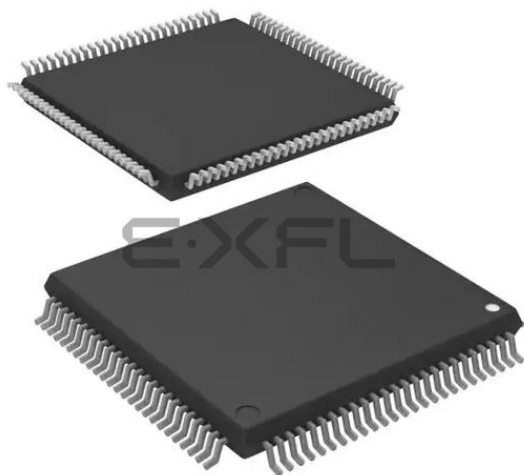




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Applications of "[Embedded - Microcontrollers](#)"

Details

Product Status	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	EBI/EMI, I ² C, SCI
Peripherals	DMA, POR, PWM, WDT
Number of I/O	117
Program Memory Size	1MB (1M x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128K x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 3.6V
Data Converters	A/D 16x10b; D/A 2x10b
Oscillator Type	External
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/r5f56106vdfp-v0

1.2 List of Products

Table 1.2 is the list of products, and figure 1.1 shows how to read the product part no.

Table 1.2 List of Products

Part No.	Package	ROM Capacity	RAM Capacity	Data Flash	Operating Frequency (Max.)
R5F56108VNFP	PLQP0144KA-A	2 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56108VDFP	PLQP0144KA-A	2 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56108WNBG	PLBG0176GA-A	2 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56108WDBG	PLBG0176GA-A	2 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56107VNFP	PLQP0144KA-A	1.5 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56107VDFP	PLQP0144KA-A	1.5 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56107WNBG	PLBG0176GA-A	1.5 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56107WDBG	PLBG0176GA-A	1.5 Mbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56106VNFP	PLQP0144KA-A	1 Mbyte	128 Kbytes	32 Kbytes	100 MHz
R5F56106VDFP	PLQP0144KA-A	1 Mbyte	128 Kbytes	32 Kbytes	100 MHz
R5F56106WNBG	PLBG0176GA-A	1 Mbyte	128 Kbytes	32 Kbytes	100 MHz
R5F56106WDBG	PLBG0176GA-A	1 Mbyte	128 Kbytes	32 Kbytes	100 MHz
R5F56104VNFP	PLQP0144KA-A	768 Kbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56104VDFP	PLQP0144KA-A	768 Kbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56104WNBG	PLBG0176GA-A	768 Kbytes	128 Kbytes	32 Kbytes	100 MHz
R5F56104WDBG	PLBG0176GA-A	768 Kbytes	128 Kbytes	32 Kbytes	100 MHz

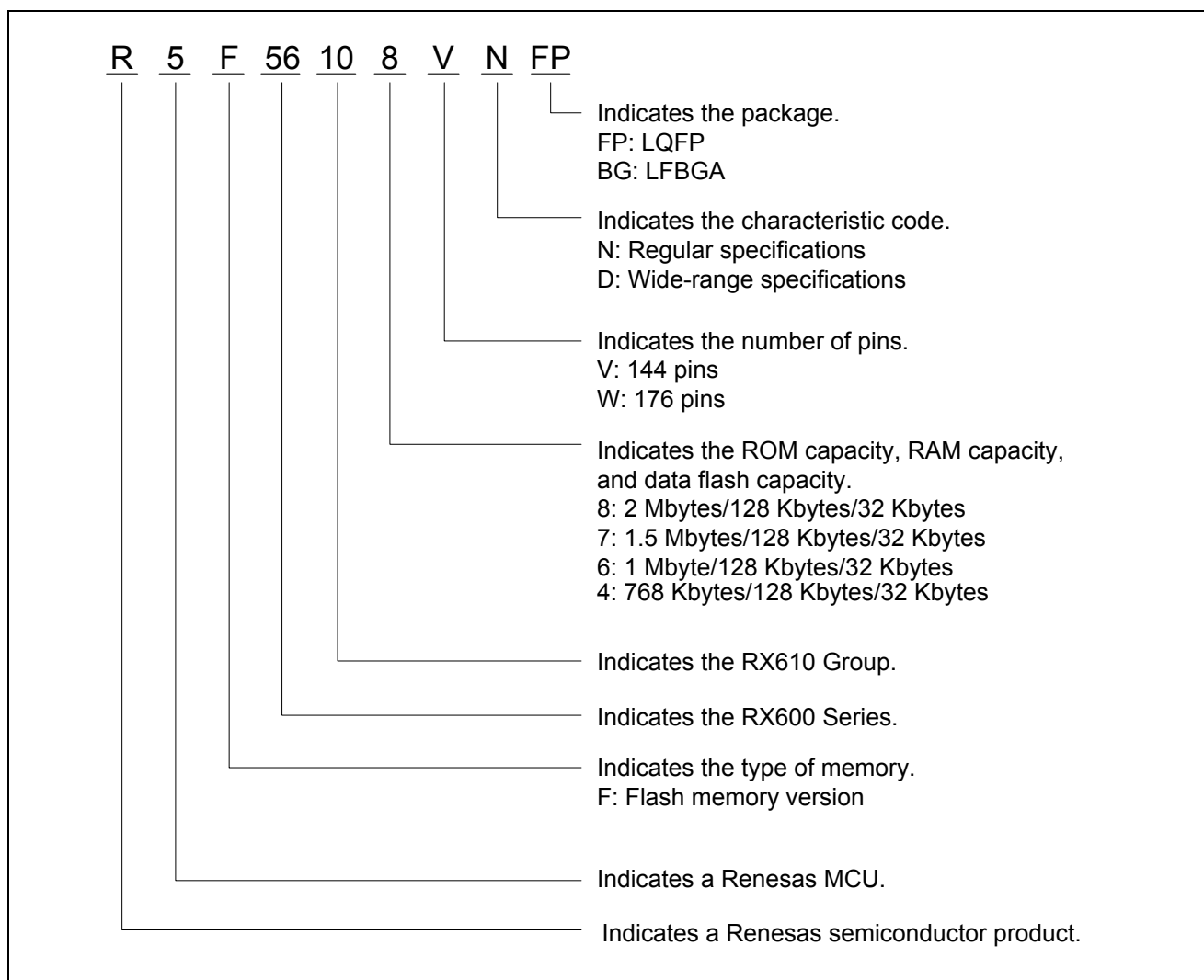


Figure 1.1 How to Read the Product Part No.

Pin No.	Power Supply							
176-Pin LFBGA	Clock System Control	I/O Port	Interrupt	External Bus	Timer	Communi- cation	Analog	On-Chip Emulator
F13		PA2		A2	PO18/ TIOCC6/ TCLKE			
F14		PA0		A0/BC0#	PO16/ TIOCA6			
F15		PA1		A1	PO17/ TIOCA6/ TIOCB6			
G1	RES#							
G2	XTAL							
G3		P85						
G4		P86						
G12		PA7		A7	PO23/ TIOCA8/ TIOCB8/ TCLKH			
G13		PA6		A6	PO22/ TIOCA8			
G14		PA4		A4	PO20/ TIOCA7			
G15		PA5		A5	PO21/ TIOCA7/ TIOCB7/ TCLKG			
H1	VCC							
H2			NMI					
H3	EXTAL							
H4	VSS							
H12		PB0		A8	PO24/ TIOCA9			
H13	VSS							
H14		PH0						
H15		PH1						
J1		PF5						
J2		PF4						
J3		PF6						
J4		P34	IRQ4-A		PO12/ TIOCA1			
J12		P72						
J13		P71		CS4#-C/ CS5#-C/ CS6#-C/ CS7#-C				
J14	VCC							

