

RZ/G1 SERIES EMBEDDED MICROPROCESSORS

High-End HMI, Video, Embedded Vision and more



BIG IDEAS
FOR EVERY SPACE

RZ/G1 SERIES MULTI-CORE MPUS WITH **HIGH-END GRAPHICS AND MULTI-STREAM VIDEO**

RZ/G1 Series microprocessors (MPUs) enable rapid development of game-changing Linux, Android, and QNX-based embedded systems. Designed for use in industrial, home appliance, office and medical equipment, the RZ/G1 Series extends the capabilities of the successful RZ/A Series MPUs to deliver high-end performance in applications such as graphics, multi-stream video, and embedded vision.

The RZ/G1 Series features up to 1.5 GHz CPUs, 3D graphics acceleration, 1080p@60fps H.264 video, and DDR3 memory interfaces for ample performance margin. Other features include USB, PCIe, SATA, Fast Ethernet and Gigabit Ethernet interfaces.

RZ/G1 APPLICATIONS

HIGH-END HUMAN MACHINE INTERFACE DISPLAYS



NETWORKED VIDEO CAMERA SYSTEMS



EMBEDDED VISION (e.g., GESTURE AND OBJECT RECOGNITION)



3D RENDERING FOR MEDICAL IMAGING



2-WAY VIDEO TELEPHONY



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RZ/G1 KEY FEATURES AND BENEFITS

KEY FEATURES

- World-class Imagination Technologies 3D graphics engine for image rendering, plus 1080p 60fps video codec
- ARM® Cortex®-A7 and A15 CPU cores in dual and quad configurations for power or performance optimization
- Shared IP and memory map over entire RZ/G1 MPU series lineup
- Rich ecosystem of line-up design and system integration partners

KEY BENEFITS

- Enhance GUI expressiveness and add value to your end application with 3D graphics and real-time video
- Tune your design to minimize power dissipation or maximize performance to suit your specific requirements
- Build scalable software thanks to common device drivers
- Compress your development cycle by tapping into a growing network of RZ/G1 MPU design experts



**No Heat Sink
with RZ/G1E**

R8A77450

RZ/G1E
1 GHz Dual
ARM Cortex-A7
(3,800 DMIPS)

R8A77440

RZ/G1N
1.5 GHz Dual
ARM Cortex-A15
(10,500 DMIPS)

R8A77430

RZ/G1M
1.5 GHz Dual
ARM Cortex-A15
with 64b memory bus
and enhanced graphics
(10,500 DMIPS)

R8A77420

RZ/G1H
1.4 GHz Quad
ARM Cortex-A15 &
780 MHz Quad
ARM Cortex-A7
(25,528 DMIPS)

