV
(North America:PDP-5010FD, Europe:PDP-LX508D)
using M66596

Brother Industries, Ltd.
Sewing & Embroidery (Innovis4000)
using SH7727

Roland Corporation
Audio Capture (UA-101)
using M66592

Roland Corporation
Synthesizer (V-Synth GT)
using R8A66597

Sony Corporation
Visual IC Recorder (ICD-CX50)
using M66592

OLYMPUS Imaging Corp.
Digital Camera (E-1)
using M66591

Fostex Company
Digital Multitracker (MR-8HD)
using M66592

OLYMPUS Imaging Corp.
IC Recorder (WS-331M)
using M66592

Sony Corporation
IC Recorder (ICD-ST40)
using M66291

WACOM Co., Ltd.
Interactive Pen Display(Cintiq)
using M30245

Sony Corporation
Linear PCM Recorder (PCM-D1)
using M66592

Sony Corporation
Stereo IC Recorder
(ICD-SX77/67)
using M66592

Tohoku Ricoh Co., Ltd.
Barcode Label Printer
(Marvelio® TP4030)
using M66592

Fuji Photo Film Co., Ltd.
Digital Camera FinePix S7000
using M66591

Brother Industries, Ltd.
Sewing & Embroidery (PR600II)
using SH7727

Roland Corporation
Digital Ground (RG-7-R)
using SH7727

Mitsubishi Electric Corporation
Fingerprint matching
processor (DTLmk4)
using M30245

OLYMPUS Imaging Corp.
IC Recorder (DS-50)
using M66592

Roland Corporation
Sampling Workstation
(MC-808)
using M66291

OLYMPUS Imaging Corp.
Digital Camera (μ-10 DIGITAL)
using M66291

Hitachi, Ltd.
HDD/DVD Hybrid Camcorder(DZ-HS500)
using M66592

Fuji Photo Film Co., Ltd.
Digital Camera FinePix F710
using M66591

HORI Co., Ltd.
Controller for Xbox
(FIGHTING STICK EX)
using 38K2

Sony Corporation
Fingerprint Identity
Token "PUPPY"
FIU-850-N03, 860-N03
using M66592

Ricoh Company, Ltd.
Digital Camera (Caplio 500Gwide)
using M66592

USB advances to a new stage!

The USB specification established to connect the PC peripheral equipment is currently used for a number of different products in various scenarios, such as office equipment, mobile devices, AudioVideo equipment, and industrial equipment.
For topical On-The-Go, Embedded Host, and advanced wireless USB—
Renesas continues to provide you with the ideal USB devices to meet customer needs.

Various USB device expansions and superior development environments strongly supports customer's product development.

Full product lineup

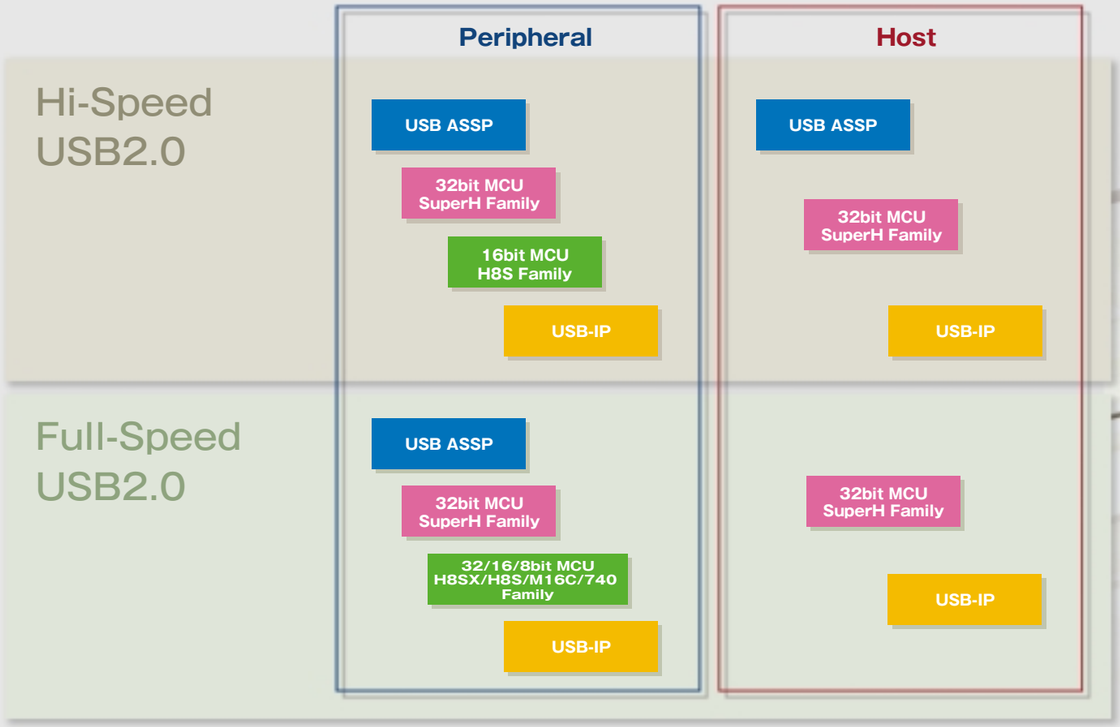
Renesas USB product lineup has expanded to wireless USB devices in addition to USB microcomputers and USB ASSPs.

System proposition

Renesas USB also creates an original IP library and we can offer suitable system to our customers.

Development support

We prepare F/W for all devices. In addition, with strong alliances among various partner vendors, we can provide excellent support for customers during development of their USB systems.



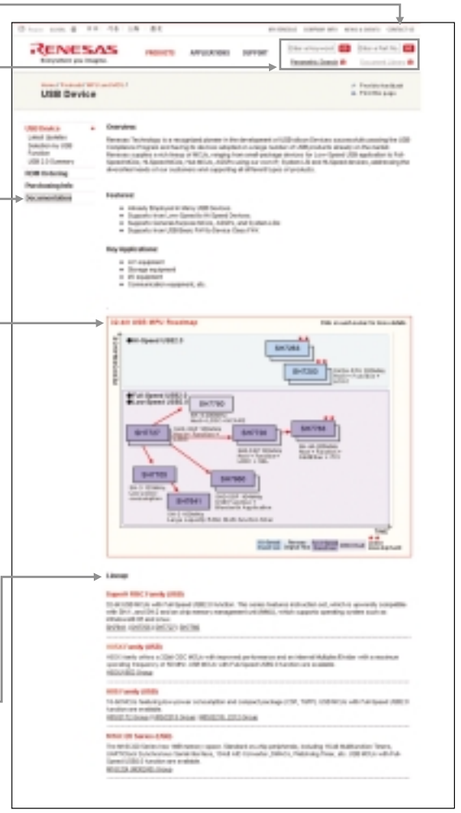
Various Renesas USB device

Renesas USB device Website

http://www.renesas.com/en/usb

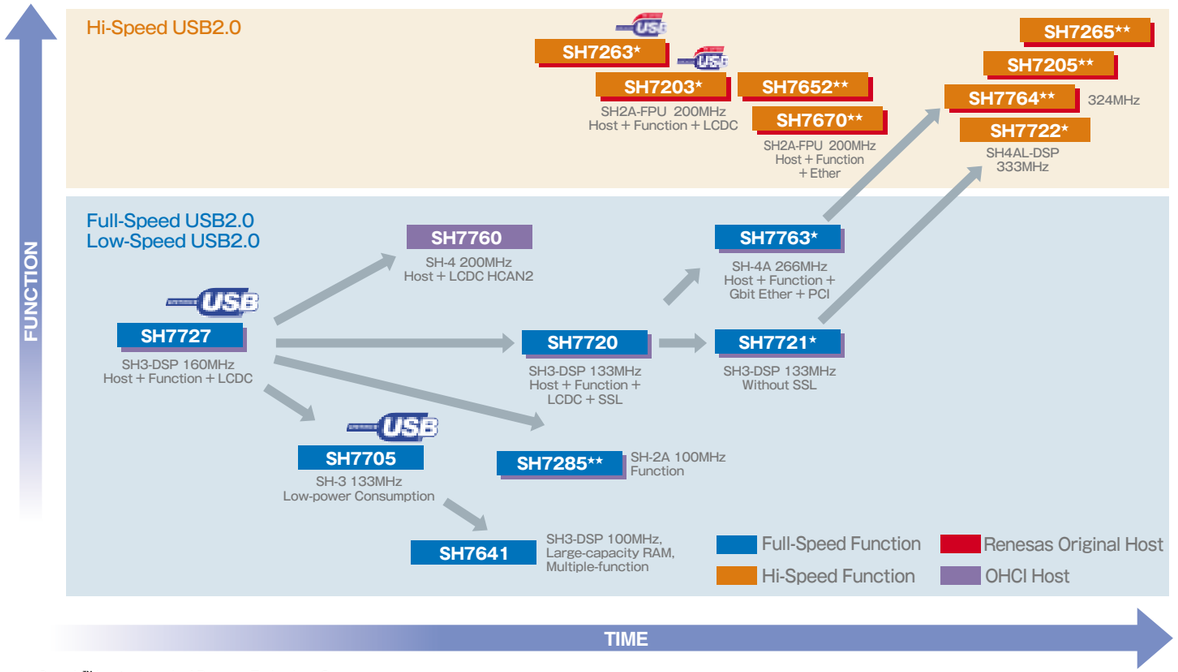
Renesas USB device Website provides you with the latest technical information, which is useful to customers in selecting the right Renesas USB device or developing their system in a time-efficient manner.

Contact	Please use this contact information for technical inquiries, etc.
Various searches	Please use the various search functions.
Document download	The hardware manual, the software manual, etc., are available for download.
Product expansion	Information regarding each device can be accessed from the expansion plan, too.
Lineup	Relevant documents, such as application notes, etc., in addition to the product specifications of each device, are also available for downloading.



USB MPU Road Map SuperH ™*1 Family

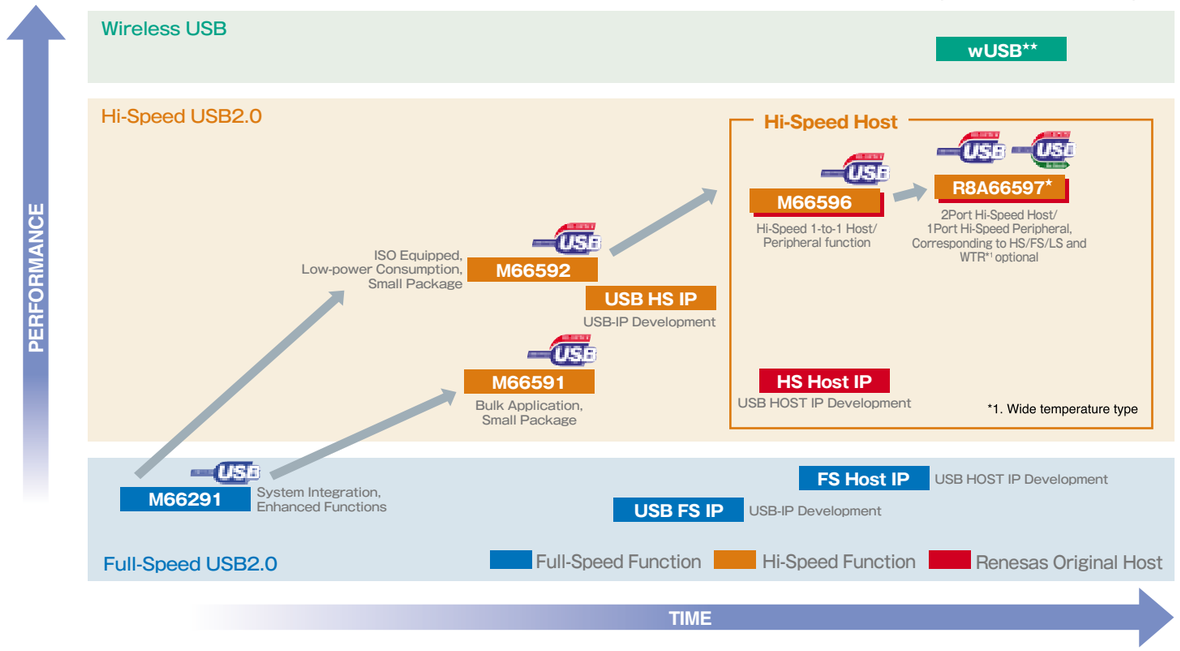
★:New product ★★:Under development



*1: SuperH™ is a trademark of Renesas Technology Corp.

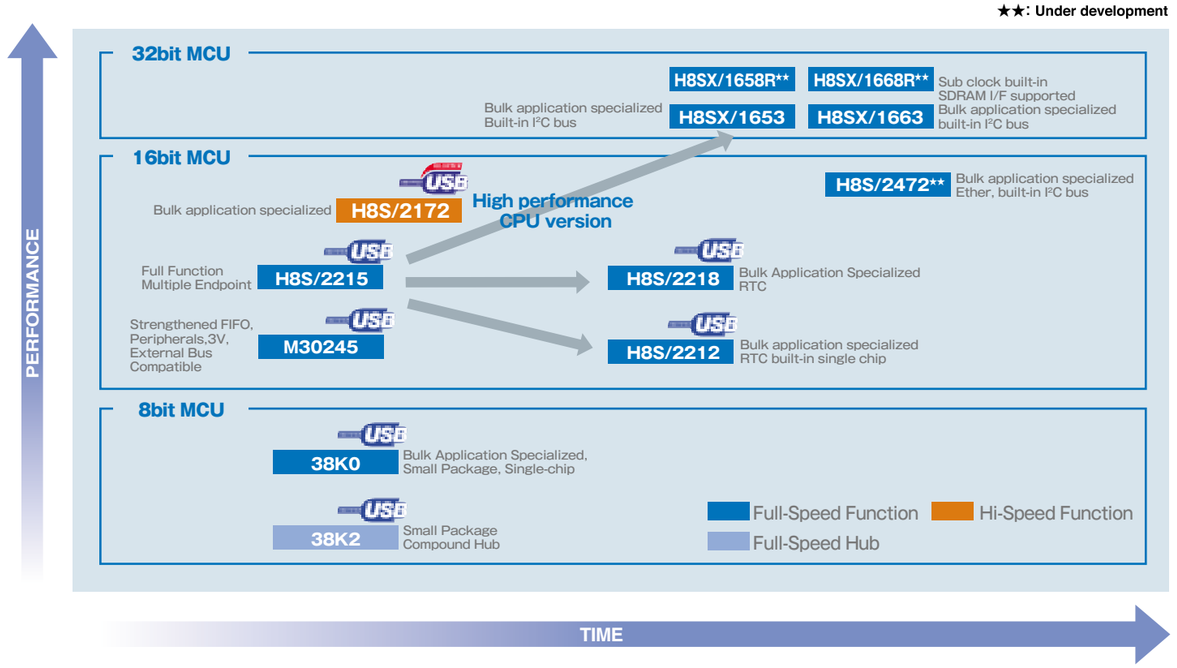
USB ASSP Road Map

★:New product ★★:Under development



USB MCU Road Map (M16C, H8SX, H8S, 740 Family)