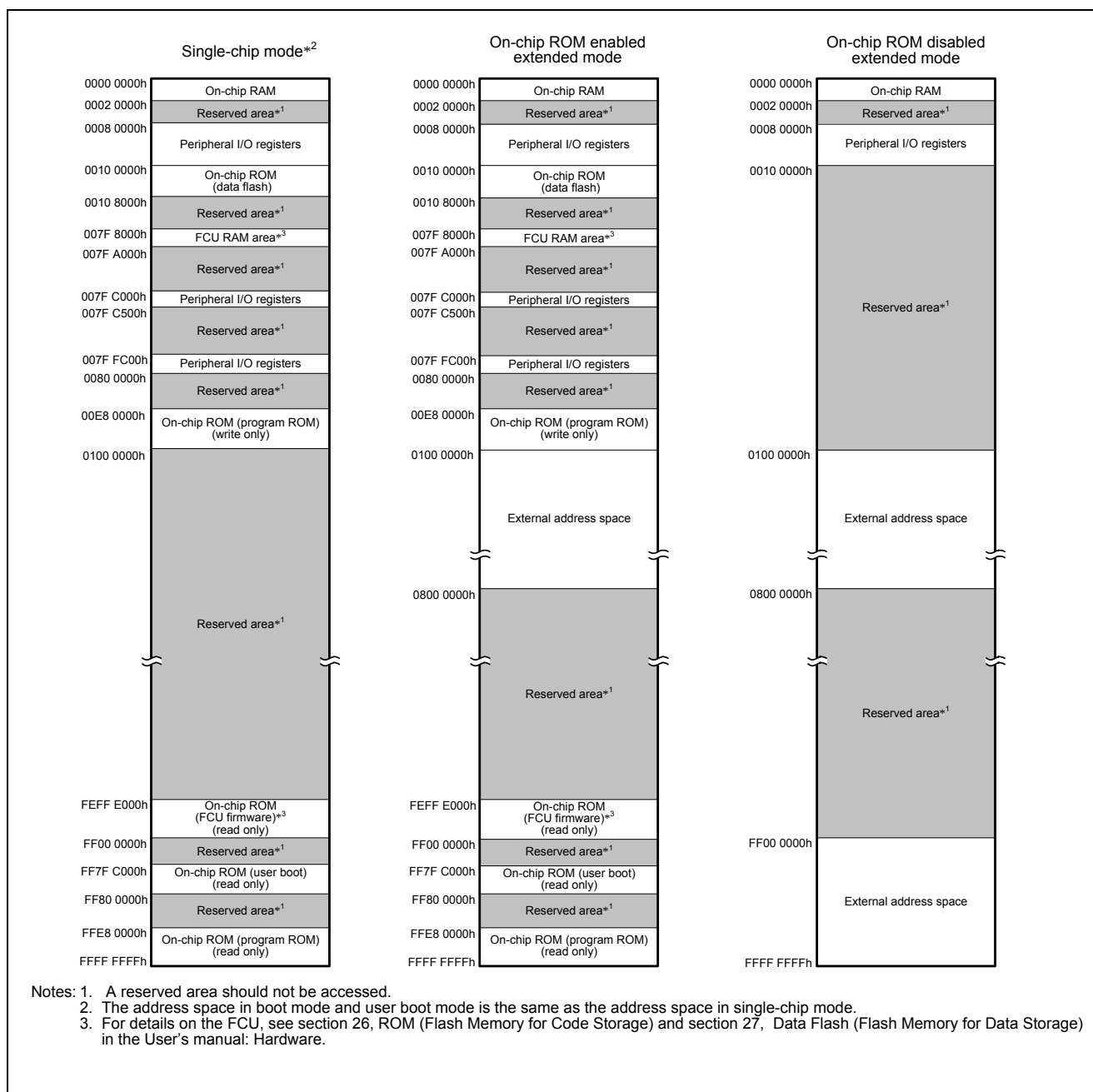


Figure 3.2 Memory Map of the R5F56107

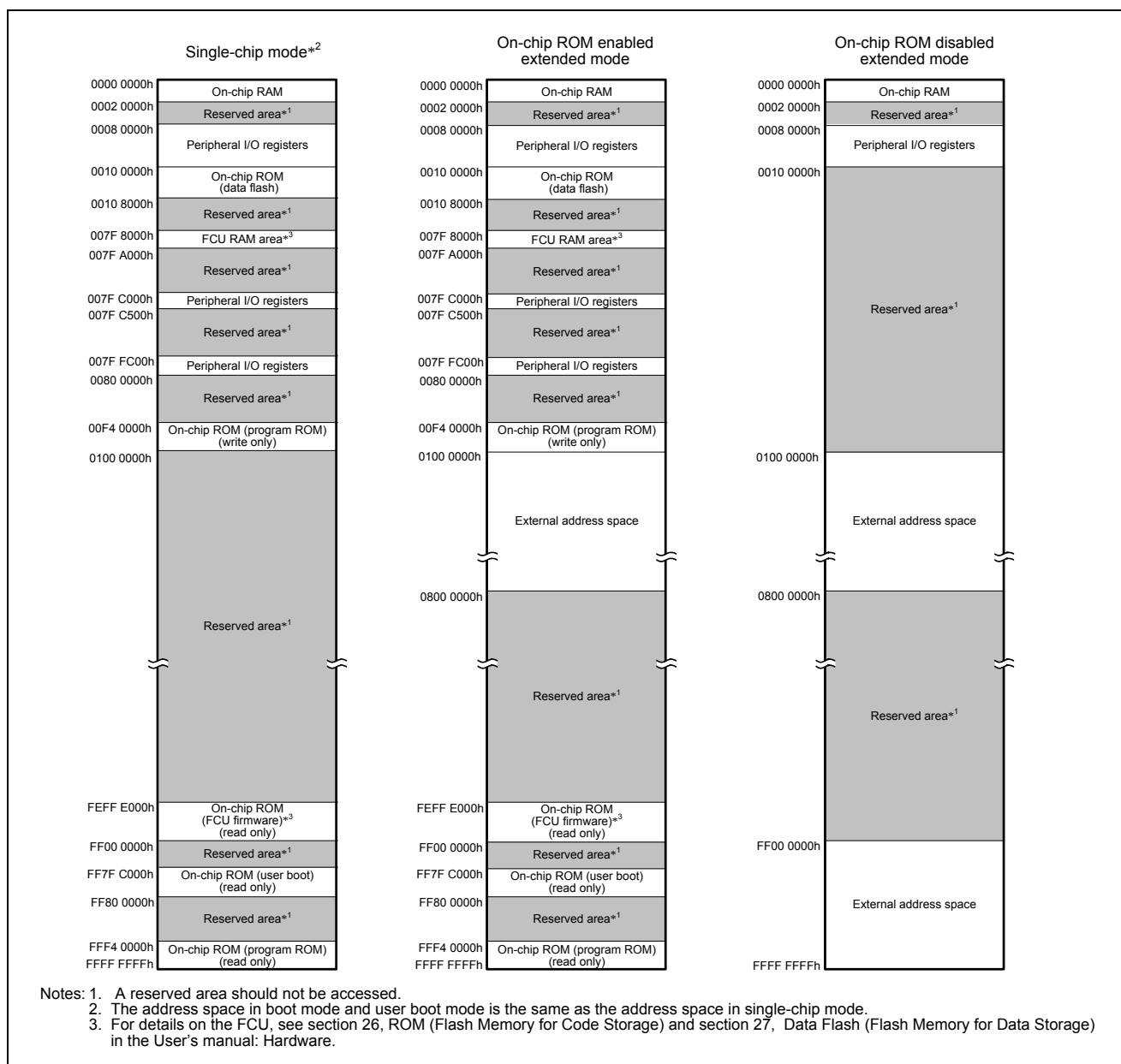
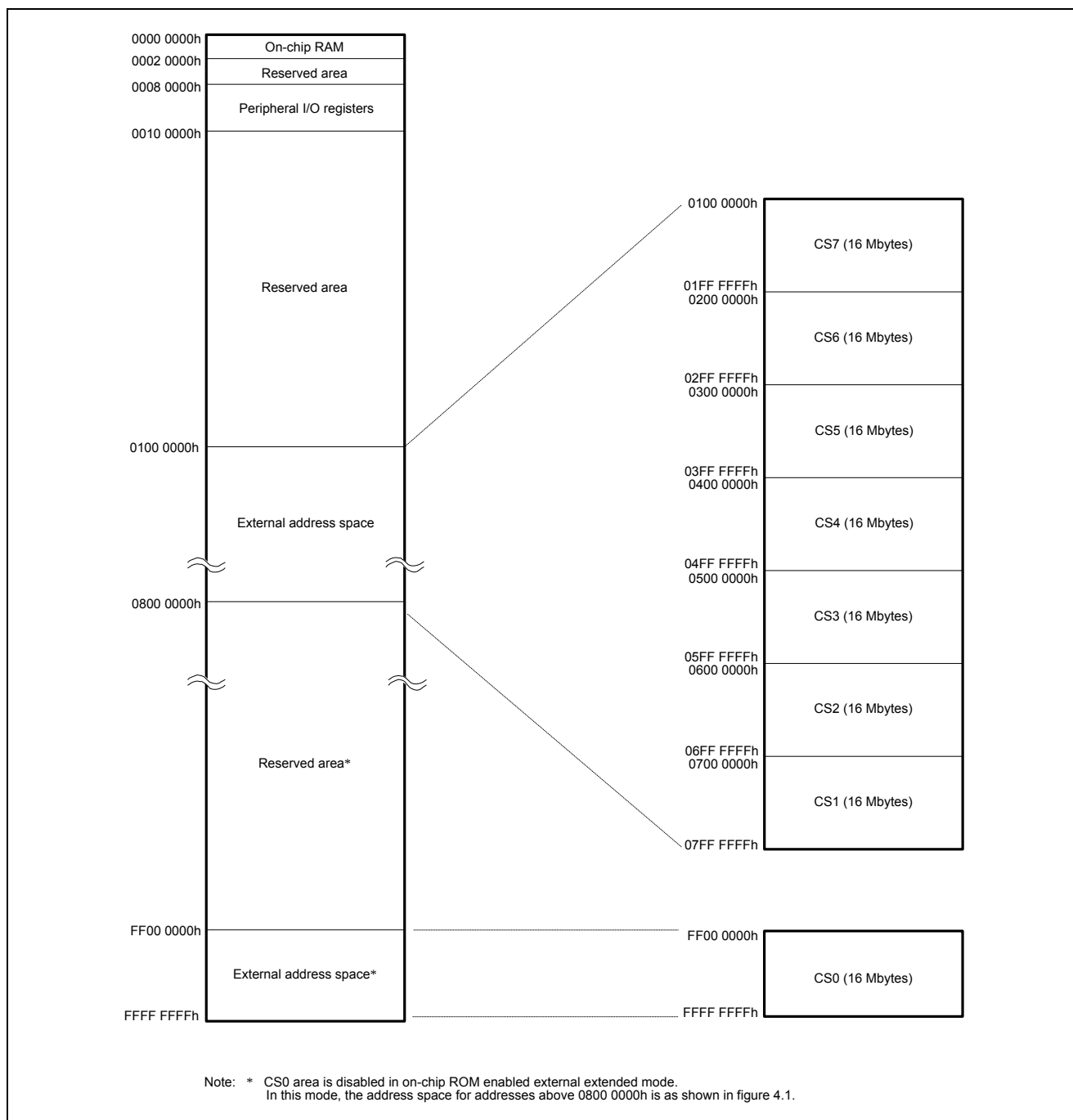


