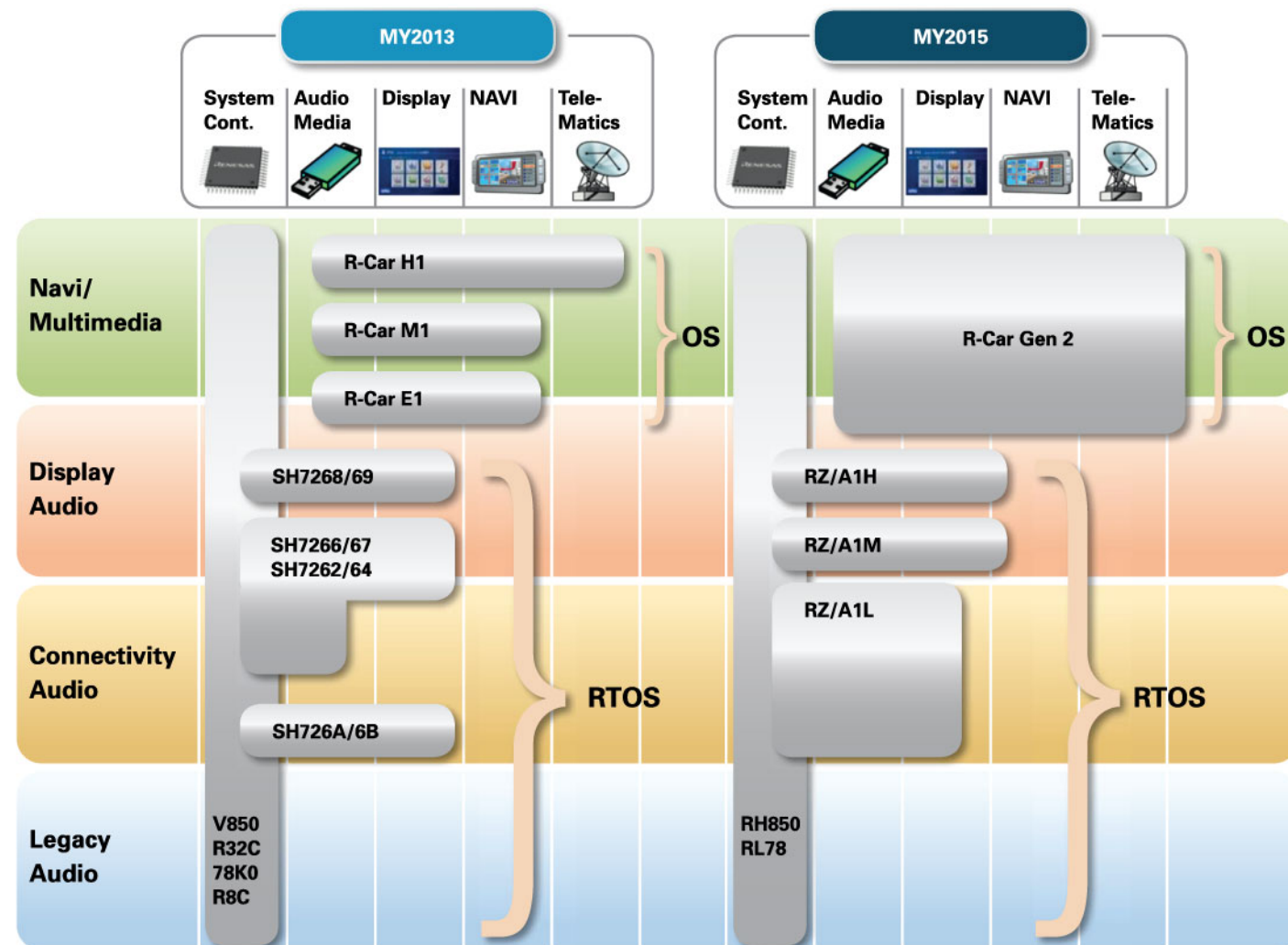# RENESAS 瑞 萨

瑞萨电子

车载信息娱乐系统智能解决方案

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.

