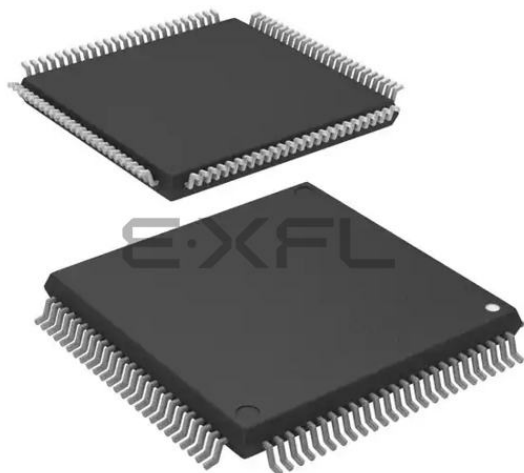




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What is "[Embedded - Microcontrollers](#)"?

"[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	57
Program Memory Size	512KB (512K x 8)
Program Memory Type	FLASH
EEPROM Size	32K x 8
RAM Size	48K 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/r5f563teadfp-v0

Table 1.2 Comparison of Functions for Different Packages

Functions			RX63T Group						
Package			144 Pins	120 Pins	112 Pins	100 Pins	64 Pins	48 Pins	
External bus			16 bits				—		
External address space			1 Mbyte × 4 areas				—		
DMA	DMA controller (DMACA)		Ch. 0 to 3						
	Data transfer controller (DTCa)		Supported						
Interrupt controller (ICUb)	NMI pin		Supported						
	IRQ pin		Supported (x 8)				Supported (x 6)		
Timers	Multi-function timer pulse unit 3 (MTU3)* ¹		Ch. 0 to 7						
	General PWM timer (GPT)* ¹	Generation of delays in PWM, not supported	Ch. 0 to 7				Ch. 0 to 3		
		Generation of delays in PWM, supported	Ch. 0 to 3				—		
	Port output enable 3 (POE3)		Supported (POE pins × 6)			Supported (POE pins × 5)	Supported (POE pins × 4)		
	Compare match timer (CMT)		Ch. 0 to 3						
	Watchdog timer (WDTA)		Supported						
	Independent watchdog timer (IWDTa)		Supported						
	Communication function	USB2.0 host/function module (USBa)		Ch. 0		—			
Serial communications interfaces (SClc)		Ch. 0 to 3			Ch. 0 to 2	Ch. 0, 1			
Serial communications interfaces (SCld)		Ch. 12							
I ² C bus interfaces (RIIC)		Ch. 0, 1		Ch. 0					
Serial peripheral interfaces (RSPI)		Ch. 0, 1				Ch. 0			
CAN module (CAN) (as an optional function)* ¹		Ch. 0				—			
12-bit A/D converter (S12ADB)			4 channels × 2 units				8 channels × 1 unit (AN000 to 007)	8 channels × 1 unit (AN000 to 004, 007)	
			Three-channel simultaneous sampling function				1 unit		
			Programmable gain amplifier				—		
			Window comparator				3 channels × 1 unit		
10-bit A/D converter (ADA)			20 channels	12 channels			—		
D/A converter (DAa)			Ch. 0, 1				—		
Clock Frequency Accuracy Measurement Circuit			Supported						
Digital power supply controller (DPC)* ²			Supported				Not supported		

Note 1. For the MTU3 and GPT, the number of pins will differ with the package. See the list of pins and pin functions for details.

In addition, the CAN module is an optional function. For details, see Table 1.3.

Note 2. Not provided for the product ID code O.

Table 1.3 List of Products (2/4)

Group	Part No.	Order Part No.	Package	On-chip ROM Capacity	On-chip RAM Capacity	Option	Operating Voltage	Operating Temperature
RX63T	R5F563TCDDFB	R5F563TCDDFB#V0	PLQP0144KA-A	384 Kbytes	32 Kbytes	CAN module not 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)
	R5F563TCDDFA	R5F563TCDDFA#V0	PLQP0120KA-A	384 Kbytes	32 Kbytes	CAN module not included		
	R5F563TCDDFH	R5F563TCDDFH#V0	PLQP0112JA-A	384 Kbytes	32 Kbytes	CAN module not included		
	R5F563TCDDFP	R5F563TCDDFP#V0	PLQP0100KB-A	384 Kbytes	32 Kbytes	CAN module not included		
	R5F563TBDDFB	R5F563TBDDFB#V0	PLQP0144KA-A	256 Kbytes	24 Kbytes	CAN module not included		
	R5F563TBDDFA	R5F563TBDDFA#V0	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module not included		
	R5F563TBDDFH	R5F563TBDDFH#V0	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module not included		
	R5F563TBDDFP	R5F563TBDDFP#V0	PLQP0100KB-A	256 Kbytes	24 Kbytes	CAN module not included		
	R5F563TEBDFB	R5F563TEBDFB#V0	PLQP0144KA-A	512 Kbytes	48 Kbytes	CAN module included	VCC/ PLLVCC/ VCC_USB 2.7 to 3.6V AVCC/ AVCC0 3.0 to 3.6V or 4.0 to 5.5V	
	R5F563TEBDFB	R5F563TEBDFB#V1	PLQP0144KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBDFA	R5F563TEBDFA#V0	PLQP0120KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBDFA	R5F563TEBDFA#V1	PLQP0120KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBDFH	R5F563TEBDFH#V0	PLQP0112JA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBDFH	R5F563TEBDFH#V1	PLQP0112JA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBDFP	R5F563TEBDFP#V0	PLQP0100KB-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBDFP	R5F563TEBDFP#V1	PLQP0100KB-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TCBDFB	R5F563TCBDFB#V0	PLQP0144KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFB	R5F563TCBDFB#V1	PLQP0144KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFA	R5F563TCBDFA#V0	PLQP0120KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFA	R5F563TCBDFA#V1	PLQP0120KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFH	R5F563TCBDFH#V0	PLQP0112JA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFH	R5F563TCBDFH#V1	PLQP0112JA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFP	R5F563TCBDFP#V0	PLQP0100KB-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBDFP	R5F563TCBDFP#V1	PLQP0100KB-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TBDDFB	R5F563TBDDFB#V0	PLQP0144KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBDDFB	R5F563TBDDFB#V1	PLQP0144KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBDFA	R5F563TBBDFA#V0	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBDFA	R5F563TBBDFA#V1	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBDFH	R5F563TBBDFH#V0	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBDFH	R5F563TBBDFH#V1	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module included		

1.5 Pin Assignments

Figure 1.3 to Figure 1.8 show the pin assignments. Table 1.5 to Table 1.10 show the lists of pins and pin functions.