★★: Under development



Selection Map

■USB ASSP

★:New product

	Package	Operation Voltage (V)	Operating Temperature (°C)	DMA interface	Other Functions		USB Function						Application
					PLL		spec	Speed	Transfer type	Endpoints	Data Buffer	Other Functions	
R8A66597*	80-pin LQFP 81-pin LFBGA	Power Source 3.0 to 3.6、 I/O 1.6 to 2.0/ 2.7 to 3.6	−20 to 85 −40 to 85*1	2ch	Frequency multiplying circuit	16-bit CPU bus interface (For address/data bus, there are separate type and multiplex type options) 8-bit split bus interface	USB2.0	Host or Function *2 Hi-Speed/ Full-Speed/ Low-Speed (Host only)	Control,Interrupt,Bulk, Isochronous	10pipes (Endpoints)	Built-in FIFO (Total 8.5K bytes)*3 (Max 2048 bytes)*4	Built in USB Pull-down Resistor（In Host Mode）, Built in USB Pull-up Resistor（In Peripheral Mode）	USB Output Resistor （In Full-Speed） Built in USB Termination Resistor （In Hi-Speed）	Vbus Detector	DVD recorder, Mobile infomation terminai, Set top box, Audio equipment, DSC, DVC Printer, Storage equipment
M66596	64-pin LQFP 64-pin FBGA 64-pin VFBGA	Power Source 1：1.35 to 1.65, Power Source 2：3.0 to 3.6、 I/O 1.6 to 2.0/ 2.7 to 3.6	−20 to 85					Host or Function*2 Hi-Speed/ Full-Speed		8pipes (Endpoints)	Built-in FIFO (Total 5K bytes)*3 (Max 2048 bytes)*4				
M66592								Hi-Speed/ Full-Speed				Built in USB Pull-up Resistor			Musical instrument, Printer, Scanner, Modem, Portable phone, DVC, DSC, other PC peripheral devices
M66591	80-pin LQFP	Power Source 3.3 to 3.6、 I/O 1.7 to 2.0/ 2.7 to 3.6		1ch					Control,Interrupt,Bulk	7pipes (Endpoints)	Built-in FIFO (Total 3.5KByte)*3 (Max 512Byte)*4	USB Pull-up Power Output Pin Power Management Output Pin	–		
M66291	48-pin LQFP 52-pin VQFN	Power Source 3.3 to 3.6、 I/O 2.7 to 3.6/ 4.5 to 5.5	−20 to 85	2ch		8/16-bit CPU bus interface		Full-Speed	Control,Interrupt,Bulk, Isochronous	7Endpoints	Built-in FIFO (Total 3KByte)*3 (Max 1024Byte)*4	USB Pull-up Power Output Pin			

*1: Wide temperature type *2: Exclusive use for Host and Function *3: Total number of built-in FIFO *4: Maximum number of bytes allowing transmissions to and from just one endpoint. Using the double buffer mode doubles transmission capability.

■USB MCUs

★:New product ★★:Under development

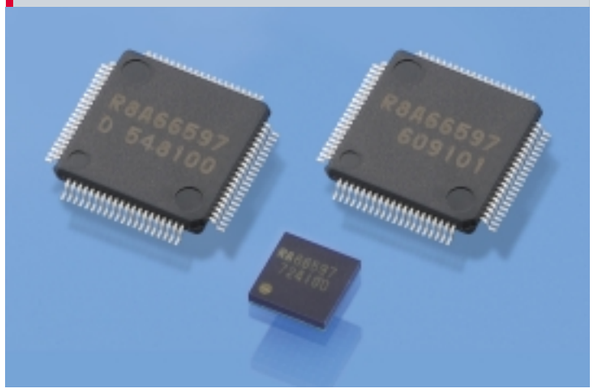
	Group	Package	Operation Voltage (V)	Operating Temperature (°C)	DMA interface	Other Functions		USB Function						Application
						I/O Ports		spec	Speed	Transfer type	Endpoints	Data Buffer	Other Functions	
32bit	SH7722*	449-pin BGA	1.15 to 1.3V(266MHz), 1.25 to 1.35V(333MHz)/ 3.0 to 3.6V(I/O)	−20 to 70/ −40 to 85	USB function DMAC x 6ch	149	H.264/MPEG4 codec JPEG codec LCDC, NAND Flash I/F camera I/F, IIC, SCIF	USB2.0	Hi-Speed Function	Control,Interrupt,Bulk, Isochronous	8Endpoints	FIFO 4KByte Double buffer	With USB Pull-up Control Terminal	Vbus Detector	One-segment navigation Portable navigation Portable multimedia, player Camera applicable equipment
	SH7203* SH7263*	240-pin QFP	1.1 to 1.3/ 3.0 to 3.6(I/O)	−20 to 85/ −40 to 85	USB function DMACx8ch	99	LCDC NAND Flash Interface I²C Bus, CAN		Hi-Speed Host or Function*5			FIFO 8KByte Double buffer Host-shared memory: SRAM, SDRAM			Audio Equipment Car Audio Equipment Industrial Equipment
	SH7763*	449-pin BGA	1.1 to 1.3/ 3.0 to 3.6(I/O) 2.3 to 2.7(DDR)	−20 to 75	USB Host DMACx6ch	107	Giga Ethernet Controller PCI Bus Controller LCDC, Security Accelerator, MMCIF, RTC, IrDA, I²C Bus		Full-Speed Function & OHCI Host		Host:127Endpoints Function:6Endpoints	FIFO 544Byte Double buffer Host-shared memory: XY RAM space			Network Equipment IT Terminal Digital Appliance
	SH7705	208-pin LQFP 208-pin CSP	1.4 to 1.6/ 3.0 to 3.6(I/O)		DMACx4ch	105	RTC、IrDA		Full-Speed	Control Interrupt,Bulk	4Endpoints	FIFO 288Byte Double buffer	USB pull-up control is a general purpose I/O		DSC,DVC, Printer,FAX
	SH7727	240-pin HQFP 240-pin CSP	1.75 to 2.05/ 3.6(I/O)(160MHz)		USB Host DMACx4ch	104	DSP, LCDC, Built-in RTC		Full-Speed Function & OHCI Host	Control,Interrupt,Bulk (Isochronous:Host only)	Host:127Endpoints Function:4Endpoints	FIFO 288Byte Double buffer Host-shared memory : SDRAM space	With USB Pull-up Control Terminal		FAX, Printer, DSC, AV equipment terminal
	SH7641	256ピンLFBGA	1.7 to 1.9/ 3.0 to 3.6(I/O)	−40 to 75	DMACx4ch WDT.INTC	164	I²C Bus		Full-Speed	Control,Interrupt,Bulk	4Endpoints	FIFO 288Byte Double buffer			Video, Printer, FA, monitor camera
	SH7720 SH7721*	256-pin CSP(17mm□) 256-pin CSP(11mm□)	1.4 to 1.6/ 3.0 to 3.6(I/O)	−20 to 75	USB Host DMACx6ch	117	DSP, LCDC, SSL Accelarator（SH7720） MMCIF, RTC, IrDA, I²CBus		Full-Speed Function & OHCI Host	Control,Interrupt,Bulk Isochronous	Host:127Endpoints Function:6Endpoints	FIFO 544Byte Double buffer Host-shared memory : SRAM, SDRAM, XY RAMspace			FAX,Printer for DSC, IP-phone, Mobile display terminal
	SH7760	256-pin BGA		−20 to 75/ −40 to 85	USB Host DMACx8ch	70(MAX)	LCDC, I²C Bus Audio interface		OHCI Host		Host:127Endpoints	Host-shared memory : Internal RAM 8Kbyte	–	–	Simple Navigation, FA POS, AV Equipment
	H8SX/1668R**	144-pin LQFP	3.0 to 3.6	−20 to 75 (−40 to 85)*1	EXDMACx4ch DMACx4ch DTC	101	I²C×2ch Bus Interface, PPG SDRAM I/F, Sub-clock circuit E10A compliant		Full-Speed	Control,Interrupt,Bulk	4Endpoints	FIFO Total 288Byte Max 64Byte	With USB Pull-up Control Terminal	Vbus Detector	POS Scanner
	H8SX/1658R**	120-pin LQFP			EXDMACx2ch DMAx4ch DTC	84	I²C×2ch Bus Interface, PPG E10A compliant								POS Scanner
	H8SX/1663	144-pin LQFP			DMACx4ch DTC	101	I²C×2ch Bus Interface, PPG SDRAM I/F, Sub-clock circuit E10A compliant								POS Scanner
	H8SX/1653	120-pin TQFP				84	I²C×2ch Bus Interface, PPG E10A compliant								POS Scanner
16bit	H8S/2172	100-pin TQFP		−20 to 75	DMAx4ch	76	E10A compliant		Hi-Speed Full-Speed			FIFO Hi-Speed Total 1224Byte Max 512Byte Full-Speed Total 328Byte Max 64Byte	–	–	Notebook PC, Memory card reader, other PC peripheral devices
	H8S/2472**	176-pin BGA			DTCx85ch E-DMACx1ch (for Ether net)	128	Ether Net I²Cx6ch, synchronous serial communication x1ch CRC operation circuit Bus interface, E10A supported		Full-Speed			FIFO Total 288Byte Max 64Byte	With USB Pull-up Control Terminal	Vbus Detector	Notebook PC, Memory card reader, PC server, other PC peripheral devices
	H8S/2212	64-pin LQFP 64-pin QFN		−20 to 75 (-40 to 85)*1	DMAx4ch	37	Sub-clock circuit E10A compliant					FIFO Total 456Byte*3 Max 128Byte			Printer, Scanner, other PC peripheral devices
	H8S/2215	120-pin TQFP 112-pin BGA			DMAx4ch DTCx85ch	75	Bus interface			Control,Interrupt,Bulk Isochronous	9Endpoints	FIFO Total 1288Byte*3 Max 265Byte*4			
							Bus interface E10A supported								
	H8S/2218	100-pin TQFP 112-pin BGA			DMAx4ch	69	Bus interface Sub Clock circuit E10A supported			Control,Interrupt,Bulk	4Endpoints	FIFO Total 456Byte*3 Max 128Byte*4			
	M30245	100-pin LQFP		−20 to 85	DMAx4ch	83(8)*2	CRC calculation circuit (2 types) Sub Clock circuit			Control,Interrupt,Bulk Isochronous	9Endpoints	FIFO Total 3.2KByte*3 Max 1024Byte*4	USB Pull-up Power Output Pin		Digital Audio Other PC Peripheral Devices
8bit	38K0	64-pin LQFP (0.5mm pitch/0.8mm pitch)	3.00 to 5.25		–	48(4)*2	Bus Interface				4Endpoints	FIFO Developed in built-in RAM Max 64 Bytes*4		–	Other PC peripheral devices
	38K2					44(4)*2			Full-Speed Hub		2Endpoints(Hub) + 4Endpoints(Function)				

*1: Wide temperature type *2: LED Drive Port *3: Total number of built-in FIFO *4: Maximum number of bytes allowing transmissions to and from just one endpoint. *5: Exclusive use for Host and Function

Hi-Speed Function　Full-Speed Function　OHCI Host　Renesas Original Host

Hi-Speed USB2.0 Host and Function

R8A66597FP/DFP*/BG



The R8A66597 is the USB controller that is the upper model of M66596. It is possible to select either a 2-port host function or a 1-port peripheral function by this model's register settings.
The host function enables the connection of an external HUB (up to one stage*1) and communications for up to 10 devices.
The Embedded Host and the On-The-Go can be easily realized, the function has been expanded. In addition, it is now possible to incorporate a large variety of products thanks to the development of products that can tolerate a wide temperature range. This product is equipped with various functions that reduce the external circuit, so that a smaller external elemental device and space-saved mounting can be enabled.
The peripheral function on this model is compatible with the M66592. In addition, the ultra small 5mm square package (R8A66597BG) offers suitability for mobile device applications. Because the regulator (3.3V → core power supply) is incorporated, it can be operated by 3.3V single power supply.
In addition, the R8A66597 has been developed using Renesas's original USB-IP, and it can be smoothly integrated into an System LSI.

* Wide temperature type

USB Host
USB Hi-Speed (Control,Interrupt,Bulk, Isochronous) ,2port

USB Function
USB Hi-Speed (Control,Interrupt,Bulk, Isochronous)

Maximum Number of Connectable Functions
10 Functions
(Can connect up to 1 step of external HUB*1)

Endpoint
10pipes (Endpoints)

Clock Input Frequency
12/24/48MHz

FIFO
2KByte (MAX)*2
8.5KByte (Total)*3

DMA Interface
2ch

Bus Interface
16-bits CPU Bus I/F,
Separate/Multiplex selectable

Split Bus
8-bits Split Bus I/F

Power Source for USB Pull-up
D+Pull-up
Power Source (Supply Control)

PLL Frequency Multiplier
Built-in

Interrupt Pins
1-pin polarity set, interrupt source can be assigned

Supply Voltage
3.3V Power Supply,
I/O Power Supply

Vbus Detector
USB cable connection/ disconnection detector

Built-in Resistor
D+, D-Termination Resistor
D+, D-Pull-down Resistor (In Host Mode)
D+Pull-up Resistor(In Peripheral Mode)

Low-Power Sleep State
S/W Settable

Package
80-pin QFP
81-pin LFBGA

*1. When connected by the Full-Speed function via the Hi-Speed hub, the payload of 188 bytes or lower will be supported for Isochronous type.
*2. The number of bytes settable for one pipe. The total doubles when using the double buffer mode.
*3. Maximum number of built-in FIFO

R8A66597 ASSP Line-up

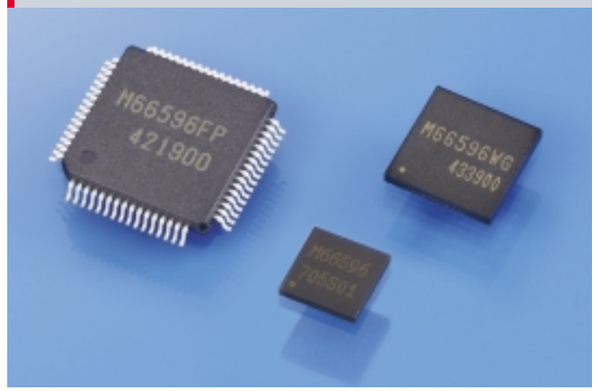
Part Number	Pin	Package	Package Code	Supply Voltage (V)	I/O Voltage (V)	Operating Temperature (°C)	Current Consumption (mA)
R8A66597FP★	80	LQFP	PLQP0080LA-A	3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:70 FS:25
R8A66597DFP*★	80	LQFP	PLQP0080LA-A	3.3	1.6 to 2.0/2.7 to 3.6	−40 to 85*	HS:70 FS:25
R8A66597BG★★	81	LFBGA	PLBG0081KA-A	3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:70 FS:25

* : Wide temperature type ★: New product ★★: Under development

Development/Evaluation Products
●M3A-0040: R8A66597FP Utility Board ●M3A-ZA53: Converter Board for USB ASSP Utility Board
●M3A-0033: Renesas USB ASSP Evaluation Motherboard
Please see P35 for details.

Hi-Speed USB2.0 Host and Function

M66596FP/WG/UG



The M66596 is a USB controller conforming to USB2.0 specifications that are suitable for embedding applications.
During register setup, the Host and Function or peripheral function can be selected. The supported transfer speeds are Hi-Speed transfer and Full-Speed transfer, and one-to-one Hi-Speed transfer with USB peripheral occurs when the USB Host and Function is selected.
The Embedded Host can be easily realized.
The full lineup of functions reduces the number of external circuits and is also equipped to enable a reduction in external elements and allow space-saving mounting. In addition to lowering power consumption, the ultra small 5mm square package (M66596UG) is suitable for mobile device applications. The M66596 is pin-compatible with USB peripheral controller M66592 and, consequently, expansion from a USB peripheral device to a USB Host device is made simple.
In addition, the M66596 has been developed using Renesas's original USB-IP, and it can be smoothly integrated into an System LSI.

