Renesas Electronics America Inc - R5F563TCEDFB#V0 Datasheet

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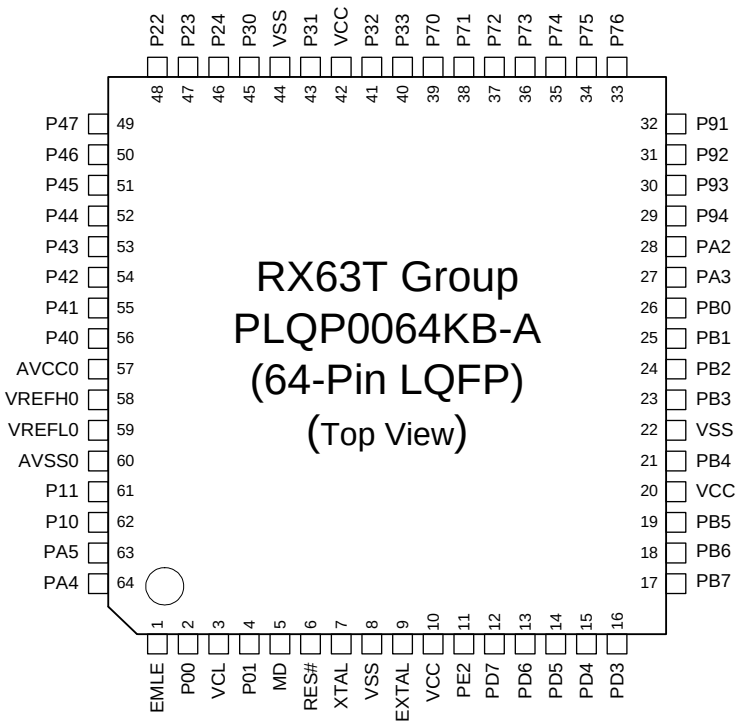
"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	EBI/EMI, I²C, LINbus, SCI, SPI
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	81
Program Memory Size	384KB (384K x 8)
Program Memory Type	FLASH
EEPROM Size	32K x 8
RAM Size	32K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 20x10b, 8x12b; D/A 2x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	144-LQFP
Supplier Device Package	144-LFQFP (20x20)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f563tcedfb-v0



Note: • This figure indicates the power supply pins and I/O port pins. For the pin configuration, see Table 1.9, List of Pins and Pin Functions (64-Pin LQFP).

Figure 1.7 Pin Assignment (64-Pin LQFP)

Table 1.5 List of Pins and Pin Functions (144-Pin LQFP) (3/4)

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
72		PG3		GTIOC6A	TXD3/SMOSI3/SSDA3		
73		PG2			SCK2	IRQ2	
74		PG1		GTIOC7B	RXD2/SMISO2/SSCL2	IRQ1	
75		PG0		GTIOC7A	TXD2/SMOSI2/SSDA2	IRQ0	
76		P76	D0/[A0/D0]	MTIOC4D/GTIOC2B			
77		P75	D1/[A1/D1]	MTIOC4C/GTIOC1B			
78		P74	D2/[A2/D2]	MTIOC3D/GTIOC0B			
79		P73	D3/[A3/D3]	MTIOC4B/GTIOC2A			
80		P72	D4/[A4/D4]	MTIOC4A/GTIOC1A			
81		P71	D5/[A5/D5]	MTIOC3B/GTIOC0A			
82		P70	D6/[A6/D6]	POE0#	CTS1#/RTS1#/SS1#	IRQ5-DS	
83		P33	D7/[A7/D7]	MTIOC3A/MTCLKA	SSLA3/SSLB3		
84		P32	D8/[A8/D8]	MTIOC3C/MTCLKB	SSLA2/SSLB2		
85	VCC						
86		P31	D9/[A9/D9]	MTIOC0A/MTCLKC	SSLA1/SSLB1		
87	VSS						
88		P30	D10/[A10/D10]	MTIOC0B/MTCLKD	SCK0/SSLA0/SSLB0		
89		P26	CS0#		TXD1/SMOSI1/SSDA1/SDA1		
90		P25	CS1#		SCK1/SCL1		
91		P24	D11/[A11/D11]		CTS0#/RTS0#/SS0#/RSPCKA/RSPCKB	IRQ4	
92		P23	D12/[A12/D12]	CACREF	TXD0/SMOSI0/SSDA0/MOSIA/MOSIB/CTX1		
93		P22	D13/[A13/D13]		RXD0/SMISO0/SSCL0/MISOA/MISOB/CRX1		ADTRG#
94		P21	D14/[A14/D14]	MTCLKA		IRQ6-DS	ADTRG1#
95		P20	D15/[A15/D15]	MTCLKB		IRQ7-DS	ADTRG0#
96		PC5					AN19
97		PC4					AN18
98		P65	A0/BC0#				AN5
99		P64	A1				AN4
100		PC3					AN17
101		PC2					AN16
102	AVCC						
103	VREF						
104	AVSS						
105		PC1					AN15
106		PC0					AN14
107		P63	A2				AN3
108		P62	A3				AN2
109		P61	A4				AN1

Table 1.6 List of Pins and Pin Functions (120-Pin LQFP) (2/4)

Pin Number 120-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
37	PLLVSS						
38		PB3	A15	MTIOC0A/CACREF	SCK0		
39		PB2		MTIOC0B	TXD0/SMOSI0/ SSDA0/SDA0		
40		PB1		MTIOC0C	RXD0/SMISO0/ SSCL0/SCL0	IRQ4	
41		PB0	A14	MTIOC0D	MOSIA/MOSIB		
42		PA5		MTIOC1A	RXD0/SMISO0/ SSCL0/ MISOA/MISOB		ADTRG1#
43		PA4		MTIOC1B	TXD0/SMOSI0/ SSDA0/RSPCKA/ RSPCKB		ADTRG0#
44		PA3		MTIOC2A	SCK0/SSLA0/SSLB0		
45		PA2		MTIOC2B	RXD2/SMISO2/ SSCL2/ SSLA1/SSLB1		
46		PA1		MTIOC6A	TXD2/SMOSI2/ SSDA2/SSLA2/SSLB2		
47		PA0		MTIOC6C	SCK2/SSLA3/SSLB3		
48	VCC						
49		P96	A13	POE4#	RXD1/SMISO1/SSCL1	IRQ4-DS	
50		PG6	CS2#		SCK1		
51	VSS						
52		P95		MTIOC6B/GTIOC4A	TXD1/SMOSI1/SSDA1		
53		P94		MTIOC7A/GTIOC5A	CTS1#/RTS1#/SS1#		
54		P93		MTIOC7B/GTIOC6A	CTS2#/RTS2#/SS2#		
55		P92		MTIOC6D/GTIOC4B			
56		P91		MTIOC7C/GTIOC5B			
57		P90		MTIOC7D/GTIOC6B			
58	TRCLK	PG5		POE12#	SCK3		ADTRG#
59	TRDATA3	PG4		GTIOC6B	RXD3/SMISO3/SSCL3	IRQ6	
60	TRDATA2	PG3		GTIOC6A	TXD3/SMOSI3/SSDA3		
61	TRDATA1	PG2			SCK2	IRQ2	
62	TRDATA0	PG1		GTIOC7B	RXD2/SMISO2/SSCL2	IRQ1	
63	TRSYNC	PG0		GTIOC7A	TXD2/SMOSI2/SSDA2	IRQ0	
64		P76	D0/[A0/D0]	MTIOC4D/GTIOC2B			
65		P75	D1/[A1/D1]	MTIOC4C/GTIOC1B			
66		P74	D2/[A2/D2]	MTIOC3D/GTIOC0B			
67		P73	D3/[A3/D3]	MTIOC4B/GTIOC2A			
68		P72	D4/[A4/D4]	MTIOC4A/GTIOC1A			
69		P71	D5/[A5/D5]	MTIOC3B/GTIOC0A			
70		P70	D6/[A6/D6]	POE0#	CTS1#/RTS1#/SS1#	IRQ5-DS	
71		P33	D7/[A7/D7]	MTIOC3A/MTCLKA	SSLA3/SSLB3		
72		P32	D8/[A8/D8]	MTIOC3C/MTCLKB	SSLA2/SSLB2		
73	VCC						
74		P31	D9/[A9/D9]	MTIOC0A/MTCLKC	SSLA1/SSLB1		

