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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, I ² C, LINbus, SCI, SPI, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	133
Program Memory Size	2MB (2M 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	176-LFBGA
Supplier Device Package	176-LFBGA (13x13)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f5631eddbg-u0

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 IWDG-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 1.2 Comparison of Functions for Different Packages in the RX63N/RX631 Group

Functions		RX63N Group				RX631 Group				
Package		177-pin 176-pin	145-pin 144-pin	100-pin	177-pin 176-pin	145-pin 144-pin	100-pin	64-pin LQFP	64-pin TFLGA	48-pin
External bus width	External bus width	32 bits	16 bits		32 bits	16 bits				Not available
	SDRAM area controller	Available		Not available	Available					Not available
DMA	DMA controller	Ch. 0 to 3				Ch. 0 to 3				
	EXDMA controller	Ch. 0 and 1			Ch. 0 and 1			Not available		
	Data transfer controller	Available				Available				
Timers	16-bit timer pulse unit	Ch. 0 to 11	Ch. 0 to 5		Ch. 0 to 11			Ch. 0 to 5		
	Multi-function timer pulse unit 2	Ch. 0 to 5				Ch. 0 to 5				
	Port output enable 2	Available				Available				
	Programmable pulse generator	Ch. 0 and 1				Ch. 0 and 1				
	8-bit timers	Ch. 0 to 3				Ch. 0 to 3				
	Compare match timer	Ch. 0 to 3				Ch. 0 to 3				
	Realtime clock	Available				Available				Not available
	Watchdog timer	Available				Available				
	Independent watchdog timer	Available				Available				
	Communicatio n function	Ethernet controller	Available				Not available			
DMA controller for Ethernet controller		Available				Not available				
USB 2.0 host/function module		Ch. 0 and 1	Ch.0		Ch. 0 and 1		Ch.0	Ch. 0 and 1	Ch.0	
Serial communications interfaces (SClc)		Ch. 0 to 11	Ch. 0 to 3, 5, 6, 8 and 9		Ch. 0 to 11	Ch. 0 to 3, 5, 6, 8 and 9	Ch. 1, 5, 6, 8 and 9	Ch. 1, 5, 6, and 8		
Serial communications interfaces (SCld)		Ch. 12				Ch. 12				
I ² C bus interfaces		Ch. 0 to 3	Ch.0 and 2		Ch. 0 to 3	Ch.0 and 2	Ch.2			
IEBus		Available				Available				
Serial peripheral interfaces		Ch.0 to 2	Ch. 0 and 1		Ch.0 to 2		Ch. 0 and 1			
CAN module		For 1.5 M or more: Ch. 0 to 2, For 1 M or less: Ch. 0 and 1	Ch. 0 and 1		For 1.5 M or more: Ch. 0 to 2, For 1 M or less: Ch. 0 and 1	Ch. 0 and 1	Ch.1			
Parallel data capture unit (PDC)		Not available				Available				Not available
12-bit A/D converter (channel)		AN000 to 020		AN000 to 013	AN000 to 020		AN000 to 013	AN000 to 004, 006, 008 to 013		AN000 to 002, 006, 009 to 012
10-bit A/D converter (channel)		AN0 to 7			AN0 to 7			Not available		
D/A converter		Ch. 0 and 1	Ch.1		Ch. 0 and 1	Ch.1	Ch.1		Not available	
Temperature sensor		Available				Available				
CRC calculator		Available				Available				
Unique ID		Available (only for the G version)								
Off-board programming (parallel programmer mode)				Available				Not available		
Sub-clock oscillator (for low clock loads)				Available				Not available		
Sub-clock oscillator (for standard clock loads)				Available						
Battery backup function				Available						
I/O port switching function		Not available			Not available			Available		

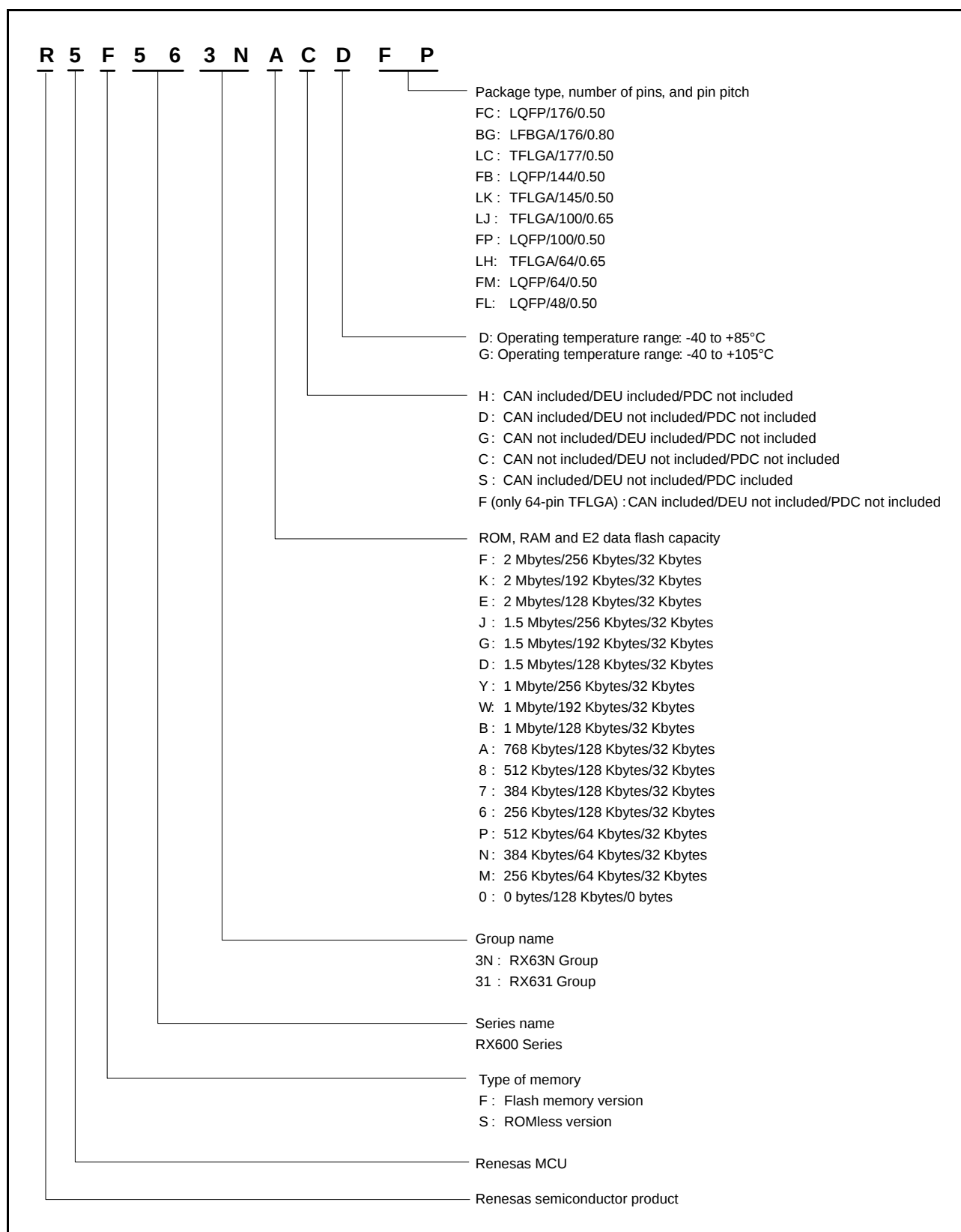


Figure 1.1 How to Read the Product Part No.

