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Product Specifications of the R-Car M1 Series

Product Specifications of the R-Car M1A and R-Car M1S

Item	Specification	
Product no.	R-Car M1A: R8A77781DA01BG, R-Car M1S: R8A77780DA01BG	
Power supply voltage	3.3V (IO), 1.8V (DDR2), 1.5V (DDR3), 1.2V (core)	
CPU cores	ARM Cortex-A9 (R-Car M1A only)	SH-4A core
Maximum operating frequency	800MHz	800MHz
Processing performance	NEON™ Media processing engine	1760 DMIPS (effective), 5600 MFLOPS
On-chip RAM	–	ILRAM: 16 Kbytes OLRAM: 16 Kbytes
Cache memory	Instruction cache: 32 Kbytes Operand cache: 32 Kbytes	Instruction cache: 32 Kbytes Operand cache: 32 Kbytes
External memory	DDR3-SDRAM (DDR1066) or DDR2-SDRAM (DDR800) Address space: 1Gbyte Maximum operating frequency: 533MHz Data bus width: 32 bits	
Expansion bus	Flash ROM and SRAM, Address space: 64 Mbytes × 6 Data bus width: 8 or 16 bits	
Main on-chip peripheral functions	GPU1: PowerVR SGX540 graphics engine (2D/3D)	
	GPU2: Renesas' R-GP2 graphics engine (2D/3D)	
	Display/screen output × 2 channels (RGB)	
	Video input interface × 2 channels	
	Video decoder: VPU5HD2 (H.264/AVC, MPEG-4, MPEG-2, VC-1)	

Item	Specification
	Video image processing (color conversion, image expansion, reduction, filter processing, expansion, edge emphasis function, etc.)
	Contrast corrective function, color conversion function
	JPU: JPEG still picture processing unit
	Distortion compensation module (image renderer)
	SD card host interfaces × 3 channels
	Multimedia card interface
	Sound Processing Units (SPU2F) × 2 channels
	Serial audio/sound interfaces × 9 channels
	USB 2.0 HS × 2 channels
	GPS baseband processing module
	FM multiple decoder
	TS interface
	IEBus™ bus interface × 2 channels
	Ethernet MAC controller (IEEE802.3u), 10/100Mbps transfers
	Controller area network interfaces × 2 channels
	Media Local Bus (MLB) interface up to 50Mbps.
	Serial communications interface (UART) × 6 channels
	I2C bus interfaces × 4 channels
	Serial Peripheral Interface (HSPI) × 3 channels
	Remote control interface × 1 channel
	DMA Controller: × 37 channels
	Timer × 9 channels
	Analog to digital conversion machine interface (12 bits) × 1 channel
	Interrupt controller (INTC)
	Clock oscillator with built-in PLL
	On-chip debugging function
	Sleep mode

Item	Specification
Low power consumption modes	Clock stop mode
	DDR-SDRAM power supply backup mode
Package	472-pin BGA (21mm × 21mm)
Development environment	ICE for ARM CPU available from different vendors Renesas' "E10A-USB" emulator for SH-4A CPU debugging.
Evaluation board	A user system development reference platform offering the following features is also available, enabling the user to carry out efficient system development. (1) Includes car information system oriented peripheral circuits, providing a user system actual device verification environment. (2) Can be used as a software development tool for application software, etc. (3) Allows easy addition of custom user functions.
Middleware	Wide variety of middleware such as H.264, MPEG-2, MPEG-4, and WMV (Windows Media™ Video) for video, MP3, AAC, WMA (Windows Media Audio), and aacPlus, etc. for Audio is available to realize complete system concept.

*Controller Area Network (CAN) is a vehicle network developed by Robert Bosch GmbH.

Product Specifications of the R-Car Dedicated Power Supply IC, R2A11301FT

Item	R2A11301FT
SW system	Synchronous rectification
Number of output channels	2CH: for CPU-Core and DDR
Max. output current	Can be arbitrarily set by external component
Switching frequency	Variable (410KHz, 460kHz), external input PLL available
Operating temperature range	−40 to +105℃
Input withstand voltage	3.4 to 35V
Output voltage	Variable (0.8V to 10V)
Output voltage tolerance	±1% (whole temp. range) ←Target value
Softstart function	Yes
Anti-FET overcurrent at start-up	Yes
Phase-shift available for oscillation	Yes
AVS	Variable-width: +/-35mV (3 steps: -35mV, 0V, +35mV), width can be adjusted by external resistance(s)
AD converter	• 12b/8ch • Successive approximation type • Input tolerant, 5V/3V input available • Supply voltage: 3.3V • Control and output by SPI interface
Others	SPI Interface: • Switchable overcurrent detection level • SW clock selectable / internal and external clock mode select
Package	HQFP-64 (lead-free, halogen-free)