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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	Discontinued at Digi-Key
Core Processor	RXv2
Core Size	32-Bit Single-Core
Speed	120MHz
Connectivity	CANbus, EBI/EMI, Ethernet, I ² C, LINbus, MMC/SD, QSPI, SCI, SPI, UART/USART, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	78
Program Memory Size	768KB (768K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	256K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 22x12b; D/A 1x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-LFQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f56517bdfp-30

Table 1.2 Code Flash Memory Capacity and Comparison of Functions for Different Packages (1/2)

Functions	Products	Products with 1 Mbyte of code flash memory or less		Products with at least 1.5 Mbytes of code flash memory		
	Package	145 Pins, 144 Pins	100 Pins	177 Pins, 176 Pins	145 Pins, 144 Pins	100 Pins
Code Flash Memory	Code Flash Memory Capacity	512 Kbytes/768 Kbytes /1 Mbyte		1.5 Mbytes/2 Mbytes		
	Dual bank function	Not available		Available		
	BGO function	Not available		Available		
Data Flash Memory		Not available		32 Kbytes		
RAM		256 Kbytes		640 Kbytes (256 Kbytes + 384 Kbytes of expansion RAM)		
External bus	External bus width	16/8 bits		32/16/8 bits	16/8 bits	
	SDRAM area controller	Available	Not available	Available		Not available
DMA	DMA controller	Ch. 0 to 7				
	Data transfer controller	Available				
	EXDMA controller	Ch. 0 and 1				
Timers	16-bit timer pulse unit	Ch. 0 to 5				
	Multi-function timer pulse unit 3	Ch. 0 to 8				
	Port output enable 3	Available				
	Programmable pulse generator	Ch. 0 and 1				
	8-bit timers	Ch. 0 to 3				
	Compare match timer	Ch. 0 to 3				
	Compare match timer W	Ch. 0 and 1				
	Realtime clock	Available				
	Watchdog timer	Available				
	Independent watchdog timer	Available				
Communication function	Ethernet controller	Ch. 0 (only for RX65N group)				
	DMA Controller for the Ethernet Controller	Ch. 0 (only for RX65N group)				
	USB 2.0 FS host/function module	Ch. 0				
	Serial communications interfaces (SCIg)	Ch. 0 to 9	Ch. 0 to 3, 5, 6, 8 and 9	Ch. 0 to 9		Ch. 0 to 3, 5, 6, 8 and 9
	Serial communications interfaces (SCIh)	Ch. 12				
	Serial communications interfaces (SCII)	Ch. 10 and 11				
	I ² C bus interfaces	Ch. 0 and 2		Ch. 0 to 2		Ch. 0 and 2
	Serial peripheral interface	Ch. 0 to 2				
	CAN module	Ch. 0 and 1				
	Quad serial peripheral interface	Ch. 0				
	SD host interface	Available				
	SD slave interface	Available				
	MMC host interface	Available				
	Parallel data capture unit	Available	Not available	Available		Not available
	Graphics	Graphic-LCD controller	Not available		Available	
2D drawing engine		Not available		Available		

1.2 List of Products

Table 1.3 is a list of products, and Figure 1.1 shows how to read the product part no.

Table 1.3 List of Products (1/8)

Group	Part No.	Package	Code Flash Memory Capacity (byte(s))	RAM Capacity (byte(s))	Data Flash Memory Capacity (byte(s))	Operating Frequency (Max.)	Encryption Module	SDHI/SDSI	Dual bank	Operating temperature (°C)
RX65N (D version)	R5F565NEDDFC	PLQP0176KB-A	2 M	640 K	32 K	120 MHz	Not available	Available	Available	−40 to +85
	R5F565NEHDFC	PLQP0176KB-A	2 M	640 K	32 K	120 MHz	Available	Available	Available	−40 to +85
	R5F565NCDDFC	PLQP0176KB-A	1.5 M	640 K	32 K	120 MHz	Not available	Available	Available	−40 to +85
	R5F565NCHDFC	PLQP0176KB-A	1.5 M	640 K	32 K	120 MHz	Available	Available	Available	−40 to +85
	R5F565NEDDFB	PLQP0144KA-B	2 M	640 K	32 K	120 MHz	Not available	Available	Available	−40 to +85
	R5F565NEHDFB	PLQP0144KA-B	2 M	640 K	32 K	120 MHz	Available	Available	Available	−40 to +85
	R5F565NCDDFB	PLQP0144KA-B	1.5 M	640 K	32 K	120 MHz	Not available	Available	Available	−40 to +85
	R5F565NCHDFB	PLQP0144KA-B	1.5 M	640 K	32 K	120 MHz	Available	Available	Available	−40 to +85
	R5F565N9ADFB	PLQP0144KA-B	1 M	256 K	Not included	120 MHz	Not available	Not available	Not available	−40 to +85
	R5F565N9BDFB	PLQP0144KA-B	1 M	256 K	Not included	120 MHz	Not available	Available	Not available	−40 to +85
	R5F565N9EDFB	PLQP0144KA-B	1 M	256 K	Not included	120 MHz	Available	Not available	Not available	−40 to +85
	R5F565N9FDFB	PLQP0144KA-B	1 M	256 K	Not included	120 MHz	Available	Available	Not available	−40 to +85
	R5F565N7ADFB	PLQP0144KA-B	768 K	256 K	Not included	120 MHz	Not available	Not available	Not available	−40 to +85
	R5F565N7BDFB	PLQP0144KA-B	768 K	256 K	Not included	120 MHz	Not available	Available	Not available	−40 to +85
	R5F565N7EDFB	PLQP0144KA-B	768 K	256 K	Not included	120 MHz	Available	Not available	Not available	−40 to +85
	R5F565N7FDFB	PLQP0144KA-B	768 K	256 K	Not included	120 MHz	Available	Available	Not available	−40 to +85
	R5F565N4ADFB	PLQP0144KA-B	512 K	256 K	Not included	120 MHz	Not available	Not available	Not available	−40 to +85
	R5F565N4BDFB	PLQP0144KA-B	512 K	256 K	Not included	120 MHz	Not available	Available	Not available	−40 to +85
	R5F565N4EDFB	PLQP0144KA-B	512 K	256 K	Not included	120 MHz	Available	Not available	Not available	−40 to +85
	R5F565N4FDFB	PLQP0144KA-B	512 K	256 K	Not included	120 MHz	Available	Available	Not available	−40 to +85
	R5F565NEDDFP	PLQP0100KB-B	2 M	640 K	32 K	120 MHz	Not available	Available	Available	−40 to +85
	R5F565NEHDFP	PLQP0100KB-B	2 M	640 K	32 K	120 MHz	Available	Available	Available	−40 to +85
	R5F565NCDDFP	PLQP0100KB-B	1.5 M	640 K	32 K	120 MHz	Not available	Available	Available	−40 to +85
	R5F565NCHDFP	PLQP0100KB-B	1.5 M	640 K	32 K	120 MHz	Available	Available	Available	−40 to +85
	R5F565N9ADFP	PLQP0100KB-B	1 M	256 K	Not included	120 MHz	Not available	Not available	Not available	−40 to +85
	R5F565N9BDFP	PLQP0100KB-B	1 M	256 K	Not included	120 MHz	Not available	Available	Not available	−40 to +85
	R5F565N9EDFP	PLQP0100KB-B	1 M	256 K	Not included	120 MHz	Available	Not available	Not available	−40 to +85
	R5F565N9FDFP	PLQP0100KB-B	1 M	256 K	Not included	120 MHz	Available	Available	Not available	−40 to +85

RX65N Group, RX651 Group
PTLG0100JA-A (100-Pin TFLGA)
(Upper Perspective View)

	A	B	C	D	E	F	G	H	J	K	
10	PE2	PE3	PE4	PA0	PA3	VSS	VCC	PB7	PC1	PC2	10
9	PE1	PD7	PE5	PA1	PA5	PA7	PB1	PB6	PC0	PC3	9
8	PE0	PD6	PD5	PE7	PA4	PB0	PB4	PC6	PC4	PC5	8
7	PD4	PD3	PD2	PE6	PA6	PB2	PB5	PC7	P50	P51	7
6	PD0	PD1	P47	P46	PA2	PB3	P52	P54	VCC_ USB	USB0_ DP	6
5	P43	P44	P42	P45	P41	P12	P53	P55	VSS_ USB	USB0_ DM	5
4	VREFL0	P40	VREFH0	VBATT	P34	P32	P27	P15	P13	P14	4
3	P07	AVCC0	PJ3	MD/ FINED	RES#	P35	P30	P16	P17	P20	3
2	AVCC1	AVSS0	AVSS1	XCOUT	VSS	VCC	P31	P25	P21	P22	2
1	P05	EMLE	VCL	XCIN	XTAL	EXTAL	P33	P26	P24	P23	1
	A	B	C	D	E	F	G	H	J	K	

Note: This figure indicates the power supply pins and I/O port pins. For the pin configuration, see Table 1.9, List of Pin and Pin Functions (100-Pin TFLGA).

