Renesas Electronics America Inc - R5F563NBDDFB#V0 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	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	CANbus, EBI/EMI, Ethernet, I²C, LINbus, SCI, SPI, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	111
Program Memory Size	1MB (1M x 8)
Program Memory Type	FLASH
EEPROM Size	32K x 8
RAM Size	128K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 8x10b, 21x12b; D/A 2x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	144-LQFP
Supplier Device Package	144-LFQFP (20x20)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f563nbddfb-v0

1. Overview

1.1 Outline of Specifications

Table 1.1 lists the specifications in outline, and table 1.2 gives a comparison of the functions of products in different packages.
Table 1.1 is for products with the greatest number of functions, so numbers of peripheral modules and channels will differ in accord with the package. For details, see Table 1.2, Comparison of Functions for Different Packages in the RX63N/RX631 Group.

Table 1.1 Outline of Specifications (1/6)

Classification	Module/Function	Description
CPU	CPU	• Maximum operating frequency: 100 MHz • 32-bit RX CPU • Minimum instruction execution time: One instruction per state (cycle of the system clock) • Address space: 4-Gbyte linear • Register set of the CPU General purpose: Sixteen 32-bit registers Control: Nine 32-bit registers Accumulator: One 64-bit register • Basic instructions: 73 • Floating-point instructions: 8 • DSP instructions: 9 • Addressing modes: 10 • Data arrangement Instructions: Little endian Data: Selectable as little endian or big endian • On-chip 32-bit multiplier: 32 x 32 → 64 bits • On-chip divider: 32 / 32 → 32 bits • Barrel shifter: 32 bits • Memory protection unit (MPU)
	FPU	• Single precision (32-bit) floating point • Data types and floating-point exceptions in conformance with the IEEE754 standard
Memory	ROM	• Capacity: ROMless, 256 Kbytes, 384 Kbytes, 512 Kbytes, 768 Kbytes, 1 Mbyte, 1.5 Mbytes, 2 Mbytes • 100 MHz, no-wait access • On-board programming: Four types • Off-board programming (parallel programmer mode) (for products with 100 pins or more)
	RAM	• Capacity: 64 Kbytes, 128 Kbytes, 192 Kbytes, 256 Kbytes • 100 MHz, no-wait access
	E2 data flash	Capacity: 32 Kbytes Programming/erasing: 100,000 times
MCU operating modes		Single-chip mode, on-chip ROM enabled expansion mode, and on-chip ROM disabled expansion mode (software switching)
Clock	Clock generation circuit	• Main clock oscillator, subclock oscillator, low-speed/high-speed on-chip oscillator, PLL frequency synthesizer, and IWDT-dedicated on-chip oscillator • Main-clock oscillation stoppage detection • Separate frequency-division and multiplication settings for the system clock (ICLK), peripheral module clock (PCLK), FlashIF clock (FCLK) and external bus clock (BCLK) The CPU and other bus masters run in synchronization with the system clock (ICLK): Up to 100 MHz Peripheral modules run in synchronization with the peripheral module clock (PCLK): Up to 50 MHz Flash IF run in synchronization with the flashIF clock (FCLK): Up to 50 MHz Devices connected to the external bus run in synchronization with the external bus clock (BCLK): Up to 50 MHz
Reset		RES# pin reset, power-on reset, voltage-monitoring reset, independent watchdog timer reset, watchdog timer reset, deep software standby reset, and software reset
Voltage detection circuit		When the voltage on VCC passes the voltage detection level (Vdet), an internal reset or internal interrupt is generated.

Table 1.1 Outline of Specifications (5/6)

Classification	Module/Function	Description
Communication function	Ethernet controller (ETHERC)	• Input and output of Ethernet/IEEE 802.3 frames • Transfer at 10 or 100 Mbps • Full- and half-duplex modes • MII (Media Independent Interface) or RMII (Reduced Media Independent Interface) as defined in IEEE 802.3u • Detection of Magic Packets™*1 or output of a "wake-on-LAN" signal (WOL) • Compliance with flow control as defined in IEEE 802.3x standards Note 1. Magic PacketTM is a registered trademark of Advanced Micro Devices, Inc.
	DMA controller for Ethernet controller (EDMAC)	• Alleviation of CPU loads by the descriptor control method • Transmission FIFO: 2 Kbytes; Reception FIFO: 2 Kbytes
	USB 2.0 host/function module (USBa)	• Includes a UDC (USB Device Controller) and transceiver for USB 2.0 • Host/function module: one port, function module: one port • Compliance with the USB 2.0 specification • Transfer rate: Full speed (12 Mbps) • Self-power mode and bus-power mode are selectable • OTG (On the Go) operation is possible • Incorporates 2 Kbytes of RAM as a transfer buffer
	Serial communications interfaces (SCIc, SCId)	• 13 channels (SCIc: 12 channels + SCId: 1 channel) • SCIc Serial communications modes: Asynchronous, clock synchronous, and smart-card interface Multi-processor function On-chip baud rate generator allows selection of the desired bit rate Choice of LSB-first or MSB-first transfer Average transfer rate clock can be input from TMR timers for SCI5, SCI6, and SCI12 Simple I^2C Simple SPI • SCId (The following functions are added to SCIc) Supports the serial communications protocol, which contains the start frame and information frame Supports the LIN format
	I^2C bus interfaces (RIIC)	• 4 channels (one of them is FM+) • Communication formats I^2C bus format/SMBus format Supports the multi-master Max. transfer rate: 1 Mbps (channel 0)
	IEBus (IEB)	• 1 channel • Supports protocol control for the IEBus Half-duplex asynchronous transfer Multi-master operation Broadcast communications function Two selectable modes, differentiated by transfer rate
	CAN module (CAN)	• 3 channels • Compliance with the ISO11898-1 specification (standard frame and extended frame) • 32 mailboxes each
	Serial peripheral interfaces (SPI)	• 3 channels • RSPI transfer facility Using the MOSI (master out, slave in), MISO (master in, slave out), SSL (slave select), and RSPCK (RSPI clock) signals enables serial transfer through SPI operation (four lines) or clock-synchronous operation (three lines) Capable of handling serial transfer as a master or slave • Data formats Switching between MSB first and LSB first The number of bits in each transfer can be changed to any number of bits from 8 to 16, or to 20, 24, or 32 bits. 128-bit buffers for transmission and reception Up to four frames can be transmitted or received in a single transfer operation (with each frame having up to 32 bits) • Buffered structure Double buffers for both transmission and reception

1.5 Pin Assignments

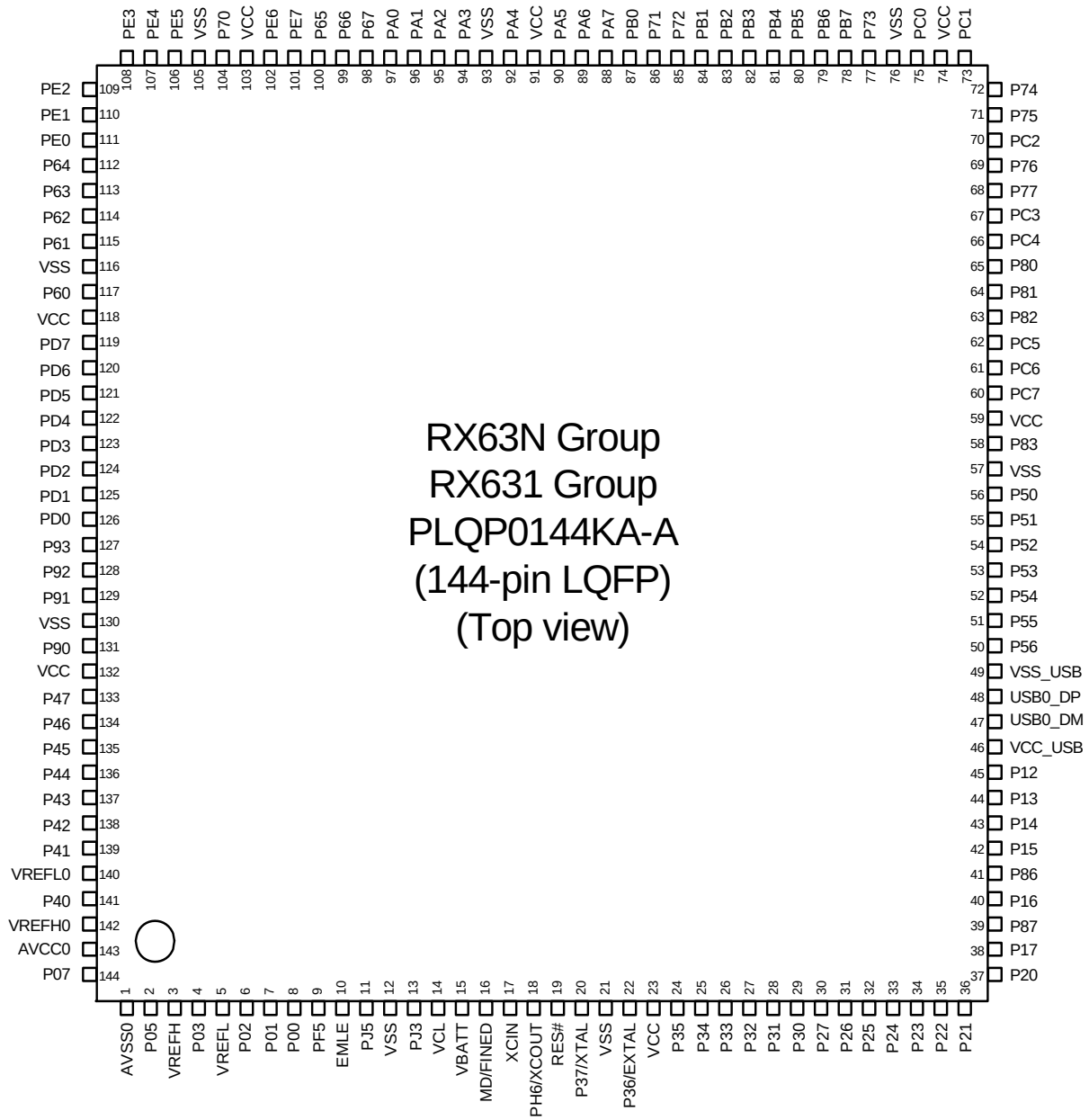
Figure 1.5 to Figure 1.12 show the pins assignments. Table 1.5 to Table 1.13 show the list of pins and pin functions. Power pins and I/O ports are shown in the pin assignment diagrams.

