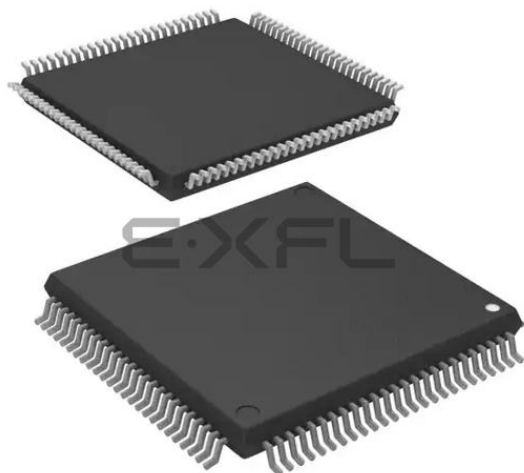




Welcome to [E-XFL.COM](#)

What is "[Embedded - Microcontrollers](#)"?

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

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

Details

Product Status	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	CANbus, EBI/EMI, I ² C, SCI, SPI, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	72
Program Memory Size	256KB (256K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	64K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 8x10/12b; D/A 1x10b
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/r5f56216bdfp-v0

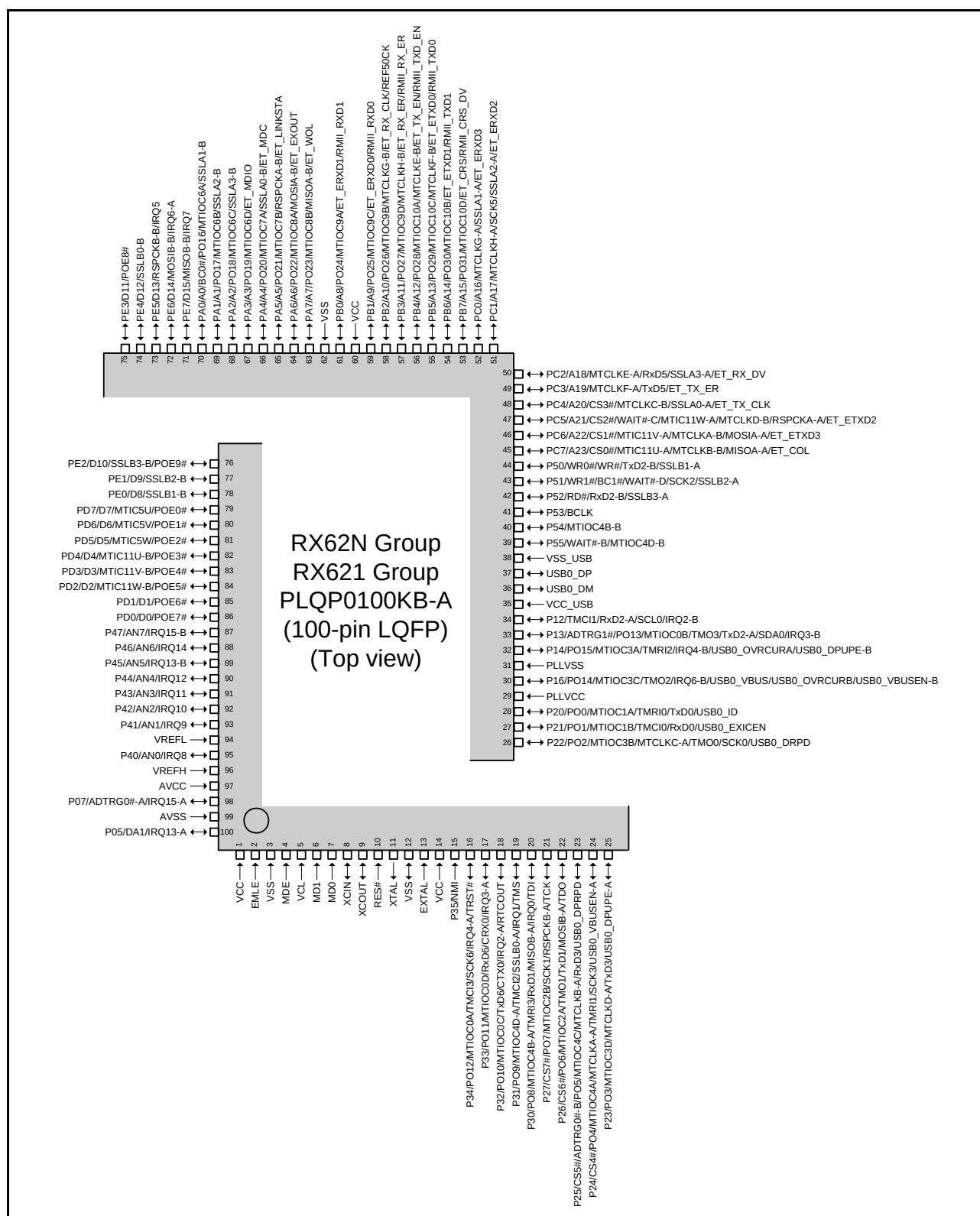


Figure 1.8 Pin Assignment of the 100-Pin LQFP (Assistance Diagram)

Table 1.4 List of Pins and Pin Functions (176-Pin LFBGA) (3 / 6)

Pin No. 176-Pin LFBGA	Power Supply Clock System Control	I/O Port	External Bus EXDMAC	ETHERC EDMAC	USB	Timers (MTU, TMR, PPG, POE, WDT)	Communi- cation (SCI, CAN, RSPI, RIIC)	Others