Figure 1.8 Pin Assignment (100-Pin TFLGA)

Table 1.6 List of Pin and Pin Functions (176-Pin LFQFP) (1/8)

Pin Number	Power Supply Clock System Control	I/O Port	Bus EXDMAC SDRAMC	Timer (MTU, TPU, TMR, PPG, RTC, CMTW, POE, CAC)	Communication (ETHERC, SCI, RSPI, RIIC, CAN, USB)	Memory Interface Camera Interface (QSPI, SDHI, SDSI, MMCIF, PDC)	GLCDC	Interrupt	A/D D/A
1	AVSS0								
2		P05						IRQ13	DA1
3	AVCC1								
4		P03						IRQ11	DA0
5	AVSS1								
6		P02		TMC11	SCK6			IRQ10	AN120
7		P01		TMC10	RXD6/SMISO6/ SSCL6			IRQ9	AN119
8		P00		TMRI0	TXD6/SMOSI6/ SSDA6			IRQ8	AN118
9		PF5						IRQ4	
10	EMLE								
11		PJ5		POE8#	CTS2#/RTS2#/ SS2#				
12	VSS								
13		PJ3	EDACK1	MTIOC3C	ET0_EXOUT/ CTS6#/RTS6#/ SS6#/CTS0#/ RTS0#/SS0#				
14	VCL								
15	VBATT								
16	NC								
17	TRST#	PF4							
18	MD/FINED								
19	XCIN								
20	XCOUT								
21	RES#								
22	XTAL	P37							
23	VSS								
24	EXTAL	P36							
25	VCC								
26	UPSEL	P35						NMI	
27		P34		MTIOC0A/ TMC13/PO12/ POE10#	ET0_LINKSTA/ SCK6/SCK0			IRQ4	
28		P33	EDREQ1	MTIOC0D/ TIOC0D/ TMRI3/PO11/ POE4#/ POE11#	RXD6/SMISO6/ SSCL6/RXD0/ SMISO0/SSCL0/ CRX0	PCKO		IRQ3-DS	
29		P32		MTIOC0C/ TIOC0C/ TMO3/PO10/ RTCIC2/ RTCOUT/ POE0#/ POE10#	TXD6/SMOSI6/ SSDA6/TXD0/ SMOSI0/SSDA0/ CTX0/ USB_VBUSEN	VSYN		IRQ2-DS	
30	TMS	PF3							
31	TDI	PF2			RXD1/SMISO1/ SSCL1				

Table 1.6 List of Pin and Pin Functions (176-Pin LFQFP) (8/8)

Pin Number				Timer (MTU, TPU, TMR, PPG, RTC, CMTW, POE, CAC)	Communication (ETHERC, SCI, RSPI, RIIC, CAN, USB)	Memory Interface Camera Interface (QSPI, SDHI, SDI, MMCIF, PDC)	GLCDC	Interrupt	A/D D/A
176-Pin LFQFP	Power Supply Clock System Control	I/O Port	Bus EXDMAC SDRAMC						
160		P92	D18/A18	POE4#	RXD7/SMISO7/ SSCL7				AN116
161		P91	D17/A17		SCK7				AN115
162	VSS								
163		P90	D16/A16		TXD7/SMOSI7/ SSDA7				AN114
164	VCC								
165		P47						IRQ15- DS	AN007
166		P46						IRQ14- DS	AN006
167		P45						IRQ13- DS	AN005
168		P44						IRQ12- DS	AN004
169		P43						IRQ11- DS	AN003
170		P42						IRQ10- DS	AN002
171		P41						IRQ9-DS	AN001
172	VREFL0								
173		P40						IRQ8-DS	AN000
174	VREFH0								
175	AVCC0								
176		P07						IRQ15	ADTRG0 #

Note 1. P53 is multiplexed with the BCLK pin function, so cannot be used as an I/O port pin when the external bus is enabled.

Table 1.7 List of Pin and Pin Functions (145-Pin TFLGA) (1/7)

Pin Number	Power Supply Clock System Control	I/O Port	Bus EXDMAC SDRAMC	Timer (MTU, TPU, TMR, PPG, RTC, CMTW, POE, CAC)	Communication (ETHERC, SCI, RSPI, RIIC, CAN, USB)	Memory Interface Camera Interface (QSPI, SDHI, SDSI, MMCIF, PDC)	GLCDC	Interrupt	A/D D/A
A1	AVSS0								
A2		P07						IRQ15	ADTRG0 #
A3		P40						IRQ8-DS	AN000
A4		P42						IRQ10-DS	AN002
A5		P45						IRQ13-DS	AN005
A6		P90	A16		TXD7/SMOSI7/SSDA7				AN114
A7		P92	A18	POE4#	RXD7/SMISO7/SSCL7				AN116
A8		PD2	D2[A2/D2]	MTIOC4D/TIC2	MISOC-A/CRX0	QIO2-B/SDHI_D2-B/MMC_D2-B	LCD_DA TA22-B*1	IRQ2	AN110
A9		PD6	D6[A6/D6]	MTIC5V/MTIOC8A/POE4#	SSLC2-A	QMO-B/QIO0-B/SDHI_D0-B/MMC_D0-B	LCD_DA TA18-B*1	IRQ6	AN106
A10	VSS								
A11		P62	RAS#/D1[A1/D1]*1/CS2#						
A12		PE1	D9[A9/D9]/D1[A1/D1]*1	MTIOC4C/MTIOC3B/PO18	TXD12/SMOSI12/SSDA12/TXDX12/SIOX12/SSLB2-B	MMC_D5-B	LCD_DA TA15-B*1		ANEX1
A13		PE3	D11[A11/D11]/D3[A3/D3]*1	MTIOC4B/PO26/TOC3/POE8#	ET0_ERXD3/CTS12#/RTS12#/SS12#	MMC_D7-B	LCD_DA TA13-B*1		AN101
B1	AVCC1								
B2	AVCC0								
B3		P05						IRQ13	DA1
B4	VREFL0								
B5		P43						IRQ11-DS	AN003
B6		P47						IRQ15-DS	AN007
B7		P91	A17		SCK7				AN115
B8		PD0	D0[A0/D0]	POE4#			LCD_EX TCLK-B*1	IRQ0	AN108
B9		PD4	D4[A4/D4]	MTIOC8B/POE11#	SSLC0-A	QSSL-B/SDHI_CMD-B/MMC_CMD-B	LCD_DA TA20-B*1	IRQ4	AN112
B10	VCC								
B11		P61	SDCS#/D0[A0/D0]*1/CS1#						
B12		PE2	D10[A10/D10]/D2[A2/D2]*1	MTIOC4A/PO23/TIC3	RXD12/SMISO12/SSCL12/RXDX12/SSLB3-B	MMC_D6-B	LCD_DA TA14-B*1	IRQ7-DS	AN100

2.3 Accumulator

The accumulator (ACC0 or ACC1) is a 72-bit register used for DSP instructions. The accumulator is handled as a 96-bit register for reading and writing. At this time, when bits 95 to 72 of the accumulator are read, the value where the value of bit 71 is sign extended is read. Writing to bits 95 to 72 of the accumulator is ignored. ACC0 is also used for the multiply and multiply-and-accumulate instructions; EMUL, EMULU, FMUL, MUL, and RMPA, in which case the prior value in ACC0 is modified by execution of the instruction.

Use the MVTACGU, MVTACHI, and MVTACLO instructions for writing to the accumulator. The MVTACGU, MVTACHI, and MVTACLO instructions write data to bits 95 to 64, the higher-order 32 bits (bits 63 to 32), and the lower-order 32 bits (bits 31 to 0), respectively.