Renesas **R-Car**

RENESAS RZ

Roadmap for Infotainment Applications

	MY2013					MY2015				
	System Cont.	Audio Media	Display	NAVI	Tele-Matics	System Cont.	Audio Media	Display	NAVI	Tele-Matics

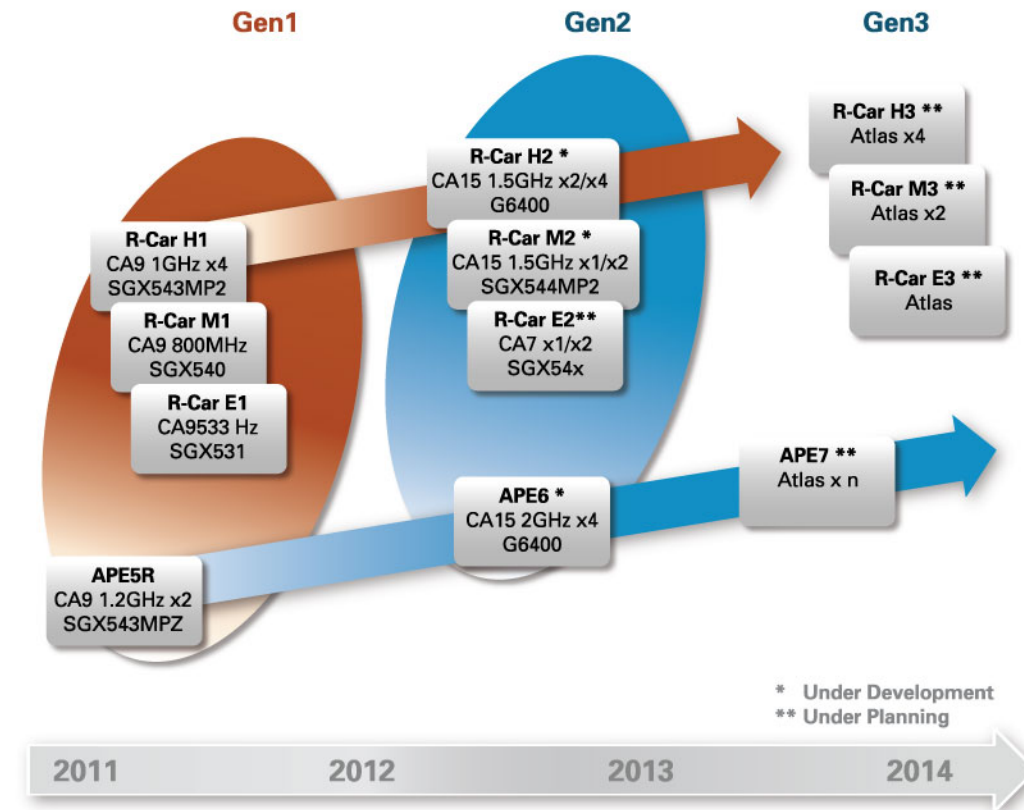|			
Navi/ Multimedia	R-Car H1 / R-Car M1 / R-Car E1	OS	R-Car Gen 2	OS
Display Audio	SH7268/69		RZ/A1H / RZ/A1M / RZ/A1L
Connectivity Audio	SH7266/67 SH7262/64 / SH726A/6B	RTOS		RTOS
Legacy Audio	V850 R32C 78K0 R8C		RH850 RL78

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
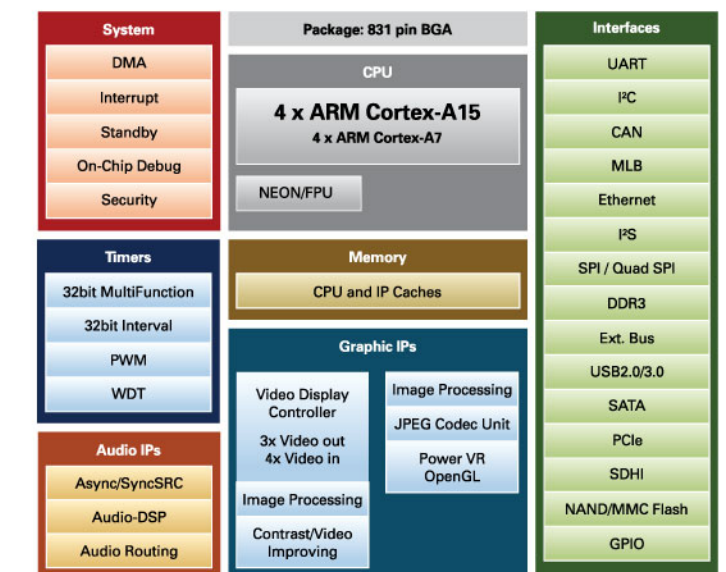
Navigation & Multimedia SoC

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.