F15		PG5	D29					TRCLK
G1	VSS							
G2	MD1							
G3	MD0							
G4	MDE							
G12	VSS							
G13	VCC							
G14		PG6	D30					TRDATA2
G15		PA1	A1/DQM3			MTIOC6B/ PO17	SSLA2-B	
H1	XTAL							
H2		P35						NMI
H3	VCC							
H4	RES#							
H12		PG7	D31					TRDATA3
H13		PA2	A2			MTIOC6C/ PO18	SSLA3-B	
H14		PA4	A4			MTIOC7A/ PO20	SSLA0-B	
H15		PA3	A3			MTIOC6D/ PO19		
J1	EXTAL							
J2		P32				MTIOC0C/ PO10/ RTCOUT	CTX0/ TxD6-B	IRQ2-A
J3		PF3						TMS
J4		P34				MTIOC0A/ TMCI3-B/ PO12	SCK6-B	IRQ4-A
J12	VSS							
J13		PA5	A5			MTIOC7B/ PO21	RSPCKA-B	
J14		PA7	A7			MTIOC8B/ PO23	MISOA-B	
J15		PA6	A6			MTIOC8A/ PO22	MOSIA-B	
K1		P33				MTIOC0D/ PO11	CRX0/ RxD6-B	IRQ3-A
K2		P31			USB1_DPRPD	MTIOC4D-A/ TMCI2-B/ PO9	SSLB0-A	IRQ1-A
K3		PF0					TxD1-B	TDO
K4		PF4						TRST#
K12		PB1	A9			MTIOC9C/ PO25		
K13		P71	CS1#-B	ET_MDIO				
K14		P72	CS2#-B	ET_MDC				

Table 1.5 List of Pins and Pin Functions (145-Pin TFLGA) (4 / 5)

