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RENESAS TECHNICAL UPDATE

TOYOSU FORESIA, 3-2-24, Toyosu, Koto-ku, Tokyo 135-0061, Japan
Renesas Electronics Corporation

Product Category	MPU/MCU		Document No.	TN-RX*-A142A/E	Rev.	1.00
Title	Addition of G Version (Ambient Temperature Range: –40 to +105°C) to RX64M Group		Information Category	Technical Notification		
Applicable Product	RX64M Group	Lot No. All lots	Reference Document	RX64M Group User's Manual: Hardware (R01UH0377EJ0100)		

The following amendments and additions related to the G version (ambient temperature range: –40 to +105°C) will be made to RX64M Group User's Manual: Hardware.

No.	Section	Title	Amendment and Addition	
1	1	Overview	Table 1.1 Outline of Specifications	Amended
			Table 1.3 List of Products	Added
			Figure 1.1 How to Read the Product Part Number	Amended
2	64	Electrical Characteristics	Table 64.1 Absolute Maximum Rating	Amended
			Table 64.4 DC Characteristics (3)	Added
			Table 64.5 DC Characteristics (4)	Added

1. Table 1.1 in section 1, Overview, will be amended as follows:

[Before change]

Table 1.1 Outline of Specifications

Classification	Module/Function	Description
Operating temperature		D-version: –40 to +85°C G-version: –40 to +105°C (in planning)

[After change]

Classification	Module/Function	Description
Operating temperature		D-version: –40 to +85°C G-version: –40 to +105°C*5

Note 5. To obtain the G version, contact a Renesas Electronics sales office.

2. The following part numbers will be added to table 1.3, List of Products, in 1.2, List of Products.

Table 1.3 List of Products

Group	Part No.	Package	Code Flash Memory Capacity	RAM Capacity	Data Flash Memory Capacity	Operating Frequency (Max.)	Encryption Module	SDHI
RX64M (G version)	R5F564MLCGFC	PLQP0176KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MLDGFC	PLQP0176KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MLGGFC	PLQP0176KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MLHGFC	PLQP0176KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MJCGFC	PLQP0176KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MJDGFC	PLQP0176KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MJGGFC	PLQP0176KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MJHGFC	PLQP0176KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MGCGFC	PLQP0176KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MGDGFC	PLQP0176KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MGGGFC	PLQP0176KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MGHGFC	PLQP0176KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MFCGFC	PLQP0176KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MFDGFC	PLQP0176KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MFGGFC	PLQP0176KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MFHGFC	PLQP0176KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MLCGFB	PLQP0144KA-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MLDGFB	PLQP0144KA-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MLGGFB	PLQP0144KA-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MLHGFB	PLQP0144KA-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MJCGFB	PLQP0144KA-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MJDGFB	PLQP0144KA-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MJGGFB	PLQP0144KA-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MJHGFB	PLQP0144KA-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MGCGFB	PLQP0144KA-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MGDGFB	PLQP0144KA-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MGGGFB	PLQP0144KA-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MGHGFB	PLQP0144KA-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MFCGFB	PLQP0144KA-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MFDGFB	PLQP0144KA-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MFGGFB	PLQP0144KA-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MFHGFB	PLQP0144KA-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MLCGFP	PLQP0100KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported

Group	Part No.	Package	Code Flash Memory Capacity	RAM Capacity	Data Flash Memory Capacity	Operating Frequency (Max.)	Encryption Module	SDHI
RX64M (G version)	R5F564MLDGFP	PLQP0100KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MLGGFP	PLQP0100KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MLHGFP	PLQP0100KB-A	4 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MJCGFP	PLQP0100KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MJDGFP	PLQP0100KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MJGGFP	PLQP0100KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MJHGFP	PLQP0100KB-A	3 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MGCGFP	PLQP0100KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MGDGFP	PLQP0100KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MGGGFP	PLQP0100KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MGHGFP	PLQP0100KB-A	2.5 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available
	R5F564MFCGFP	PLQP0100KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Not supported
	R5F564MFDGFP	PLQP0100KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Not supported	Available
	R5F564MFGGFP	PLQP0100KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Not supported
	R5F564MFHGFP	PLQP0100KB-A	2 Mbytes	512 Kbytes	64 Kbytes	120 MHz	Available	Available