Figure 3.4 Memory Map of the R5F56104

3.2 External Address Space

The external address space is divided into up to 8 areas, each corresponding to the CSi# signal output from a CSi# (i = 0 to 7) pin. Figure 4.5 shows the address ranges corresponding to the individual CSi# signals (CSi areas, i = 0 to 7) in on-chip ROM disabled external extended mode.



**Figure 3.5 Correspondence between External Address Spaces and CSi Areas
(In On-Chip ROM Disabled External Extended Mode)**

Address	Module		Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access
	Abbreviation						Cycles
0008 2400h	DMAC0		DMA control register A	DMCRA	32	32	3 ICLK
0008 2404h	DMAC0		DMA control register B	DMCRB	8	8	3 ICLK
0008 2405h	DMAC0		DMA control register C	DMCRC	8	8	3 ICLK
0008 2406h	DMAC0		DMA control register D	DMCRD	8	8	3 ICLK
0008 2407h	DMAC0		DMA control register E	DMCRE	8	8	3 ICLK
0008 2408h	DMAC1		DMA control register A	DMCRA	32	32	3 ICLK
0008 240Ch	DMAC1		DMA control register B	DMCRB	8	8	3 ICLK
0008 240Dh	DMAC1		DMA control register C	DMCRC	8	8	3 ICLK
0008 240Eh	DMAC1		DMA control register D	DMCRD	8	8	3 ICLK
0008 240Fh	DMAC1		DMA control register E	DMCRE	8	8	3 ICLK
0008 2410h	DMAC2		DMA control register A	DMCRA	32	32	3 ICLK
0008 2414h	DMAC2		DMA control register B	DMCRB	8	8	3 ICLK
0008 2415h	DMAC2		DMA control register C	DMCRC	8	8	3 ICLK
0008 2416h	DMAC2		DMA control register D	DMCRD	8	8	3 ICLK
0008 2417h	DMAC2		DMA control register E	DMCRE	8	8	3 ICLK
0008 2418h	DMAC3		DMA control register A	DMCRA	32	32	3 ICLK
0008 241Ch	DMAC3		DMA control register B	DMCRB	8	8	3 ICLK
0008 241Dh	DMAC3		DMA control register C	DMCRC	8	8	3 ICLK
0008 241Eh	DMAC3		DMA control register D	DMCRD	8	8	3 ICLK
0008 241Fh	DMAC3		DMA control register E	DMCRE	8	8	3 ICLK
0008 2502h	DMAC common		DMA start control register	DMSCNT	8	8	3 ICLK
0008 250Bh	DMAC common		DMA interrupt control register	DMICNT	8	8	3 ICLK
0008 2517h	DMAC common		DMA transfer end detect register	DMEDET	8	8	3 ICLK
0008 251Bh	DMAC common		DMA arbitration status register	DMASTS	8	8	3 ICLK
0008 3002h	BSC		CS0 mode register	CS0MOD	16	16	1 to 2 BCLK ^{*7}
0008 3004h	BSC		CS0 wait control register 1	CS0WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3008h	BSC		CS0 wait control register 2	CS0WCNT2	32	32	1 to 2 BCLK ^{*7}
0008 3012h	BSC		CS1 mode register	CS1MOD	16	16	1 to 2 BCLK ^{*7}
0008 3014h	BSC		CS1 wait control register 1	CS1WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3018h	BSC		CS1 wait control register 2	CS1WCNT2	32	32	1 to 2 BCLK ^{*7}
0008 3022h	BSC		CS2 mode register	CS2MOD	16	16	1 to 2 BCLK ^{*7}
0008 3024h	BSC		CS2 wait control register 1	CS2WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3028h	BSC		CS2 wait control register 2	CS2WCNT2	32	32	1 to 2 BCLK ^{*7}
0008 3032h	BSC		CS3 mode register	CS3MOD	16	16	1 to 2 BCLK ^{*7}
0008 3034h	BSC		CS3 wait control register 1	CS3WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3038h	BSC		CS3 wait control register 2	CS3WCNT2	32	32	1 to 2 BCLK ^{*7}
0008 3042h	BSC		CS4 mode register	CS4MOD	16	16	1 to 2 BCLK ^{*7}
0008 3044h	BSC		CS4 wait control register 1	CS4WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3048h	BSC		CS4 wait control register 2	CS4WCNT2	32	32	1 to 2 BCLK ^{*7}
0008 3052h	BSC		CS5 mode register	CS5MOD	16	16	1 to 2 BCLK ^{*7}
0008 3054h	BSC		CS5 wait control register 1	CS5WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3058h	BSC		CS5 wait control register 2	CS5WCNT2	32	32	1 to 2 BCLK ^{*7}
0008 3062h	BSC		CS6 mode register	CS6MOD	16	16	1 to 2 BCLK ^{*7}
0008 3064h	BSC		CS6 wait control register 1	CS6WCNT1	32	32	1 to 2 BCLK ^{*7}
0008 3068h	BSC		CS6 wait control register 2	CS6WCNT2	32	32	1 to 2 BCLK ^{*7}

