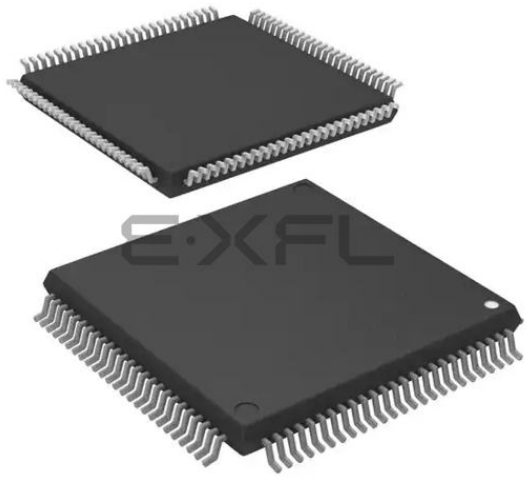
Renesas Electronics America Inc - R5F563TCADFP#V1 Datasheet



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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, I²C, LINbus, SCI, SPI, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	57
Program Memory Size	384KB (384K x 8)
Program Memory Type	FLASH
EEPROM Size	32K x 8
RAM Size	32K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 12x10b, 8x12b; D/A 2x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-LFQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f563tcadfp-v1

1.2 List of Products

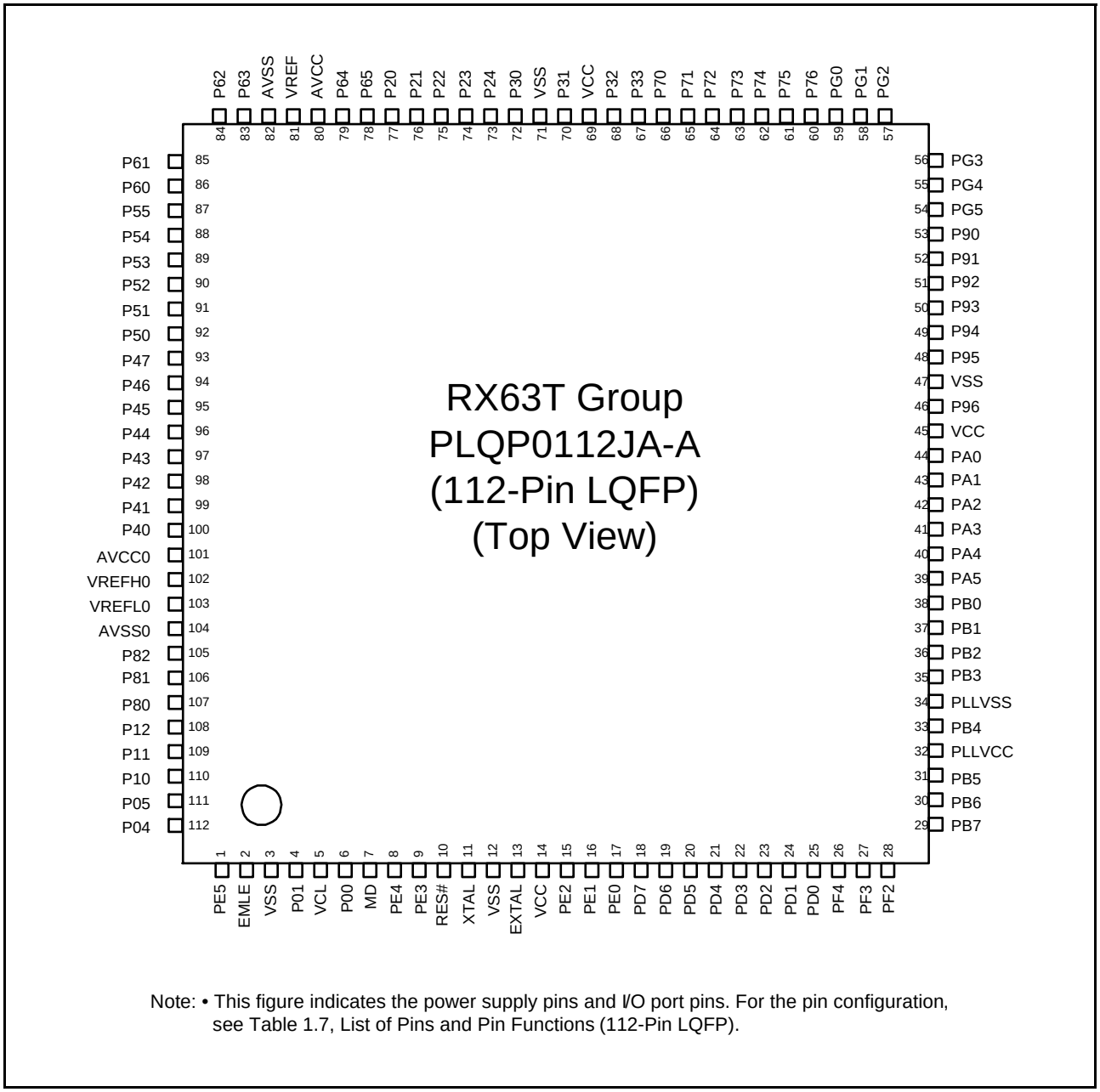
Table 1.3 is a list of products, and Figure 1.1 shows how to read the product part number.

Table 1.3 List of Products (1/4)

Group	Part No.	Order Part No.	Package	On-chip ROM Capacity	On-chip RAM Capacity	Option	Operating Voltage	Operating Temperature
RX63T	R5F563TEADFB	R5F563TEADFB#V0	PLQP0144KA-A	512 Kbytes	48 Kbytes	CAN module included	VCC/ PLLVCC 4.0 to 5.5V VCC_USB 3.0 to 3.6V AVCC/ AVCC0 4.0 to 5.5V	-40 to +85°C (D Version)
	R5F563TEADFB	R5F563TEADFB#V1	PLQP0144KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEADFA	R5F563TEADFA#V0	PLQP0120KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEADFA	R5F563TEADFA#V1	PLQP0120KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEADFH	R5F563TEADFH#V0	PLQP0112JA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEADFH	R5F563TEADFH#V1	PLQP0112JA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEADFP	R5F563TEADFP#V0	PLQP0100KB-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEADFP	R5F563TEADFP#V1	PLQP0100KB-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TCADFB	R5F563TCADFB#V0	PLQP0144KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFB	R5F563TCADFB#V1	PLQP0144KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFA	R5F563TCADFA#V0	PLQP0120KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFA	R5F563TCADFA#V1	PLQP0120KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFH	R5F563TCADFH#V0	PLQP0112JA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFH	R5F563TCADFH#V1	PLQP0112JA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFP	R5F563TCADFP#V0	PLQP0100KB-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCADFP	R5F563TCADFP#V1	PLQP0100KB-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TBADFB	R5F563TBADFB#V0	PLQP0144KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFB	R5F563TBADFB#V1	PLQP0144KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFA	R5F563TBADFA#V0	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFA	R5F563TBADFA#V1	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFH	R5F563TBADFH#V0	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFH	R5F563TBADFH#V1	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFP	R5F563TBADFP#V0	PLQP0100KB-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBADFP	R5F563TBADFP#V1	PLQP0100KB-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TEDDFB	R5F563TEDDFB#V0	PLQP0144KA-A	512 Kbytes	48 Kbytes	CAN module not included		
	R5F563TEDDFA	R5F563TEDDFA#V0	PLQP0120KA-A	512 Kbytes	48 Kbytes	CAN module not included		
	R5F563TEDDFH	R5F563TEDDFH#V0	PLQP0112JA-A	512 Kbytes	48 Kbytes	CAN module not included		
	R5F563TEDDFP	R5F563TEDDFP#V0	PLQP0100KB-A	512 Kbytes	48 Kbytes	CAN module not included		