Renesas **R-Car**

Gen1 / Gen2 / Gen3

R-Car H1 CA9 1GHz x4 SGX543MP2
R-Car M1 CA9 800MHz SGX540
R-Car E1 CA9533 Hz SGX531

R-Car H2 * CA15 1.5GHz x2/x4 G6400
R-Car M2 * CA15 1.5GHz x1/x2 SGX544MP2
R-Car E2** CA7 x1/x2 SGX54x

R-Car H3 ** Atlas x4
R-Car M3 ** Atlas x2
R-Car E3 ** Atlas

APE5R CA9 1.2GHz x2 SGX543MPZ
APE6 * CA15 2GHz x4 G6400
APE7 ** Atlas x n

* Under Development
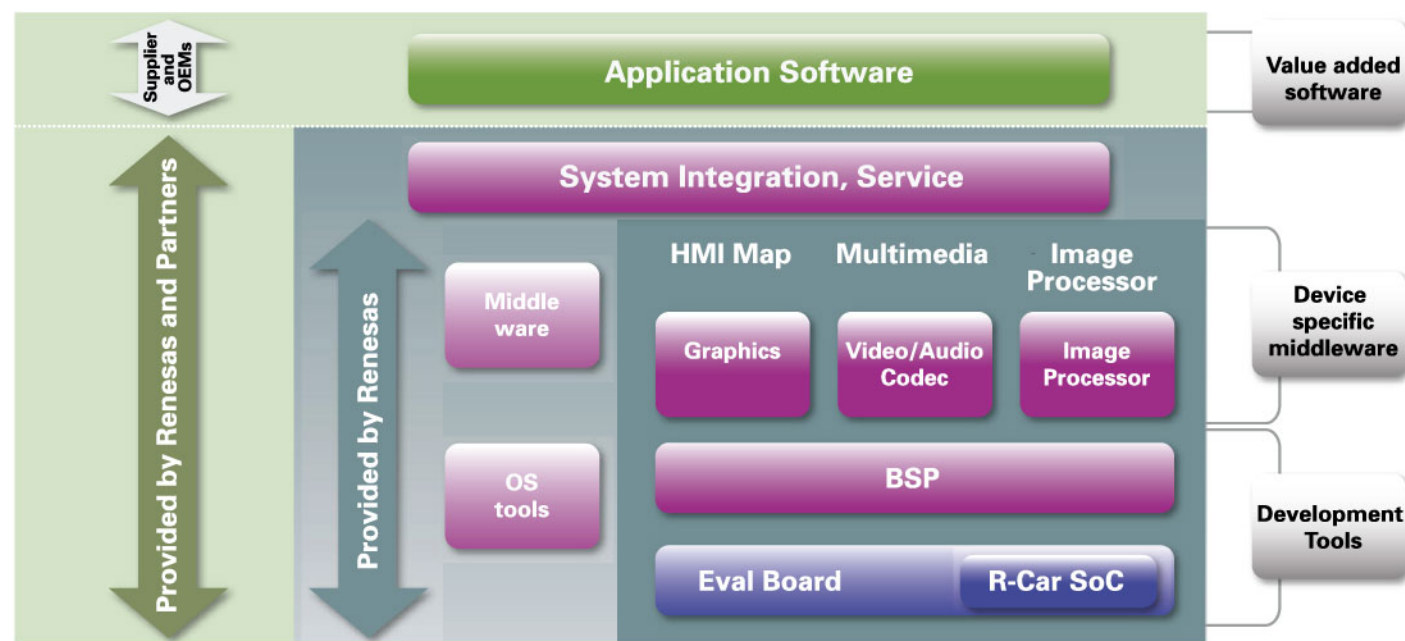** Under Planning

2011 / 2012 / 2013 / 2014

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
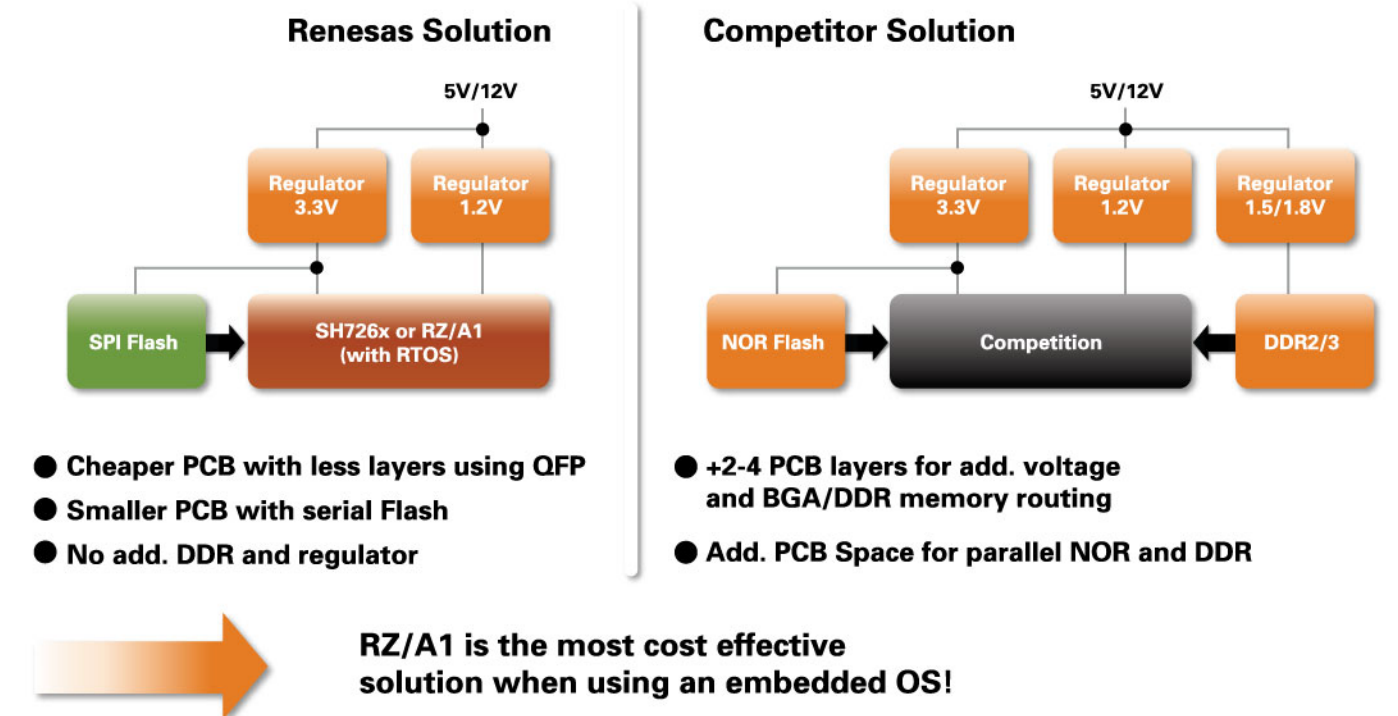
R-CAR H2 block diagram

System		Interfaces
DMA	Package: 831 pin BGA	UART
Interrupt	**CPU**	I²C
Standby	4 x ARM Cortex-A15	CAN
On-Chip Debug	4 x ARM Cortex-A7	MLB
Security	NEON/FPU	Ethernet
		I²S
Timers	**Memory**	SPI / Quad SPI
32bit MultiFunction	CPU and IP Caches	DDR3
32bit Interval	**Graphic IPs**	Ext. Bus
PWM	Video Display Controller / Image Processing	USB2.0/3.0
WDT	3x Video out 4x Video in / JPEG Codec Unit	SATA
Audio IPs	Image Processing / Power VR OpenGL	PCIe
Async/SyncSRC		SDHI
Audio-DSP	Contrast/Video Improving	NAND/MMC Flash
Audio Routing		GPIO

Software Ecosystem for R-CAR

Supplier and OEMs

Provided by Renesas and Partners

Provided by Renesas

Application Software

System Integration, Service

HMI Map | Multimedia | Image Processor

Middle ware

Graphics | Video/Audio Codec | Image Processor

OS tools

BSP

Eval Board | R-Car SoC

Value added software

Device specific middleware

Development Tools

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.