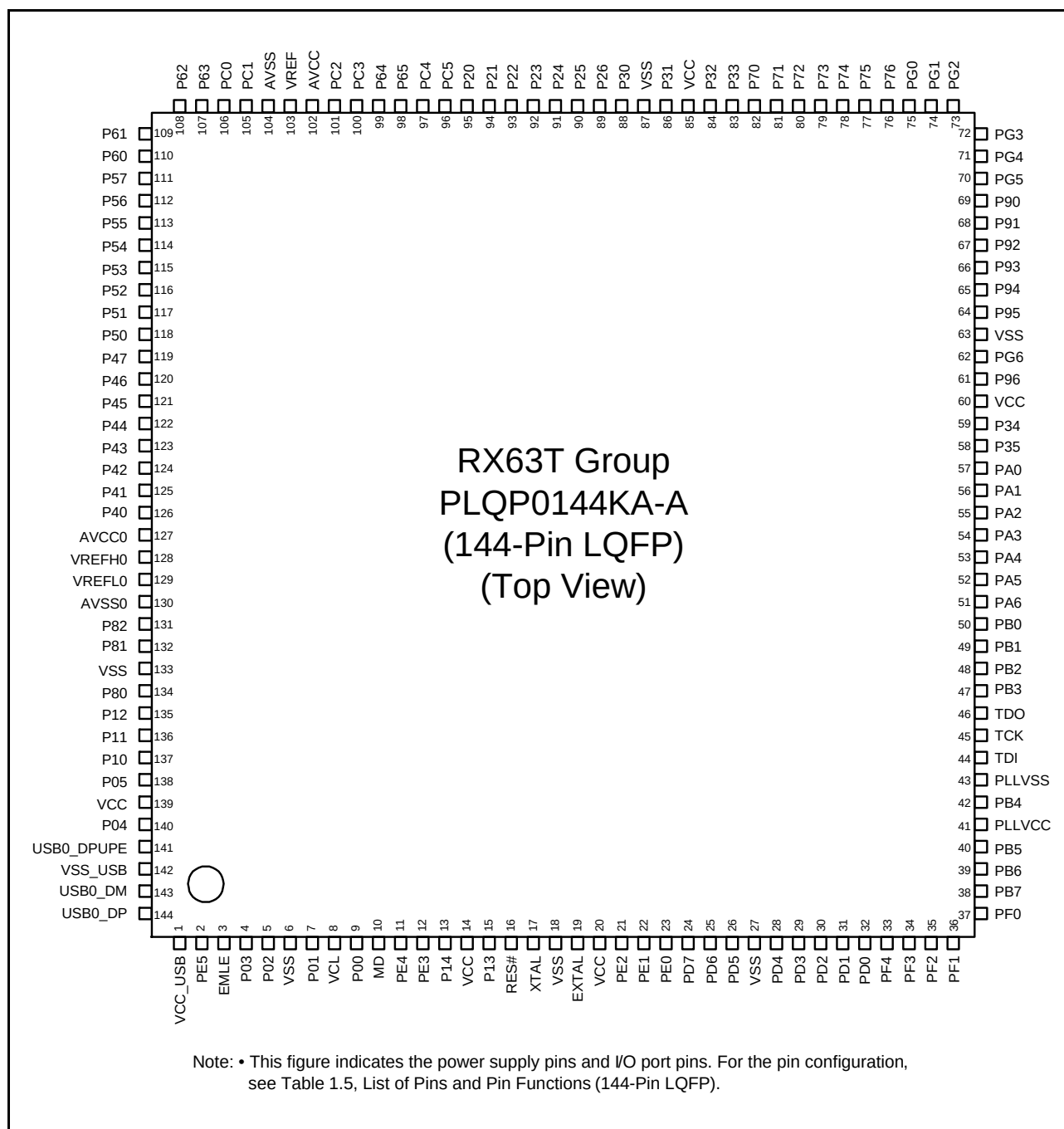


Figure 1.3 Pin Assignment (144-Pin LQFP)

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/TXD12/ SIOX12		
133	VSS						
134		P80	A9	MTIC5W	RXD12/SMISO12/ SSCL12/RXD12	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 1.9 List of Pins and Pin Functions (64-Pin LQFP) (1/3)

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)		
1	EMLE							
2		P00		GTIOC3A	CTS0# RTS0# SS0#		IRQ2-DS	
3	VCL							
4		P01		GTIOC3B CACREF			IRQ4-DS	
5	MD FINED							
6	RES#							
7	XTAL							
8	VSS							
9	EXTAL							
10	VCC							
11		PE2	POE10#				NMI	
12	TRST#	PD7		GTIOC0A	CTS0# RTS0# SS0#			
13	TMS	PD6		GTIOC0B				
14	TDI	PD5		GTIOC1A	RXD1 SMISO1 SSCL1			
15	TCK FINEC	PD4		GTIOC1B	SCK1			
16	TDO	PD3		GTIOC2A	TXD1 SMOSI1 SSDA1			
17		PB7		GTIOC2B	SCK12			
18		PB6		GTIOC2B	RXD12 SMISO12 SSCL12 RXDX12			
19		PB5	POE11#		TXD12 SMOSI12 SSDA12 TXDX12 SIOX12		IRQ0	
20	VCC							
21		PB4	POE8#	GTETRQ	CTS12# RTS12# SS12#		IRQ3-DS	
22	VSS							
23		PB3		MTIOC0A MTCLKA CACREF	SCK0			
24		PB2		MTIOC0B MTCLKB	TXD0 SMOSI0 SSDA0	SDA		
25		PB1		MTIOC0C	RXD0 SMISO0 SSCL0	SCL		
26		PB0		MTIOC0D		MOSIA		

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.

- Write to an I/O register.
- Read the value from the I/O register to a general register.
- Execute the operation using the value read.
- 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) (7/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 70C0h	ICU	Interrupt Request Register 192	IR192	8	8	2 ICLK		ICUb	Not present in versions with 112, 100, 64 or 48 pins.
0008 70C1h	ICU	Interrupt Request Register 193	IR193	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
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 70D6h	ICU	Interrupt Request Register 214	IR214	8	8	2 ICLK			
0008 70D7h	ICU	Interrupt Request Register 215	IR215	8	8	2 ICLK			
0008 70D8h	ICU	Interrupt Request Register 216	IR216	8	8	2 ICLK			
0008 70D9h	ICU	Interrupt Request Register 217	IR217	8	8	2 ICLK			
0008 70DAh	ICU	Interrupt Request Register 218	IR218	8	8	2 ICLK			
0008 70DBh	ICU	Interrupt Request Register 219	IR219	8	8	2 ICLK			
0008 70DCh	ICU	Interrupt Request Register 220	IR220	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70DDh	ICU	Interrupt Request Register 221	IR221	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70DEh	ICU	Interrupt Request Register 222	IR222	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 70DFh	ICU	Interrupt Request Register 223	IR223	8	8	2 ICLK			Not present in versions with 100, 64 or 48 pins.
0008 70E0h	ICU	Interrupt Request Register 224	IR224	8	8	2 ICLK			Not present in versions with 100, 64 or 48 pins.
0008 70E1h	ICU	Interrupt Request Register 225	IR225	8	8	2 ICLK			Not present in versions with 100, 64 or 48 pins.
0008 70E2h	ICU	Interrupt Request Register 226	IR226	8	8	2 ICLK			
0008 70E3h	ICU	Interrupt Request Register 227	IR227	8	8	2 ICLK			
0008 70E4h	ICU	Interrupt Request Register 228	IR228	8	8	2 ICLK			
0008 70E5h	ICU	Interrupt Request Register 229	IR229	8	8	2 ICLK			
0008 70E6h	ICU	Interrupt Request Register 230	IR230	8	8	2 ICLK			
0008 70E7h	ICU	Interrupt Request Register 231	IR231	8	8	2 ICLK			
0008 70E8h	ICU	Interrupt Request Register 232	IR232	8	8	2 ICLK			
0008 70E9h	ICU	Interrupt Request Register 233	IR233	8	8	2 ICLK			
0008 70EAh	ICU	Interrupt Request Register 234	IR234	8	8	2 ICLK			
0008 70EBh	ICU	Interrupt Request Register 235	IR235	8	8	2 ICLK			
0008 70ECh	ICU	Interrupt Request Register 236	IR236	8	8	2 ICLK			
0008 70EEh	ICU	Interrupt Request Register 238	IR238	8	8	2 ICLK			
0008 70EFh	ICU	Interrupt Request Register 239	IR239	8	8	2 ICLK			
0008 70F0h	ICU	Interrupt Request Register 240	IR240	8	8	2 ICLK			
0008 70F1h	ICU	Interrupt Request Register 241	IR241	8	8	2 ICLK			
0008 70F2h	ICU	Interrupt Request Register 242	IR242	8	8	2 ICLK			
0008 70F4h	ICU	Interrupt Request Register 244	IR244	8	8	2 ICLK			
0008 70F5h	ICU	Interrupt Request Register 245	IR245	8	8	2 ICLK			
0008 70F6h	ICU	Interrupt Request Register 246	IR246	8	8	2 ICLK			
0008 70F7h	ICU	Interrupt Request Register 247	IR247	8	8	2 ICLK			
0008 70F8h	ICU	Interrupt Request Register 248	IR248	8	8	2 ICLK			
0008 70FAh	ICU	Interrupt Request Register 250	IR250	8	8	2 ICLK			
0008 70FBh	ICU	Interrupt Request Register 251	IR251	8	8	2 ICLK			
0008 70FCh	ICU	Interrupt Request Register 252	IR252	8	8	2 ICLK			