3. Figure 1.1, How to Read the Product Part Number, in 1.2, List of Products, will be amended as follows.

[Before change]

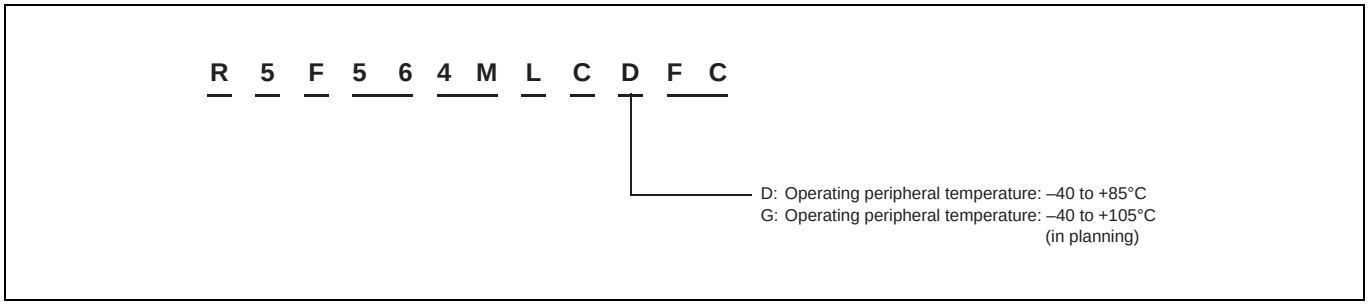
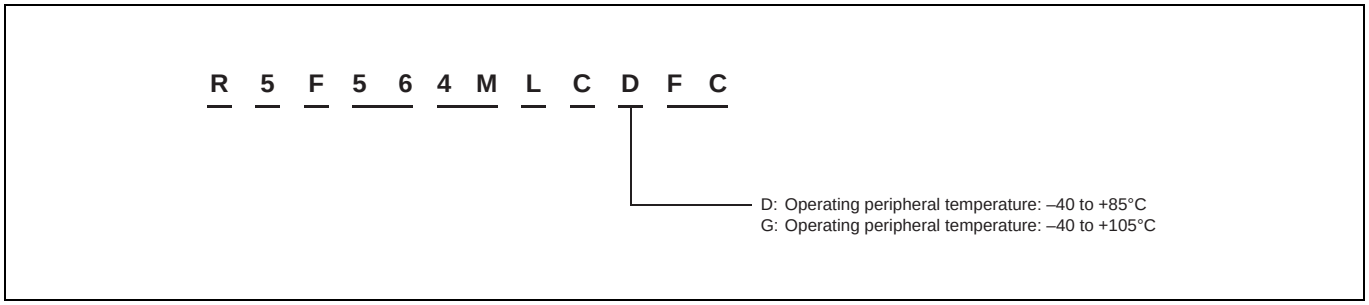


Figure 1.1 How to Read the Product Part Number

[After change]



4. Table 64.1, Absolute Maximum Rating, in section 64, Electrical Characteristics, will be amended as follows.

[Before change]

Item	Symbol	Value	Unit
Operating temperature	T_{opr}	–40 to +85	°C
Operating temperature (high-temperature products)	T_{opr}	–40 to +105 (Under planning)	°C

[After change]

Item		Symbol	Value	Unit
Operating temperature	D-version	T_{opr}	–40 to +85	°C
	G-version		–40 to +105	°C

The following additions will be made to tables 64.4 and 64.5, DC Characteristics (3) and (4).

