RENESAS

COCKPIT SOLUTIONS

Experience the future in automotive HMI and high-end computing

Renesas R-Car

BIG IDEAS
FOR EVERY SPACE

2017.03

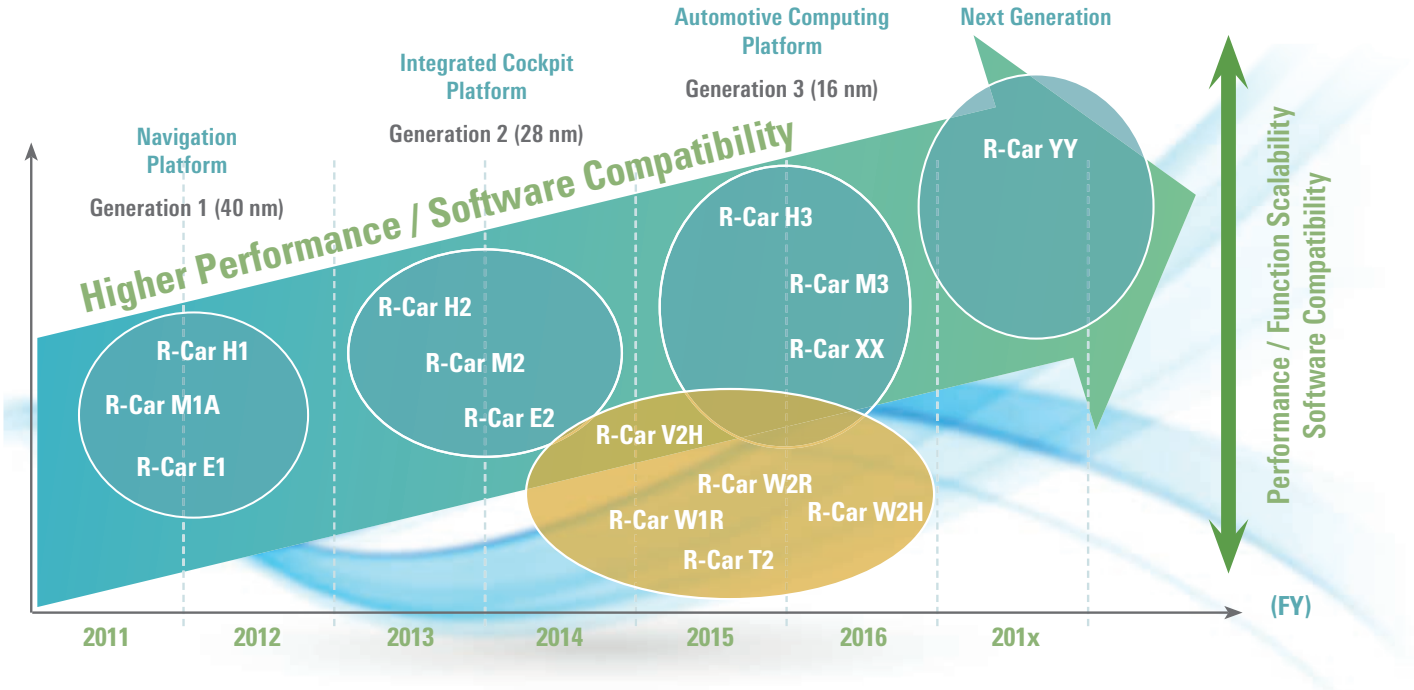
EXPERIENCE THE FUTURE

R-Car is ideally suited for automotive applications that require outstanding computing performance combined with dedicated features supporting high-end graphics generation.

- In-vehicle Infotainment
- Driver information and cluster instruments
- Integrated cockpit
- Advanced driver assistance
- Functional safety for autonomous driving
- Body / Chassis Server
- Computer vision
- Deep learning