Table 4.1 List of I/O Registers (Address Order) (9/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 717Fh	ICU	DTC Activation Enable Register 127	DTCER127	8	8	2 ICLK		ICUB	
0008 7180h	ICU	DTC Activation Enable Register 128	DTCER128	8	8	2 ICLK			
0008 7181h	ICU	DTC Activation Enable Register 129	DTCER129	8	8	2 ICLK			
0008 7185h	ICU	DTC Activation Enable Register 133	DTCER133	8	8	2 ICLK			
0008 7186h	ICU	DTC Activation Enable Register 134	DTCER134	8	8	2 ICLK			
0008 7189h	ICU	DTC Activation Enable Register 137	DTCER137	8	8	2 ICLK			
0008 718Ah	ICU	DTC Activation Enable Register 138	DTCER138	8	8	2 ICLK			
0008 718Dh	ICU	DTC Activation Enable Register 141	DTCER141	8	8	2 ICLK			
0008 718Eh	ICU	DTC Activation Enable Register 142	DTCER142	8	8	2 ICLK			
0008 718Fh	ICU	DTC Activation Enable Register 143	DTCER143	8	8	2 ICLK			
0008 7190h	ICU	DTC Activation Enable Register 144	DTCER144	8	8	2 ICLK			
0008 7192h	ICU	DTC Activation Enable Register 146	DTCER146	8	8	2 ICLK			
0008 7193h	ICU	DTC Activation Enable Register 147	DTCER147	8	8	2 ICLK			
0008 7194h	ICU	DTC Activation Enable Register 148	DTCER148	8	8	2 ICLK			
0008 7195h	ICU	DTC Activation Enable Register 149	DTCER149	8	8	2 ICLK			
0008 7196h	ICU	DTC Activation Enable Register 150	DTCER150	8	8	2 ICLK			
0008 7197h	ICU	DTC Activation Enable Register 151	DTCER151	8	8	2 ICLK			
0008 7198h	ICU	DTC Activation Enable Register 152	DTCER152	8	8	2 ICLK			
0008 7199h	ICU	DTC Activation Enable Register 153	DTCER153	8	8	2 ICLK			
0008 719Ah	ICU	DTC Activation Enable Register 154	DTCER154	8	8	2 ICLK			
0008 719Bh	ICU	DTC Activation Enable Register 155	DTCER155	8	8	2 ICLK			
0008 719Ch	ICU	DTC Activation Enable Register 156	DTCER156	8	8	2 ICLK			
0008 719Dh	ICU	DTC Activation Enable Register 157	DTCER157	8	8	2 ICLK			
0008 71A1h	ICU	DTC Activation Enable Register 161	DTCER161	8	8	2 ICLK			
0008 71A2h	ICU	DTC Activation Enable Register 162	DTCER162	8	8	2 ICLK			
0008 71A3h	ICU	DTC Activation Enable Register 163	DTCER163	8	8	2 ICLK			
0008 71A4h	ICU	DTC Activation Enable Register 164	DTCER164	8	8	2 ICLK			
0008 71A5h	ICU	DTC Activation Enable Register 165	DTCER165	8	8	2 ICLK			
0008 71ABh	ICU	DTC Activation Enable Register 171	DTCER171	8	8	2 ICLK			
0008 71ACh	ICU	DTC Activation Enable Register 172	DTCER172	8	8	2 ICLK			
0008 71ADh	ICU	DTC Activation Enable Register 173	DTCER173	8	8	2 ICLK			
0008 71AEh	ICU	DTC Activation Enable Register 174	DTCER174	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71AFh	ICU	DTC Activation Enable Register 175	DTCER175	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B0h	ICU	DTC Activation Enable Register 176	DTCER176	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B1h	ICU	DTC Activation Enable Register 177	DTCER177	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B2h	ICU	DTC Activation Enable Register 178	DTCER178	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B3h	ICU	DTC Activation Enable Register 179	DTCER179	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B4h	ICU	DTC Activation Enable Register 180	DTCER180	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B5h	ICU	DTC Activation Enable Register 181	DTCER181	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B6h	ICU	DTC Activation Enable Register 182	DTCER182	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B7h	ICU	DTC Activation Enable Register 183	DTCER183	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B8h	ICU	DTC Activation Enable Register 184	DTCER184	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71B9h	ICU	DTC Activation Enable Register 185	DTCER185	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 71BAh	ICU	DTC Activation Enable Register 186	DTCER186	8	8	2 ICLK			Not present in versions with 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (13/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK $\geq$ PCLK	ICLK $<$ PCLK		
0008 739Ah	ICU	Interrupt Source Priority Register 154	IPR154	8	8	2 ICLK		ICUB	
0008 739Eh	ICU	Interrupt Source Priority Register 158	IPR158	8	8	2 ICLK			
0008 73A1h	ICU	Interrupt Source Priority Register 161	IPR161	8	8	2 ICLK			
0008 73A3h	ICU	Interrupt Source Priority Register 163	IPR163	8	8	2 ICLK			
0008 73A5h	ICU	Interrupt Source Priority Register 165	IPR165	8	8	2 ICLK			
0008 73A6h	ICU	Interrupt Source Priority Register 166	IPR166	8	8	2 ICLK			
0008 73ABh	ICU	Interrupt Source Priority Register 171	IPR171	8	8	2 ICLK			
0008 73ACH	ICU	Interrupt Source Priority Register 172	IPR172	8	8	2 ICLK			
0008 73ADh	ICU	Interrupt Source Priority Register 173	IPR173	8	8	2 ICLK			
0008 73AEh	ICU	Interrupt Source Priority Register 174	IPR174	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B1h	ICU	Interrupt Source Priority Register 177	IPR177	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B4h	ICU	Interrupt Source Priority Register 180	IPR180	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B7h	ICU	Interrupt Source Priority Register 183	IPR183	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B9h	ICU	Interrupt Source Priority Register 185	IPR185	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73BCh	ICU	Interrupt Source Priority Register 188	IPR188	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73BEh	ICU	Interrupt Source Priority Register 190	IPR190	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 73C2h	ICU	Interrupt Source Priority Register 194	IPR194	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 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			Not present in versions with 64 or 48 pins.
0008 73DFh	ICU	Interrupt Source Priority Register 223	IPR223	8	8	2 ICLK			Not present in versions with 100, 64 or 48 pins.
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 7400h	ICU	DMAC Activation Request Select Register 0	DMRSR0	8	8	2 ICLK			
0008 7404h	ICU	DMAC Activation Request Select Register 1	DMRSR1	8	8	2 ICLK			
0008 7408h	ICU	DMAC Activation Request Select Register 2	DMRSR2	8	8	2 ICLK			
0008 740Ch	ICU	DMAC Activation Request Select Register 3	DMRSR3	8	8	2 ICLK			
0008 7500h	ICU	IRQ Control Register 0	IRQCR0	8	8	2 ICLK			
0008 7501h	ICU	IRQ Control Register 1	IRQCR1	8	8	2 ICLK			
0008 7502h	ICU	IRQ Control Register 2	IRQCR2	8	8	2 ICLK			
0008 7503h	ICU	IRQ Control Register 3	IRQCR3	8	8	2 ICLK			
0008 7504h	ICU	IRQ Control Register 4	IRQCR4	8	8	2 ICLK			
0008 7505h	ICU	IRQ Control Register 5	IRQCR5	8	8	2 ICLK			
0008 7506h	ICU	IRQ Control Register 6	IRQCR6	8	8	2 ICLK			Not present in versions with 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (16/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 8330h	RIIC1	I ² C Bus Bit Rate Low-Level Register	ICBRL	8	8	2, 3 PCLKB	2 ICLK	RIIC	Not present in versions with 112, 100, 64, or 48 pins.
0008 8331h	RIIC1	I ² C Bus Bit Rate High-Level Register	ICBRH	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 8332h	RIIC1	I ² C Bus Transmit Data Register	ICDRT	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 8333h	RIIC1	I ² C Bus Receive Data Register	ICDRR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 8380h	RSPI0	RSPI Control Register	SPCR	8	8	2, 3 PCLKB	2 ICLK	RSPI	
0008 8381h	RSPI0	RSPI Slave Select Polarity Register	SSLP	8	8	2, 3 PCLKB	2 ICLK		
0008 8382h	RSPI0	RSPI Pin Control Register	SPPCR	8	8	2, 3 PCLKB	2 ICLK		
0008 8383h	RSPI0	RSPI Status Register	SPSR	8	8	2, 3 PCLKB	2 ICLK		
0008 8384h	RSPI0	RSPI Data Register	SPDR	32	16, 32	2, 3 PCLKB	2 ICLK		
0008 8388h	RSPI0	RSPI Sequence Control Register	SPSCR	8	8	2, 3 PCLKB	2 ICLK		
0008 8389h	RSPI0	RSPI Sequence Status Register	SPSSR	8	8	2, 3 PCLKB	2 ICLK		
0008 838Ah	RSPI0	RSPI Bit Rate Register	SPBR	8	8	2, 3 PCLKB	2 ICLK		
0008 838Bh	RSPI0	RSPI Data Control Register	SPDCR	8	8	2, 3 PCLKB	2 ICLK		
0008 838Ch	RSPI0	RSPI Clock Delay Register	SPCKD	8	8	2, 3 PCLKB	2 ICLK		
0008 838Dh	RSPI0	RSPI Slave Select Negation Delay Register	SSLND	8	8	2, 3 PCLKB	2 ICLK		
0008 838Eh	RSPI0	RSPI Next-Access Delay Register	SPND	8	8	2, 3 PCLKB	2 ICLK		
0008 838Fh	RSPI0	RSPI Control Register 2	SPCR2	8	8	2, 3 PCLKB	2 ICLK		
0008 8390h	RSPI0	RSPI Command Register 0	SPCMD0	16	16	2, 3 PCLKB	2 ICLK		
0008 8392h	RSPI0	RSPI Command Register 1	SPCMD1	16	16	2, 3 PCLKB	2 ICLK		
0008 8394h	RSPI0	RSPI Command Register 2	SPCMD2	16	16	2, 3 PCLKB	2 ICLK		
0008 8396h	RSPI0	RSPI Command Register 3	SPCMD3	16	16	2, 3 PCLKB	2 ICLK		
0008 8398h	RSPI0	RSPI Command Register 4	SPCMD4	16	16	2, 3 PCLKB	2 ICLK		
0008 839Ah	RSPI0	RSPI Command Register 5	SPCMD5	16	16	2, 3 PCLKB	2 ICLK		
0008 839Ch	RSPI0	RSPI Command Register 6	SPCMD6	16	16	2, 3 PCLKB	2 ICLK		
0008 839Eh	RSPI0	RSPI Command Register 7	SPCMD7	16	16	2, 3 PCLKB	2 ICLK		
0008 83A0h	RSPI1	RSPI Control Register	SPCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83A1h	RSPI1	RSPI Slave Select Polarity Register	SSLP	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83A2h	RSPI1	RSPI Pin Control Register	SPPCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83A3h	RSPI1	RSPI Status Register	SPSR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83A4h	RSPI1	RSPI Data Register	SPDR	32	16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83A8h	RSPI1	RSPI Sequence Control Register	SPSCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83A9h	RSPI1	RSPI Sequence Status Register	SPSSR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83AAh	RSPI1	RSPI Bit Rate Register	SPBR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83ABh	RSPI1	RSPI Data Control Register	SPDCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83ACh	RSPI1	RSPI Clock Delay Register	SPCKD	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83ADh	RSPI1	RSPI Slave Select Negation Delay Register	SSLND	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83AEh	RSPI1	RSPI Next-Access Delay Register	SPND	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83AFh	RSPI1	RSPI Control Register 2	SPCR2	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 83B0h	RSPI1	RSPI Command Register 0	SPCMD0	16	16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (27/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 C1A3h	MPC	PC3 Pin Function Control Register	PC3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC	Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C1A4h	MPC	PC4 Pin Function Control Register	PC4PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C1A5h	MPC	PC5 Pin Function Control Register	PC5PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C1A8h	MPC	PD0 Pin Function Control Register	PD0PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1A9h	MPC	PD1 Pin Function Control Register	PD1PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1AAh	MPC	PD2 Pin Function Control Register	PD2PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1ABh	MPC	PD3 Pin Function Control Register	PD3PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C1ACh	MPC	PD4 Pin Function Control Register	PD4PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C1ADh	MPC	PD5 Pin Function Control Register	PD5PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C1AEh	MPC	PD6 Pin Function Control Register	PD6PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C1AFh	MPC	PD7 Pin Function Control Register	PD7PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C1B0h	MPC	PE0 Pin Function Control Register	PE0PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1B1h	MPC	PE1 Pin Function Control Register	PE1PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1B2h	MPC	PE2 Pin Function Control Register	PE2PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C1B3h	MPC	PE3 Pin Function Control Register	PE3PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1B4h	MPC	PE4 Pin Function Control Register	PE4PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1B5h	MPC	PE5 Pin Function Control Register	PE5PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C1BAh	MPC	PF2 Pin Function Control Register	PF2PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1B8h	MPC	PF3 Pin Function Control Register	PF3PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C0h	MPC	PG0 Pin Function Control Register	PG0PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C1h	MPC	PG1 Pin Function Control Register	PG1PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C2h	MPC	PG2 Pin Function Control Register	PG2PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C3h	MPC	PG3 Pin Function Control Register	PG3PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C4h	MPC	PG4 Pin Function Control Register	PG4PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C5h	MPC	PG5 Pin Function Control Register	PG5PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C1C6h	MPC	PG6 Pin Function Control Register	PG6PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 C1D0h	MPC	USB0_DPUPE Pin Function Control Register	UDPUPEPFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 C280h	SYSTEM	Deep Standby Control Register	DPSBYCR	8	8	4, 5 PCLKB	2, 3 ICLK	Low Power Consumption	
0008 C282h	SYSTEM	Deep Standby Interrupt Enable Register 0	DPSIER0	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C284h	SYSTEM	Deep Standby Interrupt Enable Register 2	DPSIER2	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C286h	SYSTEM	Deep Standby Interrupt Flag Register 0	DPSIFR0	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C288h	SYSTEM	Deep Standby Interrupt Flag Register 2	DPSIFR2	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C28Ah	SYSTEM	Deep Standby Interrupt Edge Register 0	DPSIEGR0	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C28Ch	SYSTEM	Deep Standby Interrupt Edge Register 2	DPSIEGR2	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C290h	SYSTEM	Reset Status Register 0	RSTSR0	8	8	4, 5 PCLKB	2, 3 ICLK	Resets	
0008 C291h	SYSTEM	Reset Status Register 1	RSTSR1	8	8	4, 5 PCLKB	2, 3 ICLK		

