

# Smart Solutions for Car Infotainment

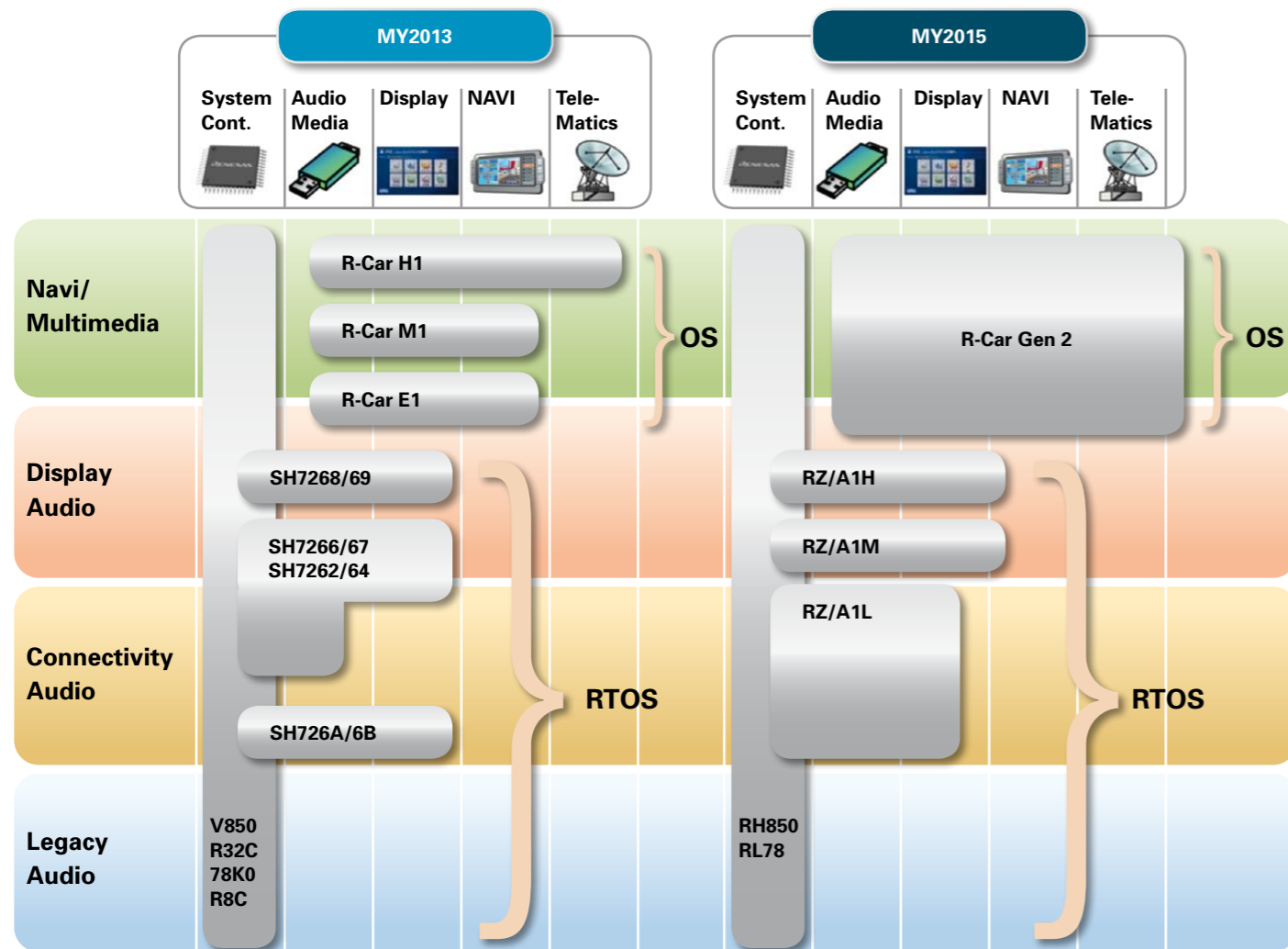


# Infotainment Solutions

Renesas has a long experience in the automotive infotainment segment and is the market leader in Japan since the introduction of navigation in the car. With the achieved know-how and established software Eco-System Renesas can provide solutions for entry level radios, leading edge connected multimedia systems and high end multimedia navigation systems. Synergies from the mobile segment are leveraging the technologies used for our infotainment products.



