

# Renesas Electronics America Solutions Guide

## Embedded Systems Conference 2010 Edition

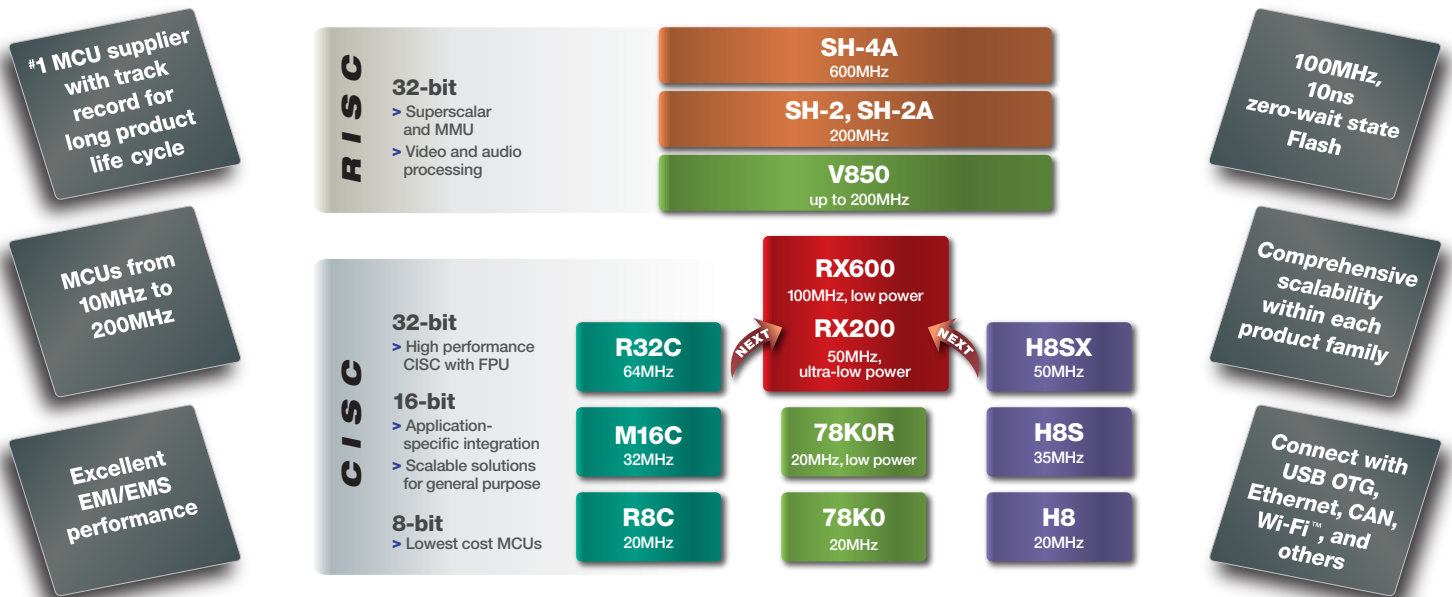
**Renesas Electronics Corporation**—the new company resulting from the April 1, 2010 merger of Renesas Technology Corporation and NEC Electronics Corporation—is a global semiconductor powerhouse offering a wide range of advanced solutions for a huge customer base around the world. Besides being the world's 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		DTC	DMA Channels	External Interrupts	GPIO (Note 4)	High Current (Note 5)	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/async)	SSU (SPI Compatible)	IrDA	PC	CAN	Hardware LIN
8/16-bit	78K0	lx2	1B2	UPD78F056MC-CAB-AX	30 SSOP	16	0.8	2.7	5.5	20	Y	-	Y	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-K0/B2	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	-	-	6	44	-	WDT0	ROK521237S001BE	RCDK8C	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	-	-	6	44	-	WDT0	ROK521237S001BE	RCDK8C	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	Y	3	2	1	12	-	2	1	-	1	1	-	-	5	44	8	WDT0, RTC	ROK521256S001BE	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	Y	3	1	1	12	-	2	1	-	1	1	-	-	4	28	8	WDT0, RTC	ROK521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	28	R5F21288SNFP#U0	64-LQFP	64	2	3	-	2.2	5.5	20	Y	Y	Y	Y	Y	Y	3	4	1	12	-	2	3	1	-	1	-	-	5	57	8	WDT0, RTC	ROK521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	28	R5F2128CSNFP#U0	64-LQFP	128	2	8	-	2.2	5.5	20	Y	Y	Y	Y	Y	Y	3	4	1	12	-	2	3	1	-	1	-	-	5	57	8	WDT0, RTC	ROK521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	20	R5F2120DSNFP#U0	80-LQFP	64	2	3	-	2.2	5.5	20	Y	Y	Y	Y	Y	Y	3	4	1	20	-	2	3	1	-	1	-	-	5	73	8	WDT0, RTC	ROK521256S001BE	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	Y	3	4	1	20	-	2	3	1	-	1	-	-	5	73	8	WDT0, RTC	ROK521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U	
	R8C	R8C/2x	2J	R5F212J0SNFP#U0	20-LSSOP	2	-	0.25	-	2.2	5.5	8	Y	-	Y	Y	Y	Y	2	1	1	-	-	-	1	-	-	-	-	3	12	-	WDT0, 2 Comparators	ROK521256S001BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
	R8C	R8C/2x	2L	R5F212L4SNFP#U0	32-LQFP	16	2	2	-	2.2	5.5	20	Y	-	Y	Y	Y	Y	2	3	1	9	-	2	-	-	-	-	-	4	28	8	WDT0	ROK521256S001BE	YMCPRP8C25	ROE00008AKCE00	YRTA-HEWNC-1U		
	R8C	R8C/3x	32C	R5F21322CNFP#U0	20-LSSOP	8	4	1	-	1.8	5.5	20	Y	Y	Y	Y	Y	Y	3	1	1	4	-	-	2	1	-	1	-	Y	-	7	15	15	WDT0, Comparator, Data Flash with BGO	ROK521350S000BE	-	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	Y	3	1	1	12	-	2	3	1	-	1	-	Y	-	7	27	27	WDT0, Comparator, Data Flash with BGO	ROK521350S000BE	-	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	Y	3	3	1	12	-	2	3	1	-	1	-	Y	-	9	48	47	WDT0, Comparator, Data Flash with BGO	ROK521350S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
	R8C	R8C/L3x	L3A	R5F213ACCNP#U0	100-LQFP	128	4	10	-	1.8	5.5	20	Y	Y	Y	Y	Y	Y	3	4	1	20	-	2	3	1	-	2	-	Y	-	16	88	16	Data Flash with BGO, comparators, 56 x 4 (52 x 8) LCD controller/driver	ROK5213A0S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U
	78K0R	Kx3-L	KC3-L	UPD78F1000GB-GAF-AX	44 P-LQFP	16	-	1	-	1.8	5.5	20	Y	Y	Y	Y	Y	Y	-	8	10	-	-	2	3	-	2	-	-	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-UUE-AX	100 P-LQFP	128	-	8	-	1.8	5.5	20	Y	Y	Y	Y	Y	Y	-	12	16	-	-	4	4	-	3	-	-	2	13	89	-	2 Comparators, 1ch - Programmable Gain Amplifier	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	Y	-	12	1	-	8	2	4	3	-	3	-	-	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-UUE-AX	100 P-LQFP	128	-	7	-	1.8	5.5	20	Y	Y	Y	Y	Y	Y	-	12	1	-	12	2	5	4	-	3	-	-	2	12	67	-	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