Table 4.1 List of I/O Registers (Address Order) (35/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000C 1308h	MTU0	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK	MTU3	
000C 130Ah	MTU0	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 130Ch	MTU0	Timer General Register C	TGRC	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 130Eh	MTU0	Timer General Register D	TGRD	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1320h	MTU0	Timer General Register E	TGRE	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1322h	MTU0	Timer General Register F	TGRF	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1324h	MTU0	Timer Interrupt Enable Register 2	TIER2	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1325h	MTU0	Timer Status Register 2	TSR2	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1326h	MTU0	Timer Buffer Operation Transfer Mode Register	TBTM	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1380h	MTU1	Timer Control Register	TCR	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1381h	MTU1	Timer Mode Register 1	TMDR1	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1382h	MTU1	Timer I/O Control Register	TIOR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1384h	MTU1	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1385h	MTU1	Timer Status Register	TSR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1386h	MTU1	Timer Counter	TCNT	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1388h	MTU1	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 138Ah	MTU1	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1390h	MTU1	Timer Input Capture Control Register	TICCR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1400h	MTU2	Timer Control Register	TCR	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1401h	MTU2	Timer Mode Register 1	TMDR1	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1402h	MTU2	Timer I/O Control Register	TIOR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1404h	MTU2	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1405h	MTU2	Timer Status Register	TSR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1406h	MTU2	Timer Counter	TCNT	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1408h	MTU2	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 140Ah	MTU2	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1A00h	MTU6	Timer Control Register	TCR	8	8, 16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A01h	MTU7	Timer Control Register	TCR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A02h	MTU6	Timer Mode Register 1	TMDR1	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1A03h	MTU7	Timer Mode Register 1	TMDR1	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A04h	MTU6	Timer I/O Control Register H	TIORH	8	8, 16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A05h	MTU6	Timer I/O Control Register L	TIORL	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A06h	MTU7	Timer I/O Control Register H	TIORH	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1A07h	MTU7	Timer I/O Control Register L	TIORL	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A08h	MTU6	Timer Interrupt Enable Register	TIER	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1A09h	MTU7	Timer Interrupt Enable Register	TIER	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A0Ah	MTU	Timer Output Master Enable Register B	TOERB	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A0Eh	MTU	Timer Output Control Register 1B	TOCR1B	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1A0Fh	MTU	Timer Output Control Register 2B	TOCR2B	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1A10h	MTU6	Timer Counter	TCNT	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A12h	MTU7	Timer Counter	TCNT	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1A14h	MTU	Timer Cycle Data Register B	TCDRB	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A16h	MTU	Timer Dead Time Data Register B	TDDRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1A18h	MTU6	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A1Ah	MTU6	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1A1Ch	MTU7	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A1Eh	MTU7	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1A20h	MTU	Timer Subcounter B	TCNTSB	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A22h	MTU	Timer Cycle Buffer Register B	TCBRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1A24h	MTU6	Timer General Register C	TGRC	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1A26h	MTU6	Timer General Register D	TGRD	16	16	4, 5 PCLKA	2, 3 ICLK		