## Roadmap for Infotainment Applications

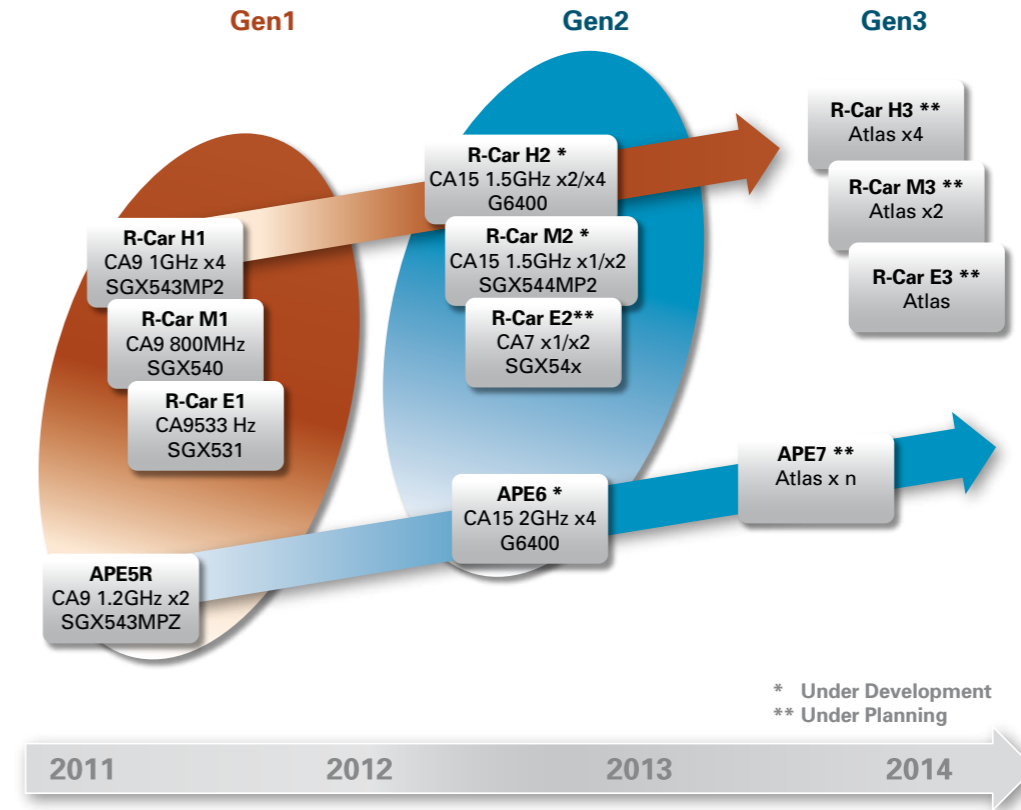


### Scalability and efficiency

- > Large variety of infotainment products for navigation, HMI and connected radios
- > Ecosystem for fast SW development from operating systems to complete application frameworks
- > Leading process technology ensures best performance at lowest power consumption

# Navigation & Multimedia SoC

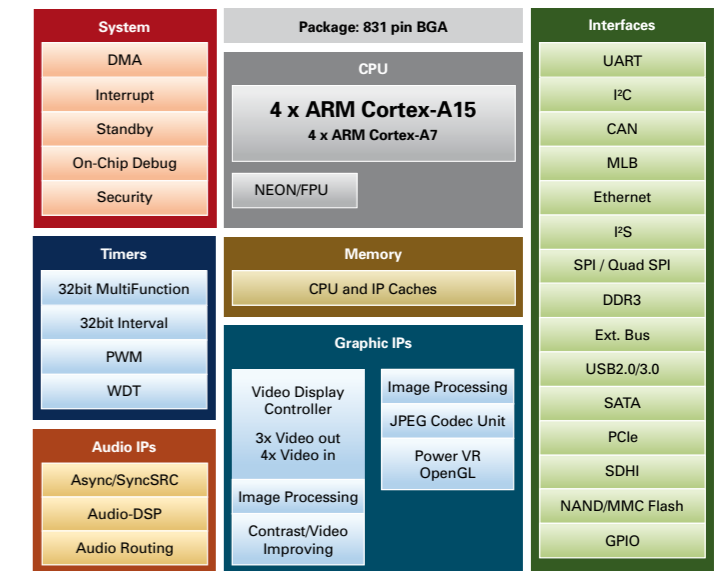
Renesas' R-CAR family provides suitable performance for all kind of infotainment and multimedia systems. The high integration of powerful hardware accelerators enables features like HD video en/decoding, image/voice recognition and impressive 3D graphics with almost no CPU load.