Table 1.4 Pin Functions (5/6)

Classifications	Pin Name	I/O	Description
Ethernet controller	ET_MDIO	I/O	Inputs or outputs bidirectional signals for exchange of management information between the RX63N Group and the PHY-LSI.
Parallel data capture unit (PDC)	PIXCLK	Input	Parallel data transfer clock
	VSYNC	Input	Vertical synchronization signal
	HSYNC	Input	Horizontal synchronization signal
	PIXD7 to PIXD0	Input	8-bit data
	PCKO	Output	Outputs parallel data transfer clock signal
USB power pins	VCC_USB	Input	Power supply pin. When the USB is not to be used, connect it to the VCC pin.
	VSS_USB	Input	Ground pin. When the USB is not to be used, connect it to the VSS pin.
USB 2.0 host/function module	USB0_DP, USB1_DP	I/O	Inputs or outputs USB transceiver D+ data.
	USB0_DM, USB1_DM	I/O	Inputs or outputs USB transceiver D- data.
	USB0_VBUS, USB1_VBUS	Input	Input pins for detection of connection and disconnection of the USB cable.
	USB0_EXICEN	Output	Output pin for control the low power of the OTG chip.
	USB0_VBUSEN	Output	Supply enable pin of VBUS (5 V) for the OTG chip.
	USB0_OVRCURA, USB0_OVRCURB,	Input	Input pin for detection of external over current.
	USB0_ID	Input	ID input pin of mini-AB connector at the OTG operation.
	USB0_DPUPE, USB1_DPUPE	Output	Pull-up control pins of the D+ signal at the function operation.
	USB0_DPRPD	Output	Pull-down control pins of the D+ signal at the host operation.
	USB0_DRPD	Output	Pull-down control pins of the D- signal at the host operation.
CAN module	CRX0 to CRX2	Input	Input pin.
	CTX0 to CTX2	Output	Output pin.
Serial peripheral interface	RSPCKA, RSPCKB, RSPCKC	I/O	Clock input/output pin.
	MOSIA, MOSIB, MOSIC	I/O	Inputs or outputs data output from the master.
	MISOA, MISOB, MISOC	I/O	Inputs or outputs data output from the slave.
	SSLA0, SSLB0, SSLC0	I/O	Input or output pins slave selection
	SSLA1 to SSLA3, SSLB1 to SSLB3, SSLC1 to SSLC3	Output	Output pins slave selection
IEBus controller	IERXD	Input	Input pin for data reception.
	IETXD	Output	Output pin for data transmission.
Realtime clock	RTCOUT	Output	Output pin for 1-Hz clock.
	RTCIC0 to RTCIC2	Input	Time capture event input pin
12-bit A/D converter	AN000 to AN020	Input	Input pins for the analog signals to be processed by the A/D converter.
	ADTRG0#	Input	Input pins for the external trigger signals that start the A/D conversion.
10-bit A/D converter	AN0 to AN7	Input	Input pins for the analog signals to be processed by the A/D converter.
	ANEX0	Output	Extended analog output pin
	ANEX1	Input	Extended analog input pin
	ADTRG#	Input	Input pins for the external trigger signals that start the A/D conversion.
D/A converter	DA0, DA1	Output	Output pins for the analog signals to be processed by the D/A converter.

Table 1.7 List of Pins and Pin Functions (145-Pin TFLGA) (3/5)

Pin No. 145-pin TFLGA	Power Supply Clock System Control	I/O Port	Bus EXDMAC SDRAMC	Timers (MTU, TPU, TMR, PPG, RTC, POE)	Communications (ETHERC, SC1c, SC1d, RSPI, RIIC, CAN, IEB, USB, and PDC)	Interrupt	S12AD AD DA
H12		PB0	A8	MTIOC5W/TIOCA3/PO24	RXD4/RXD6/SMISO4/ SMISO6/SSCL4/SSCL6/ RSPCKA/T_ERXD1/ RMII_RXD1	IRQ12	
H13		PA7	A7	TIOCB2/PO23	MISOA/ET_WOL		
J1	TRST#	P34		MTIOC0A/TMC13/PO12/ POE2#	SCK6/SCK0/ USB0_DPRPD	IRQ4	
J2		P33		MTIOC0D/TIOCD0/ TMR13/PO11/POE3#	RXD6/RXD0/SMISO6/ SMISO0/SSCL6/SSCL0/ CRX0/PCKO	IRQ3-DS	
J3		P32		MTIOC0C/TIOCC0/ TMO3/PO10/RTICOUT/ RTIC12	TXD6/TXD0/SMOSI6/ SMOSI0/SSDA6/SSDA0/ CTX0/USB0_VBUSEN/ VSYNC	IRQ2-DS	
J4	TDI	P30		MTIOC4B/TMR13/PO8/ RTIC10/POE8#	RXD1/SMISO1/SSCL1/ MISOB/USB0_DRPD	IRQ0-DS	
J10		PB3	A11	MTIOC0A/MTIOC4A/ TIOCD3/TCLKD/TMO0/ PO27/POE3#	SCK4/SCK6/ET_RX_ER/ RMII_RX_ER		
J11		PB4	A12	TIOCA4/PO28	CTS9#/RTS9#/SS9#/ ET_TX_EN/RMII_TXD_EN		
J12		PB2	A10	TIOCC3/TCLKC/PO26	CTS4#/RTS4#/CTS6#/ RTS6#/SS4#/SS6#/ ET_RX_CLK/REF50CK		
J13		PB1	A9	MTIOC0C/MTIOC4C/ TIOCB3/TMC10/PO25	TXD4/TXD6/SMOSI4/ SMOSI6/SSDA4/SSDA6/ ET_ERXD0/RMII_RXD0	IRQ4-DS	
K1	TCK/FINEC	P27	CS7#	MTIOC2B/TMC13/PO7	SCK1/RSPCKB		
K2	TDO	P26	CS6#	MTIOC2A/TMO1/PO6	TXD1/CTS3#/RTS3#/ SMOSI1/SS3#/SSDA1/ MOSIB		
K3	TMS	P31		MTIOC4D/TMC12/PO9/ RTIC11	CTS1#/RTS1#/SS1#/ SSLB0/USB0_DPUPE	IRQ1-DS	
K4		P15		MTIOC0B/MTCLKB/ TIOCB2/TCLKB/TMC12/ PO13	RXD1/SCK3/SMISO1/ SSCL1/CRX1-DS/PIXD0	IRQ5	
K5	TRDATA2	P54	ALE/EDACK0	MTIOC4B/TMC11	CTS2#/RTS2#/SS2#/ CTX1/ET_LINKSTA		
K6		P53*1	BCLK				
K7		P51	WR1#/BC1#/ WAIT#		SCK2/SSLB2		
K8	VCC						
K9	TRDATA0	P80	EDREQ0	MTIOC3B/PO26	SCK10/ET_TX_EN/ RMII_TXD_EN		
K10		P76	CS6#	PO22	RXD11/SMISO11/SSCL11/ ET_RX_CLK/REF50CK		
K11		PB7	A15	MTIOC3B/TIOCB5/ PO31	TXD9/SMOSI9/SSDA9/ ET_CRS/RMII_CRS_DV		
K12		PB6	A14	MTIOC3D/TIOCA5/ PO30	RXD9/SMISO9/SSCL9/ ET_ETXD1/RMII_TXD1		
K13		PB5	A13	MTIOC2A/MTIOC1B/ TIOCB4/TMR11/PO29/ POE1#	SCK9/ET_ETXD0/ RMII_TXD0		
L1		P25	CS5#/EDACK1	MTIOC4C/MTCLKB/ TIOCA4/PO5	RXD3/SMISO3/SSCL3/ USB0_DPRPD/HSYNC		ADTRG0#
L2		P23	EDACK0	MTIOC3D/MTCLKD/ TIOCD3/PO3	TXD3/CTS0#/RTS0#/ SMOSI3/SS0#/SSDA3/ USB0_DPUPE/PIXD7		

Table 1.10 List of Pins and Pin Functions (100-Pin LQFP) (4/4)

Pin No. 100-pin LQFP	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
94	VREFL0						
95		P40				IRQ8-DS	AN000
96	VREFH0						
97	AVCC0						
98		P07				IRQ15	ADTRG0#
99	AVSS0						
100		P05				IRQ13	DA1

Note 1. Enabled only for the ROM capacity of 768 Kbytes or more

Note 2. The BCLK function is multiplexed with the I/O port function for pin P53, so the port function is not available if the external bus is enabled.