Table 64.4 DC Characteristics (3) (G version (+85 < T_a ≤ +105°C))

Conditions: VCC = AVCC0 = AVCC1 = VREFH0 = VCC_USB = 2.7 to 3.6 V, 2.7 ≤ VREFH0 ≤ AVCC0,
VCC_USBA = AVCC_USBA = 3.0 to 3.6 V,
VSS = AVSS0 = AVSS1 = VREFL0 = VSS_USB = VSS1_USBA = VSS2_USBA = PVSS_USBA = AVSS_USBA
= 0 V, T_a = T_{opr}

Item				Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Supply current*1	High-speed operating mode	Max.*2		I_{CC}*3	—	—	120	mA	ICLK = 120 MHz PCLKA = 120 MHz PCLKB = 60 MHz PCLKC = 60 MHz PCLKD = 60 MHz FCLK = 60 MHz BCLK = 120 MHz BCLK pin = 60 MHz
		Normal	Peripheral function clock signal supplied*4		—	39	—		
			Peripheral function clock signal stopped*4		—	16	—		
		Coremark	Peripheral function clock signal stopped*4		—	21	—		
		Sleep mode: Supply of the clock signal to peripheral modules is stopped*4				32	70		
		All-module-clock-stop mode (reference value)			—	10	40		
		Increased by BGO operation *5	Reading from the code flash memory while the data flash memory is being programmed		—	7	—		
			Reading from the code flash memory while the code flash memory is being programmed		—	10	—		
	Low-speed operating mode 1: Supply of the clock signal to peripheral modules is stopped*4				—	3	—		All clocks 1 MHz
	Low-speed operating mode 2: Supply of the clock signal to peripheral modules is stopped*4				—	1.2	—		All clocks 32.768 kHz
	Software standby mode				—	0.7	19		
	Deep software standby mode	Power supplied to standby RAM and USB resume detecting unit (USB0 only)			—	22	95	μA	
		Power not supplied to standby RAM and USB resume detecting unit (USB0 only)	Power-on reset circuit and low-power consumption function disabled*6		—	12.5	36.4		
			Power-on reset circuit and low-power consumption function enabled*7		—	3.1	20.0		
		Increased by RTC operation	When a crystal oscillator for low clock loads is in use		—	0.6	—		
			When a crystal oscillator for standard clock loads is in use		—	2.0	—		
	RTC operating while VCC is off (with the battery backup function, only the RTC and sub-clock oscillator operate)		When a crystal oscillator for low clock loads is in use		—	0.9	—		V_{BATT} = 2.0 V, VCC = 0 V
					—	1.6	—		V_{BATT} = 3.3 V, VCC = 0 V
			When a crystal oscillator for standard clock loads is in use		—	1.7	—		V_{BATT} = 2.0 V, VCC = 0 V
					—	3.3	—		V_{BATT} = 3.3 V, VCC = 0 V

Note 1. Supply current values are with all output pins unloaded and all input pull-up MOSs in the off state.

Note 2. Supply of the clock signal to peripheral modules is stopped in this state. This does not include operations as BGO (background operations).

Note 3. I_{CC} depends on f (ICLK) as follows. (ICLK/PCLKA:PCLKB/PCLKC/PCLKD:BCLK:BCLK pin = 10:5:10:5 when EXTAL = 12 MHz)

I_{CC} Max. = $0.77 \times f + 18$ [$T_a \leq 85°C$], $0.77 \times f + 27$ [$85 < T_a \leq 105°C$] (max. operation in high-speed operating mode)

I_{CC} Typ. = $0.08 \times f + 6$ (normal operation in high-speed operating mode)

I_{CC} Typ. = $0.5 \times f + 2.6$ (ICLK = 1 MHz max.) (low-speed operating mode 1)

I_{CC} Max. = $0.36 \times f + 18$ [$T_a \leq 85°C$], $0.36 \times f + 27$ [$85 < T_a \leq 105°C$] (sleep mode)

Note 4. This does not include operations as BGO (background operations). Whether supply of the clock signal to peripheral modules continues or is stopped only depends on the state determined by the settings of the bits in module stop control registers A to D.