Table 1.4 Pin Functions (2/5)

Classifications	Pin Name	I/O	Description
Interrupt	NMI	Input	Non-maskable interrupt request pin
	IRQ0 to IRQ7	Input	Maskable interrupt request pin
Multi-function timer pulse unit 3	MTIOC0A, MTIOC0B MTIOC0C, MTIOC0D	I/O	The TGRA0 to TGRD0 input capture input/output compare output/ PWM output pins
	MTIOC1A, MTIOC1B	I/O	The TGRA1 and TGRB1 input capture input/output compare output/ PWM output pins
	MTIOC2A, MTIOC2B	I/O	The TGRA2 and TGRB2 input capture input/output compare output/ PWM output pins
	MTIOC3A, MTIOC3B MTIOC3C, MTIOC3D	I/O	The TGRA3 to TGRD3 input capture input/output compare output/ PWM output pins
	MTIOC4A, MTIOC4B MTIOC4C, MTIOC4D	I/O	The TGRA4 to TGRD4 input capture input/output compare output/ PWM output pins
	MTIC5U, MTIC5V MTIC5W	Input	The TGRU5, TGRV5, and TGRW5 input capture input/dead time compensation input pins
	MTIOC6A, MTIOC6B MTIOC6C, MTIOC6D	I/O	The TGRA6 to TGRD6 input capture input/output compare output/ PWM output pins
	MTIOC7A, MTIOC7B MTIOC7C, MTIOC7D	I/O	The TGRA7 to TGRD7 input capture input/output compare output/ PWM output pins
	MTCLKA, MTCLKB MTCLKC, MTCLKD	Input	Input pins for external clock
Port output enable 3	POE0#, POE4# POE8#, POE10# POE11#, POE12#	Input	Input pins for request signals to place the MTU/GPT large-current pins in the high impedance state
General PWM timer	GTIOC0A, GTIOC0B	I/O	The GPT0.GTGRA and GPT0.GTGRB input capture input/output compare output/PWM output pins.
	GTIOC1A, GTIOC1B	I/O	The GPT1.GTGRA and GPT1.GTGRB input capture input/output compare output/PWM output pins.
	GTIOC2A, GTIOC2B	I/O	The GPT2.GTGRA and GPT2.GTGRB input capture input/output compare output/PWM output pins.
	GTIOC3A, GTIOC3B	I/O	The GPT3.GTGRA and GPT3.GTGRB input capture input/output compare output/PWM output pins.
	GTETRG0	Input	External trigger input pin for the GPT0 to GPT3
	GTIOC4A, GTIOC4B	I/O	The GPT4.GTGRA and GPT4.GTGRB input capture input/output compare output/PWM output pins.
	GTIOC5A, GTIOC5B	I/O	The GPT5.GTGRA and GPT5.GTGRB input capture input/output compare output/PWM output pins.
	GTIOC6A, GTIOC6B	I/O	The GPT6.GTGRA and GPT6.GTGRB input capture input/output compare output/PWM output pins.
	GTIOC7A, GTIOC7B	I/O	The GPT7.GTGRA and GPT7.GTGRB input capture input/output compare output/PWM output pins.
	GTETRG1	Input	External trigger input pin for the GPT4 to GPT7



Note: • This figure indicates the power supply pins and I/O port pins. For the pin configuration, see Table 1.7, List of Pins and Pin Functions (112-Pin LQFP).

Figure 1.5 Pin Assignment (112-Pin LQFP)

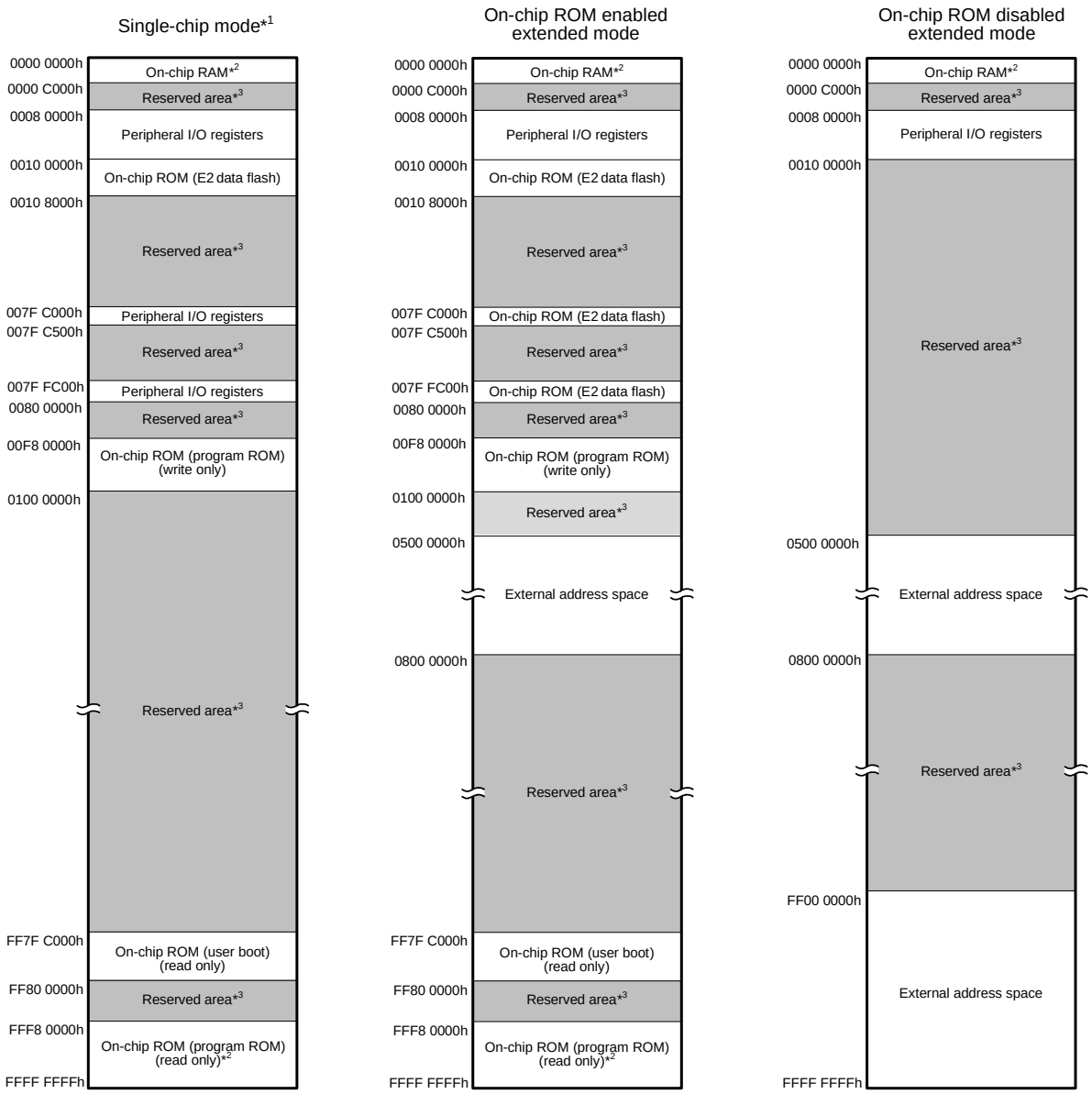
Table 1.5 List of Pins and Pin Functions (144-Pin LQFP) (4/4)