	M16C	M16C	65	R5F36500DFB#U0	100-LQFP	144	8	12	Y	2.7	5.5	32	Y	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	ROK53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	M16C	M16C	65	R5F36500EDFB#U0	100-LQFP	272	8	20	Y	2.7	5.5	32	Y	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	ROK53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	M16C	M16C	65	R5F36500MDFB#U0	100-LQFP	528	8	31	Y	2.7	5.5	32	Y	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	ROK53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	M16C	M16C	65	R5F3651TDFCA#U0	128-LQFP	782	8	47	Y	2.7	5.5	32	Y	Y	Y	Y	Y	Y	-	11	1	26	-	2	9	-	7	-	-	4	13	114	-	CRC, CEC Function, RTC, 3-phase Motor Control, Remote control circuit Receiver	ROK53650ES000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
	M16C	R32C	111	R5F64112NLG#U0	100-TFLGA	384	8	63	Y	3.0	5.5	50	Y	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	ROK564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U	
M16C	R32C	111	R5F6411FNLG#U0	100-TFLGA	512	8	63	Y	3.0	5.5	50	Y	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	ROK564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	111	R5F6411EDFN#U0	64-LQFP	128	8	32	-	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	26	-	2	6	-	6	-	-	4	11	52	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	ROK564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	111	R5F64111DFN#U0	64-LQFP	256	8	32	-	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	26	-	2	6	-	6	-	-	4	11	52	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	ROK564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	111	R5F64110DFB#U0	100-LQFP	256	8	63	Y	3.0	5.5	50	Y	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	ROK564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	111	R5F64112DFB#U0	100-LQFP	512	8	63	Y	3.0	5.5	50	Y	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	ROK564112S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	116	R5F64165DFB#U0	100-LQFP	384	8	40	Y	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	26	-	2	10	-	10	-	-	4	11	86	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	ROK564189S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	116	R5F64166DFB#U0	144-LQFP	512	8	40	Y	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	34	-	2	10	-	10	-	-	4	11	122	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	ROK564189S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	117	R5F64175DFB#U0	144-LQFP	384	8	40	Y	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	34	-	2	10	-	10	1	-	4	11	122	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	ROK564189S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	117	R5F64179DFB#U0	100-LQFP	1024	8	63	Y	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	26	-	2	10	-	10	1	-	4	11	86	-	X-Y converter, Intelligent IO (16-ch 16-bit IC; 19-ch 16-bit OC), CRC	ROK564189S000BE	-	ROE00008AKCE00	YRTA-HEWNC-1U		
M16C	R32C	118	R5F64185DFB#U0	100-LQFP	384	8	40	Y	3.0	5.5	50	Y	Y	Y	Y	Y	Y	-	11	1	26	-	2	10	-	10	2	-	4										