2.2.1 Register Associated with DSP Instructions

(1) Accumulator (ACC)

The accumulator (ACC) is a 64-bit register used for DSP instructions. The accumulator is also used for the multiply and multiply-and-accumulate instructions; EMUL, EMULU, FMUL, MUL, and RMPA, in which case the prior value in the accumulator is modified by execution of the instruction.
Use the MVTACHI and MVTACLO instructions for writing to the accumulator. The MVTACHI and MVTACLO instructions write data to the higher-order 32 bits (bits 63 to 32) and the lower-order 32 bits (bits 31 to 0), respectively.
Use the MVFACHI and MVFACMI instructions for reading data from the accumulator. The MVFACHI and MVFACMI instructions read data from the higher-order 32 bits (bits 63 to 32) and the middle 32 bits (bits 47 to 16), respectively.

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) (13/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 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) (26/48)

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

Table 4.1 List of I/O Registers (Address Order) (28/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 C293h	SYSTEM	Main Clock Oscillator Forced Oscillation Control Register	MOFCR	8	8	4, 5 PCLKB	2, 3 ICLK	Clock Generation Circuit	
0008 C296h	FLASH	Flash P/E Protection Register	FWEPROR	8	8	4, 5 PCLKB	2, 3 ICLK	ROM	
0008 C297h	SYSTEM	Voltage Monitoring Circuit Control Register	LVCMPCR	8	8	4, 5 PCLKB	2, 3 ICLK	LVDA	
0008 C298h	SYSTEM	Voltage Detection Level Select Register	LVDLVLR	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C29Ah	SYSTEM	Voltage Monitoring 1 Circuit Control Register 0	LVD1CR0	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C29Bh	SYSTEM	Voltage Monitoring 2 Circuit Control Register 0	LVD2CR0	8	8	4, 5 PCLKB	2, 3 ICLK		
0008 C2A0h to 0008 C2BFh	SYSTEM	Deep Standby Backup Register 0 to 31	DPSBKR0 to 31	8	8	4, 5 PCLKB	2, 3 ICLK	Low Power Consumption	
0008 C300h	ICU	Group 0 Interrupt Source Register	GRP00	32	32	1, 2 PCLKB	2 ICLK	ICUb	Not present in versions with 64 or 48 pins.
0008 C330h	ICU	Group 12 Interrupt Source Register	GRP12	32	32	1, 2 PCLKB	2 ICLK		
0008 C340h	ICU	Group 0 Interrupt Enable Register	GEN00	32	32	1, 2 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C370h	ICU	Group 12 Interrupt Enable Register	GEN12	32	32	1, 2 PCLKB	2 ICLK		
0008 C380h	ICU	Group 0 Interrupt Clear Register	GCR00	32	32	1, 2 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C4C0h	POE	Input Level Control/Status Register 1	ICSR1	16	8, 16	2, 3 PCLKB	2 ICLK	POE3	
0008 C4C2h	POE	Output Level Control/Status Register 1	OCSR1	16	8, 16	2, 3 PCLKB	2 ICLK		
0008 C4C4h	POE	Input Level Control/Status Register 2	ICSR2	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C4C6h	POE	Output Level Control/Status Register 2	OCSR2	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C4C8h	POE	Input Level Control/Status Register 3	ICSR3	16	8, 16	2, 3 PCLKB	2 ICLK		
0008 C4CAh	POE	Software Port Output Enable Register	SPOER	8	8	2, 3 PCLKB	2 ICLK		
0008 C4CBh	POE	Port Output Enable Control Register 1	POECR1	8	8	2, 3 PCLKB	2 ICLK		
0008 C4CCh	POE	Port Output Enable Control Register 2	POECR2	16	16	2, 3 PCLKB	2 ICLK		
0008 C4CEh	POE	Port Output Enable Control Register 3	POECR3	16	16	2, 3 PCLKB	2 ICLK		
0008 C4D0h	POE	Port Output Enable Control Register 4	POECR4	16	16	2, 3 PCLKB	2 ICLK		
0008 C4D2h	POE	Port Output Enable Control Register 5	POECR5	16	16	2, 3 PCLKB	2 ICLK		
0008 C4D4h	POE	Port Output Enable Control Register 6	POECR6	16	16	2, 3 PCLKB	2 ICLK		
0008 C4D6h	POE	Input Level Control/Status Register 4	ICSR4	16	8, 16	2, 3 PCLKB	2 ICLK		
0008 C4D8h	POE	Input Level Control/Status Register 5	ICSR5	16	8, 16	2, 3 PCLKB	2 ICLK		
0008 C4DAh	POE	Active Level Setting Register 1	ALR1	16	8, 16	2, 3 PCLKB	2 ICLK		
0008 C4DCh	POE	Input Level Control/Status Register 6	ICSR6	16	16	2, 3 PCLKB	2 ICLK		
0008 C4DEh	POE	Active Level Setting Register 2	ALR2	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C4E0h	POE	Input Level Control/Status Register 7	ICSR7	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C4E2h	POE	Port Output Enable Control Register 7	POECR7	16	16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C4E4h	POE	Port Output Enable Control Register 8	POECR8	16	16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1200h to 0009 13FFh	CAN1	Mailbox Register 0 to 31	MB0 to 31	128	8, 16, 32	2, 3 PCLKB	2 ICLK	CAN	Not present in versions with 64 or 48 pins.
0009 1400h to 0009 141Ch	CAN1	Mask Register 0 to 7	MKR0 to 7	32	8, 16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1420h	CAN1	FIFO Received ID Compare Register 0 and 1	FIDCR0	32	8, 16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1424h	CAN1	FIFO Received ID Compare Register 0 and 1	FIDCR1	32	8, 16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1428h	CAN1	Mask Invalid Register	MKIVLR	32	8, 16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 142Ch	CAN1	Mailbox Interrupt Enable Register	MIER	32	8, 16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1820h to 0009 183Fh	CAN1	Message Control Register 0 to 31	MCTL0 to 31	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (34/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000C 120Fh	MTU	Timer Output Control Register 2A	TOCR2A	8	8	4, 5 PCLKA	2, 3 ICLK	MTU3	
000C 1210h	MTU3	Timer Counter	TCNT	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1212h	MTU4	Timer Counter	TCNT	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1214h	MTU	Timer Cycle Data Register A	TCDRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1216h	MTU	Timer Dead Time Data Register A	TDDRA	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1218h	MTU3	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 121Ah	MTU3	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 121Ch	MTU4	Timer General Register A	TGRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 121Eh	MTU4	Timer General Register B	TGRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1220h	MTU	Timer Subcounter A	TCNTSA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1222h	MTU	Timer Cycle Buffer Register A	TCBRA	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1224h	MTU3	Timer General Register C	TGRC	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1226h	MTU3	Timer General Register D	TGRD	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1228h	MTU4	Timer General Register C	TGRC	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 122Ah	MTU4	Timer General Register D	TGRD	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 122Ch	MTU3	Timer Status Register	TSR	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 122Dh	MTU4	Timer Status Register	TSR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1230h	MTU	Timer Interrupt Skipping Set Register 1A	TITCR1A	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1231h	MTU	Timer Interrupt Skipping Counters 1A	TITCNT1A	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1232h	MTU	Timer Buffer Transfer Set Register A	TBTERA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1234h	MTU	Timer dead time enable register A	TDERA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1236h	MTU	Timer output level buffer register A	TOLBRA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1238h	MTU3	Timer Buffer Operation Transfer Mode Register	TBTM	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1239h	MTU4	Timer Buffer Operation Transfer Mode Register	TBTM	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 123Ah	MTU	Timer Interrupt Skipping Mode Register A	TITMRA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 123Bh	MTU	Timer Interrupt Skipping Set Register 2A	TITCR2A	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 123Ch	MTU	Timer Interrupt Skipping Counters 2A	TITCNT2A	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1240h	MTU4	Timer A/D Converter Start Request Control Register	TADCR	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1244h	MTU4	Timer A/D Converter Start Request Cycle Set Register A	TADCORA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1246h	MTU4	Timer A/D Converter Start Request Cycle Set Register B	TADCORB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1248h	MTU4	Timer A/D Converter Start Request Cycle Set Buffer Register A	TADCOBRA	16	16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 124Ah	MTU4	Timer A/D Converter Start Request Cycle Set Buffer Register B	TADCOBRB	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1260h	MTU	Timer Waveform Control Register A	TWCRA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1270h	MTU	Timer Mode Register 2A	TMDR2A	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1272h	MTU3	Timer General Register E	TGRE	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1274h	MTU4	Timer General Register E	TGRE	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1276h	MTU4	Timer General Register F	TGRF	16	16	4, 5 PCLKA	2, 3 ICLK		
000C 1280h	MTU	Timer Start Register A	TSTRA	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1281h	MTU	Timer Synchronous Register A	TSYRA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1282h	MTU	Timer Counter Synchronous Start Register	TCSYSTR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1284h	MTU	Timer Read/Write Enable Register A	TRWERA	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1300h	MTU0	Timer Control Register	TCR	8	8, 16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1301h	MTU0	Timer Mode Register 1	TMDR1	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1302h	MTU0	Timer I/O Control Register H	TIORH	8	8, 16	4, 5 PCLKA	2, 3 ICLK		
000C 1303h	MTU0	Timer I/O Control Register L	TIORL	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1304h	MTU0	Timer Interrupt Enable Register	TIER	8	8, 16, 32	4, 5 PCLKA	2, 3 ICLK		
000C 1305h	MTU0	Timer Status Register	TSR	8	8	4, 5 PCLKA	2, 3 ICLK		
000C 1306h	MTU0	Timer Counter	TCNT	16	16	4, 5 PCLKA	2, 3 ICLK		