Address	Module		Register Name	Register Abbreviation	Number of Bits	Access Size	Number of
	Abbreviation						Access Cycles
0008 7064h	ICU		Interrupt request register 100	IR100	8	8	2 ICLK
0008 7065h	ICU		Interrupt request register 101	IR101	8	8	2 ICLK
0008 7068h	ICU		Interrupt request register 104	IR104	8	8	2 ICLK
0008 7069h	ICU		Interrupt request register 105	IR105	8	8	2 ICLK
0008 706Ah	ICU		Interrupt request register 106	IR106	8	8	2 ICLK
0008 706Bh	ICU		Interrupt request register 107	IR107	8	8	2 ICLK
0008 706Ch	ICU		Interrupt request register 108	IR108	8	8	2 ICLK
0008 706Fh	ICU		Interrupt request register 111	IR111	8	8	2 ICLK
0008 7070h	ICU		Interrupt request register 112	IR112	8	8	2 ICLK
0008 7073h	ICU		Interrupt request register 115	IR115	8	8	2 ICLK
0008 7074h	ICU		Interrupt request register 116	IR116	8	8	2 ICLK
0008 7075h	ICU		Interrupt request register 117	IR117	8	8	2 ICLK
0008 7076h	ICU		Interrupt request register 118	IR118	8	8	2 ICLK
0008 7078h	ICU		Interrupt request register 120	IR120	8	8	2 ICLK
0008 7079h	ICU		Interrupt request register 121	IR121	8	8	2 ICLK
0008 707Ah	ICU		Interrupt request register 122	IR122	8	8	2 ICLK
0008 707Bh	ICU		Interrupt request register 123	IR123	8	8	2 ICLK
0008 707Ch	ICU		Interrupt request register 124	IR124	8	8	2 ICLK
0008 707Dh	ICU		Interrupt request register 125	IR125	8	8	2 ICLK
0008 707Eh	ICU		Interrupt request register 126	IR126	8	8	2 ICLK
0008 707Fh	ICU		Interrupt request register 127	IR127	8	8	2 ICLK
0008 7080h	ICU		Interrupt request register 128	IR128	8	8	2 ICLK
0008 7083h	ICU		Interrupt request register 131	IR131	8	8	2 ICLK
0008 7084h	ICU		Interrupt request register 132	IR132	8	8	2 ICLK
0008 7085h	ICU		Interrupt request register 133	IR133	8	8	2 ICLK
0008 7086h	ICU		Interrupt request register 134	IR134	8	8	2 ICLK
0008 7088h	ICU		Interrupt request register 136	IR136	8	8	2 ICLK
0008 7089h	ICU		Interrupt request register 137	IR137	8	8	2 ICLK
0008 708Ah	ICU		Interrupt request register 138	IR138	8	8	2 ICLK
0008 708Bh	ICU		Interrupt request register 139	IR139	8	8	2 ICLK
0008 708Ch	ICU		Interrupt request register 140	IR140	8	8	2 ICLK
0008 708Dh	ICU		Interrupt request register 141	IR141	8	8	2 ICLK
0008 708Eh	ICU		Interrupt request register 142	IR142	8	8	2 ICLK
0008 7091h	ICU		Interrupt request register 145	IR145	8	8	2 ICLK
0008 7092h	ICU		Interrupt request register 146	IR146	8	8	2 ICLK
0008 7095h	ICU		Interrupt request register 149	IR149	8	8	2 ICLK
0008 7096h	ICU		Interrupt request register 150	IR150	8	8	2 ICLK
0008 7097h	ICU		Interrupt request register 151	IR151	8	8	2 ICLK
0008 7098h	ICU		Interrupt request register 152	IR152	8	8	2 ICLK
0008 709Ah	ICU		Interrupt request register 154	IR154	8	8	2 ICLK
0008 709Bh	ICU		Interrupt request register 155	IR155	8	8	2 ICLK
0008 709Ch	ICU		Interrupt request register 156	IR156	8	8	2 ICLK
0008 709Dh	ICU		Interrupt request register 157	IR157	8	8	2 ICLK
0008 709Eh	ICU		Interrupt request register 158	IR158	8	8	2 ICLK
0008 709Fh	ICU		Interrupt request register 159	IR159	8	8	2 ICLK

Address	Module		Register Name	Register Abbreviation	Number of Bits	Access Size	Number of
	Abbreviation						Access Cycles
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 70EDh	ICU		Interrupt request register 237	IR237	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 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 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
0008 70FDh	ICU		Interrupt request register 253	IR253	8	8	2 ICLK
0008 711Ch	ICU		Interrupt request destination setting register 028	ISELR028	8	8	2 ICLK
0008 711Dh	ICU		Interrupt request destination setting register 029	ISELR029	8	8	2 ICLK
0008 711Eh	ICU		Interrupt request destination setting register 030	ISELR030	8	8	2 ICLK
0008 711Fh	ICU		Interrupt request destination setting register 031	ISELR031	8	8	2 ICLK
0008 7140h	ICU		Interrupt request destination setting register 064	ISELR064	8	8	2 ICLK
0008 7141h	ICU		Interrupt request destination setting register 065	ISELR065	8	8	2 ICLK
0008 7142h	ICU		Interrupt request destination setting register 066	ISELR066	8	8	2 ICLK
0008 7143h	ICU		Interrupt request destination setting register 067	ISELR067	8	8	2 ICLK
0008 7144h	ICU		Interrupt request destination setting register 068	ISELR068	8	8	2 ICLK
0008 7145h	ICU		Interrupt request destination setting register 069	ISELR069	8	8	2 ICLK
0008 7146h	ICU		Interrupt request destination setting register 070	ISELR070	8	8	2 ICLK
0008 7147h	ICU		Interrupt request destination setting register 071	ISELR071	8	8	2 ICLK
0008 7148h	ICU		Interrupt request destination setting register 072	ISELR072	8	8	2 ICLK
0008 7149h	ICU		Interrupt request destination setting register 073	ISELR073	8	8	2 ICLK
0008 714Ah	ICU		Interrupt request destination setting register 074	ISELR074	8	8	2 ICLK
0008 714Bh	ICU		Interrupt request destination setting register 075	ISELR075	8	8	2 ICLK
0008 714Ch	ICU		Interrupt request destination setting register 076	ISELR076	8	8	2 ICLK
0008 714Dh	ICU		Interrupt request destination setting register 077	ISELR077	8	8	2 ICLK
0008 714Eh	ICU		Interrupt request destination setting register 078	ISELR078	8	8	2 ICLK
0008 714Fh	ICU		Interrupt request destination setting register 079	ISELR079	8	8	2 ICLK
0008 7162h	ICU		Interrupt request destination setting register 098	ISELR098	8	8	2 ICLK
0008 7163h	ICU		Interrupt request destination setting register 099	ISELR099	8	8	2 ICLK
0008 7164h	ICU		Interrupt request destination setting register 100	ISELR100	8	8	2 ICLK
0008 7165h	ICU		Interrupt request destination setting register 101	ISELR101	8	8	2 ICLK
0008 7168h	ICU		Interrupt request destination setting register 104	ISELR104	8	8	2 ICLK
0008 7169h	ICU		Interrupt request destination setting register 105	ISELR105	8	8	2 ICLK
0008 716Ah	ICU		Interrupt request destination setting register 106	ISELR106	8	8	2 ICLK
0008 716Bh	ICU		Interrupt request destination setting register 107	ISELR107	8	8	2 ICLK
0008 716Fh	ICU		Interrupt request destination setting register 111	ISELR111	8	8	2 ICLK

Address	Module		Register Name	Register Abbreviation	Number of Bits	Access Size	Number of
	Abbreviation						Access Cycles
0008 7321h	ICU		Interrupt priority register 21	IPR21	8	8	2 ICLK
0008 7322h	ICU		Interrupt priority register 22	IPR22	8	8	2 ICLK
0008 7323h	ICU		Interrupt priority register 23	IPR23	8	8	2 ICLK
0008 7324h	ICU		Interrupt priority register 24	IPR24	8	8	2 ICLK
0008 7325h	ICU		Interrupt priority register 25	IPR25	8	8	2 ICLK
0008 7326h	ICU		Interrupt priority register 26	IPR26	8	8	2 ICLK
0008 7327h	ICU		Interrupt priority register 27	IPR27	8	8	2 ICLK
0008 7328h	ICU		Interrupt priority register 28	IPR28	8	8	2 ICLK
0008 7329h	ICU		Interrupt priority register 29	IPR29	8	8	2 ICLK
0008 732Ah	ICU		Interrupt priority register 2A	IPR2A	8	8	2 ICLK
0008 732Bh	ICU		Interrupt priority register 2B	IPR2B	8	8	2 ICLK
0008 732Ch	ICU		Interrupt priority register 2C	IPR2C	8	8	2 ICLK
0008 732Dh	ICU		Interrupt priority register 2D	IPR2D	8	8	2 ICLK
0008 732Eh	ICU		Interrupt priority register 2E	IPR2E	8	8	2 ICLK
0008 732Fh	ICU		Interrupt priority register 2F	IPR2F	8	8	2 ICLK
0008 7340h	ICU		Interrupt priority register 40	IPR40	8	8	2 ICLK
0008 7344h	ICU		Interrupt priority register 44	IPR44	8	8	2 ICLK
0008 7345h	ICU		Interrupt priority register 45	IPR45	8	8	2 ICLK
0008 7346h	ICU		Interrupt priority register 46	IPR46	8	8	2 ICLK
0008 7347h	ICU		Interrupt priority register 47	IPR47	8	8	2 ICLK
0008 734Ch	ICU		Interrupt priority register 4C	IPR4C	8	8	2 ICLK
0008 734Dh	ICU		Interrupt priority register 4D	IPR4D	8	8	2 ICLK
0008 734Eh	ICU		Interrupt priority register 4E	IPR4E	8	8	2 ICLK
0008 734Fh	ICU		Interrupt priority register 4F	IPR4F	8	8	2 ICLK
0008 7350h	ICU		Interrupt priority register 50	IPR50	8	8	2 ICLK
0008 7351h	ICU		Interrupt priority register 51	IPR51	8	8	2 ICLK
0008 7352h	ICU		Interrupt priority register 52	IPR52	8	8	2 ICLK
0008 7353h	ICU		Interrupt priority register 53	IPR53	8	8	2 ICLK
0008 7354h	ICU		Interrupt priority register 54	IPR54	8	8	2 ICLK
0008 7355h	ICU		Interrupt priority register 55	IPR55	8	8	2 ICLK
0008 7356h	ICU		Interrupt priority register 56	IPR56	8	8	2 ICLK
0008 7357h	ICU		Interrupt priority register 57	IPR57	8	8	2 ICLK
0008 7358h	ICU		Interrupt priority register 58	IPR58	8	8	2 ICLK
0008 7359h	ICU		Interrupt priority register 59	IPR59	8	8	2 ICLK
0008 735Ah	ICU		Interrupt priority register 5A	IPR5A	8	8	2 ICLK
0008 735Bh	ICU		Interrupt priority register 5B	IPR5B	8	8	2 ICLK
0008 735Ch	ICU		Interrupt priority register 5C	IPR5C	8	8	2 ICLK
0008 735Dh	ICU		Interrupt priority register 5D	IPR5D	8	8	2 ICLK
0008 735Eh	ICU		Interrupt priority register 5E	IPR5E	8	8	2 ICLK
0008 735Fh	ICU		Interrupt priority register 5F	IPR5F	8	8	2 ICLK
0008 7360h	ICU		Interrupt priority register 60	IPR60	8	8	2 ICLK
0008 7361h	ICU		Interrupt priority register 61	IPR61	8	8	2 ICLK
0008 7362h	ICU		Interrupt priority register 62	IPR62	8	8	2 ICLK
0008 7363h	ICU		Interrupt priority register 63	IPR63	8	8	2 ICLK
0008 7368h	ICU		Interrupt priority register 68	IPR68	8	8	2 ICLK

