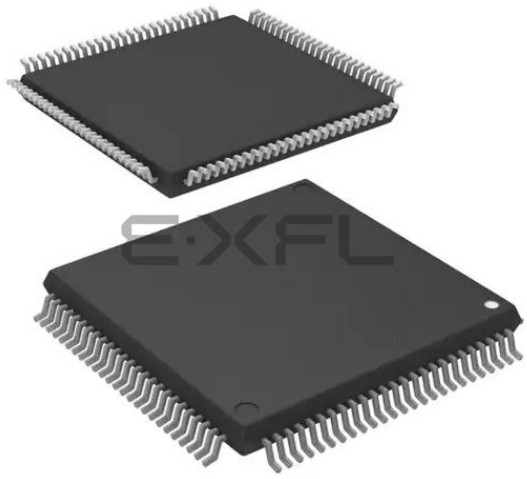
Renesas Electronics America Inc - R5F524TCADFP#31 Datasheet



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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	Active
Core Processor	RXv2
Core Size	32-Bit Single-Core
Speed	80MHz
Connectivity	CANbus, I²C, SCI, SPI
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	80
Program Memory Size	384KB (384K x 8)
Program Memory Type	FLASH
EEPROM Size	8K x 8
RAM Size	32K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 22x12b; D/A 2x8b
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/r5f524tcadfp-31

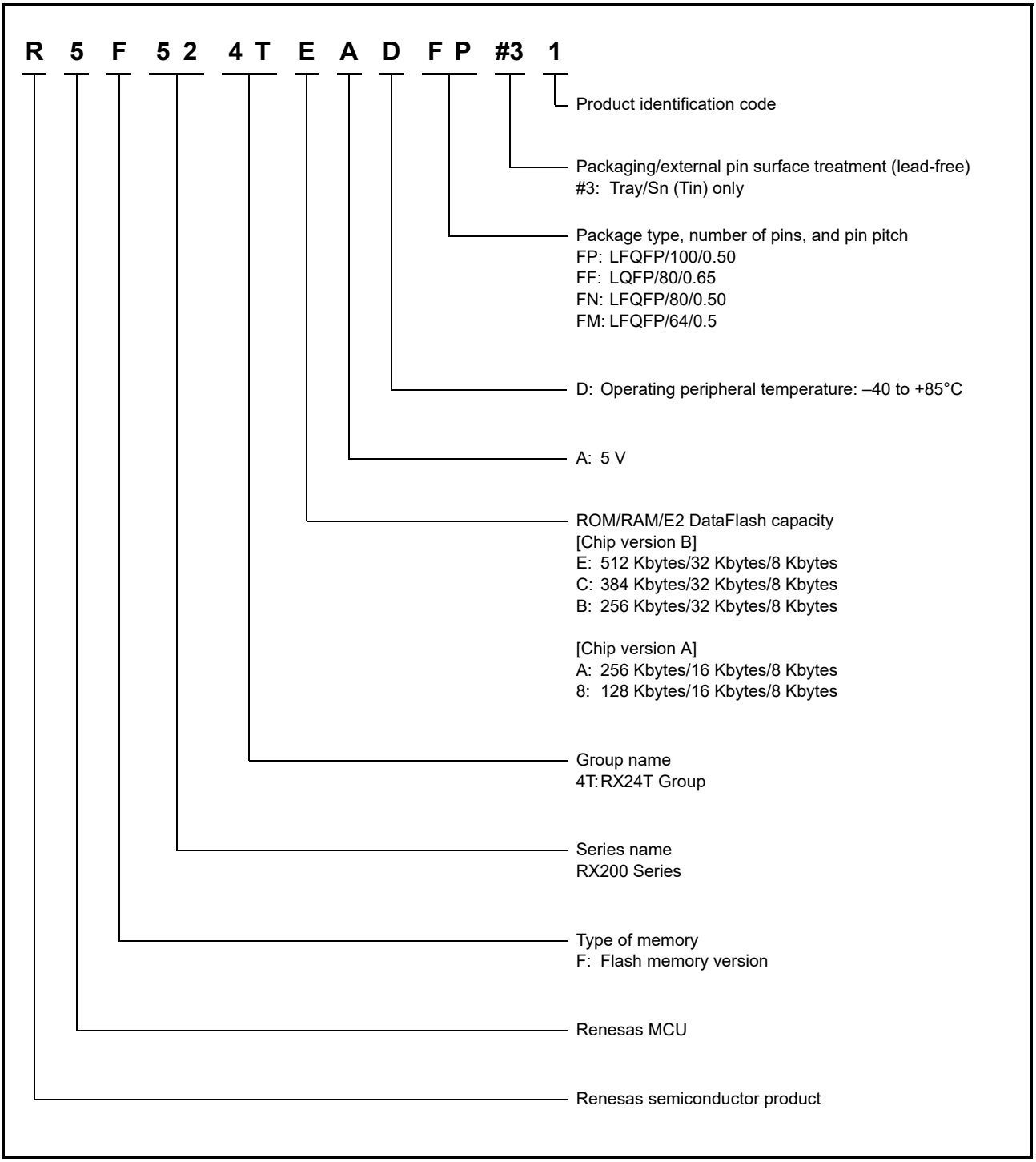


Figure 1.1 How to Read the Product Part Number

Table 1.4 Pin Functions (4/4)

Classifications	Pin Name	I/O	Description
I/O ports	P00 to P02	I/O	3-bit input/output pins.
	P10, P11	I/O	2-bit input/output pins.
	P20 to P24	I/O	5-bit input/output pins.
	P30 to P33, P36, P37	I/O	6-bit input/output pins.
	P40 to P47	I/O	8-bit input/output pins.
	P50 to P55	I/O	6-bit input/output pins.
	P60 to P65	I/O	6-bit input/output pins.
	P70 to P76	I/O	7-bit input/output pins.
	P80 to P82	I/O	3-bit input/output pins.
	P90 to P96	I/O	7-bit input/output pins.
	PA0 to PA5	I/O	6-bit input/output pins.
	PB0 to PB7	I/O	8-bit input/output pins.
	PD0 to PD7	I/O	8-bit input/output pins.
	PE0 to PE5	I/O	6-bit input/output pins (PE2: input).

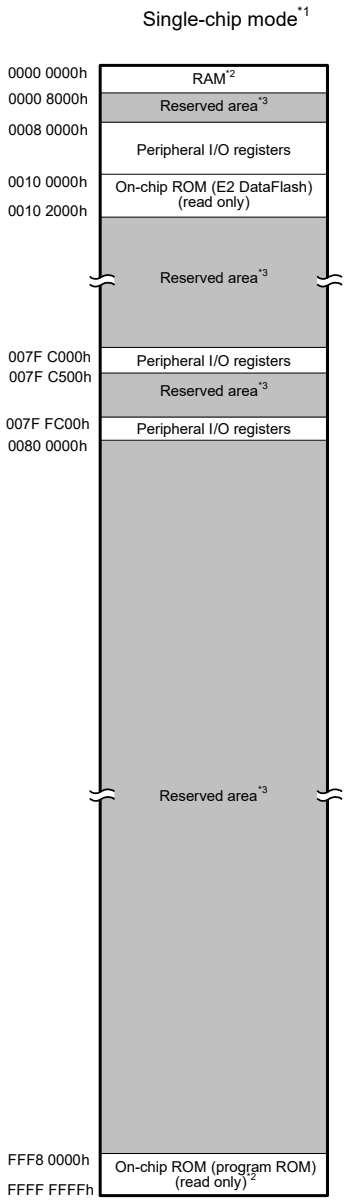
Note: When the A/D converter, D/A converter, and comparator C are not used, connect the AVCC0, AVCC1, AVCC2, and VREF pins to VCC, and connect the AVSS0, AVSS1 and AVSS2 pins to VSS, respectively.

Table 1.5 List of Pins and Pin Functions (100-Pin LFQFP, Chip Version B) (2/3)

Pin No.	Power Supply, Clock, System Control	I/O Port	Timers (TMR, MTU, POE, CAC, GPT)	Communications (SCI, RSPI, RIIC, RSCAN)	Others
52		P75	MTIOC4C, MTIOC4C#, GTIOC1B, GTIOC1B#		
53		P74	MTIOC3D, MTIOC3D#, GTIOC0B, GTIOC0B#		
54		P73	MTIOC4B, MTIOC4B#, GTIOC2A, GTIOC2A#		
55		P72	MTIOC4A, MTIOC4A#, GTIOC1A, GTIOC1A#		
56		P71	MTIOC3B, MTIOC3B#, GTIOC0A, GTIOC0A#		
57		P70	POE0#		IRQ5
58		P33	MTIOC3A, MTIOC3A#, MTCLKA, MTCLKA#, TMO0	SSLA3	
59		P32	MTIOC3C, MTIOC3C#, MTCLKB, MTCLKB#, TMO6	SSLA2	
60	VCC				
61		P31	MTIOC0A, MTIOC0A#, MTCLKC, MTCLKC#, TMRI6	SSLA1	IRQ6
62	VSS				
63		P30	MTIOC0B, MTIOC0B#, MTCLKD, MTCLKD#, TMCI6	SSLA0	IRQ7, COMP3
64		P24	MTIC5U, MTIC5U#, TMCI2, TMO6	RSPCKA	COMP0, DA0
65		P23	MTIC5V, MTIC5V#, TMO2, CACREF	MOSIA	COMP1, DA1
66		P22	MTIC5W, MTIC5W#, TMRI2, TMO4	MISOA	ADTRG2#, COMP2
67		P21	MTCLKA, MTCLKA#, MTIOC9A, MTIOC9A#, TMCI4		IRQ6, ADTRG1#, AN116
68		P20	MTCLKB, MTCLKB#, MTIOC9C, MTIOC9C#, TMRI4		IRQ7, ADTRG0#, AN016
69		P65			AN205
70		P64			AN204
71	AVCC2				
72	VREF				
73	AVSS2				
74		P63			AN203, IRQ7
75		P62			AN202, IRQ6
76		P61			AN201, IRQ5
77		P60			AN200, IRQ4
78		P55			AN211, IRQ3
79		P54			AN210, IRQ2
80		P53			AN209, IRQ1
81		P52			AN208, IRQ0
82		P51			AN207
83		P50			AN206
84		P47			AN103
85		P46			AN102, CMPC12, CMPC13, CMPC30, CMPC31
86		P45			AN101, CMPC02, CMPC03, CMPC20, CMPC21
87		P44			AN100, CMPC10, CMPC11, CMPC32, CMPC33
88		P43			AN003
89		P42			AN002
90		P41			AN001
91		P40			AN000, CMPC00, CMPC01, CMPC22, CMPC23
92	AVCC1				
93	AVCC0				

Table 1.7 List of Pins and Pin Functions (80-Pin LQFP/LFQFP) (2/2)

Pin No.	Power Supply, Clock, System Control	I/O Port	Timers (MTU, TMR, POE, CAC)	Communications (SCI, RSPI, RIIC)	Others
49		P31	MTIOC0A, MTCLKC, TMRI6	SSLA1	IRQ6
50	VSS				
51		P30	MTIOC0B, MTCLKD, TMCI6	SSLA0	IRQ7, COMP3
52		P24	MTIC5U, TMCI2, TMO6	RSPCKA	COMP0
53		P23	MTIC5V, TMO2, CACREF	MOSIA	COMP1
54		P22	MTIC5W, TMRI2, TMO4	MISOA	ADTRG2#, COMP2
55		P21	MTCLKA, MTIOC9A, TMCI4		IRQ6, ADTRG1#, AN116, CVREFC1
56		P20	MTCLKB, MTIOC9C, TMRI4		IRQ7, ADTRG0#, AN016, CVREFC0
57	AVCC2				
58	VREF				
59	AVSS2				
60		P62			AN202, IRQ6
61		P55			AN211, IRQ3
62		P54			AN210, IRQ2
63		P53			AN209, IRQ1
64		P52			AN208, IRQ0
65		P51			AN207
66		P50			AN206
67		P47			AN103
68		P46			AN102, CMPC12, CMPC13, CMPC30, CMPC31
69		P45			AN101, CMPC02, CMPC03, CMPC20, CMPC21
70		P44			AN100, CMPC10, CMPC11, CMPC32, CMPC33
71		P43			AN003
72		P42			AN002
73		P41			AN001
74		P40			AN000, CMPC00, CMPC01, CMPC22, CMPC23
75	AVCC1				
76	AVCC0				
77	AVSS0				
78	AVSS1				
79		P11	MTIOC3A, MTCLKC, TMO3		IRQ1
80		P10	MTIOC9B, MTCLKD, TMRI3, POE12#	CTS6#, RTS6#, SS6#	IRQ0



Note 1. The address space in 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	32 K	0000 0000h to 0000 7FFFh	8 K	0010 0000h to 0010 1FFFh
384 K	FFFA 0000h to FFFF FFFFh				
256 K	FFFC 0000h to FFFF FFFFh				
256 K	FFFC 0000h to FFFF FFFFh	16 K	0000 0000h to 0000 3FFFh		
128 K	FFFE 0000h to FFFF FFFFh				

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

Note 3. Reserved areas should not be accessed.