Pin No.	Power Supply					Timers	Communi-	
145-Pin TFLGA	Clock System Control	I/O Port	External Bus EXDMAC	ETHERC EDMAC	USB	(MTU, TMR, PPG, POE, WDT)	(SCI, CAN, RSPI, RIIC)	Others
K4		P26	CS6#-C			MTIOC2A/ TMO1/ PO6	MOSIB-A/ TxD1	TDO
K5	BCLK	P53						
K6	VSS							
K7		PC7	A23/ CS0#-B	ET_COL		MTIC11U-A/ MTCLKB-B	MISOA-A	
K8		P82	EDREQ1-A	ET_ETXD1/ RMII_TXD1		MTIOC4A-B		TRSYNC
K9		PC3	A19-A	ET_TX_ER		MTCLKF-A	TxD5	
K10		PB7	A15			MTIOC10D/ PO31		
K11		P73	CS3#-B	ET_WOL				
K12		PC0	A16-A	ET_ERXD3		MTCLKG-A	SSLA1-A	
K13		PB3	A11			MTIOC9D/ MTCLKH-B/ PO27		
L1		P25	CS5#-C/ EDACK1-B		USB0_DPRPD	MTIOC4C-A/ MTCLKB-A/ PO5	RxD3-B	ADTRG0#-B
L2		P22	EDREQ0-B		USB0_DRPD	MTIOC3B-A/ MTCLKC-A/ TMO0/PO2	SCK0	
L3		P17				MTIOC3A/ PO15	TxD3-A	IRQ7-B
L4		P12				TMCI1-B	SCL0/ RxD2-A	IRQ2-B
L5	VCC_USB							
L6		P56	EDACK1-C			MTIOC3C-B		
L7		P52	RD#				SSLB3-A/ RxD2-B	
L8		P83	EDACK1-A	ET_CRS/ RMII_CRS_D V		MTIOC4C-B		TRCLK
L9		P81	EDACK0-A	ET_ETXD0/ RMII_TXD0		MTIOC3D-B		TRDATA1
L10		P77	CS7#-B	ET_RX_ER/ RMII_RX_ER				
L11		P75	CS5#-B	ET_ERXD0/ RMII_RXD0				
L12	VCC							
L13		PB6	A14			MTIOC10B/ PO30		
M1		P23	EDACK0-B		USB0_DPUPE -A	MTIOC3D-A/ MTCLKD-A/ PO3	TxD3-B	
M2		P20			USB0_ID	MTIOC1A/ TMRI0-B/ PO0	SDA1/ TxD0	
M3	PLLVC							

Table 1.6 List of Pins and Pin Functions (144-Pin LQFP) (2 / 5)

Pin No.	Power Supply Clock System Control	I/O Port	External Bus EXDMAC	ETHERC EDMAC	USB	Timers (MTU, TMR, PPG, POE, WDT)	Communi- cation (SCI, CAN, RSPI, RIIC)	Others
32		P25	CS5#-C/ EDACK1-B		USB0_DPRPD	MTIOC4C- A/ MTCLKB-A/ PO5	RxD3-B	ADTRG0#-B
33		P24	CS4#-C/ EDREQ1-B		USB0_VBUSEN -A	MTIOC4A-A/ MTCLKA-A/ TMRI1/PO4	SCK3-B	
34		P23	EDACK0-B		USB0_DPUPE- A	MTIOC3D- A/ MTCLKD-A/ PO3	TxD3-B	
35		P22	EDREQ0-B		USB0_DRPD	MTIOC3B-A/ MTCLKC-A/ TMO0/PO2	SCK0	
36		P21			USB0_EXICEN	MTIOC1B/ TMCI0-B/ PO1	SCL1/RxD0	
37		P20			USB0_ID	MTIOC1A/ TMRI0-B/ PO0	SDA1/ TxD0	
38		P17				MTIOC3A/ PO15	TxD3-A	IRQ7-B
39	PLLVC							
40		P16			USB0_VBUS/ USB0_OVRCU RB/ USB0_VBUSEN -B	MTIOC3C- A/ TMO2/ PO14	RxD3-A	IRQ6-B
41	PLLVS							
42		P15				MTIOC0B/ TMCI2-A/ PO13	SCK3-A	IRQ5-B
43		P14			USB0_OVRCU RA/ USB0_DPUPE- B	TMRI2		IRQ4-B
44		P13				TMO3	SDA0/ TxD2-A	IRQ3-B/ ADTRG1#
45		P12				TMCI1-B	SCL0/ RxD2-A	IRQ2-B
46	VCC_USB							
47					USB0_DM			
48					USB0_DP			
49	VSS_USB							
50		P56	EDACK1-C			MTIOC3C-B		
51		P55	WAIT#-B/ EDREQ0-C	ET_EXOUT		MTIOC4D-B		TRDATA3
52		P54	EDACK0-C	ET_LINKSTA		MTIOC4B-B		TRDATA2
53	BCLK	P53						
54		P52	RD#				SSLB3-A/ RxD2-B	

Table 1.6 List of Pins and Pin Functions (144-Pin LQFP) (4 / 5)