USB Host
USB Hi-Speed (Control,Interrupt,Bulk, Isochronous)

USB Function
USB Hi-Speed (Control,Interrupt,Bulk, Isochronous)

Maximum Number of Connectable Functions
1 Function

Endpoint
8pipes (Endpoints)

Clock Input Frequency
12/24/48MHz

FIFO
2KByte (MAX) *1
5KByte (Total) *2

DMA Interface
2ch

Bus Interface
16-bits CPU Bus I/F,
Separate/Multiplex selectable

Split Bus
8-bits Split Bus I/F

Power Source for USB Pull-up
D+Pull-up
Power Source (Supply Control)

PLL Frequency Multiplier
Built-in

Interrupt Pins
1-pin polarity set, interrupt source can be assigned

Supply Voltage
1.5V,3.3V Power Supply,
I/O Power Supply

Vbus Detector
USB cable connection/ disconnection detector

Built-in Resistor
D+, D-Termination Resistor
D+, D-Pull-down Resistor (In Host Mode)
D+Pull-up Resistor(In Peripheral Mode)

Low-Power Sleep State
S/W Settable

Package
64-pin LQFP, FBGA, VFBGA

*1. The number of bytes settable for one pipe. The total doubles when using the double buffer mode.
*2. Maximum number of built-in FIFO

M66596 ASSP Line-up

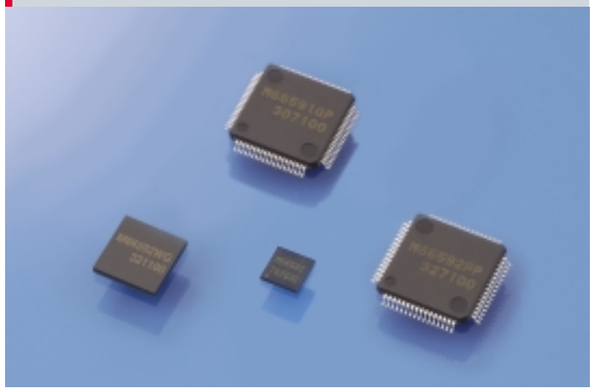
Part Number	Pin	Package	Package Code	Supply Voltage (V)	I/O Voltage (V)	Operating Temperature (°C)	Current Consumption (mA)
M66596FP	64	LQFP	64P6X-B	1.5/3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:40 FS:18
M66596WG	64	FBGA	64FHX-A	1.5/3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:40 FS:18
M66596UG★	64	VFBGA	64FHX-C	1.5/3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:40 FS:18

★: New product

Development/Evaluation Products
●M3A-0039: M66596FP Utility Board ●M3A-ZA53: Converter Board for USB ASSP Utility Board
●M3A-0033: Renesas USB ASSP Evaluation Motherboard
Please see P35 for details.

Hi-Speed USB2.0 Function

M66591GP/ M66592FP/WG/UG



The M66591 and M66592 are USB peripheral controllers embedded with a Hi-Speed/Full-Speed transceiver, compliant with USB2.0 specifications, and can operate in both Hi-Speed transfer mode and Full-Speed transfer mode.
The M66592 is a USB peripheral controller that furnishes low power consumption in an ultra small 5mm square package (M66592UG) that is suitable for mobile device applications.
The M66592 supports all transfer types of USB2.0 specifications with a 5KB FIFO that can be set at a maximum of 8 Endpoints. In addition, the 8-bit split bus (a DMA interface independent from the CPU bus) furnishes high-speed communications without stressing the CPU.
The M66591 is a peripheral controller in a small package that is specialized for bulk application. The 3.5KB FIFO can be set at a maximum of 7 Endpoints.
The M66591 and M66592 have all been developed using Renesas's original USB-IP and each can be smoothly integrated into an System LSI.

USB Function
USB Hi-Speed
(Control, Interrupt,Bulk, Isochronous) (M66592)
(Control, Interrupt,Bulk) (M66591)

Endpoint
7pipes (Endpoints) (M66591)
8pipes (Endpoints) (M66592)

Clock Input Frequency
12/24/48MHz

FIFO
512KByte (MAX) *2 3.5KByte (Total) *2 (M66591)
2KByte (MAX) *1 5KByte (Total) *2 (M66592)

DMA Interface
2ch (M66592)
1ch (M66591)

Bus Interface
16 bits CPU Bus I/F
Separate/Multiplex selectable (M66591)

Split Bus
8 bit Split Bus I/F (M66592)

Power Source for USB Pull-up
D+Pull-up
Power Source (Supply Control)

PLL Frequency Multiplier
Built-in

Interrupt Pins
1-pin polarity set, interrupt source can be assigned (M66592 Fix to polarity)

Supply Voltage
3.3V Power Supply, I/O Power Supply, (M66591) 1.5V, 3.3V Power Supply, I/O Power Supply, (M66592)

Vbus Detector
USB cable connection/ disconnection detector

Built-in Resistor
D+, D-Termination Resistor D+Pull-up Resistor (M66592)

Low-Power Sleep State
S/W Settable (M66592)

Package
80-pin LQPP(M66591)
64-pin LQFP, FBGA, VFBGA (M66592)

USB Power Management Output Function
Configured Condition (M66591)
Suspend Condition (M66591)

*1. The number of bytes settable for one pipe. The total doubles when using the double buffer mode.
*2. Maximum number of built-in FIFO
*3. EP1-2=Bulk, 512 Byte double-buffer EP3-4=Bulk, 512 Byte single-buffer EP5-6=Interrupt in 64 Byte single-buffer

M66591/M66592 ASSP Line-up

Part Number	Pin	Package	Package Code	Supply Voltage (V)	I/O Voltage (V)	Operating Temperature (°C)	Current Consumption (mA)
M66591GP	80	LQFP	PLQP0080LA-A	3.3	1.7 to 2.0/2.7 to 3.6	−20 to 85	184
M66592FP	64	LQFP	64P6X-B	1.5/3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:40 FS:18
M66592WG	64	FBGA	64FHX-A	1.5/3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:40 FS:18
M66592UG★	64	VFBGA	64FHX-C	1.5/3.3	1.6 to 2.0/2.7 to 3.6	−20 to 85	HS:40 FS:18

★: New product

Development/Evaluation Products
●M3A-0037G01:M66591GPUtility Board
●M3A-0038G01:M66592FPUtility Board
●M3A-0033: Renesas USB ASSP Evaluation Motherboard
●M3A-ZA53: Converter Board for USB ASSP Utility Board
Please see P35 for details

Full-Speed USB2.0 Function

M66291GP/HP

The M66291 is a USB peripheral controller in compliance with the Full-Speed USB2.0 and equipped with Full-Speed transceiver. It supports all USB2.0 transfer types with the 3KB FIFO settable to a maximum of 7 Endpoints. It also supports a variety of DMA modes thanks to the built-in DMA interface (2-ch) and features selectable polarity. In addition, the M66291 comes equipped with 2 interrupt pins, selectable polarity, and interrupt source options. Connection to a CPU with a 5V power supply is available because the I/O power supply is 2.7 to 5.5V. The M66291 was developed using Renesas's original USB-IP, and it will be able to smoothly integrate System LSI.

USB Function
USB Full-Speed
(Control,Interrupt,Bulk, Isochronous)

Endpoint
7Endpoints

Clock Input Frequency
6/12/24/48MHz*3

FIFO
1KByte (MAX) *1
3KByte (Total) *2

DMA Interface
2ch poldrity set, 8/16 bit correspondence

BUS Interface
8/16 bits CPU

Power Source for USB Pull-up
D+Pull-up
Power Source (Supply Control)

PLL Frequency Multiplier
Built-in

Interrupt Pins
2-pin polarity set, interrupt source can be assigned

Supply Voltage
3.3V, I/0 2.7 to 3.6V/ 4.5 to 5.5V

Vbus Detector
USB cable connection/ disconnection detector

Package
48-pin LQFP,52-pin VQFN

*1. Maximum number of bytes allowing set to just one Endpoint. Using the double buffer mode doubles transmission capability.
*2. Total number of built-in FIFO
*3. When I/O voltage=2.7 to 3.6V, clock input is 6/12/24/48MHz. When I/O voltage=4.5 to 5.5V, clock input is 24/48MHz.

M66291 ASSP Line-up

Part Number	Pin	Package	Package Code	Supply Voltage (V)	I/O Voltage (V)	Operating Temperature (°C)	Current Consumption (mA)
M66291GP	48	LQFP	PLQP0048KB-A	3.3	2.7 to 3.6/4.5 to 5.5	−20 to 85	15
M66291HP	52	VQFN	PVQN0052LA-A	3.3	2.7 to 3.6/4.5 to 5.5	−20 to 85	15

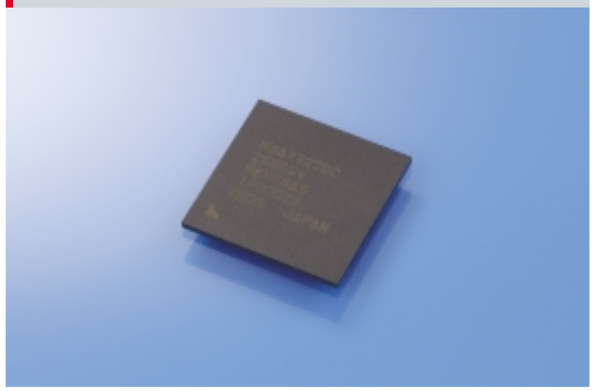
Development/Evaluation Products
●M3A-0032: M66291GP Utility Board
●M3A-0033: Renesas USB ASSP Evaluation Motherboard
●M3A-ZA53: Converter Board for USB ASSP Utility Board
Please see P35 for details

Hi-Speed USB2.0 Function

SH7780 Series

SH7722

32 bit



The SH7722 is a 32-bit RISC microprocessor embedded with a USB Function conforming to Hi-Speed USB2.0 specifications. The operation is available at up to 333MHz, as well as various multimedia support functions such as accelerators with MPEG4･H.264, and 2D graphics, an LCD controller, a camera interface, and sound I/O, as core functions, plus CPU- and DSP-expanded functions of SuperH architecture.
The USB module supports all transfer types with USB2.0 specifications with a 4KB FIFO that can be set to a maximum of eight Endpoints.
The SH7722 is suitable for multimedia equipment that simultaneously requires high performance and low power, such as one-segment supported auto navigation equipment or portable media players.

USB Function
USB Hi-Speed (Control,Interrupt, Bulk, Isochronous) 8 Endpoints

Vbus Detector
USB cable connection/ disconnection detector

FIFO
4KByte FIFO

Cache Memory and Built-in RAM
64KByte Cache 16KByte RAM

MMU
4Way 128Ently

VPU
H.264/MPEG4 Encode / decode

JPU
JPEG Encode / decode

LCDC
TFT Response 16.67 million Color Display

DMA Controller
6 channels

Serial I/O
FIFO-equipped Serial Interface×2ch Clock Sync. Serial×1ch UART/Clock Sync. ×3ch

General-purpose Timer
32bit×2 16bit×4

Bus State Controller
Flash, ROM, Page ROM, SRAM, PCMCIA (×32/×16)

SDRAM Dedicated Controller
SDRAM (×64/x32/×16)

Watchdog Timer
1 channel

RTC
1 channel Clock/Calendar

H-UDI
JTAG Debug Interface

I/O Ports
149

Supply Voltage
Internal: 1.15 to 1.3V External: 3.1 to 3.6V

Package
BGA449

SH7722 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Built-in RAM (Byte)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
R8A77220AC266BGV★	449	BGA	PRBG0449GA-A	64KB/128KB	266 333	19	1.15 to 1.3/3.0 to 3.6 1.25 to 1.35/3.0 to 3.6	−20 to 70 −40 to 85	0.75mW/MHz

★: New product

Development/Evaluation Products ●MS7722SE01：SH7722 Solution Engine ➡ Please see P34 for details.

Hi-Speed USB2.0 Host/Function

SH7260/SH7200 Series

SH7263/SH7203

32 bit

The SH7263/7203 is a 32-bit RISC microprocessor embedded with USB Host and Function conforming to Hi-Speed USB2.0 specifications. In addition to the 200MHz SH2A-FPU core, 16KB cache memory, and 80KB internal RAM, the device features abundant peripheral functions such as color LCDC, DMAC, audio interface, CDROM decoder, sampling rate converter, and other peripheral functions.
The USB module complies with all transfer types of USB2.0 specifications and is capable of setting the 8KB FIFO up to 8 endpoints.
SH7263 is the best choice for digital audio devices such as car audio and home audio, and SH7203 is the best choice for industrial devices such as sequencers, robots, and other devices.

USB Function
USB Hi-Speed & Full-Speed (Control,Interrupt,Bulk,Isochronous) 8 Endpoints

USB Host
USB Hi-Speed & Full-Speed (Control,Interrupt,Bulk,Isochronous)

Maximum Number of Connectable Functions
1 Function

SDHI
1bit/4bit SD bus

Sampling rate converter
1 channel

CD-ROM decoder
1 channel

Cache Memory and Built-in RAM
32KB Cache 16KB RAM

CAN Controller
2 channels

AND/NAND flash memory controller
Max. 4-Gbit

LCDC
TFT, STN, DSTN Response 65536 Color Display

DMA Controller
8 channels

Serial I/O
FIFO-equipped UART/Clock x 4ch Clock Sync x 2ch I²C x 4ch Sound Interface x 4ch

General-purpose Timer
16bit x 7

Bus State Controller
Flash ROM, Page ROM, SRAM, SDRAM, PCMCIA

Watchdog Timer
1 channel

RTC
1 channel Clock/Calendar Function

A/D, D/A Converter
A/D 10bit x 8ch D/A 8bit x 2ch

H-UDI
JTAG Debug Interface

I/O Ports
99

Supply Voltage
Internal: 1.1 to 1.3V External: 3.0 to 3.6V

Package
QFP240 (32mm□)

SH7263/SH7203 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Built-in RAM (Byte)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
R5S72630P200FP★	240	QFP	QFP3232-240Cu	16KB/80KB	200	5.0	1.1 to 1.3/3.0 to 3.6	−40 to 85	TBD
R5S72631P200FP★									
R5S72632P200FP★									
R5S72633P200FP★									
R5S72030P200FP★	240	QFP	QFP3232-240Cu	16KB/80KB	200	5.0	1.1 to 1.3/3.0 to 3.6	−20 to 85	TBD

★: New product

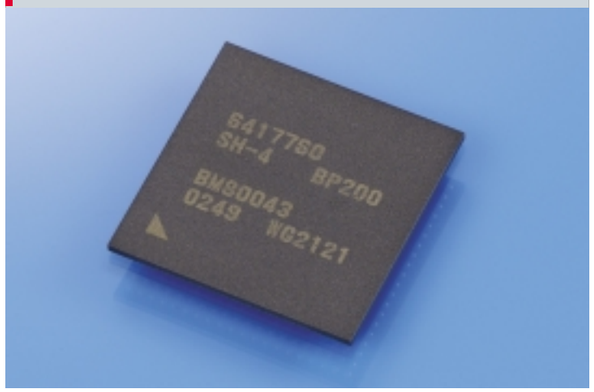
Development/Evaluation Products ●R0K572630D000BR：SH7263Evaluation Board ➡ Please see P34 for details.