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	
15	PE2	PE3	P70	P65	P67	VSS	VCC	PG7	PA6	PB0	P72	PB4	VSS	VCC	PC1	15
14	PE1	PE0	VSS	PE7	PG3	PA0	PA1	PA2	PA7	VCC	PB1	PB5	P73	P75	P74	14
13	P63	P64	PE4	VCC	PG2	PG4	PG6	PA3	VSS	P71	PB3	PB7	PC0	PC2	P76	13
12	P60	VSS	P62	PE5	PE6	P66	PG5	PA4	PA5	PB2	PB6	P77	PC3	PC4	P80	12
11	PD6	PG1	VCC	P61								P81	P82	PC6	VCC	11
10	P97	PD4	PG0	PD7								PC5	PC7	P83	VSS	10
9	VCC	P96	PD3	PD5								P50	P51	P52	P84	9
8	P94	PD1	PD2	VSS								P53	VCC_ USB	USB1_ DP	USB1_ DM	8
7	VSS	P92	PD0	P95								P54	P55	VSS_ USB	USB0_ DP	7
6	VCC	P91	P90	P93								P56	P57	VCC_ USB	USB0_ DM	6
5	P46	P47	P45	P44	NC							P13	P12	P10	P11	5
4	P42	P41	P43	P00	VSS	BSCANP	PF4	P35	PF3	PF1	P25	P86	P15	P14	P85	4
3	VREFL0	P40	VREFH0	P03	PF5	PJ3	MD/ FINED	RES#	P34	PF2	PF0	P24	P22	P87	P16	3
2	AVCC0	P07	VREFH	P02	EMLE	VCL	XCOUT	VSS	VCC	P32	P30	P26	P23	P17	P20	2
1	AVSS0	P05	VREFL	P01	PJ5	VBATT	XCIN	XTAL	EXTAL	P33	P31	P27	VCC	VSS	P21	1
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	

RX63N Group
RX631 Group
PTLG0177KA-A
(177-pin TFLGA)
(Top perspective view)

Note: This figure indicates the power supply pins and I/O port pins. For the pin configuration, see Table 1.5, List of Pin and Pin Functions (177-Pin TFLGA, 176-Pin LFBGA).

Figure 1.3 Pin Assignment (177-Pin TFLGA)



Note: This figure indicates the power supply pins and I/O port pins. For the pin configuration, see Table 1.8, List of Pins and Pin Functions (144-Pin LQFP).

Figure 1.7 Pin Assignment (144-Pin LQFP)

Table 1.5 List of Pin and Pin Functions (177-Pin TFLGA, 176-Pin LFBGA) (3/5)

Pin Number 177-Pin TFLGA 176-Pin LFBGA	Power Supply Clock System Control	I/O Port	Bus EXDMAC SDRAMC	Timer (MTU, TPU, TMR, PPG, RTC, POE)	Communications (ETHERC, SCIc, SCId, RSPI, RIIC, CAN, IEB, USB, and PDC)	Interrupt	S12AD, AD, DA
H3	RES#						
H4		P35				NMI	
H12		PA4	A4	MTIC5U/MTCLKA/ TIOCA1/TMRI0/PO20	ET_MDC/TXD5/SMOSI5/ SSDA5/SSLA0	IRQ5-DS	
H13		PA3	A3	MTIOC0D/MTCLKD/ TIOCD0/TCLKB/PO19	ET_MDIO/RXD5/SMISO5/ SSCL5	IRQ6-DS	
H14		PA2	A2	PO18	RXD5/SMISO5/SSCL5/ SSLA3		
H15	TRDATA3	PG7	D31				
J1	EXTAL	P36					
J2	VCC						
J3		P34		MTIOC0A/TMCI3/PO12/ POE2#	SCK6/SCK0/ USB0_DPRPD	IRQ4	
J4	TMS	PF3					
J12		PA5	A5	TIOCB1/PO21	ET_LINKSTA/RSPCKA		
J13	VSS						
J14		PA7	A7	TIOCB2/PO23	ET_WOL/MISOA		
J15		PA6	A6	MTIC5V/MTCLKB/ TIOCA2/TMCI3/PO22/ POE2#	ET_EXOUT/CTS5#/ RTS5#/SS5#/MOSIA		
K1		P33		MTIOC0D/TIOCD0/ TMRI3/PO11/POE3#	RXD6/RXD0/SMISO6/ SMISO0/SSCL6/SSCL0/ CRX0/PCKO	IRQ3-DS	
K2		P32		MTIOC0C/TIOCC0/TMO3/ PO10/RTCOUT/RTCIC2	TXD6/TXD0/SMOSI6/ SMOSI0/SSDA6/SSDA0/ CTX0/USB0_VBUSEN/ VSYNC	IRQ2-DS	
K3	TDI	PF2			RXD1/SMISO1/SSCL1		
K4	TCK/FINEC	PF1			SCK1		
K12		PB2	A10	TIOCC3/TCLKC/PO26	ET_RX_CLK/REF50CK/ CTS4#/RTS4#/CTS6#/ RTS6#/SS4#/SS6#		
K13		P71	CS1#		ET_MDIO		
K14	VCC						
K15		PB0	A8	MTIC5W/TIOCA3/PO24	ET_ERXD1/RMII_RXD1/ RXD4/RXD6/SMISO4/ SMISO6/SSCL4/SSCL6/ RSPCKA	IRQ12	
L1		P31		MTIOC4D/TMCI2/PO9/ RTCIC1	CTS1#/RTS1#/SS1#/ SSLB0/USB0_DPUPE	IRQ1-DS	
L2		P30		MTIOC4B/TMRI3/PO8/ RTCIC0/POE8#	RXD1/SMISO1/SSCL1/ MISOB/USB0_DRPD	IRQ0-DS	
L3	TDO	PF0			TXD1/SMOSI1/SSDA1		
L4		P25	CS5#/EDACK1	MTIOC4C/MTCLKB/ TIOCA4/PO5	RXD3/SMISO3/SSCL3/ USB0_DPRPD/HSYNC		ADTRG0#
L12		PB6	A14	MTIOC3D/TIOCA5/PO30	ET_ETXD1/RMII_TXD1/ RXD9/SMISO9/SSCL9		
L13		PB3	A11	MTIOC0A/MTIOC4A/ TIOCD3/TCLKD/TMO0/ PO27/POE3#	ET_RX_ER/RMII_RX_ER/ SCK4/SCK6		
L14		PB1	A9	MTIOC0C/MTIOC4C/ TIOCB3/TMCI0/PO25	ET_ERXD0/RMII_RXD0/ TXD4/TXD6/SMOSI4/ SMOSI6/SSDA4/SSDA6	IRQ4-DS	
L15		P72	CS2#		ET_MDC		
M1		P27	CS7#	MTIOC2B/TMCI3/PO7	SCK1/RSPCKB		

Table 1.8 List of Pins and Pin Functions (144-Pin LQFP) (4/5)

