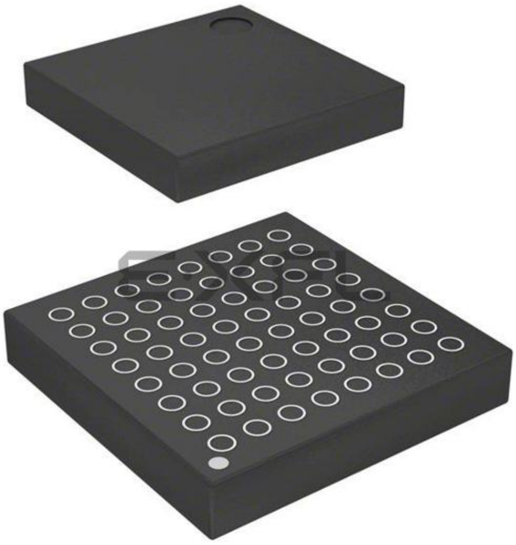
Renesas Electronics America Inc - R5F212A7SNLG#W4 Datasheet



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"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	R8C
Core Size	16-Bit
Speed	20MHz
Connectivity	I²C, LINbus, SIO, SSU, UART/USART
Peripherals	POR, PWM, Voltage Detect, WDT
Number of I/O	55
Program Memory Size	48KB (48K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	2.5K x 8
Voltage - Supply (Vcc/Vdd)	2.2V ~ 5.5V
Data Converters	A/D 12x10b; D/A 2x8b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	64-TFLGA
Supplier Device Package	64-TFLGA (6x6)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f212a7snlg-w4

R8C/2A Group, R8C/2B Group

RENESAS MCU

REJ03B0182-0210
Rev.2.10
Nov 26, 2007

1. Overview

1.1 Features

The R8C/2A Group and R8C/2B Group of single-chip MCUs incorporates the R8C/Tiny Series CPU core, employing sophisticated instructions for a high level of efficiency. With 1 Mbyte of address space, and it is capable of executing instructions at high speed. In addition, the CPU core boasts a multiplier for high-speed operation processing.

Power consumption is low, and the supported operating modes allow additional power control. These MCUs also use an anti-noise configuration to reduce emissions of electromagnetic noise and are designed to withstand EMI.

Integration of many peripheral functions, including multifunction timer and serial interface, reduces the number of system components.

Furthermore, the R8C/2B Group has on-chip data flash (1 KB × 2 blocks).

The difference between the R8C/2A Group and R8C/2B Group is only the presence or absence of data flash. Their peripheral functions are the same.

1.1.1 Applications

Electronic household appliances, office equipment, audio equipment, consumer equipment, etc.

1.2 Product List

Table 1.5 lists Product List for R8C/2A Group, Figure 1.1 shows a Part Number, Memory Size, and Package of R8C/2A Group, Table 1.6 lists Product List for R8C/2B Group, and Figure 1.2 shows a Part Number, Memory Size, and Package of R8C/2B Group.

Table 1.5 Product List for R8C/2A Group **Current of Nov. 2007**

Part No.	ROM Capacity	RAM Capacity	Package Type	Remarks	
R5F212A7SNFP	48 Kbytes	2.5 Kbytes	PLQP0064KB-A	N version	
R5F212A7SNFA	48 Kbytes	2.5 Kbytes	PLQP0064GA-A		
R5F212A7SNLG	48 Kbytes	2.5 Kbytes	PTLG0064JA-A		
R5F212A8SNFP	64 Kbytes	3 Kbytes	PLQP0064KB-A		
R5F212A8SNFA	64 Kbytes	3 Kbytes	PLQP0064GA-A		
R5F212A8SNLG	64 Kbytes	3 Kbytes	PLTG0064JA-A		
R5F212AASNFP	96 Kbytes	7 Kbytes	PLQP0064KB-A		
R5F212AASNFA	96 Kbytes	7 Kbytes	PLQP0064GA-A		
R5F212AASNLG	96 Kbytes	7 Kbytes	PLTG0064JA-A		
R5F212ACSNFP	128 Kbytes	7.5 Kbytes	PLQP0064KB-A		
R5F212ACSNFA	128 Kbytes	7.5 Kbytes	PLQP0064GA-A		
R5F212ACSNLG	128 Kbytes	7.5 Kbytes	PLTG0064JA-A		
R5F212A7SDFP	48 Kbytes	2.5 Kbytes	PLQP0064KB-A	D version	
R5F212A7SDFA	48 Kbytes	2.5 Kbytes	PLQP0064GA-A		
R5F212A8SDFP	64 Kbytes	3 Kbytes	PLQP0064KB-A		
R5F212A8SDFA	64 Kbytes	3 Kbytes	PLQP0064GA-A		
R5F212AASDFP	96 Kbytes	7 Kbytes	PLQP0064KB-A		
R5F212AASDFA	96 Kbytes	7 Kbytes	PLQP0064GA-A		
R5F212ACSDFP	128 Kbytes	7.5 Kbytes	PLQP0064KB-A		
R5F212ACSDFA	128 Kbytes	7.5 Kbytes	PLQP0064GA-A		
R5F212A7SNXXXFP	48 Kbytes	2.5 Kbytes	PLQP0064KB-A	N version	Factory programming product(1)
R5F212A7SNXXXFA	48 Kbytes	2.5 Kbytes	PLQP0064GA-A		
R5F212A7SNXXXLG	48 Kbytes	2.5 Kbytes	PTLG0064JA-A		
R5F212A8SNXXXFP	64 Kbytes	3 Kbytes	PLQP0064KB-A		
R5F212A8SNXXXFA	64 Kbytes	3 Kbytes	PLQP0064GA-A		
R5F212A8SNXXXLG	64 Kbytes	3 Kbytes	PLTG0064JA-A		
R5F212AASNXXXFP	96 Kbytes	7 Kbytes	PLQP0064KB-A		
R5F212AASNXXXFA	96 Kbytes	7 Kbytes	PLQP0064GA-A		
R5F212AASNXXXLG	96 Kbytes	7 Kbytes	PLTG0064JA-A		