# Renesas Electronics America Solutions Guide

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### Renesas Development Tools — [am.renesas.com/tool](http://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
- ▶ Simulator and debugger
- ▶ Code generator and pin configurator
- ▶ 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](http://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](http://am.renesas.com/motorcontrol)
- [am.renesas.com/can](http://am.renesas.com/can)
- [am.renesas.com/lcd](http://am.renesas.com/lcd)



#### RTOS and Middleware support – Special Offer from Renesas and Micrium

Select the Renesas SH7216 or SH7264 Microcontroller + Get Micrium's Real-time Kernel with technical support for FREE

Get FREE Micrium kernel with purchase of Ultra-fast Flash SH7216!\*

and Save 50% on Micrium's Proven Middleware, too!

[am.renesas.com/micriumpromotion](http://am.renesas.com/micriumpromotion)

### The Renesas Ecosystem — Long-term customer support programs



Consultant and Tool Vendor Network  
[am.renesas.com/alliance](http://am.renesas.com/alliance)



University Program  
[renesasuniversity.com](http://renesasuniversity.com)



Online Training  
[renesasinteractive.com](http://renesasinteractive.com)



Customized Updates  
[am.renesas.com/MyRenesas](http://am.renesas.com/MyRenesas)



[am.renesas.com/Samples](http://am.renesas.com/Samples)



[am.renesas.com/tech\\_support](http://am.renesas.com/tech_support)

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