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 7369h	ICU	Interrupt priority register 69	IPR69	8	8	2 ICLK
0008 736Ah	ICU	Interrupt priority register 6A	IPR6A	8	8	2 ICLK
0008 736Bh	ICU	Interrupt priority register 6B	IPR6B	8	8	2 ICLK
0008 7370h	ICU	Interrupt priority register 70	IPR70	8	8	2 ICLK
0008 7371h	ICU	Interrupt priority register 71	IPR71	8	8	2 ICLK
0008 7372h	ICU	Interrupt priority register 72	IPR72	8	8	2 ICLK
0008 7373h	ICU	Interrupt priority register 73	IPR73	8	8	2 ICLK
0008 7380h	ICU	Interrupt priority register 80	IPR80	8	8	2 ICLK
0008 7381h	ICU	Interrupt priority register 81	IPR81	8	8	2 ICLK
0008 7382h	ICU	Interrupt priority register 82	IPR82	8	8	2 ICLK
0008 7383h	ICU	Interrupt priority register 83	IPR83	8	8	2 ICLK
0008 7384h	ICU	Interrupt priority register 84	IPR84	8	8	2 ICLK
0008 7385h	ICU	Interrupt priority register 85	IPR85	8	8	2 ICLK
0008 7386h	ICU	Interrupt priority register 86	IPR86	8	8	2 ICLK
0008 7388h	ICU	Interrupt priority register 88	IPR88	8	8	2 ICLK
0008 7389h	ICU	Interrupt priority register 89	IPR89	8	8	2 ICLK
0008 738Ah	ICU	Interrupt priority register 8A	IPR8A	8	8	2 ICLK
0008 738Bh	ICU	Interrupt priority register 8B	IPR8B	8	8	2 ICLK
0008 738Ch	ICU	Interrupt priority register 8C	IPR8C	8	8	2 ICLK
0008 738Dh	ICU	Interrupt priority register 8D	IPR8D	8	8	2 ICLK
0008 738Eh	ICU	Interrupt priority register 8E	IPR8E	8	8	2 ICLK
0008 738Fh	ICU	Interrupt priority register 8F	IPR8F	8	8	2 ICLK
0008 73F0h	ICU	Fast interrupt register	FIR	16	16	2 ICLK
0008 7400h	DTC	DTC control register	DTCCR	8	8	2 ICLK
0008 7404h	DTC	DTC vector base register	DTCVBR	32	32	2 ICLK
0008 7408h	DTC	DTC address mode register	DTCADMOD	8	8	2 ICLK
0008 740Ch	DTC	DTC module start register	DTCST	8	8	2 ICLK
0008 8000h	CMT (unit 0)	Compare match timer start register 0	CMSTR0	16	16	2 to 3 PCLK ^{*7}
0008 8002h	CMT0	Compare match timer control register	CMCR	16	16	2 to 3 PCLK ^{*7}
0008 8004h	CMT0	Compare match timer counter	CMCNT	16	16	2 to 3 PCLK ^{*7}
0008 8006h	CMT0	Compare match timer constant register	CMCOR	16	16	2 to 3 PCLK ^{*7}
0008 8008h	CMT1	Compare match timer control register	CMCR	16	16	2 to 3 PCLK ^{*7}
0008 800Ah	CMT1	Compare match timer counter	CMCNT	16	16	2 to 3 PCLK ^{*7}
0008 800Ch	CMT1	Compare match timer constant register	CMCOR	16	16	2 to 3 PCLK ^{*7}
0008 8010h	CMT (unit 1)	Compare match timer start register 1	CMSTR1	16	16	2 to 3 PCLK ^{*7}
0008 8012h	CMT2	Compare match timer control register	CMCR	16	16	2 to 3 PCLK ^{*7}
0008 8014h	CMT2	Compare match timer counter	CMCNT	16	16	2 to 3 PCLK ^{*7}
0008 8016h	CMT2	Compare match timer constant register	CMCOR	16	16	2 to 3 PCLK ^{*7}
0008 8018h	CMT3	Compare match timer control register	CMCR	16	16	2 to 3 PCLK ^{*7}
0008 801Ah	CMT3	Compare match timer counter	CMCNT	16	16	2 to 3 PCLK ^{*7}
0008 801Ch	CMT3	Compare match timer constant register	CMCOR	16	16	2 to 3 PCLK ^{*7}
0008 8028h	WDT	Timer control/status register	TCSR	8	8	2 to 3 PCLK ^{*7}
0008 8028h	WDT	Write window A register	WINA	16	16	2 to 3 PCLK ^{*7}
0008 8029h	WDT	Timer counter	TCNT	8	8	2 to 3 PCLK ^{*7}
0008 802Ah	WDT	Write window B register	WINB	16	16	2 to 3 PCLK ^{*7}