NOTE:

1. The user ROM is programmed before shipment.

Table 4.9 SFR Information (9)[1]

Address	Register	Symbol	After reset
0200h			
0201h			
0202h			
0203h			
0204h			
0205h			
0206h			
0207h			
0208h			
0209h			
020Ah			
020Bh			
020Ch			
020Dh			
020Eh			
020Fh			
0210h			
0211h			
0212h			
0213h			
0214h			
0215h			
0216h			
0217h			
0218h			
0219h			
021Ah			
021Bh			
021Ch			
021Dh			
021Eh			
021Fh			
0220h			
0221h			
0222h			
0223h			
0224h			
0225h			
0226h			
0227h			
0228h			
0229h			
022Ah			
022Bh			
022Ch			
022Dh			
022Eh			
022Fh			
0230h			
0231h			
0232h			
0233h			
0234h			
0235h			
0236h			
0237h			
0238h			
0239h			
023Ah			
023Bh			
023Ch			
023Dh			
023Eh			
023Fh			

NOTE:
1. The blank regions are reserved. Do not access locations in these regions.

Table 4.10 SFR Information (10)[1]

Address	Register	Symbol	After reset
0240h			
0241h			
0242h			
0243h			
0244h			
0245h			
0246h			
0247h			
0248h			
0249h			
024Ah			
024Bh			
024Ch			
024Dh			
024Eh			
024Fh			
0250h			
0251h			
0252h			
0253h			
0254h			
0255h			
0256h			
0257h			
0258h			
0259h			
025Ah			
025Bh			
025Ch			
025Dh			
025Eh			
025Fh			
0260h			
0261h			
0262h			
0263h			
0264h			
0265h			
0266h			
0267h			
0268h			
0269h			
026Ah			
026Bh			
026Ch			
026Dh			
026Eh			
026Fh			
0270h			
0271h			
0272h			
0273h			
0274h			
0275h			
0276h			
0277h			
0278h			
0279h			
027Ah			
027Bh			
027Ch			
027Dh			
027Eh			
027Fh			

NOTE:
1. The blank regions are reserved. Do not access locations in these regions.

Table 5.24 Electrical Characteristics (4) [Vcc = 3 V]
(Topr = -20 to 85 °C (N version) / -40 to 85 °C (D version), unless otherwise specified.)

Symbol	Parameter	Condition		Standard			Unit
				Min.	Typ.	Max.	
ICC	Power supply current (VCC = 2.7 to 3.3 V) Single-chip mode, output pins are open, other pins are VSS	High-speed clock mode	XIN = 10 MHz (square wave) High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz No division		5.5		mA
			XIN = 10 MHz (square wave) High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz Divide-by-8		2		mA
		High-speed on-chip oscillator mode	XIN clock off High-speed on-chip oscillator on fOCO = 10 MHz Low-speed on-chip oscillator on = 125 kHz No division		5.5	11	mA
			XIN clock off High-speed on-chip oscillator on fOCO = 10 MHz Low-speed on-chip oscillator on = 125 kHz Divide-by-8		2.2		mA
		Low-speed on-chip oscillator mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz Divide-by-8, FMR47 = 1		145	400	µA
		Low-speed clock mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator off XCIN clock oscillator on = 32 kHz FMR47 = 1		145	400	µA
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator off XCIN clock oscillator on = 32 kHz Program operation on RAM Flash memory off, FMSTP = 1		30		µA
		Wait mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz While a WAIT instruction is executed Peripheral clock operation VCA27 = VCA26 = VCA25 = 0 VCA20 = 1		28	85	µA
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz While a WAIT instruction is executed Peripheral clock off VCA27 = VCA26 = VCA25 = 0 VCA20 = 1		17	50	µA
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator off XCIN clock oscillator on = 32 kHz (high drive) While a WAIT instruction is executed VCA27 = VCA26 = VCA25 = 0 VCA20 = 1		3.3		µA
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator off XCIN clock oscillator on = 32 kHz (low drive) While a WAIT instruction is executed VCA27 = VCA26 = VCA25 = 0 VCA20 = 1		2.1		µA
		Stop mode	XIN clock off, Topr = 25 °C High-speed on-chip oscillator off Low-speed on-chip oscillator off CM10 = 1 Peripheral clock off VCA27 = VCA26 = VCA25 = 0		0.65	3.0	µA
			XIN clock off, Topr = 85 °C High-speed on-chip oscillator off Low-speed on-chip oscillator off CM10 = 1 Peripheral clock off VCA27 = VCA26 = VCA25 = 0		1.65		µA