Table 4.1 List of I/O Registers (Address Order) (38/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000C 211Ah	GPT0	General PWM Timer Compare Capture Register F	GTCCRF	16	16, 32	2 to 5 PCLKA	2, 3 ICLK	GPT	
000C 211Ch	GPT0	General PWM Timer Cycle Setting Register	GTPR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 211Eh	GPT0	General PWM Timer Cycle Setting Buffer Register	GTPBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2120h	GPT0	General PWM Timer Cycle Setting Double-Buffer Register	GTPDBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2124h	GPT0	A/D Converter Start Request Timing Register A	GTADTRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2126h	GPT0	A/D Converter Start Request Timing Buffer Register A	GTADTBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2128h	GPT0	A/D Converter Start Request Timing Double-Buffer Register A	GTADTDBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 212Ch	GPT0	A/D Converter Start Request Timing Register B	GTADTRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 212Eh	GPT0	A/D Converter Start Request Timing Buffer Register B	GTADTBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2130h	GPT0	A/D Converter Start Request Timing Double-Buffer Register B	GTADTDBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2134h	GPT0	General PWM Timer Output Negate Control Register	GTONCR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2136h	GPT0	General PWM Timer Dead Time Control Register	GTDTCR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2138h	GPT0	General PWM Timer Dead Time Value Register U	GTDVU	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 213Ah	GPT0	General PWM Timer Dead Time Value Register D	GTDVD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 213Ch	GPT0	General PWM Timer Dead Time Buffer Register U	GTDBU	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 213Eh	GPT0	General PWM Timer Dead Time Buffer Register D	GTDBD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2140h	GPT0	General PWM Timer Output Protection Function Status Register	GTSOS	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2142h	GPT0	General PWM Timer Output Protection Function Temporary Release Register	GTSOTR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2180h	GPT1	General PWM Timer I/O Control Register	GTIOR	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2182h	GPT1	General PWM Timer Interrupt Output Setting Register	GTINTAD	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2184h	GPT1	General PWM Timer Control Register	GTCR	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2186h	GPT1	General PWM Timer Buffer Enable Register	GTBER	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2188h	GPT1	General PWM Timer Count Direction Register	GTUDC	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 218Ah	GPT1	General PWM Timer Interrupt, A/D Converter Start Request Skipping Setting Register	GTITC	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 218Ch	GPT1	General PWM Timer Status Register	GTST	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 218Eh	GPT1	General PWM Timer Counter	GTCNT	16	16	2 to 5 PCLKA	2, 3 ICLK		
000C 2190h	GPT1	General PWM Timer Compare Capture Register A	GTCCRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2192h	GPT1	General PWM Timer Compare Capture Register B	GTCCRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2194h	GPT1	General PWM Timer Compare Capture Register C	GTCCRC	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2196h	GPT1	General PWM Timer Compare Capture Register D	GTCCRD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2198h	GPT1	General PWM Timer Compare Capture Register E	GTCCRE	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 219Ah	GPT1	General PWM Timer Compare Capture Register F	GTCCRF	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 219Ch	GPT1	General PWM Timer Cycle Setting Register	GTPR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 219Eh	GPT1	General PWM Timer Cycle Setting Buffer Register	GTPBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21A0h	GPT1	General PWM Timer Cycle Setting Double-Buffer Register	GTPDBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21A4h	GPT1	A/D Converter Start Request Timing Register A	GTADTRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		