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 C020h	P0	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C021h	P1	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C022h	P2	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C023h	P3	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C024h	P4	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C025h	P5	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C026h	P6	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C027h	P7	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C028h	P8	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C029h	P9	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C02Ah	PA	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C02Bh	PB	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C02Ch	PC	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C02Dh	PD	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C02Eh	PE	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C02Fh	PF	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C030h	PG	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C031h	PH	Data register	DR	8	8	2 to 3 PCLK ^{*7}
0008 C040h	P0	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C041h	P1	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C042h	P2	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C043h	P3	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C044h	P4	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C045h	P5	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C046h	P6	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C047h	P7	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C048h	P8	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C049h	P9	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C04Ah	PA	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C04Bh	PB	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C04Ch	PC	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C04Dh	PD	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C04Eh	PE	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C04Fh	PF	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C050h	PG	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C051h	PH	Port register	PORT	8	8	2 to 3 PCLK ^{*7}
0008 C060h	P0	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C061h	P1	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C062h	P2	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C063h	P3	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C064h	P4	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C065h	P5	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C066h	P6	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C067h	P7	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C068h	P8	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 C069h	P9	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C06Ah	PA	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C06Bh	PB	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C06Ch	PC	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C06Dh	PD	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C06Eh	PE	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C06Fh	PF	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C070h	PG	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C071h	PH	Input buffer control register	ICR	8	8	2 to 3 PCLK ^{*7}
0008 C082h	P2	Open drain control register	ODR	8	8	2 to 3 PCLK ^{*7}
0008 C08Ch	PC	Open drain control register	ODR	8	8	2 to 3 PCLK ^{*7}
0008 C0CAh	PA	Pull-Up resistor control register	PCR	8	8	2 to 3 PCLK ^{*7}
0008 C0CBh	PB	Pull-Up resistor control register	PCR	8	8	2 to 3 PCLK ^{*7}
0008 C0CCh	PC	Pull-Up resistor control register	PCR	8	8	2 to 3 PCLK ^{*7}
0008 C0CDh	PD	Pull-Up resistor control register	PCR	8	8	2 to 3 PCLK ^{*7}
0008 C0CEh	PE	Pull-Up resistor control register	PCR	8	8	2 to 3 PCLK ^{*7}
0008 C100h	I/O PORT	Port function control register 0	PFCR0	8	8	2 to 3 PCLK ^{*7}
0008 C101h	I/O PORT	Port function control register 1	PFCR1	8	8	2 to 3 PCLK ^{*7}
0008 C102h	I/O PORT	Port function control register 2	PFCR2	8	8	2 to 3 PCLK ^{*7}
0008 C103h	I/O PORT	Port function control register 3	PFCR3	8	8	2 to 3 PCLK ^{*7}
0008 C104h	I/O PORT	Port function control register 4	PFCR4	8	8	2 to 3 PCLK ^{*7}
0008 C105h	I/O PORT	Port function control register 5	PFCR5	8	8	2 to 3 PCLK ^{*7}
0008 C106h	I/O PORT	Port function control register 6	PFCR6	8	8	2 to 3 PCLK ^{*7}
0008 C107h	I/O PORT	Port function control register 7	PFCR7	8	8	2 to 3 PCLK ^{*7}
0008 C108h	I/O PORT	Port function control register 8	PFCR8	8	8	2 to 3 PCLK ^{*7}
0008 C109h	I/O PORT	Port function control register 9	PFCR9	8	8	2 to 3 PCLK ^{*7}
0008 C280h	SYSTEM	Deep standby control register	DPSBYCR	8	8	4 to 5 PCLK ^{*7}
0008 C281h	SYSTEM	Deep standby wait control register	DPSWCR	8	8	4 to 5 PCLK ^{*7}
0008 C282h	SYSTEM	Deep standby interrupt enable register	DPSIER	8	8	4 to 5 PCLK ^{*7}
0008 C283h	SYSTEM	Deep standby interrupt flag register	DPSIFR	8	8	4 to 5 PCLK ^{*7}
0008 C284h	SYSTEM	Deep standby interrupt edge register	DPSIEGR	8	8	4 to 5 PCLK ^{*7}
0008 C285h	SYSTEM	Reset status register	RSTSR	8	8	4 to 5 PCLK ^{*7}
0008 C289h	FLASH	Flash write erase protection register	FWEPOR	8	8	4 to 5 PCLK ^{*7}
0008 C290h	SYSTEM	Deep standby backup register 0	DPSBKR0	8	8	4 to 5 PCLK ^{*7}
0008 C291h	SYSTEM	Deep standby backup register 1	DPSBKR1	8	8	4 to 5 PCLK ^{*7}
0008 C292h	SYSTEM	Deep standby backup register 2	DPSBKR2	8	8	4 to 5 PCLK ^{*7}
0008 C293h	SYSTEM	Deep standby backup register 3	DPSBKR3	8	8	4 to 5 PCLK ^{*7}
0008 C294h	SYSTEM	Deep standby backup register 4	DPSBKR4	8	8	4 to 5 PCLK ^{*7}
0008 C295h	SYSTEM	Deep standby backup register 5	DPSBKR5	8	8	4 to 5 PCLK ^{*7}
0008 C296h	SYSTEM	Deep standby backup register 6	DPSBKR6	8	8	4 to 5 PCLK ^{*7}
0008 C297h	SYSTEM	Deep standby backup register 7	DPSBKR7	8	8	4 to 5 PCLK ^{*7}
0008 C298h	SYSTEM	Deep standby backup register 8	DPSBKR8	8	8	4 to 5 PCLK ^{*7}
0008 C299h	SYSTEM	Deep standby backup register 9	DPSBKR9	8	8	4 to 5 PCLK ^{*7}
0008 C29Ah	SYSTEM	Deep standby backup register 10	DPSBKR10	8	8	4 to 5 PCLK ^{*7}
0008 C29Bh	SYSTEM	Deep standby backup register 11	DPSBKR11	8	8	4 to 5 PCLK ^{*7}

5. Electrical Characteristics

5.1 Absolute Maximum Ratings

Table 5.1 Absolute Maximum Ratings

Item	Symbol	Value	Unit
Power supply voltage	V_{CC} , $PLL V_{CC}$	-0.3 to +4.6	V
Input voltage (except for ports 0, 14 to 17)	V_{in}	-0.3 to $V_{CC} + 0.3$	V
Input voltage (ports 0, 14 to 17* ¹)	V_{in}	-0.3 to +6.5	V
Reference power supply voltage	V_{REFH}	-0.3 to $V_{CC} + 0.3$	V
Analog power supply voltage	AV_{CC} * ²	-0.3 to +4.6	V
Analog input voltage	V_{AN}	-0.3 to $V_{CC} + 0.3$	V
Operating temperature	T_{opr}	Regular specifications: -20 to +85	°C
		Wide-range specifications: -40 to +85	
Storage temperature	T_{stg}	-55 to +125	°C

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

Notes: 1. Ports 0, and 14 to 17 are 5 V tolerant.

2. Connect AV_{CC} to V_{CC} . When neither the A/D converter nor the D/A converter is in use, do not leave the AV_{SS} , V_{REFH} , and V_{REFL} pins open. Connect the AV_{CC} and V_{REFH} pins to V_{CC} , and the AV_{SS} and V_{REFL} pins to V_{SS} , respectively.