Pin Number 144-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SCIc, SCId, RSPI, RIIC, CAN, USB)	Interrupt	S12ADB, AD, DA
110		P60	A5				AN0
111		P57					AN13
112		P56					AN12
113		P55					AN11/DA1
114		P54					AN10/ DA0
115		P53	A6				AN9
116		P52	A7				AN8
117		P51					AN7
118		P50					AN6
119		P47					AN103/ CVREFH
120		P46					AN102
121		P45					AN101
122		P44					AN100
123		P43					AN003/ CVREFL
124		P42					AN002
125		P41					AN001
126		P40					AN000
127	AVCC0						
128	VREFH0						
129	VREFL0						
130	AVSS0						
131		P82	WAIT#	MTIC5U	SCK12	IRQ3	
132		P81	A8	MTIC5V	TXD12/SMOSI12/ SSDA12/TXDX12/ SIOX12		
133	VSS						
134		P80	A9	MTIC5W	RXD12/SMISO12/ SSCL12/RXDX12	IRQ5	
135		P12	CS3#		USB0_DPRPD		
136		P11	ALE	MTCLKC		IRQ1-DS	
137		P10		MTCLKD		IRQ0-DS	
138		P05	CS2#/WAIT#				
139	VCC						
140		P04					
141					USB0_DPUPE		
142	VSS_USB						
143					USB0_DM		
144					USB0_DP		

Note 1. Available for use as SCI pin only in boot mode.

Table 1.10 List of Pins and Pin Functions (48-Pin LQFP) (2/2)

Pin Number 64-Pin LQFP	Power Supply Clock System Control	I/O Port	POE3	Timer (MTU3, GPT, CAC)	Communications		Interrupt	S12ADB
					(SCIc, SCId)	(RSPI, RIIC)		
26		P74		MTIOC3D GTIOC0B MTIOC6D				
27		P73		MTIOC4B GTIOC2A MTIOC7B				
28		P72		MTIOC4A GTIOC1A MTIOC7A				
29		P71		MTIOC3B GTIOC0A MTIOC6B				
30		P70	POE0#		CTS1# RTS1# SS1#		IRQ5-DS	
31	VCC							
32		P30		MTIOC0B MTCLKD	TXD0 SMOSI0 SSDA0	SSLA0		
33	VSS							
34		P24		MTIC5U MTCLKC	RXD0 SMISO0 SSCL0	RSPCKA		
35		P23		MTIC5V MTCLKB CACREF	SCK0	MOSIA		
36		P22		MTIC5W MTCLKA	CTS0# RTS0# SS0#	MISOA		
37		P47						AN007 CVREFH
38		P44						AN004
39		P43						AN003 CVREFL
40		P42						AN002
41		P41						AN001
42		P40						AN000
43	AVCC0							
44	VREFH0							
45	VREFL0							
46	AVSS0							
47	VCL							
48	EMLE							



Note 1. The address space in boot mode and user boot mode is the same as the address space in single-chip mode.
Note 2. The capacity of ROM/RAM differs depending on the products.

ROM (bytes)		RAM (bytes)		E2 DataFlash (bytes)	
Capacity	**Address**	**Capacity**	**Address**	**Capacity**	**Address**
512 K	FFF8 0000h to FFFF FFFFh	48 K	0000 0000h to 0000 BFFFh	32 K	0010 0000h to 0010 8000h
384 K	FFFA 0000h to FFFF FFFFh	32 K	0000 0000h to 0000 7FFFh		
256 K	FFFC 0000h to FFFF FFFFh	24 K	0000 0000h to 0000 5FFFh		
64 K	FFFF 0000h to FFFF FFFFh	8 K	0000 0000h to 0000 1FFFh	8 K	0010 0000h to 0010 2000h
48 K	FFFF 4000h to FFFF FFFFh				
32 K	FFFF 8000h to FFFF FFFFh				

Note:•See Table 1.3, List of Products, for the product type name.

Note 3. Reserved areas should not be accessed.
Note 4. For details on the FCU, see section 41, Flash Memory in the User's Manual: Hardware.

Figure 3.1 Memory Map in Each Operating Mode

4. I/O Registers

This section gives information on the on-chip I/O register addresses. The information is given as shown below. Notes on writing to registers are also given at the end.

(1) I/O register addresses (address order)

- Registers are listed from the lower allocation addresses.
- Registers are classified according to module symbols.
- The number of access cycles indicates the number of cycles based on the specified reference clock.
- Among the internal I/O register area, addresses not listed in the list of registers are reserved. Reserved addresses must not be accessed. Do not access these addresses; otherwise, the operation when accessing these bits and subsequent operations cannot be guaranteed.

(2) Notes on writing to I/O registers

When writing to an I/O register, the CPU starts executing the subsequent instruction before completing I/O register write. This may cause the subsequent instruction to be executed before the post-update I/O register value is reflected on the operation.
As described in the following examples, special care is required for the cases in which the subsequent instruction must be executed after the post-update I/O register value is actually reflected.

[Examples of cases requiring special care]

- The subsequent instruction must be executed while an interrupt request is disabled with the IENj bit in IERn of the ICU (interrupt request enable bit) cleared to 0.
- A WAIT instruction is executed immediately after the preprocessing for causing a transition to the low power consumption state.

In the above cases, after writing to an I/O register, wait until the write operation is completed using the following procedure and then execute the subsequent instruction.

(a) Write to an I/O register.
(b) Read the value from the I/O register to a general register.
(c) Execute the operation using the value read.
(d) Execute the subsequent instruction.