Full-Speed USB (OHCI1.0 Host)

SH7750 Series

SH7760

32 bit



The SH7760 is the 32-bit RISC microprocessor embedded with the USB Host with Low-Speed and Full-Speed OHCI1.0 specifications. In addition to the SH-4 core with the highly efficient floating point arithmetic unit, 16KB instruction cache memory and 32KB data cache memory, the device features abundant peripheral functions such as 65536-color LCDC, DMAC, UART with FIFO, audio interface, 32-bit automatic reloading timer, WDT, etc. An external bus interface can control FLASH, SRAM, byte control SRAM and SDRAM. All this makes the device the best choice for electric devices because of the simple navigation system, color liquid crystal-equipped POS terminal and audio apparatus.

USB Host
USB Full-Speed &Low-Speed (Control,Interrupt,Bulk, Isochronous)

Host-shared Memory(USB Host)
Built-in 8KB Memory
Use Possible

Cache Memory
Instruction:16KByte
Data:32KByte

MMU
Instruction:4Entry
Data:64Entry

LCDC
TFT, STN, DSTN
65536 Color Display

DMA Controller
8 channels

Bus State Controller
Flash, Page ROM, SRAM, SDRAM, Byte controlSRAM, PCMCIA, MPX

Serial I/O
FIFO-equipped UART/ Clock sync x 3ch
Audio Interface x 2ch

A/D Converter
A/D 10bit x 4ch

General-purpose Timer
32bit x 3

I²C Bus
1 channel
Continuous Reception/ Transmission Capability

Watchdog Timer
1 channel

UBC
2ch
Sequential Break Function

H-UDI
JTAG
Debug Interface

I/O Ports
70

Supply Voltage
Internal:1.4 to 1.6V
I/O:3.0 to 3.6V
(with operation 200MHz)

Package
BGA256

SH7760 MCU Line-up

Part Number	Pin	Package	Package Code	Cache(Instruction/ Data)(Bytes)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
HD6417760BL200ADV	256	BGA	PLBG0256GB-A	16K/32K	200	2.5	1.4 to 1.6/3.0 to 3.6	−40 to 85	330/200 (typ,Core)
HD6417760BL200AV	256	BGA	PLBG0256GB-A	16K/32K	200	2.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	330/200 (typ,Core)

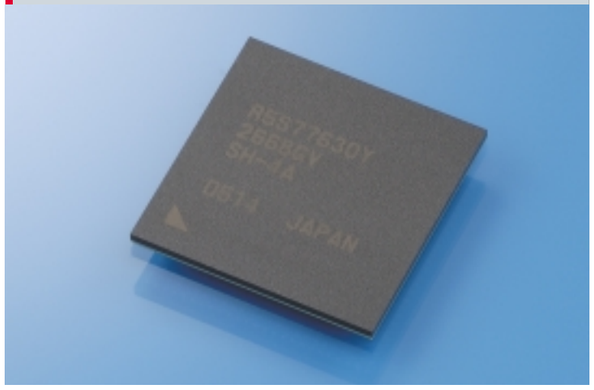
Development/Evaluation Products	●MS7760CP02P:SH7760 Solution Engine 2	➡ Please see P34 for details.

Full-Speed USB2.0 Function&OHCI1.0 Host

SH7700 Series

SH7763

32 bit



The SH7763 is the 32-bit RISC microprocessor embedded with USB Function conforming to Full-Speed USB2.0 specifications and USB Host of Low-Speed and Full-Speed OHCI1.0 specifications. In addition to the high-performance SH-4A core, 64KB cache memory and 16KB internal RAM, the device features abundant peripheral functions such as gigabit Ethernet controller, PCI bus controller, security accelerator, color LCDC, DMAC, RTC, WDT, and others.
System development is simple so that USB Function can process the USB standard commands, and the USB State nearly fully automatically uses the hardware. With the bulk endpoint engineered with a double-buffer composition, high-speed data transmission is a reality. All this and more make the device the best choice for electric devices, such as network devices, IT terminals, and digital appliances.

USB Function
USB Full-Speed (Control,Interrupt,Bulk,Isochronous)
6 Endpoints

USB Host
USB Full-Speed &Low-Speed (Control,Interrupt,Bulk,Isochronous)
127 Endpoints

Vbus Detector
USB cable connection/ disconnection detector

FIFO (USB Function)
544Byte Bulk Endpoint: Double Buffer

USB State Control
USB Standard Command Processing(USB Function)
H/W Automatic Processing (Partial Software Processing)

Cache Memory and Built-in RAM
64KByte Cache
16KByte RAM

MMU
4Way
128Entry

Security Accelrator
CES, Triple-DES code/ Decryption

LCDC
TFT, STN, DSTN Response
65536 Color Display

DMA Controller
6 channels

Serial I/O
FIFO-equipped UART/ Clock Sync. x 3ch
Audio Interface x 3ch

General-purpose Timer
32bit x 6
16bit x 4

Host-shared Memory
DDR-SRAM

Gigabit EtherNet controller
2 channels

PCI Bus Controller

DDR-SDRAM Controller

Bus State Controller
Flash, ROM, Page ROM, SRAM, PCMCIA

Watchdog Timer
1 channel

RTC
1 channel
Clock/Calendar

A/D, D/A Converter
A/D 10 bits x 4 channels
D/A 8 bits X 2 channels

H-UDI
JTAG
Debug Interface

I/O Ports
117

Supply Voltage
Internal : 1.1 to 1.3V
External : 3.0 to 3.6V
DDR : 2.3 to 2.7V

Package
BGA449

SH7763 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Built-in RAM (Byte)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Current Consumption (mA/MHz)	Other
R5S77630Y-266BGV★	449	BGA	PRBG0449GA-A	64KB/16KB	266	1.9	1.15 to 1.35/3.0 to 3.6/2.3 to 2.7	−20 to 75	950/266(typ, Core)	With cipher
R5S77631Y-266BGV★	449	BGA	PRBG0449GA-A	64KB/16KB	266	1.9	1.15 to 1.35/3.0 to 3.6/2.3 to 2.7	−20 to 75	950/266(typ, Core)	Without cipher
R5S77632Y-266BGV★	449	BGA	PRBG0449GA-A	64KB/16KB	266	1.9	1.15 to 1.35/3.0 to 3.6/2.3 to 2.7	−20 to 75	950/266(typ, Core)	With cipher SD Card I/ F with cipher

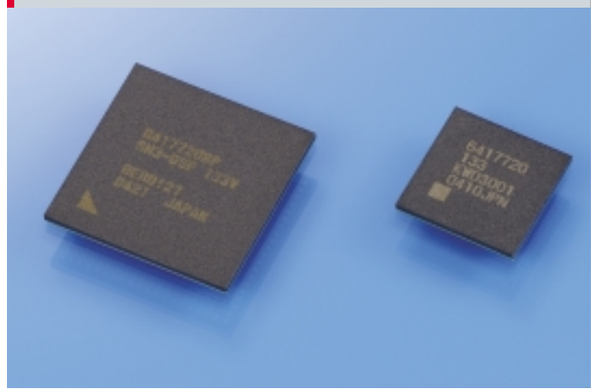
★: New product

Full-Speed USB2.0 Function & OHCI1.0 Host

SH7700 Series

SH7720/SH7721

32 bit



The SH7720/SH7721 is a 32-bit RISC MCU embedded with USB Function that conforms to Full-Speed USB2.0 specifications and includes both USB Host Low-Speed and Full-Speed OHCI1.0 specifications. In addition to its high performance SH3-DSP core, 32KB cache memory, and 16KB internal RAM, this device features many peripheral functions, such as an SSL security (SH7720 only), color LCDC with 65536-color display DMAC, audio interface, RTC, and WDT. System development is simple, because of allowing the USB Function to process USB standard commands and virtually automatic USB operation using the hardware. With a bulk endpoint engineered with a double-buffer composition, high-speed data transmission is a reality. This device is the best choice for electrical equipment, such as a color liquid crystal equipped FAX, a direct printer, IP telephones, and audio apparatus.

USB Function
USB Full-Speed (Control, Interrupt, Bulk, Isochronous) 6 Endpoints

USB Host
USB Full-Speed &Low-Speed (Control, Interrupt, Bulk, Isochronous) 127 Endpoints

Vbus Detector
USB cable connection/ disconnection detector

FIFO (USB Function)
544Byte Bulk Endpoint: Double Buffer

USB State Control USB Standard Command Processing(USB Function)
H/W Automatic Processing (Partial Software Processing)

Cache Memory and Built-in RAM
32KByte Cache 16KByte RAM

MMU
4Way 128Entry

SSL Accelrator
RSA,DES, Triple-DES code/ Decryption

LCDC
TFT, STN, DSTN Response 65536 Color Display

DMA Controller
6 channels

Serial I/O
FIFO-equipped UART/ Clock Sync. x 2ch Audio Interface x 2ch

General-purpose Timer
32bit x 3 16bit x 4

Bus State Controller
Flash, ROM, Page ROM, SRAM, PCMCIA, SDRAM

Watchdog Timer
1 channel

RTC
1 channel Clock/Calendar

A/D, D/A Converter
A/D 10 bits x 4 channels D/A 8 bits X 2 channels

H-UDI
JTAG Debug Interface

I/O Ports
117

Supply Voltage
Internal : 1.4 to 1.6V External : 3.0 to 3.6V

Package
CSP256 (17mm□) CSP256 (11mm□)

Host-shared Memory(USB Host)
SRAM, SDRAM, XYRAM Space Use Possible

SH7720/SH7721 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Built-in RAM (Byte)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (C)	Current Consumption (mA/MHz)	other
HD6417720BP133CV	256	CSP	PLBG0256GA-A	32K/16K	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	with SSL
HD6417720BL133CV	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
HD6417320BP133CV	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	with SSL SD card I/F
HD6417320BL133CV	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
HD6417321BP133CV	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	with SSL MS card I/F
HD6417321BL133CV	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
HD6417330BP133CV	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	with SSL SD card I/F
HD6417330BL133CV	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
R8A77210C133BGV ★	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	without SSL
R8A77210C133BAV ★	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
R8A77211C133BGV ★	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	without SSL SD card I/F
R8A77211C133BAV ★	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
R8A77212C133BGV ★	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	without SSL MS card I/F
R8A77212C133BAV ★	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	
R8A77213C133BGV ★	256	CSP	PLBG0256GA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	without SSL SD, MS card I/F
R8A77213C133BAV ★	256	CSP	PLBG0256KA-A	32K/16KB	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	230/133(typ, Core)	

★: New product

Development/Evaluation Products ●MS7720RP02:SH7720 Solution Engine Light ➡ Please see P34 for details.

Full-Speed USB2.0 Function & OHCI1.0 Host

SH7700 Series

SH7727

32 bit

The SH7727 is a 32-bit RISC microprocessor embedded with USB Function conforming to Full-Speed USB2.0, and USB Host compatible with Low-Speed and Full-Speed OHC1.0. In addition to high-performance SH3-DSP core, 16KB large-capacity cache memory and 16KB internal RAM, the unit features a color LCDC with 65536 color display capacity, DMAC, audio interface, RTC, WDT and other abundant peripheral functions. For the USB Module, because the USB standard commands and USB state are processed nearly fully automatically with hardware, system development is simple. With the bulk Endpoint engineered with double-buffer mode, high-speed data transmission becomes a reality. All this and more make this MCU the best choice for color liquid crystal equipped FAX machines, direct printers, audio equipment and other sophisticated electronic equipment.

USB Function
USB Full-Speed (Control, Interrupt,Bulk) 4 Endpoints

USB Host
USB Full-Speed &Low-Speed (Control, Interrupt, Bulk,Isochronous) 127 Device Address 16X2 Endpoints

Vbus Detector
USB cable connection/ disconnection detector

FIFO (USB Function)
288 Bytes Bulk Endpoint: Double Buffer

Host-shared Memory(USB Host)
Area 3 SDRAM Space Use Possible

USB State Control USB Standard Command Processing(USB Function)
H/W Automatic Processing (Partial Software Processing)

Cache Memory and Built-in RAM
16K Bytes Cache 16K Bytes RAM

MMU
4 Way 256 Entry

LCDC
TFT, STN, DSTN Response 65536 Color Display

DMA Controller
4 channels

Serial I/O
UART/Clock Sync. x 1ch FIFO-equipped UART x 1ch Audio Interface x 1ch

General-purpose Timer
32 bits x 3

Bus State Controller
Flash, ROM, Page ROM, SRAM, PCMCIA, SDRAM

Watchdog Timer
1 channel

RTC
1 channel Clock/Calendar

A/D, D/A Converter
A/D 10 bits x 6 channels D/A 8 bits X 2 channels

H-UDI
JTAG Debug Interface

I/O Ports
104

Supply Voltage
Internal: 1.75 to 20.5V External: 3.0 to 3.6V (160MHz operating)

Package
HQFP240 CSP240

SH7727 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Built-in RAM (Byte)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (C)	Power Consumption (mW/MHz)
HD6417727F160C	240	HQFP	PRQP0240KC-B	16K/16K	160	6.25	1.75 to 2.05/3.0 to 3.6	−20 to 75	627/160
HD6417727F100C				16K/16K	100	10.0	1.6 to 2.05/2.6 to 3.6	−20 to 75	475/100
HD6417727BP160C	240	CSP	PLBG0240JA-A	16K/16K	160	6.25	1.75 to 2.05/3.0 to 3.6	−20 to 75	627/160
HD6417727BP100C				16K/16K	100	10.0	1.6 to 2.05/2.6 to 3.6	−20 to 75	475/100

Development/Evaluation Products ●MS7727RP03:SH7727 Solution Engine Light ➡ Please see P34 for details.

Full-Speed USB2.0 Function

SH7641 Series

SH7641

32 bit

The SH7641 is a 32-bit RISC microcomputer embedded with USB Function, conforming to Full-Speed USB2.0 specifications. In addition to high-performance SH3-DSP core and 16KB large-capacity cache memory, the device features 144KB large-capacity SRAM, DMAC, serial interface, I²C, WDT, multi-function timer unit and other abundant peripheral functions. The external bus interface may be directly connected to Flash, ROM, SRAM and byte-select SRAM, as well as to SDRAM. For the USB Module, because the USB standard commands and USB state are processed nearly fully automatically with hardware, system development is simple. With the bulk Endpoint engineered with a double-buffer mode, high-speed data transfer becomes a reality. Also provided is a sleep mode and module standby mode to shut down the CPU during idling, along with other outstanding built-in power management functions. All this makes the SH7641 the optimum MCU for fields that demand high speed and low-power consumption in a single package.

USB Function
USB Full-Speed (Control,Interrupt,Bulk)

Vbus Detector
USB cable connection/ disconnection detector

Endpoint
4 Endpoints

FIFO
288 Bytes Bulk Endpoint: Double Buffer

USB State Control
USB Standard Command Processing
H/W Automatic Processing (Partial Software Processing)

Built-in RAM
Large capacity 144K Bytes

Cache Memory
16K Bytes Instruction/Data Mix

DMA Controller
4 channels

Serial I/O
16 Bytes FIFO UART/Clock Sync. x 3ch

General-purpose Timer
16 bits x 2

Multiple Timer
16 bits x 5 (PWM)

Bus State Controller
Flash, ROM, Page ROM, SRAM, Byte Select SRAM, SDRAM

Watchdog Timer
1 channel

I²C Bus
1 channel
Continuous Reception/ Transmission Capability

A/D Converter
10 bits x 8 channels

H-UDI
JTAG
Debug Interface

UBC
2 channel
Sequential Break Function

I/O Ports
164

Supply Voltage
Internal: 1.7 to 1.9V
External: 3.0 to 3.6V

Package
LFBGA256

SH7641 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Built-in RAM (Byte)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
HD6417641BP100	256	LFBGA	CSP256pin	16K/144K	100	100	1.7 to 1.9/3.0 to 3.6	−40 to 85	640/100

Full-Speed USB2.0 Function

SH7700 Series

SH7705

32 bit

The SH7705 is a 32-bit RISC microprocessor with embedded USB Function, conforming to Full-Speed USB2.0 specifications. In addition to high-performance SH-3 core and 32KB large-capacity cache memory, the device features built-in DMAC, serial interface, IrDA 1.0, RTC, WDT and other abundant peripheral functions. The external bus interface may be directly connected to Flash, ROM, SRAM and byte-select SRAM, as well as 512Mbit large-capacity SDRAM. For the USB Module, because the USB standard commands and USB state are processed nearly fully automatically with hardware, system development is simple. With the bulk Endpoint engineered in a double-buffer mode, high-speed data transmission becomes a reality. Also provided is a sleep mode and module standby mode to shut down the CPU during idling, along with other outstanding internalized power management functions. In short, this MCU is the best choice for mobile terminals that demand high speed and low-power consumption in a single package.

