

August 25, 2011

## Product Specifications of the R-Car E1 SoC

Item	Specification
Product number	R-Car E1 (μPD35004)
Power supply voltage	3.3 V (IO), 1.8 (DDR2), 1.5 (DDR3), 1.1 V (core)
CPU core	ARM®Cortex™-A9 (with NEON™)
Maximum operating frequency	533 MHz
Processing performance	1330 DMIPS
Cache memory	Instruction cache: 32 KB Operand cache: 32 KB
External memory	DDR3-SDRAM (DDR1066) or DDR2-SDRAM (DDR533) Address space: 1 GB Maximum operating frequency: 533 MHz Data bus width: 16-bit
Expansion bus	Flash ROM and SRAM, Address space: 64 MB × 3 Data bus width: 8- or 16-bit
Main on-chip peripheral functions	PowerVR SGX531 graphics engine (2D/3D)
	Display/screen output × 2 channels (Digital RGB × 1 ch, PAL/NTSC × 1 ch)  Screen1: RGB888, WVGA (max), Dot clock: 45 MHz (max), Auto Gamma Control and Power Saving, TCON (RGB888)  Screen2: PAL/NTSC Encoder&plus;DAC
	Video input interface × 1 channel
	VPU5HD2 (H.264/AVC, MPEG-4, VC-1)

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	<p>Video image processing (color conversion, image expansion, reduction, filter processing)</p> <p>Distortion compensation module (image renderer)</p> <p>SD card host interfaces × 3 channels</p> <p>Multimedia card interface</p> <p>Serial audio/sound interfaces × 8 channels</p> <p>Media Local Bus (MLB) interface × 1 (MediaLB Ver2.0, 512fs (max) support)</p> <p>USB 2.0 HS × 2 channels</p> <p>GPS baseband processing module</p> <p>TS interface</p> <p>CD-ROM decoder</p> <p>IEBus™ bus interface</p> <p>Ethernet MAC controller (IEEE802.3u, RMII, without PHY)</p> <p>Controller area network interfaces × 2 channels</p> <p>Serial communications interface (UART) × 8 channels</p> <p>I<sup>2</sup>C bus interfaces × 4 channels</p> <p>Serial Peripheral Interface (HSPI) × 3 channels</p> <p>DMA Controller LBSC-DMAC: 3 ch / SuperHyway-DMAC: 2 ch / HPB-DMAC: 30 ch</p> <p>Timer × 9 channels</p> <p>General AD Converter (10-bit, 24 KHz sampling) × 2</p> <p>Video DA converter (10-bit DAC, R-string)</p> <p>Interrupt controller (INTC)</p> <p>Clock oscillator with built-in PLL</p> <p>On-chip debugging function</p>
Low power consumption modes	Clock stop mode, DDR-SDRAM power supply backup mode

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Package	429-pin FPBGA (22 mm × 22 mm)
Development environment	ICE for ARM CPU available from different vendors.
Evaluation board	<p>A user system development reference platform offering the following features is also available, enabling the users to carry out efficient system development.</p> <ul style="list-style-type: none"> <li>(1) Includes car information system-oriented peripheral circuits, providing users with an actual device verification environment.</li> <li>(2) Can be used as a software development tool for application software, etc.</li> <li>(3) Allows easy implementation of custom user functions.</li> </ul>
Middleware	Wide variety of middleware such as H.264, MPEG-4 and VC-1 for video is available to realize complete system concept.