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Details

Product Status	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	EBI/EMI, I ² C, LINbus, SCI, SPI
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	72
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	120-LQFP
Supplier Device Package	120-LQFP (16x16)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f563teddfa-v1

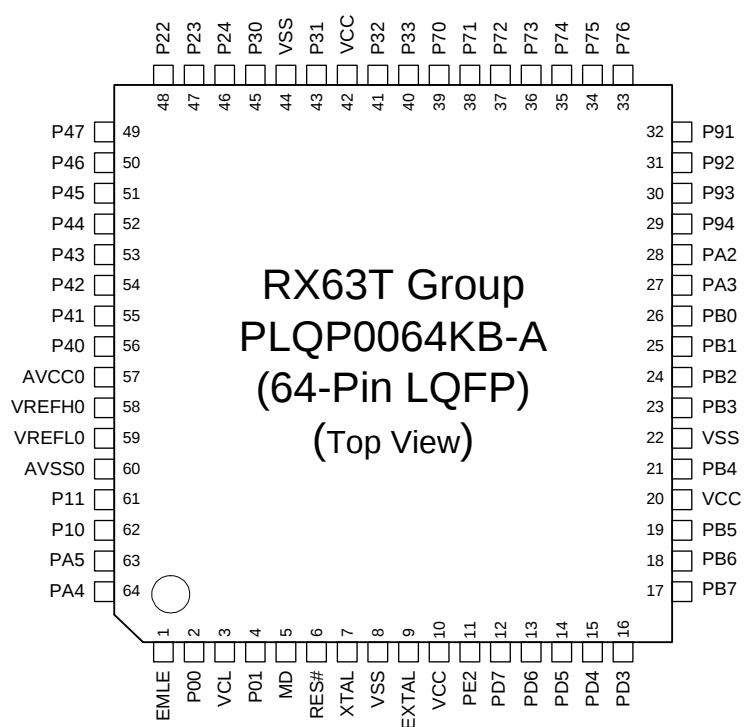


Figure 1.7 Pin Assignment (64-Pin LQFP)

Table 1.7 List of Pins and Pin Functions (112-Pin LQFP) (3/4)

Pin Number 112-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SCIC, SCID, RSPI, RIIC, CAN)	Interrupt	S12ADB, AD, DA
74		P23	D12/[A12/ D12]	CACREF	TXD0/SMOSI0/ SSDA0/MOSIA/ MOSIB/CTX1		
75		P22	D13/[A13/ D13]		RXD0/SMISO0/ SSCL0/MISOA/ MISOB/CRX1		ADTRG#
76		P21	D14/[A14/ D14]	MTCLKA		IRQ6-DS	ADTRG1#
77		P20	D15/[A15/ D15]	MTCLKB		IRQ7-DS	ADTRG0#
78		P65	A0/BC0#				AN5
79		P64	A1				AN4
80	AVCC						
81	VREF						
82	AVSS						
83		P63	A2				AN3
84		P62	A3				AN2
85		P61	A4				AN1
86		P60	A5				AN0
87		P55					AN11/DA1
88		P54					AN10/ DA0
89		P53	A6				AN9
90		P52	A7				AN8
91		P51					AN7
92		P50					AN6
93		P47					AN103/ CVREFH
94		P46					AN102
95		P45					AN101
96		P44					AN100
97		P43					AN003/ CVREFL
98		P42					AN002
99		P41					AN001
100		P40					AN000
101	AVCC0						
102	VREFH0						
103	VREFL0						
104	AVSS0						
105		P82	WAIT#	MTIC5U	SCK12	IRQ3	
106		P81	A8	MTIC5V	TXD12/SMOSI12/ SSDA12/TXD12/ SIOX12		
107		P80	A9	MTIC5W	RXD12/SMISO12/ SSCL12/RDX12	IRQ5	
108		P12	CS3#				
109		P11	ALE	MTCLKC		IRQ1-DS	

Table 1.7 List of Pins and Pin Functions (112-Pin LQFP) (4/4)

Pin Number 112-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SCIc, SCId, RSPI, RIIC, CAN)	Interrupt	S12ADB, AD, DA
110		P10		MTCLKD		IRQ0-DS	
111	TRST#	P05	WAIT#/CS2#				
112	TMS	P04					

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

Table 1.8 List of Pins and Pin Functions (100-Pin LQFP) (1/3)

Pin Number 100-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SCIc, SCId, RSPI, RIIC, CAN)	Interrupt	S12ADB, AD, DA
1		PE5	BCLK			IRQ0	
2	EMLE						
3	VSS						
4		P01	RD#		CTS0#/RTS0#/SS0#		
5	VCL						
6		P00	CS1#	CACREF			
7	MD/FINED						
8		PE4	A10	POE10#/MTCLKC		IRQ1	
9		PE3	A11	POE11#/MTCLKD		IRQ2-DS	
10	RES#						
11	XTAL						
12	VSS						
13	EXTAL						
14	VCC						
15		PE2		POE10#		NMI	
16		PE1	WR0#/WR#		CTS12#/RTS12#/ SS12#/SSLA3/SSLB3		
17		PE0	WR1#/BC1#/ WAIT#		SSLA2/SSLB2/CRX1	IRQ7	
18	TRST#	PD7		GTIOC0A	CTS0#/RTS0#/SS0#/ SSLA1/SSLB1/CTX1		
19	TMS	PD6		GTIOC0B	SSLA0/SSLB0		
20	TDI	PD5		GTIOC1A	RXD1/SMISO1/SSCL1	IRQ6	
21	TCK/FINEC	PD4		GTIOC1B	SCK1		
22	TDO	PD3		GTIOC2A	TXD1/SMOSI1/SSDA1		
23		PD2	CS2#	GTIOC2B	MOSIA/MOSIB		
24		PD1	CS0#	GTIOC3A	MISOA/MISOB		
25		PD0	A12	GTIOC3B	RSPCKA/RSPCKB		
26		PB7	A19		SCK12		
27		PB6	A18		RXD12/SMISO12/ SSCL12/RDX12/ CRX1	IRQ2	
28		PB5	A17		TXD12/SMOSI12/ SSDA12/TDX12/ SIOX12/CTX1		
29	PLLVCC						
30		PB4	A16	POE8#/GTETRG0		IRQ3-DS	
31	PLLVSS						
32		PB3	A15	MTIOC0A/CACREF	SCK0		
33		PB2		MTIOC0B	TXD0/SMOSI0/ SSDA0/SDA0		
34		PB1		MTIOC0C	RXD0/SMISO0/ SSCL0/SCL0	IRQ4	
35		PB0	A14	MTIOC0D	MOSIA/MOSIB		
36		PA5		MTIOC1A	RXD0/SMISO0/ SSCL0/ MISOA/MISOB		ADTRG1#