Figure 3.1 Memory Map in Each Operating Mode

Table 4.1 List of I/O Registers (Address Order) (5/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles
						ICLK ≥ PCLK
0008 70D0h	ICU	Interrupt Request Register 208*2	IR208	8	8	2 ICLK
0008 70D1h	ICU	Interrupt Request Register 209*2	IR209	8	8	2 ICLK
0008 70D2h	ICU	Interrupt Request Register 210*2	IR210	8	8	2 ICLK
0008 70D3h	ICU	Interrupt Request Register 211*2	IR211	8	8	2 ICLK
0008 70D4h	ICU	Interrupt Request Register 212*2	IR212	8	8	2 ICLK
0008 70D5h	ICU	Interrupt Request Register 213*2	IR213	8	8	2 ICLK
0008 70D6h	ICU	Interrupt Request Register 214*2	IR214	8	8	2 ICLK
0008 70D7h	ICU	Interrupt Request Register 215*2	IR215	8	8	2 ICLK
0008 70D8h	ICU	Interrupt Request Register 216*2	IR216	8	8	2 ICLK
0008 70D9h	ICU	Interrupt Request Register 217*2	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
0008 70DDh	ICU	Interrupt Request Register 221	IR221	8	8	2 ICLK
0008 70DEh	ICU	Interrupt Request Register 222	IR222	8	8	2 ICLK
0008 70DFh	ICU	Interrupt Request Register 223	IR223	8	8	2 ICLK
0008 70E0h	ICU	Interrupt Request Register 224	IR224	8	8	2 ICLK
0008 70E1h	ICU	Interrupt Request Register 225	IR225	8	8	2 ICLK
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 70EEh	ICU	Interrupt Request Register 238*2	IR238	8	8	2 ICLK
0008 70EFh	ICU	Interrupt Request Register 239*2	IR239	8	8	2 ICLK
0008 70F0h	ICU	Interrupt Request Register 240*2	IR240	8	8	2 ICLK
0008 70F1h	ICU	Interrupt Request Register 241*2	IR241	8	8	2 ICLK
0008 70F2h	ICU	Interrupt Request Register 242*2	IR242	8	8	2 ICLK
0008 70F3h	ICU	Interrupt Request Register 243*2	IR243	8	8	2 ICLK
0008 70F4h	ICU	Interrupt Request Register 244*2	IR244	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 70F9h	ICU	Interrupt Request Register 249	IR249	8	8	2 ICLK
0008 711Bh	ICU	DTC Transfer Request Enable Register 027	DTCER027	8	8	2 ICLK
0008 711Ch	ICU	DTC Transfer Request Enable Register 028	DTCER028	8	8	2 ICLK
0008 711Dh	ICU	DTC Transfer Request Enable Register 029	DTCER029	8	8	2 ICLK
0008 711Eh	ICU	DTC Transfer Request Enable Register 030	DTCER030	8	8	2 ICLK
0008 711Fh	ICU	DTC Transfer Request Enable Register 031	DTCER031	8	8	2 ICLK
0008 712Dh	ICU	DTC Transfer Request Enable Register 045	DTCER045	8	8	2 ICLK
0008 712Eh	ICU	DTC Transfer Request Enable Register 046	DTCER046	8	8	2 ICLK
0008 7130h	ICU	DTC Transfer Request Enable Register 048*2	DTCER048	8	8	2 ICLK
0008 7131h	ICU	DTC Transfer Request Enable Register 049*2	DTCER049	8	8	2 ICLK
0008 7132h	ICU	DTC Transfer Request Enable Register 050*2	DTCER050	8	8	2 ICLK
0008 7133h	ICU	DTC Transfer Request Enable Register 051*2	DTCER051	8	8	2 ICLK
0008 7135h	ICU	DTC Transfer Request Enable Register 053*2	DTCER053	8	8	2 ICLK
0008 7136h	ICU	DTC Transfer Request Enable Register 054*2	DTCER054	8	8	2 ICLK
0008 7137h	ICU	DTC Transfer Request Enable Register 055*2	DTCER055	8	8	2 ICLK
0008 7138h	ICU	DTC Transfer Request Enable Register 056*2	DTCER056	8	8	2 ICLK
0008 713Bh	ICU	DTC Transfer Request Enable Register 059*2	DTCER059	8	8	2 ICLK
0008 7140h	ICU	DTC Transfer Request Enable Register 064	DTCER064	8	8	2 ICLK
0008 7141h	ICU	DTC Transfer Request Enable Register 065	DTCER065	8	8	2 ICLK
0008 7142h	ICU	DTC Transfer Request Enable Register 066	DTCER066	8	8	2 ICLK

Table 4.1 List of I/O Registers (Address Order) (10/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles
						ICLK ≥ PCLK
0008 73BDh	ICU	Interrupt Source Priority Register 189	IPR189	8	8	2 ICLK
0008 73C0h	ICU	Interrupt Source Priority Register 192	IPR192	8	8	2 ICLK
0008 73C3h	ICU	Interrupt Source Priority Register 195	IPR195	8	8	2 ICLK
0008 73CAh	ICU	Interrupt Source Priority Register 202*2	IPR202	8	8	2 ICLK
0008 73CBh	ICU	Interrupt Source Priority Register 203*2	IPR203	8	8	2 ICLK
0008 73CCh	ICU	Interrupt Source Priority Register 204*2	IPR204	8	8	2 ICLK
0008 73CDh	ICU	Interrupt Source Priority Register 205*2	IPR205	8	8	2 ICLK
0008 73CEh	ICU	Interrupt Source Priority Register 206*2	IPR206	8	8	2 ICLK
0008 73CFh	ICU	Interrupt Source Priority Register 207*2	IPR207	8	8	2 ICLK
0008 73D0h	ICU	Interrupt Source Priority Register 208*2	IPR208	8	8	2 ICLK
0008 73D1h	ICU	Interrupt Source Priority Register 209*2	IPR209	8	8	2 ICLK
0008 73D2h	ICU	Interrupt Source Priority Register 210*2	IPR210	8	8	2 ICLK
0008 73D3h	ICU	Interrupt Source Priority Register 211*2	IPR211	8	8	2 ICLK
0008 73D4h	ICU	Interrupt Source Priority Register 212*2	IPR212	8	8	2 ICLK
0008 73D5h	ICU	Interrupt Source Priority Register 213*2	IPR213	8	8	2 ICLK
0008 73D6h	ICU	Interrupt Source Priority Register 214*2	IPR214	8	8	2 ICLK
0008 73D7h	ICU	Interrupt Source Priority Register 215*2	IPR215	8	8	2 ICLK
0008 73D8h	ICU	Interrupt Source Priority Register 216*2	IPR216	8	8	2 ICLK
0008 73D9h	ICU	Interrupt Source Priority Register 217*2	IPR217	8	8	2 ICLK
0008 73DAh	ICU	Interrupt Source Priority Register 218	IPR218	8	8	2 ICLK
0008 73DEh	ICU	Interrupt Source Priority Register 222	IPR222	8	8	2 ICLK
0008 73E2h	ICU	Interrupt Source Priority Register 226	IPR226	8	8	2 ICLK
0008 73EEh	ICU	Interrupt Source Priority Register 238*2	IPR238	8	8	2 ICLK
0008 73EFh	ICU	Interrupt Source Priority Register 239*2	IPR239	8	8	2 ICLK
0008 73F0h	ICU	Interrupt Source Priority Register 240*2	IPR240	8	8	2 ICLK
0008 73F1h	ICU	Interrupt Source Priority Register 241*2	IPR241	8	8	2 ICLK
0008 73F2h	ICU	Interrupt Source Priority Register 242*2	IPR242	8	8	2 ICLK
0008 73F3h	ICU	Interrupt Source Priority Register 243*2	IPR243	8	8	2 ICLK
0008 73F4h	ICU	Interrupt Source Priority Register 244*2	IPR244	8	8	2 ICLK
0008 73F6h	ICU	Interrupt Source Priority Register 246	IPR246	8	8	2 ICLK
0008 73F7h	ICU	Interrupt Source Priority Register 247	IPR247	8	8	2 ICLK
0008 73F8h	ICU	Interrupt Source Priority Register 248	IPR248	8	8	2 ICLK
0008 73F9h	ICU	Interrupt Source Priority Register 249	IPR249	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
0008 7507h	ICU	IRQ Control Register 7	IRQCR7	8	8	2 ICLK
0008 7510h	ICU	IRQ Pin Digital Filter Enable Register 0	IRQFLTE0	8	8	2 ICLK
0008 7514h	ICU	IRQ Pin Digital Filter Setting Register 0	IRQFLTC0	16	16	2 ICLK
0008 7580h	ICU	Non-Maskable Interrupt Status Register	NMISR	8	8	2 ICLK
0008 7581h	ICU	Non-Maskable Interrupt Enable Register	NMIER	8	8	2 ICLK
0008 7582h	ICU	Non-Maskable Interrupt Status Clear Register	NMICLR	8	8	2 ICLK
0008 7583h	ICU	NMI Pin Interrupt Control Register	NMICR	8	8	2 ICLK
0008 7590h	ICU	NMI Pin Digital Filter Enable Register	NMIFLTE	8	8	2 ICLK
0008 7594h	ICU	NMI Pin Digital Filter Setting Register	NMIFLTC	8	8	2 ICLK
0008 8000h	CMT	Compare Match Timer Start Register 0	CMSTR0	16	16	2 or 3 PCLKB
0008 8002h	CMT0	Compare Match Timer Control Register	CMCR	16	16	2 or 3 PCLKB
0008 8004h	CMT0	Compare Match Counter	CMCNT	16	16	2 or 3 PCLKB