Table 4.1 List of I/O Registers (Address Order) (47/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
000C3056h	DPC	Control Calculation Parameter Setting Register KQ2	PARAMKQ2	16	16	3 to 5 PCLKA	2, 3 ICLK	DPC	Not present in versions with 64 or 48 pins.
000C305Ah	DPC	Control Calculation Parameter Setting Register KF2	PARAMKF2	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C305Eh	DPC	Control Calculation Parameter Setting Register KP3	PARAMKP3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3062h	DPC	Control Calculation Parameter Setting Register KI3	PARAMKI3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3066h	DPC	Control Calculation Parameter Setting Register KQ3	PARAMKQ3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C306Ah	DPC	Control Calculation Parameter Setting Register KF3	PARAMKF3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C306Ch	DPC	Control Calculation Result Higher-Order Bits Store Register 0	RESULTU0	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C306Eh	DPC	Control Calculation Result Lower-Order Bits Store Register 0	RESULTL0	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3070h	DPC	Control Calculation Result Higher-Order Bits Store Register 1	RESULTU1	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3072h	DPC	Control Calculation Result Lower-Order Bits Store Register 1	RESULTL1	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3074h	DPC	Control Calculation Result Higher-Order Bits Store Register 2	RESULTU2	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3076h	DPC	Control Calculation Result Lower-Order Bits Store Register 2	RESULTL2	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3078h	DPC	Control Calculation Result Higher-Order Bits Store Register 3	RESULTU3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C307Ah	DPC	Control Calculation Result Lower-Order Bits Store Register 3	RESULTL3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C307Eh	DPC	Input Code Monitor Enable Register	TMONEN	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3082h	DPC	Maximum Input Code Monitor Register 0	TMONMAX0	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3086h	DPC	Minimum Input Code Monitor Register 0	TMONMIN0	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C308Ah	DPC	Maximum Input Code Monitor Register 1	TMONMAX1	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C308Eh	DPC	Minimum Input Code Monitor Register 1	TMONMIN1	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3092h	DPC	Maximum Input Code Monitor Register 2	TMONMAX2	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C3096h	DPC	Minimum Input Code Monitor Register 2	TMONMIN2	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C309Ah	DPC	Maximum Input Code Monitor Register 3	TMONMAX3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C309Eh	DPC	Minimum Input Code Monitor Register 3	TMONMIN3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C30A2h	DPC	Overvoltage Output Error Judgment Threshold Setting Register 0	ERRVTH0	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C30A6h	DPC	Overvoltage Output Error Judgment Threshold Setting Register 1	ERRVTH1	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C30AAh	DPC	Overvoltage Output Error Judgment Threshold Setting Register 2	ERRVTH2	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C30AEh	DPC	Overvoltage Output Error Judgment Threshold Setting Register 3	ERRVTH3	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
000C30B2h	DPC	PWM Shut-Down at Overvoltage Output Error Setting Register	ERRDWN	16	16	3 to 5 PCLKA	2, 3 ICLK		Not present in versions with 64 or 48 pins.
007F C402h	FLASH	Flash Mode Register	FMODR	8	8	2, 3 FCLK	2, 3 ICLK	ROM/ E2 DataFlash Memory	
007F C410h	FLASH	Flash Access Status Register	FASTAT	8	8	2, 3 FCLK	2, 3 ICLK		
007F C411h	FLASH	Flash Access Error Interrupt Enable Register	FAEINT	8	8	2, 3 FCLK	2, 3 ICLK		
007F C412h	FLASH	Flash Ready Interrupt Enable Register	FRDYIE	8	8	2, 3 FCLK	2, 3 ICLK	ROM	
007F C440h	FLASH	E2 DataFlash Read Enable Register 0	DFLRE0	16	16	2, 3 FCLK	2, 3 ICLK	E2 DataFlash Memory	
007F C442h	FLASH	E2 DataFlash Read Enable Register 1	DFLRE1	16	16	2, 3 FCLK	2, 3 ICLK		
007F C450h	FLASH	E2 DataFlash P/E Enable Register 0	DFLWE0	16	16	2, 3 FCLK	2, 3 ICLK		
007F C452h	FLASH	E2 DataFlash P/E Enable Register 1	DFLWE1	16	16	2, 3 FCLK	2, 3 ICLK		

Table 5.6 Permissible Power Consumption (G version product only)

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

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

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

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

Ta = -40 to +105°C. Ta is common to conditions 1 to 3.