Pin No. 144-pin LQFP	Power Supply Clock System Control	I/O Port	Bus EXDMAC SDRAMC	Timers (MTU, TPU, TMR, PPG, RTC, POE)	Communications (ETHERC, SCIc, SCId, RSPI, RIIC, CAN, IEB, USB, and PDC)	Interrupt	S12AD AD DA
89		PA6	A6	MTIC5V/MTCLKB/ TIOCA2/TMCI3/PO22/ POE2#	CTS5#/RTS5#/SS5# MOSIA/ET_EXOUT		
90		PA5	A5	TIOCB1/PO21	RSPCKA/ET_LINKSTA		
91	VCC						
92		PA4	A4	MTIC5U/MTCLKA/ TIOCA1/TMRI0/PO20	TXD5/SMOSI5/SSDA5/ SSLA0/ET_MDC	IRQ5-DS	
93	VSS						
94		PA3	A3	MTIOC0D/MTCLKD/ TIOCD0/TCLKB/PO19	RXD5/SMISO5/SSCL5/ ET_MDIO	IRQ6-DS	
95		PA2	A2	PO18	RXD5/SMISO5/SSCL5/ SSLA3		
96		PA1	A1	MTIOC0B/MTCLKC/ TIOCB0/PO17	SCK5/SSLA2/ET_WOL	IRQ11	
97		PA0	A0/BC0#	MTIOC4A/TIOCA0/ PO16	SSLA1/ET_TX_EN/ RMII_TXD_EN		
98		P67	CS7#/DQM1		CRX2*2	IRQ15	
99		P66	CS6#/DQM0		CTX2*2		
100		P65	CS5#/CKE				
101		PE7	D15[A15/D15]	TIOCB11	MISOB	IRQ7	AN5
102		PE6	D14[A14/D14]	TIOCA11	MOSIB	IRQ6	AN4
103	VCC						
104	SDCLK	P70					
105	VSS						
106		PE5	D13[A13/D13]	MTIOC4C/MTIOC2B/ TIOCB10	RSPCKB/ET_RX_CLK/ REF50CK	IRQ5	AN3
107		PE4	D12[A12/D12]	MTIOC4D/MTIOC1A/ TIOCA10/PO28	SSLB0/ET_ERXD2		AN2
108		PE3	D11[A11/D11]	MTIOC4B/TIOCB9/ PO26/POE8#	CTS12#/RTS12#/ SS12#/MISOB/ ET_ERXD3		AN1
109		PE2	D10[A10/D10]	MTIOC4A/TIOCA9/ PO23	RXD12/SMISO12/ SSCL12/RXDX12/ SSLB3/MOSIB	IRQ7-DS	AN0
110		PE1	D9[A9/D9]	MTIOC4C/TIOCD9/ PO18	TXD12/SMOSI12/ SSDA12/TXDX12/ SIOX12/SSLB2/ RSPCKB		ANEX1
111		PE0	D8[A8/D8]	TIOCC9	SCK12/SSLB1		ANEX0
112		P64	CS4#/WE#				
113		P63	CS3#/CAS#				
114		P62	CS2#/RAS#				
115		P61	CS1#/SDCS#				
116	VSS						
117		P60	CS0#				
118	VCC						
119		PD7	D7[A7/D7]	MTIC5U/POE0#	SSLC3	IRQ7	AN7
120		PD6	D6[A6/D6]	MTIC5V/POE1#	SSLC2	IRQ6	AN6
121		PD5	D5[A5/D5]	MTIC5W/POE2#	SSLC1	IRQ5	AN013
122		PD4	D4[A4/D4]	POE3#	SSLC0	IRQ4	AN012
123		PD3	D3[A3/D3]	TIOCB8/TCLKH/ POE8#	RSPCKC	IRQ3	AN011
124		PD2	D2[A2/D2]	MTIOC4D/TIOCA8	MISOC/CRX0	IRQ2	AN010

Table 1.9 List of Pins and Pin Functions (100-Pin TFLGA) (2/5)

Pin No. 100-pin TFLGA	Power Supply Clock System Control	I/O Port	Bus EXDMAC	Timers (MTU, TPU, TMR, PPG, RTC, POE)	Communications (ETHERC, SCIc, SCId, RSPI, RIIC, CAN, IEB, USB)	Interrupt	S12AD AD DA
D2	XCOUT						
D3	MD/FINED						
D4	VBATT						
D5		P45				IRQ13-DS	AN005
D6		P46				IRQ14-DS	AN006
D7		PE6	D14[A14/D14]		MOSIB	IRQ6	AN4
D8		PE7	D15[A15/D15]		MISOB	IRQ7	AN5
D9		PA1	A1	MTIOC0B/ MTCLKC/ TIOCB0/PO17	SCK5/SSLA2/ ET_WOL	IRQ11	
D10		PA0	A0/BC0#	MTIOC4A/ TIOCA0/PO16	SSLA1/ET_TX_EN/ RMII_TXD_EN		
E1	XTAL	P37					
E2	VSS						
E3	RES#						
E4	TRST#	P34		MTIOC0A/ TMCI3/PO12/ POE2#	SCK6/SCK0/ USB0_DPRPD	IRQ4	
E5		P41				IRQ9-DS	AN001
E6		PA2	A2	PO18	RXD5/SMISO5/ SSCL5/SSLA3		
E7		PA6	A6	MTIC5V/ MTCLKB/ TIOCA2/ TMCI3/PO22/ POE2#	CTS5#/RTS5#/ SS5#/MOSIA/ ET_EXOUT		
E8		PA4	A4	MTIC5U/ MTCLKA/ TIOCA1/ TMRI0/PO20	TXD5/SMOSI5/ SSDA5/SSLA0/ ET_MDC	IRQ5-DS	
E9		PA5	A5	TIOCB1/PO21	RSPCKA/ ET_LINKSTA		
E10		PA3	A3	MTIOC0D/ MTCLKD/ TIOCD0/ TCLKB/PO19	RXD5/SMISO5/ SSCL5/ET_MDIO	IRQ6-DS	
F1	EXTAL	P36					
F2	VCC						
F3		P35				NMI	
F4		P32		MTIOC0C/ TIOCC0/TMO3/ PO10/ RTCOUT/ RTCIC2	TXD6/TXD0/ SMOSI6/SMOSI0/ SSDA6/SSDA0/ CTX0*1/ USB0_VBUSEN	IRQ2-DS	
F5		P12		TMCI1	RXD2/SMISO2/ SSCL2/SCL0[FM+]	IRQ2	
F6		PB3	A11	MTIOC0A/ MTIOC4A/ TIOCD3/ TCLKD/TMO0/ PO27/POE3#	SCK6/ET_RX_ER/ RMII_RX_ER		

Table 1.12 List of Pins and Pin Functions (64-Pin LQFP) (3/3)

Pin Number 64-Pin LQFP	Power Supply Clock System Control	I/O Port	Timer (MTU2a, TPUa, TMR, PPG, RTCa, POE2a)	Timer Communications (SCIc, SCId, RSPI, RIIC, CAN, IEB, USB)	Interrupt	S12ADa, DAa
61	VREFH0					
62	AVCC0					
63		P05			IRQ13	DA1
64	AVSS0					