Table 4.1 List of I/O Registers (Address Order) (6/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 7047h	ICU	Interrupt request register 071	IR071	8	8	2	ICLK	ICUb
0008 7048h	ICU	Interrupt request register 072	IR072	8	8	2	ICLK	
0008 7049h	ICU	Interrupt request register 073	IR073	8	8	2	ICLK	
0008 704Ah	ICU	Interrupt request register 074	IR074	8	8	2	ICLK	
0008 704Bh	ICU	Interrupt request register 075	IR075	8	8	2	ICLK	
0008 704Ch	ICU	Interrupt request register 076	IR076	8	8	2	ICLK	
0008 704Dh	ICU	Interrupt request register 077	IR077	8	8	2	ICLK	
0008 704Eh	ICU	Interrupt request register 078	IR078	8	8	2	ICLK	
0008 704Fh	ICU	Interrupt request register 079	IR079	8	8	2	ICLK	
0008 705Ah	ICU	Interrupt request register 090	IR090	8	8	2	ICLK	
0008 705Bh	ICU	Interrupt request register 091	IR091	8	8	2	ICLK	
0008 705Ch	ICU	Interrupt request register 092	IR092	8	8	2	ICLK	
0008 705Dh	ICU	Interrupt request register 093	IR093	8	8	2	ICLK	
0008 7062h	ICU	Interrupt request register 098	IR098	8	8	2	ICLK	
0008 7066h	ICU	Interrupt request register 102	IR102	8	8	2	ICLK	
0008 706Ah	ICU	Interrupt request register 106	IR106	8	8	2	ICLK	
0008 706Bh	ICU	Interrupt request register 107	IR107	8	8	2	ICLK	
0008 706Ch	ICU	Interrupt request register 108	IR108	8	8	2	ICLK	
0008 706Dh	ICU	Interrupt request register 109	IR109	8	8	2	ICLK	
0008 706Eh	ICU	Interrupt request register 110	IR110	8	8	2	ICLK	
0008 706Fh	ICU	Interrupt request register 111	IR111	8	8	2	ICLK	
0008 7070h	ICU	Interrupt request register 112	IR112	8	8	2	ICLK	
0008 7072h	ICU	Interrupt request register 114	IR114	8	8	2	ICLK	
0008 707Ah	ICU	Interrupt request register 122	IR122	8	8	2	ICLK	
0008 707Bh	ICU	Interrupt request register 123	IR123	8	8	2	ICLK	
0008 707Ch	ICU	Interrupt request register 124	IR124	8	8	2	ICLK	
0008 707Dh	ICU	Interrupt request register 125	IR125	8	8	2	ICLK	
0008 707Eh	ICU	Interrupt request register 126	IR126	8	8	2	ICLK	
0008 707Fh	ICU	Interrupt request register 127	IR127	8	8	2	ICLK	
0008 7080h	ICU	Interrupt request register 128	IR128	8	8	2	ICLK	
0008 7081h	ICU	Interrupt request register 129	IR129	8	8	2	ICLK	
0008 7082h	ICU	Interrupt request register 130	IR130	8	8	2	ICLK	
0008 7083h	ICU	Interrupt request register 131	IR131	8	8	2	ICLK	
0008 7084h	ICU	Interrupt request register 132	IR132	8	8	2	ICLK	
0008 7085h	ICU	Interrupt request register 133	IR133	8	8	2	ICLK	
0008 7086h	ICU	Interrupt request register 134	IR134	8	8	2	ICLK	
0008 7087h	ICU	Interrupt request register 135	IR135	8	8	2	ICLK	
0008 7088h	ICU	Interrupt request register 136	IR136	8	8	2	ICLK	
0008 7089h	ICU	Interrupt request register 137	IR137	8	8	2	ICLK	
0008 708Ah	ICU	Interrupt request register 138	IR138	8	8	2	ICLK	
0008 708Bh	ICU	Interrupt request register 139	IR139	8	8	2	ICLK	
0008 708Ch	ICU	Interrupt request register 140	IR140	8	8	2	ICLK	
0008 708Dh	ICU	Interrupt request register 141	IR141	8	8	2	ICLK	
0008 708Eh	ICU	Interrupt request register 142	IR142	8	8	2	ICLK	
0008 708Fh	ICU	Interrupt request register 143	IR143	8	8	2	ICLK	
0008 7090h	ICU	Interrupt request register 144	IR144	8	8	2	ICLK	
0008 7091h	ICU	Interrupt request register 145	IR145	8	8	2	ICLK	
0008 7092h	ICU	Interrupt request register 146	IR146	8	8	2	ICLK	
0008 7093h	ICU	Interrupt request register 147	IR147	8	8	2	ICLK	
0008 7094h	ICU	Interrupt request register 148	IR148	8	8	2	ICLK	
0008 7095h	ICU	Interrupt request register 149	IR149	8	8	2	ICLK	

Table 4.1 List of I/O Registers (Address Order) (7/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 7096h	ICU	Interrupt request register 150	IR150	8	8	2	ICLK	ICUb
0008 7097h	ICU	Interrupt request register 151	IR151	8	8	2	ICLK	
0008 7098h	ICU	Interrupt request register 152	IR152	8	8	2	ICLK	
0008 7099h	ICU	Interrupt request register 153	IR153	8	8	2	ICLK	
0008 709Ah	ICU	Interrupt request register 154	IR154	8	8	2	ICLK	
0008 709Bh	ICU	Interrupt request register 155	IR155	8	8	2	ICLK	
0008 709Ch	ICU	Interrupt request register 156	IR156	8	8	2	ICLK	
0008 709Dh	ICU	Interrupt request register 157	IR157	8	8	2	ICLK	
0008 709Eh	ICU	Interrupt request register 158	IR158	8	8	2	ICLK	
0008 709Fh	ICU	Interrupt request register 159	IR159	8	8	2	ICLK	
0008 70A0h	ICU	Interrupt request register 160	IR160	8	8	2	ICLK	
0008 70A1h	ICU	Interrupt request register 161	IR161	8	8	2	ICLK	
0008 70A2h	ICU	Interrupt request register 162	IR162	8	8	2	ICLK	
0008 70A3h	ICU	Interrupt request register 163	IR163	8	8	2	ICLK	
0008 70A4h	ICU	Interrupt request register 164	IR164	8	8	2	ICLK	
0008 70A5h	ICU	Interrupt request register 165	IR165	8	8	2	ICLK	
0008 70A6h	ICU	Interrupt request register 166	IR166	8	8	2	ICLK	
0008 70A7h	ICU	Interrupt request register 167	IR167	8	8	2	ICLK	
0008 70AAh	ICU	Interrupt request register 170	IR170	8	8	2	ICLK	
0008 70ABh	ICU	Interrupt request register 171	IR171	8	8	2	ICLK	
0008 70ACh	ICU	Interrupt request register 172	IR172	8	8	2	ICLK	
0008 70ADh	ICU	Interrupt request register 173	IR173	8	8	2	ICLK	
0008 70AEh	ICU	Interrupt request register 174	IR174	8	8	2	ICLK	
0008 70AFh	ICU	Interrupt request register 175	IR175	8	8	2	ICLK	
0008 70B0h	ICU	Interrupt request register 176	IR176	8	8	2	ICLK	
0008 70B1h	ICU	Interrupt request register 177	IR177	8	8	2	ICLK	
0008 70B2h	ICU	Interrupt request register 178	IR178	8	8	2	ICLK	
0008 70B3h	ICU	Interrupt request register 179	IR179	8	8	2	ICLK	
0008 70B4h	ICU	Interrupt request register 180	IR180	8	8	2	ICLK	
0008 70B5h	ICU	Interrupt request register 181	IR181	8	8	2	ICLK	
0008 70B6h	ICU	Interrupt request register 182	IR182	8	8	2	ICLK	
0008 70B7h	ICU	Interrupt request register 183	IR183	8	8	2	ICLK	
0008 70B8h	ICU	Interrupt request register 184	IR184	8	8	2	ICLK	
0008 70B9h	ICU	Interrupt request register 185	IR185	8	8	2	ICLK	
0008 70BAh	ICU	Interrupt request register 186	IR186	8	8	2	ICLK	
0008 70BBh	ICU	Interrupt request register 187	IR187	8	8	2	ICLK	
0008 70BCh	ICU	Interrupt request register 188	IR188	8	8	2	ICLK	
0008 70BDh	ICU	Interrupt request register 189	IR189	8	8	2	ICLK	
0008 70BEh	ICU	Interrupt request register 190	IR190	8	8	2	ICLK	
0008 70BFh	ICU	Interrupt request register 191	IR191	8	8	2	ICLK	
0008 70C0h	ICU	Interrupt request register 192	IR192	8	8	2	ICLK	
0008 70C1h	ICU	Interrupt request register 193	IR193	8	8	2	ICLK	
0008 70C2h	ICU	Interrupt request register 194	IR194	8	8	2	ICLK	
0008 70C3h	ICU	Interrupt request register 195	IR195	8	8	2	ICLK	
0008 70C4h	ICU	Interrupt request register 196	IR196	8	8	2	ICLK	
0008 70C5h	ICU	Interrupt request register 197	IR197	8	8	2	ICLK	
0008 70C6h	ICU	Interrupt request register 198	IR198	8	8	2	ICLK	
0008 70C7h	ICU	Interrupt request register 199	IR199	8	8	2	ICLK	
0008 70C8h	ICU	Interrupt request register 200	IR200	8	8	2	ICLK	
0008 70C9h	ICU	Interrupt request register 201	IR201	8	8	2	ICLK	
0008 70CAh	ICU	Interrupt request register 202	IR202	8	8	2	ICLK	