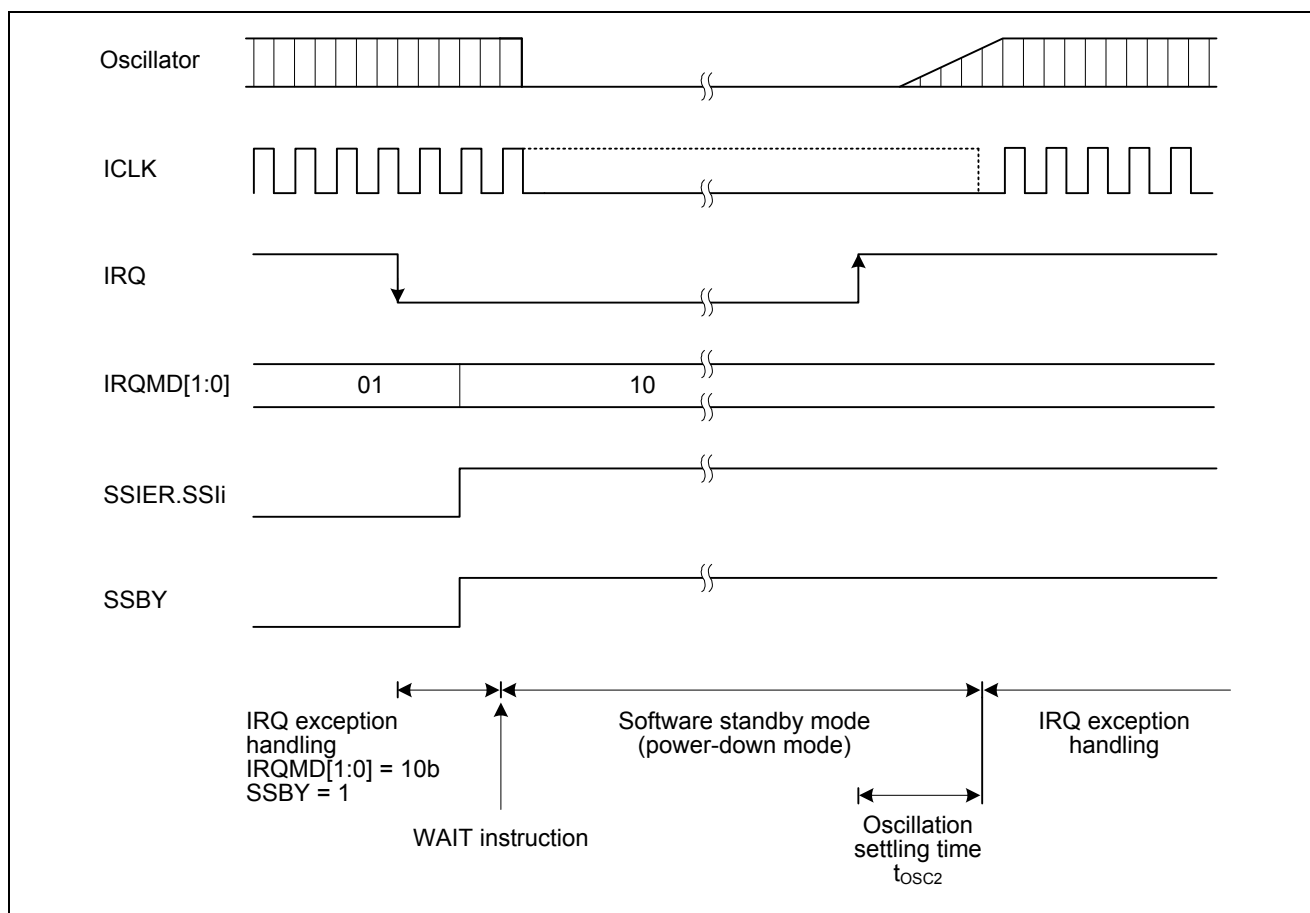


Figure 5.2 Oscillation Settling Timing after Software Standby Mode

5.3.2 Control Signal Timing

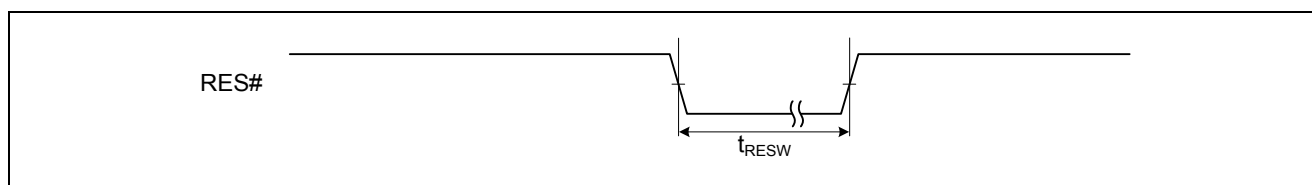
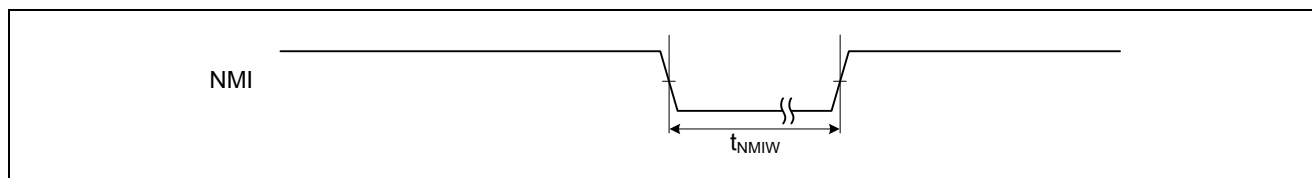
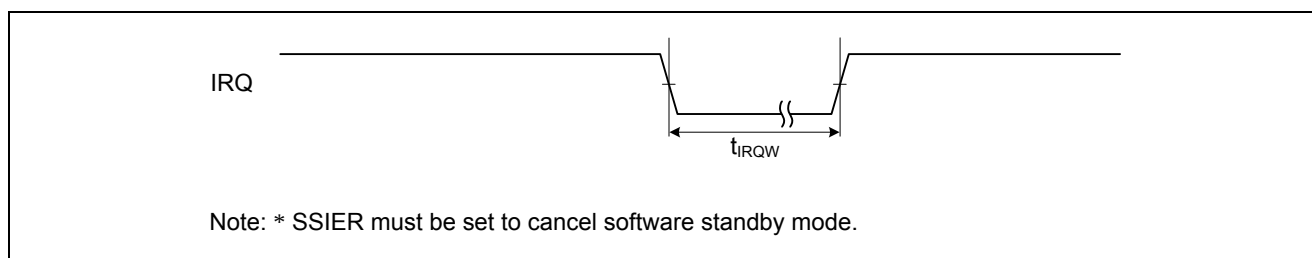
Table 5.6 Control Signal Timing

Conditions: $V_{CC} = PLLV_{CC} = AV_{CC} = 3.0$ to 3.6 V, $V_{REFH} = 3.0$ V to AV_{CC} , $V_{SS} = PLLV_{SS} = V_{REFL} = 0$ V
 $ICLK = 8$ to 100 MHz, $BCLK = 8$ to 25 MHz
 $T_a = -20$ to $+85^{\circ}\text{C}$ (regular specifications), $T_a = -40$ to $+85^{\circ}\text{C}$ (wide-range specifications)

Item	Symbol	Min.	Max.	Unit	Test Conditions
RES# pulse width (except for ROM, data flash programming/erasure)	t_{RESW}^{*1}	20	—	t_{cyc}	Figure 5.6
		1.5	—	μs	
Internal reset time (during ROM, data flash programming/erasure)	t_{RESW2}^{*2}	35	—	μs	
NMI pulse width	t_{NMIW}	200	—	ns	Figure 5.7
IRQ pulse width	t_{IRQW}	200	—	ns	Figure 5.8

Notes: 1. Both the time and the number of cycles should satisfy the specifications.

2. This is to specify the FCU reset and the WDT reset.


Figure 5.6 Reset Input Timing

Figure 5.7 NMI Interrupt Input Timing

Figure 5.8 IRQ Interrupt Input Timing

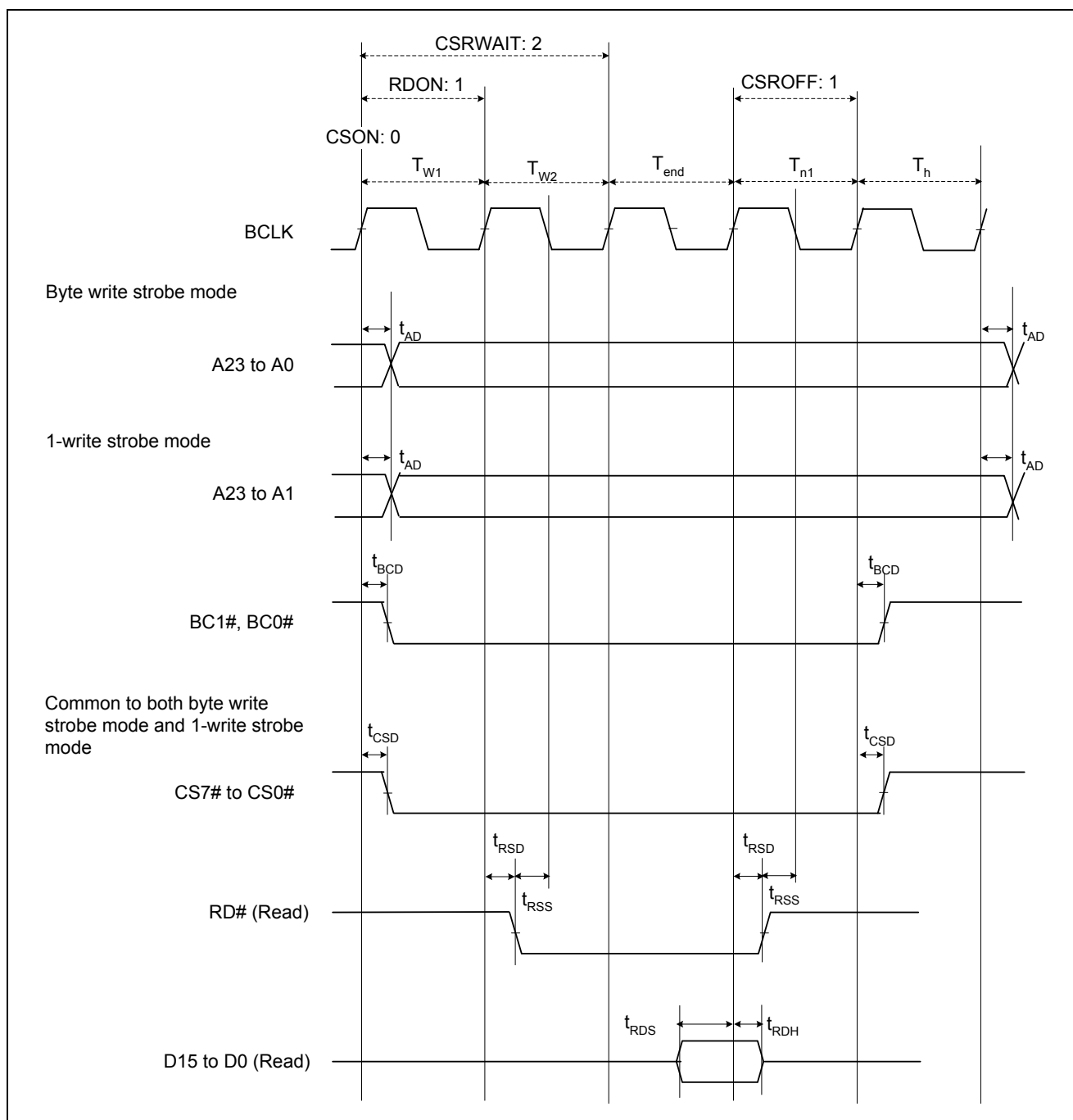


Figure 5.9 External Bus Timing/Normal Read Cycle (Bus Clock Synchronized)