The setting for the peripheral module clock stopped state is FCLK = BCLK = PCLKA = PCLKB = PCLKC = PCLKD = BCLK pin = 3.75 MHz (division by 64).

Note 5. This is the increase for programming or erasure of the code flash memory (limitations apply to the combinations of ranges in which writing proceed) or data flash memory during program execution in the code flash memory.

Note 6. The low power consumption function is disabled and DEEPCUT[1:0] = 01b.

Note 7. The low power consumption function is enabled and DEEPCUT[1:0] = 11b.

Table 64.5 DC Characteristics (4) (G version (+85 < $T_a \leq$ +105°C))

Conditions: VCC = AVCC0 = AVCC1 = VREFH0 = VCC_USB = 2.7 to 3.6 V, 2.7 ≤ VREFH0 ≤ AVCC0,
VCC_USBA = AVCC_USBA = 3.0 to 3.6 V,
VSS = AVSS0 = AVSS1 = VREFL0 = VSS_USB = VSS1_USBA = VSS2_USBA = PVSS_USBA = AVSS_USBA
= 0 V, $T_a = T_{opr}$

Item			Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Analog power supply current*1	During 12-bit A/D conversion (unit 0)		AI_{CC}	—	0.7	1.0	mA	IAVCC0_AD
	During 12-bit A/D conversion (unit 0) with the channel-dedicated sample-and-hold circuits for 3 channels operating			—	1.7	2.5	mA	IAVCC0_AD+SH
	During 12-bit A/D conversion (unit 1)			—	0.6	1.0	mA	IAVCC1_AD
	During 12-bit A/D conversion (unit 1) with the temperature sensor operating			—	0.7	1.1	mA	IAVCC1_AD+TEMP
	During D/A conversion (per unit)	Without AMP output		—	0.24	0.4	mA	IAVCC1_DA
		With AMP output		—	0.4	0.7	mA	
	Waiting for A/D, D/A, or temperature sensor conversion (all units)			—	0.9	1.4	mA	IAVCC0 + IAVCC1
	A/D, D/A converter, temperature sensor in standby mode (all units)			—	1.3	4.5	µA	IAVCC0 + IAVCC1
Reference power supply current	During 12-bit A/D conversion (unit 0)		AI_{REFH}	—	70	120	µA	IVREFH0
	Waiting for 12-bit A/D conversion (unit 0)			—	0.07	0.5	µA	IVREFH0
	12-bit A/D converter in standby mode (unit 0)			—	0.07	0.4	µA	IVREFH0
USB operating current	Low speed	USB0	$I_{CCUSBLS}$	—	3.5	6.5	mA	VCC_USB
		USBA		—	8.5	12.0	mA	VCC_USBA = AVCC_USBA (PHYSET.HSEB = 0)
		USBA		—	2.8	3.6	mA	VCC_USBA = AVCC_USBA (PHYSET.HSEB = 1)
	Full speed	USB0	$I_{CCUSBFS}$	—	4.0	10.0	mA	VCC_USB
		USBA		—	12.0	20.0	mA	VCC_USBA = AVCC_USBA (PHYSET.HSEB = 0)
		USBA		—	6.5	13.0	mA	VCC_USBA = AVCC_USBA (PHYSET.HSEB = 1)
	Standby mode (direct power down)	USBA	$I_{CCUSBSBY}$	—	0.1	3.0	µA	VCC_USBA = AVCC_USBA
RAM standby voltage			V_{RAM}	2.7	—	—	V	
VCC rising gradient			SrVCC	8.4	—	20000	µs/V	
VCC falling gradient*2			SfVCC	8.4	—	—	µs/V	

Note 1. The reference power supply current is included in the power supply current value for 12-bit A/D conversion (unit 1) and D/A conversion.

Note 2. This applies when V_{BATT} is used.