Table 1.9 List of Pins and Pin Functions (64-Pin LQFP) (3/3)

Pin Number 64-Pin LQFP	Power Supply Clock System Control	I/O Port	POE3	Timer (MTU3, GPT, CAC)	Communications		Interrupt	S12ADB
					(SC1c, SC1d)	(RSPI, RIIC)		
50		P46						AN006
51		P45						AN005
52		P44						AN004
53		P43						AN003 CVREFL
54		P42						AN002
55		P41						AN001
56		P40						AN000
57	AVCC0							
58	VREFH0							
59	VREFL0							
60	AVSS0							
61		P11		MTCLKC			IRQ1-DS	
62		P10		MTCLKD			IRQ0-DS	
63		PA5		MTIOC1A		MISOA		
64		PA4		MTIOC1B		RSPCKA		ADTRG0#

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

Pin Number 64-Pin LQFP	Power Supply Clock System Control	I/O Port	POE3	Timer (MTU3, GPT, CAC)	Communications		Interrupt	S12ADB
					(SC1c, SC1d)	(RSPI, RIIC)		
26		P74		MTIOC3D GTIOC0B MTIOC6D				
27		P73		MTIOC4B GTIOC2A MTIOC7B				
28		P72		MTIOC4A GTIOC1A MTIOC7A				
29		P71		MTIOC3B GTIOC0A MTIOC6B				
30		P70	POE0#		CTS1# RTS1# SS1#		IRQ5-DS	
31	VCC							
32		P30		MTIOC0B MTCLKD	TXD0 SMOSI0 SSDA0	SSLA0		
33	VSS							
34		P24		MTIC5U MTCLKC	RXD0 SMISO0 SSCL0	RSPCKA		
35		P23		MTIC5V MTCLKB CACREF	SCK0	MOSIA		
36		P22		MTIC5W MTCLKA	CTS0# RTS0# SS0#	MISOA		
37		P47						AN007 CVREFH
38		P44						AN004
39		P43						AN003 CVREFL
40		P42						AN002
41		P41						AN001
42		P40						AN000
43	AVCC0							
44	VREFH0							
45	VREFL0							
46	AVSS0							
47	VCL							
48	EMLE							