Table 4.1 List of I/O Registers (Address Order) (15/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 8036h	IWDT	IWDT reset control register	IWDTRCR	8	8	2, 3 PCLKB	2 ICLK	IWDTa
0008 8038h	IWDT	IWDT count stop control register	IWDTCSTPR	8	8	2, 3 PCLKB	2 ICLK	
0008 80C0h	DA	D/A data register 0	DADR0	16	16	2, 3 PCLKB	2 ICLK	DAa
0008 80C2h	DA	D/A data register 1	DADR1	16	16	2, 3 PCLKB	2 ICLK	
0008 80C4h	DA	D/A control register	DACR	8	8	2, 3 PCLKB	2 ICLK	
0008 80C5h	DA	DADRm format select register	DADPR	8	8	2, 3 PCLKB	2 ICLK	
0008 80C6h	DA	D/A A/D synchronous start control register	DAADSCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8100h	TPUA	Timer start register	TSTR	8	8	2, 3 PCLKB	2 ICLK	TPUa
0008 8101h	TPUA	Timer synchronous register	TSYR	8	8	2, 3 PCLKB	2 ICLK	
0008 8108h	TPU0	Noise filter control register	NFCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8109h	TPU1	Noise filter control register	NFCR	8	8	2, 3 PCLKB	2 ICLK	
0008 810Ah	TPU2	Noise filter control register	NFCR	8	8	2, 3 PCLKB	2 ICLK	
0008 810Bh	TPU3	Noise filter control register	NFCR	8	8	2, 3 PCLKB	2 ICLK	
0008 810Ch	TPU4	Noise filter control register	NFCR	8	8	2, 3 PCLKB	2 ICLK	
0008 810Dh	TPU5	Noise filter control register	NFCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8110h	TPU0	Timer control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8111h	TPU0	Timer mode register	TMDR	8	8	2, 3 PCLKB	2 ICLK	
0008 8112h	TPU0	Timer I/O control register H	TIORH	8	8	2, 3 PCLKB	2 ICLK	
0008 8113h	TPU0	Timer I/O control register L	TIORL	8	8	2, 3 PCLKB	2 ICLK	
0008 8114h	TPU0	Timer interrupt enable register	TIER	8	8	2, 3 PCLKB	2 ICLK	
0008 8115h	TPU0	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8116h	TPU0	Timer counter	TCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 8118h	TPU0	Timer general register A	TGRA	16	16	2, 3 PCLKB	2 ICLK	
0008 811Ah	TPU0	Timer general register B	TGRB	16	16	2, 3 PCLKB	2 ICLK	
0008 811Ch	TPU0	Timer general register C	TGRC	16	16	2, 3 PCLKB	2 ICLK	
0008 811Eh	TPU0	Timer general register D	TGRD	16	16	2, 3 PCLKB	2 ICLK	
0008 8120h	TPU1	Timer control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8121h	TPU1	Timer mode register	TMDR	8	8	2, 3 PCLKB	2 ICLK	
0008 8122h	TPU1	Timer I/O control register	TIOR	8	8	2, 3 PCLKB	2 ICLK	
0008 8124h	TPU1	Timer interrupt enable register	TIER	8	8	2, 3 PCLKB	2 ICLK	
0008 8125h	TPU1	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8126h	TPU1	Timer counter	TCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 8128h	TPU1	Timer general register A	TGRA	16	16	2, 3 PCLKB	2 ICLK	
0008 812Ah	TPU1	Timer general register B	TGRB	16	16	2, 3 PCLKB	2 ICLK	
0008 8130h	TPU2	Timer control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8131h	TPU2	Timer mode register	TMDR	8	8	2, 3 PCLKB	2 ICLK	
0008 8132h	TPU2	Timer I/O control register	TIOR	8	8	2, 3 PCLKB	2 ICLK	
0008 8134h	TPU2	Timer interrupt enable register	TIER	8	8	2, 3 PCLKB	2 ICLK	
0008 8135h	TPU2	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8136h	TPU2	Timer counter	TCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 8138h	TPU2	Timer general register A	TGRA	16	16	2, 3 PCLKB	2 ICLK	
0008 813Ah	TPU2	Timer general register B	TGRB	16	16	2, 3 PCLKB	2 ICLK	
0008 8140h	TPU3	Timer control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8141h	TPU3	Timer mode register	TMDR	8	8	2, 3 PCLKB	2 ICLK	
0008 8142h	TPU3	Timer I/O control register H	TIORH	8	8	2, 3 PCLKB	2 ICLK	
0008 8143h	TPU3	Timer I/O control register L	TIORL	8	8	2, 3 PCLKB	2 ICLK	
0008 8144h	TPU3	Timer interrupt enable register	TIER	8	8	2, 3 PCLKB	2 ICLK	
0008 8145h	TPU3	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8146h	TPU3	Timer counter	TCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 8148h	TPU3	Timer general register A	TGRA	16	16	2, 3 PCLKB	2 ICLK	
0008 814Ah	TPU3	Timer general register B	TGRB	16	16	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (22/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 862Ah	MTU4	Timer general register D	TGRD	16	16	2, 3 PCLKB	2 ICLK	MTU2a
0008 862Ch	MTU3	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 862Dh	MTU4	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8630h	MTU	Timer interrupt skipping set register	TITCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8631h	MTU	Timer interrupt skipping counter	TITCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 8632h	MTU	Timer buffer transfer set register	TBTER	8	8	2, 3 PCLKB	2 ICLK	
0008 8634h	MTU	Timer dead time enable register	TDER	8	8	2, 3 PCLKB	2 ICLK	
0008 8636h	MTU	Timer output level buffer register	TOLBR	8	8	2, 3 PCLKB	2 ICLK	
0008 8638h	MTU3	Timer buffer operation transfer mode register	TBTM	8	8	2, 3 PCLKB	2 ICLK	
0008 8639h	MTU4	Timer buffer operation transfer mode register	TBTM	8	8	2, 3 PCLKB	2 ICLK	
0008 8640h	MTU4	Timer A/D converter start request control register	TADCR	16	16	2, 3 PCLKB	2 ICLK	
0008 8644h	MTU4	Timer A/D converter start request cycle set register A	TADCORA	16	16	2, 3 PCLKB	2 ICLK	
0008 8646h	MTU4	Timer A/D converter start request cycle set register B	TADCORB	16	16	2, 3 PCLKB	2 ICLK	
0008 8648h	MTU4	Timer A/D converter start request cycle set buffer register A	TADCOBRA	16	16	2, 3 PCLKB	2 ICLK	
0008 864Ah	MTU4	Timer A/D converter start request cycle set buffer register B	TADCOBRB	16	16	2, 3 PCLKB	2 ICLK	
0008 8660h	MTU	Timer waveform control register	TWCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8680h	MTU	Timer start register	TSTR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8681h	MTU	Timer synchronous register	TSYR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8684h	MTU	Timer read/write enable register	TRWER	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8690h	MTU0	Noise filter control register	NFCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8691h	MTU1	Noise filter control register	NFCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8692h	MTU2	Noise filter control register	NFCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8693h	MTU3	Noise filter control register	NFCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8694h	MTU4	Noise filter control register	NFCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8695h	MTU5	Noise filter control register	NFCR	8	8, 16	2, 3 PCLKB	2 ICLK	
0008 8700h	MTU0	Timer control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8701h	MTU0	Timer mode register	TMDR	8	8	2, 3 PCLKB	2 ICLK	
0008 8702h	MTU0	Timer I/O control register H	TIORH	8	8	2, 3 PCLKB	2 ICLK	
0008 8703h	MTU0	Timer I/O control register L	TIORL	8	8	2, 3 PCLKB	2 ICLK	
0008 8704h	MTU0	Timer interrupt enable register	TIER	8	8	2, 3 PCLKB	2 ICLK	
0008 8705h	MTU0	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8706h	MTU0	Timer counter	TCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 8708h	MTU0	Timer general register A	TGRA	16	16	2, 3 PCLKB	2 ICLK	
0008 870Ah	MTU0	Timer general register B	TGRB	16	16	2, 3 PCLKB	2 ICLK	
0008 870Ch	MTU0	Timer general register C	TGRC	16	16	2, 3 PCLKB	2 ICLK	
0008 870Eh	MTU0	Timer general register D	TGRD	16	16	2, 3 PCLKB	2 ICLK	
0008 8720h	MTU0	Timer general register E	TGRE	16	16	2, 3 PCLKB	2 ICLK	
0008 8722h	MTU0	Timer general register F	TGRF	16	16	2, 3 PCLKB	2 ICLK	
0008 8724h	MTU0	Timer interrupt enable register2	TIER2	8	8	2, 3 PCLKB	2 ICLK	
0008 8726h	MTU0	Timer buffer operation transfer mode register	TBTM	8	8	2, 3 PCLKB	2 ICLK	
0008 8780h	MTU1	Timer control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0008 8781h	MTU1	Timer mode register	TMDR	8	8	2, 3 PCLKB	2 ICLK	
0008 8782h	MTU1	Timer I/O control register	TIOR	8	8	2, 3 PCLKB	2 ICLK	
0008 8784h	MTU1	Timer interrupt enable register	TIER	8	8	2, 3 PCLKB	2 ICLK	
0008 8785h	MTU1	Timer status register	TSR	8	8	2, 3 PCLKB	2 ICLK	
0008 8786h	MTU1	Timer counter	TCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 8788h	MTU1	Timer general register A	TGRA	16	16	2, 3 PCLKB	2 ICLK	
0008 878Ah	MTU1	Timer general register B	TGRB	16	16	2, 3 PCLKB	2 ICLK	
0008 8790h	MTU1	Timer input capture control register	TICCR	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (24/50)

