

Powertrain



The SH725x (SH-2A) is a high performance, highly integrated, high quality and cost-effective single chip 32-bit RISC microcontroller family for automotive applications, especially for powertrain. The SH725x delivers high performance with up to 200 MHz operation with extremely low power consumption, on-chip memory integration (up to 4 MB Flash, 256 KB SRAM, 128 KB data flash) and excellent peripherals.

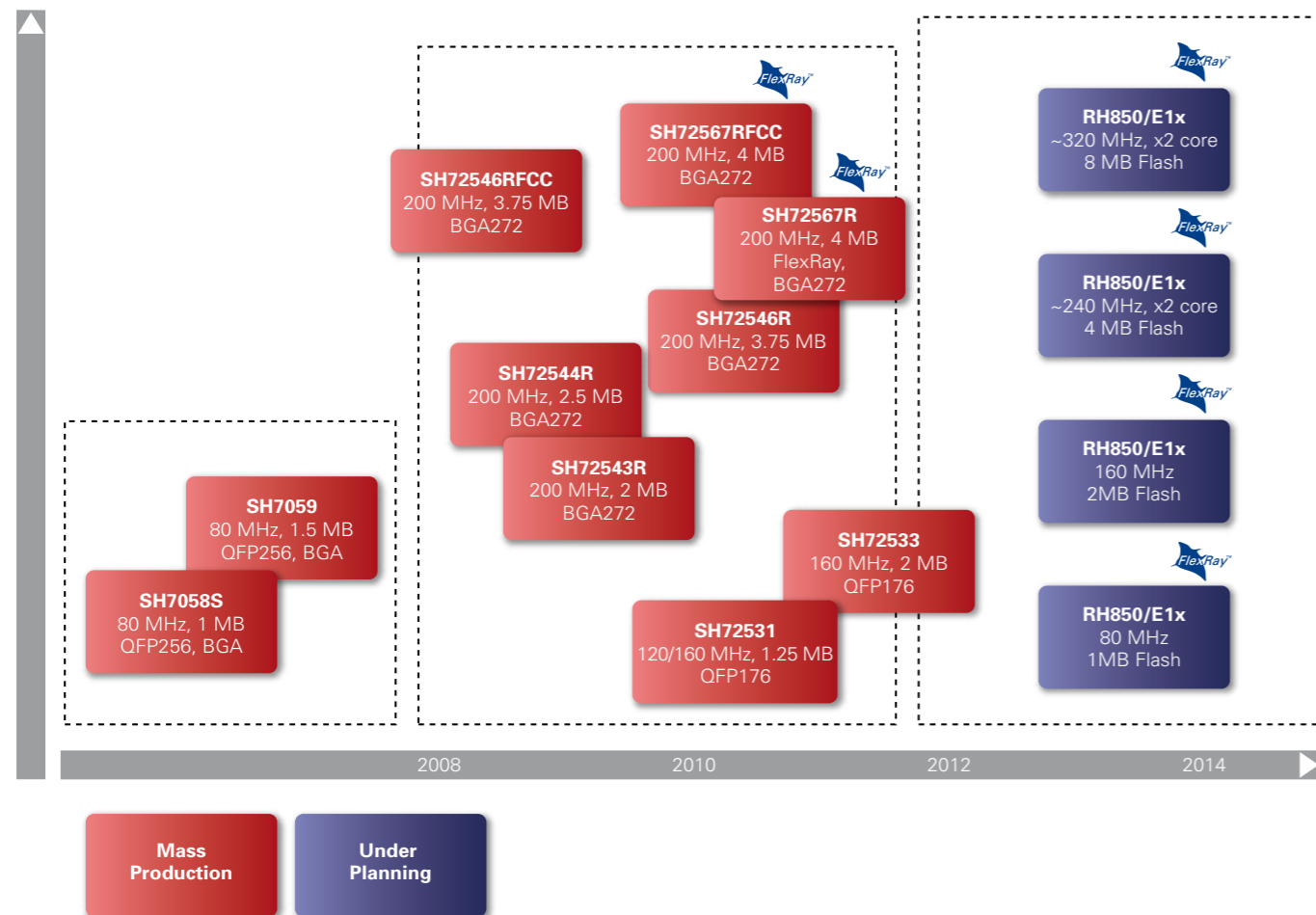
Applications

- > Engine Management
- > Transmission Management
- > Electronic Valve Control
- > High performance automotive systems with embedded Flash

Key features

- > High performance, 32-bit RISC Controller Superscalar
- > Single/double precision Floating Point Unit
- > High integration (up to 4 MB Flash, 256 KB SRAM, 128 KB data flash (EEPROM emulation))
- > Flash, SRAM and data flash with ECC
- > High quality and reliability
- > Excellent peripherals (RCAN, ADC, etc.)
- > Advanced Timer Unit (ATU-III) for up to eight cylinder engine control and complex operations
- > Comprehensive on-chip debugging features