Table 4.1 List of I/O Registers (Address Order) (39/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000C 21A6h	GPT1	A/D Converter Start Request Timing Buffer Register A	GTADTBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK	GPT	
000C 21A8h	GPT1	A/D Converter Start Request Timing Double-Buffer Register A	GTADTDBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21ACh	GPT1	A/D Converter Start Request Timing Register B	GTADTRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21AEh	GPT1	A/D Converter Start Request Timing Buffer Register B	GTADTBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21B0h	GPT1	A/D Converter Start Request Timing Double-Buffer Register B	GTADTDBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21B4h	GPT1	General PWM Timer Output Negate Control Register	GTONCR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21B6h	GPT1	General PWM Timer Dead Time Control Register	GTDTCR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21B8h	GPT1	General PWM Timer Dead Time Value Register U	GTDVU	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21BAh	GPT1	General PWM Timer Dead Time Value Register D	GTDVD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21BCh	GPT1	General PWM Timer Dead Time Buffer Register U	GTDBU	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21BEh	GPT1	General PWM Timer Dead Time Buffer Register D	GTDBD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21C0h	GPT1	General PWM Timer Output Protection Function Status Register	GTSOS	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 21C2h	GPT1	General PWM Timer Output Protection Function Temporary Release Register	GTSOTR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2200h	GPT2	General PWM Timer I/O Control Register	GTIOR	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2202h	GPT2	General PWM Timer Interrupt Output Setting Register	GTINTAD	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2204h	GPT2	General PWM Timer Control Register	GTCR	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2206h	GPT2	General PWM Timer Buffer Enable Register	GTBER	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2208h	GPT2	General PWM Timer Count Direction Register	GTUDC	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 220Ah	GPT2	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		
000C 220Ch	GPT2	General PWM Timer Status Register	GTST	16	8, 16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 220Eh	GPT2	General PWM Timer Counter	GTCNT	16	16	2 to 5 PCLKA	2, 3 ICLK		
000C 2210h	GPT2	General PWM Timer Compare Capture Register A	GTCCRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2212h	GPT2	General PWM Timer Compare Capture Register B	GTCCRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2214h	GPT2	General PWM Timer Compare Capture Register C	GTCCRC	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2216h	GPT2	General PWM Timer Compare Capture Register D	GTCCRD	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2218h	GPT2	General PWM Timer Compare Capture Register E	GTCCRE	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 221Ah	GPT2	General PWM Timer Compare Capture Register F	GTCCRF	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 221Ch	GPT2	General PWM Timer Cycle Setting Register	GTPR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 221Eh	GPT2	General PWM Timer Cycle Setting Buffer Register	GTPBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2220h	GPT2	General PWM Timer Cycle Setting Double-Buffer Register	GTPDBR	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2224h	GPT2	A/D Converter Start Request Timing Register A	GTADTRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2226h	GPT2	A/D Converter Start Request Timing Buffer Register A	GTADTBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 2228h	GPT2	A/D Converter Start Request Timing Double-Buffer Register A	GTADTDBRA	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 222Ch	GPT2	A/D Converter Start Request Timing Register B	GTADTRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		
000C 222Eh	GPT2	A/D Converter Start Request Timing Buffer Register B	GTADTBRB	16	16, 32	2 to 5 PCLKA	2, 3 ICLK		

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

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK $\geq$ PCLK	ICLK $<$ PCLK		
007F FFB0h	FLASH	Flash Status Register 0	FSTATR0	8	8	2, 3 FCLK	2, 3 ICLK	ROM	
007F FFB1h	FLASH	Flash Status Register 1	FSTATR1	8	8	2, 3 FCLK	2, 3 ICLK		
007F FFB2h	FLASH	Flash P/E Mode Entry Register	FENTRYR	16	16	2, 3 FCLK	2, 3 ICLK	ROM/ E2 DataFlash Memory	
007F FFB4h	FLASH	Flash Protection Register	FPROTR	16	16	2, 3 FCLK	2, 3 ICLK	ROM	
007F FFB6h	FLASH	Flash Reset Register	FRESETR	16	16	2, 3 FCLK	2, 3 ICLK		
007F FFBAh	FLASH	FCU Command Register	FCMDR	16	16	2, 3 FCLK	2, 3 ICLK		
007F FFC8h	FLASH	FCU Processing Switching Register	FCPSR	16	16	2, 3 FCLK	2, 3 ICLK		
007F FFCAh	FLASH	E2 DataFlash Blank Check Control Register	DFLBCCNT	16	16	2, 3 FCLK	2, 3 ICLK	E2 DataFlash Memory	
007F FFCh	FLASH	Flash P/E Status Register	FPESTAT	16	16	2, 3 FCLK	2, 3 ICLK	ROM	
007F FFCEh	FLASH	E2 DataFlash Blank Check Status Register	DFLBCSTAT	16	16	2, 3 FCLK	2, 3 ICLK	E2 DataFlash Memory	
007F FFE8h	FLASH	Peripheral Clock Notification Register	PCKAR	16	16	2, 3 FCLK	2, 3 ICLK	ROM	

Note: • This table shows the maximum specifications of I/O registers. The I/O registers of individual products correspond to the list of functions given as Table 1.2. For details, refer to Table 1.2, Comparison of Functions for Different Packages.

Note 1. When the register is accessed while the USB is operating, a delay may be generated in accessing.

Note 2. Odd addresses are not accessible in 16-bit units. Obtain 16-bit access to the two registers by access to the address of TMOCNL.

Note 3. Pins USB0 and RIIC1 are not present in 112-pin products.

Note 4. Pins USB0, RIIC1, and SCI3 are not present in 100-pin products.

Note 5. Pins GPT4 to GPT7, USB0, RSP1, RIIC1, SCI2, SCI3, CAN1, AD, and S12AD1 are not present in 64- and 48-pin products.