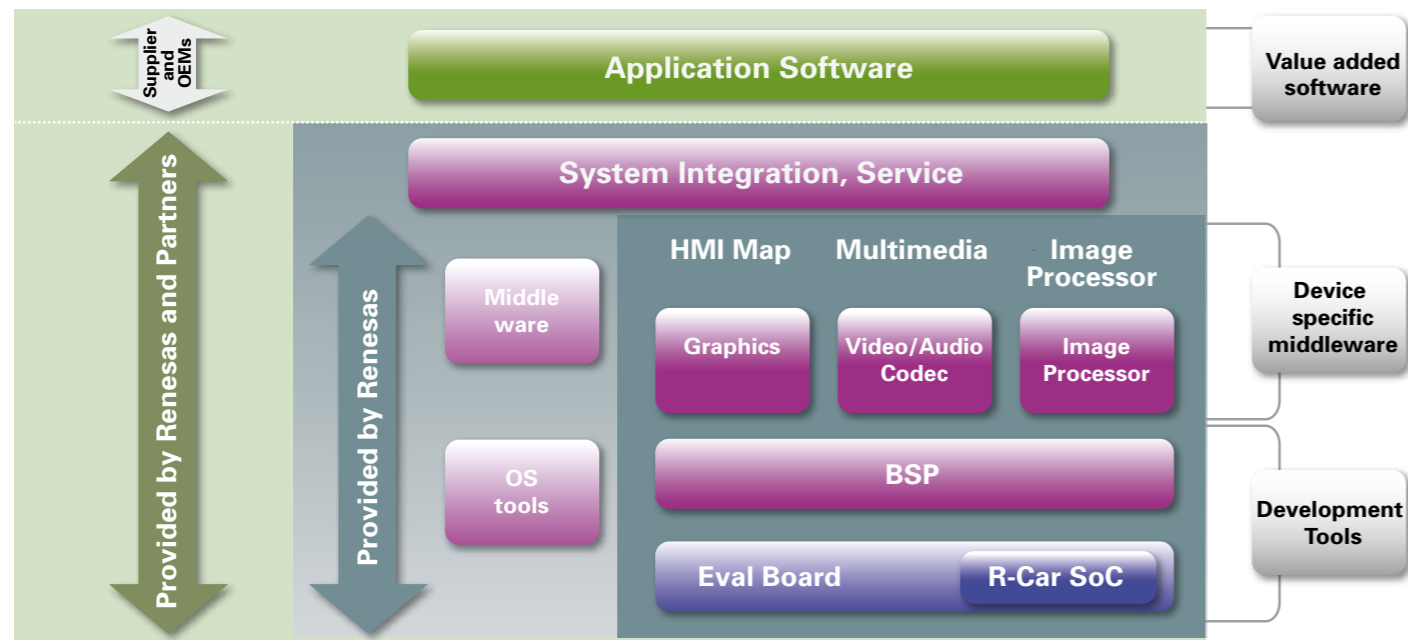
### Key Features

- > Today's highest performance SOC for Car Infotainment Systems (> 20000 DMIPS)
- > Contains the currently most powerful PowerVR Graphics Engine
- > Optimised for the best in class system performance with high clocked DDR3 interface and many on-chip IP and CPU cache memories
- > Multiple HD Video processing including Blu-Ray and display support (up to 3 independent displays)
- > 24-bit Audio-DSP for all kind of audio processing
- > Image processing in hardware
- > Video improvement functions in hardware
- > GPS baseband processing (device option)
- > Image recognition (device option)
- > Latest connectivity and network standards are included