**Performance
Optimization**

Shared IP for Software Scalability

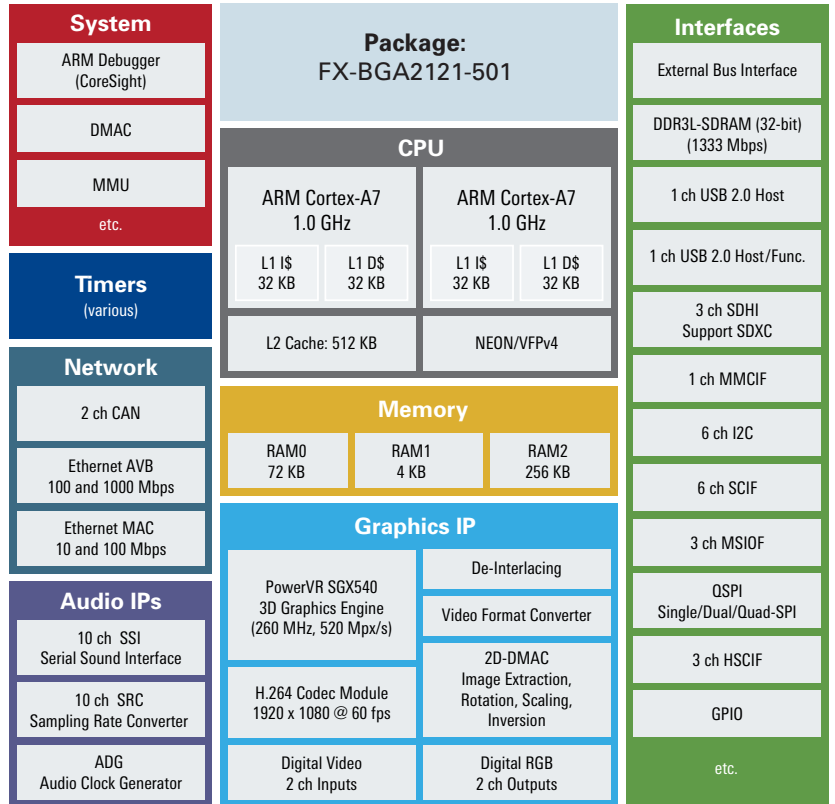
**Over 25,000 DMIPS
with RZ/G1H**

**Power
Savings**

RZ/G1 SERIES BLOCK DIAGRAMS

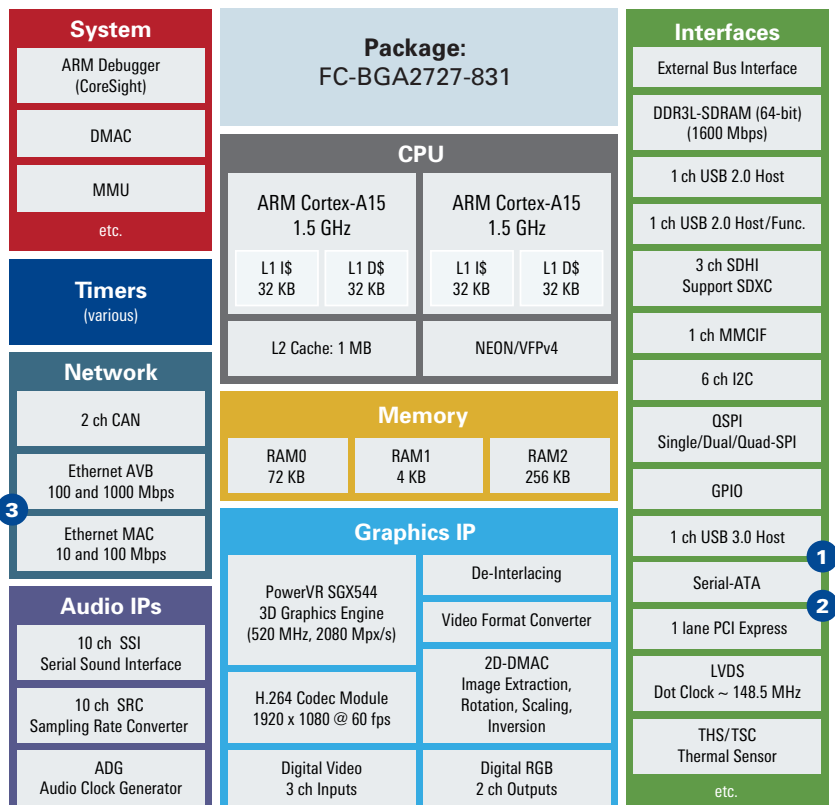
RZ/G1E (R8A77450)

Bring huge value to your low-cost embedded design with over 3,800 Dhrystone (DMIPS) performance at a low power footprint via ARM's lowest power processor, the Cortex-A7, while enjoying dual Ethernet, 3D graphics and a 1080p60 H.264 video codec.



RZ/G1M (R8A77430)

Take your high-end MPU design to the next level with over 10,000 DMIPS performance from two ARM Cortex-A15 cores; USB 3.0, SATA and PCIe interfaces; 3D graphics; a 1080p60 H.264 video codec; and a 64-bit wide external DDR3 SDRAM bus to deliver immense memory bandwidth and an incredible end-user experience.



- 1 USB 3.0 and SATA0 share same PHY.
- 2 PCIe and SATA1 share same PHY.
- 3 Ethernet AVB and 10/100 Ethernet share the same pins.

System	Package: FC-BGA2727-831	Interfaces	
ARM Debugger (CoreSight)		External Bus Interface	
DMAC	CPU	DDR3L-SDRAM (32-bit)(1600 Mbps)	
MMU etc.		1 ch USB 2.0 Host	
Timers (various)		ARM Cortex-A15 1.5 GHz	1 ch USB 2.0 Host/Func.
		ARM Cortex-A15 1.5 GHz	3 ch SDHI Support SDXC
Network	L1 I\$ 32 KB L1 D\$ 32 KB	1 ch MMCIF	
	L1 I\$ 32 KB L1 D\$ 32 KB	6 ch I2C	
Audio IPs	L2 Cache: 1 MB	QSPI Single/Dual/Quad-SPI	
	NEON/VFPv4	GPIO	
Memory	RAM0 72 KB	1 ch USB 3.0 Host	
	RAM1 4 KB	Serial-ATA 1	
Graphics IP	RAM2 256 KB	1 lane PCI Express	
	PowerVR SGX544 3D Graphics Engine (312 MHz, 1240 Mpx/s)	LVDS Dot Clock ~ 148.5 MHz	
Timers (various)	H.264 Codec Module 1920 x 1080 @ 60 fps	THS/TSC Thermal Sensor	
	2D-DMAC Image Extraction, Rotation, Scaling, Inversion	etc.	
Network	Digital Video 3 ch Inputs		
	Digital RGB 2 ch Outputs		
Audio IPs			