Table 5.21 12-Bit A/D Conversion Characteristics (1)

Condition 1: $V_{CC} = PLLVCC = VCC_USB = 2.7$ to 3.6 V, $VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0$ V
 $AVCC0 = AVCC = VREF = 3.0$ to 3.6 V, $VREFH0 = 3.0$ V to $AVCC0$

$T_a = T_{opr}$

Item		Min.	Typ.	Max.	Unit	Test Conditions
Resolution		12	12	12	Bit	
Conversion time*1 (ADCLK = 25 MHz)	Without 0.1- μ F external capacitor Permissible signal source impedance (max.) = 1.0 k Ω	2.0	—	—	μ s	Sampling in 20 states
Analog input capacitance		—	—	8	pF	
Sample and hold circuit in use	Integral nonlinearity error	—	—	± 4.0	LSB	$AV_{in} = 0.25$ to $AV_{REFH} - 0.25$
	Offset error	—	—	± 4.0	LSB	
	Full-scale error	—	—	± 4.0	LSB	
	Quantization error	—	± 0.5	—	LSB	
	Absolute accuracy	—	—	± 8.0	LSB	
Sample and hold circuit not in use	Integral nonlinearity error	—	—	± 3.0	LSB	$AV_{in} = AV_{REFL}$ to AV_{REFH}
	Offset error	—	—	± 3.0	LSB	
	Full-scale error	—	—	± 3.0	LSB	
	Quantization error	—	± 0.5	—	LSB	
	Absolute accuracy	—	—	± 6.0	LSB	

Note 1. The conversion time includes the sampling time and the comparison time. As the test conditions, the number of sampling states is indicated.

Table 5.22 12-Bit A/D Conversion Characteristics (2)

Note: Common standard values for conditions not given in the table are listed as "Condition 1" and "Condition 2" below.

Condition 1: $V_{CC} = PLLVCC = VCC_USB = 2.7$ to 3.6 V, $VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0$ V
 $AVCC0 = AVCC = VREF = 4.0$ to 5.5 V, $VREFH0 = 4.0$ V to $AVCC0$

Condition 2: $V_{CC} = PLLVCC = 4.0$ to 5.5 V, $VCC_USB = 3.0$ to 3.6 V, $VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0$ V
 $AVCC0 = AVCC = VREF = 4.0$ to 5.5 V, $VREFH0 = 4.0$ V to $AVCC0$

$T_a = T_{opr}$. T_a is common to conditions 2 and 3.

Item		Min.	Typ.	Max.	Unit	Test Conditions
Resolution		12	12	12	Bit	
Conversion time*1 (ADCLK = 50 MHz)	Without 0.1- μ F external capacitor Permissible signal source impedance (max.) = 1.0 k Ω	1.0	—	—	μ s	Sampling in 20 states
Analog input capacitance		—	—	6	pF	
Sample and hold circuit in use	Integral nonlinearity error	—	—	± 6.0	LSB	$AV_{in} = 0.25$ to $AV_{REFH} - 0.25$
	Offset error	—	—	± 6.0	LSB	
	Full-scale error	—	—	± 6.0	LSB	
	Quantization error	—	± 0.5	—	LSB	
	Absolute accuracy	—	—	± 8.0	LSB	
Sample and hold circuit not in use	Integral nonlinearity error	—	—	± 3.0	LSB	$AV_{in} = AV_{REFL}$ to AV_{REFH}
	Offset error	—	—	± 3.0	LSB	
	Full-scale error	—	—	± 3.0	LSB	
	Quantization error	—	± 0.5	—	LSB	
	Absolute accuracy	—	—	± 6.0	LSB	

Note 1. The conversion time includes the sampling time and the comparison time. As the test conditions, the number of sampling states is indicated.

5.10 E² Flash Characteristics

Table 5.31 E² Flash Characteristics (1)

Condition 1: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0

Condition 2: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VCC_USB = 3.0 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

Temperature range for the programming/erasure operation: T_a = T_{opr}. T_a is common to conditions 1 to 3.

Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Reprogram/erase cycle*1	N _{DPEC}	100000	—	—	Times	
Data hold time	t _{DDRP}	30*2	—	—	Year	T _a = +85°C

Note 1. Definition of reprogram/erase cycle:

The reprogram/erase cycle is the number of erasing for each block. When the reprogram/erase cycle is n times (n = 100000), erasing can be performed n times for each block. For instance, when 128-byte programming is performed 16 times for different addresses in 2-Kbyte block and then the entire block is erased, the reprogram/erase cycle is counted as one. However, programming the same address for several times as one erasing is not enabled (overwriting is prohibited).

Note 2. The value is obtained from the reliability test.

Table 5.32 E² Flash Characteristics (2)

Note: Common standard values for conditions not given in the table are listed as "Condition 1" to "Condition 3" below.

Condition 1: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0

Condition 2: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VCC_USB = 3.0 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

Temperature range for the programming/erasure operation: T_a = T_{opr}. T_a is common to conditions 1 to 3.

Item		Symbol	FCLK = 4 MHz			20 MHz ≤ FCLK ≤ 50 MHz			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Programming time N _{DPEC} ≤ 100 times	2 bytes	t _{DP2}	—	0.7	6	—	0.25	2	ms
Programming time N _{DPEC} > 100 times	2 bytes	t _{DP2}	—	0.7	6	—	0.25	2	ms
Erasure time N _{DPEC} ≤ 100 times	32 bytes	t _{DE32}	—	4	40	—	2	20	ms
Erasure time N _{DPEC} > 100 times	32 bytes	t _{DE32}	—	7	40	—	4	20	ms
Blank check time	2 bytes	t _{DBC2}	—	—	100	—	—	30	μs
Suspend delay time during programming		t _{DSPD}	—	—	250	—	—	120	μs
First suspend delay time during erasing (in suspend priority mode)		t _{DSESD1}	—	—	250	—	—	120	μs
Second suspend delay time during erasing (in suspend priority mode)		t _{DSESD2}	—	—	500	—	—	300	μs
Suspend delay time during erasing (in erasure priority mode)		t _{DSEED}	—	—	500	—	—	300	μs