Use the MVFACGU, MVFACHI, MVFACMI, and MVFACLO instructions for reading data from the accumulator. The MVFACGU, MVFACHI, MVFACMI, and MVFACLO instructions read data from the guard bits (bits 95 to 64), higher-order 32 bits (bits 63 to 32), the middle 32 bits (bits 47 to 16), and the lower-order 32 bits (bits 31 to 0), respectively.

Table 4.1 List of I/O Registers (Address Order) (6 / 61)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 2862h	EXDMA C1	EXDMA Peripheral Request Flag Register	EDMPRF	8	8	1, 2 BCLK		EXDMA Ca
0008 2A00h	EXDMA C	EXDMAC Module Start Register	EDMAST	8	8	1, 2 BCLK		EXDMA Ca
0008 2BE0h	EXDMA C	Cluster Buffer Register 0	CLSBR0	32	32	1, 2 BCLK		EXDMA Ca
0008 2BE4h	EXDMA C	Cluster Buffer Register 1	CLSBR1	32	32	1, 2 BCLK		EXDMA Ca
0008 2BE8h	EXDMA C	Cluster Buffer Register 2	CLSBR2	32	32	1, 2 BCLK		EXDMA Ca
0008 2BECh	EXDMA C	Cluster Buffer Register 3	CLSBR3	32	32	1, 2 BCLK		EXDMA Ca
0008 2BF0h	EXDMA C	Cluster Buffer Register 4	CLSBR4	32	32	1, 2 BCLK		EXDMA Ca
0008 2BF4h	EXDMA C	Cluster Buffer Register 5	CLSBR5	32	32	1, 2 BCLK		EXDMA Ca
0008 2BF8h	EXDMA C	Cluster Buffer Register 6	CLSBR6	32	32	1, 2 BCLK		EXDMA Ca
0008 2BFCh	EXDMA C	Cluster Buffer Register 7	CLSBR7	32	32	1, 2 BCLK		EXDMA Ca
0008 3002h	BSC	CS0 Mode Register	CS0MOD	16	16	1, 2 BCLK		Buses
0008 3004h	BSC	CS0 Wait Control Register 1	CS0WCR1	32	32	1, 2 BCLK		Buses
0008 3008h	BSC	CS0 Wait Control Register 2	CS0WCR2	32	32	1, 2 BCLK		Buses
0008 3012h	BSC	CS1 Mode Register	CS1MOD	16	16	1, 2 BCLK		Buses
0008 3014h	BSC	CS1 Wait Control Register 1	CS1WCR1	32	32	1, 2 BCLK		Buses
0008 3018h	BSC	CS1 Wait Control Register 2	CS1WCR2	32	32	1, 2 BCLK		Buses
0008 3022h	BSC	CS2 Mode Register	CS2MOD	16	16	1, 2 BCLK		Buses
0008 3024h	BSC	CS2 Wait Control Register 1	CS2WCR1	32	32	1, 2 BCLK		Buses
0008 3028h	BSC	CS2 Wait Control Register 2	CS2WCR2	32	32	1, 2 BCLK		Buses
0008 3032h	BSC	CS3 Mode Register	CS3MOD	16	16	1, 2 BCLK		Buses
0008 3034h	BSC	CS3 Wait Control Register 1	CS3WCR1	32	32	1, 2 BCLK		Buses
0008 3038h	BSC	CS3 Wait Control Register 2	CS3WCR2	32	32	1, 2 BCLK		Buses
0008 3042h	BSC	CS4 Mode Register	CS4MOD	16	16	1, 2 BCLK		Buses
0008 3044h	BSC	CS4 Wait Control Register 1	CS4WCR1	32	32	1, 2 BCLK		Buses
0008 3048h	BSC	CS4 Wait Control Register 2	CS4WCR2	32	32	1, 2 BCLK		Buses
0008 3052h	BSC	CS5 Mode Register	CS5MOD	16	16	1, 2 BCLK		Buses
0008 3054h	BSC	CS5 Wait Control Register 1	CS5WCR1	32	32	1, 2 BCLK		Buses
0008 3058h	BSC	CS5 Wait Control Register 2	CS5WCR2	32	32	1, 2 BCLK		Buses
0008 3062h	BSC	CS6 Mode Register	CS6MOD	16	16	1, 2 BCLK		Buses
0008 3064h	BSC	CS6 Wait Control Register 1	CS6WCR1	32	32	1, 2 BCLK		Buses
0008 3068h	BSC	CS6 Wait Control Register 2	CS6WCR2	32	32	1, 2 BCLK		Buses
0008 3072h	BSC	CS7 Mode Register	CS7MOD	16	16	1, 2 BCLK		Buses
0008 3074h	BSC	CS7 Wait Control Register 1	CS7WCR1	32	32	1, 2 BCLK		Buses
0008 3078h	BSC	CS7 Wait Control Register 2	CS7WCR2	32	32	1, 2 BCLK		Buses
0008 3802h	BSC	CS0 Control Register	CS0CR	16	16	1, 2 BCLK		Buses
0008 380Ah	BSC	CS0 Recovery Cycle Register	CS0REC	16	16	1, 2 BCLK		Buses
0008 3812h	BSC	CS1 Control Register	CS1CR	16	16	1, 2 BCLK		Buses
0008 381Ah	BSC	CS1 Recovery Cycle Register	CS1REC	16	16	1, 2 BCLK		Buses
0008 3822h	BSC	CS2 Control Register	CS2CR	16	16	1, 2 BCLK		Buses
0008 382Ah	BSC	CS2 Recovery Cycle Register	CS2REC	16	16	1, 2 BCLK		Buses
0008 3832h	BSC	CS3 Control Register	CS3CR	16	16	1, 2 BCLK		Buses
0008 383Ah	BSC	CS3 Recovery Cycle Register	CS3REC	16	16	1, 2 BCLK		Buses
0008 3842h	BSC	CS4 Control Register	CS4CR	16	16	1, 2 BCLK		Buses
0008 384Ah	BSC	CS4 Recovery Cycle Register	CS4REC	16	16	1, 2 BCLK		Buses