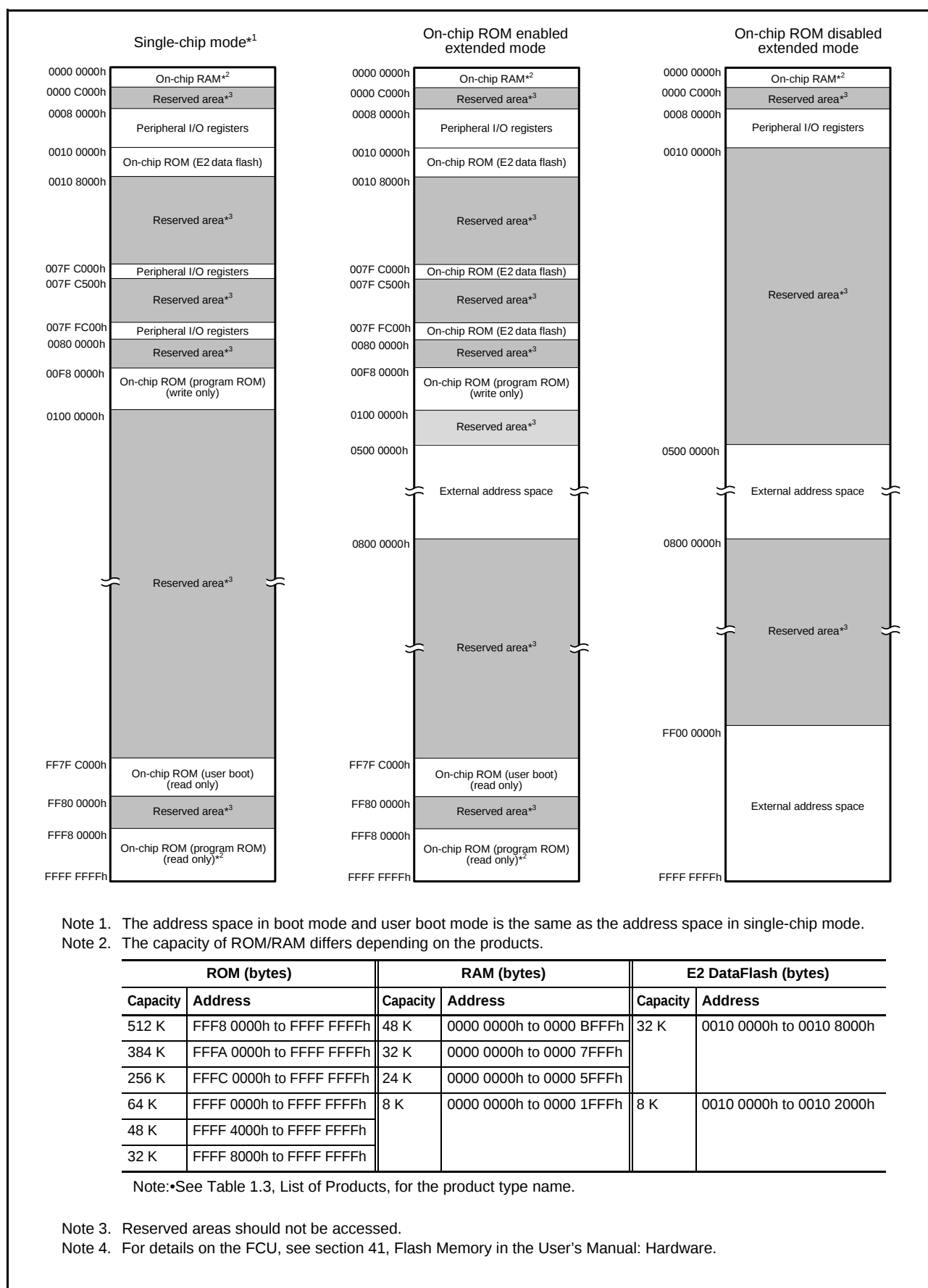


Figure 3.1 Memory Map in Each Operating Mode

Table 4.1 List of I/O Registers (Address Order) (25/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 C14Ch	MPC	P14 Pin Function Control Register	P14PFS	8	8	2, 3 PCLKB	2 ICLK	MPC	Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C150h	MPC	P20 Pin Function Control Register	P20PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C151h	MPC	P21 Pin Function Control Register	P21PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C152h	MPC	P22 Pin Function Control Register	P22PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C153h	MPC	P23 Pin Function Control Register	P23PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C154h	MPC	P24 Pin Function Control Register	P24PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C155h	MPC	P25 Pin Function Control Register	P25PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 C156h	MPC	P26 Pin Function Control Register	P26PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
0008 C158h	MPC	P30 Pin Function Control Register	P30PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C159h	MPC	P31 Pin Function Control Register	P31PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C15Ah	MPC	P32 Pin Function Control Register	P32PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C15Bh	MPC	P33 Pin Function Control Register	P33PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C15Ch	MPC	P34 Pin Function Control Register	P34PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C15Dh	MPC	P35 Pin Function Control Register	P35PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C160h	MPC	P40 Pin Function Control Register	P40PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C161h	MPC	P41 Pin Function Control Register	P41PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C162h	MPC	P42 Pin Function Control Register	P42PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C163h	MPC	P43 Pin Function Control Register	P43PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C164h	MPC	P44 Pin Function Control Register	P44PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C165h	MPC	P45 Pin Function Control Register	P45PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C166h	MPC	P46 Pin Function Control Register	P46PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C167h	MPC	P47 Pin Function Control Register	P47PFS	8	8	2, 3 PCLKB	2 ICLK		
0008 C168h	MPC	P50 Pin Function Control Register	P50PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C169h	MPC	P51 Pin Function Control Register	P51PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C16Ah	MPC	P52 Pin Function Control Register	P52PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C16Bh	MPC	P53 Pin Function Control Register	P53PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C16Ch	MPC	P54 Pin Function Control Register	P54PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C16Dh	MPC	P55 Pin Function Control Register	P55PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C16Eh	MPC	P56 Pin Function Control Register	P56PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C16Fh	MPC	P57 Pin Function Control Register	P57PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 120, 112, 100, 64, or 48 pins.
0008 C170h	MPC	P60 Pin Function Control Register	P60PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C171h	MPC	P61 Pin Function Control Register	P61PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C172h	MPC	P62 Pin Function Control Register	P62PFS	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C173h	MPC	P63 Pin Function Control Register	P63PFS	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) (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) (29/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0009 1840h	CAN1	Control Register	CTLR	16	8, 16	2, 3 PCLKB	2 ICLK	CAN	Not present in versions with 64 or 48 pins.
0009 1842h	CAN1	Status Register	STR	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1844h	CAN1	Bit Configuration Register	BCR	32	8, 16, 32	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1848h	CAN1	Receive FIFO Control Register	RFCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1849h	CAN1	Receive FIFO Pointer Control Register	RFPCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 184Ah	CAN1	Transmit FIFO Control Register	TFCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 184Bh	CAN1	Transmit FIFO Pointer Control Register	TFPCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 184Ch	CAN1	Error Interrupt Enable Register	EIER	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 184Dh	CAN1	Error Interrupt Factor Judge Register	EIFR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 184Eh	CAN1	Receive Error Count Register	RECR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 184Fh	CAN1	Transmit Error Count Register	TECR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1850h	CAN1	Error Code Store Register	ECSR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1851h	CAN1	Channel Search Support Register	CSSR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1852h	CAN1	Mailbox Search Status Register	MSSR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1853h	CAN1	Mailbox Search Mode Register	MSMR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1854h	CAN1	Time Stamp Register	TSR	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1856h	CAN1	Acceptance Filter Support Register	AFSR	16	8, 16	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0009 1858h	CAN1	Test Control Register	TCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
000A 0000h	USB0	System Configuration Control Register	SYSCFG	16	16	3, 4 PCLKB	2, 3 ICLK	USBa	Not present in versions with 112, 100, 64, or 48 pins.
000A 0004h	USB0	System Configuration Status Register 0	SYSSTS0	16	16	9 PCLKB or more			Not present in versions with 112, 100, 64, or 48 pins.
000A 0008h	USB0	Device State Control Register 0	DVSTCTR0	16	16	9 PCLKB or more			Not present in versions with 112, 100, 64, or 48 pins.
000A 0014h	USB0	CFIFO Port Register	CFIFO	16	8, 16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 0018h	USB0	D0FIFO Port Register	D0FIFO	16	8, 16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 001Ch	USB0	D1FIFO Port Register	D1FIFO	16	8, 16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 0020h	USB0	CFIFO Port Select Register	CFIFOSEL	16	16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 0022h	USB0	CFIFO Port Control Register	CFIFOCTR	16	16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 0028h	USB0	D0FIFO Port Select Register	D0FIFOSEL	16	16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 002Ah	USB0	D0FIFO Port Control Register	D0FIFOCTR	16	16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.
000A 002Ch	USB0	D1FIFO Port Select Register	D1FIFOSEL	16	16	3, 4 PCLKB	2, 3 ICLK		Not present in versions with 112, 100, 64, or 48 pins.

5.3 AC Characteristics

Table 5.7 Operation Frequency Value

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
Operation frequency	System clock (ICLK)	f	—	—	100	MHz
	Peripheral module clock (PCLK) *1		—	—	50	
	Timer module clock (PCLKA)		—	—	100	
	AD clock (PCLKC)		—	—	100	
	S12AD clock (PCLKD)		—	—	50	
	FlashIF clock (FCLK)		—	—	50	
	External bus clock (BCLK)		—	—	50	
	BCLK pin output		—	—	25	
	USB clock (UCLK)		—	—	48	

Note 1. The PCLK must run at a frequency of at least 24 MHz when the USB is in use.