### R-CAR H2 block diagram

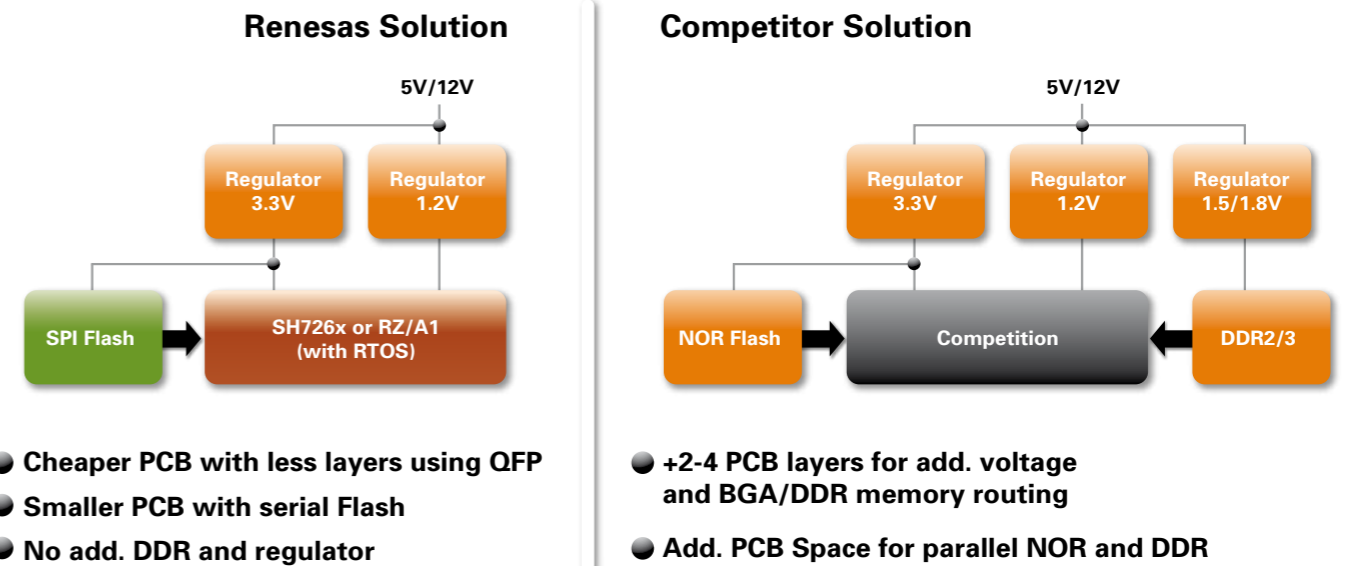


# Software Ecosystem for R-CAR



# Display Audio & Connectivity

Renesas' RZ/A1 family is the right choice to meet today's requirements for a wide range of connected radios as well as HMI systems with handwriting recognition or gesture control: Best system performance thanks to the large embedded RAM combined with intelligent IPs in a small package.



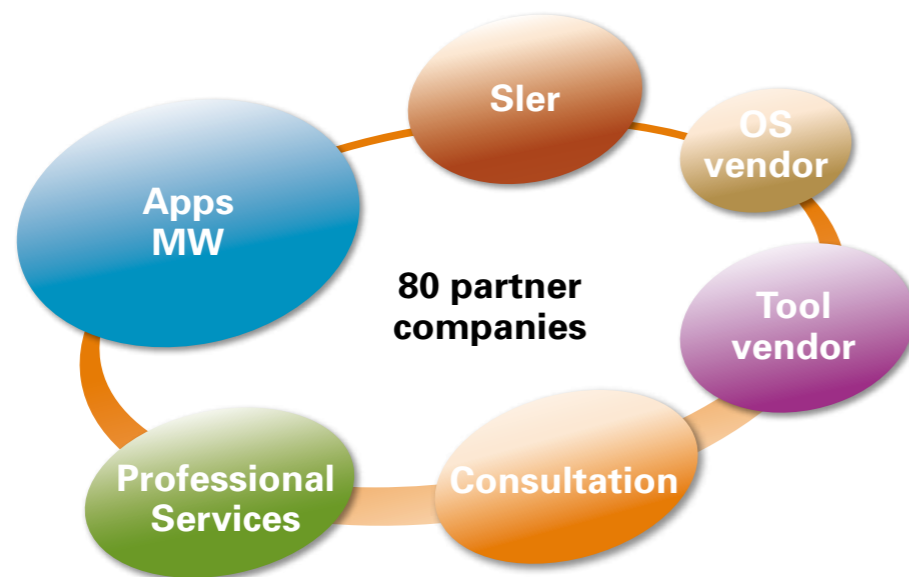
- Cheaper PCB with less layers using QFP
- Smaller PCB with serial Flash
- No add. DDR and regulator

- +2-4 PCB layers for add. voltage and BGA/DDR memory routing
- Add. PCB Space for parallel NOR and DDR