Table 4.1 List of I/O Registers (Address Order) (7 / 61)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 3852h	BSC	CS5 Control Register	CS5CR	16	16	1, 2 BCLK		Buses
0008 385Ah	BSC	CS5 Recovery Cycle Register	CS5REC	16	16	1, 2 BCLK		Buses
0008 3862h	BSC	CS6 Control Register	CS6CR	16	16	1, 2 BCLK		Buses
0008 386Ah	BSC	CS6 Recovery Cycle Register	CS6REC	16	16	1, 2 BCLK		Buses
0008 3872h	BSC	CS7 Control Register	CS7CR	16	16	1, 2 BCLK		Buses
0008 387Ah	BSC	CS7 Recovery Cycle Register	CS7REC	16	16	1, 2 BCLK		Buses
0008 3880h	BSC	CS Recovery Cycle Insertion Enable Register	CSRECEN	16	16	1, 2 BCLK		Buses
0008 3C00h	BSC	SDC Control Register	SDCCR	8	8	1, 2 BCLK		Buses
0008 3C01h	BSC	SDC Mode Register	SDCMOD	8	8	1, 2 BCLK		Buses
0008 3C02h	BSC	SDRAM Access Mode Register	SDAMOD	8	8	1, 2 BCLK		Buses
0008 3C10h	BSC	SDRAM Self-Refresh Control Register	SDSELF	8	8	1, 2 BCLK		Buses
0008 3C14h	BSC	SDRAM Refresh Control Register	SDRFCR	16	16	1, 2 BCLK		Buses
0008 3C16h	BSC	SDRAM Auto-Refresh Control Register	SDRFEN	8	8	1, 2 BCLK		Buses
0008 3C20h	BSC	SDRAM Initialization Sequence Control Register	SDICR	8	8	1, 2 BCLK		Buses
0008 3C24h	BSC	SDRAM Initialization Register	SDIR	16	16	1, 2 BCLK		Buses
0008 3C40h	BSC	SDRAM Address Register	SDADR	8	8	1, 2 BCLK		Buses
0008 3C44h	BSC	SDRAM Timing Register	SDTR	32	32	1, 2 BCLK		Buses
0008 3C48h	BSC	SDRAM Mode Register	SDMOD	16	16	1, 2 BCLK		Buses
0008 3C50h	BSC	SDRAM Status Register	SDSR	8	8	1, 2 BCLK		Buses
0008 6400h	MPU	Region-0 Start Page Number Register	RSPAGE0	32	32	1 ICLK		MPU
0008 6404h	MPU	Region-0 End Page Number Register	REPAGE0	32	32	1 ICLK		MPU
0008 6408h	MPU	Region-1 Start Page Number Register	RSPAGE1	32	32	1 ICLK		MPU
0008 640Ch	MPU	Region-1 End Page Number Register	REPAGE1	32	32	1 ICLK		MPU
0008 6410h	MPU	Region-2 Start Page Number Register	RSPAGE2	32	32	1 ICLK		MPU
0008 6414h	MPU	Region-2 End Page Number Register	REPAGE2	32	32	1 ICLK		MPU
0008 6418h	MPU	Region-3 Start Page Number Register	RSPAGE3	32	32	1 ICLK		MPU
0008 641Ch	MPU	Region-3 End Page Number Register	REPAGE3	32	32	1 ICLK		MPU
0008 6420h	MPU	Region-4 Start Page Number Register	RSPAGE4	32	32	1 ICLK		MPU
0008 6424h	MPU	Region-4 End Page Number Register	REPAGE4	32	32	1 ICLK		MPU
0008 6428h	MPU	Region-5 Start Page Number Register	RSPAGE5	32	32	1 ICLK		MPU
0008 642Ch	MPU	Region-5 End Page Number Register	REPAGE5	32	32	1 ICLK		MPU
0008 6430h	MPU	Region-6 Start Page Number Register	RSPAGE6	32	32	1 ICLK		MPU
0008 6434h	MPU	Region-6 End Page Number Register	REPAGE6	32	32	1 ICLK		MPU
0008 6438h	MPU	Region-7 Start Page Number Register	RSPAGE7	32	32	1 ICLK		MPU
0008 643Ch	MPU	Region-7 End Page Number Register	REPAGE7	32	32	1 ICLK		MPU
0008 6500h	MPU	Memory-Protection Enable Register	MPEN	32	32	1 ICLK		MPU
0008 6504h	MPU	Background Access Control Register	MPBAC	32	32	1 ICLK		MPU
0008 6508h	MPU	Memory-Protection Error Status-Clearing Register	MPECLR	32	32	1 ICLK		MPU
0008 650Ch	MPU	Memory-Protection Error Status Register	MPESTS	32	32	1 ICLK		MPU
0008 6514h	MPU	Data Memory-Protection Error Address Register	MPDEA	32	32	1 ICLK		MPU
0008 6520h	MPU	Region Search Address Register	MPSA	32	32	1 ICLK		MPU
0008 6524h	MPU	Region Search Operation Register	MPOPS	16	16	1 ICLK		MPU
0008 6526h	MPU	Region Invalidation Operation Register	MPOPI	16	16	1 ICLK		MPU
0008 6528h	MPU	Instruction-Hit Region Register	MHITI	32	32	1 ICLK		MPU
0008 652Ch	MPU	Data-Hit Region Register	MHITD	32	32	1 ICLK		MPU
0008 7010h to 0008 70FFh	ICU	Interrupt Request Registers 016 to 255	IR016 to 255	8	8	2 ICLK		ICUB
0008 711Ah to 0008 71FFh	ICU	DTC Transfer Request Enable Registers 026 to 255	DTCER026 to DTCER255	8	8	2 ICLK		ICUB
0008 7202h to 0008 721Fh	ICU	Interrupt Request Enable Registers 02 to 1F	IER02 to IER1F	8	8	2 ICLK		ICUB

Table 4.1 List of I/O Registers (Address Order) (25 / 61)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 A046h	SMCI2	Smart Card Mode Register	SCMR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A047h	SCI2	Serial Extended Mode Register	SEMR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A048h	SCI2	Noise Filter Setting Register	SNFR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A049h	SCI2	I ² C Mode Register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Ah	SCI2	I ² C Mode Register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Bh	SCI2	I ² C Mode Register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Ch	SCI2	I ² C Status Register	SISR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Dh	SCI2	SPI Mode Register	SPMR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Eh	SCI2	Transmit Data Register H	TDRH	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Fh	SCI2	Transmit Data Register L	TDRL	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A04Eh	SCI2	Transmit Data Register HL	TDRHL	16	16	4, 5 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A050h	SCI2	Receive Data Register H	RDRH	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A051h	SCI2	Receive Data Register L	RDRL	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A050h	SCI2	Receive Data Register HL	RDRHL	16	16	4, 5 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A052h	SCI2	Modulation Duty Register	MDDR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A060h	SCI3	Serial Mode Register	SMR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A061h	SCI3	Bit Rate Register	BRR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A062h	SCI3	Serial Control Register	SCR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A063h	SCI3	Transmit Data Register	TDR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A064h	SCI3	Serial Status Register	SSR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A065h	SCI3	Receive Data Register	RDR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A066h	SMCI3	Smart Card Mode Register	SCMR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli
0008 A067h	SCI3	Serial Extended Mode Register	SEMR	8	8	2, 3 PCLKB	2 ICLK	SClg, SClh, Scli

Table 4.1 List of I/O Registers (Address Order) (32 / 61)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 A132h	SCI9	Modulation Duty Register	MDDR	8	8	2, 3 PCLKB	2 ICLK	SCIg, SC1h, SC1i
0008 AC00h	SDHI	Command Register	SDCMD	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC08h	SDHI	Argument Register	SDARG	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC10h	SDHI	Data Stop Register	SDSTOP	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC14h	SDHI	Block Count Register	SDBLKCNT	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC18h	SDHI	Response Register 10	SDRSP10	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC20h	SDHI	Response Register 32	SDRSP32	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC28h	SDHI	Response Register 54	SDRSP54	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC30h	SDHI	Response Register 76	SDRSP76	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC38h	SDHI	SD Status Register 1	SDSTS1	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC3Ch	SDHI	SD Status Register 2	SDSTS2	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC40h	SDHI	SD Interrupt Mask Register 1	SDIMSK1	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC44h	SDHI	SD Interrupt Mask Register 2	SDIMSK2	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC48h	SDHI	SDHI Clock Control Register	SDCLKCR	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC4Ch	SDHI	Transfer Data Size Register	SDSIZE	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC50h	SDHI	Card Access Option Register	SDOPT	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC58h	SDHI	SD Error Status Register 1	SDERSTS1	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC5Ch	SDHI	SD Error Status Register 2	SDERSTS2	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC60h	SDHI	SD Buffer Register	SDBUFR	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC68h	SDHI	SDIO Mode Control Register	SDIOMD	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC6Ch	SDHI	SDIO Status Register	SDIOSTS	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 AC70h	SDHI	SDIO Interrupt Mask Register	SDIOIMSK	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 ADB0h	SDHI	DMA Transfer Enable Register	SDDMAEN	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 ADC0h	SDHI	SDHI Software Reset Register	SDRST	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 ADC4h	SDHI	Version Register	SDVER	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 ADE0h	SDHI	Swap Control Register	SDSWAP	32	32	2, 3 PCLKB	2 ICLK	SDHI
0008 B000h	CAC	CAC Control Register 0	CACR0	8	8	2, 3 PCLKB	2 ICLK	CAC
0008 B001h	CAC	CAC Control Register 1	CACR1	8	8	2, 3 PCLKB	2 ICLK	CAC
0008 B002h	CAC	CAC Control Register 2	CACR2	8	8	2, 3 PCLKB	2 ICLK	CAC
0008 B003h	CAC	CAC Interrupt Request Enable Register	CAICR	8	8	2, 3 PCLKB	2 ICLK	CAC
0008 B004h	CAC	CAC Status Register	CASTR	8	8	2, 3 PCLKB	2 ICLK	CAC
0008 B006h	CAC	CAC Upper-Limit Value Setting Register	CAULVR	16	16	2, 3 PCLKB	2 ICLK	CAC
0008 B008h	CAC	CAC Lower-Limit Value Setting Register	CALLVR	16	16	2, 3 PCLKB	2 ICLK	CAC
0008 B00Ah	CAC	CAC Counter Buffer Register	CACNTBR	16	16	2, 3 PCLKB	2 ICLK	CAC
0008 B080h	DOC	DOC Control Register	DOCR	8	8	2, 3 PCLKB	2 ICLK	DOC
0008 B082h	DOC	DOC Data Input Register	DODIR	16	16	2, 3 PCLKB	2 ICLK	DOC
0008 B084h	DOC	DOC Data Setting Register	DODSR	16	16	2, 3 PCLKB	2 ICLK	DOC
0008 B100h	ELC	Event Link Control Register	ELCR	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B101h	ELC	Event Link Setting Register 0	ELSR0	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B104h	ELC	Event Link Setting Register 3	ELSR3	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B105h	ELC	Event Link Setting Register 4	ELSR4	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B108h	ELC	Event Link Setting Register 7	ELSR7	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B10Bh	ELC	Event Link Setting Register 10	ELSR10	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B10Ch	ELC	Event Link Setting Register 11	ELSR11	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B10Dh	ELC	Event Link Setting Register 12	ELSR12	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B10Eh	ELC	Event Link Setting Register 13	ELSR13	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B110h	ELC	Event Link Setting Register 15	ELSR15	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B111h	ELC	Event Link Setting Register 16	ELSR16	8	8	2, 3 PCLKB	2 ICLK	ELC
0008 B113h	ELC	Event Link Setting Register 18	ELSR18	8	8	2, 3 PCLKB	2 ICLK	ELC