Pin No.	Power Supply Clock System Control	I/O Port	External Bus EXDMAC	ETHERC EDMAC	USB	Timers (MTU, TMR, PPG, POE, WDT)	Communication (SCI, CAN, RSPI, RIIC)	Others
82		PB3	A11			MTIOC9D/ MTCLKH-B/ PO27		
83		PB2	A10			MTIOC9B/ MTCLKG-B/ PO26		
84		PB1	A9			MTIOC9C/ PO25		
85		P72	CS2#-B	ET_MDC				
86		P71	CS1#-B	ET_MDIO				
87		PB0	A8			MTIOC9A/ PO24		
88		PA7	A7			MTIOC8B/ PO23	MISOA-B	
89		PA6	A6			MTIOC8A/ PO22	MOSIA-B	
90		PA5	A5			MTIOC7B/ PO21	RSPCKA-B	
91	VCC							
92		PA4	A4			MTIOC7A/ PO20	SSLA0-B	
93	VSS							
94		PA3	A3			MTIOC6D/ PO19		
95		PA2	A2			MTIOC6C/ PO18	SSLA3-B	
96		PA1	A1			MTIOC6B/ PO17	SSLA2-B	
97		PA0	A0/BC0#/ DQM1			MTIOC6A/ PO16	SSLA1-B	
98		P67	CS7#-A/ DQM1					
99		P66	CS6#-A/ DQM0					
100		P65	CS5#-A/ CKE					
101		PE7	D15				MISOB-B	IRQ7-A
102		PE6	D14				MOSIB-B	IRQ6-A
103	VCC							
104	SDCLK	P70						
105	VSS							
106		PE5	D13				RSPCKB-B	IRQ5-A
107		PE4	D12				SSLB0-B	
108		PE3	D11			POE8#		
109		PE2	D10			POE9#	SSLB3-B	
110		PE1	D9				SSLB2-B	
111		PE0	D8				SSLB1-B	

Table 1.9 Pin Functions (6 / 7)

Classifications	Pin Name	I/O	Description
USB 2.0 host/function module	VCC_USB	Input	Power-supply pin for the USB. Connect this pin to the system power supply even when the USB is not to be used.
	VSS_USB	Input	Ground pin for the USB. Connect this pin to the system power supply (0 V) even when the USB is not to be used.
	USB0_DP USB1_DP	I/O	Inputs or outputs D+ data for the USB bus.
	USB0_DM USB1_DM	I/O	Inputs or outputs D- data for the USB bus.
	USB0_DPRPD USB1_DPRPD	Output	Enable D+ pull-down.
	USB0_DRPD USB1_DRPD	Output	Enable D- pull-down.
	USB0_EXICEN USB1_EXICEN	Output	Connect these pins to the OTG power supply IC.
	USB0_ID USB1_ID	Input	Connect these pins to the OTG power supply IC.
	USB0_VBUSEN-A/ USB0_VBUSEN-B USB1_VBUSEN-A/ USB1_VBUSEN-B	Output	VBUS power enable pins for the USB.
	USB0_DPUPE-A/ USB0_DPUPE-B USB1_DPUPE-A/ USB1_DPUPE-B	Output	Pull-up pins for the USB.
	USB0_OVRCURA/ USB0_OVRCURB USB1_OVRCURA/ USB1_OVRCURB	Input	Over current pins for the USB.
	USB0_VBUS USB1_VBUS	Input	Input pins for detection of connection and disconnection of the USB cable.
CAN module	CRX0	Input	Input pins for the CAN.
	CTX0	Output	Output pins for the CAN.
Serial peripheral interfaces	RSPCKA-A/ RSPCKA-B	I/O	Clock input/output pins for the RSPI.
	RSPCKB-A/ RSPCKB-B	I/O	Clock input/output pins for the RSPI
	MOSIA-A/MOSIA-B MOSIB-A/MOSIB-B	I/O	Input or output data output from the master for the RSPI.
	MISOA-A/MISOA-B MISOB-A/MISOB-B	I/O	Input or output data output from the slave for the RSPI.
	SSLA0-A/SSLA0-B	I/O	Select the slave for the RSPI.
	SSLA1-A/SSLA1-B SSLA2-A/SSLA2-B SSLA3-A/SSLA3-B	Output	
	SSLB0-A/SSLB0-B	I/O	
	SSLB1-A/SSLB1-B SSLB2-A/SSLB2-B SSLB3-A/SSLB3-B	Output	
Realtime clock	RTCOUT	Output	Output pin for 1-Hz clock.
A/D converter	AN0 to AN7	Input	Input pins for the analog signals to be processed by the A/D converter.
	ADTRG0#-A/ADTRG0#-B ADTRG1#	Input	Input pins for the external trigger signals that start the A/D conversion.
D/A converter	DA0, DA1	Output	Output pins for the analog signals from the D/A converter.