USB Function
USB Full-Speed (Control,Interrupt,Bulk)

Vbus Detector
USB cable connection/ disconnection detector

Endpoint
4Endpoints

FIFO
288Byte Bulk Endpoint: Double Buffer

USB State Control
USB Standard Command Processing
H/W Automatic Processing (Partial Software Processing)

Cache Memory
32KByte Instruction/Data Mix

MMU
4 Way
128 Entry

DMA Controller
4 channels

Serial I/O
64 Bytes FIFO
UART/Clock Sync. x 2ch (IrDA1.0 x 1ch)

General-purpose Timer
32 bits x 3

Multiple Timer
16 bits x 4 (PWM)

Bus State Controller
Flash, ROM, Page ROM, SRAM, Bytes Select SRAM, SDRAM

Watchdog Timer
1 channel

RTC
1 channel
Clock/Calendar Function

A/D Converter
10 bits x 4 channels

H-UDI
JTAG
Debug Interface

UBC
2 channel
Sequential Break Function

I/O Ports
105

Supply Voltage
Internal: 1.4 to 1.6V
External: 3.0 to 3.6V

Package
LQFP208
CSP208

SH7705 MCU Line-up

Part Number	Pin	Package	Package Code	Cache Memory (Bytes)	Clock (MHz)(MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
HD6417705F133B	208	LQFP	PLQP0208KA-A	32K	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	200/133
HD6417705F100B				32K	100	10.0	1.4 to 1.6/3.0 to 3.6	−20 to 75	157/100
HD6417705BP133B	208	CSP	TTBG0208JA-A	32K	133	7.5	1.4 to 1.6/3.0 to 3.6	−20 to 75	200/133
HD6417705BP100B				32K	100	10.0	1.4 to 1.6/3.0 to 3.6	−20 to 75	157/100

Full-Speed USB2.0 Function

H8SX Family

H8SX/1668R Group

Flash 32 bit

The H8SX/1668R group contains 32-bit CISC MCUs embedded with a USB Function conforming to Full-Speed USB2.0 specifications. These products mount high-speed H8SX CPU cores with a maximum operation frequency of 50MHz. They incorporate large 1MB/512KB/384KB flash memories and 56KB/40KB of RAM. This H8SX/1663 product group offers pin function upward compatibility and peripheral functions, such as AD, TPU, and EXDMAC, are strengthened, which provides an optimum solution to wide-ranging areas, such as consumer, industrial, and OA equipment. The combination with Secure IC enables applications in areas that require tamper resistance, such as POS terminals and IC card transaction terminals.
System development is simple and allows the USB module to process USB standard commands and virtually automatic USB operation using the hardware. Three transfer modes (Control, Bulk, and Interrupt) are supported, and with a bulk endpoint engineered with a double-buffer composition, high-speed data transmission becomes a reality.
In addition to the full emulator, the E10A-USB on-chip emulator conforming to JTAG I/F is also prepared, making it possible to select the development environment according to the user's needs.

USB Function USB Full-Speed (Control,Interrupt,Bulk)	**Endpoint** 4 Endpoints Dedicated FIFO	**Vbus Detector** USB cable connection/ disconnection detector	**FIFO** 288Byte (Total)	**USB State Control** **USB Standard Command Processing** H/W Automatic Processing (Partial Software Processing)	**DMA Controller** EXDMAC 4ch DMAC 4ch	**DTC**
Serial Interface UART/Clock Sync. x 4ch Smart Card 6ch High Speed SCI 2ch	**I²C Bus** 2 channels	**A/D Converter** 10bit x 8channels (4ch x 2Unit)	**D/A Converter** 8bit x 2channels	**Timer** 16 bits x 12 8 bits x 8	**Watchdog Timer** 1 channel	**PPG** 16bit + 16bit
JTAG Debug Interface HUDI	**PLL Frequency Multiplier** Built-in USB48MHz generated internally	**Minimum Instruction Execution Time** 20 ns	**Supply Voltage** 3.0 to 3.6V	**I/O Ports** 101	**Package** LQFP-144	**Bus State Controller** SDRAM I/F

H8SX/1668R Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM	Memory Size RAM	Clock (MHz)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (C)	Power Consumption (mW/MHz)
R5F61668RFPV ★★	144	LQFP	PLQP0144KA-A	1MB	56KB	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)	TBD
R5F61664RFPV ★★	144	LQFP	PLQP0144KA-A	512KB	40KB	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)	TBD
R5F61663RFPV ★★	144	LQFP	PLQP0144KA-A	384KB	40KB	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)	TBD

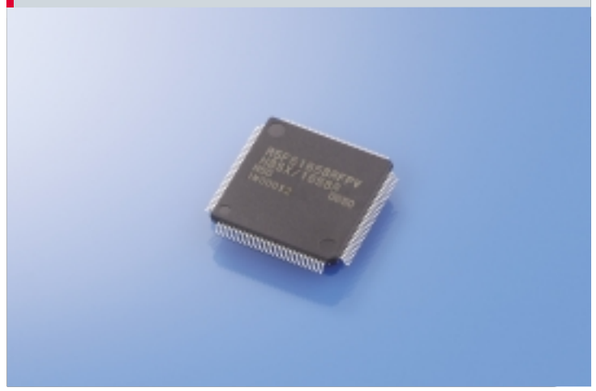
★★: Under development

Full-Speed USB2.0 Function

H8SX Family

H8SX/1658R Group

Flash 32 bit



The H8SX/1658R group contains 32-bit CISC MCUs embedded with a USB Function conforming to Full-Speed USB2.0 specifications. These products mount high-speed H8SX CPU cores with 50MHz maximum operation frequencies and incorporate large 1MB/512KB/384KB flash memories and 56KB/40KB RAM. This H8SX/1653 product group offers pin function upward compatibility and peripheral functions, such as AD, TPU, and EXDMAC, are strengthened, which provides an optimum solution to wide-ranging areas, such as consumer, industrial, and OA equipment. The combination with Secure IC enables applications in areas that require tamper resistance, such as POS terminals and IC card transaction terminals.
System development is simple and allows the USB module to process USB standard commands and virtually automatic USB operation using the hardware. Three transfer modes (Control, Bulk, and Interrupt) are supported, and with a bulk endpoint engineered with a double-buffer composition, high-speed data transmission becomes a reality.
In addition to the full emulator, the E10A-USB on-chip emulator conforming to JTAG I/F is also prepared, making it possible to select the development environment according to the user's needs.

USB Function USB Full-Speed (Control,Interrupt,Bulk)	**Endpoint** 4 Endpoints Dedicated FIFO	**Vbus Detector** USB cable connection/ disconnection detector	**FIFO** 288Byte (Total)	**USB State Control** **USB Standard Command Processing** H/W Automatic Processing (Partial Software Processing)	**DMA Controller** EXDMAC 2channel DMAC 4channel	**DTC**
Serial Interface UART/Clock Sync. x 4ch UART x 2ch Smart Card 6ch High Speed SCI2 2ch	**I²C Bus** 2channel	**A/D Converter** 10bit x 8ch (4ch x 2Unit)	**D/A Converter** 8bit x 2channel	**Timer** 16bit x 12 8bit x 8	**Watchdog Timer** 1channel	**PPG** 8bit + 16bit
JTAG Debug Interface HUDI	**PLL Frequency Multiplier** Built-in (USB48MHz generated internally)	**Minimum Instruction Execution Time** 20ns	**Supply Voltage** 3.0 to 3.6V	**I/O Ports** 84	**Package** LQFP-120	

H8SX/1658R Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM	Memory Size RAM	Clock (MHz)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (C)	Power Consumption (mW/MHz)
R5F61658RFPV ★★	120	LQFP	PLQP0120LA-A	1MB	56KB	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)	TBD
R5F61654RFPV ★★	120	LQFP	PLQP0120LA-A	512KB	40KB	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)	TBD
R5F61653RFPV ★★	120	LQFP	PLQP0120LA-A	384KB	40KB	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)	TBD

★★: Under development

Full-Speed USB2.0 Function

H8SX Family

H8SX/1653/1663 Group

Flash 32 bit

The H8SX/1653/1663 Group consists of embedded 32-bit CISC microcomputers with USB function and conforming to the Full-Speed USB2.0 specifications. They are equipped with a high-speed H8SX CPU core with maximum operational frequency of 50MHz, and includes a built-in large-capacity flash memory of 512K/384KB and RAM of 40KB. Equipped with abundant peripheral functions such as a high-speed data transfer function, SCI (compliant with Smart Card I/F and High-Speed SCI), timer, and A/D and D/A, they offer optimum solutions for a wide range of fields such as public welfare, industry, and OA devices. By combining with a Secure IC, it can be applied to fields in which tamper-proof operation is required, such as POS or IC card settlement terminals. For the USB module, because the USB standard commands and state are processed nearly fully automatically with hardware, system development is simple. Support is furnished for 3-type (Control, Bulk, and Interrupt) transfer modes, and because the bulk Endpoint is engineered with a double-buffer configuration, high-speed data transfer is possible. Likewise, because the JTAG I/F-compliant, on-chip emulator E10A is prepared, in addition to the full emulator, the development environment is selectable to suit user requirements.

USB Function USB Full-Speed (Control,Interrupt,Bulk)	**Vbus Detector** USB cable connection/ disconnection detector	**Endpoint** 4Endpoints	**FIFO** 288Byte (Total) 64Byte (MAX)	**USB State Control** **USB Standard Command Processing** H/W Automatic Processing (Partial Software Processing)	**DMA Controller** 4 channels	**DTC**
Serial Interface UART/Clock Sync. x 4ch UART x 2ch Smart Card 6ch High Speed SCI 2ch	**I²C Bus** 2 channels	**A/D Converter** 10bit x 8channels	**D/A Converter** 8bit x 2channels	**Timer** 16 bits x 6 8 bits x 2	**Watchdog Timer** 1 channel	**PPG** 8 bits (H8SX/1653Group) 16 bits (H8SX/1663Group)
H-UDI JTAG Debag Interface	**PLL Frequency Multiplier** Built-in USB48MHz generated internally	**Minimum Instruction Execution Time** 20 ns	**Supply Voltage** 3.0 to 3.6V	**I/O Ports** 84 (H8SX/1653Group) 101 (H8SX/1663Group)	**Package** TQFP-120 (H8SX/1653Group) LQFP-144 (H8SX/1663Group)	**Bus State Controller** SDRAM I/F (H8SX/1663Group)

H8SX/1653/1663 Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM (Byte)	Memory Size RAM (Byte)	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (°C)	Power Consumption (mW/MHz)
R5F61654FTV	120	LQFP	PTQP0120LA-A	512K	40K	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)*	248
R5F61653FTV				384K	40K	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)*	248
R5F61664FPV	144	LQFP	PLQP0144KA-A	512K	40K	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)*	248
R5F61663FPV				384K	40K	50	20	3.0 to 3.6	−20 to 75 (−40 to 85)*	248

*: Wide temperature type

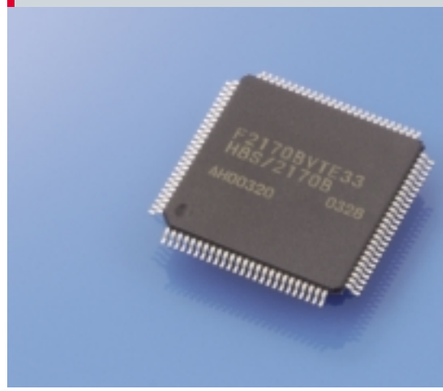
Development/Evaluation Products ●H8SX/1653/1663 Group Evaluation Board ➡ Please see P34 for details.

Hi-Speed USB2.0 Function

H8S Family

H8S/2172 Group

HI-SPEED CERTIFIED USB Flash 16 bit



The H8S/2172 group is the 16-bit single chip microprocessor with an H8S2000 CPU core and contains a USB Function control unit (Control, Interrupt, Bulk transmission) conforming to Hi-Speed USB2.0 specifications. In addition to the USB2.0 interface, this CPU has Memory Stick PRO I/F and can process data transmission between USB and Memory Stick PRO efficiently and speedily. These devices are the best choice for note PCs, memory card readers and other PC peripherals.

USB Function USB Hi-Speed (Control,Interrupt,Bulk)	**Vbus Detector** USB cable connection/ disconnection detector	**Endpoint** 4 Endpoints	**FIFO** 5 FIFO (interactive) 512 Bytes x 2 64 Bytes x 2	**DMA Controller** 4 channels	**SCI** Flash write-only serial 1 channel	**Timer** 8 bits x 2 Internal interrupt 16 bits x 3
I/O Ports 8 bits input/output: 72 ports 4 bits input/output: 4 ports	**Interrupt Factor** Internal: 10 External: 19	**Minimum Instruction Execution Time** 30.3 ns	**Package** 100-pin TQFP	**Supply Voltage** 3.0 to 3.6V	**PLL Frequency Multiplier** Built-in x 2	**Watchdog Timer** 1 channel
H-UDI JTAG Debag Interface						

H8S/2172 Group MCU Line-up

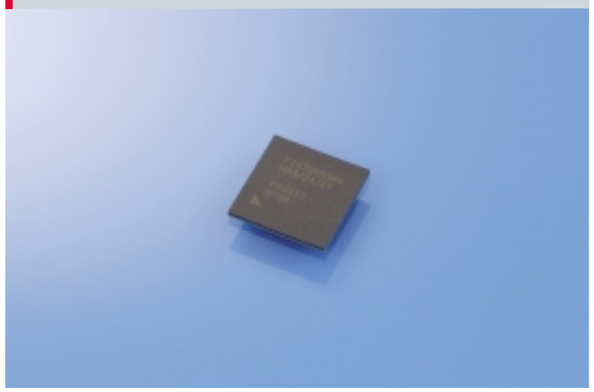
Part Number	Pin	Package	Package Code	Memory Size ROM (Byte)	Memory Size RAM (Byte)	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (°C)	Power Consumption (mW/MHz)
HD64F2170BVTE	100	TQFP	PTQP0100KA-A	256K	32K	33	30.3	3.0 to 3.6	−20 to 75	165/33

Full Speed USB2.0 Function

H8S Family

H8S/2472 Group

Flash 16 bit



The H8S/2472 group contains 16-bit single chip MCUs embedded with a USB Function conforming to Full-Speed USB2.0 specifications. In addition to the high-speed CPU of internal 32-bit constituents with 34MHz (at four times greater than 8.5MHz) operation, a high capacity flash memory of 512KB, and 40KB of RAM, various peripheral functions, such as an Ethernet controller, a serial interface (the Smart Card I/F), a I^2C bus, an 8-bit timer, synchronous serial communications, and a CRC operation circuit, are also incorporated. Applications with an Ethernet and USB gateways are also available.
System development is simple and allows the USB module to process USB standard commands and virtually automatic USB operation using the hardware. Three transfer modes (Control, Bulk, and Interrupt) are supported, and with a bulk endpoint engineered with a double-buffer composition, high-speed data transmission becomes a reality.
In addition to the full emulator, the E10A-USB on-chip emulator conforming to JTAG I/F is also prepared, making it possible to select the development environment according to the user's needs.