Table 4.1 List of I/O Registers (Address Order) (12/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 7322h	ICU	Interrupt source priority register 034	IPR034	8	8	2	ICLK	ICUb
0008 7323h	ICU	Interrupt source priority register 035	IPR035	8	8	2	ICLK	
0008 7324h	ICU	Interrupt source priority register 036	IPR036	8	8	2	ICLK	
0008 7325h	ICU	Interrupt source priority register 037	IPR037	8	8	2	ICLK	
0008 7326h	ICU	Interrupt source priority register 038	IPR038	8	8	2	ICLK	
0008 7327h	ICU	Interrupt source priority register 039	IPR039	8	8	2	ICLK	
0008 732Ah	ICU	Interrupt source priority register 042	IPR042	8	8	2	ICLK	
0008 732Dh	ICU	Interrupt source priority register 045	IPR045	8	8	2	ICLK	
0008 7330h	ICU	Interrupt source priority register 048	IPR048	8	8	2	ICLK	
0008 7334h	ICU	Interrupt source priority register 052	IPR052	8	8	2	ICLK	
0008 7338h	ICU	Interrupt source priority register 056	IPR056	8	8	2	ICLK	
0008 733Eh	ICU	Interrupt source priority register 062	IPR062	8	8	2	ICLK	
0008 7340h	ICU	Interrupt source priority register 064	IPR064	8	8	2	ICLK	
0008 7341h	ICU	Interrupt source priority register 065	IPR065	8	8	2	ICLK	
0008 7342h	ICU	Interrupt source priority register 066	IPR066	8	8	2	ICLK	
0008 7343h	ICU	Interrupt source priority register 067	IPR067	8	8	2	ICLK	
0008 7344h	ICU	Interrupt source priority register 068	IPR068	8	8	2	ICLK	
0008 7345h	ICU	Interrupt source priority register 069	IPR069	8	8	2	ICLK	
0008 7346h	ICU	Interrupt source priority register 070	IPR070	8	8	2	ICLK	
0008 7347h	ICU	Interrupt source priority register 071	IPR071	8	8	2	ICLK	
0008 7348h	ICU	Interrupt source priority register 072	IPR072	8	8	2	ICLK	
0008 7349h	ICU	Interrupt source priority register 073	IPR073	8	8	2	ICLK	
0008 734Ah	ICU	Interrupt source priority register 074	IPR074	8	8	2	ICLK	
0008 734Bh	ICU	Interrupt source priority register 075	IPR075	8	8	2	ICLK	
0008 734Ch	ICU	Interrupt source priority register 076	IPR076	8	8	2	ICLK	
0008 734Dh	ICU	Interrupt source priority register 077	IPR077	8	8	2	ICLK	
0008 734Eh	ICU	Interrupt source priority register 078	IPR078	8	8	2	ICLK	
0008 734Fh	ICU	Interrupt source priority register 079	IPR079	8	8	2	ICLK	
0008 735Ah	ICU	Interrupt source priority register 090	IPR090	8	8	2	ICLK	
0008 735Bh	ICU	Interrupt source priority register 091	IPR091	8	8	2	ICLK	
0008 735Ch	ICU	Interrupt source priority register 092	IPR092	8	8	2	ICLK	
0008 735Dh	ICU	Interrupt source priority register 093	IPR093	8	8	2	ICLK	
0008 7362h	ICU	Interrupt source priority register 098	IPR098	8	8	2	ICLK	
0008 7366h	ICU	Interrupt source priority register 102	IPR102	8	8	2	ICLK	
0008 736Ah	ICU	Interrupt source priority register 106	IPR106	8	8	2	ICLK	
0008 736Bh	ICU	Interrupt source priority register 107	IPR107	8	8	2	ICLK	
0008 736Ch	ICU	Interrupt source priority register 108	IPR108	8	8	2	ICLK	
0008 736Dh	ICU	Interrupt source priority register 109	IPR109	8	8	2	ICLK	
0008 736Eh	ICU	Interrupt source priority register 110	IPR110	8	8	2	ICLK	
0008 736Fh	ICU	Interrupt source priority register 111	IPR111	8	8	2	ICLK	
0008 7370h	ICU	Interrupt source priority register 112	IPR112	8	8	2	ICLK	
0008 7372h	ICU	Interrupt source priority register 114	IPR114	8	8	2	ICLK	
0008 737Ah	ICU	Interrupt source priority register 122	IPR122	8	8	2	ICLK	
0008 737Eh	ICU	Interrupt source priority register 126	IPR126	8	8	2	ICLK	
0008 7382h	ICU	Interrupt source priority register 130	IPR130	8	8	2	ICLK	
0008 7384h	ICU	Interrupt source priority register 132	IPR132	8	8	2	ICLK	
0008 7386h	ICU	Interrupt source priority register 134	IPR134	8	8	2	ICLK	
0008 738Ah	ICU	Interrupt source priority register 138	IPR138	8	8	2	ICLK	
0008 738Ch	ICU	Interrupt source priority register 140	IPR140	8	8	2	ICLK	
0008 738Eh	ICU	Interrupt source priority register 142	IPR142	8	8	2	ICLK	
0008 7392h	ICU	Interrupt source priority register 146	IPR146	8	8	2	ICLK	

Table 4.1 List of I/O Registers (Address Order) (13/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 7394h	ICU	Interrupt source priority register 148	IPR148	8	8	2	ICLK	ICUb
0008 7396h	ICU	Interrupt source priority register 150	IPR150	8	8	2	ICLK	
0008 7398h	ICU	Interrupt source priority register 152	IPR152	8	8	2	ICLK	
0008 739Ch	ICU	Interrupt source priority register 156	IPR156	8	8	2	ICLK	
0008 73A0h	ICU	Interrupt source priority register 160	IPR160	8	8	2	ICLK	
0008 73A1h	ICU	Interrupt source priority register 161	IPR161	8	8	2	ICLK	
0008 73A4h	ICU	Interrupt source priority register 164	IPR164	8	8	2	ICLK	
0008 73A6h	ICU	Interrupt source priority register 166	IPR166	8	8	2	ICLK	
0008 73AAh	ICU	Interrupt source priority register 170	IPR170	8	8	2	ICLK	
0008 73ADh	ICU	Interrupt source priority register 173	IPR173	8	8	2	ICLK	
0008 73B0h	ICU	Interrupt source priority register 176	IPR176	8	8	2	ICLK	
0008 73B3h	ICU	Interrupt source priority register 179	IPR179	8	8	2	ICLK	
0008 73B6h	ICU	Interrupt source priority register 182	IPR182	8	8	2	ICLK	
0008 73B7h	ICU	Interrupt source priority register 183	IPR183	8	8	2	ICLK	
0008 73B8h	ICU	Interrupt source priority register 184	IPR184	8	8	2	ICLK	
0008 73B9h	ICU	Interrupt source priority register 185	IPR185	8	8	2	ICLK	
0008 73BAh	ICU	Interrupt source priority register 186	IPR186	8	8	2	ICLK	
0008 73BBh	ICU	Interrupt source priority register 187	IPR187	8	8	2	ICLK	
0008 73BCh	ICU	Interrupt source priority register 188	IPR188	8	8	2	ICLK	
0008 73BDh	ICU	Interrupt source priority register 189	IPR189	8	8	2	ICLK	
0008 73BEh	ICU	Interrupt source priority register 190	IPR190	8	8	2	ICLK	
0008 73BFh	ICU	Interrupt source priority register 191	IPR191	8	8	2	ICLK	
0008 73C0h	ICU	Interrupt source priority register 192	IPR192	8	8	2	ICLK	
0008 73C1h	ICU	Interrupt source priority register 193	IPR193	8	8	2	ICLK	
0008 73C2h	ICU	Interrupt source priority register 194	IPR194	8	8	2	ICLK	
0008 73C3h	ICU	Interrupt source priority register 195	IPR195	8	8	2	ICLK	
0008 73C4h	ICU	Interrupt source priority register 196	IPR196	8	8	2	ICLK	
0008 73C5h	ICU	Interrupt source priority register 197	IPR197	8	8	2	ICLK	
0008 73C6h	ICU	Interrupt source priority register 198	IPR198	8	8	2	ICLK	
0008 73C7h	ICU	Interrupt source priority register 199	IPR199	8	8	2	ICLK	
0008 73C8h	ICU	Interrupt source priority register 200	IPR200	8	8	2	ICLK	
0008 73C9h	ICU	Interrupt source priority register 201	IPR201	8	8	2	ICLK	
0008 73CAh	ICU	Interrupt source priority register 202	IPR202	8	8	2	ICLK	
0008 73CBh	ICU	Interrupt source priority register 203	IPR203	8	8	2	ICLK	
0008 73CEh	ICU	Interrupt source priority register 206	IPR206	8	8	2	ICLK	
0008 73CFh	ICU	Interrupt source priority register 207	IPR207	8	8	2	ICLK	
0008 73D0h	ICU	Interrupt source priority register 208	IPR208	8	8	2	ICLK	
0008 73D6h	ICU	Interrupt source priority register 214	IPR214	8	8	2	ICLK	
0008 73D9h	ICU	Interrupt source priority register 217	IPR217	8	8	2	ICLK	
0008 73DCh	ICU	Interrupt source priority register 220	IPR220	8	8	2	ICLK	
0008 73DFh	ICU	Interrupt source priority register 223	IPR223	8	8	2	ICLK	
0008 73E2h	ICU	Interrupt source priority register 226	IPR226	8	8	2	ICLK	
0008 73E5h	ICU	Interrupt source priority register 229	IPR229	8	8	2	ICLK	
0008 73E8h	ICU	Interrupt source priority register 232	IPR232	8	8	2	ICLK	
0008 73EBh	ICU	Interrupt source priority register 235	IPR235	8	8	2	ICLK	
0008 73EEh	ICU	Interrupt source priority register 238	IPR238	8	8	2	ICLK	
0008 73F1h	ICU	Interrupt source priority register 241	IPR241	8	8	2	ICLK	
0008 73F4h	ICU	Interrupt source priority register 244	IPR244	8	8	2	ICLK	
0008 73F7h	ICU	Interrupt source priority register 247	IPR247	8	8	2	ICLK	
0008 73FAh	ICU	Interrupt source priority register 250	IPR250	8	8	2	ICLK	
0008 73FDh	ICU	Interrupt source priority register 253	IPR253	8	8	2	ICLK	