**RZ/A1 is the most cost effective solution when using an embedded OS!**

# TSP Turnkey Software Package

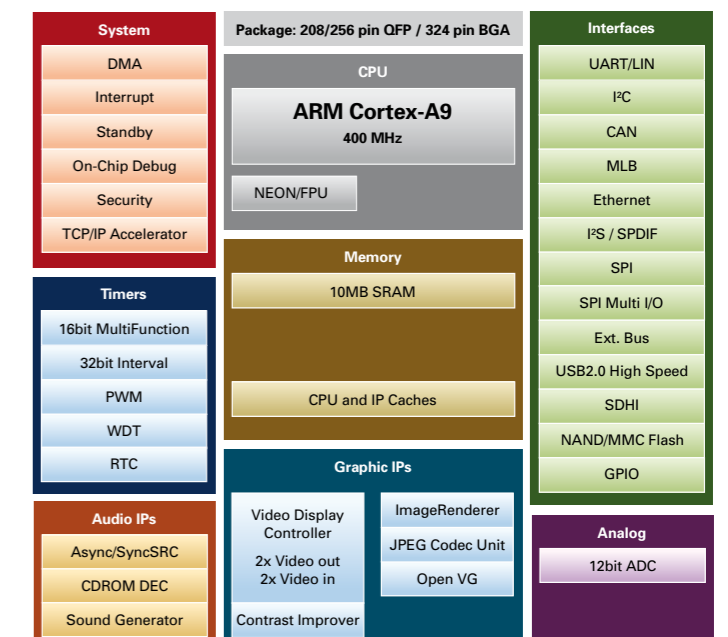
Renesas offers together with a wide range of leading industry partners middleware, multiple operating systems as well dedicated solutions for image processing, audio/video applications and state of the art 2D & 3D Graphics.



## Key Features

- > Up to 10MB integrated SRAM for video and/or code
- > Serial high speed flash interface with Execute-in-Place (XiP)
- > Up to 2 digital or analog camera/video inputs with contrast improvement and distortion correction capabilities
- > Embedded 2D (OpenVG1.1) drawing engine
- > Up to 2 independent display outputs
- > 4 channel audio mixer with asynchronous sample rate conversion (up to 96KHz) and digital volume control
- > Integrated security features
- > Support for automotive interfaces (CAN, LIN, MOST, Ethernet)
- > TCP/IP accelerator reduces CPU load for smartphone connectivity