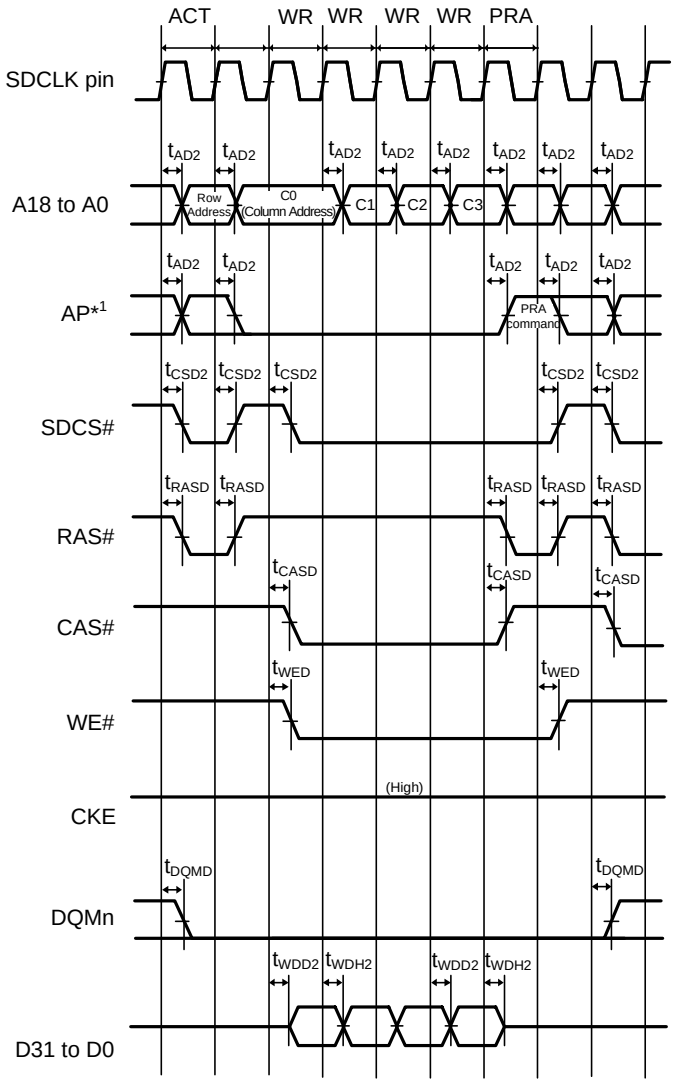
Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 9034h	S12AD	A/D data register 10	ADDR10	16	16	2, 3 PCLKB	2 ICLK	S12ADa
0008 9036h	S12AD	A/D data register 11	ADDR11	16	16	2, 3 PCLKB	2 ICLK	
0008 9038h	S12AD	A/D data register 12	ADDR12	16	16	2, 3 PCLKB	2 ICLK	
0008 903Ah	S12AD	A/D data register 13	ADDR13	16	16	2, 3 PCLKB	2 ICLK	
0008 903Ch	S12AD	A/D data register 14	ADDR14	16	16	2, 3 PCLKB	2 ICLK	
0008 903Eh	S12AD	A/D data register 15	ADDR15	16	16	2, 3 PCLKB	2 ICLK	
0008 9040h	S12AD	A/D data register 16	ADDR16	16	16	2, 3 PCLKB	2 ICLK	
0008 9042h	S12AD	A/D data register 17	ADDR17	16	16	2, 3 PCLKB	2 ICLK	
0008 9044h	S12AD	A/D data register 18	ADDR18	16	16	2, 3 PCLKB	2 ICLK	
0008 9046h	S12AD	A/D data register 19	ADDR19	16	16	2, 3 PCLKB	2 ICLK	
0008 9048h	S12AD	A/D data register 20	ADDR20	16	16	2, 3 PCLKB	2 ICLK	
0008 9060h	S12AD	A/D sampling state register01	ADSSTR01	16	16	2, 3 PCLKB	2 ICLK	
0008 9070h	S12AD	A/D sampling state register 23	ADSSTR23	16	16	2, 3 PCLKB	2 ICLK	
0008 9800h	AD	A/D data register A	ADDRA	16	16	2, 3 PCLKB	2 ICLK	ADb
0008 9802h	AD	A/D data register B	ADDRB	16	16	2, 3 PCLKB	2 ICLK	
0008 9804h	AD	A/D data register C	ADDRC	16	16	2, 3 PCLKB	2 ICLK	
0008 9806h	AD	A/D data register D	ADDRD	16	16	2, 3 PCLKB	2 ICLK	
0008 9808h	AD	A/D data register E	ADDRE	16	16	2, 3 PCLKB	2 ICLK	
0008 980Ah	AD	A/D data register F	ADDRF	16	16	2, 3 PCLKB	2 ICLK	
0008 980Ch	AD	A/D data register G	ADDRG	16	16	2, 3 PCLKB	2 ICLK	
0008 980Eh	AD	A/D data register H	ADDRH	16	16	2, 3 PCLKB	2 ICLK	
0008 9810h	AD	A/D control/status register	ADCSR	8	8	2, 3 PCLKB	2 ICLK	
0008 9811h	AD	A/D control register	ADCR	8	8	2, 3 PCLKB	2 ICLK	
0008 9812h	AD	A/D control register 2	ADCR2	8	8	2, 3 PCLKB	2 ICLK	
0008 9813h	AD	A/D sampling state register	ADSSTR	8	8	2, 3 PCLKB	2 ICLK	
0008 981Fh	AD	A/D self-diagnostic register	ADDIAGR	8	8	2, 3 PCLKB	2 ICLK	
0008 A000h	SCI0	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	SCIc, SCId
0008 A001h	SCI0	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A002h	SCI0	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A003h	SCI0	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A004h	SCI0	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A005h	SCI0	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A006h	SCI0	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A007h	SCI0	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A008h	SCI0	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A009h	SCI0	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Ah	SCI0	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Bh	SCI0	I^2C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Ch	SCI0	I^2C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Dh	SCI0	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A020h	SCI1	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A021h	SCI1	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A022h	SCI1	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A023h	SCI1	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A024h	SCI1	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A025h	SCI1	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A026h	SCI1	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A027h	SCI1	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A028h	SCI1	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A029h	SCI1	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A02Ah	SCI1	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (34/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 C1B1h	MPC	PE1 pin function control register	PE1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B2h	MPC	PE2 pin function control register	PE2PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B3h	MPC	PE3 pin function control register	PE3PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B4h	MPC	PE4 pin function control register	PE4PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B5h	MPC	PE5 pin function control register	PE5PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B6h	MPC	PE6 pin function control register	PE6PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B7h	MPC	PE7 pin function control register	PE7PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B8h	MPC	PF0 pin function control register	PF0PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1B9h	MPC	PF1 pin function control register	PF1PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1BAh	MPC	PF2 pin function control register	PF2PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1BDh	MPC	PF5 pin function control register	PF5PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1D3h	MPC	PJ3 pin function control register	PJ3PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C280h	SYSTEM	Deep standby control register	DPSBYCR	8	8	4, 5 PCLKB	2, 3 ICLK	Low Power Consumption
0008 C282h	SYSTEM	Deep standby interrupt enable register 0	DPSIER0	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C283h	SYSTEM	Deep standby interrupt enable register 1	DPSIER1	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C284h	SYSTEM	Deep standby interrupt enable register 2	DPSIER2	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C285h	SYSTEM	Deep standby interrupt enable register 3	DPSIER3	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C286h	SYSTEM	Deep standby interrupt flag register 0	DPSIFR0	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C287h	SYSTEM	Deep standby interrupt flag register 1	DPSIFR1	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C288h	SYSTEM	Deep standby interrupt flag register 2	DPSIFR2	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C289h	SYSTEM	Deep standby interrupt flag register 3	DPSIFR3	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C28Ah	SYSTEM	Deep standby interrupt edge register 0	DPSIEGR0	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C28Bh	SYSTEM	Deep standby interrupt edge register 1	DPSIEGR1	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C28Ch	SYSTEM	Deep standby interrupt edge register 2	DPSIEGR2	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C28Dh	SYSTEM	Deep standby interrupt edge register 3	DPSIEGR3	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C290h	SYSTEM	Reset status register 0	RSTSR0	8	8	4, 5 PCLKB	2, 3 ICLK	Resets
0008 C291h	SYSTEM	Reset status register 1	RSTSR1	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C293h	SYSTEM	Main clock oscillator forced oscillation control register	MOFCR	8	8	4, 5 PCLKB	2, 3 ICLK	Clock Generation Circuit
0008 C294h	SYSTEM	High-speed on-chip oscillator power supply control register	HOCOPCR	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C296h	FLASH	Flash write erase protection register	FWEPROR	8	8	4, 5 PCLKB	2, 3 ICLK	ROM
0008 C297h	SYSTEM	Voltage monitoring circuit control register	LVCMPCR	8	8	4, 5 PCLKB	2, 3 ICLK	LVDA
0008 C298h	SYSTEM	Voltage detection level select register	LVDLVLR	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C29Ah	SYSTEM	Voltage monitoring 1 circuit control register 0	LVD1CR0	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C29Bh	SYSTEM	Voltage monitoring 2 circuit control register 0	LVD2CR0	8	8	4, 5 PCLKB	2, 3 ICLK	
0008 C2A0h to 0008 C2BFh	SYSTEM	Deep standby backup register 0 to 31	DPSBKR0 to 31	8	8	4, 5 PCLKB	2, 3 ICLK	Low Power Consumption
0008 C300h	ICU	Group 0 interrupt source register	GRP00	32	32	1 to 2PCLKB	2 ICLK	ICUb
0008 C304h	ICU	Group 1 interrupt source register	GRP01	32	32	1 to 2PCLKB	2 ICLK	
0008 C308h	ICU	Group 2 interrupt source register	GRP02	32	32	1 to 2PCLKB	2 ICLK	
0008 C30Ch	ICU	Group 3 interrupt source register	GRP03	32	32	1 to 2PCLKB	2 ICLK	
0008 C310h	ICU	Group 4 interrupt source register	GRP04	32	32	1 to 2PCLKB	2 ICLK	
0008 C314h	ICU	Group 5 interrupt source register	GRP05	32	32	1 to 2PCLKB	2 ICLK	
0008 C318h	ICU	Group 6 interrupt source register	GRP06	32	32	1 to 2PCLKB	2 ICLK	
0008 C330h	ICU	Group 12 interrupt source register	GRP12	32	32	1 to 2PCLKB	2 ICLK	
0008 C340h	ICU	Group 0 interrupt enable register	GEN00	32	32	1 to 2PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (35/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 C344h	ICU	Group 1 interrupt enable register	GEN01	32	32	1 to 2PCLKB	2 ICLK	ICUb
0008 C348h	ICU	Group 2 interrupt enable register	GEN02	32	32	1 to 2PCLKB	2 ICLK	
0008 C34Ch	ICU	Group 3 interrupt enable register	GEN03	32	32	1 to 2PCLKB	2 ICLK	
0008 C350h	ICU	Group 4 interrupt enable register	GEN04	32	32	1 to 2PCLKB	2 ICLK	
0008 C354h	ICU	Group 5 interrupt enable register	GEN05	32	32	1 to 2PCLKB	2 ICLK	
0008 C358h	ICU	Group 6 interrupt enable register	GEN06	32	32	1 to 2PCLKB	2 ICLK	
0008 C370h	ICU	Group 12 interrupt enable register	GEN12	32	32	1 to 2PCLKB	2 ICLK	
0008 C380h	ICU	Group 0 interrupt clear register	GCR00	32	32	1 to 2PCLKB	2 ICLK	
0008 C384h	ICU	Group 1 interrupt clear register	GCR01	32	32	1 to 2PCLKB	2 ICLK	
0008 C388h	ICU	Group 2 interrupt clear register	GCR02	32	32	1 to 2PCLKB	2 ICLK	
0008 C38Ch	ICU	Group 3 interrupt clear register	GCR03	32	32	1 to 2PCLKB	2 ICLK	
0008 C390h	ICU	Group 4 interrupt clear register	GCR04	32	32	1 to 2PCLKB	2 ICLK	
0008 C394h	ICU	Group 5 interrupt clear register	GCR05	32	32	1 to 2PCLKB	2 ICLK	
0008 C398h	ICU	Group 6 interrupt clear register	GCR06	32	32	1 to 2PCLKB	2 ICLK	
0008 C3C0h	ICU	Unit select register	SEL	32	32	1 to 2PCLKB	2 ICLK	
0008 C400h	RTC	64-Hz counter	R64CNT	8	8	2, 3 PCLKB	2 ICLK	RTCa
0008 C402h	RTC	Second counter	RSECCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C404h	RTC	Minute counter	RMINCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C406h	RTC	Hour counter	RHRCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C408h	RTC	Day-of-week counter	RWKCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C40Ah	RTC	Date counter	RDAYCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C40Ch	RTC	Month counter	RMONCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C40Eh	RTC	Year counter	RYRCNT	16	16	2, 3 PCLKB	2 ICLK	
0008 C410h	RTC	Second alarm register	RSECAR	8	8	2, 3 PCLKB	2 ICLK	
0008 C412h	RTC	Minute alarm register	RMINAR	8	8	2, 3 PCLKB	2 ICLK	
0008 C414h	RTC	Hour alarm register	RHRAR	8	8	2, 3 PCLKB	2 ICLK	
0008 C416h	RTC	Day-of-week alarm register	RWKAR	8	8	2, 3 PCLKB	2 ICLK	
0008 C418h	RTC	Date alarm register	RDAYAR	8	8	2, 3 PCLKB	2 ICLK	
0008 C41Ah	RTC	Month alarm register	RMONAR	8	8	2, 3 PCLKB	2 ICLK	
0008 C41Ch	RTC	Year alarm register	RYRAR	16	16	2, 3 PCLKB	2 ICLK	
0008 C41Eh	RTC	Year alarm enable register	RYRAREN	8	8	2, 3 PCLKB	2 ICLK	
0008 C422h	RTC	RTC control register 1	RCR1	8	8	2, 3 PCLKB	2 ICLK	
0008 C424h	RTC	RTC control register 2	RCR2	8	8	2, 3 PCLKB	2 ICLK	
0008 C426h	RTC	RTC control register 3	RCR3	8	8	2, 3 PCLKB	2 ICLK	
0008 C428h	RTC	RTC control register 4	RCR4	8	8	2, 3 PCLKB	2 ICLK	
0008 C42Ah	RTC	Frequency register H	RFRH	16	16	2, 3 PCLKB	2 ICLK	
0008 C42Ch	RTC	Frequency register L	RFRL	16	16	2, 3 PCLKB	2 ICLK	
0008 C42Eh	RTC	Time error adjustment register	RADJ	8	8	2, 3 PCLKB	2 ICLK	
0008 C440h	RTC	Time capture control register 0	RTCCR0	8	8	2, 3 PCLKB	2 ICLK	
0008 C442h	RTC	Time capture control register 1	RTCCR1	8	8	2, 3 PCLKB	2 ICLK	
0008 C444h	RTC	Time capture control register 2	RTCCR2	8	8	2, 3 PCLKB	2 ICLK	
0008 C452h	RTC	Second capture register 0	RSECCP0	8	8	2, 3 PCLKB	2 ICLK	
0008 C454h	RTC	Minute capture register 0	RMINCP0	8	8	2, 3 PCLKB	2 ICLK	