Table 4.1 List of I/O Registers (Address Order) (26/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 A0A6h	SCI5	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	SCIc, SCId
0008 A0A7h	SCI5	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A8h	SCI5	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A9h	SCI5	I ² C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A0AAh	SCI5	I ² C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ABh	SCI5	I ² C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ACh	SCI5	I ² C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ADh	SCI5	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C0h	SCI6	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C1h	SCI6	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C2h	SCI6	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C3h	SCI6	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C4h	SCI6	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C5h	SCI6	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C6h	SCI6	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C7h	SCI6	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C8h	SCI6	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C9h	SCI6	I ² C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CAh	SCI6	I ² C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CBh	SCI6	I ² C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CCh	SCI6	I ² C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CDh	SCI6	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E0h	SCI7	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E1h	SCI7	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E2h	SCI7	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E3h	SCI7	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E4h	SCI7	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E5h	SCI7	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E6h	SCI7	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E7h	SCI7	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E8h	SCI7	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E9h	SCI7	I ² C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A0EAh	SCI7	I ² C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A0EBh	SCI7	I ² C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ECh	SCI7	I ² C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0EDh	SCI7	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A100h	SCI8	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A101h	SCI8	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A102h	SCI8	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A103h	SCI8	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A104h	SCI8	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A105h	SCI8	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A106h	SCI8	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A107h	SCI8	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A108h	SCI8	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A109h	SCI8	I ² C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A10Ah	SCI8	I ² C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A10Bh	SCI8	I ² C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A10Ch	SCI8	I ² C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A10Dh	SCI8	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A120h	SCI9	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (32/50)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK≥PCLK	ICLK<PCLK	
0008 C114h	MPC	USB0 control register	PFUSB0	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C115h	MPC	USB1 control register	PFUSB1	8	8	2, 3 PCLKB	2 ICLK	
0008 C11Fh	MPC	Write-protect register	PWPR	8	8	2, 3 PCLKB	2 ICLK	
0008 C120h	PORT	Port switching register B	PSRB	8	8	2, 3 PCLKB	2 ICLK	I/O Ports
0008 C121h	PORT	Port switching register A	PSRA	8	8	2, 3 PCLKB	2 ICLK	
0008 C140h	MPC	P00 pin function control register	P00PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C141h	MPC	P01 pin function control register	P01PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C142h	MPC	P02 pin function control register	P02PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C143h	MPC	P03 pin function control register	P03PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C145h	MPC	P05 pin function control register	P05PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C147h	MPC	P07 pin function control register	P07PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C148h	MPC	P10 pin function control register	P10PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C149h	MPC	P11 pin function control register	P11PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C14Ah	MPC	P12 pin function control register	P12PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C14Bh	MPC	P13 pin function control register	P13PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C14Ch	MPC	P14 pin function control register	P14PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C14Dh	MPC	P15 pin function control register	P15PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C14Eh	MPC	P16 pin function control register	P16PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C14Fh	MPC	P17 pin function control register	P17PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C150h	MPC	P20 pin function control register	P20PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C151h	MPC	P21 pin function control register	P21PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C152h	MPC	P22 pin function control register	P22PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C153h	MPC	P23 pin function control register	P23PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C154h	MPC	P24 pin function control register	P24PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C155h	MPC	P25 pin function control register	P25PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C156h	MPC	P26 pin function control register	P26PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C157h	MPC	P27 pin function control register	P27PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C158h	MPC	P30 pin function control register	P30PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C159h	MPC	P31 pin function control register	P31PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C15Ah	MPC	P32 pin function control register	P32PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C15Bh	MPC	P33 pin function control register	P33PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C15Ch	MPC	P34 pin function control register	P34PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C160h	MPC	P40 pin function control register	P40PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C161h	MPC	P41 pin function control register	P41PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C162h	MPC	P42 pin function control register	P42PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C163h	MPC	P43 pin function control register	P43PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C164h	MPC	P44 pin function control register	P44PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C165h	MPC	P45 pin function control register	P45PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C166h	MPC	P46 pin function control register	P46PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C167h	MPC	P47 pin function control register	P47PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C168h	MPC	P50 pin function control register	P50PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C169h	MPC	P51 pin function control register	P51PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Ah	MPC	P52 pin function control register	P52PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Ch	MPC	P54 pin function control register	P54PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Dh	MPC	P55 pin function control register	P55PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Eh	MPC	P56 pin function control register	P56PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Fh	MPC	P57 pin function control register	P57PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C170h	MPC	P60 pin function control register	P60PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C171h	MPC	P61 pin function control register	P61PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C176h	MPC	P66 pin function control register	P66PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C177h	MPC	P67 pin function control register	P67PFS	8	8	2, 3 PCLKB	2 ICLK	

Table 5.4 DC Characteristics (3) (for D and G Versions (-40 ≤ Ta ≤ +85°C))