Table 4.1 List of I/O Registers (Address Order) (11/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles
						ICLK ≥ PCLK
0008 8006h	CMT0	Compare Match Constant Register	CMCOR	16	16	2 or 3 PCLKB
0008 8008h	CMT1	Compare Match Timer Control Register	CMCR	16	16	2 or 3 PCLKB
0008 800Ah	CMT1	Compare Match Counter	CMCNT	16	16	2 or 3 PCLKB
0008 800Ch	CMT1	Compare Match Constant Register	CMCOR	16	16	2 or 3 PCLKB
0008 8010h	CMT	Compare Match Timer Start Register 1	CMSTR1	16	16	2 or 3 PCLKB
0008 8012h	CMT2	Compare Match Timer Control Register	CMCR	16	16	2 or 3 PCLKB
0008 8014h	CMT2	Compare Match Counter	CMCNT	16	16	2 or 3 PCLKB
0008 8016h	CMT2	Compare Match Constant Register	CMCOR	16	16	2 or 3 PCLKB
0008 8018h	CMT3	Compare Match Timer Control Register	CMCR	16	16	2 or 3 PCLKB
0008 801Ah	CMT3	Compare Match Counter	CMCNT	16	16	2 or 3 PCLKB
0008 801Ch	CMT3	Compare Match Constant Register	CMCOR	16	16	2 or 3 PCLKB
0008 8030h	IWDT	IWDT Refresh Register	IWDTRR	8	8	2 or 3 PCLKB
0008 8032h	IWDT	IWDT Control Register	IWDTCR	16	16	2 or 3 PCLKB
0008 8034h	IWDT	IWDT Status Register	IWDTSR	16	16	2 or 3 PCLKB
0008 8036h	IWDT	IWDT Reset Control Register	IWDTRCR	8	8	2 or 3 PCLKB
0008 8038h	IWDT	IWDT Count Stop Control Register	IWDTCSTPR	8	8	2 or 3 PCLKB
0008 80C0h	DA	D/A Data Register 0	DADR0	16	16	2 or 3 PCLKB
0008 80C2h	DA	D/A Data Register 1*2	DADR1	16	16	2 or 3 PCLKB
0008 80C4h	DA	D/A Control Register	DACR	8	8	2 or 3 PCLKB
0008 80C5h	DA	DADRm Format Select Register	DADPR	8	8	2 or 3 PCLKB
0008 80C6h	DA	D/A A/D Synchronous Start Control Register*2	DAADSCR	8	8	2 or 3 PCLKB
0008 8200h	TMR0	Timer Control Register	TCR	8	8	2 or 3 PCLKB
0008 8201h	TMR1	Timer Control Register	TCR	8	8	2 or 3 PCLKB
0008 8202h	TMR0	Timer Control/Status Register	TCSR	8	8	2 or 3 PCLKB
0008 8203h	TMR1	Timer Control/Status Register	TCSR	8	8	2 or 3 PCLKB
0008 8204h	TMR0	Time Constant Register A	TCORA	8	8	2 or 3 PCLKB
0008 8205h	TMR1	Time Constant Register A	TCORA	8	8*1	2 or 3 PCLKB
0008 8206h	TMR0	Time Constant Register B	TCORB	8	8	2 or 3 PCLKB
0008 8207h	TMR1	Time Constant Register B	TCORB	8	8*1	2 or 3 PCLKB
0008 8208h	TMR0	Timer Counter	TCNT	8	8	2 or 3 PCLKB
0008 8209h	TMR1	Timer Counter	TCNT	8	8*1	2 or 3 PCLKB
0008 820Ah	TMR0	Timer Counter Control Register	TCCR	8	8	2 or 3 PCLKB
0008 820Bh	TMR1	Timer Counter Control Register	TCCR	8	8*1	2 or 3 PCLKB
0008 8210h	TMR2	Timer Control Register	TCR	8	8	2 or 3 PCLKB
0008 8211h	TMR3	Timer Control Register	TCR	8	8	2 or 3 PCLKB
0008 8212h	TMR2	Timer Control/Status Register	TCSR	8	8	2 or 3 PCLKB
0008 8213h	TMR3	Timer Control/Status Register	TCSR	8	8	2 or 3 PCLKB
0008 8214h	TMR2	Time Constant Register A	TCORA	8	8	2 or 3 PCLKB
0008 8215h	TMR3	Time Constant Register A	TCORA	8	8*1	2 or 3 PCLKB
0008 8216h	TMR2	Time Constant Register B	TCORB	8	8	2 or 3 PCLKB
0008 8217h	TMR3	Time Constant Register B	TCORB	8	8*1	2 or 3 PCLKB
0008 8218h	TMR2	Timer Counter	TCNT	8	8	2 or 3 PCLKB
0008 8219h	TMR3	Timer Counter	TCNT	8	8*1	2 or 3 PCLKB
0008 821Ah	TMR2	Timer Counter Control Register	TCCR	8	8	2 or 3 PCLKB
0008 821Bh	TMR3	Timer Counter Control Register	TCCR	8	8*1	2 or 3 PCLKB
0008 8220h	TMR4	Timer Control Register	TCR	8	8	2 or 3 PCLKB
0008 8221h	TMR5	Timer Control Register	TCR	8	8	2 or 3 PCLKB
0008 8222h	TMR4	Timer Control / Status Register	TCSR	8	8	2 or 3 PCLKB
0008 8223h	TMR5	Timer Control / Status Register	TCSR	8	8	2 or 3 PCLKB
0008 8224h	TMR4	Time Constant Register A	TCORA	8	8	2 or 3 PCLKB
0008 8225h	TMR5	Time Constant Register A	TCORA	8	8*1	2 or 3 PCLKB
0008 8226h	TMR4	Time Constant Register B	TCORB	8	8	2 or 3 PCLKB

Table 4.1 List of I/O Registers (Address Order) (15/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles
						ICLK ≥ PCLK
0008 94D4h	S12AD2	A/D Channel Select Register C0	ADANSC0	16	16	2 or 3 PCLKB
0008 94D9h	S12AD2	A/D Group C Trigger Select Register	ADGCTRGR	8	8	2 or 3 PCLKB
0008 94DFh	S12AD2	A/D Sampling State Register O	ADSSTRO	8	8	2 or 3 PCLKB
0008 94E0h	S12AD2	A/D Sampling State Register 0	ADSSTR0	8	8	2 or 3 PCLKB
0008 94E1h	S12AD2	A/D Sampling State Register 1	ADSSTR1	8	8	2 or 3 PCLKB
0008 94E2h	S12AD2	A/D Sampling State Register 2	ADSSTR2	8	8	2 or 3 PCLKB
0008 94E3h	S12AD2	A/D Sampling State Register 3	ADSSTR3	8	8	2 or 3 PCLKB
0008 94E4h	S12AD2	A/D Sampling State Register 4	ADSSTR4	8	8	2 or 3 PCLKB
0008 94E5h	S12AD2	A/D Sampling State Register 5	ADSSTR5	8	8	2 or 3 PCLKB
0008 94E6h	S12AD2	A/D Sampling State Register 6	ADSSTR6	8	8	2 or 3 PCLKB
0008 94E7h	S12AD2	A/D Sampling State Register 7	ADSSTR7	8	8	2 or 3 PCLKB
0008 94E8h	S12AD2	A/D Sampling State Register 8	ADSSTR8	8	8	2 or 3 PCLKB
0008 94E9h	S12AD2	A/D Sampling State Register 9	ADSSTR9	8	8	2 or 3 PCLKB
0008 94EAh	S12AD2	A/D Sampling State Register 10	ADSSTR10	8	8	2 or 3 PCLKB
0008 94EBh	S12AD2	A/D Sampling State Register 11	ADSSTR11	8	8	2 or 3 PCLKB
0008 A020h	SCI1	Serial Mode Register	SMR	8	8	2 or 3 PCLKB
0008 A021h	SCI1	Bit Rate Register	BRR	8	8	2 or 3 PCLKB
0008 A022h	SCI1	Serial Control Register	SCR	8	8	2 or 3 PCLKB
0008 A023h	SCI1	Transmit Data Register	TDR	8	8	2 or 3 PCLKB
0008 A024h	SCI1	Serial Status Register	SSR	8	8	2 or 3 PCLKB
0008 A025h	SCI1	Receive Data Register	RDR	8	8	2 or 3 PCLKB
0008 A026h	SMCI1	Smart Card Mode Register	SCMR	8	8	2 or 3 PCLKB
0008 A027h	SCI1	Serial Extended Mode Register	SEMR	8	8	2 or 3 PCLKB
0008 A028h	SCI1	Noise Filter Setting Register	SNFR	8	8	2 or 3 PCLKB
0008 A029h	SCI1	I^2C Mode Register 1	SIMR1	8	8	2 or 3 PCLKB
0008 A02Ah	SCI1	I^2C Mode Register 2	SIMR2	8	8	2 or 3 PCLKB
0008 A02Bh	SCI1	I^2C Mode Register 3	SIMR3	8	8	2 or 3 PCLKB
0008 A02Ch	SCI1	I^2C Status Register	SISR	8	8	2 or 3 PCLKB
0008 A02Dh	SCI1	SPI Mode Register	SPMR	8	8	2 or 3 PCLKB
0008 A02Eh	SCI1	Transmit Data Register HL	TDRHL	16	16	4 or 5 PCLKB
0008 A02Eh	SCI1	Transmit Data Register H	TDRH	8	8	2 or 3 PCLKB
0008 A02Fh	SCI1	Transmit Data Register L	TDRL	8	8	2 or 3 PCLKB
0008 A030h	SCI1	Receive Data Register HL	RDRHL	16	16	4 or 5 PCLKB
0008 A030h	SCI1	Receive Data Register H	RDRH	8	8	2 or 3 PCLKB
0008 A031h	SCI1	Receive Data Register L	RDRL	8	8	2 or 3 PCLKB
0008 A032h	SCI1	Modulation Duty Register	MDDR	8	8	2 or 3 PCLKB
0008 A0A0h	SCI5	Serial Mode Register	SMR	8	8	2 or 3 PCLKB
0008 A0A1h	SCI5	Bit Rate Register	BRR	8	8	2 or 3 PCLKB
0008 A0A2h	SCI5	Serial Control Register	SCR	8	8	2 or 3 PCLKB
0008 A0A3h	SCI5	Transmit Data Register	TDR	8	8	2 or 3 PCLKB
0008 A0A4h	SCI5	Serial Status Register	SSR	8	8	2 or 3 PCLKB
0008 A0A5h	SCI5	Receive Data Register	RDR	8	8	2 or 3 PCLKB
0008 A0A6h	SMCI5	Smart Card Mode Register	SCMR	8	8	2 or 3 PCLKB
0008 A0A7h	SCI5	Serial Extended Mode Register	SEMR	8	8	2 or 3 PCLKB
0008 A0A8h	SCI5	Noise Filter Setting Register	SNFR	8	8	2 or 3 PCLKB
0008 A0A9h	SCI5	I^2C Mode Register 1	SIMR1	8	8	2 or 3 PCLKB
0008 A0AAh	SCI5	I^2C Mode Register 2	SIMR2	8	8	2 or 3 PCLKB
0008 A0ABh	SCI5	I^2C Mode Register 3	SIMR3	8	8	2 or 3 PCLKB
0008 A0ACh	SCI5	I^2C Status Register	SISR	8	8	2 or 3 PCLKB
0008 A0ADh	SCI5	SPI Mode Register	SPMR	8	8	2 or 3 PCLKB
0008 A0AEh	SCI5	Transmit Data Register HL	TDRHL	16	16	4 or 5 PCLKB
0008 A0AEh	SCI5	Transmit Data Register H	TDRH	8	8	2 or 3 PCLKB