Item	Symbol	Typ.	Max.	Unit	Test Conditions
Total permissible power consumption*1	Pd	—	345	mW	85°C < Ta ≤ 105°C

Note: • Please contact Renesas Electronics sales office for derating of operation under Ta = +85°C to +105°C. Derating is the systematic reduction of load for the sake of improved reliability.

Note 1. The total power consumption of the whole chip including output current.

5.3.1 Reset Timing

Table 5.8 Reset Timing

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

$T_a = T_{opr}$. T_a is common to conditions 1 to 3.

Item		Symbol	Min.	Typ.	Max.	Unit	Test Conditions
RES# pulse width	Power-on	t_{RESWP}	2	—	—	ms	Figure 5.1
	Deep software standby mode	t_{RESWD}	1	—	—	ms	Figure 5.2
	Software standby mode	t_{RESWS}	1	—	—	ms	
	Programming or erasure of the ROM or E2 DataFlash memory or blank checking of the E2 DataFlash memory	t_{RESWF}	200	—	—	µs	
	Other than above	t_{RESW}	200	—	—	µs	
Wait time after RES# cancellation		t_{RESWT}	59	—	60	t_{cyc}	
Internal reset time (independent watchdog timer reset, watchdog timer reset, software reset)		t_{RESW2}	112	—	120	t_{cyc}	

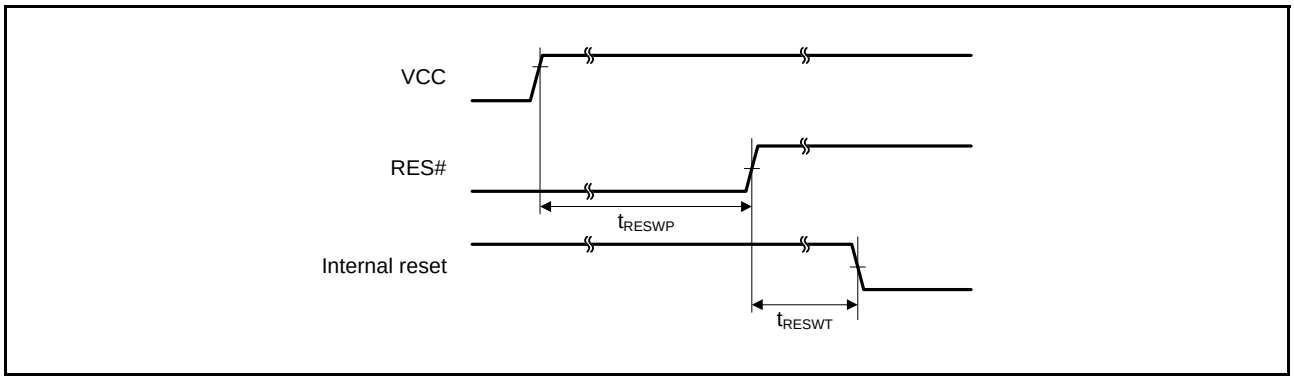


Figure 5.1 Reset Input Timing at Power-On

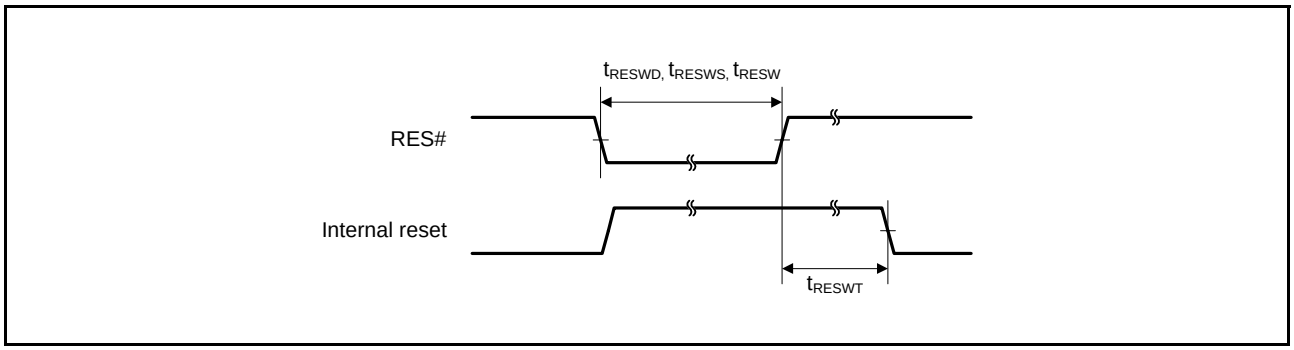


Figure 5.2 Reset Input Timing

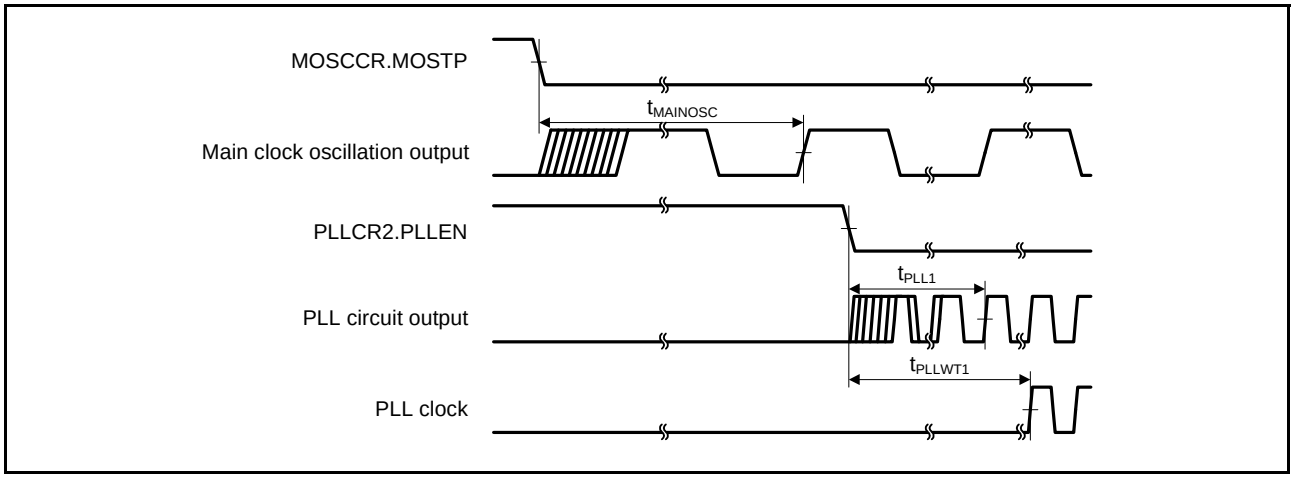


Figure 5.7 PLL Clock Oscillation Start Timing (PLL is Operated after Main Clock Oscillation Has Settled)