[Instruction examples]

- Byte-size I/O registers

```
MOV.L  #SFR_ADDR, R1
MOV.B  #SFR_DATA, [R1]
CMP    [R1].UB, R1
;; Next process
```

- Word-size I/O registers

```
MOV.L  #SFR_ADDR, R1
MOV.W  #SFR_DATA, [R1]
CMP    [R1].W, R1
;; Next process
```

Table 4.1 List of I/O Registers (Address Order) (5/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 703Eh	ICU	Interrupt Request Register 062	IR062	8	8	2 ICLK		ICUb	Not present in versions with 64 or 48 pins.
0008 7040h	ICU	Interrupt Request Register 064	IR064	8	8	2 ICLK			
0008 7041h	ICU	Interrupt Request Register 065	IR065	8	8	2 ICLK			
0008 7042h	ICU	Interrupt Request Register 066	IR066	8	8	2 ICLK			
0008 7043h	ICU	Interrupt Request Register 067	IR067	8	8	2 ICLK			
0008 7044h	ICU	Interrupt Request Register 068	IR068	8	8	2 ICLK			
0008 7045h	ICU	Interrupt Request Register 069	IR069	8	8	2 ICLK			
0008 7046h	ICU	Interrupt Request Register 070	IR070	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7047h	ICU	Interrupt Request Register 071	IR071	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 705Ah	ICU	Interrupt Request Register 090	IR090	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 7062h	ICU	Interrupt Request Register 098	IR098	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7066h	ICU	Interrupt Request Register 102	IR102	8	8	2 ICLK			
0008 7067h	ICU	Interrupt Request Register 103	IR103	8	8	2 ICLK			
0008 7068h	ICU	Interrupt Request Register 104	IR104	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7069h	ICU	Interrupt Request Register 105	IR105	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 706Ah	ICU	Interrupt Request Register 106	IR106	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
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			
0008 7096h	ICU	Interrupt Request Register 150	IR150	8	8	2 ICLK			
0008 7097h	ICU	Interrupt Request Register 151	IR151	8	8	2 ICLK			

Table 4.1 List of I/O Registers (Address Order) (6/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 7098h	ICU	Interrupt Request Register 152	IR152	8	8	2 ICLK		ICUb	
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 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			Not present in versions with 64 or 48 pins.
0008 70A8h	ICU	Interrupt Request Register 168	IR168	8	8	2 ICLK			
0008 70A9h	ICU	Interrupt Request Register 169	IR169	8	8	2 ICLK			
0008 70AAh	ICU	Interrupt Request Register 170	IR170	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
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			Not present in versions with 64 or 48 pins.
0008 70AFh	ICU	Interrupt Request Register 175	IR175	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B0h	ICU	Interrupt Request Register 176	IR176	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B1h	ICU	Interrupt Request Register 177	IR177	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B2h	ICU	Interrupt Request Register 178	IR178	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B3h	ICU	Interrupt Request Register 179	IR179	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B4h	ICU	Interrupt Request Register 180	IR180	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B5h	ICU	Interrupt Request Register 181	IR181	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B6h	ICU	Interrupt Request Register 182	IR182	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B7h	ICU	Interrupt Request Register 183	IR183	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B8h	ICU	Interrupt Request Register 184	IR184	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70B9h	ICU	Interrupt Request Register 185	IR185	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70BAh	ICU	Interrupt Request Register 186	IR186	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70BBh	ICU	Interrupt Request Register 187	IR187	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70BCh	ICU	Interrupt Request Register 188	IR188	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70BDh	ICU	Interrupt Request Register 189	IR189	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70BEh	ICU	Interrupt Request Register 190	IR190	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 70BFh	ICU	Interrupt Request Register 191	IR191	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (12/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 732C	ICU	Interrupt Source Priority Register 044	IPR044	8	8	2 ICLK		ICUb	Not present in versions with 64 or 48 pins.
0008 732Dh	ICU	Interrupt Source Priority Register 045	IPR045	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7331h	ICU	Interrupt Source Priority Register 049	IPR049	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7334h	ICU	Interrupt Source Priority Register 052	IPR052	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7336h	ICU	Interrupt Source Priority Register 054	IPR054	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7337h	ICU	Interrupt Source Priority Register 055	IPR055	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7338h	ICU	Interrupt Source Priority Register 056	IPR056	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7339h	ICU	Interrupt Source Priority Register 057	IPR057	8	8	2 ICLK			
0008 733Ah	ICU	Interrupt Source Priority Register 058	IPR058	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Bh	ICU	Interrupt Source Priority Register 059	IPR059	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Ch	ICU	Interrupt Source Priority Register 060	IPR060	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Dh	ICU	Interrupt Source Priority Register 061	IPR061	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Eh	ICU	Interrupt Source Priority Register 062	IPR062	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
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			Not present in versions with 64 or 48 pins.
0008 7347h	ICU	Interrupt Source Priority Register 071	IPR071	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 735Ah	ICU	Interrupt Source Priority Register 090	IPR090	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 7362h	ICU	Interrupt Source Priority Register 098	IPR098	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7366h	ICU	Interrupt Source Priority Register 102	IPR102	8	8	2 ICLK			
0008 7367h	ICU	Interrupt Source Priority Register 103	IPR103	8	8	2 ICLK			
0008 7368h	ICU	Interrupt Source Priority Register 104	IPR104	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7369h	ICU	Interrupt Source Priority Register 105	IPR105	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 736Ah	ICU	Interrupt Source Priority Register 106	IPR106	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
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 7385h	ICU	Interrupt Source Priority Register 133	IPR133	8	8	2 ICLK			
0008 7387h	ICU	Interrupt Source Priority Register 135	IPR135	8	8	2 ICLK			
0008 7389h	ICU	Interrupt Source Priority Register 137	IPR137	8	8	2 ICLK			
0008 738Bh	ICU	Interrupt Source Priority Register 139	IPR139	8	8	2 ICLK			
0008 738Dh	ICU	Interrupt Source Priority Register 141	IPR141	8	8	2 ICLK			
0008 7391h	ICU	Interrupt Source Priority Register 145	IPR145	8	8	2 ICLK			
0008 7392h	ICU	Interrupt Source Priority Register 146	IPR146	8	8	2 ICLK			
0008 7396h	ICU	Interrupt Source Priority Register 150	IPR150	8	8	2 ICLK			
0008 7397h	ICU	Interrupt Source Priority Register 151	IPR151	8	8	2 ICLK			