SIer

OS vendor

Apps MW

80 partner companies

Tool vendor

Professional Services

Consultation

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.

RENESAS RZ

Renesas Solution

5V/12V

Regulator 3.3V | Regulator 1.2V

SPI Flash → SH726x or RZ/A1 (with RTOS)

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

Competitor Solution

5V/12V

Regulator 3.3V | Regulator 1.2V | Regulator 1.5/1.8V

NOR Flash → Competition ← DDR2/3

● +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!

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

System: DMA, Interrupt, Standby, On-Chip Debug, Security, TCP/IP Accelerator

Package: 208/256 pin QFP / 324 pin BGA

CPU: ARM Cortex-A9 400 MHz, NEON/FPU

Memory: 10MB SRAM, CPU and IP Caches

Timers: 16bit MultiFunction, 32bit Interval, PWM, WDT, RTC

Audio IPs: Async/SyncSRC, CDROM DEC, Sound Generator

Graphic IPs: Video Display Controller, 2x Video out, 2x Video in, ImageRenderer, JPEG Codec Unit, Open VG, Contrast Improver

Interfaces: UART/LIN, I²C, CAN, MLB, Ethernet, I²S / SPDIF, SPI, SPI Multi I/O, Ext. Bus, USB2.0 High Speed, SDHI, NAND/MMC Flash, GPIO

Analog: 12bit ADC

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.

OS Layer / RTOS	Middleware Layer			Application Layer
	Car Audio Demo	Dashboard Demo	Custom Application	Custom Application
	Multimedia Framework	Graphics Framework	Connectivity Framework	Custom Framework/ Library
	IOIF framework (POSIX style)			**Abstraction Layer**
Platform Boot	Target CPU drivers			**Driver Layer**
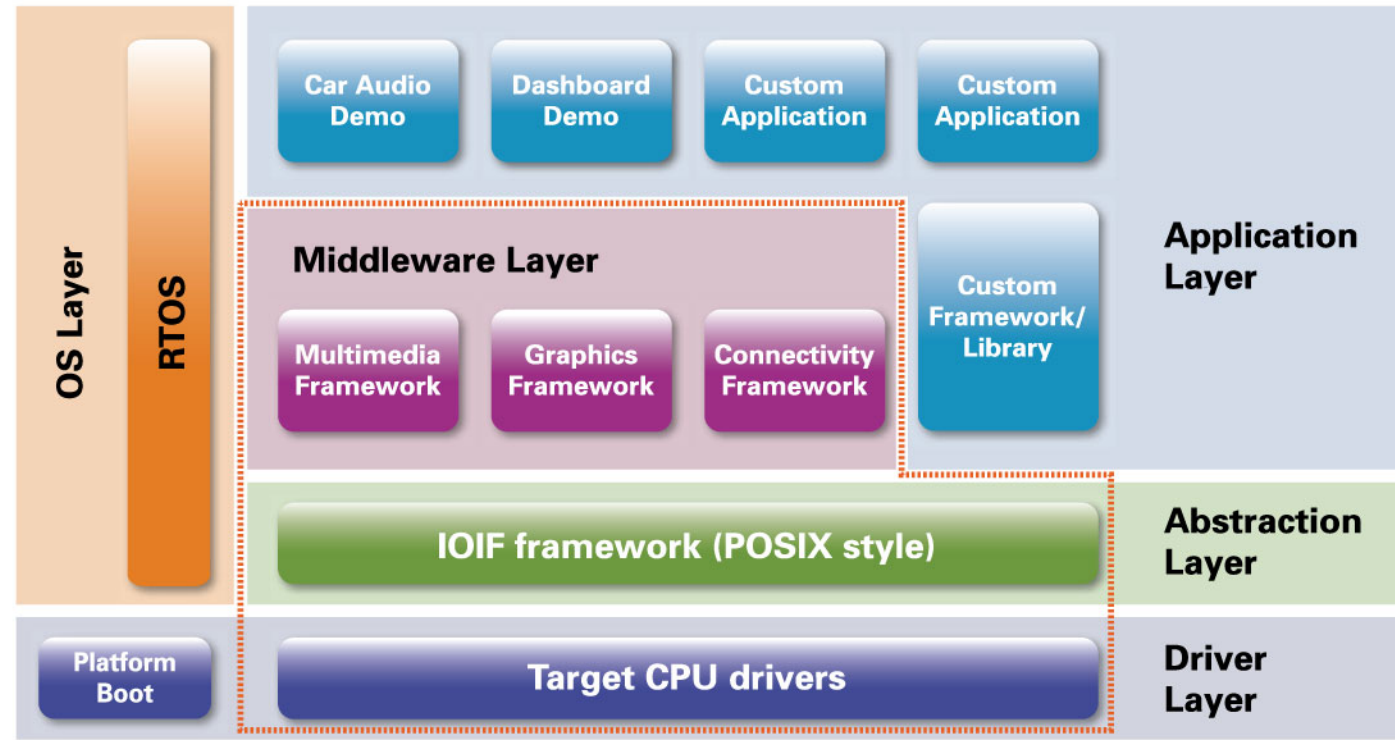
Ecosystem Landscape