Table 4.1 List of I/O Registers (Address Order) (26/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles
						ICLK ≥ PCLK
000A 8462h	RSCAN	Receive Buffer Register 12AH*2	RMIDH12	16	16	2 or 3 PCLKB
000A 8464h	RSCAN	Receive Buffer Register 12BL*2	RMTS12	16	16	2 or 3 PCLKB
000A 8466h	RSCAN	Receive Buffer Register 12BH*2	RMPTR12	16	16	2 or 3 PCLKB
000A 8468h	RSCAN	Receive Buffer Register 12CL*2	RMDF012	16	16	2 or 3 PCLKB
000A 846Ah	RSCAN	Receive Buffer Register 12CH*2	RMDF112	16	16	2 or 3 PCLKB
000A 846Ch	RSCAN	Receive Buffer Register 12DL*2	RMDF212	16	16	2 or 3 PCLKB
000A 846Eh	RSCAN	Receive Buffer Register 12DH*2	RMDF312	16	16	2 or 3 PCLKB
000A 8470h	RSCAN	Receive Buffer Register 13AL*2	RMIDL13	16	16	2 or 3 PCLKB
000A 8472h	RSCAN	Receive Buffer Register 13AH*2	RMIDH13	16	16	2 or 3 PCLKB
000A 8474h	RSCAN	Receive Buffer Register 13BL*2	RMTS13	16	16	2 or 3 PCLKB
000A 8476h	RSCAN	Receive Buffer Register 13BH*2	RMPTR13	16	16	2 or 3 PCLKB
000A 8478h	RSCAN	Receive Buffer Register 13CL*2	RMDF013	16	16	2 or 3 PCLKB
000A 847Ah	RSCAN	Receive Buffer Register 13CH*2	RMDF113	16	16	2 or 3 PCLKB
000A 847Ch	RSCAN	Receive Buffer Register 13DL*2	RMDF213	16	16	2 or 3 PCLKB
000A 847Eh	RSCAN	Receive Buffer Register 13DH*2	RMDF313	16	16	2 or 3 PCLKB
000A 8480h	RSCAN	Receive Buffer Register 14AL*2	RMIDL14	16	16	2 or 3 PCLKB
000A 8482h	RSCAN	Receive Buffer Register 14AH*2	RMIDH14	16	16	2 or 3 PCLKB
000A 8484h	RSCAN	Receive Buffer Register 14BL*2	RMTS14	16	16	2 or 3 PCLKB
000A 8486h	RSCAN	Receive Buffer Register 14BH*2	RMPTR14	16	16	2 or 3 PCLKB
000A 8488h	RSCAN	Receive Buffer Register 14CL*2	RMDF014	16	16	2 or 3 PCLKB
000A 848Ah	RSCAN	Receive Buffer Register 14CH*2	RMDF114	16	16	2 or 3 PCLKB
000A 848Ch	RSCAN	Receive Buffer Register 14DL*2	RMDF214	16	16	2 or 3 PCLKB
000A 848Eh	RSCAN	Receive Buffer Register 14DH*2	RMDF314	16	16	2 or 3 PCLKB
000A 8490h	RSCAN	Receive Buffer Register 15AL*2	RMIDL15	16	16	2 or 3 PCLKB
000A 8492h	RSCAN	Receive Buffer Register 15AH*2	RMIDH15	16	16	2 or 3 PCLKB
000A 8494h	RSCAN	Receive Buffer Register 15BL*2	RMTS15	16	16	2 or 3 PCLKB
000A 8496h	RSCAN	Receive Buffer Register 15BH*2	RMPTR15	16	16	2 or 3 PCLKB
000A 8498h	RSCAN	Receive Buffer Register 15CL*2	RMDF015	16	16	2 or 3 PCLKB
000A 849Ah	RSCAN	Receive Buffer Register 15CH*2	RMDF115	16	16	2 or 3 PCLKB
000A 849Ch	RSCAN	Receive Buffer Register 15DL*2	RMDF215	16	16	2 or 3 PCLKB
000A 849Eh	RSCAN	Receive Buffer Register 15DH*2	RMDF315	16	16	2 or 3 PCLKB
000A 8580h to 000A 859Fh	RSCAN	RAM Test Register 0 to 15*2	RPGACC0 to 15	16	16	2 or 3 PCLKB
000A 85A0h	RSCAN	Receive FIFO Access Register 0AL*2	RFIDL0	16	16	2 or 3 PCLKB
000A 85A0h	RSCAN	RAM Test Register 16*2	RPGACC16	16	16	2 or 3 PCLKB
000A 85A2h	RSCAN	Receive FIFO Access Register 0AH*2	RFIDH0	16	16	2 or 3 PCLKB
000A 85A2h	RSCAN	RAM Test Register 17*2	RPGACC17	16	16	2 or 3 PCLKB
000A 85A4h	RSCAN	Receive FIFO Access Register 0BL*2	RFTS0	16	16	2 or 3 PCLKB
000A 85A4h	RSCAN	RAM Test Register 18*2	RPGACC18	16	16	2 or 3 PCLKB
000A 85A6h	RSCAN	Receive FIFO Access Register 0BH*2	RFPTR0	16	16	2 or 3 PCLKB
000A 85A6h	RSCAN	RAM Test Register 19*2	RPGACC19	16	16	2 or 3 PCLKB
000A 85A8h	RSCAN	Receive FIFO Access Register 0CL*2	RFDF00	16	16	2 or 3 PCLKB
000A 85A8h	RSCAN	RAM Test Register 20*2	RPGACC20	16	16	2 or 3 PCLKB
000A 85AAh	RSCAN	Receive FIFO Access Register 0CH*2	RFDF10	16	16	2 or 3 PCLKB
000A 85AAh	RSCAN	RAM Test Register 21*2	RPGACC21	16	16	2 or 3 PCLKB
000A 85ACh	RSCAN	Receive FIFO Access Register 0DL*2	RFDF20	16	16	2 or 3 PCLKB
000A 85ACh	RSCAN	RAM Test Register 22*2	RPGACC22	16	16	2 or 3 PCLKB
000A 85AEh	RSCAN	Receive FIFO Access Register 0DH*2	RFDF30	16	16	2 or 3 PCLKB
000A 85AEh	RSCAN	RAM Test Register 23*2	RPGACC23	16	16	2 or 3 PCLKB
000A 85B0h	RSCAN	Receive FIFO Access Register 1AL*2	RFIDL1	16	16	2 or 3 PCLKB
000A 85B0h	RSCAN	RAM Test Register 24*2	RPGACC24	16	16	2 or 3 PCLKB
000A 85B2h	RSCAN	Receive FIFO Access Register 1AH*2	RFIDH1	16	16	2 or 3 PCLKB

Table 4.1 List of I/O Registers (Address Order) (30/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles ICLK ≥ PCLK
000C 1293h	MTU3	Noise Filter Control Register 3	NFCR3	8	8	4 or 5 PCLKA
000C 1294h	MTU4	Noise Filter Control Register 4	NFCR4	8	8	4 or 5 PCLKA
000C 1296h	MTU9	Noise Filter Control Register 9	NFCR9	8	8	4 or 5 PCLKA
000C 1299h	MTU0	Noise Filter Control Register C	NFCRC	8	8	4 or 5 PCLKA
000C 1300h	MTU0	Timer Control Register	TCR	8	8, 16, 32	4 or 5 PCLKA
000C 1301h	MTU0	Timer Mode Register 1	TMDR1	8	8	4 or 5 PCLKA
000C 1302h	MTU0	Timer I/O Control Register H	TIORH	8	8, 16	4 or 5 PCLKA
000C 1303h	MTU0	Timer I/O Control Register L	TIORL	8	8	4 or 5 PCLKA
000C 1304h	MTU0	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4 or 5 PCLKA
000C 1306h	MTU0	Timer Counter	TCNT	16	16	4 or 5 PCLKA
000C 1308h	MTU0	Timer General Register A	TGRA	16	16, 32	4 or 5 PCLKA
000C 130Ah	MTU0	Timer General Register B	TGRB	16	16	4 or 5 PCLKA
000C 130Ch	MTU0	Timer General Register C	TGRC	16	16, 32	4 or 5 PCLKA
000C 130Eh	MTU0	Timer General Register D	TGRD	16	16	4 or 5 PCLKA
000C 1320h	MTU0	Timer General Register E	TGRE	16	16, 32	4 or 5 PCLKA
000C 1322h	MTU0	Timer General Register F	TGRF	16	16	4 or 5 PCLKA
000C 1324h	MTU0	Timer Interrupt Enable Register 2	TIER2	8	8, 16	4 or 5 PCLKA
000C 1326h	MTU0	Timer Buffer Operation Transfer Mode Register	TBTM	8	8	4 or 5 PCLKA
000C 1328h	MTU0	Timer Control Register 2	TCR2	8	8	4 or 5 PCLKA
000C 1380h	MTU1	Timer Control Register	TCR	8	8, 16	4 or 5 PCLKA
000C 1381h	MTU1	Timer Mode Register 1	TMDR1	8	8	4 or 5 PCLKA
000C 1382h	MTU1	Timer I/O Control Register	TIOR	8	8	4 or 5 PCLKA
000C 1384h	MTU1	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4 or 5 PCLKA
000C 1385h	MTU1	Timer Status Register	TSR	8	8	4 or 5 PCLKA
000C 1386h	MTU1	Timer Counter	TCNT	16	16	4 or 5 PCLKA
000C 1388h	MTU1	Timer General Register A	TGRA	16	16, 32	4 or 5 PCLKA
000C 138Ah	MTU1	Timer General Register B	TGRB	16	16	4 or 5 PCLKA
000C 1390h	MTU1	Timer Input Capture Control Register	TICCR	8	8	4 or 5 PCLKA
000C 1391h	MTU1	Timer Mode Register 3	TMDR3	8	8	4 or 5 PCLKA
000C 1394h	MTU1	Timer Control Register 2	TCR2	8	8	4 or 5 PCLKA
000C 13A0h	MTU1	Timer Longword Counter	TCNTLW	32	32	4 or 5 PCLKA
000C 13A4h	MTU1	Timer Longword General Register	TGRALW	32	32	4 or 5 PCLKA
000C 13A8h	MTU1	Timer Longword General Register	TGRBLW	32	32	4 or 5 PCLKA
000C 1400h	MTU2	Timer Control Register	TCR	8	8, 16	4 or 5 PCLKA
000C 1401h	MTU2	Timer Mode Register 1	TMDR1	8	8	4 or 5 PCLKA
000C 1402h	MTU2	Timer I/O Control Register	TIOR	8	8	4 or 5 PCLKA
000C 1404h	MTU2	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4 or 5 PCLKA
000C 1405h	MTU2	Timer Status Register	TSR	8	8	4 or 5 PCLKA
000C 1406h	MTU2	Timer Counter	TCNT	16	16	4 or 5 PCLKA
000C 1408h	MTU2	Timer General Register A	TGRA	16	16, 32	4 or 5 PCLKA
000C 140Ah	MTU2	Timer General Register B	TGRB	16	16	4 or 5 PCLKA
000C 140Ch	MTU2	Timer Control Register 2	TCR2	8	8	4 or 5 PCLKA
000C 1580h	MTU9	Timer Control Register	TCR	8	8, 16, 32	4 or 5 PCLKA
000C 1581h	MTU9	Timer Mode Register 1	TMDR1	8	8	4 or 5 PCLKA
000C 1582h	MTU9	Timer I/O Control Register H	TIORH	8	8, 16	4 or 5 PCLKA
000C 1583h	MTU9	Timer I/O Control Register L	TIORL	8	8	4 or 5 PCLKA
000C 1584h	MTU9	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4 or 5 PCLKA
000C 1586h	MTU9	Timer Counter	TCNT	16	16	4 or 5 PCLKA
000C 1588h	MTU9	Timer General Register A	TGRA	16	16, 32	4 or 5 PCLKA
000C 158Ah	MTU9	Timer General Register B	TGRB	16	16	4 or 5 PCLKA
000C 158Ch	MTU9	Timer General Register C	TGRC	16	16, 32	4 or 5 PCLKA
000C 158Eh	MTU9	Timer General Register D	TGRD	16	16	4 or 5 PCLKA