Note 1: Address pins for output of the precharge-setting command (Precharge-sel) for SDRAM.

Figure 5.27 SDRAM Space Multiple Write Bus Timing

Table 5.23 Timing of On-Chip Peripheral Modules (5)

Conditions: VCC = AVCC0 = VREFH = VCC_USB = 2.7 to 3.6 V, VREFH0 = 2.7 V to AVCC0
VSS = AVSS0 = VREFL/VREFL0 = VSS_USB = 0 V
PCLK = 8 to 50 MHz
$T_a = T_{opr}$
High drive output is selected by the drive capacity control register.

Item		Symbol	Min.*1,*2	Max.*	Unit	Test Conditions
RIIC (Standard-mode, SMBus) ICFER.FMPE = 0	SCL input cycle time	t_{SCL}	$6(12) \times t_{IICcyc} + 1300$	—	ns	Figure 5.47
	SCL input high pulse width	t_{SCLH}	$3(6) \times t_{IICcyc} + 300$	—	ns	
	SCL input low pulse width	t_{SCLL}	$3(6) \times t_{IICcyc} + 300$	—	ns	
	SCL, SDA input rise time	t_{Sr}	—	1000	ns	
	SCL, SDA input fall time	t_{Sf}	—	300	ns	
	SCL, SDA input spike pulse removal time	t_{SP}	0	$1(4) \times t_{IICcyc}$	ns	
	SDA input bus free time	t_{BUF}	$3(6) \times t_{IICcyc} + 300$	—	ns	
	Start condition input hold time	t_{STAH}	$t_{IICcyc} + 300$	—	ns	
	Restart condition input setup time	t_{STAS}	1000	—	ns	
	Stop condition input setup time	t_{STOS}	1000	—	ns	
	Data input setup time	t_{SDAS}	$t_{IICcyc} + 50$	—	ns	
	Data input hold time	t_{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C_b	—	400	pF	
RIIC (Fast-mode)	SCL input cycle time	t_{SCL}	$6(12) \times t_{IICcyc} + 600$	—	ns	
	SCL input high pulse width	t_{SCLH}	$3(6) \times t_{IICcyc} + 300$	—	ns	
	SCL input low pulse width	t_{SCLL}	$3(6) \times t_{IICcyc} + 300$	—	ns	
	SCL, SDA input rise time	t_{Sr}	$20 + 0.1C_b$	300	ns	
	SCL, SDA input fall time	t_{Sf}	$20 + 0.1C_b$	300	ns	
	SCL, SDA input spike pulse removal time	t_{SP}	0	$1(4) \times t_{IICcyc}$	ns	
	SDA input bus free time	t_{BUF}	$3(6) \times t_{IICcyc} + 300$	—	ns	
	Start condition input hold time	t_{STAH}	$t_{IICcyc} + 300$	—	ns	
	Restart condition input setup time	t_{STAS}	300	—	ns	
	Stop condition input setup time	t_{STOS}	300	—	ns	
	Data input setup time	t_{SDAS}	$t_{IICcyc} + 50$	—	ns	
	Data input hold time	t_{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C_b	—	400	pF	

Note: t_{IICcyc}: RIIC internal reference clock (IICϕ) Cycle
Note 1. The value within parentheses is applicable when the value of the ICMR3.NF[1:0] bits is 11b while the digital filter is enabled by the setting ICFER.NFE = 1.
Note 2. Cb is the total capacitance of the bus lines.