(9) Accumulator (ACC)

The accumulator (ACC) is a 64-bit register used for DSP instructions. The accumulator is also used for the multiply and multiply-and-accumulate instructions; EMUL, EMULU, FMUL, MUL, and RMPA, in which case the prior value in the accumulator is modified by execution of the instruction.

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

Use the MVFACHI and MVFACMI instructions for reading data from the accumulator. The MVFACHI and MVFACMI instructions read data from the higher-order 32 bits (bits 63 to 32) and the middle 32 bits (bits 47 to 16), respectively.

Table 4.1 List of I/O Registers (Address Order) (8 / 36)

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 70B9h	ICU	Interrupt request register 185	IR185	8	8	2 ICLK
0008 70C6h	ICU	Interrupt request register 198	IR198	8	8	2 ICLK
0008 70C7h	ICU	Interrupt request register 199	IR199	8	8	2 ICLK
0008 70C8h	ICU	Interrupt request register 200	IR200	8	8	2 ICLK
0008 70C9h	ICU	Interrupt request register 201	IR201	8	8	2 ICLK
0008 70CAh	ICU	Interrupt request register 202	IR202	8	8	2 ICLK
0008 70CBh	ICU	Interrupt request register 203	IR203	8	8	2 ICLK
0008 70D6h	ICU	Interrupt request register 214	IR214	8	8	2 ICLK
0008 70D7h	ICU	Interrupt request register 215	IR215	8	8	2 ICLK
0008 70D8h	ICU	Interrupt request register 216	IR216	8	8	2 ICLK
0008 70D9h	ICU	Interrupt request register 217	IR217	8	8	2 ICLK
0008 70DAh	ICU	Interrupt request register 218	IR218	8	8	2 ICLK
0008 70DBh	ICU	Interrupt request register 219	IR219	8	8	2 ICLK
0008 70DCh	ICU	Interrupt request register 220	IR220	8	8	2 ICLK
0008 70DDh	ICU	Interrupt request register 221	IR221	8	8	2 ICLK
0008 70DEh	ICU	Interrupt request register 222	IR222	8	8	2 ICLK
0008 70DFh	ICU	Interrupt request register 223	IR223	8	8	2 ICLK
0008 70E0h	ICU	Interrupt request register 224	IR224	8	8	2 ICLK
0008 70E1h	ICU	Interrupt request register 225	IR225	8	8	2 ICLK
0008 70E2h	ICU	Interrupt request register 226	IR226	8	8	2 ICLK
0008 70E3h	ICU	Interrupt request register 227	IR227	8	8	2 ICLK
0008 70E4h	ICU	Interrupt request register 228	IR228	8	8	2 ICLK
0008 70E5h	ICU	Interrupt request register 229	IR229	8	8	2 ICLK
0008 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 711Bh	ICU	DTC activation enable register 027	DTCER027	8	8	2 ICLK
0008 711Ch	ICU	DTC activation enable register 028	DTCER028	8	8	2 ICLK
0008 711Dh	ICU	DTC activation enable register 029	DTCER029	8	8	2 ICLK
0008 711Eh	ICU	DTC activation enable register 030	DTCER030	8	8	2 ICLK
0008 711Fh	ICU	DTC activation enable register 031	DTCER031	8	8	2 ICLK
0008 7124h	ICU	DTC activation enable register 036	DTCER036	8	8	2 ICLK

Table 4.1 List of I/O Registers (Address Order) (17 / 36)