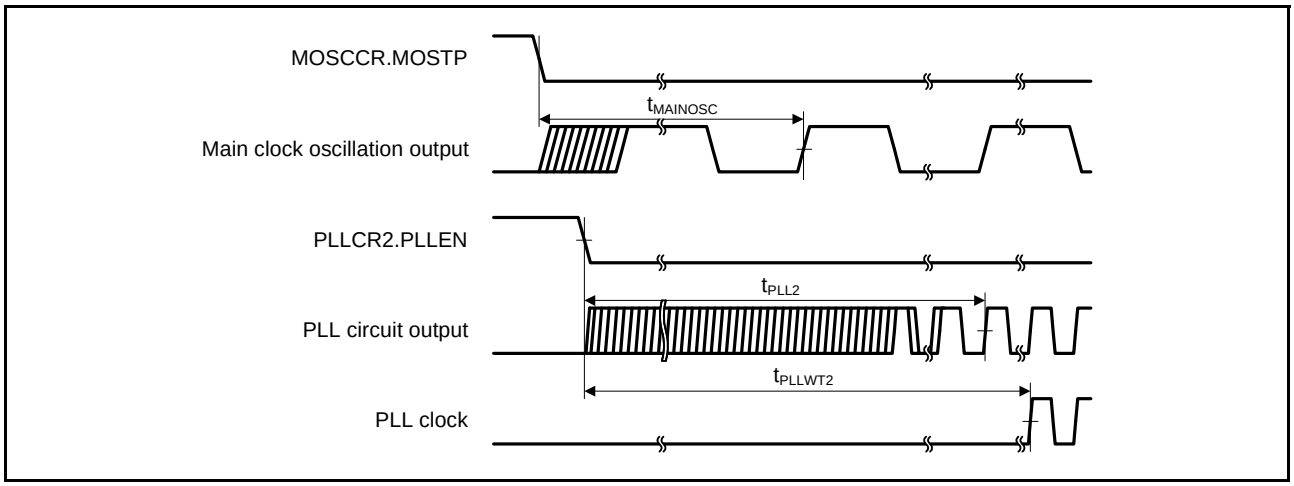


Figure 5.8 PLL Clock Oscillation Start Timing (PLL is Operated before Main Clock Oscillation Has Settled)

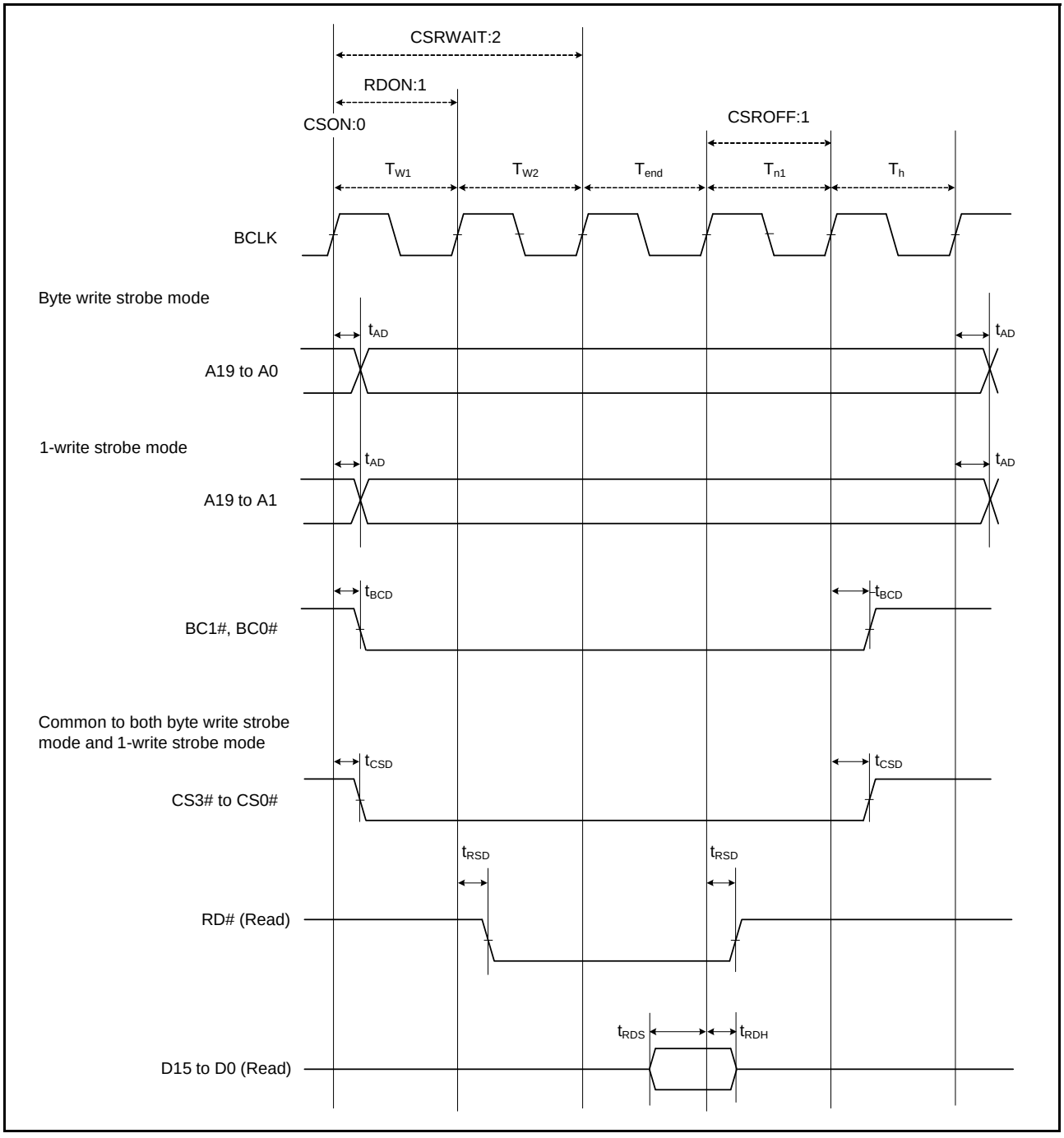


Figure 5.13 External Bus Timing/Normal Read Cycle (Bus Clock Synchronized)