Table 4.1 List of I/O Registers (Address Order) (32/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles ICLK ≥ PCLK
000C 1A4Dh	MTU7	Timer Control Register 2	TCR2	8	8	4 or 5 PCLKA
000C 1A50h	MTU6	Timer Synchronous Clear Register	TSYCR	8	8	4 or 5 PCLKA
000C 1A60h	MTU	Timer Waveform Control Register B	TWCRB	8	8	4 or 5 PCLKA
000C 1A70h	MTU	Timer Mode Register 2B	TMDR2B	8	8	4 or 5 PCLKA
000C 1A72h	MTU6	Timer General Register E	TGRE	16	16	4 or 5 PCLKA
000C 1A74h	MTU7	Timer General Register E	TGRE	16	16	4 or 5 PCLKA
000C 1A76h	MTU7	Timer General Register F	TGRF	16	16	4 or 5 PCLKA
000C 1A80h	MTU	Timer Start Register B	TSTRB	8	8, 16	4 or 5 PCLKA
000C 1A81h	MTU	Timer Synchronous Register B	TSYRB	8	8	4 or 5 PCLKA
000C 1A84h	MTU	Timer Read/Write Enable Register B	TRWERB	8	8	4 or 5 PCLKA
000C 1A93h	MTU6	Noise Filter Control Register 6	NFCR6	8	8	4 or 5 PCLKA
000C 1A94h	MTU7	Noise Filter Control Register 7	NFCR7	8	8	4 or 5 PCLKA
000C 1A95h	MTU5	Noise Filter Control Register 5	NFCR5	8	8	4 or 5 PCLKA
000C 1C80h	MTU5	Timer Counter U	TCNTU	16	16, 32	4 or 5 PCLKA
000C 1C82h	MTU5	Timer General Register U	TGRU	16	16	4 or 5 PCLKA
000C 1C84h	MTU5	Timer Control Register U	TCRU	8	8	4 or 5 PCLKA
000C 1C85h	MTU5	Timer Control Register 2U	TCR2U	8	8	4 or 5 PCLKA
000C 1C86h	MTU5	Timer I/O Control Register U	TIORU	8	8	4 or 5 PCLKA
000C 1C90h	MTU5	Timer Counter V	TCNTV	16	16, 32	4 or 5 PCLKA
000C 1C92h	MTU5	Timer General Register V	TGRV	16	16	4 or 5 PCLKA
000C 1C94h	MTU5	Timer Control Register V	TCRV	8	8	4 or 5 PCLKA
000C 1C95h	MTU5	Timer Control Register 2V	TCR2V	8	8	4 or 5 PCLKA
000C 1C96h	MTU5	Timer I/O Control Register V	TIORV	8	8	4 or 5 PCLKA
000C 1CA0h	MTU5	Timer Counter W	TCNTW	16	16, 32	4 or 5 PCLKA
000C 1CA2h	MTU5	Timer General Register W	TGRW	16	16	4 or 5 PCLKA
000C 1CA4h	MTU5	Timer Control Register W	TCRW	8	8	4 or 5 PCLKA
000C 1CA5h	MTU5	Timer Control Register 2W	TCR2W	8	8	4 or 5 PCLKA
000C 1CA6h	MTU5	Timer I/O Control Register W	TIORW	8	8	4 or 5 PCLKA
000C 1CB2h	MTU5	Timer Interrupt Enable Register	TIER	8	8	4 or 5 PCLKA
000C 1CB4h	MTU5	Timer Start Register	TSTR	8	8	4 or 5 PCLKA
000C 1CB6h	MTU5	Timer Compare Match Clear Register	TCNTCMPCLR	8	8	4 or 5 PCLKA
000C 1D30h	MTU	A/D Conversion Start Request Select Register 0	TADSTRGR0	8	8	4 or 5 PCLKA
000C 1D32h	MTU	A/D Conversion Start Request Select Register 1	TADSTRGR1	8	8	4 or 5 PCLKA
000C 2000h	GPT	General PWM Timer Software Start Register*2	GTSTR	16	8, 16, 32	4 or 5 PCLKA
000C 2002h	GPT	Noise Filter Control Register*2	NFCR	16	16, 32	4 or 5 PCLKA
000C 2004h	GPT	General PWM Timer Hardware Source Start/Stop Control Register 0*2	GTHSCR	16	8, 16, 32	4 or 5 PCLKA
000C 2006h	GPT	General PWM Timer Hardware Source Clear Control Register*2	GTHCCR	16	8, 16, 32	4 or 5 PCLKA
000C 2008h	GPT	General PWM Timer Hardware Start Source Select Register*2	GTHSSR	16	8, 16, 32	4 or 5 PCLKA
000C 200Ah	GPT	General PWM Timer Hardware Stop/Clear Source Select Register*2	GTHPSR	16	8, 16, 32	4 or 5 PCLKA
000C 200Ch	GPT	General PWM Timer Write-Protection Register*2	GTWP	16	8, 16, 32	4 or 5 PCLKA
000C 200Eh	GPT	General PWM Timer Sync Register*2	GTSYNC	16	8, 16, 32	4 or 5 PCLKA
000C 2010h	GPT	General PWM Timer External Trigger Input Interrupt Register*2	GTETINT	16	8, 16, 32	4 or 5 PCLKA
000C 2014h	GPT	General PWM Timer Buffer Operation Disable Register*2	GTBDR	16	8, 16, 32	4 or 5 PCLKA
000C 2018h	GPT	General PWM Timer Start Write-Protection Register*2	GTSWP	16	8, 16, 32	4 or 5 PCLKA
000C 201Ch	GPT	General PWM Timer Clearing Write-Protection Register*2	GTCWP	16	8, 16, 32	4 or 5 PCLKA
000C 2020h	GPT	General PWM Timer Common Register Write-Protection Register*2	GTCMNWP	16	8, 16, 32	4 or 5 PCLKA
000C 2024h	GPT	General PWM Timer Mode Register*2	GTMDR	16	8, 16, 32	4 or 5 PCLKA
000C 2028h	GPT	General PWM Timer External Clock Noise Filter Control Register*2	GTECNFCR	32	8, 16, 32	4 or 5 PCLKA

Table 4.1 List of I/O Registers (Address Order) (33/37)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles
						ICLK ≥ PCLK
000C 202Ch	GPT	General PWM Timer A/D Conversion Start Request Signal Monitor Register*2	GTADSMR	32	8, 16, 32	4 or 5 PCLKA
000C 2100h	GPT0	General PWM Timer I/O Control Register*2	GTIOR	16	8, 16, 32	4 or 5 PCLKA
000C 2102h	GPT0	General PWM Timer Interrupt Output Setting Register*2	GTINTAD	16	8, 16, 32	4 or 5 PCLKA
000C 2104h	GPT0	General PWM Timer Control Register*2	GTCR	16	8, 16, 32	4 or 5 PCLKA
000C 2106h	GPT0	General PWM Timer Buffer Enable Register*2	GTBER	16	8, 16, 32	4 or 5 PCLKA
000C 2108h	GPT0	General PWM Timer Count Direction Register*2	GTUDC	16	8, 16, 32	4 or 5 PCLKA
000C 210Ah	GPT0	General PWM Timer Interrupt and A/D Converter Start Request Skipping Setting Register*2	GTITC	16	8, 16, 32	4 or 5 PCLKA
000C 210Ch	GPT0	General PWM Timer Status Register*2	GTST	16	8, 16, 32	4 or 5 PCLKA
000C 210Eh	GPT0	General PWM Timer Counter*2	GTCNT	16	16	4 or 5 PCLKA
000C 2110h	GPT0	General PWM Timer Compare Capture Register A*2	GTCCRA	16	16, 32	4 or 5 PCLKA
000C 2112h	GPT0	General PWM Timer Compare Capture Register B*2	GTCCRB	16	16, 32	4 or 5 PCLKA
000C 2114h	GPT0	General PWM Timer Compare Capture Register C*2	GTCCRC	16	16, 32	4 or 5 PCLKA
000C 2116h	GPT0	General PWM Timer Compare Capture Register D*2	GTCCRD	16	16, 32	4 or 5 PCLKA
000C 2118h	GPT0	General PWM Timer Compare Capture Register E*2	GTCCRE	16	16, 32	4 or 5 PCLKA
000C 211Ah	GPT0	General PWM Timer Compare Capture Register F*2	GTCCRF	16	16, 32	4 or 5 PCLKA
000C 211Ch	GPT0	General PWM Timer Period Setting Register*2	GTPR	16	16, 32	4 or 5 PCLKA
000C 211Eh	GPT0	General PWM Timer Period Setting Buffer Register*2	GTPBR	16	16, 32	4 or 5 PCLKA
000C 2120h	GPT0	General PWM Timer Period Setting Double Buffer Register*2	GTPDBR	16	16, 32	4 or 5 PCLKA
000C 2124h	GPT0	A/D Converter Start Request Timing Register A*2	GTADTRA	16	16, 32	4 or 5 PCLKA
000C 2126h	GPT0	A/D Converter Start Request Timing Buffer Register A*2	GTADTBRA	16	16, 32	4 or 5 PCLKA
000C 2128h	GPT0	A/D Converter Start Request Timing Double Buffer Register A*2	GTADTDBRA	16	16, 32	4 or 5 PCLKA
000C 212Ch	GPT0	A/D Converter Start Request Timing Register B*2	GTADTRB	16	16, 32	4 or 5 PCLKA
000C 212Eh	GPT0	A/D Converter Start Request Timing Buffer Register B*2	GTADTBRB	16	16, 32	4 or 5 PCLKA
000C 2130h	GPT0	A/D Converter Start Request Timing Double Buffer Register B*2	GTADTDBRB	16	16, 32	4 or 5 PCLKA
000C 2134h	GPT0	General PWM Timer Output Negate Control Register*2	GTONCR	16	16, 32	4 or 5 PCLKA
000C 2136h	GPT0	General PWM Timer Dead Time Control Register*2	GTDTCR	16	16, 32	4 or 5 PCLKA
000C 2138h	GPT0	General PWM Timer Dead Time Value Register U*2	GTDVU	16	16, 32	4 or 5 PCLKA
000C 213Ah	GPT0	General PWM Timer Dead Time Value Register D*2	GTDVD	16	16, 32	4 or 5 PCLKA
000C 213Ch	GPT0	General PWM Timer Dead Time Buffer Register U*2	GTDBU	16	16, 32	4 or 5 PCLKA
000C 213Eh	GPT0	General PWM Timer Dead Time Buffer Register D*2	GTDBD	16	16, 32	4 or 5 PCLKA
000C 2140h	GPT0	General PWM Timer Output Protection Function Status Register*2	GTSOS	16	16, 32	4 or 5 PCLKA
000C 2142h	GPT0	General PWM Timer Output Protection Function Temporary Release Register*2	GTSOTR	16	16, 32	4 or 5 PCLKA
000C 2180h	GPT1	General PWM Timer I/O Control Register*2	GTIOR	16	8, 16, 32	4 or 5 PCLKA
000C 2182h	GPT1	General PWM Timer Interrupt Output Setting Register*2	GTINTAD	16	8, 16, 32	4 or 5 PCLKA
000C 2184h	GPT1	General PWM Timer Control Register*2	GTCR	16	8, 16, 32	4 or 5 PCLKA
000C 2186h	GPT1	General PWM Timer Buffer Enable Register*2	GTBER	16	8, 16, 32	4 or 5 PCLKA
000C 2188h	GPT1	General PWM Timer Count Direction Register*2	GTUDC	16	8, 16, 32	4 or 5 PCLKA
000C 218Ah	GPT1	General PWM Timer Interrupt and A/D Converter Start Request Skipping Setting Register*2	GTITC	16	8, 16, 32	4 or 5 PCLKA
000C 218Ch	GPT1	General PWM Timer Status Register*2	GTST	16	8, 16, 32	4 or 5 PCLKA
000C 218Eh	GPT1	General PWM Timer Counter*2	GTCNT	16	16	4 or 5 PCLKA
000C 2190h	GPT1	General PWM Timer Compare Capture Register A*2	GTCCRA	16	16, 32	4 or 5 PCLKA
000C 2192h	GPT1	General PWM Timer Compare Capture Register B*2	GTCCRB	16	16, 32	4 or 5 PCLKA
000C 2194h	GPT1	General PWM Timer Compare Capture Register C*2	GTCCRC	16	16, 32	4 or 5 PCLKA
000C 2196h	GPT1	General PWM Timer Compare Capture Register D*2	GTCCRD	16	16, 32	4 or 5 PCLKA
000C 2198h	GPT1	General PWM Timer Compare Capture Register E*2	GTCCRE	16	16, 32	4 or 5 PCLKA
000C 219Ah	GPT1	General PWM Timer Compare Capture Register F*2	GTCCRF	16	16, 32	4 or 5 PCLKA
000C 219Ch	GPT1	General PWM Timer Period Setting Register*2	GTPR	16	16, 32	4 or 5 PCLKA
000C 219Eh	GPT1	General PWM Timer Period Setting Buffer Register*2	GTPBR	16	16, 32	4 or 5 PCLKA