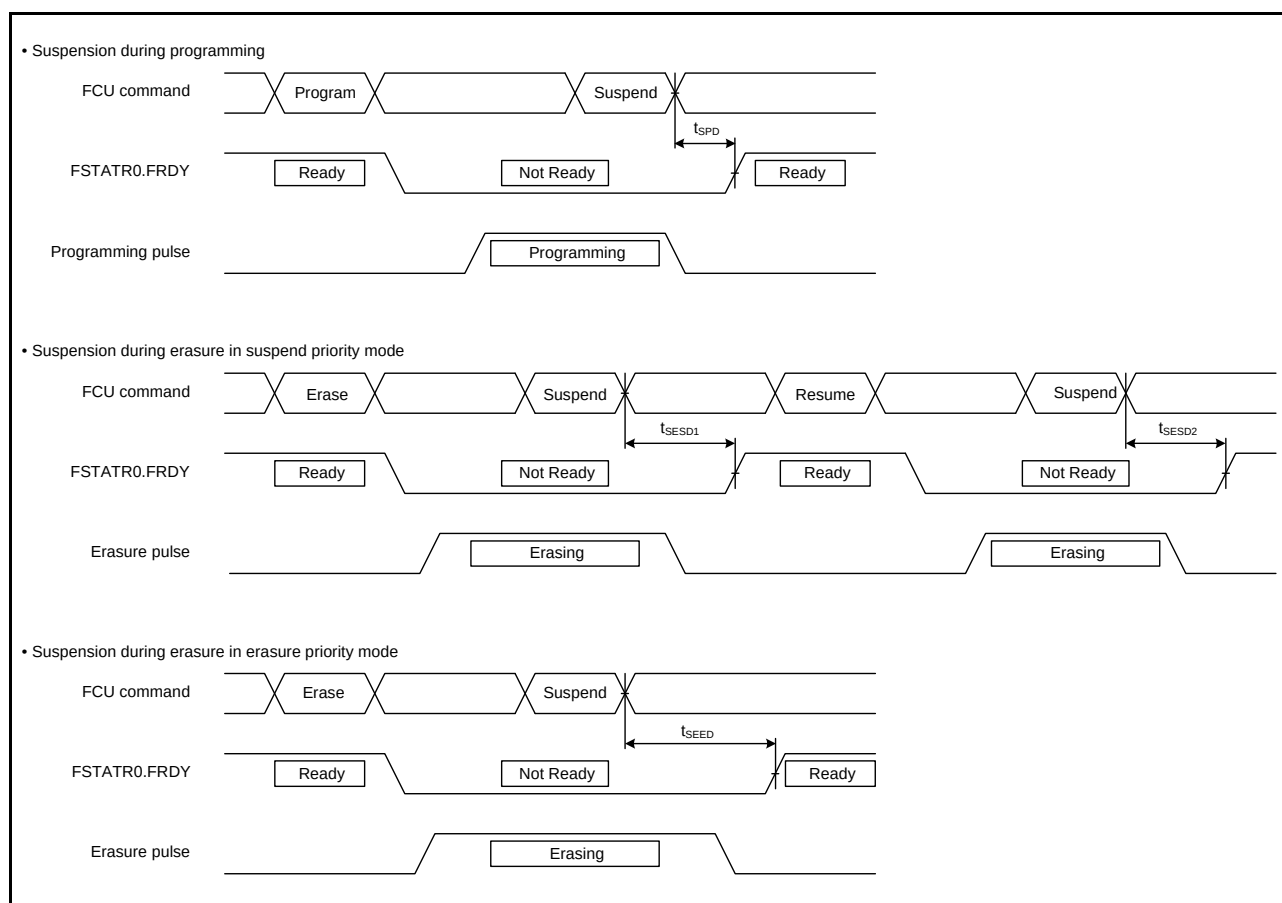


Figure 5.44 Flash Memory Program/Erase Suspend Timing

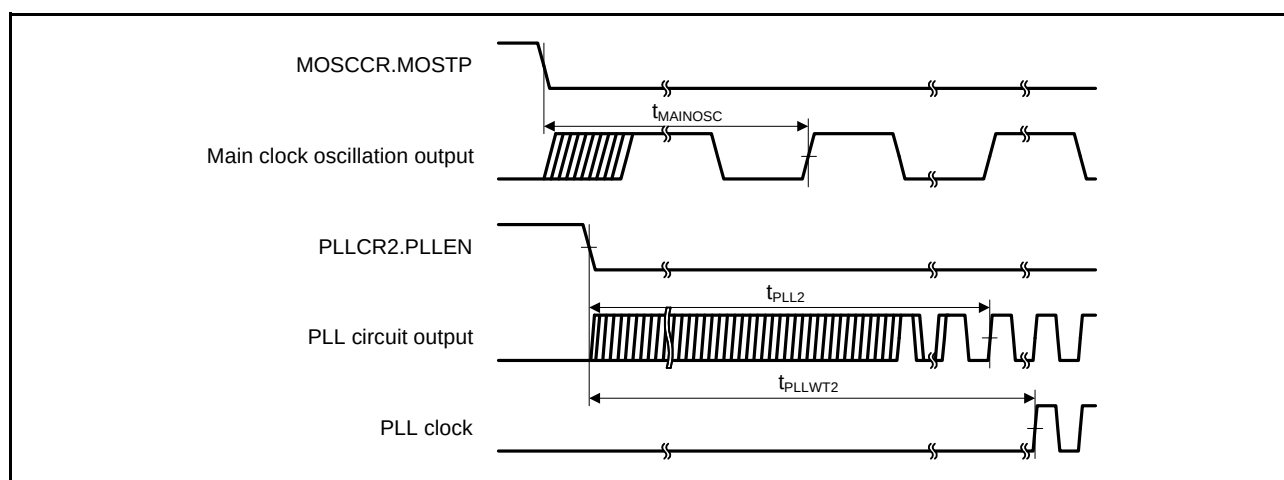


Figure 6.5 PLL Clock Oscillation Start Timing (PLL is Operated before Main Clock Oscillation Has Settled)

Table 6.14 Timing of On-Chip Peripheral Modules (4)

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		Sym- bol	Min.	Max.	Unit	Test Conditions
RIIC (Standard-mode)	SCL input cycle time	t _{SCL}	6(12) × t _{IIcCyc} + 1300	—	ns	Figure 6.25
	SCL input high pulse width	t _{SCLH}	3(6) × t _{IIcCyc} + 300	—	ns	
	SCL input low pulse width	t _{SCLL}	3(6) × t _{IIcCyc} + 300	—	ns	
	SCL, SDA input rise time	t _{Sr}	—	1000	ns	
	SCL, SDA input fall time	t _{Sf}	—	300	ns	
	SCL, SDA input spike pulse removal time	t _{SP}	0	1(4) × t _{IIcCyc}	ns	
	SDA input bus free time	t _{BUF}	3(6) × t _{IIcCyc} + 300	—	ns	
	Start condition input hold time	t _{STAH}	t _{IIcCyc} + 300	—	ns	
	Restart condition input setup time	t _{STAS}	1000	—	ns	
	Stop condition input setup time	t _{STOS}	1000	—	ns	
	Data input setup time	t _{SDAS}	t _{IIcCyc} + 50	—	ns	
	Data input hold time	t _{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C _b	—	400	pF	
RIIC (Fast-mode)	SCL input cycle time	t _{SCL}	6(12) × t _{IIcCyc} + 600	—	ns	
	SCL input high pulse width	t _{SCLH}	3(6) × t _{IIcCyc} + 300	—	ns	
	SCL input low pulse width	t _{SCLL}	3(6) × t _{IIcCyc} + 300	—	ns	
	SCL, SDA input rise time	t _{Sr}	20 + 0.1C _b	300	ns	
	SCL, SDA input fall time	t _{Sf}	20 + 0.1C _b	300	ns	
	SCL, SDA input spike pulse removal time	t _{SP}	0	1(4) × t _{IIcCyc}	ns	
	SDA input bus free time	t _{BUF}	3(6) × t _{IIcCyc} + 300	—	ns	
	Start condition input hold time	t _{STAH}	t _{IIcCyc} + 300	—	ns	
	Restart condition input setup time	t _{STAS}	300	—	ns	
	Stop condition input setup time	t _{STOS}	300	—	ns	
	Data input setup time	t _{SDAS}	t _{IIcCyc} + 50	—	ns	
	Data input hold time	t _{SDAH}	0	—	ns	
	SCL, SDA capacitive load	C _b	—	400	pF	

Note 1. t_{IIcCyc}: RIIC internal reference clock (IICφ) Cycle

Note 2. The value within parentheses is applicable when the value of the ICMR3.NF[1:0] bits is 11b while the digital filter is enabled by the setting ICFER.NFE = 1.

Note 3. C_b is the total capacitance of the bus lines.