Table 4.1 List of I/O Registers (Address Order) (22/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 B308h	SCI12	Noise Filter Setting Register	SNFR	8	8	2, 3 PCLKB	2 ICLK	SCIc, SCId	
0008 B309h	SCI12	I^2C Mode Register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Ah	SCI12	I^2C Mode Register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Bh	SCI12	I^2C Mode Register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Ch	SCI12	I^2C Status Register	SISR	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Dh	SCI12	SPI Mode Register	SPMR	8	8	2, 3 PCLKB	2 ICLK		
0008 B320h	SCI12	Extended Serial Module Enable Register	ESMER	8	8	2, 3 PCLKB	2 ICLK		
0008 B321h	SCI12	Control Register 0	CR0	8	8	2, 3 PCLKB	2 ICLK		
0008 B322h	SCI12	Control Register 1	CR1	8	8	2, 3 PCLKB	2 ICLK		
0008 B323h	SCI12	Control Register 2	CR2	8	8	2, 3 PCLKB	2 ICLK		
0008 B324h	SCI12	Control Register 3	CR3	8	8	2, 3 PCLKB	2 ICLK		
0008 B325h	SCI12	Port Control Register	PCR	8	8	2, 3 PCLKB	2 ICLK		
0008 B326h	SCI12	Interrupt Control Register	ICR	8	8	2, 3 PCLKB	2 ICLK		
0008 B327h	SCI12	Status Register	STR	8	8	2, 3 PCLKB	2 ICLK		
0008 B328h	SCI12	Status Clear Register	STCR	8	8	2, 3 PCLKB	2 ICLK		
0008 B329h	SCI12	Control Field 0 Data Register	CF0DR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Ah	SCI12	Control Field 0 Compare Enable Register	CF0CR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Bh	SCI12	Control Field 0 Receive Data Register	CF0RR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Ch	SCI12	Primary Control Field 1 Data Register	PCF1DR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Dh	SCI12	Primary Control Field 1 Data Register	SCF1DR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Eh	SCI12	Secondary Control Field 1 Data Register	CF1CR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Fh	SCI12	Control Field 1 Receive Data Register	CF1RR	8	8	2, 3 PCLKB	2 ICLK		
0008 B330h	SCI12	Timer Control Register	TCR	8	8	2, 3 PCLKB	2 ICLK		
0008 B331h	SCI12	Timer Mode Register	TMR	8	8	2, 3 PCLKB	2 ICLK		
0008 B332h	SCI12	Timer Prescaler Register	TPRE	8	8	2, 3 PCLKB	2 ICLK		
0008 B333h	SCI12	Timer Count Register	TCNT	8	8	2, 3 PCLKB	2 ICLK		
0008 C000h	PORT0	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK	I/O Ports	Not present in versions with 48 pins.
0008 C001h	PORT1	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C002h	PORT2	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C003h	PORT3	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C007h	PORT7	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C008h	PORT8	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C009h	PORT9	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C00Ah	PORTA	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C00Bh	PORTB	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C00Dh	PORTD	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C00Eh	PORTE	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C00Fh	PORTF	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C010h	PORTG	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C020h	PORT0	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C021h	PORT1	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C022h	PORT2	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		
0008 C023h	PORT3	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		
0008 C027h	PORT7	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		
0008 C028h	PORT8	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C029h	PORT9	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.

Table 4.1 List of I/O Registers (Address Order) (26/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 C174h	MPC	P64 Pin Function Control Register	P64PFS	8	8	2, 3 PCLKB	2 ICLK	MPC	Not present in versions with 64 or 48 pins.
0008 C175h	MPC	P65 Pin Function Control Register	P65PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C178h	MPC	P70 Pin Function Control Register	P70PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C179h	MPC	P71 Pin Function Control Register	P71PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C17Ah	MPC	P72 Pin Function Control Register	P72PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C17Bh	MPC	P73 Pin Function Control Register	P73PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C17Ch	MPC	P74 Pin Function Control Register	P74PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C17Dh	MPC	P75 Pin Function Control Register	P75PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C17Eh	MPC	P76 Pin Function Control Register	P76PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C180h	MPC	P80 Pin Function Control Register	P80PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C181h	MPC	P81 Pin Function Control Register	P81PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C182h	MPC	P82 Pin Function Control Register	P82PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C188h	MPC	P90 Pin Function Control Register	P90PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C189h	MPC	P91 Pin Function Control Register	P91PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C18Ah	MPC	P92 Pin Function Control Register	P92PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C18Bh	MPC	P93 Pin Function Control Register	P93PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C18Ch	MPC	P94 Pin Function Control Register	P94PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C18Dh	MPC	P95 Pin Function Control Register	P95PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C18Eh	MPC	P96 Pin Function Control Register	P96PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C190h	MPC	PA0 Pin Function Control Register	PA0PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C191h	MPC	PA1 Pin Function Control Register	PA1PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C192h	MPC	PA2 Pin Function Control Register	PA2PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C193h	MPC	PA3 Pin Function Control Register	PA3PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C194h	MPC	PA4 Pin Function Control Register	PA4PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C195h	MPC	PA5 Pin Function Control Register	PA5PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C196h	MPC	PA6 Pin Function Control Register	PA6PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64 or 48 pins.
0008 C198h	MPC	PB0 Pin Function Control Register	PB0PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C199h	MPC	PB1 Pin Function Control Register	PB1PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C19Ah	MPC	PB2 Pin Function Control Register	PB2PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C19Bh	MPC	PB3 Pin Function Control Register	PB3PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C19Ch	MPC	PB4 Pin Function Control Register	PB4PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C19Dh	MPC	PB5 Pin Function Control Register	PB5PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C19Eh	MPC	PB6 Pin Function Control Register	PB6PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C19Fh	MPC	PB7 Pin Function Control Register	PB7PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C1A0h	MPC	PC0 Pin Function Control Register	PC0PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C1A1h	MPC	PC1 Pin Function Control Register	PC1PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C1A2h	MPC	PC2 Pin Function Control Register	PC2PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (30/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000A 002Eh	USB0	D1FIFO Port Control Register	D1FIFOCTR	16	16	3, 4 PCLKB	2, 3 ICLK	USBa	Not present in versions with 112, 100, 64, or 48 pins.
000A 0030h	USB0	Interrupt Enable Register 0	INTENB0	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0032h	USB0	Interrupt Enable Register 1	INTENB1	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0036h	USB0	BRDY Interrupt Enable Register	BRDYENB	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0038h	USB0	NRDY Interrupt Enable Register	NRDYENB	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 003Ah	USB0	BEMP Interrupt Enable Register	BEMPENB	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 003Ch	USB0	SOF Output Configuration Register	SOFCFG	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0040h	USB0	Interrupt Status Register 0	INTSTS0	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0042h	USB0	Interrupt Status Register 1	INTSTS1	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0046h	USB0	BRDY Interrupt Status Register	BRDYSTS	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 0048h	USB0	NRDY Interrupt Status Register	NRDYSTS	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.
000A 004Ah	USB0	BEMP Interrupt Status Register	BEMPSTS	16	16	9 PCLKB or more	Rounded up to the nearest integer greater than 1 + 9/(frequency ratio of ICLK/PCLKB)*1		Not present in versions with 112, 100, 64, or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (45/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000C 2A24h	GPT6	A/D Converter Start Request Timing Register A	GTADTRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK	GPT	Not present in versions with 64 or 48 pins.
000C 2A26h	GPT6	A/D Converter Start Request Timing Buffer Register A	GTADTBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A28h	GPT6	A/D Converter Start Request Timing Double-Buffer Register A	GTADTDBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A2Ch	GPT6	A/D Converter Start Request Timing Register B	GTADTRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A2Eh	GPT6	A/D Converter Start Request Timing Buffer Register B	GTADTBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A30h	GPT6	A/D Converter Start Request Timing Double-Buffer Register B	GTADTDBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A34h	GPT6	General PWM Timer Output Negate Control Register	GTONCR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A36h	GPT6	General PWM Timer Dead Time Control Register	GTDTCR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A38h	GPT6	General PWM Timer Dead Time Value Register U	GTDVU	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A3Ah	GPT6	General PWM Timer Dead Time Value Register D	GTDVD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A3Ch	GPT6	General PWM Timer Dead Time Buffer Register U	GTDBU	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A3Eh	GPT6	General PWM Timer Dead Time Buffer Register D	GTDBD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A40h	GPT6	General PWM Timer Output Protection Function Status Register	GTSOS	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A42h	GPT6	General PWM Timer Output Protection Function Temporary Release Register	GTSOTR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A80h	GPT7	General PWM Timer I/O Control Register	GTIOR	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A82h	GPT7	General PWM Timer Interrupt Output Setting Register	GTINTAD	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A84h	GPT7	General PWM Timer Control Register	GTCR	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A86h	GPT7	General PWM Timer Buffer Enable Register	GTBER	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A88h	GPT7	General PWM Timer Count Direction Register	GTUDC	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A8Ah	GPT7	General PWM Timer Interrupt and A/D Converter Start Request Skipping Setting Register	GTITC	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A8Ch	GPT7	General PWM Timer Status Register	GTST	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A8Eh	GPT7	General PWM Timer Counter	GTCNT	16	16	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A90h	GPT7	General PWM Timer Compare Capture Register A	GTCCRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A92h	GPT7	General PWM Timer Compare Capture Register B	GTCCRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A94h	GPT7	General PWM Timer Compare Capture Register C	GTCCRC	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A96h	GPT7	General PWM Timer Compare Capture Register D	GTCCRD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A98h	GPT7	General PWM Timer Compare Capture Register E	GTCCRE	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A9Ah	GPT7	General PWM Timer Compare Capture Register F	GTCCRF	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A9Ch	GPT7	General PWM Timer Cycle Setting Register	GTPR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2A9Eh	GPT7	General PWM Timer Cycle Setting Buffer Register	GTPBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2AA0h	GPT7	General PWM Timer Cycle Setting Double-Buffer Register	GTPDBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2AA4h	GPT7	A/D Converter Start Request Timing Register A	GTADTRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C 2AA6h	GPT7	A/D Converter Start Request Timing Buffer Register A	GTADTBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.