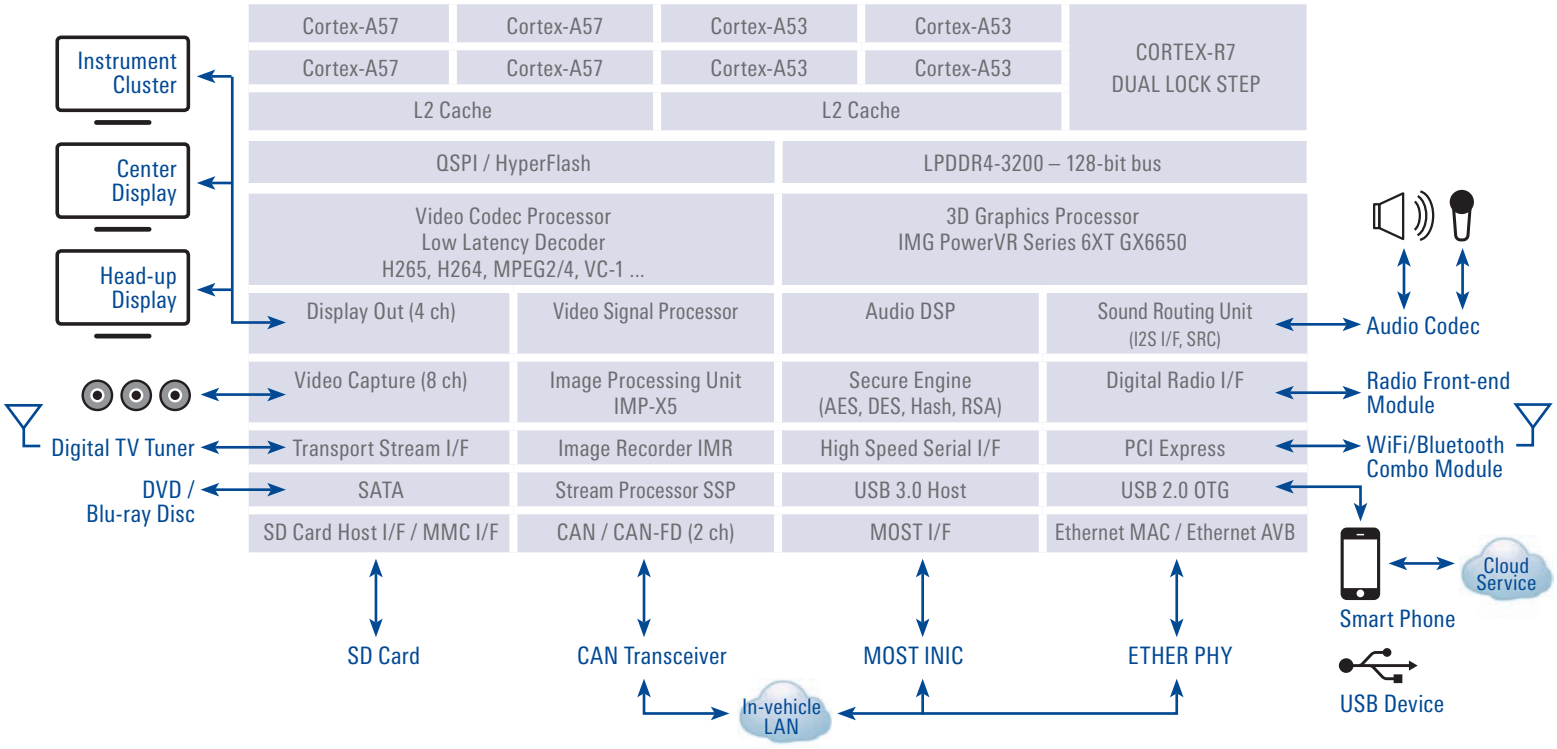
R-CAR ROADMAP

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



CONTENT

R-CAR H3 INFOTAINMENT SYSTEM



UNIQUE FEATURES

- Scalable platform line-up
  R-Car Gen 3 provides scalable SOC platform/family ensuring consequent compatibility for same features sharing same key IPs and chip architecture but offering scalable performance.
- Outstanding performance by utilization of state of the art CPU architecture, utilization of powerful graphics IPs and bandwidth optimized memory connection
- R-Car Gen 3 offers significant system cost reduction by providing dedicated real-time Cortex R7 core
  Cortex R7 core capable to replace external system controller (e.g. for applications such as fast-boot / Autosar / networking / ...)
- GPU based virtualization support by dedicated/separate register sets for individual OS access
- Developed for the tough automotive environment and quality requirements
- Functional safety support
  R-Car Gen.-3 designed for ASIL-B applications

Renesas R-Car

R-CAR H3 / M3 FEATURE LINE-UP

Renesas has launched the third generation of high performance SOCs fully supporting the high demands of automotive applications such as In-vehicle Infotainment, Integrated cockpit or Advanced driver assistance.