5.3.4 Control Signal Timing

Table 5.11 Control Signal 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
NMI pulse width	t_{NMIW}	200	—	—	ns	$t_c(PCLK) \times 2 \leq 200$ ns, Figure 5.11
		$t_c(PCLK) \times 2$	—	—	ns	$t_c(PCLK) > 200$ ns, Figure 5.11
IRQ pulse width	t_{IRQW}	200	—	—	ns	$t_c(PCLK) \leq 200$ ns, Figure 5.12
		$t_c(PCLK) \times 2$	—	—	ns	$t_c(PCLK) > 200$ ns, Figure 5.12

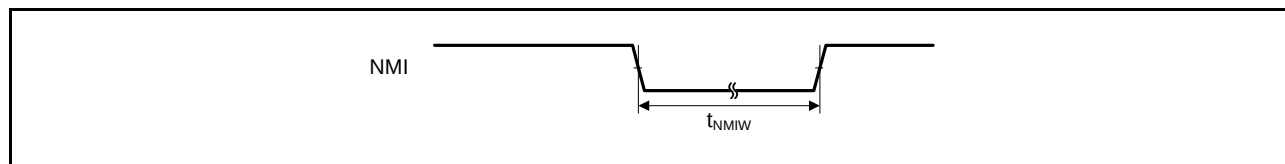


Figure 5.11 NMI Interrupt Input Timing

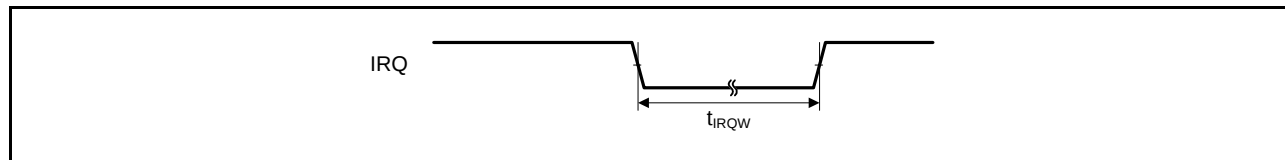


Figure 5.12 IRQ Interrupt Input Timing

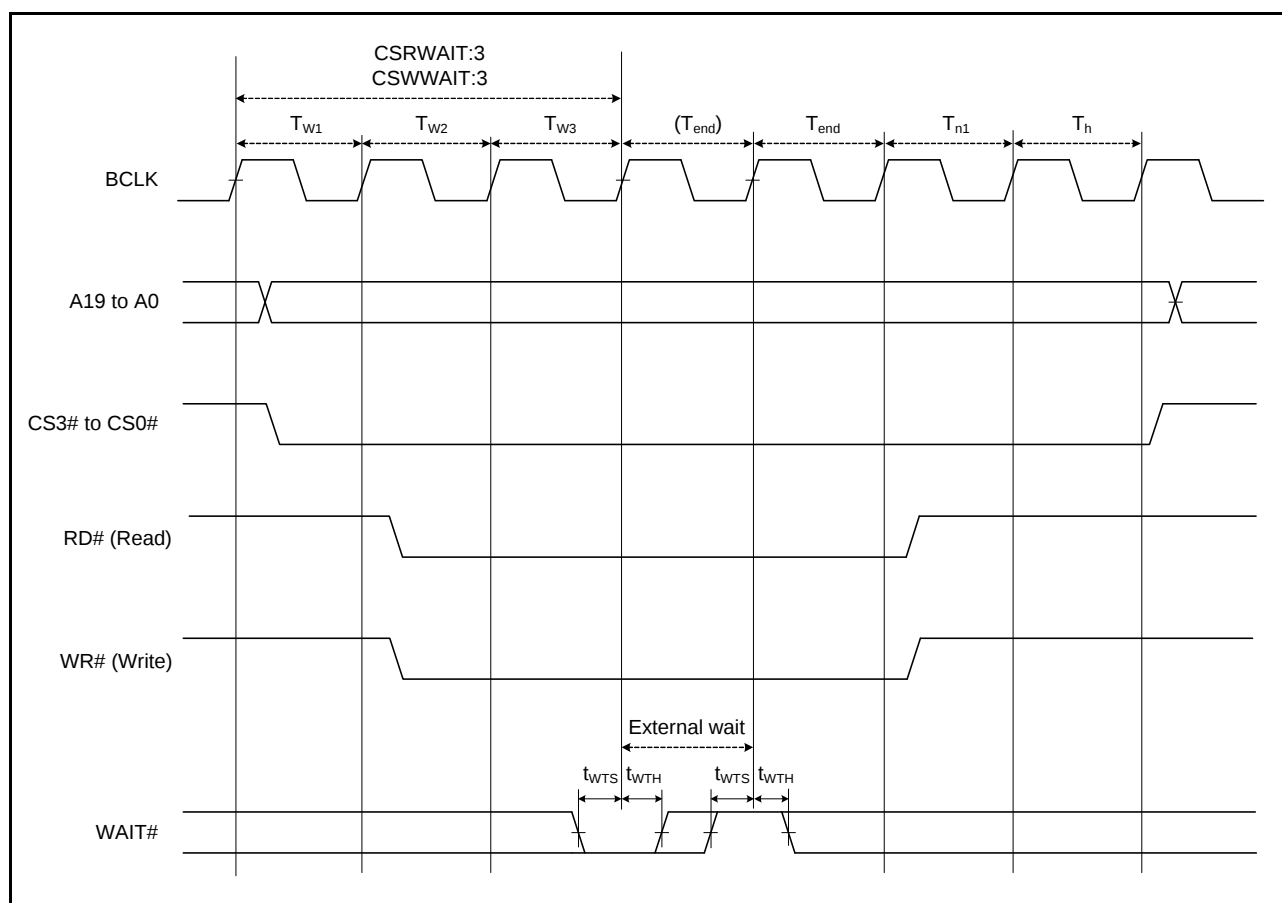


Figure 5.17 External Bus Timing/External Wait Control

Table 5.14 Bus Timing (Multiplexed Bus) (3)