Table 4.1 List of I/O Registers (Address Order) (41 / 61)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 C193h	MPC	PA3 Pin Function Control Register	PA3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C194h	MPC	PA4 Pin Function Control Register	PA4PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C195h	MPC	PA5 Pin Function Control Register	PA5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C196h	MPC	PA6 Pin Function Control Register	PA6PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C197h	MPC	PA7 Pin Function Control Register	PA7PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C198h	MPC	PB0 Pin Function Control Register	PB0PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C199h	MPC	PB1 Pin Function Control Register	PB1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C19Ah	MPC	PB2 Pin Function Control Register	PB2PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C19Bh	MPC	PB3 Pin Function Control Register	PB3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C19Ch	MPC	PB4 Pin Function Control Register	PB4PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C19Dh	MPC	PB5 Pin Function Control Register	PB5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C19Eh	MPC	PB6 Pin Function Control Register	PB6PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C19Fh	MPC	PB7 Pin Function Control Register	PB7PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A0h	MPC	PC0 Pin Function Control Register	PC0PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A1h	MPC	PC1 Pin Function Control Register	PC1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A2h	MPC	PC2 Pin Function Control Register	PC2PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A3h	MPC	PC3 Pin Function Control Register	PC3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A4h	MPC	PC4 Pin Function Control Register	PC4PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A5h	MPC	PC5 Pin Function Control Register	PC5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A6h	MPC	PC6 Pin Function Control Register	PC6PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A7h	MPC	PC7 Pin Function Control Register	PC7PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A8h	MPC	PD0 Pin Function Control Register	PD0PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1A9h	MPC	PD1 Pin Function Control Register	PD1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1AAh	MPC	PD2 Pin Function Control Register	PD2PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1ABh	MPC	PD3 Pin Function Control Register	PD3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1ACh	MPC	PD4 Pin Function Control Register	PD4PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1ADh	MPC	PD5 Pin Function Control Register	PD5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1AEh	MPC	PD6 Pin Function Control Register	PD6PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1AFh	MPC	PD7 Pin Function Control Register	PD7PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B0h	MPC	PE0 Pin Function Control Register	PE0PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B1h	MPC	PE1 Pin Function Control Register	PE1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B2h	MPC	PE2 Pin Function Control Register	PE2PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B3h	MPC	PE3 Pin Function Control Register	PE3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B4h	MPC	PE4 Pin Function Control Register	PE4PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B5h	MPC	PE5 Pin Function Control Register	PE5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B6h	MPC	PE6 Pin Function Control Register	PE6PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B7h	MPC	PE7 Pin Function Control Register	PE7PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B8h	MPC	PF0 Pin Function Control Register	PF0PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1B9h	MPC	PF1 Pin Function Control Register	PF1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1BAh	MPC	PF2 Pin Function Control Register	PF2PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1BDh	MPC	PF5 Pin Function Control Register	PF5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1D0h	MPC	PJ0 Pin Function Control Register	PJ0PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1D1h	MPC	PJ1 Pin Function Control Register	PJ1PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1D2h	MPC	PJ2 Pin Function Control Register	PJ2PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1D3h	MPC	PJ3 Pin Function Control Register	PJ3PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C1D5h	MPC	PJ5 Pin Function Control Register	PJ5PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C280h	SYSTM	Deep Standby Control Register	DPSBYCR	8	8	4, 5 PCLKB	2, 3 ICLK	Low Power Consumption

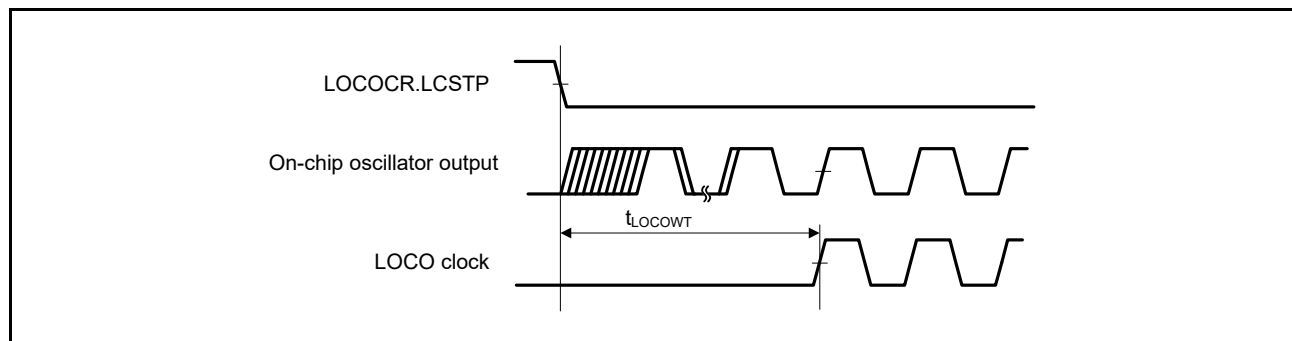
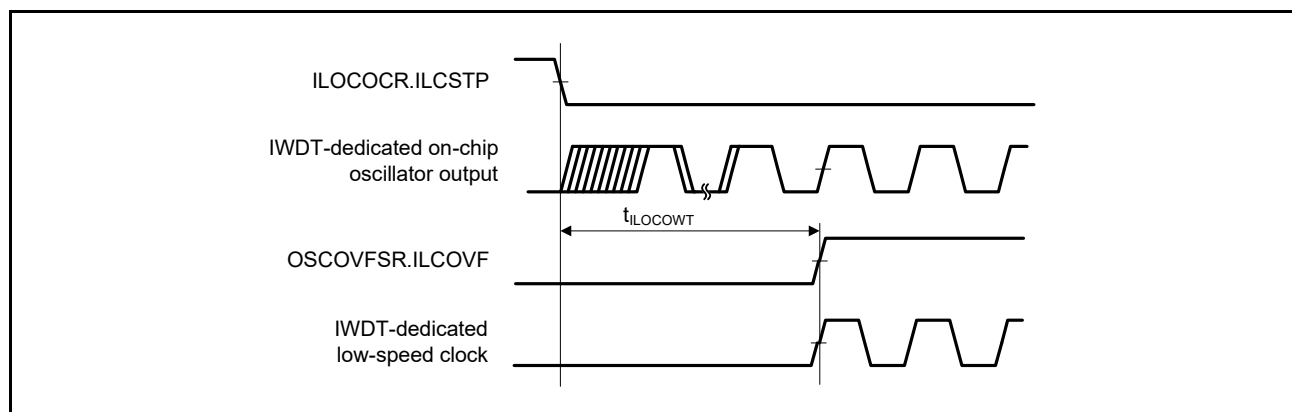
Table 4.1 List of I/O Registers (Address Order) (43 / 61)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access Cycles		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 C2A0h to 0008 C2BFh	SYSTEM	Deep Standby Backup Registers 0 to 31	DPSBKR0 to 31	8	8	4, 5 PCLKB	2, 3 ICLK	Low Power Consumption
0008 C400h	RTC	64-Hz Counter	R64CNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C402h	RTC	Second Counter	RSECCNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C402h	RTC	Binary Counter 0	BCNT0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C404h	RTC	Minute Counter	RMINCNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C404h	RTC	Binary Counter 1	BCNT1	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C406h	RTC	Hour Counter	RHRCNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C406h	RTC	Binary Counter 2	BCNT2	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C408h	RTC	Day-of-Week Counter	RWKCNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C408h	RTC	Binary Counter 3	BCNT3	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C40Ah	RTC	Date Counter	RDAYCNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C40Ch	RTC	Month Counter	RMONCNT	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C40Eh	RTC	Year Counter	RYRCNT	16	16	2, 3 PCLKB	2 ICLK	RTCd
0008 C410h	RTC	Second Alarm Register	RSECAR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C410h	RTC	Binary Counter 0 Alarm Register	BCNT0AR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C412h	RTC	Minute Alarm Register	RMINAR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C412h	RTC	Binary Counter 1 Alarm Register	BCNT1AR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C414h	RTC	Hour Alarm Register	RHRAR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C414h	RTC	Binary Counter 2 Alarm Register	BCNT2AR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C416h	RTC	Day-of-Week Alarm Register	RWKAR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C416h	RTC	Binary Counter 3 Alarm Register	BCNT3AR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C418h	RTC	Date Alarm Register	RDAYAR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C418h	RTC	Binary Counter 0 Alarm Enable Register	BCNT0AER	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C41Ah	RTC	Month Alarm Register	RMONAR	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C41Ah	RTC	Binary Counter 1 Alarm Enable Register	BCNT1AER	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C41Ch	RTC	Year Alarm Register	RYRAR	16	16	2, 3 PCLKB	2 ICLK	RTCd
0008 C41Ch	RTC	Binary Counter 2 Alarm Enable Register	BCNT2AER	16	16	2, 3 PCLKB	2 ICLK	RTCd
0008 C41Eh	RTC	Year Alarm Enable Register	RYRAREN	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C41Eh	RTC	Binary Counter 3 Alarm Enable Register	BCNT3AER	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C422h	RTC	RTC Control Register 1	RCR1	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C424h	RTC	RTC Control Register 2	RCR2	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C426h	RTC	RTC Control Register 3	RCR3	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C428h	RTC	RTC Control Register 4	RCR4	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C42Ah	RTC	Frequency Register H	RFRH	16	16	2, 3 PCLKB	2 ICLK	RTCd
0008 C42Ch	RTC	Frequency Register L	RFRL	16	16	2, 3 PCLKB	2 ICLK	RTCd
0008 C42Eh	RTC	Time Error Adjustment Register	RADJ	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C440h	RTC	Time Capture Control Register 0	RTCCR0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C442h	RTC	Time Capture Control Register 1	RTCCR1	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C444h	RTC	Time Capture Control Register 2	RTCCR2	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C452h	RTC	Second Capture Register 0	RSECCP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C452h	RTC	BCNT0 Capture Register 0	BCNT0CP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C454h	RTC	Minute Capture Register 0	RMINCP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C454h	RTC	BCNT1 Capture Register 0	BCNT1CP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C456h	RTC	Hour Capture Register 0	RHRCP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C456h	RTC	BCNT2 Capture Register 0	BCNT2CP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C45Ah	RTC	Date Capture Register 0	RDAYCP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C45Ah	RTC	BCNT3 Capture Register 0	BCNT3CP0	8	8	2, 3 PCLKB	2 ICLK	RTCd
0008 C45Ch	RTC	Month Capture Register 0	RMONCP0	8	8	2, 3 PCLKB	2 ICLK	RTCd