- 64-bit ARM Cortex – A57 Quad / ARM Cortex – A53 Quad / ARM Cortex – R7 Dual lock-step
- Open GL ES 3.1
- H.265 video on 4k screens
- H/W virtualization
- Functional safety
- Realtime support by dual lock step CR7
- High / outstanding memory bandwidth
- Comprehensive Ecosystem
- Low cost development tools

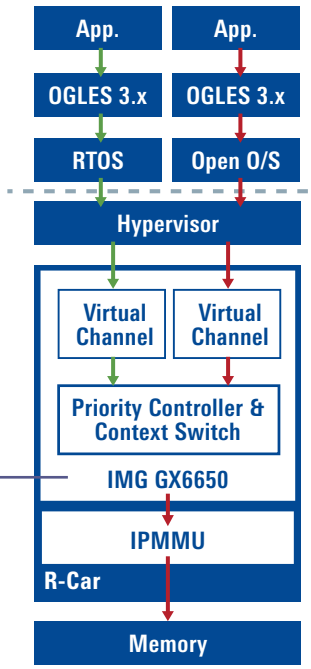
		R-Car M3	R-Car H3
Basics	CPU Core	ARM Cortex -A57 Dual ARM Cortex -A53 Quad ARM Cortex R7 Dual Lock- step	ARM Cortex -A57 Quad ARM Cortex -A53 Quad ARM Cortex R7 Dual Lock-step
		L2 cache 1 Mbytes (ECC)	L2 cache 2 Mbytes (ECC)
	Main CPU (MHz)	1800	1700
Graphic Peripherals	3D Graphics	IMG Power VR GX6250 (700 MHz)	IMG Power VR GX6650 (600 MHz)
	2D Graphics	D/AVE HD	
	Image recognition processor	IMP-X5S	IMP-X5
	Video I/O	Display Out x 3 ch Video Input x 8 ch	Display Out x 4 ch Video Input x 8 ch
	Distortion compensation module	IMR x 2 ch	IMR x 4 ch
	Video image processing (Up and down scaling, Dynamic y correction, Color management, I/P conversion, Super resolution processing, Rotation, Visual near lossless image compression)	3 x VSPD 1 x VSPI 1 x VSPB	3 x VSPD 2 x VSPI 2 x VSPB
	De-interlacing	1 x FDP	2 x FDP
External Memory		64bit LPPDDR4-3200 SDRAM (2 x 32bit) (ECC) Max. operating frequency 1600 MHz	128bit LPDDR4-3200 SDRAM (4 x 32bit) (ECC) Max. operating frequency 1600 MHz
		16-bit Ext. Bus (SRAM)	16-bit Ext. Bus (SRAM)
		Raw NAND	Raw NAND
		QSPI (Hyperflash)	QSPI (Hyperflash)
		4 x SDIO (SDR104)	4 x SDIO (SDR104)
		2 x eMMC (5.0, HS400)	2 x eMMC (5.0, HS400)
Audio Peripherals	Audio DSP	HIFI2 DSP	HIFI2 DSP
		Audio router ASRC mixer I2S (TDM) Audio DMA	Audio router ASRC mixer I2S (TDM) Audio DMA
Radio Peripheral		4 x RF I/F (66 MHz)	4 x RF I/F (66 MHz)
System	Security	2 x Crypto Core	2 x Crypto Core
		System RAM	System RAM
		Power Domain Ctrl	Power Domain Ctrl
		Thermal Sensor	Thermal Sensor
		Safety Goal: ASIL-B	Safety Goal: ASIL-B
		JTAG Debug	JTAG Debug and Trace

		R-Car M3	R-Car H3
Connectivity	Expansion bus – PCIE Controller	2 x PCI Express 2.0 (1 lane)	2 x PCI Express 2.0 (1 lane)
	Serial ATA	– – –	SATA
	USB	USB 3.0 / 2.0 (OTG)	USB 3.0 / 2.0 (OTG)
		2 x USB 2.0 (2H, 2H/ F/ OTG)	4 x USB 2.0 (2H, 2H/ F/ OTG)
	Ethernet AVB (1 Gbps) - Interface: RGMII - Ethernet AVB (802.1BA)	1 x ETH AVB	1 x ETH AVB
	Media Local Bus (MLB Interface)	MLB-3pin (50 Mbit)	MLB-3pin (50 Mbit)
	CAN / CAN FD	2 x CAN 2.0B / CAN FD	2 x CAN 2.0B / CAN FD
	Std. serial IFs	6 x UART 5 x H-UART 4 x SPI 7 x I2C 1 x DVFS ctrl	6 x UART 5 x H-UART 4 x SPI 7 x I2C 1 x DVFS ctrl
Low Power Mode		Power Domain Control GPU / Image Processor / CPU	Power Domain Control GPU / Image Processor / CPU
		- DVFS (Dynamic Voltage and Frequency Scaling) - DDR SDRAM power supply backup mode	- DVFS (Dynamic Voltage and Frequency Scaling) - DDR SDRAM power supply backup mode
Package		FCBGA 29 x 29 mm², 1022 pins (0.8 mm pitch)	FCBGA 21 x 21 mm², 1384 pins (0.5 mm pitch)
Ordering Information		R8A77960JA50BG#YJ4	R8A77951JA00BA#YJ0

VIRTUALIZATION

R-Car Gen3 provides Full hardware virtualization of the 3D GPU and of all other video IPs.