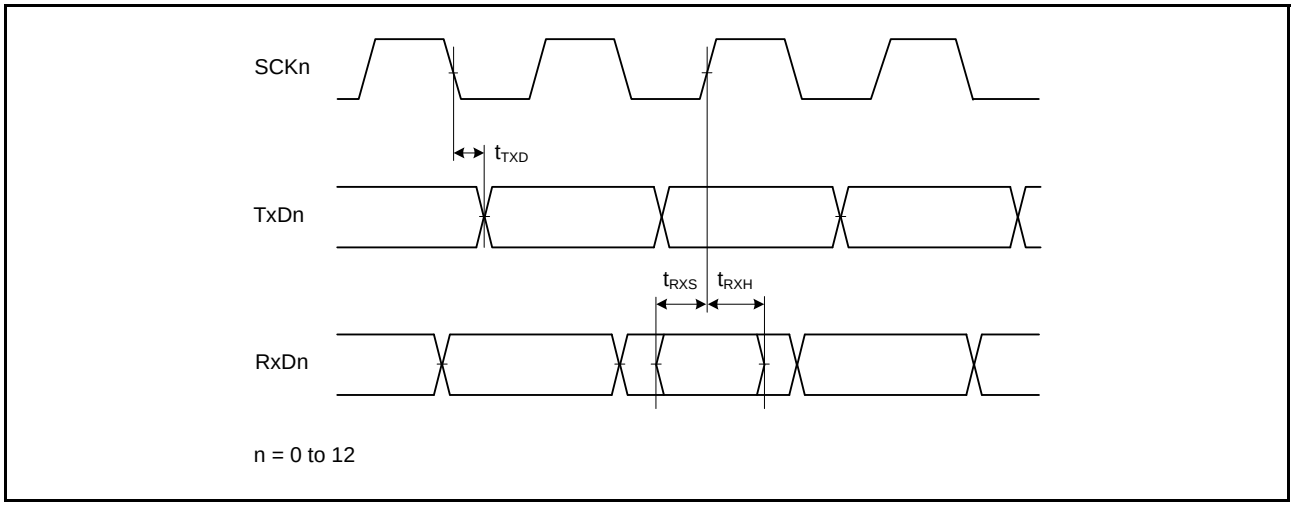


Figure 5.40 SCI Input/Output Timing: Clock Synchronous Mode

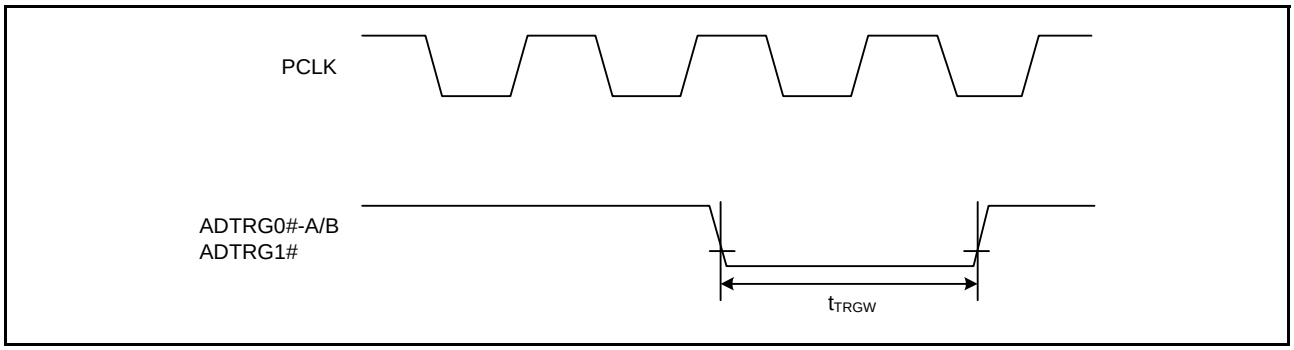


Figure 5.41 A/D Converter External Trigger Input Timing

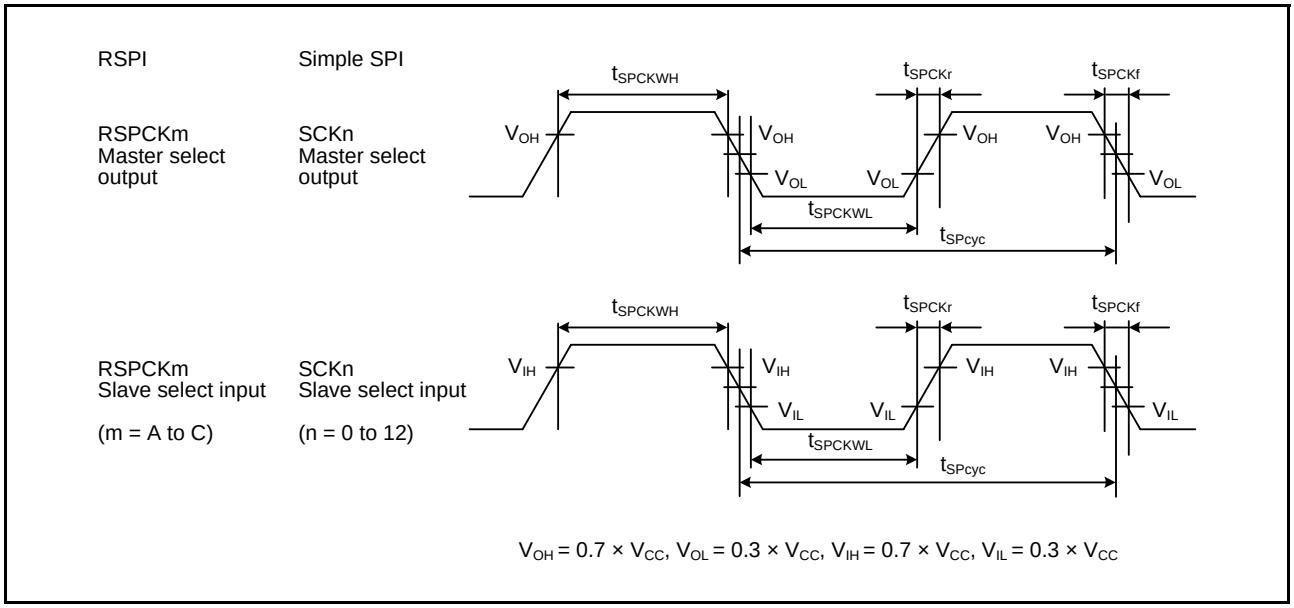


Figure 5.42 RSPI Clock Timing and Simple SPI Clock Timing

5.6 D/A Conversion Characteristics

Table 5.31 D/A Conversion Characteristics

Conditions: VCC = AVCC0 = VREFH = VCC_USB = 2.7 to 3.6 V, VREFH0 = 2.7 V to VCC
VSS = AVSS0 = VREFL/VREFL0 = VSS_USB = 0 V
$T_a = T_{opr}$

Item	Min.	Typ.	Max.	Unit	Test Conditions
Resolution	10	10	10	Bit	
Conversion time	—	—	3.0	µs	20-pF capacitive load
Absolute accuracy	—	±2.0	±4.0	LSB	2-MΩ resistive load
	—	—	±3.0	LSB	4-MΩ resistive load
	—	—	±2.0	LSB	10-MΩ resistive load
RO output resistance	—	3.6	—	kΩ	