USB Function
USB Full-Speed
(Control,Interrupt,Bulk,)

Endpoint
4 Endpoints
Dedicated FIFO

Vbus Detector
USB cable connection/
disconnection detector

FIFO
288Byte (Total)

USB State Control
USB Standard Command Processing
H/W Automatic Processing
(Partial Software Processing)

DTC
85ch

Ether net
Ether-C
E-DMAC

Serial Interface
UART/ Clock Synchronization x 2ch
(Smart Card 6ch operated)
UART 1ch with FIFO

Synchronous Serial Communications
1ch

I^2Cbus
6ch

A/D Converter
10bit x 8ch

Timer
16bit Free-run x 1
8bits x 4
16bit PWM x 4

Watchdog Timer
2ch

CRC Operation Circuit
$x^8+x^2+x^1+1$
$x^{16}+x^{15}+x^2+1$
$x^{16}+x^{12}+x^5+1$

H-UDI
JTAG Debug
Interface

PLL Frequency Multiplier
Built-in
USB48MHz generated internally

MinimumInstruction Execution Time
29ns

Supply Voltage
3.0 to 3.6V

I/O Ports
128

Package
BP-176V

H8S/2472 Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM	Memory Size RAM	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
R4F2472VBR ★★	176	LFBGA	PLBG0176GA-A	512KB	40KB	34	29	3.0 to 3.6	−20 to 75	TBD

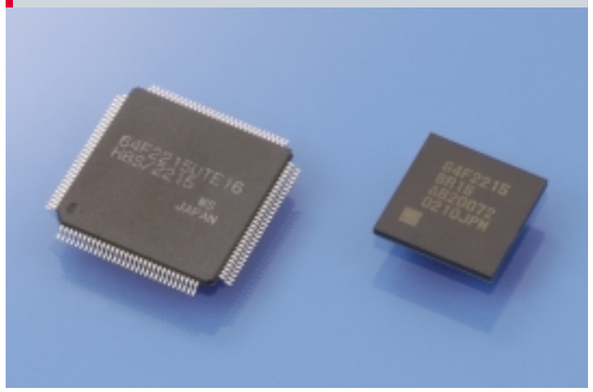
★★: Under development

Full- Speed USB2.0 Function

H8S Family

H8S/2212/ 2215/2218 Group

CERTIFIED USB Flash 16 bit



The H8S/2212/2215/2218 Group consists of USB function embedded 16-bit single-chip microcomputers conforming to the Full-Speed USB2.0. In addition to the high-speed CPU with built-in 32-bit configured 24MHz operation and 128KB/256KB large-capacity flash memory, these devices are internalized with DMAC, serial interface, 16-bit timer, RTC, WDT and other abundant peripheral functions. For the USB Module, because the USB standard commands and USB state are processed nearly fully automatically with hardware, system development is simple. Support is furnished for 4-type (H8S/2215 Group) and 3-type (H8S/2212, 2218 Group) transfer modes, and because the bulk Endpoint (the H8S/2215 Group has isochronous support) is engineered with a double-buffer mode, high-speed data transfer becomes a reality. Through USB, meanwhile, an onboard rewritable flash memory version is also available. With bus expansion possible, these MCUs are highly suited for PCs and OA equipment that require more memory, while the sleep mode, module standby mode and other outstanding built-in power management functions make them the optimum choices for machines that also demand low-power consumption at the same time.

USB Function
USB Full-Speed
(Control,Interrupt,Bulk,
Isochronous(H8S/2215 only)

Vbus Detector
USB cable connection/
disconnection detector

Endpoint
H8S/2215:9 Endpoints
H8S/2212/2218:
4 Endpoints

FIFO
H8S/2215:1288 Bytes (Total)
256 Bytes (MAX)
H8S/2212/2218:456 Bytes (Total)
128 Bytes (MAX)

USB State Control
USB Standard Command Processing
H/W Automatic Processing
(S/W Processing of port)

DMA Controller
4 channels

DTC
H8S/2215: 85 channels

D/A Converter
H8S/2215:8bit x 2channels

A/D Converter
10 bits x 6 channels

RTC
1 channel
Clock/Calendar
(except H8S/2215)

Timer
16 bits x 3/8 bits x 2
(H8S/2215 only)

Watchdog Timer
1 channel

BSD Scan
I/F Conforming to JTAG
Debug Interface
(H8S/2215, H8S/2218 FLASH only)

Serial Interface
UART/clock sync.x 3ch
(H8S/2212/2218: 2ch)
(High-speed SCI: 720kbps x1ch)

Minimum Instruction Execution Time
41.7ns

PLL Frequency Multiplier
Built-in
(USB48MHz generated internally)

Supply Voltage
3.0 to 3.6V

Package
LQFP64/TQFP100
TQFP120/P-LFBGA112

Smart Card Interface
Built-in

H-UDI
JTAG Debug Interface
(H8S/2218,2215R,and 2215T
Flash version of 2212)

H8S/2212/2215/2218Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM (Byte)	Memory Size RAM (Byte)	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
HD64F2212FP	64	LQFP	PLQP0064KC-A	128K	12K	24	42	3.0 to 3.6	−20 to 75 (−40 to 85)*	135/24 100/16
HD64F2211FP				64K	8K					
HD6432211(***)FP				64K	8K					
HD6432210(***)FP				32K	4K					
HD64F2215RTE	120	TQFP	PTQP0120LA-A	256K	20K	24/48	42	3.0 to 3.6	−20 to 75 (−40 to 85)*	132/24 93/16
HD64F2215TTE				256K	20K	24/48	42			
HD64F2215TE				256K	16K	16/48	62.5			120/16
HD64F2215RBR	112	P-LFBGA	PLBG0112GA-A	256K	20K	24/48	42			132/24 93/16
HD64F2215TBR				256K	20K	24/48	42			
HD64F2215BR				256K	16K	16/48	62.5			120/16
HD6432215B(***)TE	120	TQFP	PTQP0120LA-A	128K	16K	16/48	62.5	3.0 to 3.6	−20 to 75 (−40 to 85)*	120/16
HD6432215C(***)TE				64K	8K					
HD6432215B(***)BR	112	P-LFBGA	PLBG0112GA-A	128K	16K					
HD6432215C(***)BR				64K	8K					
HD64F2218TF	100	TQFP	PTQP0100LC-A	128K	12K	24	42	3.0 to 3.6	−20 to 75 (−40 to 85)*	135/24 100/16
HD6432217(***)TF				64K	8K					
HD64F2218BR	112	P-LFBGA	PLBG0112GA-A	128K	12K					
HD6432217(***)BR				64K	8K					

*: Wide temperature type

Development/Evaluation Products

- HSB8S2215RST: H8S/2215 Group Evaluation Board
- HSB8S2215ST: H8S/2215 Group Evaluation Board
- HSB8S2218ST: H8S/2218 Group Evaluation Board
- HSB8S2212ST: H8S/2212 Group Evaluation Board

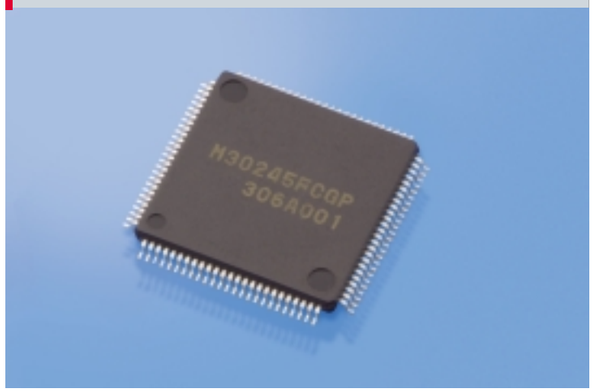
Please see P34 for details.

Full-Speed USB2.0 Function

M16C/20 Series

M30245

CERTIFIED USB Flash 16 bit



The M30245 (M16C/24 Group) consists of 16-bit single-chip MCUs with built-in USB functions in compliance with Full-Speed USB2.0. With a powerful M16C CPU embedded at the core, the M16C family boasts rich peripheral functions and handles high-speed processing with sophisticated instructions as well as its various USB control functions, such as the USB pull-up power source circuit and clock generator. The maximum 9 endpoints are equipped with FIFO to handle all USB transfer types. With the M30245, the addition of a multi-bit serial I/O enables an audio interface function, while the greater CRC calculating function enhances the memory card interface. In addition, other steps facilitating audio application are implemented, making this system simple to configure for use in memory card application fields. Meanwhile, the USB Function is also improved with the mounting of large-capacity FIFO, programmable FIFO volume capacity settings and a strengthened continuous transfer function. Besides this, an onboard rewritable flash memory version is also available, as is the highly in demand external bus access.

USB Function
USB Full-Speed (Control,Interrupt,Bulk, Isochronous)

Power Source for USB Pull-up
D+ Pull-up Power Source (Supply Control)

Endpoint
9 Endpoints

FIFO
1024 Byte (MAX)*1
3.2 KByte (Total)*2

Oscillation Circuit
2 circuits

DMA Controller
4 channels

A/D Converter
10 bits x 8 channels

Serial I/O
Multi-functional x 4ch

Timer
Multiple 16 bits x 5

I/O Ports
Input: 1
Programmable I/O: 82

Interrupt Factor
33

External Memory Connect
Memory Expansion Mode
Microprocessor Mode
(Programmable-Wait Function)

Minimum Instruction Execution Time
62.5 ns

Package
100-pin LQFP

Supply Voltage
3.0 to 3.6V

PLL Frequency Multiplier
Built-in
(USB 48MHz generated internally)

CRC Calculation Circuit
Selectable from 2 circuits
(CRC-CCITT/CRC16)

Watchdog Timer
1 channel

Vbus Detector
USB cable connection/ disconnection detector

Pull-up I/O Port
80(4-port unit)

*1. Maximum number of bytes allowing set to just one Endpoint. Using the double buffer mode doubles transmission capability. *2. Total number of built-in FIFO.

M30245 MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM (Byte)	Memory Size RAM (Byte)	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
M30245M8-XXXGP	100	LQFP	PTQP0100KB-A	64K	5K	16	62.5	3.0 to 3.6	−20 to 85	142/16
M30245MC-XXXGP	100	LQFP	PTQP0100KB-A	128K	10K	16	62.5	3.0 to 3.6	−20 to 85	142/16
M30245FCGP	100	LQFP	PTQP0100KB-A	128K*3	10K	16	62.5	3.0 to 3.6	−20 to 85	142/16

*3. Flash memory

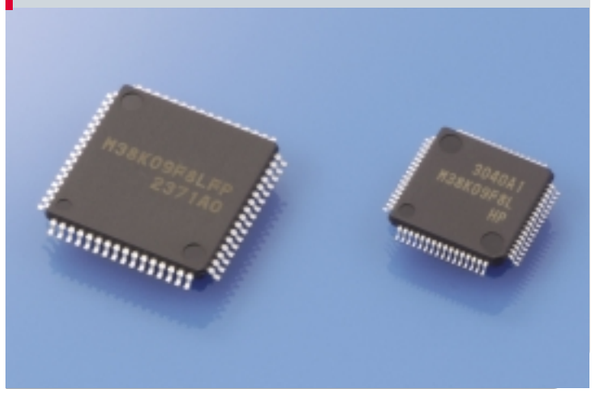
Development/Evaluation Products ●M3A-0245: M16C/24 Group M30245 Evaluation Board ➡ Please see P34 for details.

Full-Speed USB2.0 Function

38000 Series

38K0 Group

CERTIFIED USB Flash 8 bit



The 38K0 Group consists of 8-bit single-chip MCUs with built-in USB functions in compliance with Full-Speed USB2.0. The built-in 4 endpoints, external bus interface x 1, serial I/O x 1, 8-bit timer x 3 and A/D converter (8-channel) enable a variety of USB functions. In addition, 38K0 Group MCUs are suitable for USB conversion devices since the internal RAM can be accessed directly from USB and external interfaces.

USB Function
USB Full-Speed (Control,Interrupt,Bulk, Isochronous)

Power Source for USB Pull-up
D+ Pull-up Power Source

Endpoint
4 Endpoints

USB Buffer
MAX 64 Bytes x 6 +16 Bytes (Internal RAM used)*1

Bus Interface
8 bits x 1
DMA Specification

Serial I/O
UART/Clock Sync.
8 bits x 1 channel

A/D Converter
10 bits x 8 channels

Timer
8 bits x 3
(with Prescaler)

I/O Ports
48
(LED: 4)

Pull-up I/O Port
10

Interrupt Factor
15

Minimum Instruction Execution Time
250 ns

Package
64-pin LQFP
(0.5mm pitch/0.8mm pitch)

Supply Voltage
3.00 to 5.25V

PLL Frequency Multiplier
Built-in
(USB48MHz generated internally)

*1. Maximum number of bytes allowing set to just one Endpoint. Using the double buffer mode doubles transmission capability.

38K0 Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM (Byte)	Memory Size RAM (Byte)	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (℃)	Power Consumption (mW/MHz)
M38K07M4L-XXXFP	64	LQFP	PLQP0064GA-A	16K	1K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6
M38K07M4L-XXXHP	64	LQFP	PLQP0064KB-A	16K	1K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6
M38K09F8LFP	64	LQFP	PLQP0064GA-A	32K*2	2K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6
M38K09F8LHP	64	LQFP	PLQP0064KB-A	32K*2	2K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6

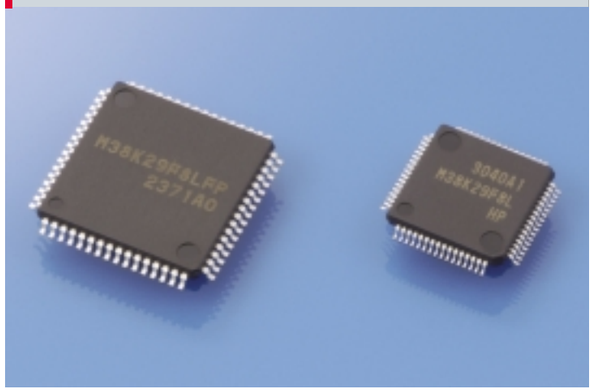
*2. Flash memory
*3. This is the maximum oscillation frequency which can be connected to external. Use 6MHz or 8MHz internal clock at 5V, 6MHz clock at 3V.

Development/Evaluation Products ●M3A-8K02: 38K0 Group/38K2 Group Evaluation, Development Board ➡ Please see P34 for details.

Full-Speed USB2.0 Function and Hub

38000 Series

38K2 Group



8 bit

The 38K2 Group consists of 8-bit single-chip MCUs with built-in USB Hub + USB functions in compliance with Full-Speed USB2.0. The built-in downstream ports x 2, 6 endpoints (USB functions: 4, USB Hub: 2), external bus interface x 1, serial I/O x 1, 8-bit timer x 3 and A/D converter (8-channel) enable a variety of USB Hub + USB functions. In addition, 38K2 Group MCUs are suitable for USB conversion devices since the internal RAM can be accessed directly from USB and external interface.