Conditions: VCC = AVCC0 = VREFH = VCC_USB = V_{BATT} = 2.7 to 3.6 V, VREFH0 = 2.7 V to AVCC0,
VSS = AVSS0 = VREFL/VREFL0 = VSS_USB = 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	—	—	100	mA	ICLK = 100 MHz PCLKA = 100MHz PCLKB = 50 MHz FCLK = 50 MHz BCLK = 100MHz		
		Normal*4	Peripheral function: clock signal supplied*4		—	52	—				
			Peripheral function: clock signal stopped*4		—	40	—				
		Sleep mode			—	25	65				
		All-module-clock-stop mode (reference value)			—	20	38				
		Increased by BGO operation*5			—	15	—				
	Low-speed operating mode 1*6				—	4	—				ICLK = 1 MHz
	Low-speed operating mode 2				—	1	—				ICLK = 32.768 kHz
	Software standby mode				—	0.2	6				
	Deep software standby mode	Power supplied to RAM and USB resume detecting unit			—	22	200	μA			
		Power not supplied to RAM and USB resume detecting unit	Power-on reset circuit and low-power consumption function disabled		—	21	60				
			Power-on reset circuit and low-power		—	6.2	28				
	Increase when the RTC is operating		When a crystal oscillator for low clock loads is in use		—	1.0	—				
			When a crystal oscillator for standard clock loads is in use		—	3.0	—				
	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 = 0V		
			When a crystal oscillator for standard clock loads is in use		—	1.6	—		V _{BATT} = 3.3 V, VCC = 0V		
					—	1.7	—		V _{BATT} = 2.0 V (for products with 100 pins or more), VBATT = 2.3 V (for the 64-pin product), VCC = 0V		
					—	3.3	—		V _{BATT} = 3.3 V, VCC = 0V		
Analog power supply current*7	During 12-bit A/D conversion (including temperature sensor)			I _{AVCC0}	—	2.3	3.2	mA			
	During 10-bit A/D conversion			I _{VREFH} *9	—	1.0	1.65				
	During D/A conversion (per unit)				—	0.7	1.0				
	Waiting for A/D, D/A conversion (all units)*10			—	—	25	35		μA		
	A/D, D/A converter in standby mode (all units)*10				—	0.1	4.0		μA		
Reference power supply current	During 12-bit A/D conversion			I _{VREFH0}	—	0.6	0.7	mA			
	Waiting for 12-bit A/D conversion (per unit)				—	0.5	0.6				
	12-bit A/D converter in standby mode (per unit)				—	0.1	2.0		μA		

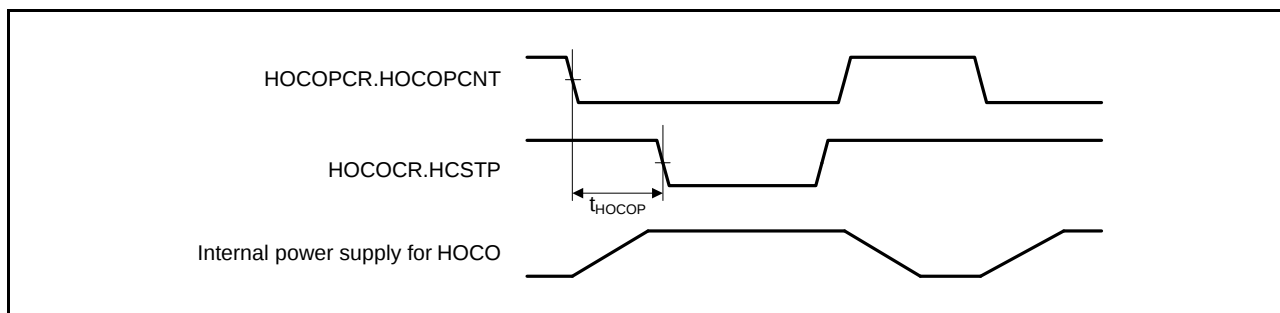


Figure 5.9 HOCO Power Supply Control Timing

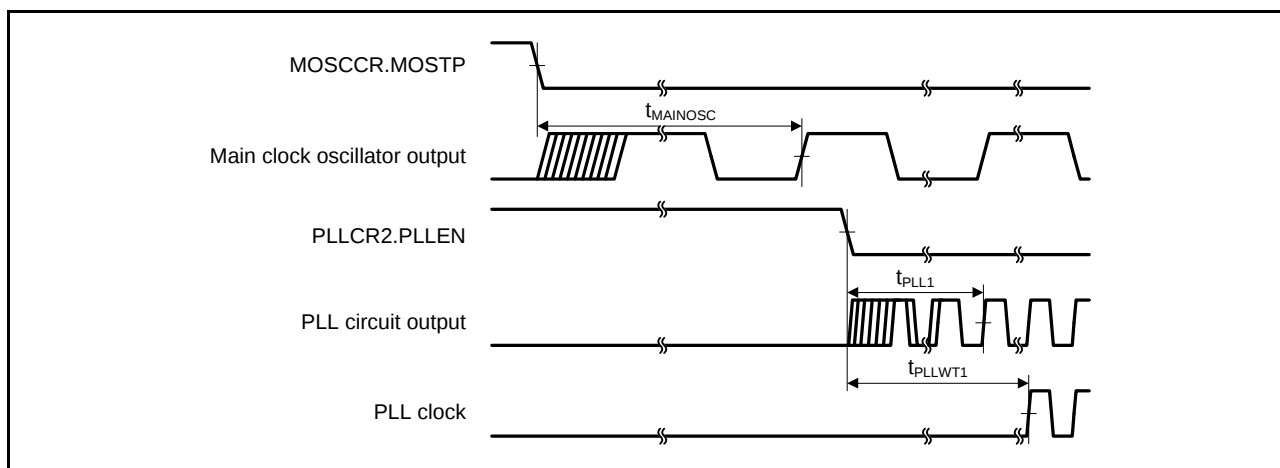


Figure 5.10 PLL Clock Oscillation Start Timing (PLL is Operated after Main Clock Oscillation Has Settled)

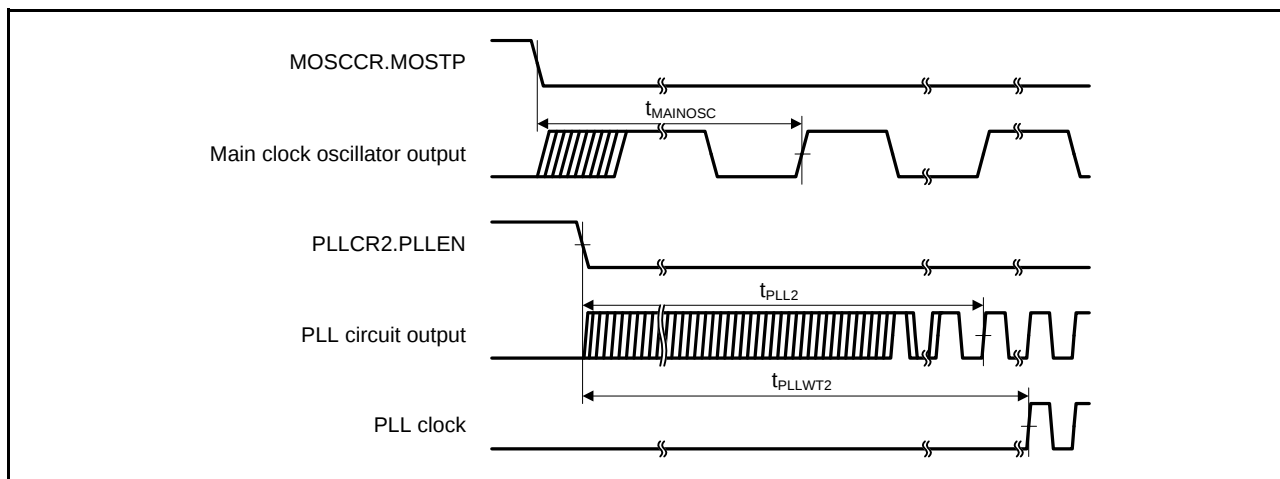


Figure 5.11 PLL Clock Oscillation Start Timing (PLL is Operated before Main Clock Oscillation Has Settled)

Table 5.22 Timing of On-Chip Peripheral Modules (4)Conditions: $V_{CC} = AVCC0 = VREFH = VCC_USB = 2.7$ 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.	Max.	Unit*1	Test Conditions
Simple SPI	SCK clock cycle output (master)	t_{SPcyc}	4	65536	t_{Pcyc}	Figure 5.42
	SCK clock cycle input (slave)		8	65536		
	SCK clock high pulse width	t_{SPCKWH}	0.4	0.6	t_{SPcyc}	
	SCK clock low pulse width	t_{SPCKWL}	0.4	0.6	t_{SPcyc}	
	SCK clock rise/fall time	t_{SPCKr}, t_{SPCKf}	—	20	ns	
	Data input setup time	t_{SU}	40	—	ns	Figure 5.43 to Figure 5.46
	Data input hold time	t_H	40	—	ns	
	SS input setup time	t_{LEAD}	1	—	t_{SPcyc}	
	SS input hold time	t_{LAG}	1	—	t_{SPcyc}	
	Data output delay time	t_{OD}	—	40	ns	
	Data output hold time	t_{OH}	−10	—	ns	Figure 5.46
	Data rise/fall time	t_{Dr}, t_{Df}	—	20	ns	
	SS input rise/fall time	t_{SSLr}, t_{SSLf}	—	20	ns	
	Slave access time	t_{SA}	—	5	t_{Pcyc}	
	Slave output release time	t_{REL}	—	5	t_{Pcyc}	

