

Renesas Electronics America

Solutions Guide

Embedded Systems Conference 2010 Edition

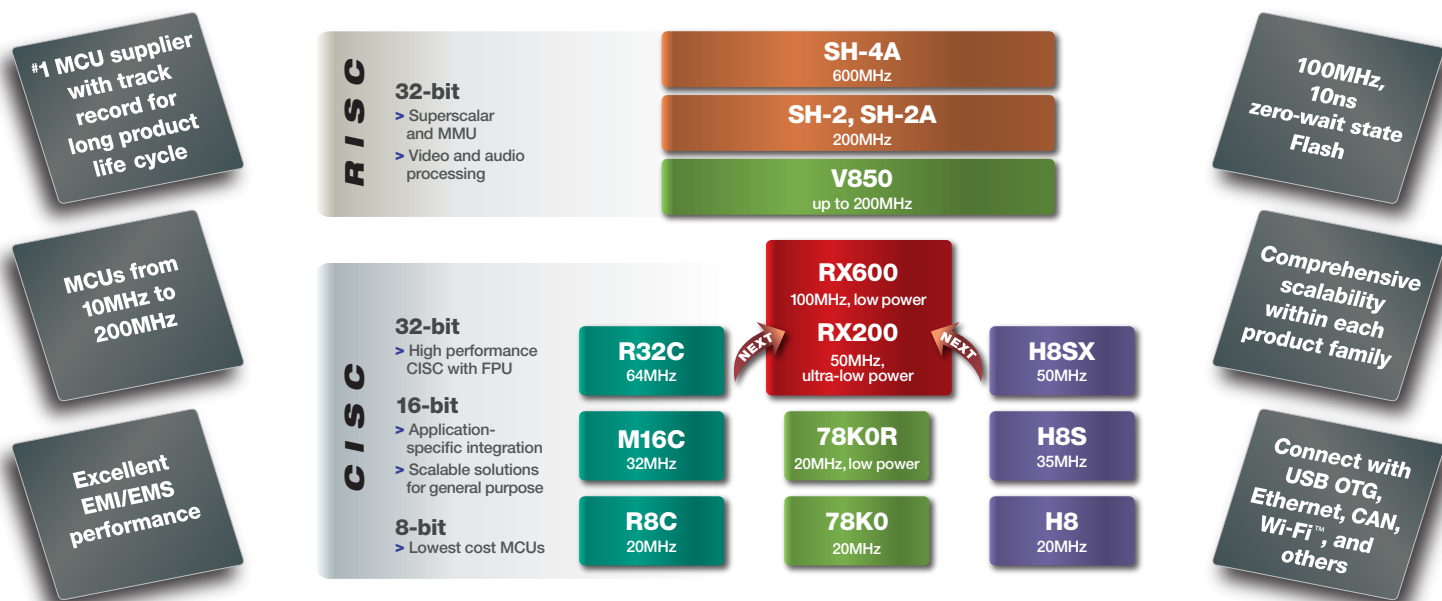
Renesas Electronics Corporation—the new company resulting from the April 1, 2010 merger of Renesas Technology Corporation and NEC Electronics Corporation—is a global semiconductor powerhouse offering a wide range of advanced solutions for a huge customer base around the world. Besides being the world's top supplier of microcontrollers with a 30% market share*, we are also a premiere supplier of SoC products, analog/mixed-signal chips, power devices and much more.

New and existing customers gain significant advantages from the unprecedented strength, extensive technology assets, and clear business focus made possible by our recent merger and invigorated corporate structure.

- ▶ Renesas' microcontroller architectures are #1 across diverse markets, and their extensive use and broad support both facilitate successful system designs and reduce engineering risk.
- ▶ Access to the state-of-the-art design and production technologies of the two biggest Japanese semiconductor companies drives solid product roadmaps and sparks innovation, while top-level commitments to customers protect engineering investments in our existing architectures.
- ▶ Being one of the few chipmakers now supporting an ITDM (Integrated Device and Technology Manufacturer) business model, Renesas Electronics Corporation provides exceptional levels of quality and flexibility by maintaining total control over all aspects of the products we produce: semiconductor R&D, chip design, and device production, including processing, packaging and testing.