USB Function USB Full-Speed (Control,Interrupt,Bulk, Isochronous)	**Power Source for USB Pull-up** D+ Pull-up Power Source	**Endpoint** 2 Endpoints (USB Hub) 4 Endpoints (USB Function)	**USB Hub Function** 2 downstream port	**USB Buffer** MAX 64 Bytes x 6 +40 Bytes (Internal RAM used)*1	**Bus Interface** 8 bits x 1 DMA Specification	**Serial I/O** UART/Clock Sync. 8 bits x 1ch
A/D Converter 10 bits x 8 channels	**Timer** 8 bits x 3 (with Prescaler)	**I/O Ports** 44 (LED: 4)	**Pull-up I/O Port** 10	**Interrupt Factor** 16	**Minimum Instruction Execution Time** 250ns	**Package** 64-pin LQFP (0.5mm pitch/0.8mm pitch)
Supply Voltage 3.00 to 5.25V	**PLL Frequency Multiplier** Built-in (USB 48MHz generated internally)					

*1. Maximum number of bytes allowing set to just one Endpoint. Using the double buffer mode doubles transmission capability.

38K2 Group MCU Line-up

Part Number	Pin	Package	Package Code	Memory Size ROM (Byte)	Memory Size RAM (Byte)	Clock (MHz) (MAX)	Minimum Instruction Execution Time (ns)	Supply Voltage (V)	Operating Temperature (°C)	Power Consumption (mW/MHz)
M38K27M4L- XXXFP	64	LQFP	PLQP0064GA-A	16K	1K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6
M38K27M4L- XXXHP	64	LQFP	PLQP0064KB-A	16K	1K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6
M38K29F8LFP	64	LQFP	PLQP0064GA-A	32K*2	2K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/
M38K29F8LHP	64	LQFP	PLQP0064KB-A	32K*2	2K	12*3	250	3.00 to 5.25	−20 to 85	5V 125/6 3V 30/6

*2. Flash memory
*3. This is the maximum oscillation frequency which can be connected to external. Use 6MHz or 8MHz internal clock at 5V, 6MHz clock at 3V.

Development/Evaluation Products	●M3A-8K02: 38K0 Group/38K2 Group Evaluation, Development Board	➡ Please see P34 for details.

USB2.0 Host

USB Host-IP

USB IP

USB Host-IP consists of OHCI Host-IP, EHCI Host-IP and Renesas original Host-IP, which is librarized Renesas USB ASSP.
It is possible to choose a number of Endpoints and FIFO capacity according to the system.

USB communication function USB Full-Speed/Low-Speed (Control, Interrupt, Bulk,Isochronous) (OHCI)	**USB communication function** USB Hi-Speed (Control, Interrupt,Bulk, Isochronous) (EHCI, Renesas original *1)	**Maximum number of connectable functions** 10 Functions (Renesas original*2)	**Endpoint** 32 Endpoints (MAX) (OHCI, EHCI) 10 pipes (Fixation) (Renesas Original)	**FIFO** Special memory (with modifiable size) or external memory area available (OHCI, EHCI)Special memory 16KByte (MAX) (Renesas original)

*1. It does not support High Band Width of Isochronous and Interrupt type.
*2. Single-layer connection with an external HUB is available. When connected by the Full-Speed function via the Hi-Speed hub, the payload of 188 bytes or lower will be supported for Isochronous type.

USB2.0 Function

USB-IP

USB IP

USB-IP is librarized Renesas USB ASSP and consists of Full-Speed and Hi-Speed types.
It is possible to choose a number of Endpoints and FIFO capacity according to the system.

USB communication function USB Full-Speed (Control,Interrupt,Bulk,Isochronous)	**USB communication function** USB Hi-Speed (Control,Interrupt,Bulk,Isochronous)	**Endpoint** 16Endpoints (MAX) (FS) 8 Pipes (MAX) (HS)	**FIFO** 4KByte (MAX) (FS) 16KByte (MAX) (HS)

USB2.0 (480 Mbps) supporting low-capacitance surge absorption Zener diode

HZM6.2/6.8Z4MFA (MPAK-5, 4 elements), HZM6.2/6.8Z4MWA (MPAK-3, 2 elements),
RKZ6.2/6.8Z4MFAKT (VSON-5T, 4 elements),,
HZD6.2/6.8Z4 (SFP, 1 element), HZL6.2/6.8Z4 (EFP, 1 element)

Protecting an electric equipment and an electron device from ESD surge in a high-speed signal transmission path.

Electrical characteristics*3

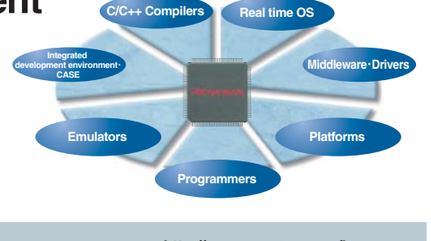
Item	Code	Test condition		6.2Z4 (6.2V) Min.	6.2Z4 (6.2V) Typ.	6.2Z4 (6.2V) Max.	6.8Z4 (6.8V) Min.	6.8Z4 (6.8V) Typ.	6.8Z4 (6.8V) Max.	Unit
Zener voltage	Vz	Iz=5mA 40ms Pulse		5.9	—	6.5	6.47	—	7.0	V
Reverse leak current	IR	VR=3.5V		—	—	—	—	—	2.0	μA
		VR=5.5V		—	—	3.0	—	—	—	μA
Junction capacitance	C	VR=0V f=1MHz	2.4 elements	—	4.0	4.5	—	4.0	4.5	pF
			1 elements	—	—	4.0	—	—	4.0	pF
Dynamic resistance	Rd	Iz=5mA		—	—	60	—	—	30	Ω
ESD*4	—	C=150pF R=330Ω 10 times forward and reverse impression		8	—	—	8	—	—	kV

*3 Value per one element *4 Based on IEC61000-4-2 / Judgment with reverse leak current

Renesas Development Environment

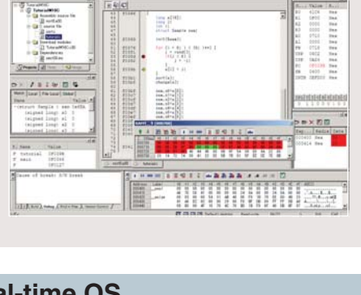
Web **http://www.renesas.com/tools**

While improving the engineers' productivity by shortening development cycle, Renesas provides development tools that will allow users to get more performance out of MCUs.
Moreover, we have partnered with wide variety of vendors who can respond to Renesas customers' need and requirements as well.



High-performance Embedded Workshop

http://www.renesas.com/hew



- Seamless development environment
  - Each tool, from editor to debugger, is integrated and managed collectively
  - Various build*1 patterns are flexibly supported
    (It is possible to store multiple option specification patterns, and to add an external tool to build processes, etc.)
- Test support function to improve debugging efficiency
  - Record and re-execution of build and debugging operations using the macro generation support function
  - Archive and compare window execution results contents from macro executions in test image files
- Constant provision of the latest tools and documents
  - Auto update utility
  - Document updater
- Coordination with products provided by partner vendors (such as CASE tools etc.)

*1. Build: This is a series of processes that execute the compiling, assembling, and linkage, and then generate the object module.

Real-time OS

http://www.renesas.com/uitron

- High-speed and compact μITRON specification OS
  - Real-time OS for device-embedded systems
  - Provided along with a rich lineup of middleware and platforms to address the total solution with Renesas microprocessors.

Emulator Lineup

http://www.renesas.com/emulation_debugging

- **Wide range of lineup of emulators that can be selected for your purpose**
- **Easily operatable from High-performance Embedded Workshop**

Professional — Introductory

Full-specification Emulators

E200F Emulator

The E200F emulator is a high performance emulator with on-chip debugging emulation and bus trace functions.

- Real-time emulation with a maximum operation frequency of MCU is available
- PC interface: USB

Web http://www.renesas.com/e200f

SH

E6000H Emulator

The E6000H emulator is a high-performance emulator complying to the maximum operation frequency of 100MHz.

- Enhanced emulation functions such as C language source level debugging, trace and break
- Realizing debugging environment complying to any operating environment
- PC Interface: PCI Bus, PC Card Bus, LAN, USB

Web http://www.renesas.com/e6000h

H8SX

E6000 Emulator

The E6000 emulator is a high-performance emulator complying to the maximum operation frequency of 33MHz.

- Enhanced emulation functions such as C language source level debugging, trace and break
- PC Interface: PCI Bus, PCMCIA Bus, LAN, USB

Web http://www.renesas.com/e6000

H8S

PC4701U Emulator

The PC4701U emulator is a high-performance emulator common to M16C, 740 family complying to the operating frequency of microcomputers up to 20MHz.

- The 4701U emulator can be modified to the debugging environment corresponding to various microcomputers at the minimum cost.
  (The simulation pod is changeable by each microcomputer.)
- PC Interface: LAN, USB, LPT Parallel

Web http://www.renesas.com/pc4701u

M16C 740

Compact Emulator

M38000T2-CPE

Fully functional, low-priced, and compact in-circuit emulator

- This product package includes a set of development tools, such as an integrated development environment, an emulator debugger, and an evaluation version of a C compiler/assembler.
- Though the emulator is small in size, it is capable of addressing full scale development through use of its capable functions, such as real-time tracing.
- PC interface: USB

Web http://www.renesas.com/cpe

740

On-chip Debugging Emulators

E10A-USB Emulator

The emulator is an OCD (On Chip Debugging) emulator excellent in cost performance.

- The E10A-USB emulator is capable of debugging a users system in a state as close as a final product.
- The emulator is USB bus powered and thus external power supply is not needed
- PC Interface: USB

Web http://www.renesas.com/e10a_usb

SH H8S H8SX

Development Tools for the SuperH™ Family

MCU		Software tool				Hardware too				Programmer (Flash)
						Economy model *2	High-performance model *2			
Series	Group	RTOS (μITRON)	C/C++ Compiler Package	Simulator Debugger	IDE	Emulator *3	Emulator	Host Interface board	User system Interface board or evaluation chipboard	Options	
SH7780	SH7722★	(HI7700/4) R0R40770TRW02w*1 (HI7300/PX) R0R50730PRW01w*5	C/C++ Compiler Package for SuperH Family (MISRA C Correspondence*4)			(E10A-USB) HS0005KCU01H/ 02H*8	(E200F) R0E0200F2EMU00	Bundled with emulator	—	R0E0200F0ETU00 *6 (External bus trace unit) R0E0200F0EPU00 (Extended profile unit)	—
	SH7763★	(HI7750/4) R0R40775TRW02w*1 (HI7300/PX) R0R50730PRW01w*5									
SH7750	SH7760	(HI7750/4) R0R40775TRW02w*1									
SH7700	SH7727	(HI7700/4) R0R40770TRW02w*1					—	—		—	
	SH7720 SH7721★										
	SH7705										
SH7641	SH7641										
SH7200	SH7203★	(HI7000/4) R0R40700TRW02w*1					(E200F) R0E0200F1EMU00	Bundled with emulator		R0E0200F0ACC00 (Trace cable) R0E0200F0EPU00 (Extended profile unit) R0E0200F1ETU00 *7 (External bus trace unit) R0E0200F1MSR00 (8MByte) *7 (Emulation memory unit) R0E0200F1MSR01 (16MByte) *7 (Emulation memory unit)	
SH7260	SH7263★										

*1.w="1": Evaluation contract for one host machine; w="5": Evaluation contract for up to five host machines; w="A": Evaluation contract for up to ten host machines; w="K": Mass production contract for up to 1,000 user systems; w="U": Mass production contract for an unlimited number of user systems; w="Z": Mass production contract for an unlimited number of user systems, with kernel source code; *2. Emulator software is bundled with an emulator. *3. HS0005KCU01H only uses the H-UDI device function. HS0005KCU02H uses the H-UDI AUD device functions. *4. By installing the separately available MISRA C rule checker SQMlint (t type name R0C00000SCW01R), the MISRAC rule inspection function is added. *5. HI7300/PX supports SH-4A and SH4AL-DSP MCUs. *6. The trace cable (R0E0200F0ACC00) is bundled *7. A trace cable is required. When attaching multiple optional products, use only one trace cable. *8.The emulator softwine is being developed for SH7721. ★New product

Development Tools for the M16C Family

MCU			Software tool			Hardware tool				Programmer
								User system terminal area		
MCU	Group	MCU	RTOS	C Compiler Package (simulator debugger is bundled)	IDE	Emulator (emulator debugger is bundled *5)	Emulation pod	Package name	Recommended accessories	
M16C/20	M16C/24	M30245	(M3T-MR30/4) R0R30600TRW02wJ*1	(M3T-NC30WA)*2 R0C30600CLW05R (MISRA C*3)	High-performance Embedded Workshop*4	PC4701U	M30245T3-RPD-E	PLQP0100KB-A (100P6Q-A)	*6	*7

*1. The M3T-MR30 is the generic name for a real-time OS development kit (M3T-MR30K) and mass production contract (M3T-MR30S). *2. The M3T-NC30WA includes an integrated development environment (High-performance Embedded Workshop, TM), C compiler, assembler and simulator debugger (M16C R8C simulator debugger.) *3. The MISRA C rule checker SQMlint (type name: R0C00000SCW01R) is an optional product for the Renesas C compiler. *4. A High-performance Embedded Workshop is included with the C compiler package. An integrated development environment TM (bundled in the C compiler package) is also available. *5. The following and most recent version of the emulator debugger can be downloaded from the Internet (free of charge): M16C PC4701 emulator debugger *6. Refer to the accessory information website (http://www.renesas.com/accessory) for accessories.
*7. Programs prepared by our partner vendors are addressing to your requirements.