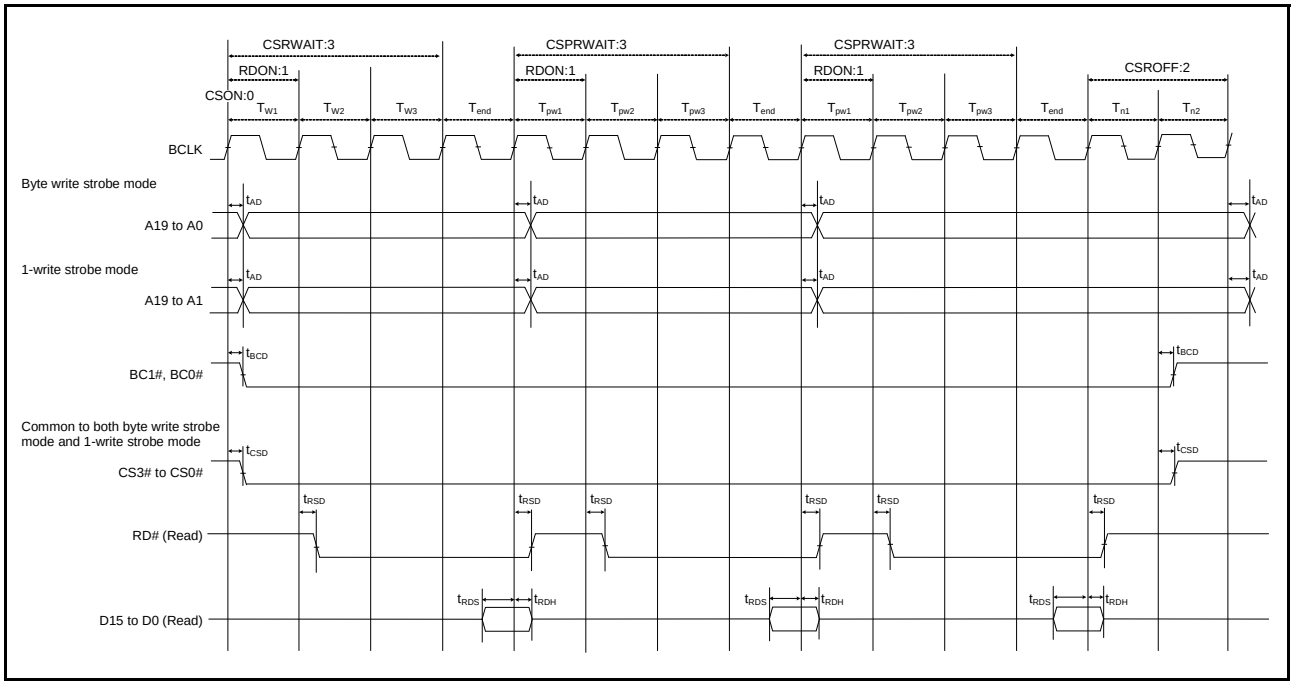
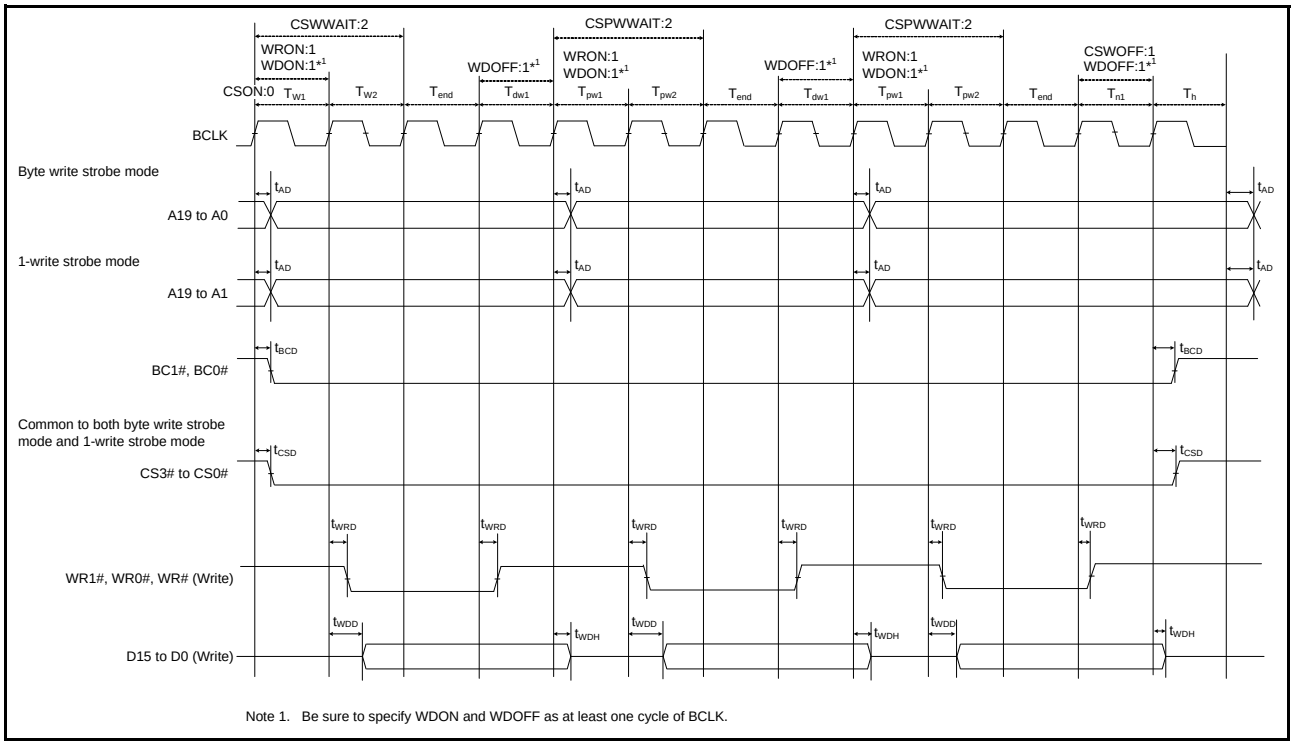


Figure 5.15 External Bus Timing/Page Read Cycle (Bus Clock Synchronized)



Note 1. Be sure to specify WDON and WDOFF as at least one cycle of BCLK.

Figure 5.16 External Bus Timing/Page Write Cycle (Bus Clock Synchronized)