Condition: PLLVCC = VCC_USB = AVCC0 = AVCC = VREF = 3.0 to 3.6 V

VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V, VREFH0 = 3.0 V to AVCC0

$T_a = T_{opr}$

Output load conditions: $V_{OH} = VCC \times 0.5$, $V_{OL} = VCC \times 0.5$, $I_{OH} = -1.0 \text{ mA}$, $I_{OL} = 1.0 \text{ mA}$, $C = 30 \text{ pF}$

Item	Symbol	Min.	Max.	Unit	Test Conditions
Address delay time	t_{AD}	—	35	ns	Figure 5.18, Figure 5.19
Byte control delay time	t_{BCD}	—	30	ns	
CS# delay time	t_{CSD}	—	30	ns	
RD# delay time	t_{RSD}	—	30	ns	
ALE delay time	t_{ALED}	—	30	ns	
Read data setup time	t_{RDS}	20	—	ns	
Read data hold time	t_{RDH}	0	—	ns	
WR# delay time	t_{WRD}	—	30	ns	
Write data delay time	t_{WDD}	—	35	ns	
Write data hold time	t_{WDH}	0	—	ns	
WAIT# setup time	t_{WTS}	20	—	ns	Figure 5.17
WAIT# hold time	t_{WTH}	0.0	—	ns	

Table 5.16 Timing of On-Chip Peripheral Modules (3)

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.

High drive output is selected by the drive capacity control register.

Item			Symbol	Min.	Max.	Unit*1	Test Conditions
RSPI	RSPCK clock cycle	Master	t_{SPcyc}	2	4096	t_{Pcyc}	C = 30 pF, Figure 5.32
		Slave		8	4096		
	RSPCK clock high pulse width	Master	t_{SPCKWH}	$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2 - 3$	—	ns	
		Slave		$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2$	—		
	RSPCK clock low pulse width	Master	t_{SPCKWL}	$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2 - 3$	—	ns	
		Slave		$(t_{SPcyc} - t_{SPCKR} - t_{SPCKF}) / 2$	—		
	RSPCK clock rise/fall time	Output	t_{SPCKR}, t_{SPCKF}	—	5	ns	C = 30 pF, Figure 5.33 to Figure 5.40
		Input		—	1	μs	
	RSPCK clock fall time	Input	t_{SPCKF}	—	0.1	μs/V	
	Data input setup time	Master	t_{SU}	4	—	ns	
		Slave		$20 - t_{Pcyc}$	—		
	Data input hold time	Master	t_H	t_{Pcyc}	—	ns	
				—	—		
		Slave	t_H	$20 + 2 \times t_{Pcyc}$	—		
	SSL setup time	Master	t_{LEAD}	1	8	t_{SPcyc}	
		Slave		4	—	t_{Pcyc}	
	SSL hold time	Master	t_{LAG}	1	8	t_{SPcyc}	
		Slave		4	—	t_{Pcyc}	
	Data output delay time	Master	t_{OD}	—	10	ns	
		Slave		—	$3 \times t_{Pcyc} + 40$		
	Data output hold time	Master	t_{OH}	0	—	ns	
		Slave		0	—		
	Successive transmission delay time	Master	t_{TD}	$t_{SPcyc} + 2 \times t_{Pcyc}$	$8 \times t_{SPcyc} + 2 \times t_{Pcyc}$	ns	
		Slave		$4 \times t_{Pcyc}$	—		
	MOSI and MISO rise/fall time	Output	t_{DR}, t_{DF}	—	5	ns	
		Input		—	1	μs	
	SSL rise/fall time	Output	t_{SSLr}, t_{SSLf}	—	15	ns	
		Input		—	1	μs	
	Slave access time		t_{SA}	—	4	t_{Pcyc}	Figure 5.39 and Figure 5.40
	Slave output release time		t_{REL}	—	3	t_{Pcyc}	