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 824Fh	SCI1	Serial extended mode register	SEMR	8	8	2 to 3 PCLK*8
0008 8248h	SMCI1	Serial mode register	SMR	8	8	2 to 3 PCLK*8
0008 8249h	SMCI1	Bit rate register	BRR	8	8	2 to 3 PCLK*8
0008 824Ah	SMCI1	Serial control register	SCR	8	8	2 to 3 PCLK*8
0008 824Bh	SMCI1	Transmit data register	TDR	8	8	2 to 3 PCLK*8
0008 824Ch	SMCI1	Serial status register	SSR	8	8	2 to 3 PCLK*8
0008 824Dh	SMCI1	Receive data register	RDR	8	8	2 to 3 PCLK*8
0008 824Eh	SMCI1	Smart card mode register	SCMR	8	8	2 to 3 PCLK*8
0008 8250h	SCI2	Serial mode register	SMR	8	8	2 to 3 PCLK*8
0008 8251h	SCI2	Bit rate register	BRR	8	8	2 to 3 PCLK*8
0008 8252h	SCI2	Serial control register	SCR	8	8	2 to 3 PCLK*8
0008 8253h	SCI2	Transmit data register	TDR	8	8	2 to 3 PCLK*8
0008 8254h	SCI2	Serial status register	SSR	8	8	2 to 3 PCLK*8
0008 8255h	SCI2	Receive data register	RDR	8	8	2 to 3 PCLK*8
0008 8256h	SCI2	Smart card mode register	SCMR	8	8	2 to 3 PCLK*8
0008 8257h	SCI2	Serial extended mode register	SEMR	8	8	2 to 3 PCLK*8
0008 8250h	SMCI2	Serial mode register	SMR	8	8	2 to 3 PCLK*8
0008 8251h	SMCI2	Bit rate register	BRR	8	8	2 to 3 PCLK*8
0008 8252h	SMCI2	Serial control register	SCR	8	8	2 to 3 PCLK*8
0008 8253h	SMCI2	Transmit data register	TDR	8	8	2 to 3 PCLK*8
0008 8254h	SMCI2	Serial status register	SSR	8	8	2 to 3 PCLK*8
0008 8255h	SMCI2	Receive data register	RDR	8	8	2 to 3 PCLK*8
0008 8256h	SMCI2	Smart card mode register	SCMR	8	8	2 to 3 PCLK*8
0008 8258h	SCI3	Serial mode register	SMR	8	8	2 to 3 PCLK*8
0008 8259h	SCI3	Bit rate register	BRR	8	8	2 to 3 PCLK*8
0008 825Ah	SCI3	Serial control register	SCR	8	8	2 to 3 PCLK*8
0008 825Bh	SCI3	Transmit data register	TDR	8	8	2 to 3 PCLK*8
0008 825Ch	SCI3	Serial status register	SSR	8	8	2 to 3 PCLK*8
0008 825Dh	SCI3	Receive data register	RDR	8	8	2 to 3 PCLK*8
0008 825Eh	SCI3	Smart card mode register	SCMR	8	8	2 to 3 PCLK*8
0008 825Fh	SCI3	Serial extended mode register	SEMR	8	8	2 to 3 PCLK*8
0008 8258h	SMCI3	Serial mode register	SMR	8	8	2 to 3 PCLK*8
0008 8259h	SMCI3	Bit rate register	BRR	8	8	2 to 3 PCLK*8
0008 825Ah	SMCI3	Serial control register	SCR	8	8	2 to 3 PCLK*8
0008 825Bh	SMCI3	Transmit data register	TDR	8	8	2 to 3 PCLK*8
0008 825Ch	SMCI3	Serial status register	SSR	8	8	2 to 3 PCLK*8
0008 825Dh	SMCI3	SMCI3 Receive data register	RDR	8	8	2 to 3 PCLK*8
0008 825Eh	SMCI3	SMCI3 Smart card mode register	SCMR	8	8	2 to 3 PCLK*8
0008 8268h	SCI5	Serial mode register	SMR	8	8	2 to 3 PCLK*8
0008 8269h	SCI5	Bit rate register	BRR	8	8	2 to 3 PCLK*8
0008 826Ah	SCI5	Serial control register	SCR	8	8	2 to 3 PCLK*8
0008 826Bh	SCI5	Transmit data register	TDR	8	8	2 to 3 PCLK*8
0008 826Ch	SCI5	Serial status register	SSR	8	8	2 to 3 PCLK*8
0008 826Dh	SCI5	Receive data register	RDR	8	8	2 to 3 PCLK*8
0008 826Eh	SCI5	Smart card mode register	SCMR	8	8	2 to 3 PCLK*8