Note 1. t_{Pcyc} : PCLK cycle

Table 5.24 Timing of On-Chip Peripheral Modules (6)

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.*1	Unit	Test Conditions
RIIC (Fast-mode+) ICFER.FMPE = 1	SCL input cycle time	t_{SCL}	$6(12) \times t_{IICcyc} + 240$	—	ns	Figure 5.47
	SCL input high pulse width	t_{SCLH}	$3(6) \times t_{IICcyc} + 120$	—	ns	
	SCL input low pulse width	t_{SCLL}	$3(6) \times t_{IICcyc} + 120$	—	ns	
	SCL, SDA input rise time	t_{Sr}	—	120	ns	
	SCL, SDA input fall time	t_{Sf}	—	120	ns	
	SCL, SDA input spike pulse removal time	t_{SP}	0	$1(4) \times t_{IICcyc}$	ns	
	SDA input bus free time	t_{BUF}	$3(6) \times t_{IICcyc} + 120$	—	ns	
	Start condition input hold time	t_{STAH}	$t_{IICcyc} + 120$	—	ns	
	Restart condition input setup time	t_{STAS}	120	—	ns	
	Stop condition input setup time	t_{STOS}	120	—	ns	
	Data input setup time	t_{SDAS}	$t_{IICcyc} + 120$	—	ns	
	Data input hold time	t_{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C_b	—	550	pF	
Simple IIC (Standard-mode)	SDA input rise time	t_{Sr}	—	1000	ns	
	SDA input fall time	t_{Sf}	—	300	ns	
	SDA input spike pulse removal time	t_{SP}	0	$4 \times t_{IICcyc}$	ns	
	Data input setup time	t_{SDAS}	250	—	ns	
	Data input hold time	t_{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C_b	—	400	pF	
Simple IIC (Fast-mode)	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	$4 \times t_{IICcyc}$	ns	
	Data input setup time	t_{SDAS}	100	—	ns	
	Data input hold time	t_{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C_b	—	400	pF	

Note: t_{IICcyc} : RIIC internal reference clock (IIC ϕ) Cycle, t_{Pcyc} : PCLK cycle

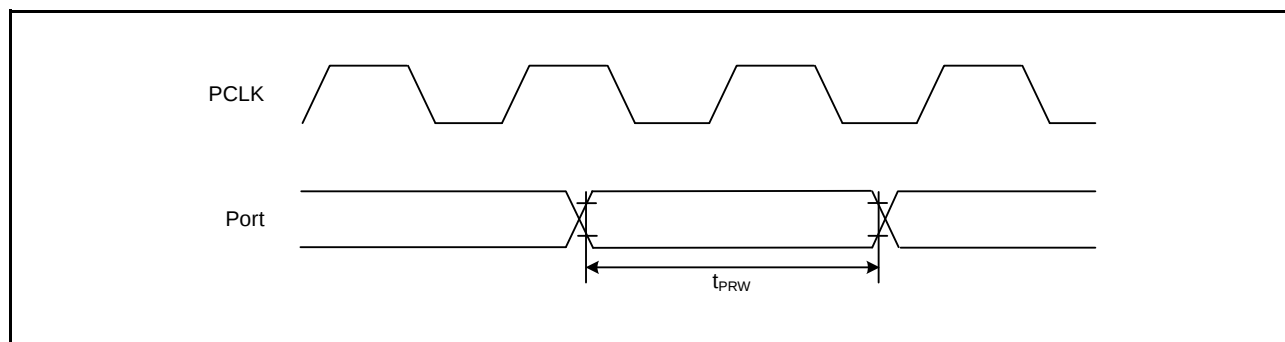
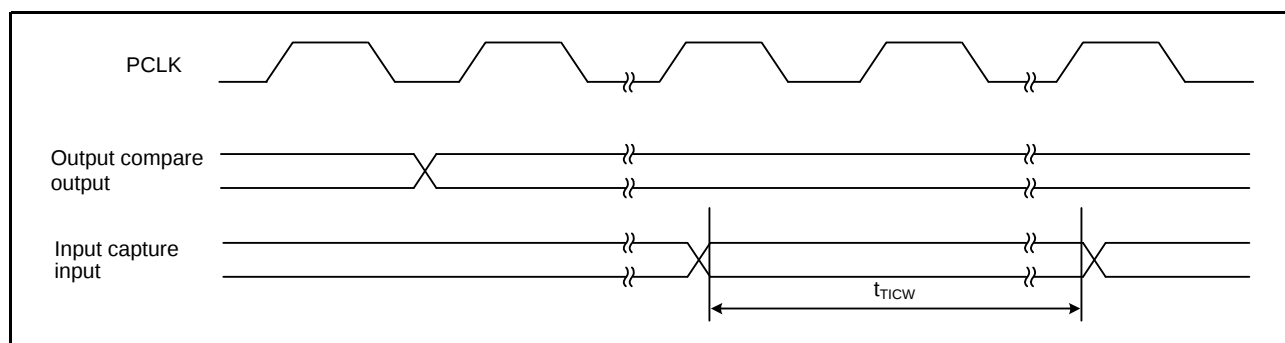
Note 1. The value in parentheses is used when ICMR3.NF[1:0] are set to 11b while a digital filter is enabled with ICFER.NFE = 1.

Note 2. C_b indicates the total capacity of the bus line.

Table 5.26 Timing of On-Chip Peripheral Modules (8)

Conditions: VCC = AVCC0 = VREFH = VCC_USB = 2.7 to 3.6V, VREFH0 = 2.7V to AVCC0,
VSS = AVSS0 = VREFL/VREFL0 = VSS_USB = 0V, PIXCLK = 27MHz, T_a = T_{opr}

	Item	Symbol	min	typ	max	Unit	Test Conditions
PDC	VSYN/HSYN input setup time	t _{SYNCSSETUP}	10	—	—	ns	Figure 5.58
	VSYN/HSYN input hold time	t _{SYNCHOLD}	5	—	—	ns	
	PIXD input setup time	t _{DATASETUP}	10	—	—	ns	
	PIXD input hold time	t _{DATAHOLD}	5	—	—	ns	
	PIXCLK input cycle time	t _{PIXcyc}	37	—	1000	ns	Figure 5.59
	PIXCLK input pulse width high level	t _{PIXH}	10	—	—	ns	
	PIXCLK input pulse width low level	t _{PIXL}	10	—	—	ns	
	PCKO pin output cycle time	t _{PCKcyc}	40	—	1000	ns	Figure 5.60
	PCKO pin output high level pulse width	t _{PCKH}	13	—	—	ns	
	PCKO pin output low level pulse width	t _{PCKL}	13	—	—	ns	
	PCKO pin output rising time	t _{PCKr}	—	—	5	ns	
	PCKO pin output falling time	t _{PCKf}	—	—	5	ns	