Table 5.17 LOCO and IWDT-Dedicated Low-Speed Clock Timing

Conditions: $V_{CC} = AVCC0 = AVCC1 = V_{CC_USB} = V_{BATT} = 2.7$ to 3.6 V, 2.7 V $\leq V_{REFH0} \leq AVCC0$,
 $V_{SS} = AVSS0 = AVSS1 = V_{REFL0} = V_{SS_USB} = 0$ V,
 $T_a = T_{opr}$

Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
LOCO clock cycle time	t_{Lcyc}	4.63	4.16	3.78	μ s	
LOCO clock oscillation frequency	f_{LOCO}	216	240	264	kHz	
LOCO clock oscillation stabilization wait time	t_{LOCOWT}	—	—	44	μ s	Figure 5.6
IWDT-dedicated low-speed clock cycle time	t_{ILcyc}	9.26	8.33	7.57	μ s	
IWDT-dedicated low-speed clock oscillation frequency	f_{ILOCO}	108	120	132	kHz	
IWDT-dedicated low-speed clock oscillation stabilization wait time	$t_{ILOCOWT}$	—	142	190	μ s	Figure 5.7

**Figure 5.6 LOCO Clock Oscillation Start Timing****Figure 5.7 IWDT-dedicated Low-Speed Clock Oscillation Start Timing**

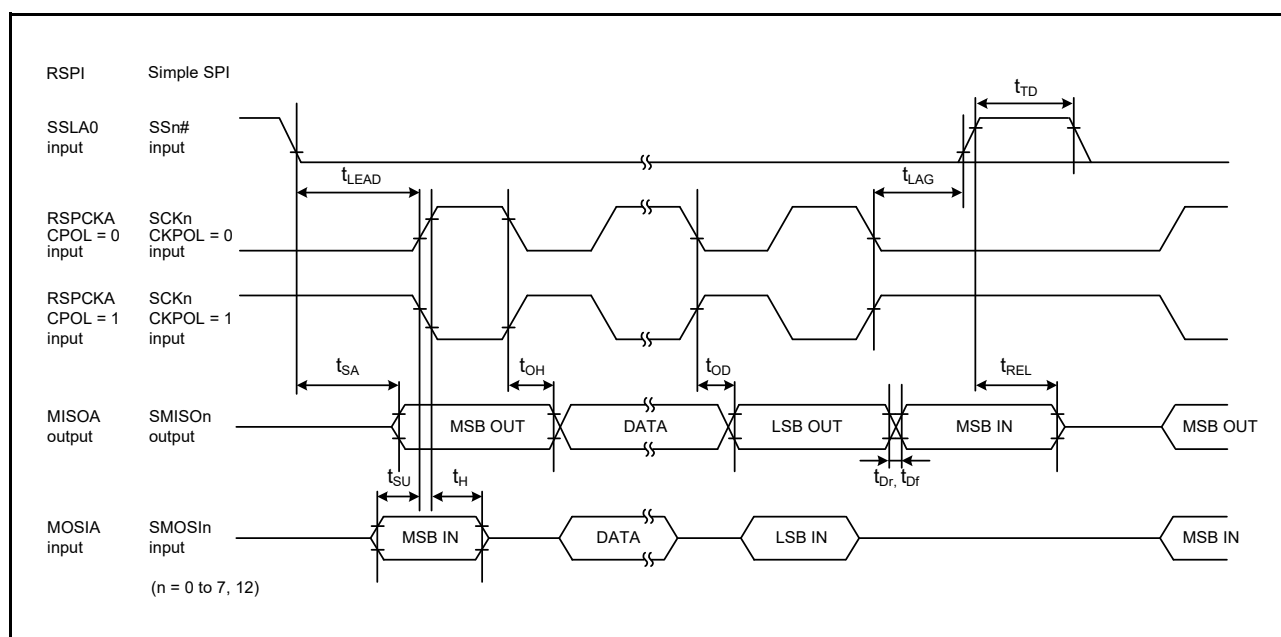


Figure 5.49 RSPI Timing (Slave, CPHA = 0) and Simple SPI Timing (Slave, CKPH = 1)