Note 1. t_{Pcyc} : PCLK cycle

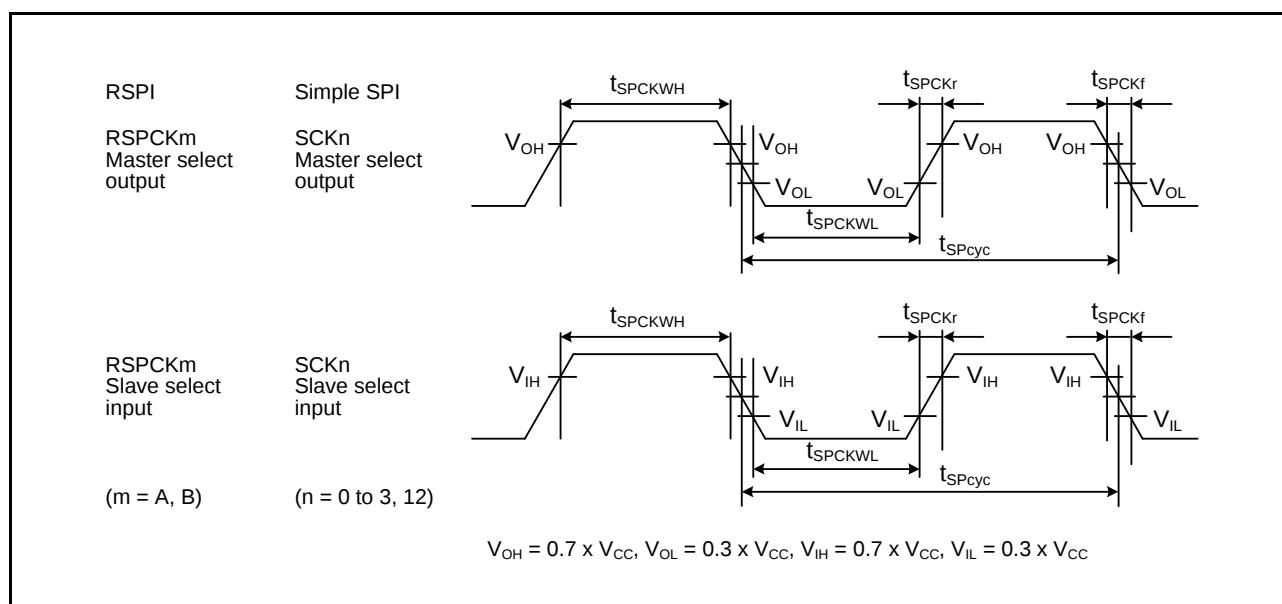


Figure 5.29 RSPI Clock Timing and Simple SPI Clock Timing

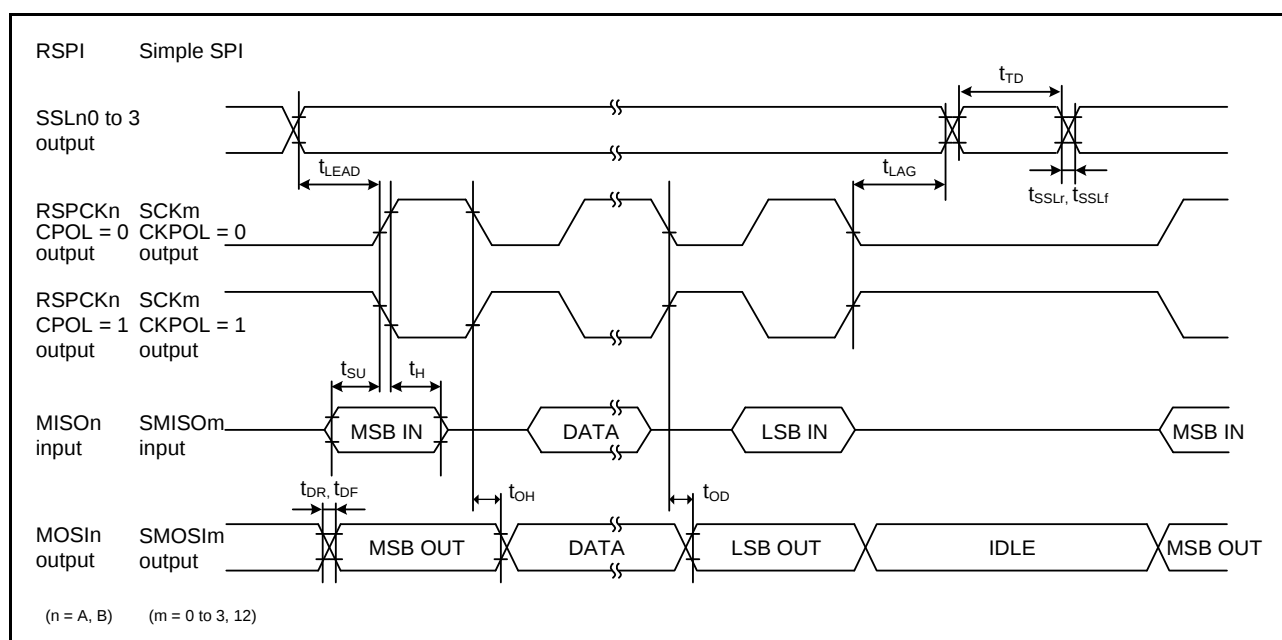


Figure 5.30 RSPI Timing (Master, CPHA = 0) (Bit Rate: PCLKB Division Ratio Set to a Value Other Than 1/2) and Simple SPI Timing (Master, CKPH = 1)