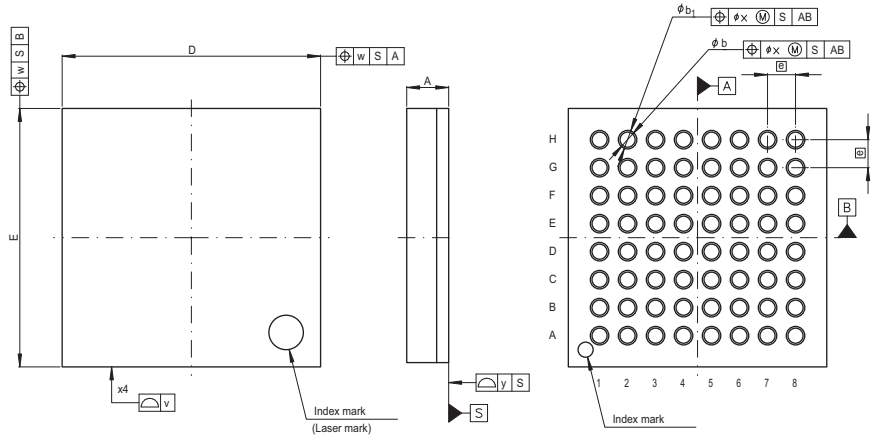
5.7 Temperature Sensor Characteristics

Table 5.32 Temperature Sensor Characteristics

Conditions: VCC = AVCC0 = VREFH = VCC_USB = 2.7 to 3.6 V, VREFH0 = 2.7 V to VCC
VSS = AVSS0 = VREFL/VREFL0 = VSS_USB = 0 V
$T_a = T_{opr}$

Item	Min.	Typ.	Max.	Unit	Test Conditions
Relative accuracy	—	±1	—	°C	
Temperature slope	—	4.1	—	mV/°C	
Output voltage (@25°C)	—	1.26	—	V	
Temperature sensor start time	—	—	30	µs	
Sampling time	—	—	5	µs	

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-TFLGA64-6x6-0.65	PTLG0064JA-A	64F0G	0.07g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	6.0	—
E	—	6.0	—
v	—	—	0.15
w	—	—	0.20
A	—	—	1.05
e	—	0.65	—
b	0.31	0.35	0.39
b_1	0.39	0.43	0.47
x	—	—	0.08
y	—	—	0.10

Figure H 64-pin TFLGA (PTLG0064JA-A)

REVISION HISTORY — RX63N Group, RX631 Group Datasheet

Rev.	Date	Description	
		Page	Summary
0.50	May 13. 2011	—	First Edition issued
0.90	Dec 27. 2011	All	
		—	Package added (177-pin TFLGA, 176-pin LFBGA, 145-pin TFLGA), module name changed
		—	Interrupt Controller (ICUb) module name changed
		1. Overview	
		2 to 6	Table 1.1 Outline of Specifications, Reset, Realtime clock, Temperature sensor, Power supply voltage, changed
		8 to 10	Table 1.3 List of Products, changed
		10	Figure 1.1 How to Read the Product Part No., changed
		12 to 17	Table 1.4 Pin Functions, BSCANP pin added
		18	Figure 1.3 Pin Assignment (176-Pin TFLGA), added
		19	Figure 1.4 Pin Assignment (176-Pin LFBGA), added
		20	Figure 1.5 Pin Assignment (176-Pin LQFP), pin 18 changed
		21	Figure 1.6 Pin Assignment (144-Pin TFLGA), added
		22	Figure 1.7 Pin Assignment (144-Pin LQFP), pin 16 changed
		23	Figure 1.8 Pin Assignment (100-Pin LQFP), pin 7 changed
		24 to 28	Table 1.5 List of Pins and Pin Functions (177-pin TFLGA, 176-pin LFBGA), added
		34 to 38	Table 1.7 List of Pins and Pin Functions (145-Pin TFLGA), added
		4. I/O Registers	
		56 to 99	Table 5.1 List of I/O Registers, changed
		Appendix 2. Package Dimensions	
		100	Figure A. 177-pin TFLGA (PTLG0177KA-A), added
		101	Figure B. 176-pin LFBGA (PLBG0176GA-A), added
		103	Figure D. 145-pin TFLGA (PTLG0145KA-A), added
		105	Figure F. 100-pin TFLGA (PTLG0100KA-A), added
1.00	Jun 06. 2012	1. Overview	
		2 to 6	Table1.1 Outline of Specifications: CPU, ROM, RAM, E2 DataFlash, clock generation circuit, temperature sensor, power supply voltage, changed. Low power consumption, deleted
		8 to 10	Table1.3 List of Products, changed
		11	Figure 1.2 Block Diagram, changed
		12	Table1.4 Pin Functions, description of VCC, changed
		24 to 28	Table 1.5 List of Pin and Pin Functions (177-Pin TFLGA, 176-Pin LFBGA): SDRAMC, added to table header; BCLK in pin number line M8, moved to Power Supply Clock System Control column
		29 to 33	Table 1.6 List of Pin and Pin Functions (176-Pin LQFP): SDRAMC, added to table header; BCLK in pin number line 68, moved to Power Supply Clock System Control column
		34 to 38	Table 1.7 List of Pin and Pin Functions (145-Pin TFLGA): SDRAMC, added to table header; MOSIB, added to pin number line D13; T_ERXD1 in pin number line H12, changed to ET_ERXD1; PO8, added to pin number line J4; BCLK in pin number line K6, moved to Power Supply Clock System Control column
		39 to 43	Table 1.8 List of Pins and Pin Functions (144-Pin LQFP): SDRAMC, added to table header; PO8, added to pin number line 29; BCLK in pin number line 53, moved to Power Supply Clock System Control column; T_ERXD1 in pin number 87, changed to ET_ERXD1; MOSIB, added to pin number line 102
		44 to 47	Table 1.9 List of Pins and Pin Functions (100-Pin LQFP): BCLK in pin number line 41, moved to Power Supply Clock System Control column
		4. I/O Registers	
		57, 58	Table4.1, MPU registers, added
		5. Electrical Characteristics	
		105 to 163	Added

Rev.	Date	Description	
		Page	Summary
1.60	Mar 13. 2013	Feature	
		1	Changed
		1. Overview	
		2 to 7	Table 1.1 Outline of Specifications: changed, note added
		8	Table1.2 Comparison of Functions for Different Packages in the RX63N/RX631 Group, changed
		9 to 15	Table 1.3 List of Products, changed
		16	Figure 1.1 How to Read the Product Part No., changed
		17	Figure 1.2 Block Diagram, changed
		24 to 32	Figure 1.3 to Figure 1.11 Pin Assignment: note, added
		53 to 57	Table 1.9 List of Pins and Pin Functions (100-Pin TFLGA), added
		62 to 64	Table 1.11 List of Pins and Pin Functions (64-Pin LQFP), added
		65, 66	Table 1.12 List of Pins and Pin Functions (48-Pin LQFP), added
		3. Address Space	
		71	Figure 3.1 Memory Map in Each Operating Mode, changed
		4. I/O Registers	
		75 to 120	Table 4.1 List of I/O Registers (Address Order), changed
		5. Electrical Characteristics	
		All	Characteristics and timing conditions in the tables, changed
		124, 125	Table 5.4 DC Characteristics (3), changed
		126	Table 5.5 DC Characteristics (4), changed
		127	5.3 AC Characteristics, changed
		130, 131	Table 5.11, Clock Timing (Except for Sub-Clock Related): Condition and the table, changed, note, added
		132	Table 5.12 Clock Timing (Sub-Clock Related): Condition and the table, changed, note, added
		176	Table 5.33 Battery Backup Function Characteristics: Condition, changed
		Appendix 1.Package Dimensions	
		189	Figure H 64-pin LQFP (PLQP0064KB-A), added
		190	Figure I 48-pin LQFP (PLQP0048KB-A), added
1.70	Oct 08. 2013	Features	
		1	changed
		1. Overview	
		2 to 7	Table 1.1 Outline of Specifications, General I/O ports, Packages, changed, Parallel data capture unit (PDC), added.
		8	Table 1.2 Comparison of Functions for Different Packages in the RX63N/RX631 Group, 64-pin LQFP, changed, 64-pin TFLGA, Parallel data capture unit (PDC), added.
		9 to 16	Table 1.3 List of Products, changed.
		17	Figure 1.1 How to Read the Product Part No., changed
		18	Figure 1.2 Block Diagram, changed
		19 to 24	Table 1.4 Pin Functions,changed, Parallel data capture unit (PDC), added
		32	Figure 1.10 Pin Assignment (64-Pin TFLGA), added
		35 to 40	Table 1.5 List of Pin and Pin Functions (177-Pin TFLGA, 176-Pin LFBGA), changed
		41 to 45	Table 1.6 List of Pin and Pin Functions (176-Pin LQFP), changed
		46 to 50	Table 1.7 List of Pins and Pin Functions (145-Pin TFLGA), changed
		51 to 55	Table 1.8 List of Pins and Pin Functions (144-Pin LQFP), changed
		65 to 66	Table 1.11 List of Pins and Pin Functions (64-Pin TFLGA), added
		3. Address Space	
		76	Figure 3.1 Memory Map in Each Operating Mode, changed
		4. I/O Registers	
		79	(4) Restrictions in Relation to RMPA and String-Manipulation Instructions, added