Performance & Integration



Hardware features of SH725x family

CPU

- > 480 Mips Dhrystone @ 200 MHz
- > SH-2A core
- > 32-bit RISC superscalar architecture
- > Harvard bus architecture
- > High code density thanks to 16-bit instruction base
- > 16 x 32-bit general-purpose registers
- > 32 x 32- + 64-bits MAC for DSP algorithms
- > 5-stage pipeline
- > 235 interrupt vectors, 16 priority levels

Floating-point unit

- > Single-precision mode (IEEE-1394 compliant)
- > 16 x 32-bit dedicated floating-point registers
- > Double-precision mode (IEEE-1394 compliant)
- > 8 x 64-bit dedicated floating-point registers
- > Square root function
- > Configurable NaN/Infinity handling

On-chip memory

- > Up to 4 MB flash, three-cycle random access @ 200 MHz, single-cycle access if cache hits
- > Up to 256 KB SRAM
- > Up to 128 KB data flash with EEPROM emulation

DMA controller

- > 8-channel: general-purpose with 4 GB address space
- > Burst mode, normal cycle-steal mode and intermittent cycle-steal mode
- > Peripheral units can trigger DMA directly without interrupt or CPU
- > 66-channel: automotive purpose, assigned to peripheral units (fixed)

On-chip peripherals

- > ATU-III advanced timer unit with up to 122 pulses for up to 8 cylinders
- > Angle clock generation, PWM, input capture, output compare
- > Watchdog timer (WDT)
- > Phase-lock loop (PLL)
- > On-chip back-up clock oscillator
- > RCAN interface (Bosch V2.0B compliant)
 - Up to 4 channels
 - 32 message buffers/channel
 - message priority system

- > FlexRay™ interface (1 node/2 channels)
- > Up to 5 serial communication interfaces (SCI)
 - synchronous and asynchronous
- > Bus-state controller (BSC)
 - 4 chip selects, 16-bit data bus support (max.)
- > A/D converter
 - 2 independent converters with sample and hold (up to 40 ch + 9 ch)
 - 1.25 µs per conversion
- > More than 140 general-purpose I/O pins

On-chip debug and calibration interface

- > JTAG, high-performance user debug interface (H-UDI) for high-speed download
- > Advanced user debugger (AUD-II) for non-intrusive calibration and trace output
- > User break controller for hardware breakpoints

Temperature and packages

- > TA = -40...+125 °C
- > BGA-272, QFP-176

Development tools and support

Hardware debugging tools

- > Renesas ASK72546/ASK72567
- > Renesas E10A-USB on-chip debugger
- > Lauterbach Supertrace
- > plS UDE development tools

C, C++ compiler

- > Renesas C/C++, GNU C/C++, Greenhills C/C++, IAR Systems C/C++

3rd party support

- > OSEK: Vector Informatik, ETAS
- > CAN driver: Vector Informatik
- > Flash bootloader: Vector Informatik
- > Automatic code generation: dSpace (Targetlink)
- > Calibration support: ETAS (ETK, INCA), Vector Informatik (VX1000), dSpace (GS11)

Device		CPU			Memory		Interfaces			Timer			ADC	Power	Package	
Nickname	Partnumber	Frequency [MHz]	Core	FPU	Flash ROM [MB]	Data Flash [kB]	RAM [kB]	SCI/R-SPI	CAN	FlexRay™	Channels	PWM	SENT	12-bit [Channels]	Supply Voltages	Pins
SH72531	R5F72531KFPV	120	SH2A	Single/double precision	1.25	32	64	3/2	2	--	64	20	2	9+23	3.3+5.0 V	QFP176
SH72531D	R5F72531DKFPV	160	SH2A		1.25	32	64	3/2	2	--	64	20	2	9+23		QFP176
SH72533	R5F72533KFPV	160	SH2A		2	32	96	3/2	2	--	64	20	2	9+23		QFP176
SH72543R	R5F72543RKBGV	200	SH2A		2	128	128	5/3	3	--	96	40	4	9+28		BGA272
SH72544R	R5F72544RKBGV	200	SH2A		2.5	128	128	5/3	3	--	96	40	4	9+28		BGA272
SH72546R	R5F72546RKBGV	200	SH2A		3.75	128	256	5/3	3	--	96	40	4	9+28		BGA272
SH72567R	R5F72567RKBGV	200	SH2A		4	128	256	5/3	4	2 ch	96	40	4	9+28	BGA272	

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