Separate Sheet

Main Product Specifications of the R-Car E3 SoC

Item	R-Car E3 Specifications	
Product No	R-Car E3 (R8J77990)	
Power supply voltage	3.3/1.8 V (IO), 2.5V(Ether), 1.35 V (DDR3L), 1.03 V (core)	
CPU core	ARM® Cortex®-A53 Dual	ARM® Cortex®-R7 Dual Lock-Step
Cache memory	L1 Instruction cache: 32 KB L1 Operand cache: 32 KB L2 cache:256 KB	L1 Instruction cache: 32 KB L1 Operand cache: 32 KB
External memory	・DDR3L-SDRAM ・Approved standards：DDR3L-1866 ・Data bus width：32 bits x 1 ch	
Graphics	3D Graphics Processing Unit Imagination Technologies' PowerVR® Series 8XE GE8300	
	2D Graphics Processing Unit	
Video	Display Out x 2 ch (LVDS x 2 or LVDS + Digital RGB)	
	Video Input x 2 ch (MIPI CSI2, Digital RGB)	
	Video codec module (H.265, H.264/AV, MPEG-4, VC-1 etc.)	
	Up and down scaling, 1-D LUT/3D-LUT/1D-Histogram/2D-Histgram, color conversion, I/P conversion, super resolution, rotate, ordered dithering, sharpness, lossless compression/decompression, lossy compression	
	Distortion compensation module (IMR-LX4)	
Video output check	Display Output Compare Unit (DISCOM)	
	Video-Output-Checker (VOC)	
Audio	Audio DSP	
	Sampling rate converter x 10 ch	
	Serial sound interface x 10 ch	
Storage interfaces	USB 3.0 host interface(DRD) x 1 port (wPHY)	
	USB 2.0 host/function interface x 1 port (wPHY)	

	SD host interface x 3 ch (SDR104)
	Multimedia card interface x 1 ch
	PCI Express (1 lane) x 1 ch
	Raw NAND Flash memory interface x 1 ch
In car network and automotive peripherals	Media local bus (MLB) Interface x 1 ch (3-pin interface)
	controller area network (CAN-FD support) Interface x 2ch
	Ethernet AVB 1.0-compatible MAC built in Interface: RGMII Ethernet AVB (802.1BA) ● IEEE802.1BA ● IEEE802.1AS ● IEEE802.1Qav ● IEEE1722
Security	Crypto engine (AES, DES, Hash, RSA)
	SystemRAM
Other peripherals	SYS-DMAC x 48 ch, Realtime-DMAC x 16 ch, Audio-DMAC x 16 ch, Audio(peripheral)-DMAC x 29 ch
	32bit timer x 26 ch
	PWM timer x 7 ch
	I2C bus interface x 9 ch
	Serial communication interface (SCIF) x 11 ch
	SPI multi I/O bus controller (RPC) x 2 ch (HyperFlash™/QSPI support)
	Clock-synchronized serial interface(MSIOF) x 4 ch（SPI/IIS）
	Digital radio interface(DRIF) x 4 ch
Low power mode	Dynamic Power Shutdown
	DFS (Dynamic Frequency Scaling), DDR-SDRAM power supply backup mode
Package	552- pin Flip chip BGA (21 mm x 21 mm, 0.8 mm pitch)
Development environment	ICE for ARM CPU available from tool vendors

Evaluation board	A user system development reference platform with the following features is also available to enable the users to carry out efficient system development. (1) Incorporates car information system-oriented peripheral circuits, providing users with an actual device verification environment. (2) Can be used as a software development tool for application software, etc. (3) Allows easy implementation of custom user functions.
Software Platform	Support OS: Linux, Android™, QNX® Neutrino® RTOS, Integrity® etc.
	OpenGL ES3.1 3D graphics library, Wide variety of H.265, H.264, MPEG-4 and VC-1 for video compliant with OpenMAX IL I/F in addition to BSPs compliant with OSs standard API are available to realize complete system concept.

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