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	CSI/UART/ LIN	CAN	I²C	Timer channels [8-/16-/32-bit]	Clock [MHz]	A/D converter	Other interfaces and functions	Supply voltage (I/O) [V]	Pins/ Packages
SH-2A	SH726A	R5S726A0P216 / R5S726A1P216 / R5S726A2P216 / R5S726A3P216	1.25 M	SH-2A	yes	3/5/0	-/2/-/2	4	7	216	6 x 10-bit	SDRAM, I²S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	120 QFP
	SH726B	R5S726B0P216 / R5S726B1P216	1.25 M	SH-2A	yes	4/5/0	-/2	4	7	216	8 x 10-bit	SDRAM, I²S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	144 QFP
	SH7268	R5S72680P266 / R5S72681P266	2.5 M	SH-2A	yes	4/5/0	-/3	2	7	266	6 x 10-bit	SDRAM, Display Unit, I²S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	208 QFP
	SH7269	R5S72690P266 / R5S72691P266	2.5 M	SH-2A	yes	4/8/0	-/3	4	7	266	8 x 10-bit	SDRAM, Display Unit, I²S, MMC, SD, SPDIF, SRC, USB, CDROM dec, WDT, XIP	3.0...3.6	256 QFP / 272 BGA
RZ/A	RZ/A1L	R7S72102x	2 M / 3 M	Cortex A9	Neon/FPU	3/5/1	2	4	7	266 / 400	8 x 10-bit	SDRAM, I²S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP / SDRAM, display unit, I²S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP	3.0...3.6	176 QFP / 208 QFP / 176 QFP / 208 QFP / 176 QFP / 208 QFP
	RZ/A1M	R7S72101x	5 M	Cortex A9	Neon/FPU	5/8/2	5	4	7	400	8 x 12-bit	SDRAM, display unit, I²S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP, OpenVG	3.0...3.6	208 QFP / 256 QFP / 324 BGA
	RZ/A1H	R7S72100x	10 M	Cortex A9	Neon/FPU	5/8/2	5	4	7	400	8 x 12-bit	SDRAM, display unit, I²S, SPDIF, MMC, SD, USB, Ethernet, MLB/MOST, SPI Multi I/O, CDROM dec, WDT, XIP, OpenVG	3.0...3.6	208 QFP / 256 QFP / 324 BGA
R-CAR	R-CAR E1	µPD35004	128 K	Cortex A9	Neon/FPU					533	2 x 12-bit	DDR2/DDR3, Display Unit, Ethernet, I²S, MLB, PATA, SD, USB, GPS, OpenGL, video dec	3.0...3.6	429 BGA
	R-CAR M1S	R8A77780	512 K	SH-4A	yes	3/8/0	2	4	10	800				496 BGA
	R-CAR M1A	R8A77781	512 K	Cortex A9						800				
	R-CAR H1	R8A77790	768 K	4 x Cortex A9	Neon/FPU					1000	–	DDR2/DDR3, Display Unit, Ethernet, I²S, MLB, PATA, SD, USB, GPS, OpenGL, video dec, SATA, PCIe		831 BGA
	R-CAR E2-1		1 M L2$	Cortex A7	Neon/FPU	4/9/2	2	4	7	1000	–	DDR3, Display Unit, Ethernet, I²S, MLB, PATA, SD, USB, OpenGL, CDROM dec, video dec	3.0...3.6	tdb
	R-CAR E2-2			2x Cortex A7										tbd
	R-CAR M2-1			R-CAR M2-1	Neon/FPU	3/10/0	2	5	22	1500	–	DDR3, Display Unit, Ethernet, I²S, MLB, SD, USB, GPS, OpenGL, video dec, SATA, PCIe	3.0...3.6	831 BGA
	R-CAR M2-2			R-CAR M2-2 / 2x Cortex A15										tbd / 831 BGA
	R-CAR H2-2	R8A7790X	1 M L2$; 2M L3$	2x Cortex A15 / 2x Cortex A7	Neon/FPU	4/8/0	2	4	33	1500	–	DDR3, Display Unit, Ethernet, I²S, MLB, SD, USB, GPS, OpenGL, video dec, SATA, PCIe	3.0...3.6	831 BGA
	R-CAR H2-4		2 M L2$; 2M L3$	4 x Cortex A15 / 4x Cortex A7										