Renesas 8-, 16- and 32-bit MCU and MPU Solutions

Offering solid technology roadmaps featuring performance, integration and power efficiency, with complete development tool support



Dawn of a New Future — Renesas Electronics

Combining the strengths of
NEC Electronics and
Renesas Technology

*MCU Market Share:

- ▶ **Global #1 (30%)**
- ▶ **8-bit #1 (20%)**
- ▶ **16-bit #1 (36%)**
- ▶ **32-bit #1 (38%)**

* Source: Gartner 2009 Worldwide Semiconductor Market Share Database, March 2010 results



MCU Size	Family	Series	Group	Ordering Part Number	Pin Count and Package Type	Flash Size (Kbytes)	Data Flash (Kbytes) (Note 1)	RAM (Kbytes)	External Data Bus	Vcc min	Vcc max	max MHz @ Vcc max (note 2)	On-chip Oscillator	32 kHz Sub Clock (Note 3)	Power-On Reset	Low-Voltage Detect	On-chip Debug	Timers			Analog	Serial				Special Features	Suggested Starter Kit	Suggested Demonstration Kit	On-chip Debug Emulator	IDE (C-compiler)										
																		8-bit timers	16-bit timers	Watchdog Timers		A/D 10-bit resolution	A/D 12-bit resolution	D/A 8-bit resolution	Serial (sync/asynch)						SSU (SPI Compatible)	I ² C	PC	CAN	Hardware LIN	DTC	DMA Channels	External Interrupts	GPIO (Note 4)	High Current (Note 5)
8/16-bit	78K0	1x2	1B2	UPD78F0756MC-CAB-AX	30 SSOP	16	-	0.8	-	2.7	5.5	20	Y	-	Y	Y	Y	2	3	1	9	-	-	1	1	-	1	-	-	-	-	6	23	-	40MHz PWM, interconnected ADC, Op-Amp, Comparator and Timer (X1, X2)	QB-MINI2-K01B2	DM-78K0IX2-LED	QB-MINI2-EA	CubeSuite/CA78K0	
	R8C	R8C/2x	23	R5F21238DFP#U0	48-LQFP	64	2	3	-	2.7	5.5	20	Y	-	Y	Y	Y	3	2	1	12	-	-	2	1	-	1	1	1	-	-	6	44	-	WDTO	R0K521237S001BE	RCCK8C	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	23	R5F2123CKFP#U0	48-LQFP	128	2	6	-	3.0	5.5	16	Y	-	Y	Y	Y	3	2	1	12	-	-	2	1	-	1	1	1	-	-	6	44	-		R0K521237S001BE	RCCK8C	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	25	R5F21258SNFP#U0	52-LQFP	64	2	3	-	2.2	5.5	20	Y	Y	Y	Y	Y	3	2	1	12	-	-	2	1	-	1	-	1	-	-	5	44	8	WDTO, RTC	R0K521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	27	R5F21276SNFP#U0	32-LQFP	32	2	2	-	2.2	5.5	20	Y	Y	Y	Y	Y	3	1	1	12	-	-	2	1	-	1	-	1	-	-	4	28	8		R0K521256S001BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	28	R5F212B8SNFP#U0	64-LQFP	64	2	3	-	2.2	5.5	20	Y	Y	Y	Y	Y	3	4	1	12	-	2	3	1	-	1	-	1	-	-	5	57	8		R0K521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	28	R5F212BCSNFP#U0	64-LQFP	128	2	8	-	2.2	5.5	20	Y	Y	Y	Y	Y	3	4	1	12	-	2	3	1	-	1	-	1	-	-	5	57	8		R0K521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	20	R5F21208SNFP#U0	80-LQFP	64	2	3	-	2.2	5.5	20	Y	Y	Y	Y	Y	3	4	1	20	-	2	3	1	-	1	-	1	-	-	5	73	8		R0K521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	20	R5F2120CSNFP#U0	80-LQFP	128	2	8	-	2.2	5.5	20	Y	Y	Y	Y	Y	3	4	1	20	-	2	3	1	-	1	-	1	-	-	5	73	8		R0K521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	2J	R5F212J0SNSP#U0	20-LSSOP	2	-	0.25	-	2.2	5.5	8	Y	-	Y	Y	Y	2	1	1	-	-	-	1	-	-	-	-	1	-	-	3	12	-	WDTO, 2 Comparators	R0K521256S001BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	2L	R5F212L4SNFP#U0	32-LQFP	16	2	2	-	2.2	5.5	20	Y	-	Y	Y	Y	2	3	1	9	-	-	2	-	-	-	-	1	-	-	4	28	8	WDTO	R0K521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/3x	32C	R5F21322CNSP#U0	20-LSSOP	8	4	1	-	1.8	5.5	20	Y	Y	Y	Y	Y	3	1	1	4	-	-	2	1	-	1	-	1	Y	-	7	16	15	WDTO, Comparator, Data Flash with BGO	R0K521350S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/3x	