**Figure 5.34 I/O Port Input Timing****Figure 5.35 MTU Input/Output Timing**

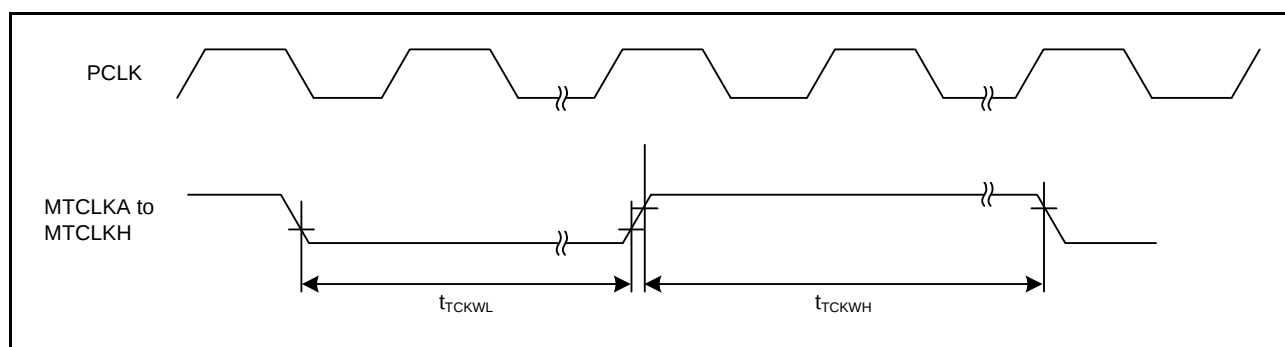


Figure 5.36 MTU Clock Input Timing

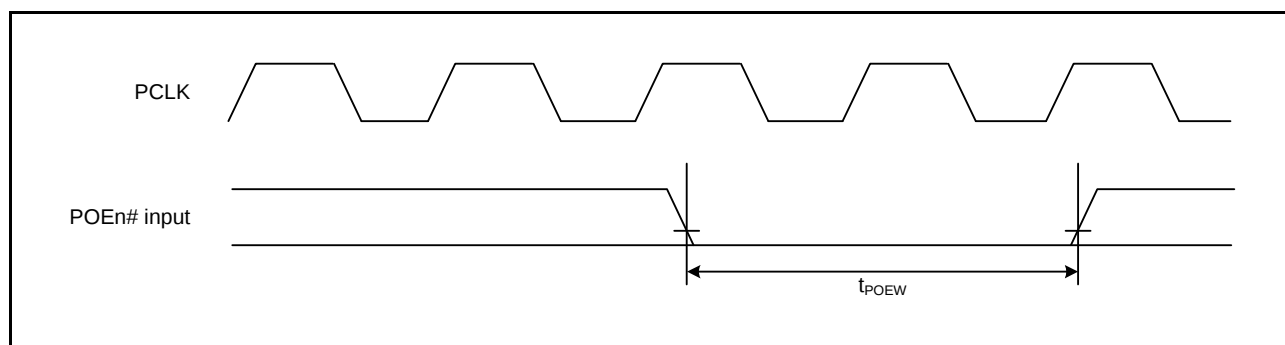


Figure 5.37 POE# Input Timing

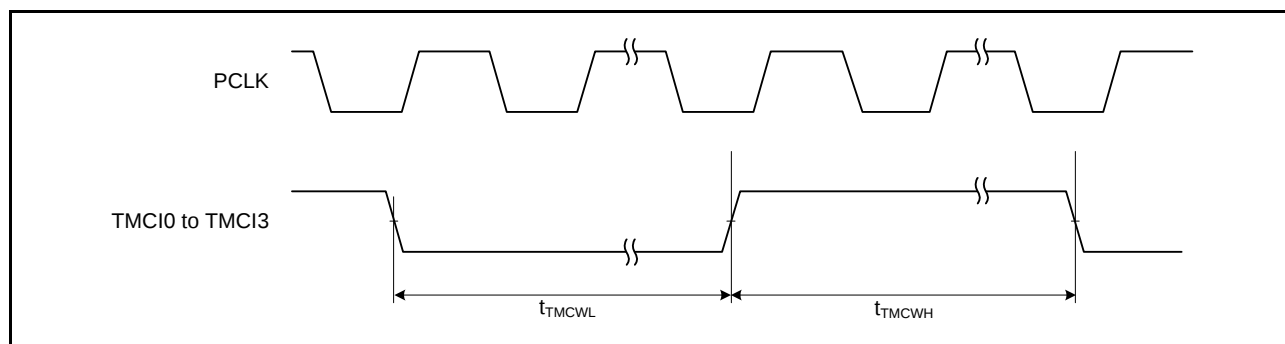


Figure 5.38 8-Bit Timer Clock Input Timing

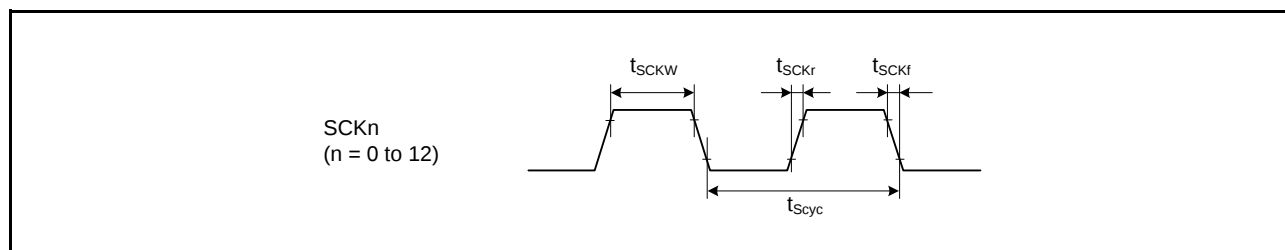


Figure 5.39 SCK Clock Input Timing

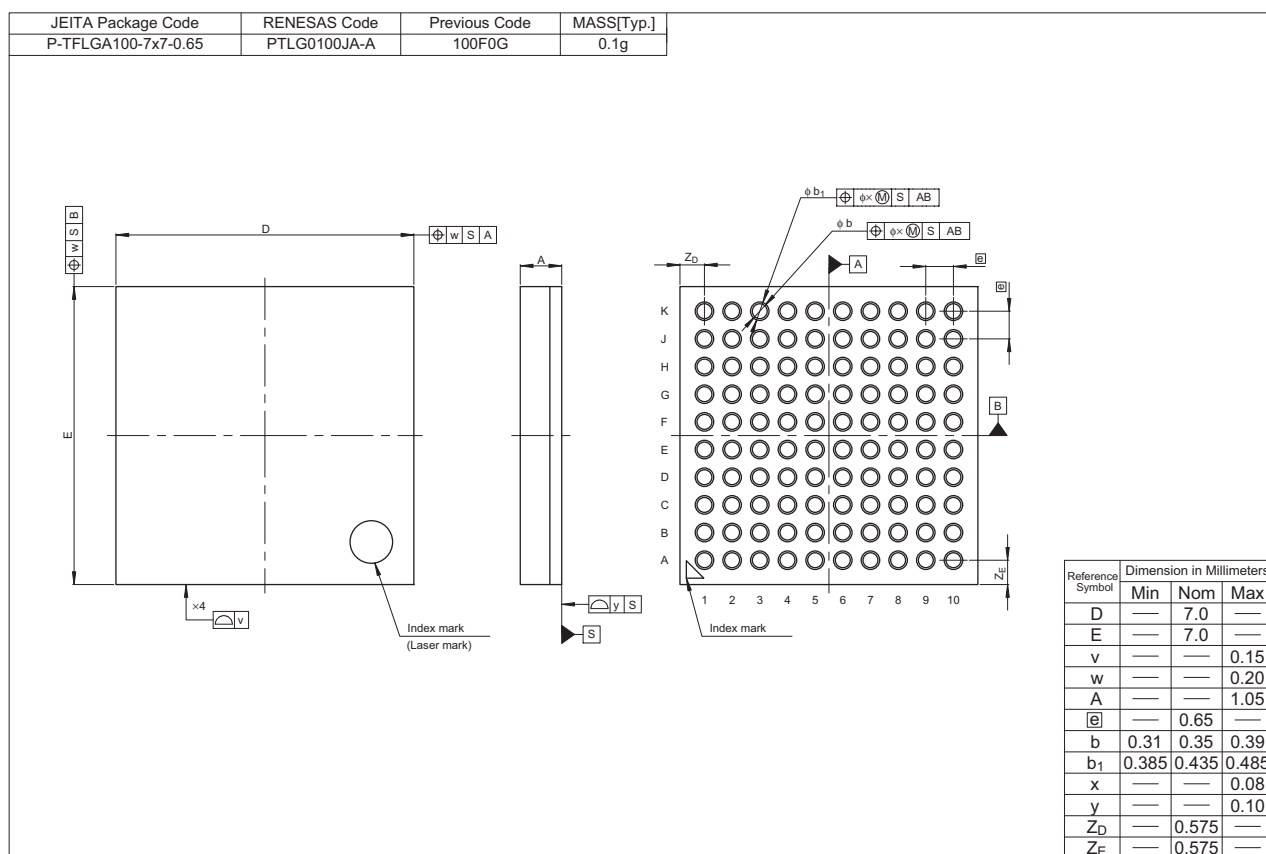


Figure F 100-pin TFLGA (PTLG0100JA-A)

REVISION HISTORY	RX63N Group, RX631 Group Datasheet
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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 Table 1.1 Outline of Specifications: CPU, ROM, RAM, E2 DataFlash, clock generation circuit, temperature sensor, power supply voltage, changed. Low power consumption, deleted 8 to 10 Table 1.3 List of Products, changed 11 Figure 1.2 Block Diagram, changed 12 Table 1.4 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 Table 4.1, MPU registers, added 5. Electrical Characteristics 105 to 163 Added