RZ/G1N (R8A77440)

Leverage a rich set of high-end embedded capabilities with 10,500 DMIPS from two ARM Cortex-A15 CPUs; a USB 3.0, SATA or PCIe interface; a 3D graphics engine; and a 1080p60 H.264 video codec to propel your application beyond the reach of your competition.

- 1** USB 3.0, SATA and PCIe share same PHY.
- 2** Ethernet AVB and 10/100 Ethernet share the same pins.

System	Package: FC-BGA2727-831	Interfaces	
ARM Debugger (CoreSight)		External Bus Interface	
DMAC MMU	CPU	DDR3L-SDRAM (64-bit) (1600 Mbps)	
S3 Cache: 2 MB etc.		2 ch USB 2.0 Host	
Timers (various)		4x ARM Cortex-A15 1.4 GHz	1 ch USB 2.0 Host/Func.
		4x ARM Cortex-A7 780 MHz	4 ch SDHI Support SDXC
Network	L1 I\$ 32 KB L1 D\$ 32 KB	2 ch MMCIF	
	L1 I\$ 32 KB L1 D\$ 32 KB	4 ch I2C	
Audio IPs	L2 Cache: 2 MB	QSPI Single/Dual/Quad-SPI	
	NEON/VFPv4	GPIO	
Memory	RAM0 72 KB	1 ch USB 3.0 Host 1	
	RAM1 4 KB	Serial-ATA 2	
Graphics IP	RAM2 256 KB	1 lane PCI Express	
	PowerVR G6400 3D Graphics Engine (520 MHz, 4,160 Mpx/s)	2 ch LVDS Dot Clock ~ 148.5 MHz	
Timers (various)	H.264 Codec Module 1920 x 1080 @ 60 fps (2 ch)	THS/TSC Thermal Sensor	
	3 ch De-Interlacing	etc.	
Network	Video Format Converter		
	2D-DMAC Image Extraction, Rotation, Scaling, Inversion		
Audio IPs	Digital Video 4 ch Inputs		
	Digital RGB 2 ch Outputs (plus 2 ch LVDS Outputs)		
Audio IPs			

RZ/G1H (R8A77420)

Harness the ultimate in embedded MPU performance with this 8-core “Big-Little” quad ARM Cortex-A15 and quad ARM Cortex-A7 based MPU that delivers over 25,000 DMIPS; USB 3.0, SATA and PCIe interfaces; ultra high-end 3D graphics with two-channel 1080p60 H.264 codecs; and a 64-bit wide DDR3 SDRAM memory bus.

- 1** USB 3.0 and SATA0 share same PHY.
- 2** PCIe and SATA1 share same PHY.
- 3** Ethernet AVB and 10/100 Ethernet share the same pins.