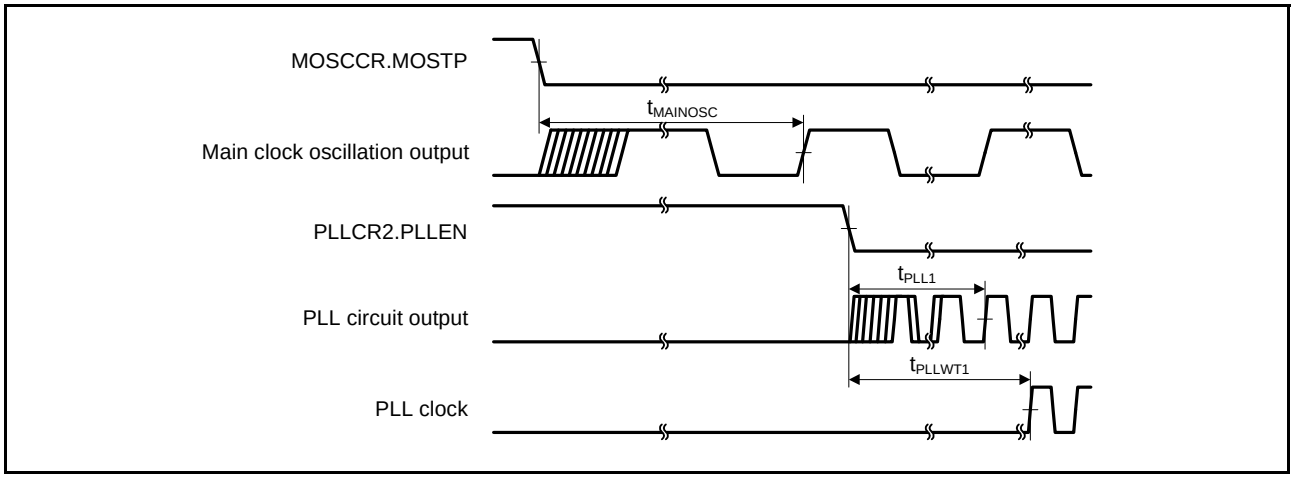


Figure 5.7 PLL Clock Oscillation Start Timing (PLL is Operated after Main Clock Oscillation Has Settled)

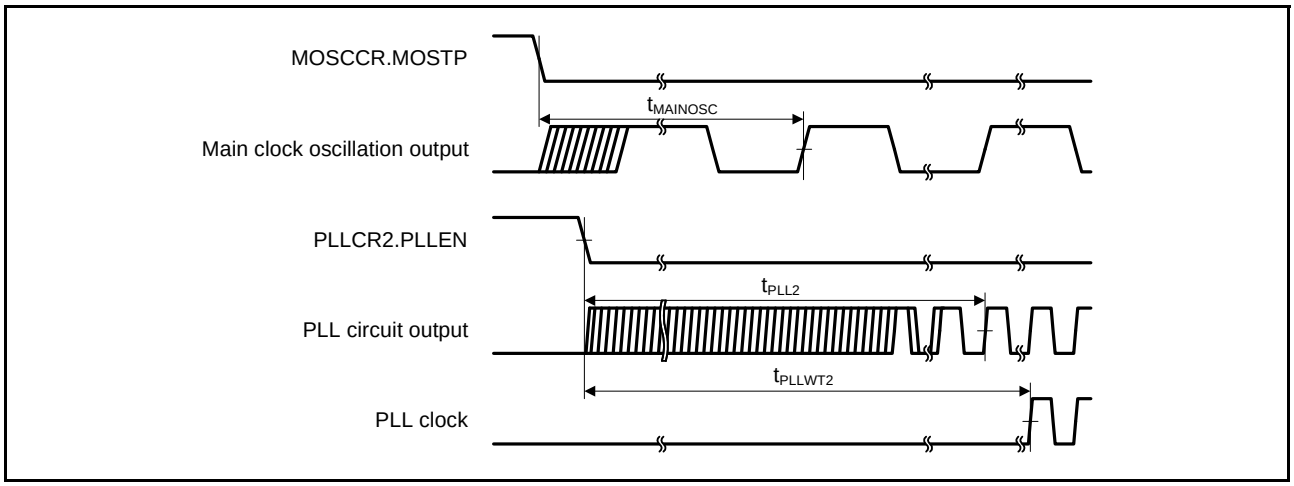


Figure 5.8 PLL Clock Oscillation Start Timing (PLL is Operated before Main Clock Oscillation Has Settled)