5.6 D/A Conversion Characteristics

Table 5.25 D/A Conversion Characteristics

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

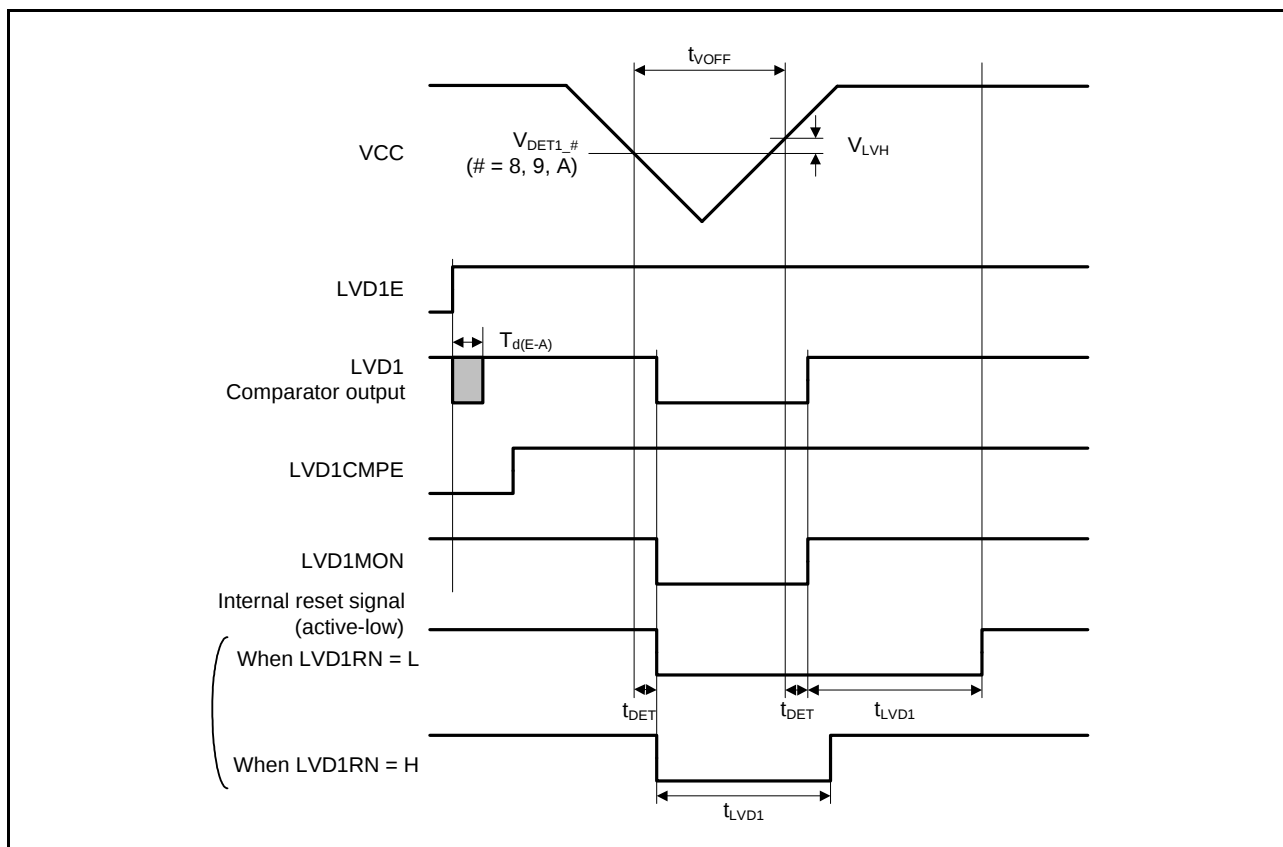
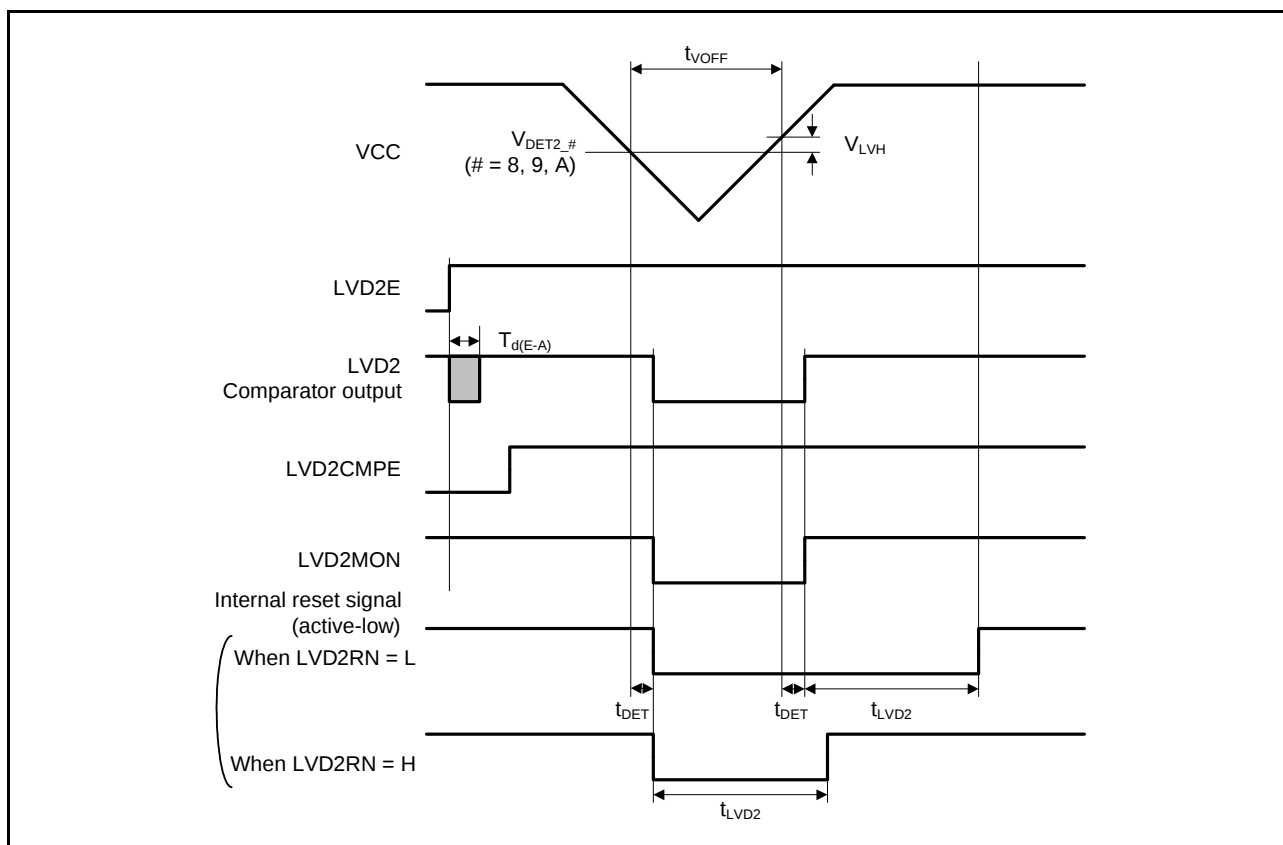
Condition 1: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V
AVCC0 = AVCC = VREF = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0

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	Min.	Typ.	Max.	Unit	Test Conditions
Resolution	10	10	10	Bit	
Conversion time	—	—	3.0	μs	20-pF capacitive load
Absolute accuracy	—	±2.0	±4.0	LSB	2-MΩ resistive load
	—	—	±3.0	LSB	4-MΩ resistive load
	—	—	±2.0	LSB	10-MΩ resistive load
RO output resistance	—	3.6	—	kΩ	

Figure 5.41 Voltage Detection Circuit Timing (V_{DET1})Figure 5.42 Voltage Detection Circuit Timing (V_{DET2})

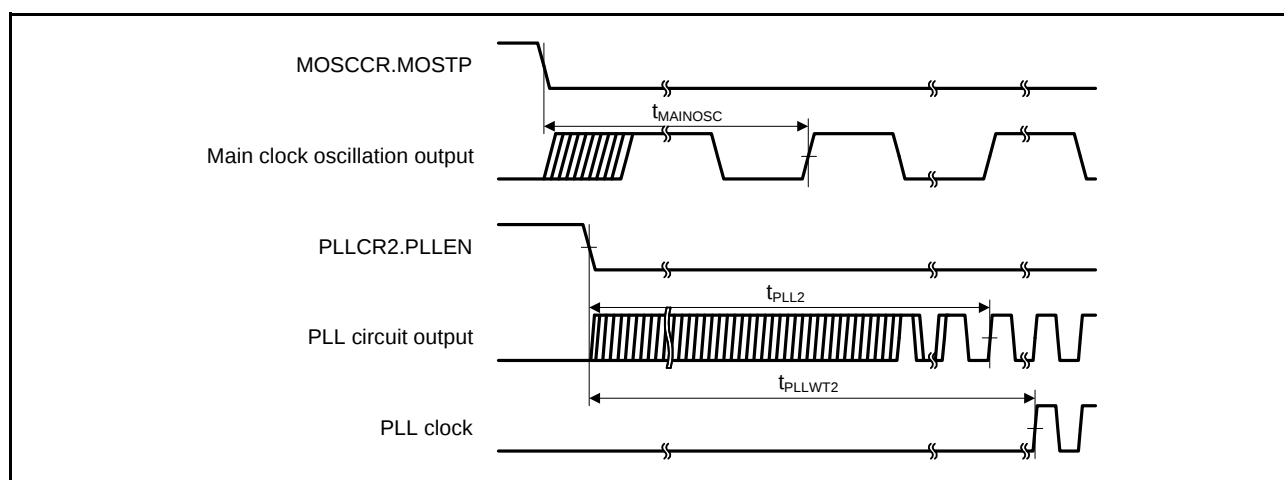


Figure 6.5 PLL Clock Oscillation Start Timing (PLL is Operated before Main Clock Oscillation Has Settled)