Table 4.1 List of I/O Registers (Address Order) (20 / 36)

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 839Ah	RSPI0	RSPI command register 5	SPCMD5	16	16	2 to 3 PCLK*8
0008 839Ch	RSPI0	RSPI command register 6	SPCMD6	16	16	2 to 3 PCLK*8
0008 839Eh	RSPI0	RSPI command register 7	SPCMD7	16	16	2 to 3 PCLK*8
0008 83A0h	RSPI1	RSPI control register	SPCR	8	8	2 to 3 PCLK*8
0008 83A1h	RSPI1	RSPI slave select polarity register	SSLP	8	8	2 to 3 PCLK*8
0008 83A2h	RSPI1	RSPI pin control register	SPPCR	8	8	2 to 3 PCLK*8
0008 83A3h	RSPI1	RSPI status register	SPSR	8	8	2 to 3 PCLK*8
0008 83A4h	RSPI1	RSPI data register	SPDR	32	16, 32	2 to 3 PCLK*8
0008 83A8h	RSPI1	RSPI sequence control register	SPSCR	8	8	2 to 3 PCLK*8
0008 83A9h	RSPI1	RSPI sequence status register	SPSSR	8	8	2 to 3 PCLK*8
0008 83AAh	RSPI1	RSPI bit rate register	SPBR	8	8	2 to 3 PCLK*8
0008 83ABh	RSPI1	RSPI data control register	SPDCR	8	8	2 to 3 PCLK*8
0008 83ACh	RSPI1	RSPI clock delay register	SPCKD	8	8	2 to 3 PCLK*8
0008 83ADh	RSPI1	RSPI slave select negation delay register	SSLND	8	8	2 to 3 PCLK*8
0008 83AEh	RSPI1	RSPI next-access delay register	SPND	8	8	2 to 3 PCLK*8
0008 83AFh	RSPI1	RSPI control register 2	SPCR2	8	8	2 to 3 PCLK*8
0008 83B0h	RSPI1	RSPI command register 0	SPCMD0	16	16	2 to 3 PCLK*8
0008 83B2h	RSPI1	RSPI command register 1	SPCMD1	16	16	2 to 3 PCLK*8
0008 83B4h	RSPI1	RSPI command register 2	SPCMD2	16	16	2 to 3 PCLK*8
0008 83B6h	RSPI1	RSPI command register 3	SPCMD3	16	16	2 to 3 PCLK*8
0008 83B8h	RSPI1	RSPI command register 4	SPCMD4	16	16	2 to 3 PCLK*8
0008 83BAh	RSPI1	RSPI command register 5	SPCMD5	16	16	2 to 3 PCLK*8
0008 83BCh	RSPI1	RSPI command register 6	SPCMD6	16	16	2 to 3 PCLK*8
0008 83BEh	RSPI1	RSPI command register 7	SPCMD7	16	16	2 to 3 PCLK*8
0008 8600h	MTU3	Timer control register	TCR	8	8	2 to 3 PCLK*8
0008 8601h	MTU4	Timer control register	TCR	8	8	2 to 3 PCLK*8
0008 8602h	MTU3	Timer mode register	TMDR	8	8	2 to 3 PCLK*8
0008 8603h	MTU4	Timer mode register	TMDR	8	8	2 to 3 PCLK*8
0008 8604h	MTU3	Timer I/O control register H	TIORH	8	8	2 to 3 PCLK*8
0008 8605h	MTU3	Timer I/O control register L	TIORL	8	8	2 to 3 PCLK*8
0008 8606h	MTU4	Timer I/O control register H	TIORH	8	8	2 to 3 PCLK*8
0008 8607h	MTU4	Timer I/O control register L	TIORL	8	8	2 to 3 PCLK*8
0008 8608h	MTU3	Timer interrupt enable register	TIER	8	8	2 to 3 PCLK*8
0008 8609h	MTU4	Timer interrupt enable register	TIER	8	8	2 to 3 PCLK*8
0008 860Ah	MTUA	Timer output master enable register	TOER	8	8	2 to 3 PCLK*8
0008 860Dh	MTUA	Timer gate control register	TGCR	8	8	2 to 3 PCLK*8
0008 860Eh	MTUA	Timer output control register 1	TOCR1	8	8	2 to 3 PCLK*8
0008 860Fh	MTUA	Timer output control register 2	TOCR2	8	8	2 to 3 PCLK*8
0008 8610h	MTU3	Timer counter	TCNT	16	16	2 to 3 PCLK*8
0008 8612h	MTU4	Timer counter	TCNT	16	16	2 to 3 PCLK*8
0008 8614h	MTUA	Timer cycle data register	TCDR	16	16	2 to 3 PCLK*8
0008 8616h	MTUA	Timer dead time data register	TDDR	16	16	2 to 3 PCLK*8
0008 8618h	MTU3	Timer general register A	TGRA	16	16	2 to 3 PCLK*8
0008 861Ah	MTU3	Timer general register B	TGRB	16	16	2 to 3 PCLK*8
0008 861Ch	MTU4	Timer general register A	TGRA	16	16	2 to 3 PCLK*8