33C	R5F21332CNFP#U0	32-LQFP	8	4	1	-	1.8	5.5	20	Y	Y	Y	Y	Y	3	1	1	12	-	2	3	1	-	1	-	1	Y	-	7	28	27		R0K521350S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/3x	35C	R5F21356CNFP#U0	52-LQFP	32	4	3	-	1.8	5.5	20	Y	Y	Y	Y	Y	3	3	1	12	-	2	3	1	-	1	-	1	Y	-	9	48	47		R0K521350S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/L3x	L3A	R5F213ACCNFP#V0	100-LQFP	128	4	10	-	1.8	5.5	20	Y	Y	Y	Y	Y	3	4	1	20	-	2	3	1	-	2	-	1	Y	-	16	88	16	Data Flash with BGO, comparators, 56 x 4 (52 x 8) LCD controller/driver	R0K52L3A0S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	16/32-bit	78K0R	Kx3-L	KC3-L	UPD78F1000GB-GAF-AX	44 P-LQFP	16	-	1	-	1.8	5.5	20	Y	Y	Y	Y	Y	-	8	1	10	-	-	2	3	-	2	-	1	-	2	9	37	-	2 Comparators, 1ch - Programmable Gain Amplifier	QB-MINI2-K0R/KG3L	DM-78K0R-KE3L	QB-MINI2-EA	CubeSuite/CA78K0R
78K0R		Kx3-L	KG3-L	UPD78F1014GC-UEU-AX	100 P-LQFP	128	-	8	-	1.8	5.5	20	Y	Y	Y	Y	Y	-	12	1	16	-	-	4	4	-	3	-	1	-	2	13	89	-		QB-MINI2-K0R/KG3L	DM-78K0R-KE3L	QB-MINI2-EA	CubeSuite/CA78K0R	
78K0R		Lx3	LF3	UPD78F1500GK-GAK-AX	80 P-LQFP	64	-	4	-	1.8	5.5	20	Y	Y	Y	Y	Y	-	12	1	-	8	2	(12bit)	4	3	-	3	-	1	-	2	8	51	-	2ch Op-Amps, Internal Voltage Ref (2.0V/2.5V), 31 x 4 (27 x 4) LCD controller/driver	QB-MINI2-K0R/LH3	TK-78K0R/LH3+LCD	QB-MINI2-EA	CubeSuite/CA78K0R
78K0R		Lx3	LG3	UPD78F1505GC-UEU-AX	100 P-LQFP	128	-	7	-	1.8	5.5	20	Y	Y	Y	Y	Y	-	12	1	-	12	2	(12bit)	5	4	-	3	-	1	-	2	12	67	-		QB-MINI2-K0R/LH3	TK-78K0R/LH3+LCD	QB-MINI2-EA	CubeSuite/CA78K0R
M16C		M16C	65	R5F36506DFB#U0	100-LQFP	144	8	12	Y	2.7	5.5	32	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	13	88	-	CRC, CEC Function, RTC, 3-phase Motor Control, Remote control circuit Receiver	R0K53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		M16C	65	R5F3650EDFB#U0	100-LQFP	272	8	20	Y	2.7	5.5	32	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	13	88	-		R0K53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		M16C	65	R5F3650MDFB#U0	100-LQFP	528	8	31	Y	2.7	5.5	32	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	13	88	-		R0K53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		M16C	65	R5F3651TDFC#U0	128-LQFP	782	8	47	Y	2.7	5.5	32	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	13	114	-		R0K53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		R32C	111	R5F64112NLG#UA	100-TFLGA	384	8	63	Y	3.0	5.5	50	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	11	86	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	R0K564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		R32C	111	R5F6411FNLG#UA	100-TFLGA	512	8	63	Y	3.0	5.5	50	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	11	86	-		R0K564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		R32C	111	R5F6411EDFN#UA	64-LQFP	128	8	32	-	3.0	5.5	50	Y	Y	Y	Y	Y	-	11	1	26	-	2	6	-	-	6	-	-	-	-	4	11	52	-		R0K564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		R32C	111	R5F6411FDFN#UA	64-LQFP	256	8	32	-	3.0	5.5	50	Y	Y	Y	Y	Y	-	11	1	26	-	2	6	-	-	6	-	-	-	-	4	11	52	-		R0K564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		R32C	111	R5F64110DFB#UA	100-LQFP	256	8	63	Y	3.0	5.5	50	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-	-	4	11	86	-		R0K564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
M16C		R32C	111	R5F64112DFB#UA	100-LQFP	512	8	63	Y	3.0	5.5	50	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	-	7	-	-	-										