Table 5.6 DC Characteristics (4)

Conditions: VCC = 2.7 V to 5.5 V, AVCC0 = AVCC1 = AVCC2 = VREF = VCC to 5.5 V, VSS = AVSS0 = AVSS1 = AVSS2 = 0 V, T_a = –40 to +85°C

Item			Symbol	Chip Version A		Chip Version B		Unit	Test Conditions
				Typ.*3	Max.	Typ.*3	Max.		
Supply current*1	Software standby mode*2	T_a = 25°C	I_{CC}	1.0	55.0	1.5	15.0	µA	
		T_a = 55°C		1.5	60.0	3.0	38.0		
		T_a = 85°C		5.5	260.0	13.0	135.0		

Note 1. Supply current values are with all output pins unloaded and all input pull-up MOSs in the off state.
Note 2. The IWDT and LVD are stopped.
Note 3. VCC = 5 V.

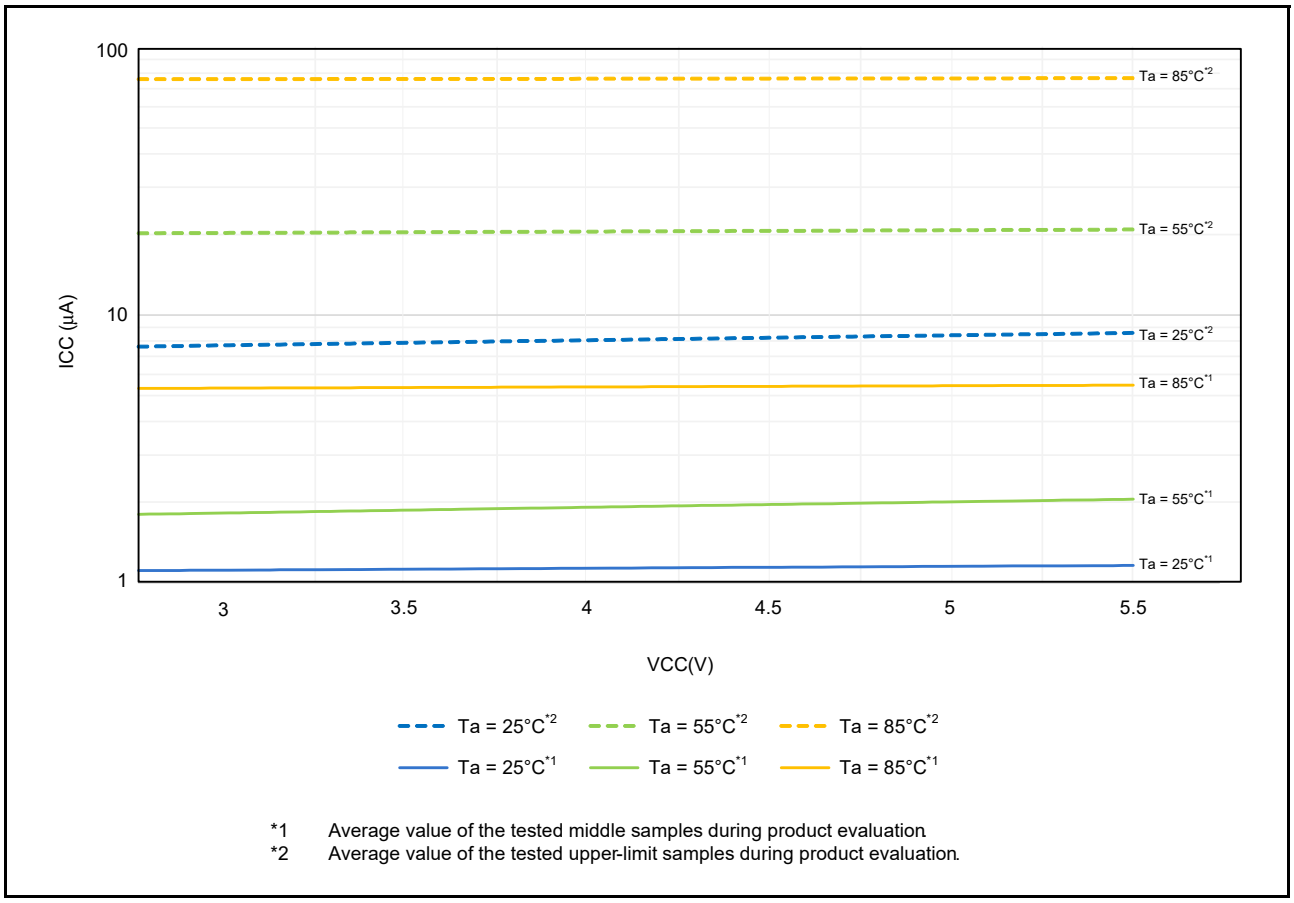


Figure 5.1 Voltage Dependency in Software Standby Mode (Chip Version A) (Reference Data)

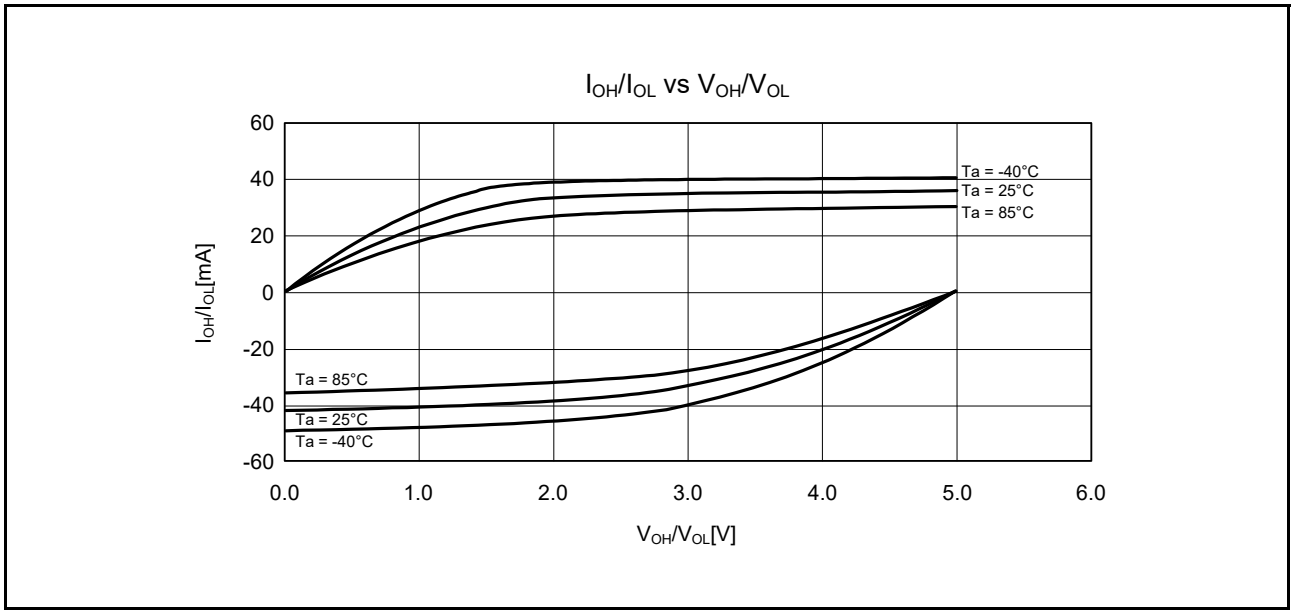


Figure 5.8 **V_{OH}/V_{OL} and I_{OH}/I_{OL} Temperature Characteristics at VCC = 5.0 V when Normal Output is Selected (Reference Data)**

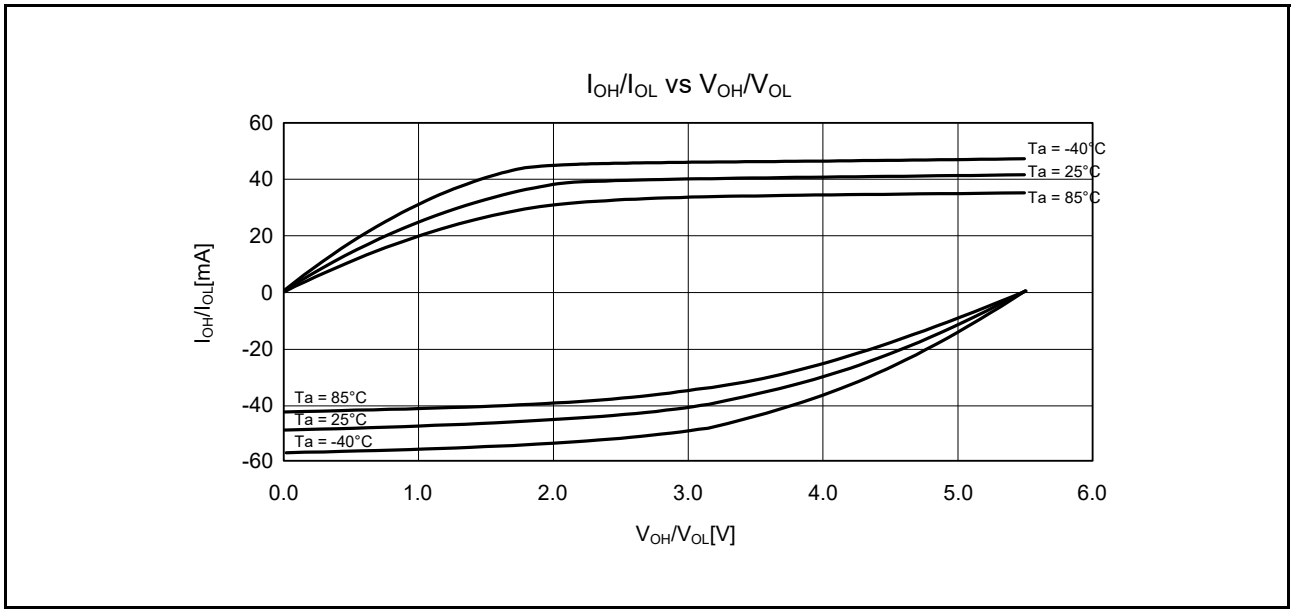


Figure 5.9 **V_{OH}/V_{OL} and I_{OH}/I_{OL} Temperature Characteristics at VCC = 5.5 V when Normal Output is Selected (Reference Data)**