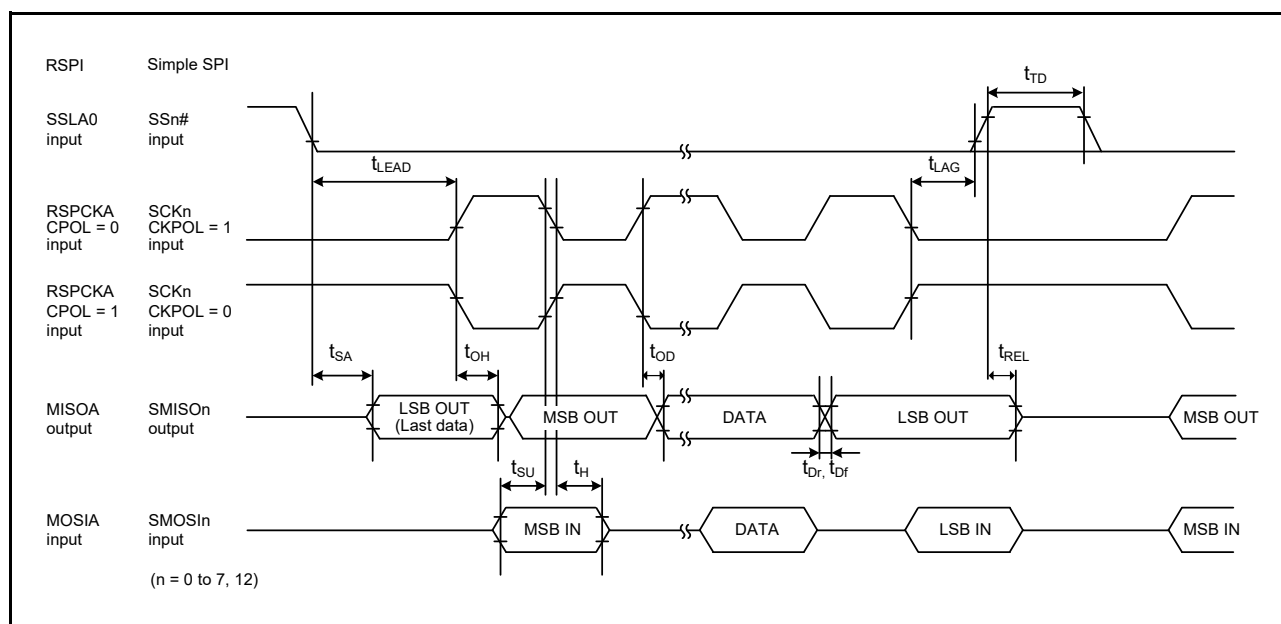


Figure 5.50 RSPI Timing (Slave, CPHA = 1) and Simple SPI Timing (Slave, CKPH = 0)

5.6 D/A Conversion Characteristics

Table 5.49 D/A Conversion Characteristics

Conditions: $V_{CC} = AVCC0 = AVCC1 = V_{CC_USB} = V_{BATT} = 2.7$ to 3.6 V, 2.7 V $\leq V_{REFH0} \leq AVCC0$,
 $V_{SS} = AVSS0 = AVSS1 = V_{REFL0} = V_{SS_USB} = 0$ V,
 $T_a = T_{opr}$

Item		Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Resolution		—	12	12	12	Bit	
Unbuffered output	Absolute accuracy	—	—	—	± 6.0	LSB	2-M Ω resistive load 10-bit conversion
	Differential nonlinearity error	DNL	—	± 1.0	± 2.0	LSB	2-M Ω resistive load
	Output resistance	R_O	—	8.6	—	k Ω	
	Setting time	t_s	—	—	3	μ s	20-pF capacitive load
Buffered output	Load resistance	R_L	5	—	—	k Ω	
	Load capacitance	C_L	—	—	50	pF	
	Output voltage	V_O	0.2	—	$AVCC1 - 0.2$	V	
	Differential nonlinearity error	DNL	—	± 1.0	± 2.0	LSB	
	Integral nonlinearity error	INL	—	± 2.0	± 4.0	LSB	
	Setting time	t_s	—	—	4	μ s	

5.7 Temperature Sensor Characteristics

Table 5.50 Temperature Sensor Characteristics

Conditions: $V_{CC} = AVCC0 = AVCC1 = V_{CC_USB} = V_{BATT} = 2.7$ to 3.6 V, 2.7 V $\leq V_{REFH0} \leq AVCC0$,
 $V_{SS} = AVSS0 = AVSS1 = V_{REFL0} = V_{SS_USB} = 0$ V,
 $T_a = T_{opr}$

Item	Min.	Typ.	Max.	Unit	Test Conditions
Relative accuracy	—	± 1	—	$^{\circ}$ C	
Temperature slope	—	4	—	mV/ $^{\circ}$ C	
Output voltage (at 25 $^{\circ}$ C)	—	1.21	—	V	
Temperature sensor start time	—	—	30	μ s	
Sampling time*1	4.15	—	—	μ s	

Note 1. Set the S12AD1.ADSSTRT register such that the sampling time of the 12-bit A/D converter satisfies this specification.

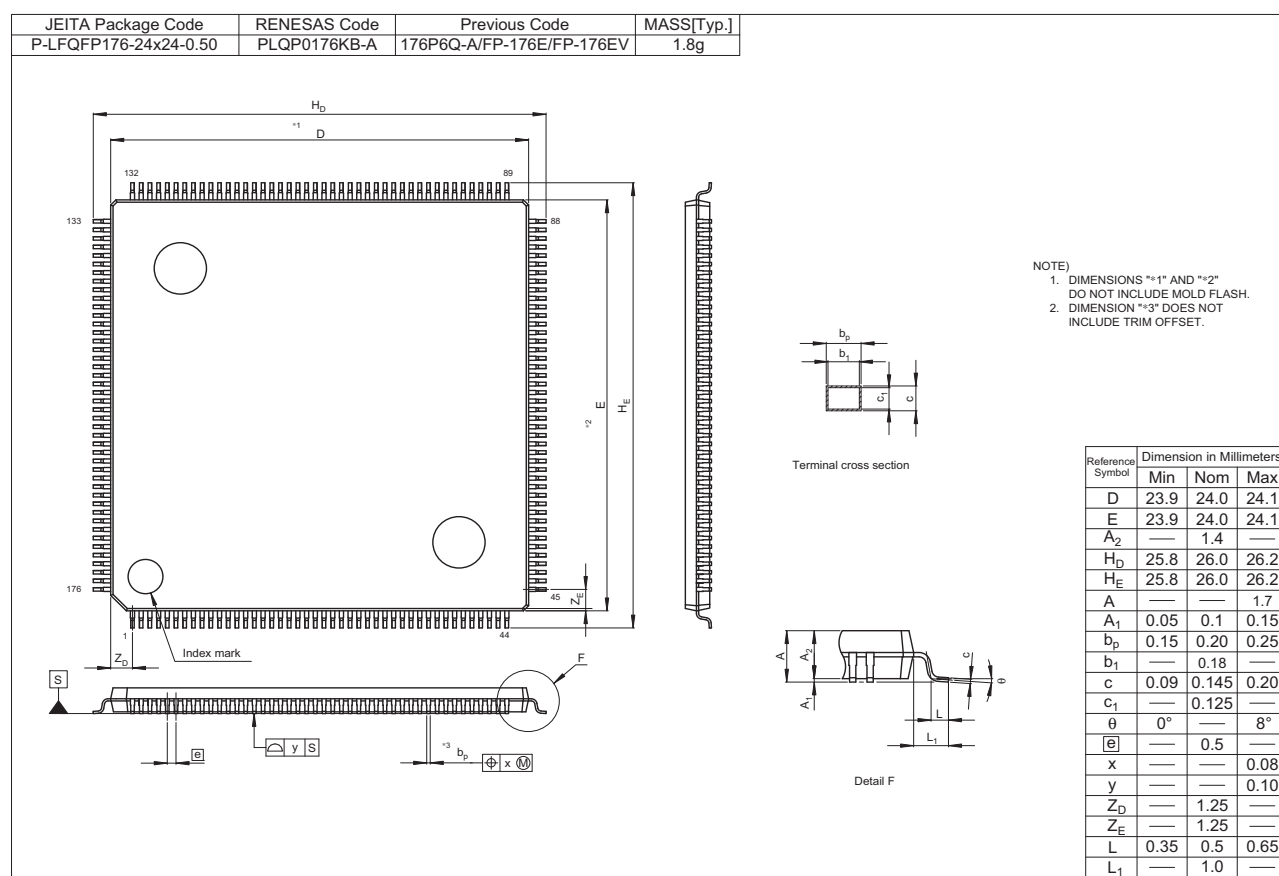


Figure C 176-Pin LFQFP (PLQP0176KB-A)