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Renesas Development Tools — am.renesas.com/tool

Renesas Electronics offers a wide range of development tools that help make everything from coding to flash memory programming and mass production easier, faster and more accurate.

Renesas Integrated Development Environments (IDEs)

HEW4 — Supports R8C, M16C, R32C, RX, H8, SuperH

- ▶ GUI-based integrated development environment for the development and debugging of embedded applications for Renesas microcontrollers.
- ▶ Powerful, yet easy-to-use, tool suite
- ▶ Industry-standard user interface
- ▶ Designed using a modular approach
- ▶ Seamlessly incorporates device family-specific C/C++ compilers and debugger elements
- ▶ Various debugging platforms including emulators and evaluation boards



CubeSuite — Supports V850, 78K0R, 78K0

- ▶ Simplified development environment for all former NEC Electronics MCUs
- ▶ Compilers and assemblers ▶ Code generator and pin configurator
- ▶ Simulator and debugger ▶ Automatic updater with version control

Renesas Debuggers and Emulators

Renesas provides wide-ranging emulator lineups with sophisticated debugging functionalities provided via an easy-to-use interface.



Software Library

Renesas and our Alliance Partners provide an extensive portfolio of sample code, middleware, device drivers, code generators, and operating systems for our microcontrollers. am.renesas.com/softwarelibrary

Jump-start your design with Renesas Starter Kits!

A Renesas Starter Kit is a cost-effective tool to get started with Renesas MCUs. It includes board, debugger, power supply and CD-ROM in one box.



Renesas Solution Kits for Motor Control, CAN, and Direct-Drive LCD

Solution Kits from Renesas offer many unique features to shorten the development cycle and reduce software complexity.

am.renesas.com/motorcontrol

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The Renesas Ecosystem — Long-term customer support programs



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