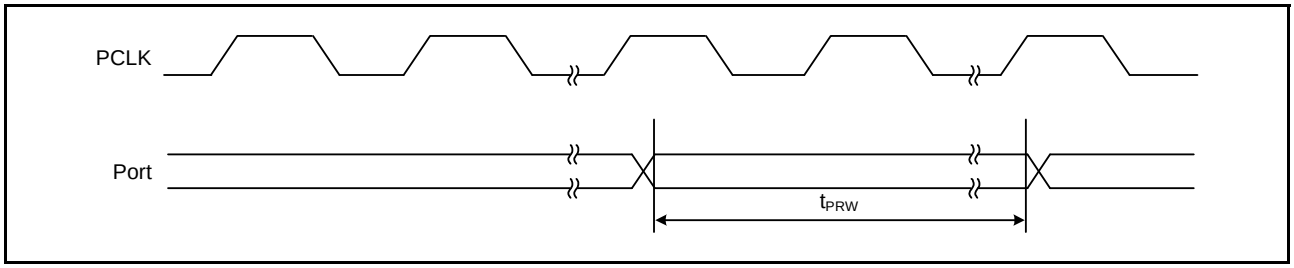


Figure 5.20 I/O port Input Timing

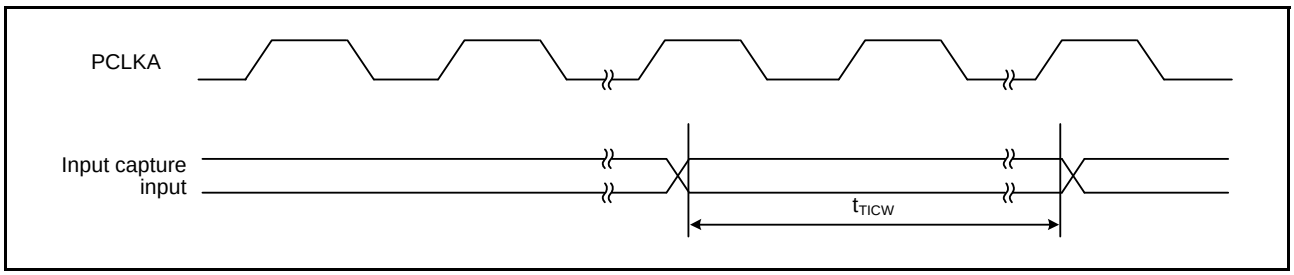


Figure 5.21 MTU3 Input/Output Timing

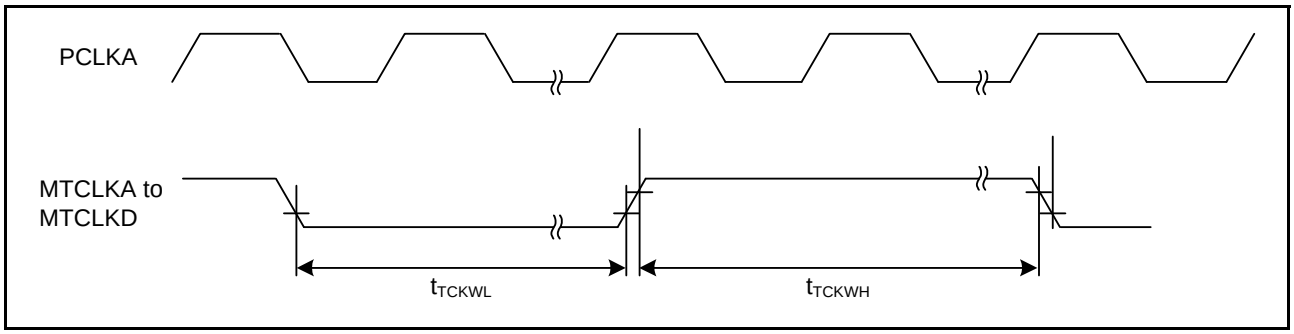


Figure 5.22 MTU3 Clock Input Timing

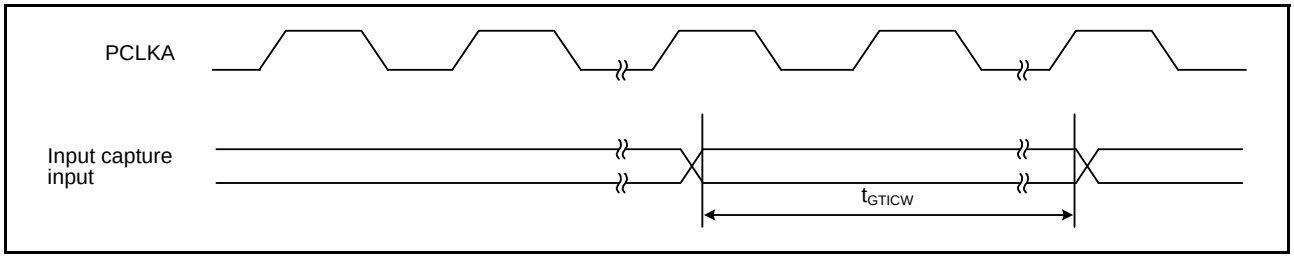


Figure 5.23 GPT Input Capture Input Timing

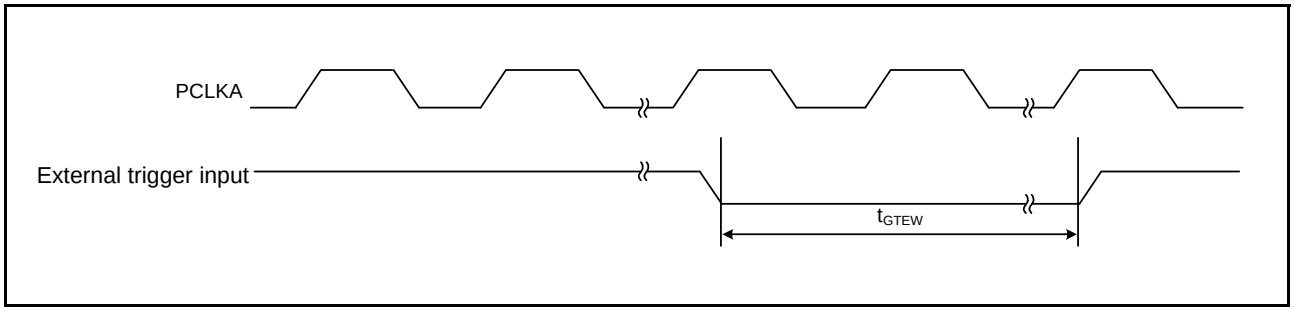


Figure 5.24 GPT External Trigger Input Timing

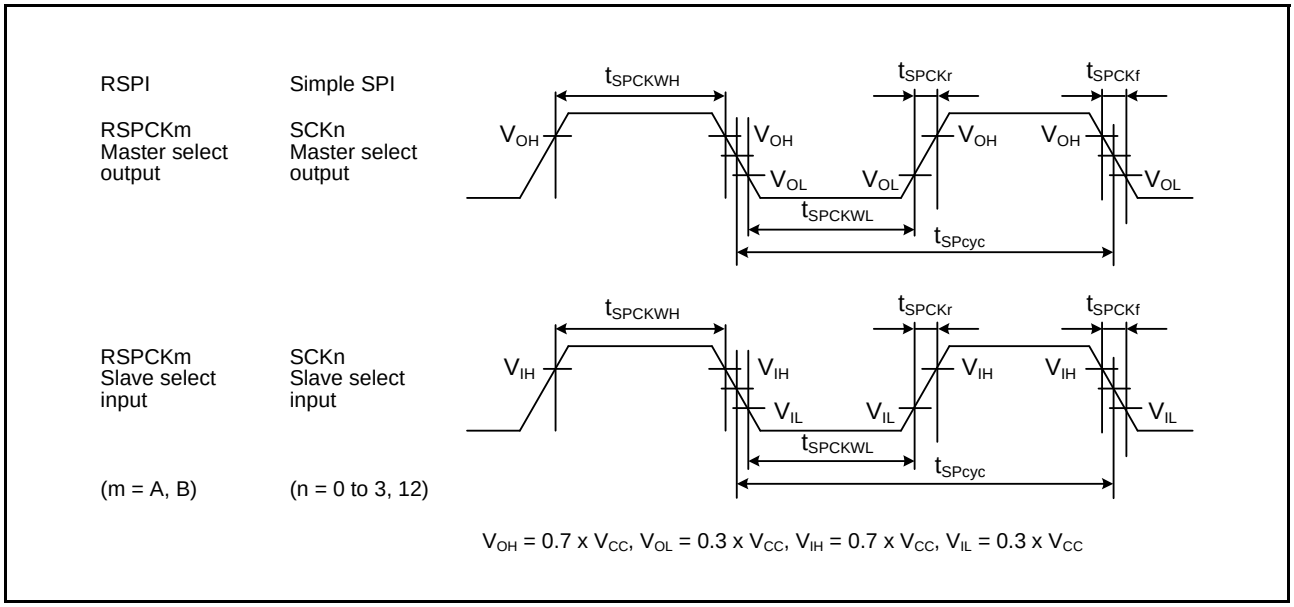


Figure 5.29 RSPI Clock Timing and Simple SPI Clock Timing

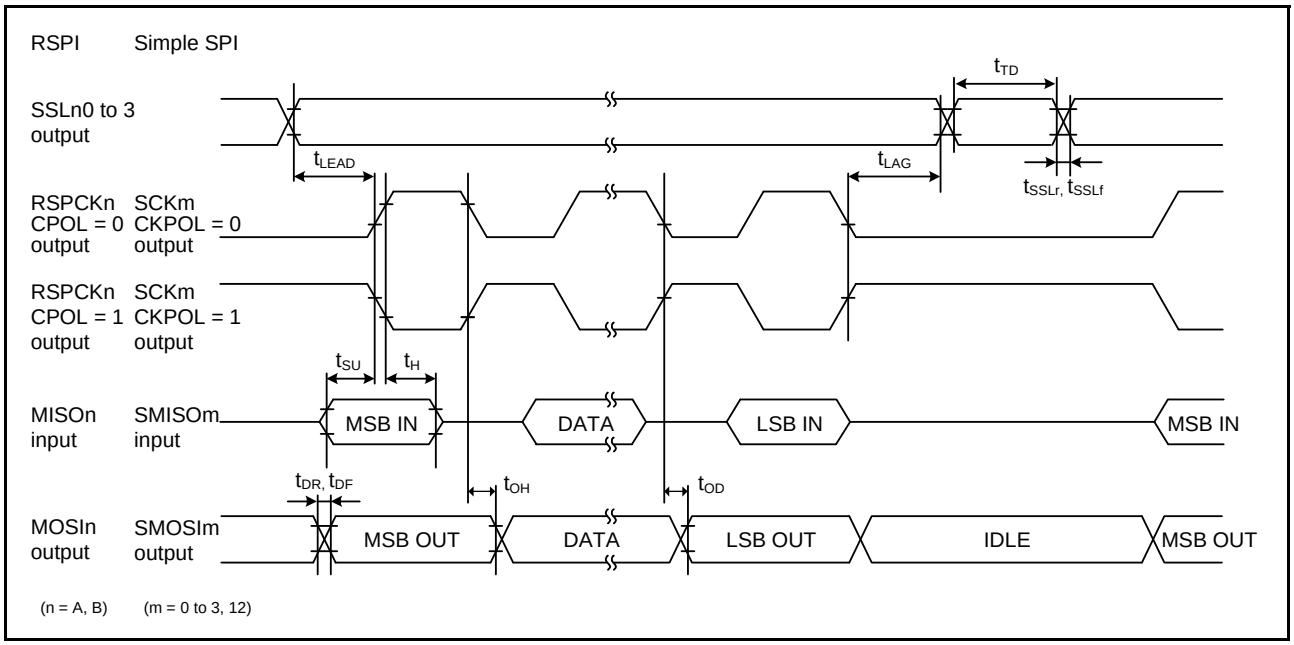


Figure 5.30 RSPI Timing (Master, CPHA = 0) (Bit Rate: PCLKB Division Ratio Set to a Value Other Than 1/2) and Simple SPI Timing (Master, CKPH = 1)

6. Electrical Characteristics [64- and 48-Pin Versions]

6.1 Absolute Maximum Ratings

Table 6.1 Absolute Maximum Ratings

Item		Symbol	Value	Unit
Power supply voltage		VCC	–0.3 to +4.6	V
Input voltage (except for ports for 5 V tolerant*1 and port 4)		Vin	–0.3 to VCC+0.3	V
Input voltage (port 4)		Vin	–0.3 to AVCC0+0.3	V
Input voltage (ports for 5 V tolerant)*1		Vin	–0.3 to +5.8	V
Analog power supply voltage		AVCC0*2	–0.3 to +4.6	V
Reference power supply voltage		VREFH0*2	–0.3 to AVCC0+0.3	V
Analog input voltage (port 4)		V_{AN}	–0.3 to AVCC0+0.3	V
Operating temperature	D version product	Topr	–40 to +85	°C
	G version product	Topr	–40 to +105	°C
Storage temperature		Tstg	–55 to +125	°C

Caution: Permanent damage to the LSI may result if absolute maximum ratings are exceeded.

Note 1. Ports 0, 1, 2, 3, 7, 9, A, B, and D are 5 V tolerant.

Note 2. When the A/D converter is not in use, do not leave the AVCC0, VREFH0, VREFL0, and AVSS0 pins open. Connect the AVCC0 and VREFH0 pins to VCC, and the AVSS0 and VREFL0 pins to VSS, respectively.

6.8 E^2 DataFlash Characteristic

Table 6.22 E^2 DataFlash (Flash Memory for Data Storage) Characteristics (1)

Conditions: VCC = 2.7 to 3.6 V, VSS = AVSS0 = VREFL0 = 0 V