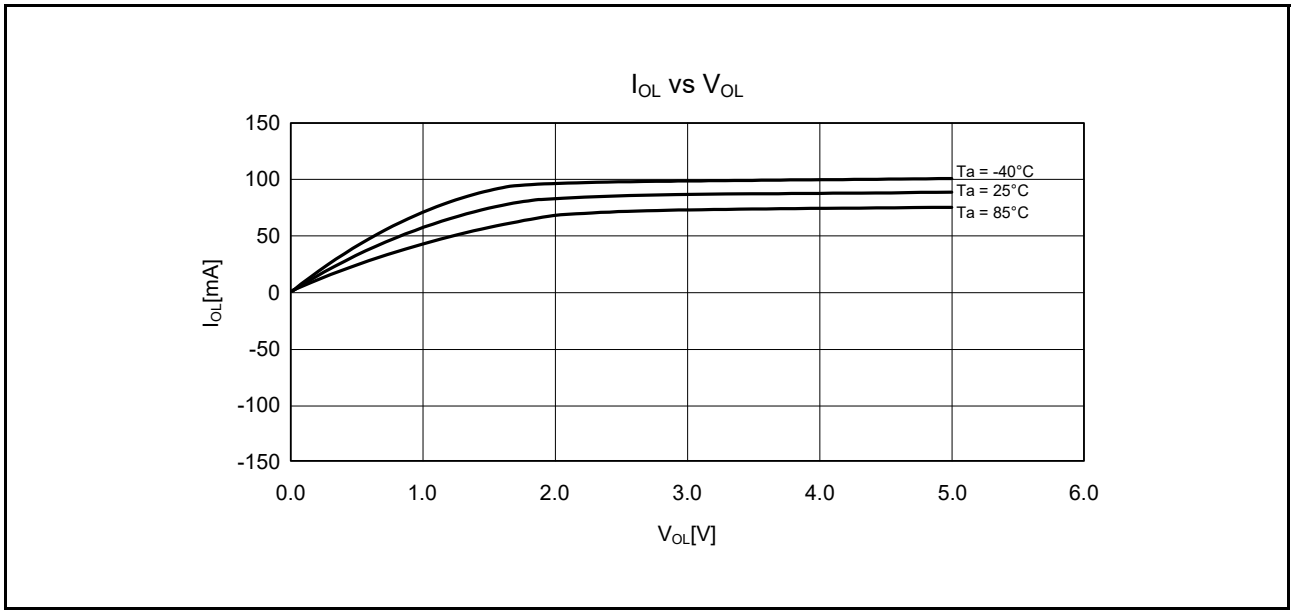


Figure 5.20 V_{OL} and I_{OL} Temperature Characteristics of RIIC Output Pin at VCC = 5.0 V (Reference Data)

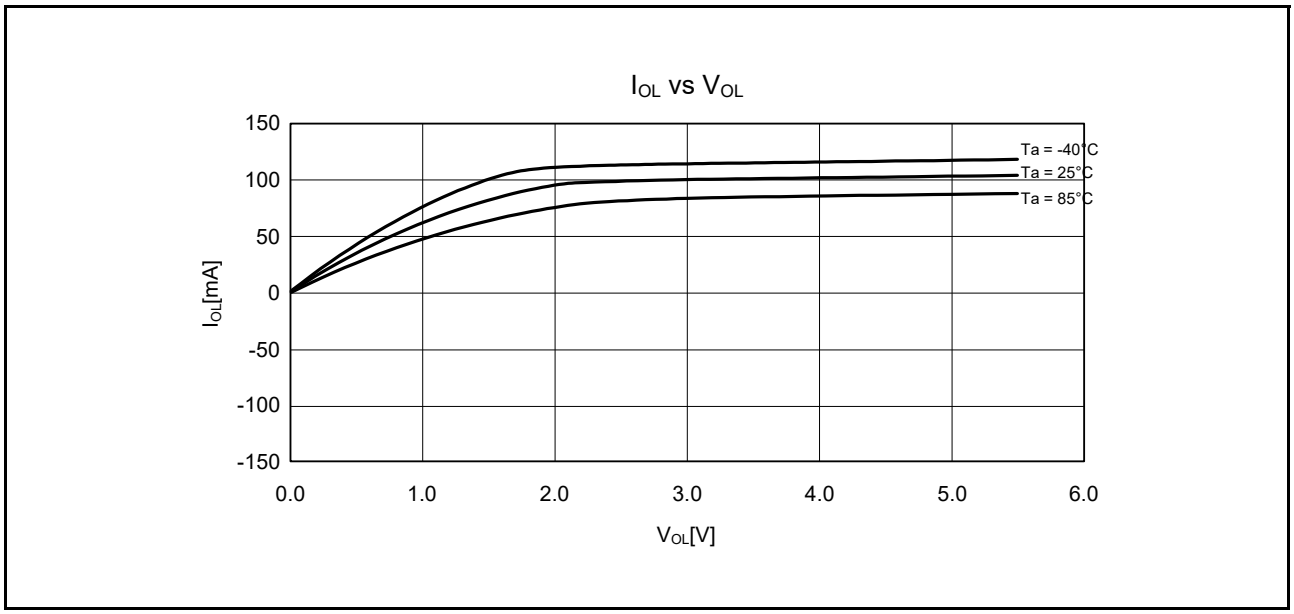


Figure 5.21 V_{OL} and I_{OL} Temperature Characteristics of RIIC Output Pin at VCC = 5.5 V (Reference Data)

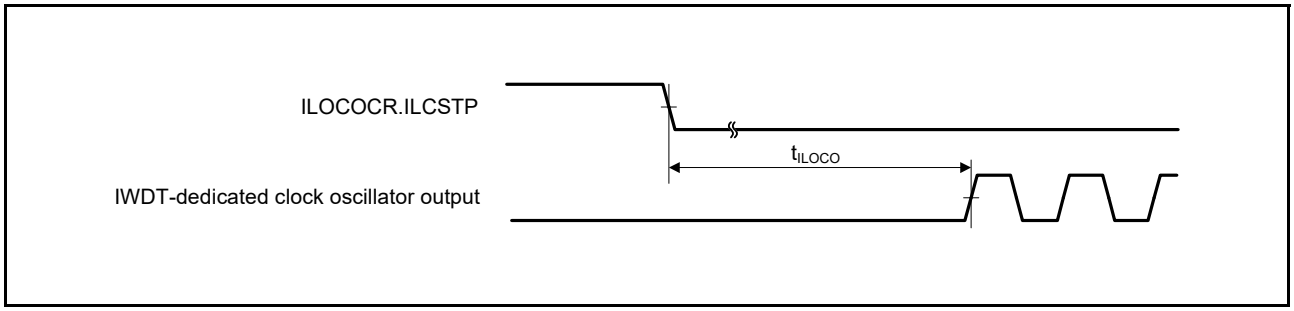


Figure 5.27 IWDT-Dedicated Clock Oscillation Start Timing

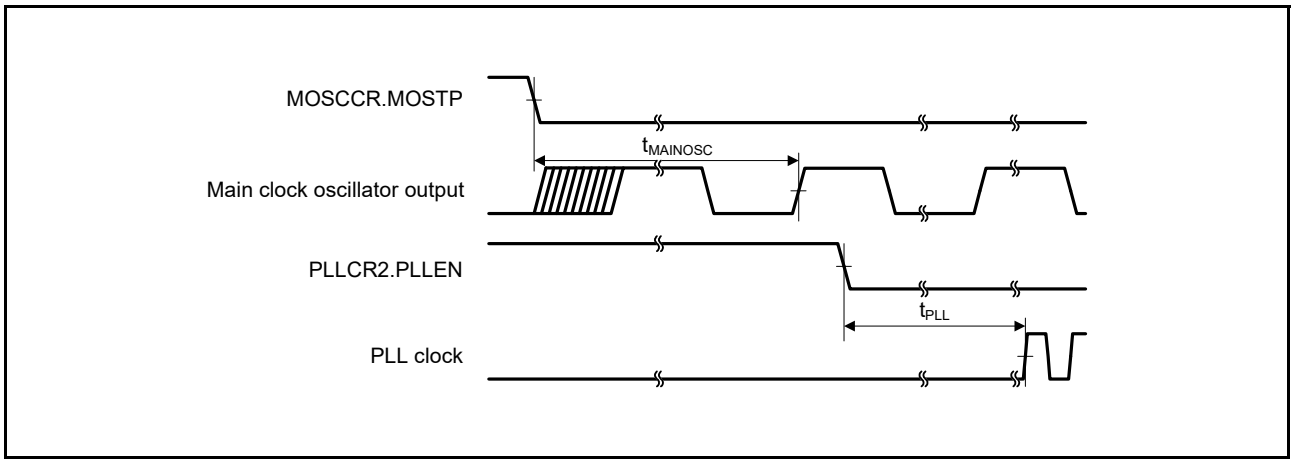


Figure 5.28 PLL Clock Oscillation Start Timing (PLL is Operated after Main Clock Oscillation Has Settled)

5.3.4 Control Signal Timing

Table 5.22 Control Signal Timing

Conditions: VCC = 2.7 V to 5.5 V, AVCC0 = AVCC1 = AVCC2 = VREF = VCC to 5.5 V, VSS = AVSS0 = AVSS1 = AVSS2 = 0 V, T_a = –40 to +85°C

Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
NMI pulse width	t_{NMIW}	200	—	—	ns	NMI digital filter disabled (NMIFLTE.NFLTEN = 0)	$t_{Pcyc} \times 2 \le 200$ ns
		$t_{Pcyc} \times 2$*1	—	—			$t_{Pcyc} \times 2 > 200$ ns
		200	—	—		NMI digital filter enabled (NMIFLTE.NFLTEN = 1)	$t_{NMICK} \times 3 \le 200$ ns
		$t_{NMICK} \times 3.5$*2	—	—			$t_{NMICK} \times 3 > 200$ ns
IRQ pulse width	t_{IRQW}	200	—	—	ns	IRQ digital filter disabled (IRQFLTE0.FLTENi = 0)	$t_{Pcyc} \times 2 \le 200$ ns
		$t_{Pcyc} \times 2$*1	—	—			$t_{Pcyc} \times 2 > 200$ ns
		200	—	—		IRQ digital filter enabled (IRQFLTE0.FLTENi = 1)	$t_{IRQCK} \times 3 \le 200$ ns
		$t_{IRQCK} \times 3.5$*3	—	—			$t_{IRQCK} \times 3 > 200$ ns

Note: 200 ns minimum in software standby mode.
Note 1. t_{Pcyc} indicates the cycle of PCLKB.
Note 2. t_{NMICK} indicates the cycle of the NMI digital filter sampling clock.
Note 3. t_{IRQCK} indicates the cycle of the IRQi digital filter sampling clock (i = 0 to 7).