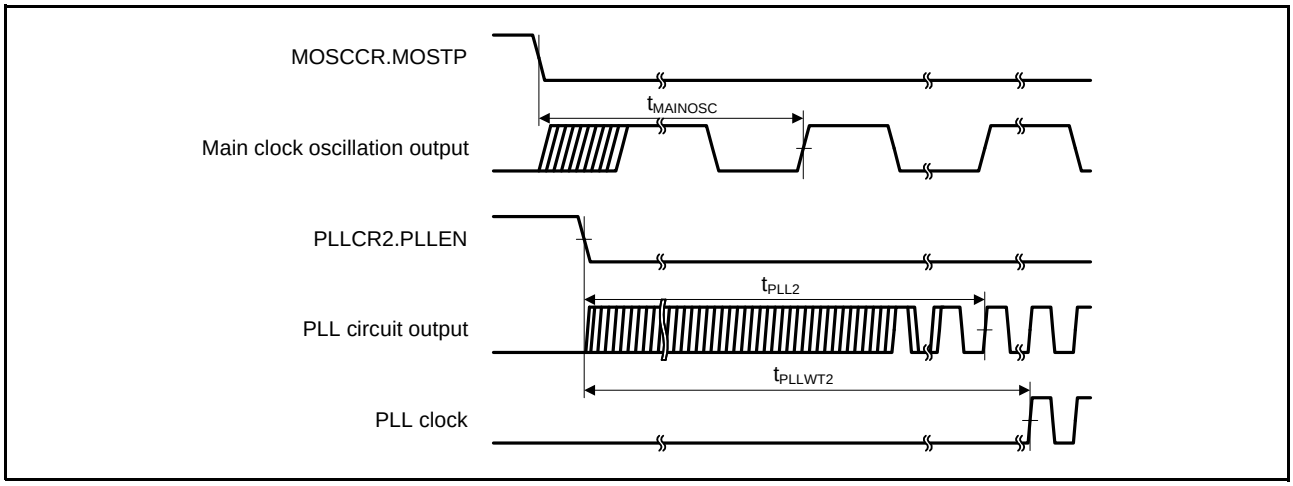


Figure 6.5 PLL Clock Oscillation Start Timing (PLL is Operated before Main Clock Oscillation Has Settled)

6.3.2 Reset Timing

Table 6.8 Reset Timing

Conditions: VCC = 2.7 to 3.6 V, VSS = AVSS0 = VREFL0 = 0 V,
AVCC0 = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0,
Ta = T_{opr}

Item		Symbol	Min	Typ	Max.	Unit	Test Conditions
RES# pulse width	Power-on	t_{RESWP}	2	—	—	ms	Figure 6.6
	Deep software standby mode	t_{RESWD}	1	—	—	ms	Figure 6.7
	Software standby mode	t_{RESWS}	1	—	—	ms	
	Other than above (except for programming or erasure of the ROM or E2 DataFlash memory or blank checking of the E2 DataFlash memory)	t_{RESW}	200	—	—	µs	
Wait time after RES# cancellation		t_{RESWT}	59	—	60	t_{cyc}	
Internal reset time (independent watchdog timer reset, watchdog timer reset, software reset)		t_{RESW2}	112	—	120	t_{cyc}	

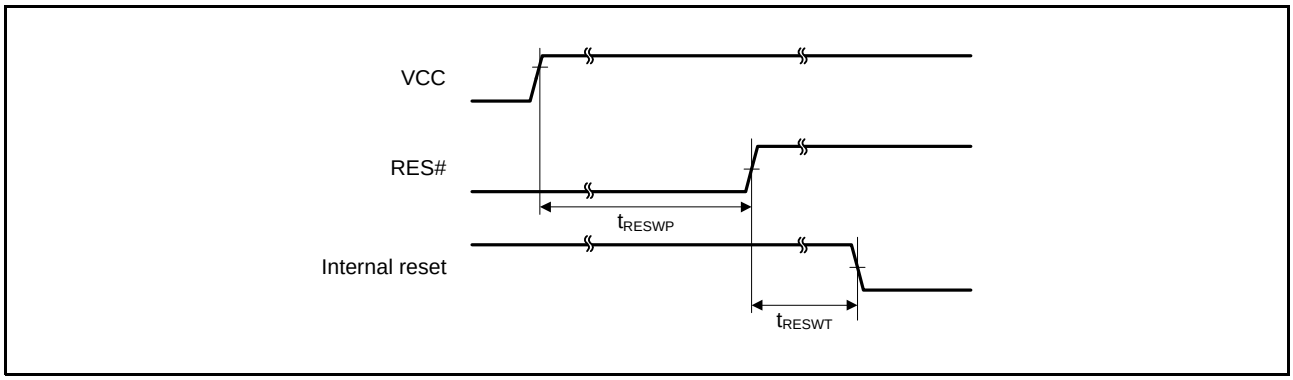


Figure 6.6 Reset Input Timing at Power-On

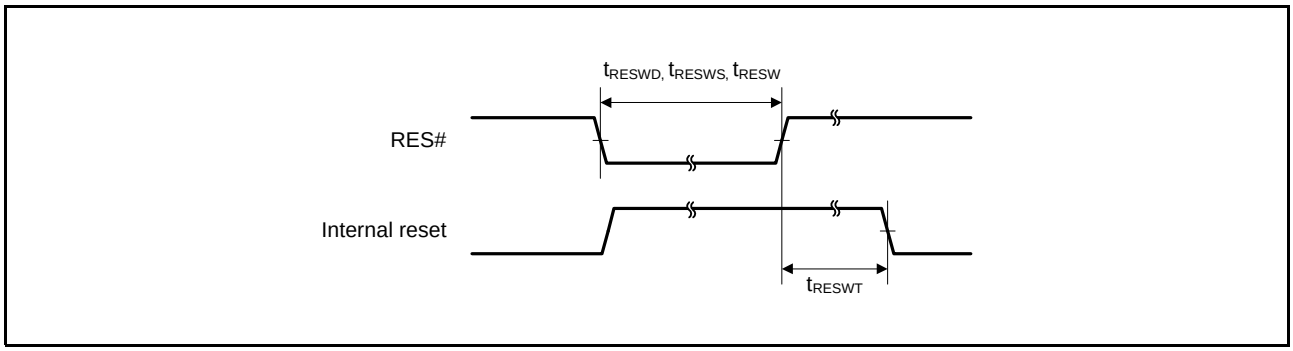


Figure 6.7 Reset Input Timing

6.3.5 Timing of On-Chip Peripheral Modules

Table 6.11 Timing of On-Chip Peripheral Modules (1)

Conditions: VCC = 2.7 to 3.6 V, VSS = AVSS0 = VREFL0 = 0 V,
AVCC0 = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0,
Ta = T_{opr}