5.3.4 Timing of On-Chip Peripheral Modules

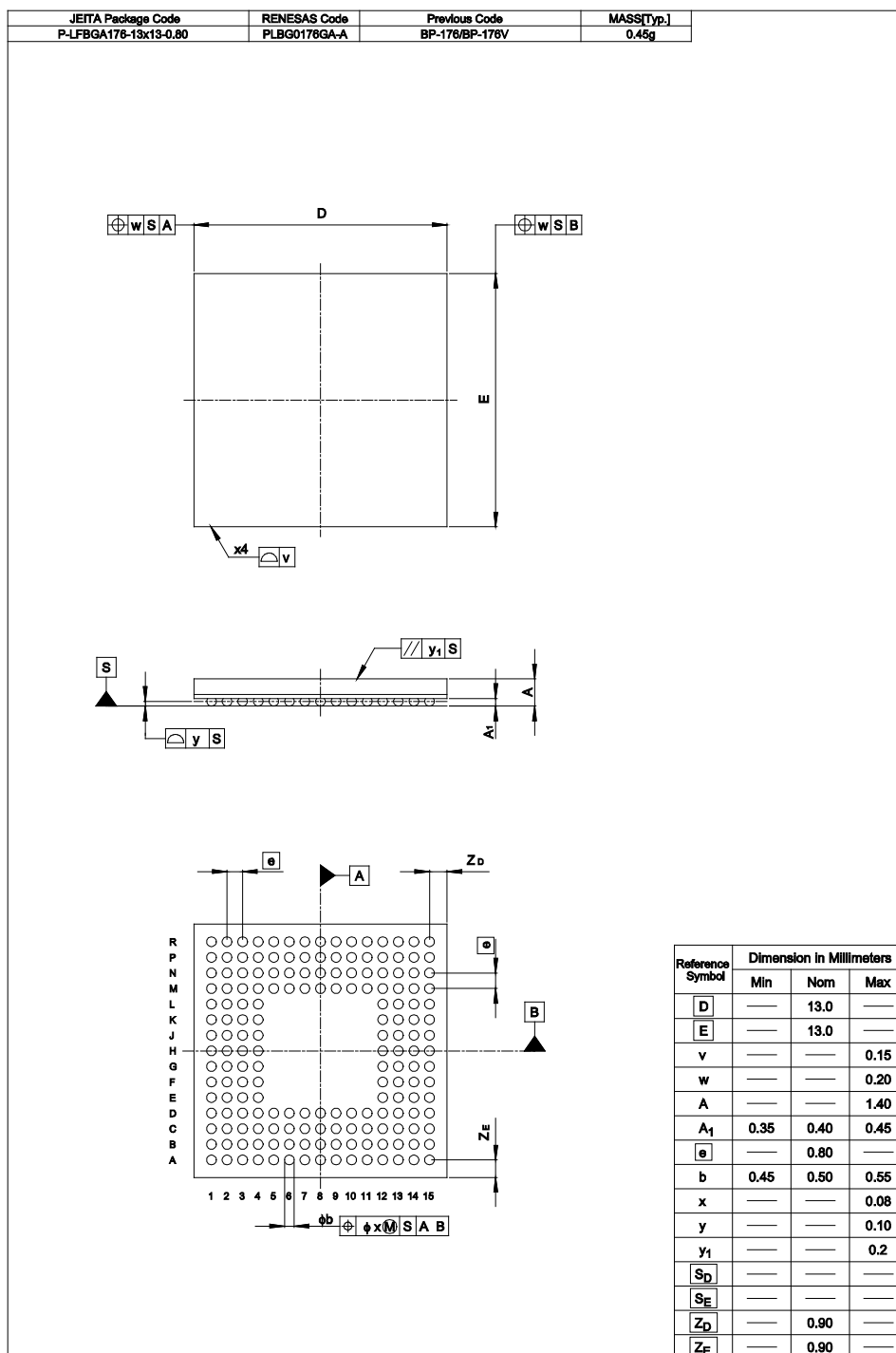
Table 5.8 Timing of On-Chip Peripheral Modules (1)

Conditions: $V_{CC} = PLLV_{CC} = AV_{CC} = 3.0$ to 3.6 V, $V_{REFH} = 3.0$ V to AV_{CC} , $V_{SS} = PLLV_{SS} = V_{REFL} = 0$ V, $PCLK = 8$ to 50 MHz
 $T_a = -20$ to $+85^{\circ}\text{C}$ (regular specifications), $T_a = -40$ to $+85^{\circ}\text{C}$ (wide-range specifications)
 Output load conditions: $V_{OH} = V_{CC} \times 0.5$, $V_{OL} = V_{CC} \times 0.5$, $I_{OH} = -1.0$ mA, $I_{OL} = 1.0$ mA, $C = 30$ pF

						Test	
Item			Symbol	Min.	Max.	Unit	Conditions
I/O ports	Output data delay time		t _{PWD}	—	40	ns	Figure 5.14
	Input data setup time		t _{PRS}	25	—	ns	
	Input data hold time		t _{PRH}	25	—	ns	
TPU	Timer output delay time		t _{TOCD}	—	40	ns	Figure 5.15
	Timer input setup time		t _{TICS}	25	—	ns	
	Timer clock input setup time		t _{TCKS}	25	—	ns	Figure 5.16
	Timer clock pulse width	Single-edge setting	t _{TCKWH}	1.5 x (1/PCLK)	—	t _{cyc}	
		Both-edge setting	t _{TCKWL}	2.5 x (1/PCLK)	—	t _{cyc}	
PPG	Pulse output delay time		t _{POD}	—	40	ns	Figure 5.17
8-bit timer	Timer output delay time		t _{TMOD}	—	40	ns	Figure 5.18
	Timer reset input setup time		t _{TMRS}	25	—	ns	Figure 5.19
	Timer clock input setup time		t _{TMCS}	25	—	ns	Figure 5.20
	Timer clock pulse width	Single-edge setting	t _{TMCWH}	1.5 x (1/PCLK)	—	t _{cyc}	
		Both-edge setting	t _{TMCWL}	2.5 x (1/PCLK)	—	t _{cyc}	
WDT	Overflow output delay time		t _{WOVD}	—	40	ns	Figure 5.21
SCI	Input clock cycle	Asynchronous	t _{Scyc}	4 x (1/PCLK)	—	t _{cyc}	Figure 5.22
		Clock synchronous		6 x (1/PCLK)	—		
	Input clock pulse width		t _{SCKW}	0.4 x t _{Scyc}	0.6 x t _{Scyc}	t _{Scyc}	
	Input clock rise time		t _{SCKr}	—	20	ns	
	Input clock fall time		t _{SCKf}	—	20	ns	
	Output clock cycle	Asynchronous	t _{Scyc}	4 x (1/PCLK)	—	t _{cyc}	
		Clock synchronous		6 x (1/PCLK)	—		
	Output clock pulse width		t _{SCKW}	0.4 x t _{Scyc}	0.6 x t _{Scyc}	t _{Scyc}	
	Output clock rise time		t _{SCKr}	—	20	ns	
	Output clock fall time		t _{SCKf}	—	20	ns	
	Transmit data delay time		t _{TXD}	—	40	ns	Figure 5.23
	Receive data setup time (clock synchronous)		t _{RXS}	40	—	ns	
	Receive data hold time (clock synchronous)		t _{RXH}	40	—	ns	
A/D converter	Trigger input setup time		t _{TRGS}	25	—	ns	Figure 5.24

Appendix 1. Package Dimensions

Information on the latest version of the package dimensions or mountings has been displayed in "Packages" on Renesas Technology Corp. website.



176-pin LFBGA (PLBG0176GA-A)

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins

Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.

- The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

The state of the product is undefined at the moment when power is supplied.

- The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.

In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.

In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

- The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

- When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

Before changing from one product to another, i.e. to one with a different part number, confirm that the change will not lead to problems.

- The characteristics of MPU/MCU in the same group but having different part numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different part numbers, implement a system-evaluation test for each of the products.