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 E²PROM
  • RS-232C, UART, USB connector
  • switches, LEDs, I/0 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)
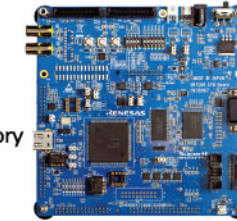
SH726B Development Board
> For SH 726A and S726B evaluation
> Equipped with
  • SH726B
  • 2 x 16 MB serial flash memory
  • 16 MB SDRAM
  • RS-232C, UART, USB, LAN, CAN interface
  • switches, LEDs, I/0 expansion headers
  • E10A USB debug connector
> Board dimensions: 180 mm x 150 mm
> Package includes 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/0 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
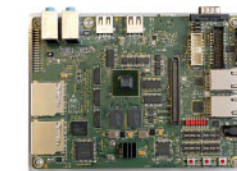
R-CAR H1 Development Board 'MARZEN'
> For R-CAR H1
> Equipped with
  • R-CAR H1 device
  • 64 MB flash memory and 1 MB serial flash/E²PROM
  • 2 x 512 MB DDR3-DRAM
  • RS-232C, UART, USB, SD, LAN, SATA, PCI, CAN and MLB interfaces
  • Analog RGB with DSUB 15-pin and/or LVDS flat cable connector
  • switches, LEDs, I/0 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
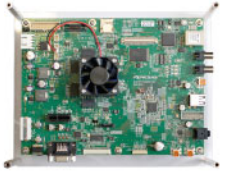
瑞萨电子车载信息娱乐系统智能解决方案
Renesas Smart Solutions for Car Infotainment

Renesas Electronics Corporation

RENESAS
瑞　萨

瑞萨电子中国销售·技术支持网点：　　　　　www.cn.renesas.com

瑞萨电子（中国）有限公司

	邮编	电话	传真
北京市海淀区知春路27号量子芯座17层	100191	+86 10 8235 1155	+86 10 8235 7679
长春分公司 吉林省长春市朝阳区西安大路727号中银大厦A座1609室	130061	+86 431 8859 7533	+86 431 8680 2944
大连分公司 辽宁省大连市中山区中山路88号天安国际大厦21楼2103室	116001	+86 411 3980 5858	+86 411 3980 5877
青岛分公司 山东省青岛市市南区香港中路10号颐和国际大厦A栋23A楼07室	100191	+86 532 6677 7600	+86 532 6677 7608
上海分公司 上海市浦东新区陆家嘴环路1233号汇亚大厦205室	200120	+86 21 5877 1818	+86 21 6887 7858
成都分公司 四川省成都市二环路南三段15号天华大厦608室	610041	+86 28 8512 5224	+86 28 8512 5334
深圳分公司 广东省深圳市福田中心区益田路4068号卓越时代广场18楼1807–1809室	518048	+86 755 8283 5080	+86 755 2399 5080

瑞萨电子管理（上海）有限公司

	邮编	电话	传真
上海市浦东新区陆家嘴环路1233号汇亚大厦205室	200120	+86 21 5877 1818	+86 21 6887 7858

瑞萨电子香港有限公司

	电话	传真
香港九龙旺角太子道西193号新世纪广场第2座16楼1601–1603室	+852 2265 6688	+852 2886 9022

瑞萨电子大中国地区（包括香港地区）代理商及分销商的联系方式：www.cn.renesas.com/buy