Item			Symbol	Min.	Max.	Unit*1	Test Conditions
I/O ports	Input data pulse width		t_{PRW}	1.5	—	t_{Pcyc}	Figure 6.12
MTU3	Input capture input pulse width	Single-edge setting	t_{TICW}	3	—	t_{PAcyc}	Figure 6.13
		Both-edge setting		5	—		
	Timer clock pulse width	Single-edge setting	t_{TCKWH}, t_{TCKWL}	3	—	t_{PAcyc}	Figure 6.14
		Both-edge setting		5	—		
		Phase counting mode		5	—		
POE3	POE# input pulse width		t_{POEW}	1.5	—	t_{Pcyc}	Figure 6.16
GPT	Input capture input pulse width	Single-edge setting	t_{GTICW}	3	—	t_{PAcyc}	Figure 6.15
		Both-edge setting		5	—		
	External trigger input pulse width	Single-edge setting	t_{OTETW}	3	—	t_{PAcyc}	Figure 6.18
		Both-edge setting		5	—		
SCI	Input clock cycle	Asynchronous	t_{Scyc}	4	—	t_{Pcyc}	Figure 6.17
		Clock synchronous		6	—		
	Input clock pulse width		t_{SCKW}	0.4	0.6	t_{Scyc}	
	Input clock rise time		t_{SCKr}	—	20	ns	
	Input clock fall time		t_{SCKf}	—	20	ns	
	Output clock cycle	Asynchronous	t_{Scyc}	16	—	t_{Pcyc}	
		Clock synchronous		4	—		
	Output clock pulse width		t_{SCKW}	0.4	0.6	t_{Scyc}	
	Output clock rise time		t_{SCKr}	—	20	ns	
	Output clock fall time		t_{SCKf}	—	20	ns	
	Transmit data delay time	Clock synchronous	t_{TXD}	—	40	ns	Figure 6.18
	Receive data setup time	Clock synchronous	t_{RXS}	40	—	ns	
	Receive data hold time	Clock synchronous	t_{RXH}	40	—	ns	
A/D converter	12-bit A/D converter trigger input pulse width		t_{TRGW}	1.5	—	t_{Pcyc}	Figure 6.19

Note 1. t_{Pcyc}: PCLK cycle, t_{PAcye}: PCLKA cycle

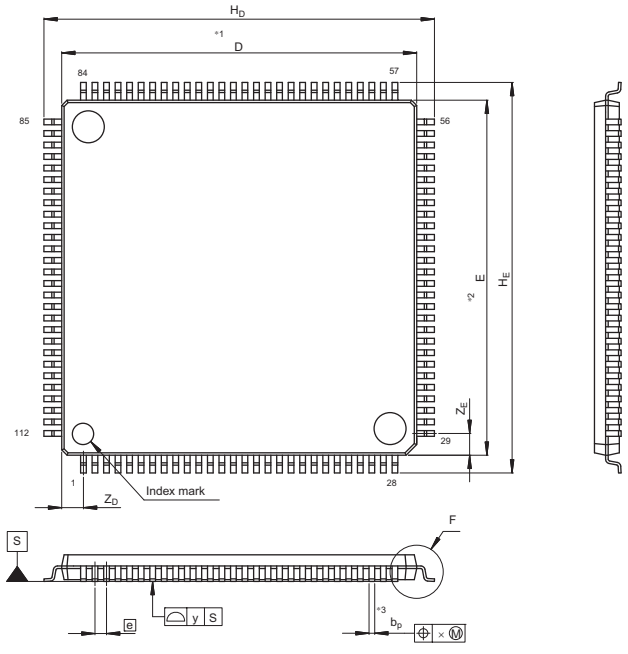
Table 6.12 Timing of On-Chip Peripheral Modules (2)

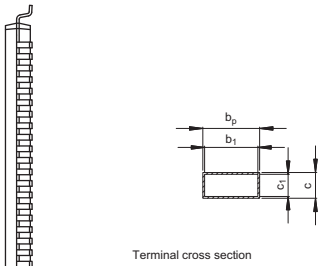
Conditions: VCC = 2.7 to 3.6 V, VSS = AVSS0 = VREFL0 = 0 V,
AVCC0 = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0,
Ta = T_{opr}

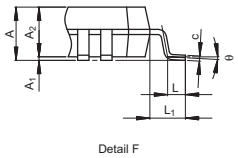
Item			Symbol	Min.	Max.	Unit*1	Test Conditions
RSPI	RSPCK clock cycle	Master	t_{SPcyc}	2	4096	t_{Pcyc}	Figure 6.20
		Slave		8	4096		
	RSPCK clock high pulse width	Master	t_{SPCKWH}	$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2 - 3$	—	ns	
		Slave		$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2$	—		
	RSPCK clock low pulse width	Master	t_{SPCKWL}	$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2 - 3$	—	ns	
		Slave		$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2$	—		
	RSPCK clock rise/fall time	Output	t_{SPCKR}, t_{SPCKF}	—	5	ns	
		Input		—	1	µs	
	Data input setup time	Master	t_{SU}	15	—	ns	Figure 6.21 to Figure 6.24
				20	—		
		Slave		$20 - t_{Pcyc}$	—		
	Data input hold time	Master	t_H	0	—	ns	
		Slave		$20 + 2 \times t_{Pcyc}$	—		
	SSL setup time	Master	t_{LEAD}	1	8	t_{SPcyc}	
		Slave		4	—	t_{Pcyc}	
	SSL hold time	Master	t_{LAG}	1	8	t_{SPcyc}	
		Slave		4	—	t_{Pcyc}	
	Data output delay time	Master	t_{OD}	—	18	ns	
		Slave		—	$3 \times t_{Pcyc} + 40$		
	Data output hold time	Master	t_{OH}	0	—	ns	
		Slave		0	—		
	Successive transmission delay time	Master	t_{TD}	$t_{SPcyc} + 2 \times t_{Pcyc}$	$8 \times t_{SPcyc} + 2 \times t_{Pcyc}$	ns	
		Slave		$4 \times t_{Pcyc}$	—		
	MOSI rise/fall time	Output	t_{MODR}, t_{MODF}	—	5	ns	
		Input		—	1	µs	
	MISO rise/fall time	Output	t_{MODR}, t_{MODF}	—	5	ns	
		Input		—	1	µs	
	SSL rise/fall time	Output	t_{SSLr}, t_{SSLf}	—	15	ns	
		Input		—	1	µs	
	Slave access time		t_{SA}	—	4	t_{Pcyc}	Figure 6.23 and Figure 6.24
	Slave output release time		t_{REL}	—	3	t_{Pcyc}	

Note 1. t_{Pcyc}: PCLK cycle

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-LQFP112-20x20-0.65	PLQP0112JA-A	FP-112E/FP-112EV	1.2g







NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	19.9	20.0	20.1
E	19.9	20.0	20.1
A_2	—	1.4	—
H_D	21.8	22.0	22.2
H_E	21.8	22.0	22.2
A	—	—	1.7
A_1	0.05	0.1	0.15
b_p	0.27	0.32	0.37
b_1	—	0.30	—
c	0.09	0.145	0.20
c_1	—	0.125	—
θ	0°	—	8°
e	—	0.65	—
x	—	—	0.13
y	—	—	0.10
Z_D	—	1.225	—
Z_E	—	1.225	—
L	0.35	0.5	0.65
L_1	—	1.0	—

Figure C 112-Pin LQFP (PLQP0112JA-A)