Table 5.30 Electrical Characteristics (5) [V_{CC} = 2.2 V]

Symbol	Parameter		Condition		Standard			Unit
					Min.	Typ.	Max.	
V_{OH}	Output “H” voltage	Except P2_0 to P2_7, XOUT	I_{OH} = -1 mA		V_{CC} - 0.5		V_{CC}	V
		P2_0 to P2_7	Drive capacity HIGH	I_{OH} = -2 mA	V_{CC} - 0.5		V_{CC}	V
			Drive capacity LOW	I_{OH} = -1 mA	V_{CC} - 0.5		V_{CC}	V
		XOUT	Drive capacity HIGH	I_{OH} = -0.1 mA	V_{CC} - 0.5		V_{CC}	V
			Drive capacity LOW	I_{OH} = -50 µA	V_{CC} - 0.5		V_{CC}	V
V_{OL}	Output “L” voltage	Except P2_0 to P2_7, XOUT	I_{OL} = 1 mA				0.5	V
		P2_0 to P2_7	Drive capacity HIGH	I_{OL} = 2 mA			0.5	V
			Drive capacity LOW	I_{OL} = 1 mA			0.5	V
		XOUT	Drive capacity HIGH	I_{OL} = 0.1 mA			0.5	V
			Drive capacity LOW	I_{OL} = 50 µA			0.5	V
V_{T+}-V_{T-}	Hysteresis	$\overline{\text{INT0}}$, $\overline{\text{INT1}}$, $\overline{\text{INT2}}$, $\overline{\text{INT3}}$, KI0, KI1, KI2, KI3, TRAIO, TRFI, RXD0, RXD1, CLK0, CLK1, CLK2, SSI, SCL, SDA, SSO			0.05	0.3		V
		$\overline{\text{RESET}}$			0.05	0.15		V
I_{IH}	Input “H” current		VI = 2.2 V				4.0	µA
I_{IL}	Input “L” current		VI = 0 V				-4.0	µA
R_{PULLUP}	Pull-up resistance		VI = 0 V		100	200	600	kΩ
R_{fXIN}	Feedback resistance	XIN				5		MΩ
R_{fXCIN}	Feedback resistance	XCIN				35		MΩ
V_{RAM}	RAM hold voltage		During stop mode		1.8			V

NOTE:

1. V_{CC} = 2.2 V at T_{opr} = -20 to 85 °C (N version) / -40 to 85 °C (D version), f(XIN) = 5 MHz, unless otherwise specified.

Rev.	Date	Description	
		Page	Summary
0.30	Dec 22, 2006	19	Table 4.1; • 000Ah: “00XXX000b” o “00h” revised • 0008h: “Module Standby Control Register” o “Module Operation Enable Register” revised • 000Fh: “00011111b” o “00X11111b” revised
		37	Table 5.11 revised
1.00	Feb 09, 2007	All pages	“Preliminary” deleted
		3	Table 1.2 revised
		5	Table 1.4 revised
		6	Table 1.5 and Figure 1.1 revised
		7	Table 1.6 and Figure 1.2 revised
		17	Figure 3.1 revised
		18	Figure 3.2 revised
		19	Table 4.1; • 0008h: “Module Standby Control Register” o “Module Operation Enable Register” revised • 000Ah: “00XXX000b” o “00h” revised • 000Fh: “00011111b” o “00X11111b” revised • 002Bh: “High-Speed On-Chip Oscillator Control Register 6” added
		23	Table 4.5; 0105h: “LIN Control Register 2” register name revised
		31	Table 5.2 revised
		32	Table 5.3 and Table 5.4; NOTE1 revised
		37	Table 5.11 revised
		44	Table 5.17 revised
		46	Table 5.21 and Figure 5.11; “i = 0 to 2” revised
		48	Table 5.24 revised
		50	Table 5.28 revised, Figure 5.16 “i = 0 to 2” revised
		52	Table 5.31 revised
		53	Table 5.34 revised
		54	Table 5.35 and Figure 5.21; “i = 0 to 2” revised
2.00	Oct 17, 2007	All pages	“PTLG0064JA-A (64F0G) package” added
		3, 5	Table 1.2 and Table 1.4; • Operating Ambient Temperature: Y version added • Package: 64-pin FLGA added
		6 to 7	Table 1.5 and Figure 1.1 revised
		8	Table 1.6 and Figure 1.2 revised
		10	Figure 1.4 “64-pin LQFP Package” added
		11	Figure 1.5 added
		19 to 20	Figure 3.1 and Figure 3.2 revised
		24	Table 4.4; 00F5h: “00h” o “000000XXb” revised

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7858/7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2377-3473

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 3518-3399

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510

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