6.3.5 Timing of On-Chip Peripheral Modules

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

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

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

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

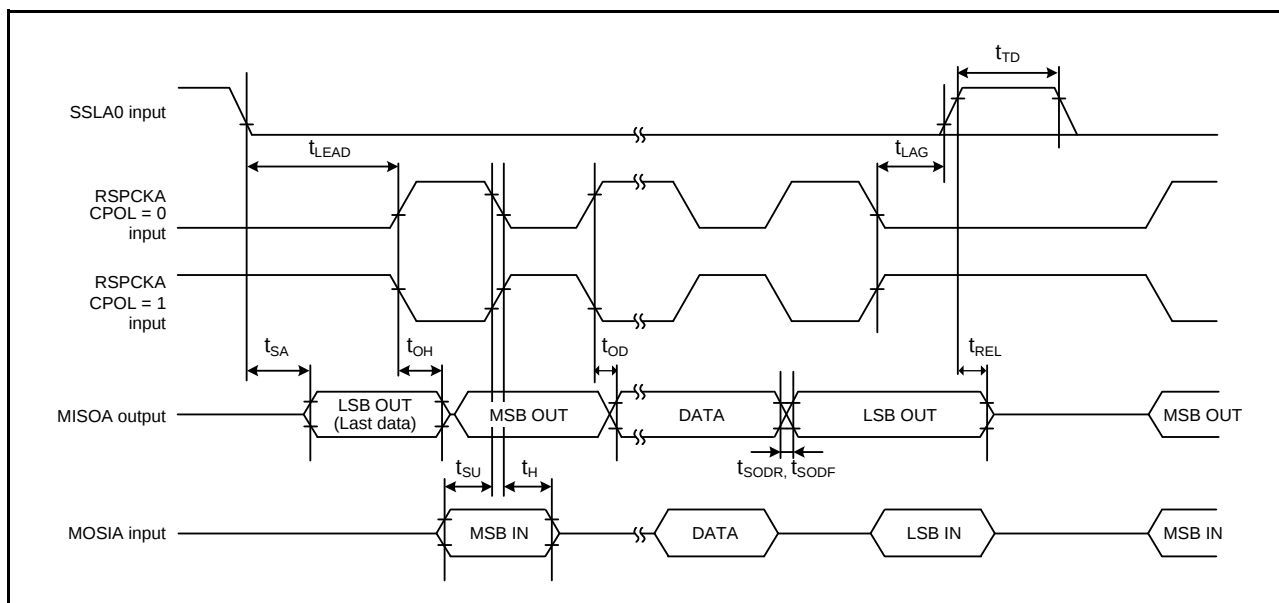


Figure 6.24 RSPCKA Timing (Slave, CPHA = 1) and Simple SPI Timing (Slave, CKPH = 0)

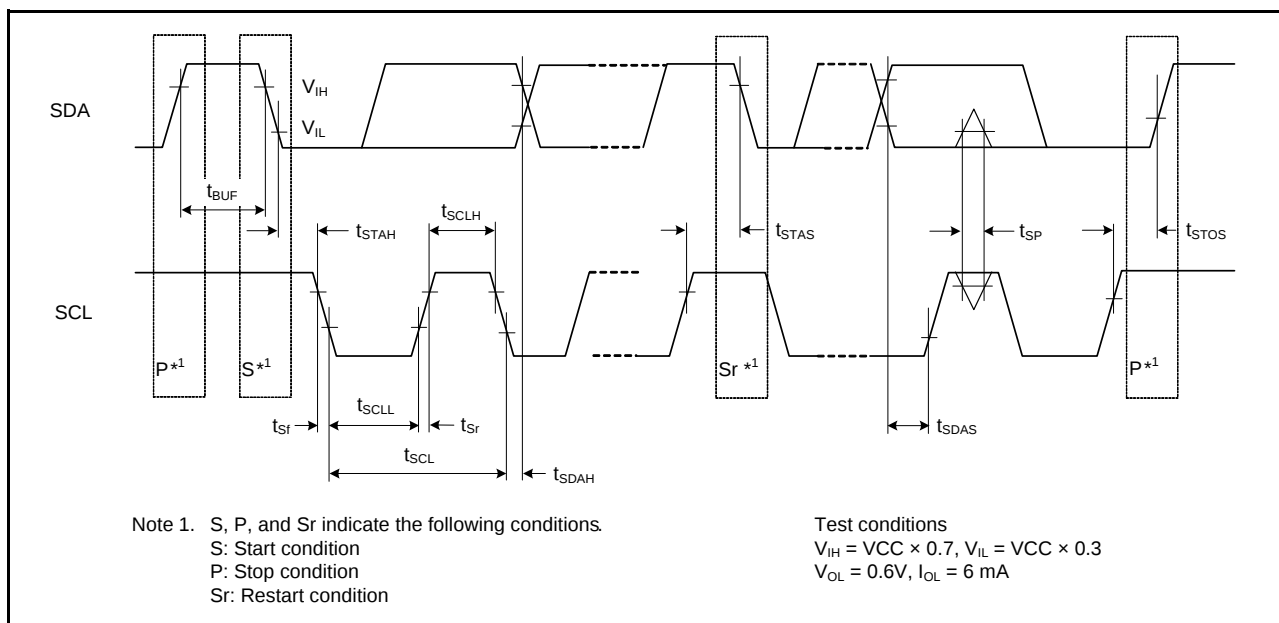


Figure 6.25 IIC Bus Interface Input/Output Timing and Simple IIC Bus Interface Input/Output Timing