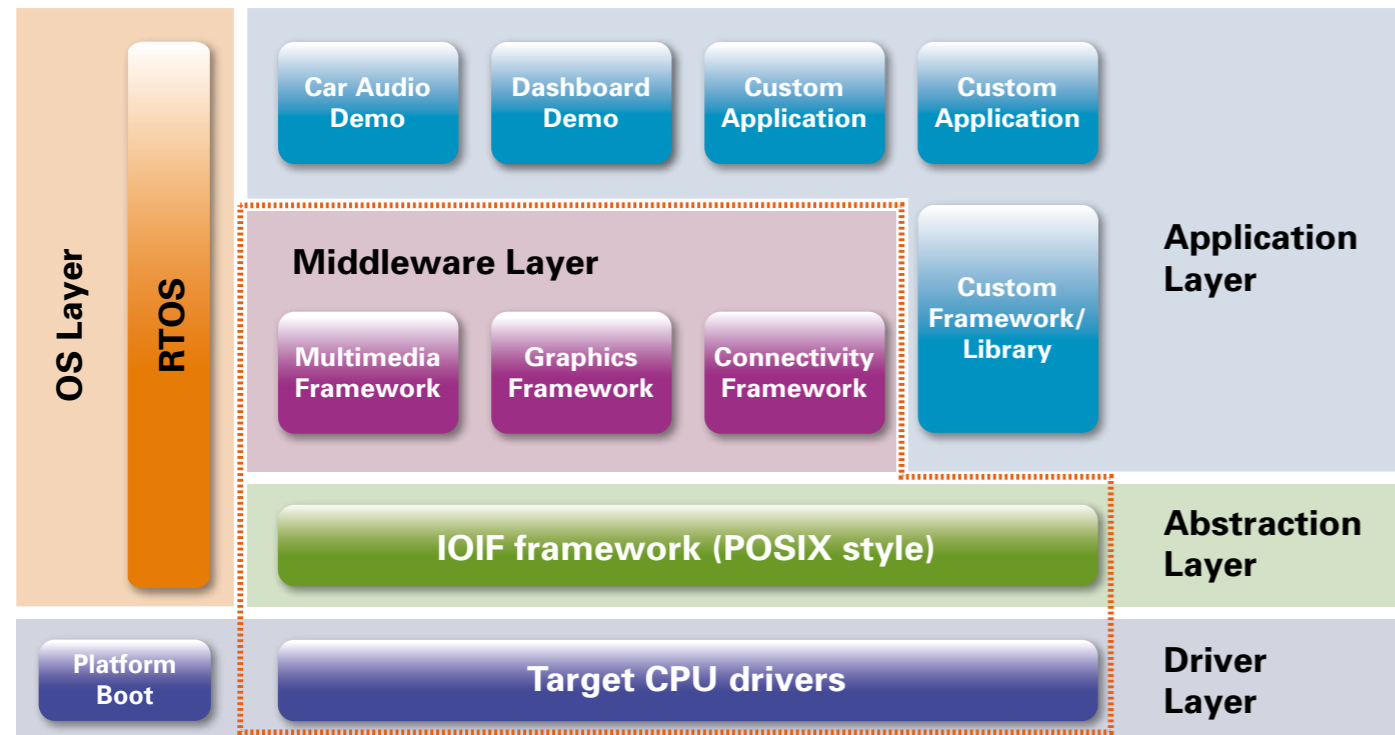
## RZ/A1H block diagram



# Software Ecosystem for RZ/A1

## RZ/A1 Media SDK

Renesas can provide a production ready Media SDK which enables a fast multimedia system development. This automotive proven SDK is the base of several successful radio designs in the market today.



## Ecosystem Landscape

There is a continuously growing community of software companies which support Renesas' products. Just to name some examples, our partners provide solutions for Bluetooth, MirrorLink, Handwriting recognition and HMI frameworks.



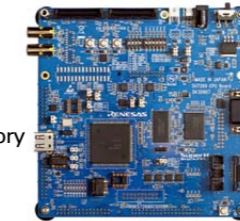
# Device & Board Overview

Series	Nickname/Group	Part number	RAM [B]	Core	FPU	CS/JUART/LIN	CAN	I <sup>2</sup> C	Timer channels [B-/16-/32-bit]	Clock [MHz]	A/D converter	Other interfaces and functions	Supply voltage I/O [V]	Pins/Packages	
SH-2A	SH726A	R5S726A0P216	1.25 M	SH-2A	yes	3/5/0	-	4	7	216	6x 10-bit	SDRAM, I <sup>2</sup> S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	120 QFP	
		R5S726A1P216													
	SH726B	R5S726B0P216	1.25 M	SH-2A	yes	4/5/0	-	4	7	216	8x 10-bit	SDRAM, I <sup>2</sup> S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	144 QFP	
		R5S726B1P216													
SH7268	SH7268	R5S72680P266	2.5 M	SH-2A	yes	4/5/0	3	2	7	266	6x 10-bit	SDRAM, Display Unit, I <sup>2</sup> S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	208 QFP	
		R5S72681P266													
SH7269	SH7269	R5S72690P266	2.5 M	SH-2A	yes	4/8/0	-	4	7	266	8x 10-bit	SDRAM, Display Unit, I <sup>2</sup> S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	256 QFP	
		R5S72691P266												272 BGA	
RZ/A	RZ/A1L	R7S72102x	2 M	Cortex A9	Neon/FPU	3/5/1	2	4	7	266	8x 10-bit	SDRAM, I <sup>2</sup> S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP	3.0...3.6	176 QFP	
			3 M											208 QFP	
	RZ/A1M	RZ/A1M	R7S72101x	5 M	Cortex A9	Neon/FPU	5/8/2	5	4	7	400	8x 12-bit	SDRAM, display unit, I <sup>2</sup> S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP, OpenVG	3.0...3.6	176 QFP
															208 QFP
RZ/A1H	RZ/A1H	R7S72100x	10 M	Cortex A9	Neon/FPU	5/8/2	5	4	7	400	8x 12-bit	SDRAM, display unit, I <sup>2</sup> S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP, OpenVG	3.0...3.6	208 QFP	
														256 QFP	
R-CAR	R-CAR E1	μPD35004	128 K	Cortex A9	Neon/FPU	3/8/0	2	4	10	533	2x 12-bit	DDR2/DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, PATA, SD, USB, GPS, OpenGL, video dec	3.0...3.6	429 BGA	
	R-CAR M1S	R8A77780	512 K	SH-4A	yes									800	496 BGA
	R-CAR M1A	R8A77781	512 K	Cortex A9											
	R-CAR H1	R8A77790	768 K	4x Cortex A9	Neon/FPU					1000		DDR2/DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, PATA, SD, USB, GPS, OpenGL, video dec, SATA, PCIe		831 BGA	
	R-CAR E2-1		1 M L2S	Cortex A7	Neon/FPU	4/9/2	2	4	7	1000	-	DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, PATA, SD, USB, OpenGL, CDROM dec, video dec	3.0...3.6	tbd	
	R-CAR E2-2		1 M L2S	2x Cortex A7	Neon/FPU	4/9/2	2	4	7	1000	-	DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, PATA, SD, USB, OpenGL, CDROM dec, video dec	3.0...3.6	tbd	
	R-CAR M2-1		R-CAR M2-1	Cortex A15	Neon/FPU	3/10/0	2	5	22	1500	-	DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, SD, USB, GPS, OpenGL, video dec, SATA, PCIe	3.0...3.6	tbd	
	R-CAR M2-2		R-CAR M2-2	2x Cortex A15	Neon/FPU	3/10/0	2	5	22	1500	-	DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, SD, USB, GPS, OpenGL, video dec, SATA, PCIe	3.0...3.6	tbd	
	R-CAR H2-2		1 M L2S; 2M L3S	2x Cortex A15	Neon/FPU	4/8/0	2	4	33	1500	-	DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, SD, USB, GPS, OpenGL, video dec, SATA, PCIe	3.0...3.6	831 BGA	
	R-CAR H2-4	R8A7790X	2 M L2S; 2M L3S	4x Cortex A15	Neon/FPU	4/8/0	2	4	33	1500	-	DDR3, Display Unit, Ethernet, I <sup>2</sup> S, MLB, SD, USB, GPS, OpenGL, video dec, SATA, PCIe	3.0...3.6	831 BGA	