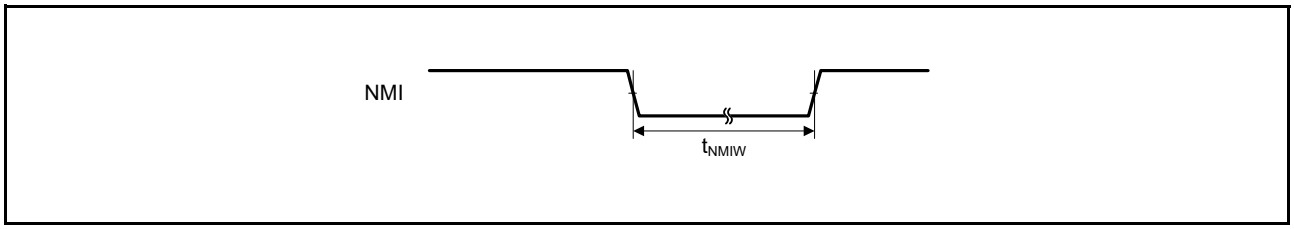


Figure 5.34 NMI Interrupt Input Timing

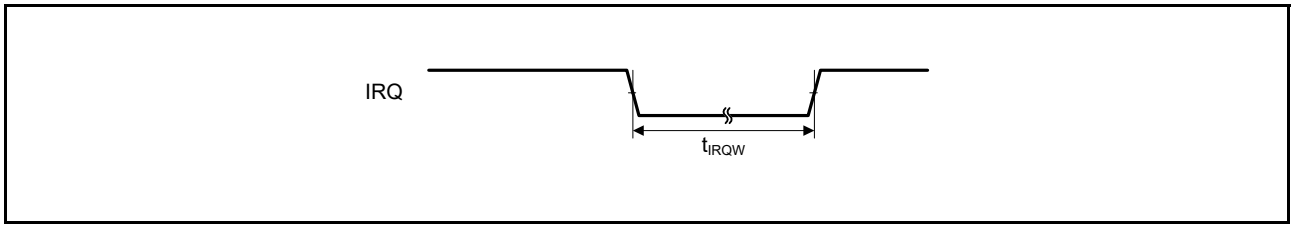


Figure 5.35 IRQ Interrupt Input Timing

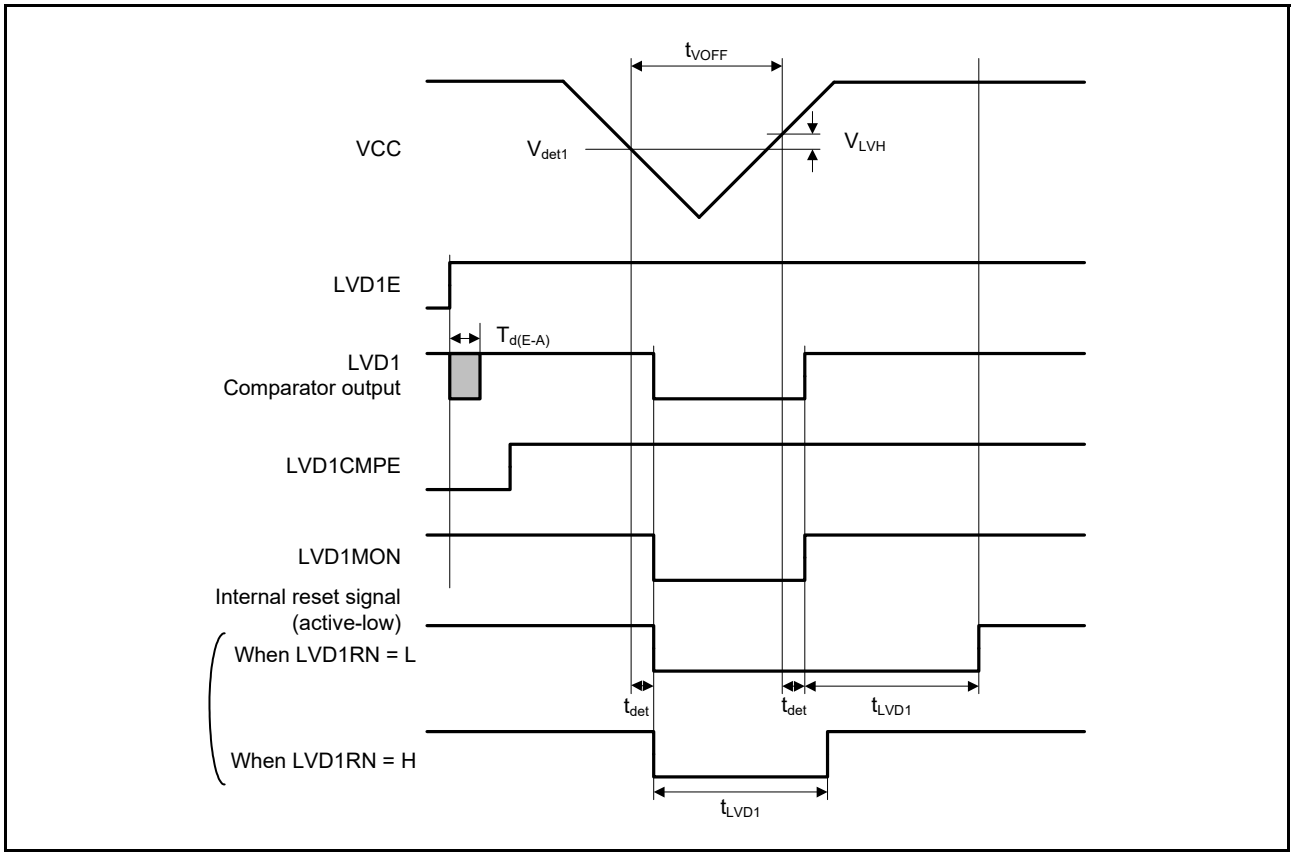


Figure 5.58 Voltage Detection Circuit Timing (V_{det1})

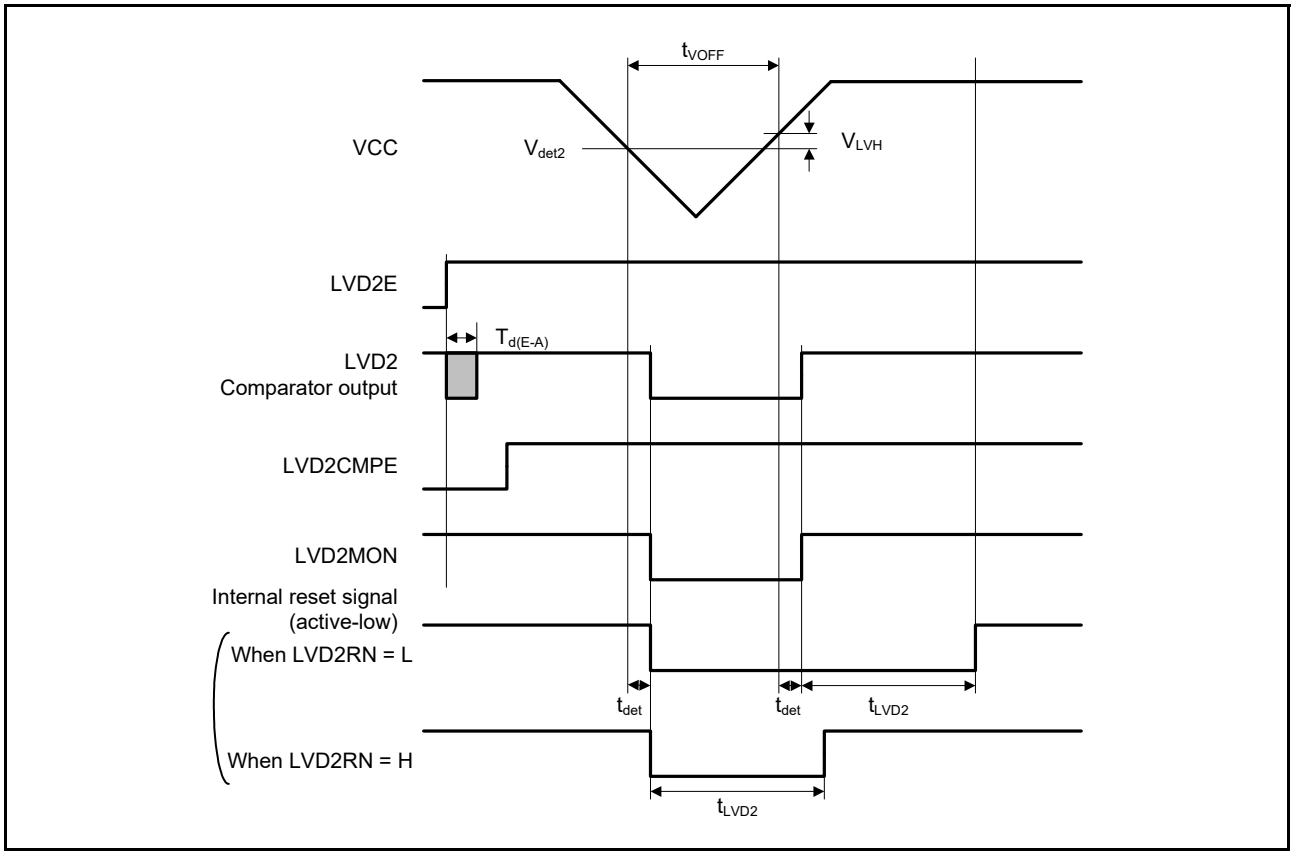


Figure 5.59 Voltage Detection Circuit Timing (V_{det2})

Table 5.41 ROM (Flash Memory for Code Storage) Characteristics (3): Middle-Speed Operating Mode

Conditions: VCC = 2.7 V to 5.5 V, AVCC0 = AVCC1 = AVCC2 = VREF = VCC to 5.5 V, VSS = AVSS0 = AVSS1 = AVSS2 = 0 V

Temperature range for the programming/erasure operation: T_a = –40 to +85°C

Item		Symbol	FCLK = 1 MHz			FCLK = 8 MHz			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Programming time	8-byte	t_{P8}	—	152.0	1367.0	—	97.9	936.0	µs
Erasure time	2-Kbyte	t_{E2K}	—	8.8	279.7	—	5.9	220.8	ms
	256-Kbyte (when block erase command used)	t_{E256K}	—	469.2	9816.9	—	100.5	2260.1	ms
	256-Kbyte (when all-block erase command used)	t_{EA256K}	—	464.0	9610.7	—	95.3	2053.7	ms
	512-Kbyte (when block erase command used)	t_{E512K}	—	928.0	19221.2	—	190.6	4107.3	ms
	512-Kbyte (when all-block erase command used)	t_{EA512K}	—	922.7	19015.0	—	185.4	3901.0	ms
Blank check time	8-byte	t_{BC8}	—	—	85.0	—	—	50.9	µs
	2-Kbyte	t_{BC2K}	—	—	1870.0	—	—	401.5	µs
Erase operation forcible stop time		t_{SED}	—	—	28.0	—	—	21.3	µs
Start-up area switching setting time		t_{SAS}	—	13.0	573.3	—	7.7	450.1	ms
Access window time		t_{AWS}	—	13.0	573.3	—	7.7	450.1	ms
ROM mode transition wait time 1		t_{DIS}	2.0	—	—	2.0	—	—	µs
ROM mode transition wait time 2		t_{MS}	3.0	—	—	3.0	—	—	µs

Note: Does not include the time until each operation of the flash memory is started after instructions are executed by software.

Note: The lower-limit frequency of FCLK is 1 MHz during programming or erasing of the flash memory. When using FCLK at below 4 MHz, the frequency can be set to 1 MHz, 2 MHz, or 3 MHz. A non-integer frequency such as 1.5 MHz cannot be set.

Note: The frequency accuracy of FCLK should be ±3.5%.