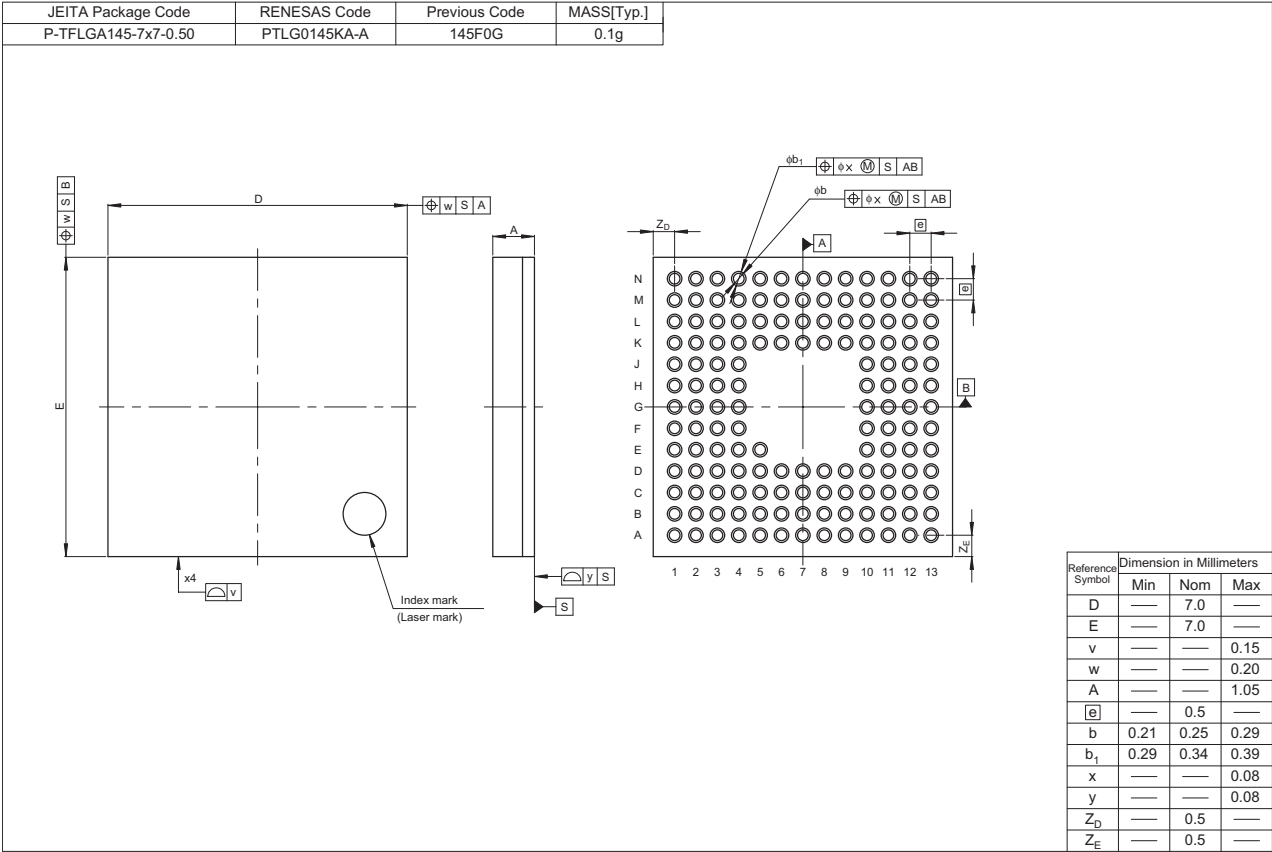


Figure D 145-Pin TFLGA (PTLG0145KA-A)

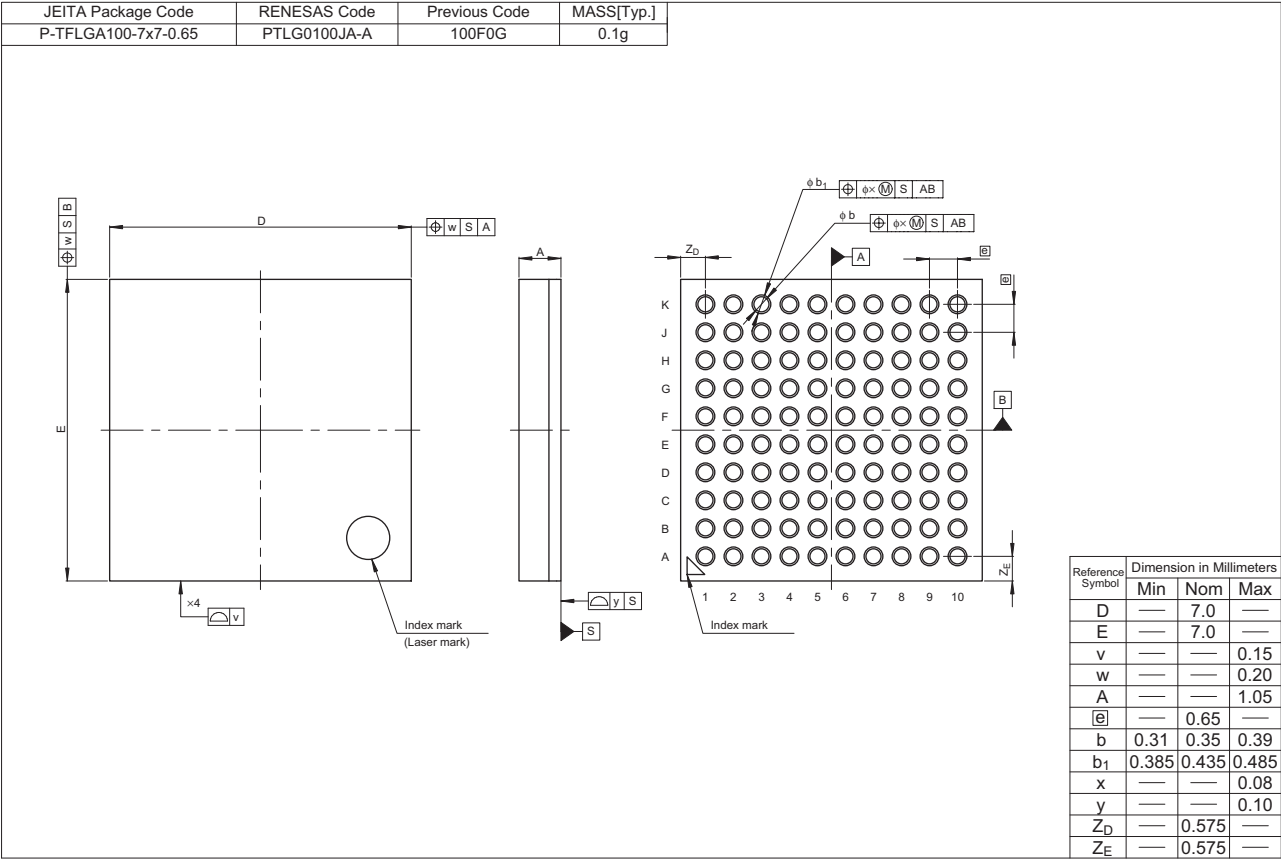


Figure F 100-Pin TFLGA (PTLG0100JA-A)

REVISION HISTORY	RX65N Group, RX651 Group Datasheet
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Classifications

- Items with Technical Update document number: Changes according to the corresponding issued Technical Update
- Items without Technical Update document number: Minor changes that do not require Technical Update to be issued

Rev.	Date	Description		Classification
		Page	Summary	
1.00	Aug 24, 2016	—	First edition, issued	
2.10	Oct 02, 2017	—	Products with at least 1.5 Mbytes of code flash memory added The conventional products indicated as "products with 1 Mbyte of code flash memory or less"	
		1. Overview		
		6, 9	Table 1.1 Outline of Specifications (5/9), Note added	TN-RX*-A164B/E
		8	Table 1.1 Outline of Specifications (8/9) Description of the 12-bit D/A converter (R12DA) changed	TN-RX*-A165A/E
		4. I/O Registers		
		131	Table 4.1 List of I/O Registers (Address Order) (46 / 61), changed	TN-RX*-A176A/E
		5. Electrical Characteristics		
		147	Table 5.1 Absolute Maximum Rating, changed	
		150	Table 5.5 DC Characteristics (3) (Products with 1 Mbyte of code flash memory or less), changed	TN-RX*-A164B/E
		152	Table 5.7 DC Characteristics (4), changed	TN-RX*-A164B/E TN-RX*-A176A/E
		153	Table 5.9 Heat Resistance Value (Reference), added	
		162	Table 5.21 Timing of Recovery from Low Power Consumption Modes (1), changed	TN-RX*-A176A/E
		189	Table 5.35 RSPI Timing, changed	
		212	Table 5.49 D/A Conversion Characteristics, changed	TN-RX*-A165A/E
		218	Table 5.54 Code Flash Memory Characteristics, changed	
		219	Table 5.55 Data Flash Memory Characteristics, changed	

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