Development Tools for the H8SX, H8S Family

MCU		Software tool				Hardware tool					Programmer (Flash)
						Economy model *2	High-performance model*2				
Series	Group	RTOS (μITRON)	C/C++ Compiler Package	Simulator Debugger	IDE	Emulator *3	Emulator	Host Interface board	User system Interface board or evaluation chipboard	Options	
H8SX/1600	H8SX/1658R★★	(HI1000/4) R0R41600TRW 01w *1	C/C++ Compiler Package for H8SX, H8S, H8 Family (MISRA C Correspondence *4)			(E10A-USB) HS0005KCU01H/02H★★	(E6000H) HS1650EPH60H★★	HS6000EIP02H (PC-Card) or HS6000EIC02H (PCI-Card) or HS6000ELN01H (LAN-Adapter) or HS6000EIU02H (USB-Adapter)	HS1658RECN61H★★ (LQFP-120)	—	R0E00008AKCE00 (USB) or HS0008EAUF1H (USB) *7 or HS0008EASF4H (RS-232C) + R0C00000FDW04R★★
	H8SX/1653					(E10A-USB) HS0005KCU01H/02H	(E6000H) HS1650EPH60H*6		HS1653ECN61H (TFP-120)		R0E00008AKCE00(USB)or HS0008EASF4H (RS-232C) or HS0008EAUF1H (USB) *7 + R0C00000FDW04R
	H8SX/1668R★★					(E10A-USB) HS0005KCU01H/02H★★	(E6000H) HS1650EPH60H★★		HS1668RECH61H★★ (FP-144L)		R0E00008AKCE00 (USB) or HS0008EAUF1H (USB) *7or HS0008EASF4H (RS-232C) + R0C00000FDW04R★★
	H8SX/1663					(E10A-USB) HS0005KCU01H/02H	(E6000H) HS1650EPH60H*6		HS1664ECH61H (FP-144L)		R0E00008AKCE00(USB)or HS0008EASF4H (RS-232C) or HS0008EAUF1H (USB) *7 + R0C00000FDW04R
H8S/2400	H8S/2462 ★★					(E10A-USB) HS0005KCU01H/02H★★	—	—	—	—	R0E00008AKCE00 (USB) or HS0008EAUF1H (USB) *7 or HS0008EASF4H (RS-232C) + R0C00000FDW04R★★
	H8S/2472★★										
H8S/2200	H8S/2218					(E10A-USB) HS0005KCU01H/02H	(E6000) HS2214EPI62H*5	HS6000EIP02H (PC-Card) or HS6000EIC02H (PCI-Card) or HS6000ELN01H (LAN-Adapter) or HS6000EIU02H (USB-Adapter)	HS2218ECN61H (TFP-100G) or HS2218ECB62H (BP-112)	HS6000EMS12H (4MB) (Expansion memory)	HS0008EASF4H (RS-232C) or HS0008EAUF1H (USB) *7 + R0C00000FDW04R
	H8S/2215					(E10A-USB) HS0005KCU01H/02H※8	(E6000) HS2214EPI62H *5		HS2215RECN61H (TFP-120) or HS2215RECB62H (BP-112)	HS6000EMS12H (4MB) (Expansionmemory)	
	H8S/2212					(E10A-USB) HS0005KCU01H/02H	(E6000) HS2214EPI62H *5		HS2212ECH61H (FP-64E)	—	
H8S/2100	H8S/2172						—	—	—	—	HS0008EASF4H (RS-232C) or HS0008EAUF1H (USB) *7 or R0E00008AKCE00(USB)+ R0C00000FDW04R

*1.w = "1": Evaluation contract for one host machine; w = "5": Evaluation contract for up to five host machines; w = "A": Evaluation contract for up to ten host machines; w = "K": Mass production contract for up to 1,000 user systems; w = "U": Mass production contract, no limit on the number of user systems; w = "Z": Mass production contract, no limit on the number of user systems, with kernel source code. *2. Emulator software is bundled with an emulator.
*3. HS0005KCU01H only uses the H-UDI function of the device. HS0005KCU02H uses the H-UDI and AUD functions of the device. *4. The MISRA C rule checker SQMlint (type name: R0C00000SCW01R) is an optional product for the Renesas C compiler. *5. A package deal with HS6000EIU02H (USB-Adapter) is also available. The package type name has -U at the end of the type name of E6000. Ex. HS2214EPI62H-U". *6. A package deal with HS6000EIU02H (USB-Adapter) is also available. The package type name has -U at the end of the type name of E6000H. Ex. HS1650EPH60H-U. *7. A license of R0C00000FDW04R is bundled with HS0008EAUF1H.
*8. Only the H8S/2215R,H8S/2215T corresponds. ★★Under development

Development Tools for the 740 Family

MCU		Software tool		Hardware tool				
Series	Group	Assembler Package C Compiler Package	IDE	Emulator (Compact emulator)	Emulator MCU	Package name	Recommended accessories	Programmer
38000	38K0	C compiler Package M3T-ICC740 *1 or Assembler Package M3T-SRA74 *2	High-performance Embedded Workshop *3 *4	M38000T2-CPE *5	M38K09RFS	PLQP0064KB-A (64P6Q-A) PLQP0064GA-A (64P6U-A)	*6	*7
	38K2				M38K29RFS	PLQP0064KB-A (64P6Q-A) PLQP0064GA-A (64P6U-A)		

*1. The M3T-ICC 740 product includes the IAR System's C compiler ICC740, Renesas's Integrated development environment, Renesas's simulator debugger and others. *2. The M3T-SRA74 product includes the integrated development environment, assembler, simulator debugger and others. *3. The high-performance Embedded Workshop is bundled to the C-compiler package and assembler package. *4. The integrated development environment TM (bundled to the C-compiler package and assembler package) can also be used. *5. The compact emulator M38000T2-CPE is attached with the integrated development environment, emulator debugger and compiler for evaluation purposes at no cost.*6. Refer to the accessory information website (http://www.renesas.com/accessory) for accessories.
*7. Programs prepared by our partner vendors are addressing to your requirements.

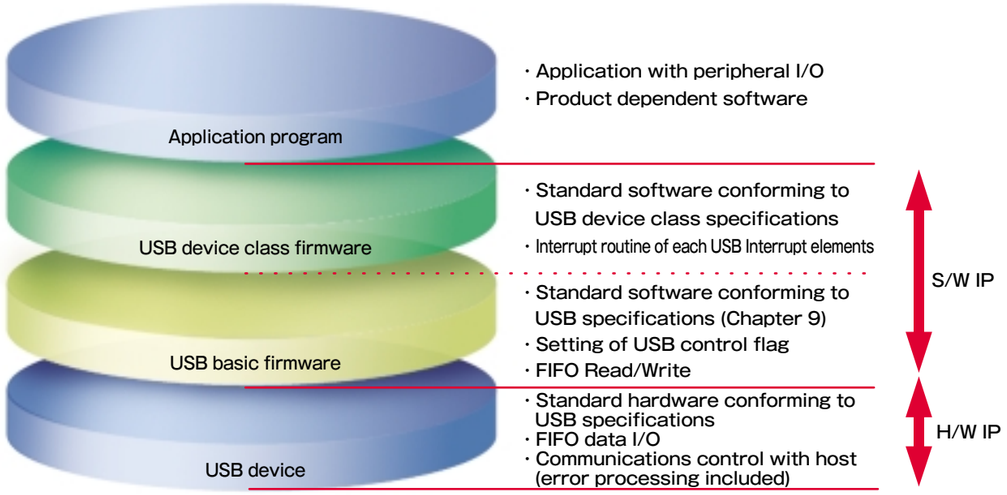
3rd Party Programmer Manufacturers

Data I/O Corporation	http://www.dataio.com E-mail rodgerb@data-io.com	**SUISEI ELECTRONICS SYSTEM CO., LTD.**	http://www.suisei.co.jp/index_e.html E-mail support@suisei.co.jp
Flash Support Group, Inc.	http://www.j-fsg.co.jp/e/form_ask01.html	**Sunny Giken Inc.**	http://www.sunnygiken.co.jp/english/ E-mail support_apl@renesas.com (Renesas Solutions Corp.)
Minato Electronics Inc.	http://www.minato.co.jp E-mail int-support@minato.co.jp	**Wave Technology Co.,Ltd.**	http://www.y1000.com/ E-mail e_sales@y1000.com
Sophia Systems Co., Ltd.	http://www.sophia-systems.com/ E-mail sales@sophiasys.com	**Yokogawa Digital Computer Corporation**	http://www.yokogawa-digital.com/emb/product/NETIMPRESS.html E-mail info-impress@yokogawa-digital.com

USB Development/Evaluation Products

Renesas supports you build demo boards for the trial USB interface control program (USB F/W) and for evaluation of the your system development.
With these demo boards added to your development environment, USB protocol control is no longer necessary. The end result easier and faster system development.
They also strongly support our customers' USB system development through our agreements with partner vendors.

USB program configuration (software IP)



USB Interface Control Program (USB F/W)

	Function						Host	
	Basic Firmware	Vendor	HID	Mass Storage	Comm.	Printer	Basic Firmware	Mass storage
SH7203/SH7263	○			○			○	○
SH7705				○	○	○	–	
SH7727				○	○	○	○	
SH7641				○	○	○	–	
SH7720				○	○	○	○	
SH7760							○	
SH7763				*	*	*	*	
H8SX/1653			○	○	○	○	–	
H8S/2212, H8S/2218			○	○	○	○	–	
H8S/2215			○	○	○	○	–	
H8S/2170				○			–	
M30245	○						–	
38K0	○				○		–	
38K2	○				○		–	
M66291	○	○		○	○		–	
M66591	○	*			*		–	
M66592	○			○	○		–	
M66596	○			○			○	○
R8A66597	○			○			○	○

○ : Now supported/Now on Sale ＊: Under development –:N/A

Demo Board/Evaluation Board — Hi-Speed MCU

R0K572630D000BR＜SH7263 Evaluation Board＞

Equipped with hardware required to evaluate the SH7263 USB, LCDC, SSI and other functions of the SH7263. Standard embedding of USB interface, LCD module interface, audio interface, and other advantages and is suitable for advanced development of USB application products such as digital audio devices. In addition, all I/O ports of SH7263 are connected to the expansion connectors, enabling simple evaluation of peripheral functions and H/W expansion.

MS7722SE01＜SH7722 Solution Engine＞

Evaluation board embedded with the H/W for evaluating the H.264/MPEG4 dynamic picture image, camera, USB, LCDC, SD Card, and other functions of SH7722. An environment where a main OS, such as a μITRON or WindowsCE, can function and the on-chip debugger can connect as ready. It is also possible to use this as an easy program evaluation board in combination with a simple monitoring program. This board is a product of Hitachi ULSI Systems Co., Ltd.

Demo Board/Evaluation Board — Full-Speed MCU

MS7720RP02＜SH7720 Solution Engine Light＞ MS7727RP03＜SH7727 Solution Engine Light＞

Evaluation board embedded with the H/W for evaluating built-in USB, LCDC, SIOF and other functions of SH7720 and SH7727. The environment where main OS such as μITRON and the on-chip debugger connection run is ready. Connection with various USB ASSP utility boards (*1) is possible through relay board M3A-ZA53. It is also possible to use it as an easy program evaluation board in combination with a simple monitor program. This board is a product of Hitachi ULSI Systems Co., Ltd.
*1: Option : M3A-0032, M3A-0037G01, M3A-0038G01, M3A-0039, M3A-0040

MS7760CP02P＜SH7760 Solution Engine 2＞

Evaluation board embedded with the H/W for evaluating built-in USB, LCDC, SCIF and other functions of SH7760. The environment where main OS such as μITRON can work and the on-chip debugger can be used is ready. It is also possible to use it as an easy program evaluation board in combination with a simple monitor program. This board is a product of Hitachi ULSI Systems Co., Ltd.

HSB8SX1653F,HSB8SX1654F<H8SX/1653 Group Evaluation Board> HSB8SX1663F,HSB8SX1664F<H8SX/1663 Group Evaluation Board>

Evaluation board for CPUs equipped with the H8SX/1653 or 1663 Groups. Application as a program evaluation board by connecting a full emulator or an on-chip emulator. This board is a product of Hokuto Denshi Co., Ltd.

HSB8S2215RST <H8S/2215 Group Evaluation Board> HSB8S2215ST <H8S/2215 Group Evaluation Board> HSB8S2218ST <H8S/2218 Group Evaluation Board> HSB8S2212ST <H8S/2212 Group Evaluation Board>

These boards contain the H8S/2215, H8S/2218 and H8S/2212 group, and it is possible to use them as an easy program evaluation board in combination with a monitor program. Emulator connection is possible and the flash chip is loadable. In addition, the USB starter's kit is also available as an evaluation kit.

M3A-0245<M16C/24 Group M30245 Evaluation Board>

Equipped with hardware required to evaluate USB and other peripherals functions of M30245. Loading of emulator connection or a flash-chip is possible. The board M3A-7754*1 for pitch conversion board can be connected and program rewriting of a flash-chip is easy. Moreover, since the connector which can be used to expand the universal board etc. is supported, the functional evaluation according to the use is possible. It can be used as an easy program evaluation board in combination with a simple monitor program. *1: Option

M3A-8K02<38K0 Group/38K2 Group Evaluation, Development Board>

Evaluation/development board for the 38K0 Group and 38K2 Group. Embedded with circuits needed for USB function and USB hub, application of the external circuit use universal board (G04) facilitates simple development and evaluation of USB systems. Replacing the two-board set upper surface boards (G02, G03) makes it possible to conduct inspections with both flash-chips and debuggers. Since it is possible to exchange Vcc = 5V/ 3.3 V, and USB rewriting/serial rewriting of flash memory with an easy switch, changes in peripheral setup can be performed in a short time.

Demo Board / Evaluation Board

Full-Speed/Hi-Speed USB ASSP

M3A-0032<M66291GP Utility Board>

A utility board embedded with the H/W required for M66291GP and USB communication. Two PCB connectors (13-pin x 2-line) are prepared for microprocessor connection. This connector is compatible with other Renesas USB ASSP utility boards, and is easily connectable to systems using Renesas USB ASSP. This comes equipped with a 12-MHz quartz-crystal oscillator, USB connector, test pin, and jumper SW for bus mode selection (expansion function of the M66291GP).

M3A-0037G01<M66591GP Utility Board>

A Utility board equipped with the H/W required for M66591GP and USB communication, and including controlled D+/D- line impedance matching. Features two built-in PCB connectors (25-pin x 2-line) for MCU board and split bus connections. These connectors are compatible with other Renesas USB ASSP utility boards, and easily connectable to systems using Renesas USB ASSP. This comes equipped with a 24-MHz quartz-crystal oscillator, USB connector, test pin, and jumper SW for interface power supply change.

M3A-0038G01<M66592FP Utility Board>

A utility board embedded with the H/W required for M66592FP and USB communication, and including controlled D+/D- line impedance matching. Features two built-in PCB connectors (25-pin x 2-line) for MCU board and split bus connections. These connectors are compatible with other Renesas USB ASSP utility boards, and easily connectable to systems using Renesas USB ASSP. This comes equipped with a 24-MHz quartz-crystal oscillator, USB connector, test pin, and jumper SW for interface power supply change.

M3A-0039<M66596FP Utility Board>

A utility board embedded with the H/W required for M66596FP and USB communication, and including controlled D+/D- line impedance matching. Features two built-in PCB connectors (25-pin x 2-line) for MCU board and split bus connections. These connectors are compatible with other Renesas USB ASSP utility boards, and are easily connectable to systems using Renesas USB ASSP. This comes equipped with a 24-MHz quartz-crystal oscillator, USB connector, test pin, and jumper SW for interface power supply change.

M3A-0040<R8A66597FP Utility Board>

A utility board embedded with the H/W required for R8A66597FP and USB communication and including controlled D+/D- line impedance matching. Features two built-in PCB connectors (25-pin x 2-line) for MCU board and split bus connections. These connectors are compatible with other Renesas USB ASSP utility boards, and are easily connectable to systems using Renesas USB ASSP. This comes equipped with a 24-MHz quartz-crystal oscillator, USB connector, test pin, and jumper SW for interface power supply change.

Demo Board / Evaluation Board

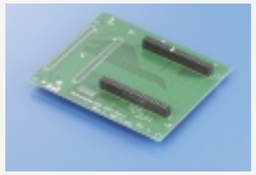
USB ASSP Evaluation Tool

M3A-0033<Renesas USB ASSP Evaluation Motherboard>

CPU board with a simple debugger embedded with M16C/80. By combining it with various USB ASSP utility boards (*1), all Renesas USB ASSP can easily be evaluated. It comes equipped with M16C/80, 10 MHz, a RS-232C driver, and interface connector for PC.

*1. Option:M3A-0037G01, M3A-0038G01, M3A-0039, M3A-0040
Bundle:M3A-0032

M3A-ZA53<for SuperH Solution Engine>
Converter Board for USB ASSP Utility Board



Relay board for evaluating Renesas USB ASSP from the SuperH Solution Engine™ using various USB ASSP utility boards (*1). It can be used in combination with the processor system Solution Engine™ (*2) and various USB ASSP utility boards .

*1. Option:M3A-0032, M3A-0037G01, M3A-0038G01, M3A-0039, M3A-0040
*2. Option:MS7727RP03, MS7720RP02

(An instance)

Memo

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