Each operating system can use its own memory context and virtual accelerators.



SYSTEM SOLUTION / ECOSYSTEM

Renesas offers complete system solutions not limited to hardware only but also offering complete SW Eco-System and extensive solutions by Renesas partners.

Renesas R-Car Consortium

The R-Car Consortium targets to provide Automotive Information and ADAS system solutions for OEMs and Tier1s around Renesas R-car products. Through early access to Renesas leading edge products (tools, software), RCC partners can propose solutions to OEMs and T1 in a timely manner.

More information about Renesas RCC partners at: **https://www.renesas.com/en-eu/support/partners/r-car-consortium/partner.html**

GETTING STARTED

Renesas provides all necessary Hardware & Software components enabling immediate project development.
Low cost development tools „Starter-Kits“ can be obtained through well established selling channels as well as proven software components.

Register to MyRenesas to get access to the various software components for R-Car: **https://update.renesas.com/SSO/login**

EVALUATION DEVELOPMENT BOARDS

„Salvator-X“ Series

Product Name	Ordering Part Number
Salvator-X with socket based R-Car **H3** SIP module	Y-R-CAR-H3-SIP-BOARD-SKT-ES11
Salvator-X with socket based R-Car **M3** SIP module	Y-R-CAR-M3-SIP-BOARD-SKT-ES11

Functions	**Salvator-X H3 (R-Car H3)**	**Salvator-X M3 (R-Car M3)**
SOC	H3 SIP	M3 SIP
DRAM	4 GB LPDDR4 (64-bit data width x2)	2 GB LPDDR4 (32-bit data width x2)
Flash Memory	64 MB flash (SIP 16 MB QSPI)	
eMMC	32 GB eMMC	
SDHI	2 ch (SD)	
USB 3.0	2 ch 1 x Host / Function; 1 x Function	1 ch 1 x Function
USB 2.0	3 ch 1 x Host / Function / OTG; 2 x Host	2 ch 1 x Host / Function / OTG; 1 x Host
Ethernet	1 ch (On board)	
Display out	4 ch 2 x HDMI; 1 x LVDS; 1 x Analog RGB	3 ch 1 x HDMI; 1 x LVDS; 1 x Analog RGB
Video in	2 ch (1 x HDMI; 1 x CVBS)	
Audio in / out	1 ch / 1 ch	
JTAG	1 ch	
Debug Serial	1 ch	
SATA / PCIE	Yes 1 x SATA connector; 1 x PCIE connector	Yes 1 x PCIE connector
EXIO Connector	Yes (4 x EXIO connectors)	
Extension Connectors	BT / WLAN / Module SSI / SDHI; MIPI CSI-2; LBSC	
Power	12 V input	

„Starter Kit“ Series

Product Name	Ordering Part Number
R-Car Starter Kit Premier (**H3**) (SIP WS1.1)	Y-ASK-RCAR-H3-ETH-WS1
R-Car Starter Kit Pro (**M3**) (SIP WS1.0)	Y-ASK-RCAR-M3-ETH-WS10

Functions	**Starter Kit Premier (R-Car H3)**	**Starter Kit Pro (R-Car M3)**
SOC	H3 SIP	M3 SIP
DRAM	4 GB LPDDR4	2 GB LPDDR4
Flash Memory	64 MB flash (SIP 16 MB QSPI)	
eMMC	8 GB eMMC	
SDHI	1 ch (Micro SD)	
USB 2.0	1 ch	
Ethernet	1 ch (On board)	
Display out	1 ch (micro HDMI)	
Audio in / out	1 ch / 1 ch	
JTAG	1 ch	
Debug Serial	1 ch	
SATA / PCIE, USB 3.0, Video in	No (COM Ex)	
EXIO Connector	COM Ex (440 pin)	
Power	5 V input	
Board Size	95 mm x 95 mm	

Software Components for R-Car Gen3 Evaluation & Development Boards

Linux BSP
Linux BSP standard drivers

MMP Multimedia and Graphics library for R-Car H3/M3 development board

Graphics Library
OpenGL / Video-Codec / GFX libraries

Renesas Electronics Europe

www.renesas.com

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