AVCC0 = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0
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	Ta = +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 = 1000), 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 6.23 E^2 DataFlash (Flash Memory for Data Storage) Characteristics (2)

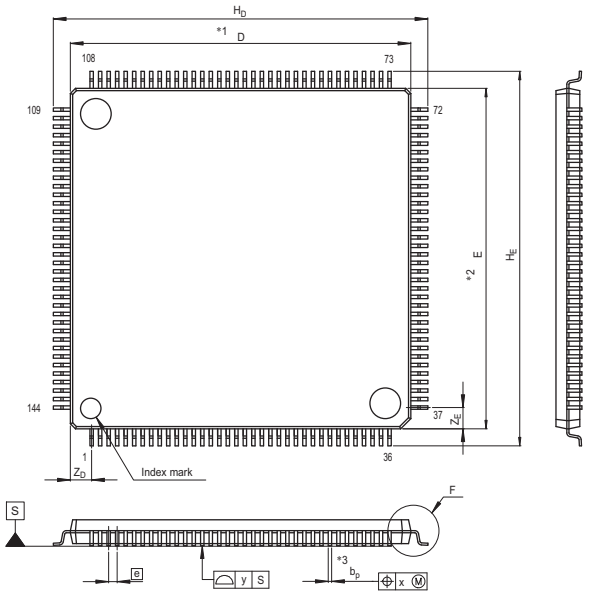
Conditions: VCC = 2.7 to 3.6 V, VSS = AVSS0 = VREFL0 = 0 V,
AVCC0 = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0,
Ta = T_{opr}

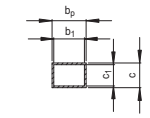
Item		Symbol	min	typ	max	Unit	Test Condition
Programming time	2 bytes	t_{DP2}	—	0.25	2	ms	FCLK = 50 MHz
Erasure time	32 bytes	t_{DE32}	—	2	20	ms	FCLK = 50 MHz $N_{DPEC} \leq 100$
	32 bytes	t_{DE32}	—	4	20	ms	FCLK = 50 MHz $N_{DPEC} > 100$
Blank check time	2 bytes	t_{DBC2}	—	—	30	µs	FCLK = 50 MHz
Suspend delay time during programming		t_{DSPD}	—	—	120	µs	Figure 6.31 PCLKB = 50 MHz
First suspend delay time during erasing (in suspend priority mode)		t_{DSESD1}	—	—	120	µs	
Second suspend delay time during erasing (in suspend priority mode)		t_{DSESD2}	—	—	300	µs	
Suspend delay time during erasing (in erasure priority mode)		t_{DSEED}	—	—	300	µs	

Appendix 1. Package Dimensions

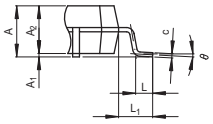
Information on the latest version of the package dimensions or mountings has been displayed in “Packages” on Renesas Electronics Corporation website.

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-LQFP144-20x20-0.50	PLQP0144KA-A	144P6Q-A / FP-144L / FP-144LV	1.2g





Terminal cross section



Detail F

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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	19.9	20.0	20.1
E	19.9	20.0	20.1
A_2	—	1.4	—
H_D	21.8	22.0	22.2
H_E	21.8	22.0	22.2
A	—	—	1.7
A_1	0.05	0.1	0.15
b_p	0.17	0.22	0.27
b_1	—	0.20	—
c	0.09	0.145	0.20
c_1	—	0.125	—
θ	0°	—	8°
e	—	0.5	—
x	—	—	0.08
y	—	—	0.10
Z_D	—	1.25	—
Z_E	—	1.25	—
L	0.35	0.5	0.65
L_1	—	1.0	—

Figure A 144-Pin LQFP (PLQP0144KA-A)