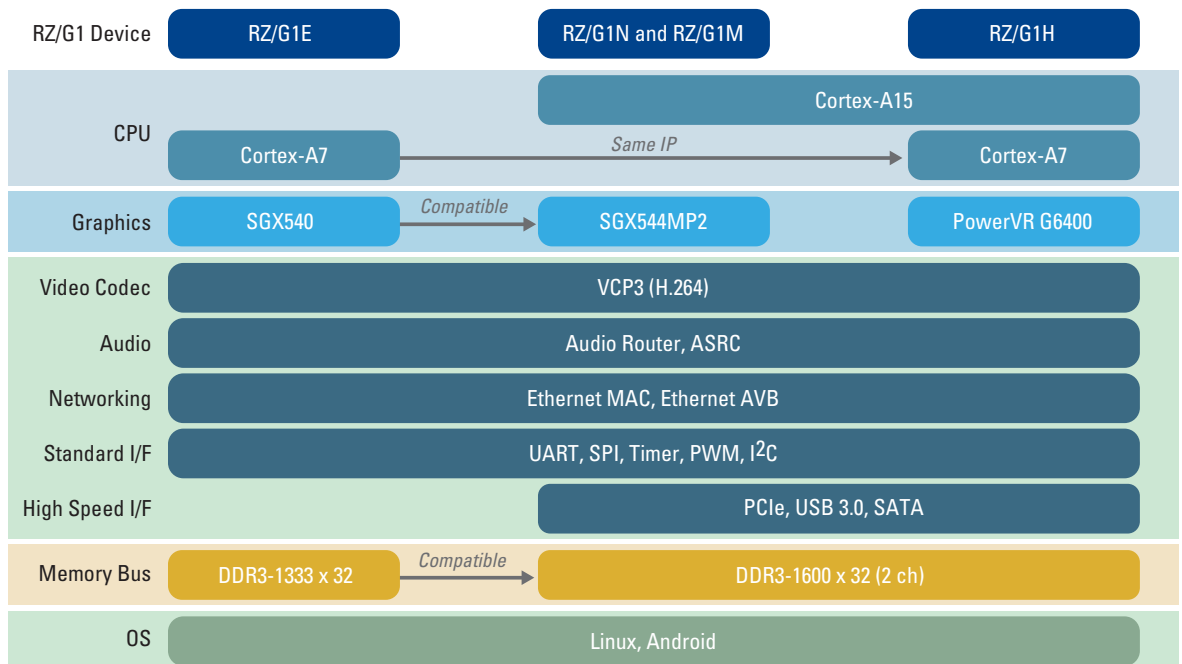
HIGH-CAPABILITY PROCESSING

	RZ/G1E R877450	RZ/G1N R877440	RZ/G1M R877430	RZ/G1H R877420
Core	Dual Cortex®-A7	Dual Cortex®-A15	Dual Cortex®-A15	Quad Cortex®-A15 Quad Cortex®-A7
Operating Frequency	1.0 GHz	1.5 GHz	1.5 GHz	1.4 GHz 780 MHz
Processing Performance	3,800 DMIPS	10,500 DMIPS	10,500 DMIPS	25,528 DMIPS
Cache Size	L1 cache I/32 KB D/32 KB L2 cache 512 KB	L1 cache I/32 KB D/32 KB L2 cache 1 MB	L1 cache I/32 KB D/32 KB L2 cache 1 MB	L1 cache I/32 KB D/32 KB L2 cache 2 MB (A15) 512 KB (A7) S3 cache 2 MB
MMU	Yes			
NEON/VFP	SIMDv2/VFPv4			

SUPPORT FOR 3D GRAPHICS AND FULL HD VIDEO

	RZ/G1E R877450	RZ/G1N R877440	RZ/G1M R877430	RZ/G1H R877420
3D Graphics	SGX540 520 Mpx/s	SGX544MP2 1240 Mpx/s	SGX544MP2 2080 Mpx/s	SG6400 4160 Mpx/s
Video Functions	2 ch digital video inputs	3 ch digital video inputs		4 ch digital video inputs
	2 ch RGB video display interfaces	1 ch RGB video display interface		
		1 ch LVDS video output		2 ch LVDS video interfaces
	H.264 – 1920x1080 @ 60 x 1 ch			H.264 – 1920x1080 @ 60 x 2 ch
Video image processing functions, including color conversion and scaling				

SCALABLE SOFTWARE ACROSS ALL RZ/G1 DEVICES



RZ/G1 EXTENDS RENESAS RZ MPU FAMILY WITH 3D GRAPHICS, H.264 VIDEO CODEC, AND HIGH-PERFORMANCE DDR3 MEMORY INTERFACES

Software Development Environment



Linux



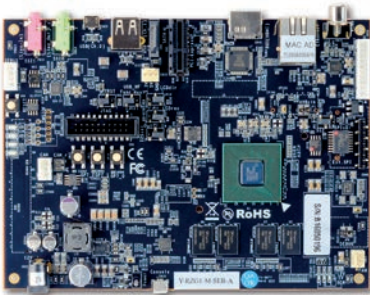
Android



Partners & Affiliations



Evaluation Kits



RZ/G1M Starter Kit
Part No.: YR8A77430S000BE



RZ/G1E Starter Kit
Part No.: YR8A77450S000BE

Various partner kits are available through emtrion and iWave.

Renesas MCU Ecosystem



Consultant and tool vendor network
renesas.com/Alliance



Customized updates
renesas.com/MyRenesas



University program
RenesasUniversity.com



Online training
RenesasInteractive.com

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