## Tool Overview

### SH7269 Development Board

- > For SH7268 and SH7269 evaluation
- > Equipped with
  - SH7269 device
  - 4 MB NOR and 256 MB NAND flash memory
  - 2 MB serial flash memory
  - 16 MB SDRAM and 16 KB E<sup>2</sup>PROM
  - RS-232C, UART, USB connector
  - switches, LEDs, I/O expansion headers
  - E10A USB debug connector
- > Board dimensions: 148 mm x 148 mm
- > Package includes CD with user's manual, schematic and sample software
- > Order codes: R0K572690C000BR (SH7269 CPU board)  
R0K572690B000BR (VDC4 Option board)



### SH726B Development Board

- > For SH 726A and S726B evaluation
- > Equipped with
  - SH726B
  - 2 x 16 MB serial flash memory
  - 16 MB SDRAM
  - RS-232C, UART, USB, LAN, CAN interface
  - switches, LEDs, I/O expansion headers
  - E10A USB debug connector
- > Board dimensions: 180 mm x 150 mm
- > Package includes CD with user's manual, schematic and sample software
- > Order code: R0K5726B0C000BR



### R-CAR M1A Development Board 'MILAN'

- > For R-CAR M1A
- > Equipped with
  - R-CAR M1A device
  - 64 MB flash memory
  - 512 MB DDR3-DRAM
  - RS-232C, UART, USB, SD, LAN, CAN MLB interfaces
  - HDMI display out (with HDMI to DVI adapter)
  - switches, LEDs, I/O expansion headers
  - 2 JTAG debug connectors
- > Board dimensions: 165 mm x 120 mm
- > Package includes CD with user's manual and schematic
- > Order code: Y-R-Car-M1A-Board



### R-CAR H1 Development Board 'MARZEN'

- > For R-CAR H1
- > Equipped with
  - R-CAR H1 device
  - 64 MB flash memory and 1 MB serial flash/E<sup>2</sup>PROM
  - 2 x 512 MB DDR3-DRAM
  - RS-232C, UART, USB, SD, LAN, SATA, PCI, CAN and MLB interfaces
  - Analog RGB with DSUB 15-pin and/or LVDS flat cable connector
  - switches, LEDs, I/O expansion headers
  - JTAG and ETM debug/trace connector
- > Board dimensions: 200 mm x 150 mm
- > Package includes CD with user's manual, schematic and boot software
- > Order code: R0P7779A00010S



# The Renesas Eco System

Online technical community

**RenesasRulz.com**  
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Facebook group



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Latest news

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