Table 4.1 List of I/O Registers (Address Order) (26 / 36)

Address	Module Abbreviation	Register Name	Register Abbreviation	Number of Bits	Access Size	Number of Access Cycles
0008 C023h	PORT3	Data register	DR	8	8	2 to 3 PCLK*8
0008 C024h	PORT4	Data register	DR	8	8	2 to 3 PCLK*8
0008 C025h	PORT5	Data register	DR	8	8	2 to 3 PCLK*8
0008 C026h	PORT6	Data register	DR*6*7	8	8	2 to 3 PCLK*8
0008 C027h	PORT7	Data register	DR*6*7	8	8	2 to 3 PCLK*8
0008 C028h	PORT8	Data register	DR*6*7	8	8	2 to 3 PCLK*8
0008 C029h	PORT9	Data register	DR*6*7	8	8	2 to 3 PCLK*8
0008 C02Ah	PORTA	Data register	DR	8	8	2 to 3 PCLK*8
0008 C02Bh	PORTB	Data register	DR	8	8	2 to 3 PCLK*8
0008 C02Ch	PORTC	Data register	DR	8	8	2 to 3 PCLK*8
0008 C02Dh	PORTD	Data register	DR	8	8	2 to 3 PCLK*8
0008 C02Eh	PORTE	Data register	DR*7	8	8	2 to 3 PCLK*8
0008 C02Fh	PORTF	Data register	DR*5*6*7	8	8	2 to 3 PCLK*8
0008 C030h	PORTG	Data register	DR**5*6*7	8	8	2 to 3 PCLK*8
0008 C040h	PORT0	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C041h	PORT1	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C042h	PORT2	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C043h	PORT3	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C044h	PORT4	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C045h	PORT5	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C046h	PORT6	Port register	PORT*6*7	8	8	2 to 3 PCLK*8
0008 C047h	PORT7	Port register	PORT*6*7	8	8	2 to 3 PCLK*8
0008 C048h	PORT8	Port register	PORT*6*7	8	8	2 to 3 PCLK*8
0008 C049h	PORT9	Port register	PORT*6*7	8	8	2 to 3 PCLK*8
0008 C04Ah	PORTA	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C04Bh	PORTB	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C04Ch	PORTC	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C04Dh	PORTD	Port register	PORT	8	8	2 to 3 PCLK*8
0008 C04Eh	PORTE	Port register	PORT*7	8	8	2 to 3 PCLK*8
0008 C04Fh	PORTF	Port register	PORT*5*6*7	8	8	2 to 3 PCLK*8
0008 C050h	PORTG	Port register	PORT*5*6*7	8	8	2 to 3 PCLK*8
0008 C060h	PORT0	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C061h	PORT1	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C062h	PORT2	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C063h	PORT3	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C064h	PORT4	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C065h	PORT5	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C066h	PORT6	Input buffer control register	ICR*6*7	8	8	2 to 3 PCLK*8
0008 C067h	PORT7	Input buffer control register	ICR*6*7	8	8	2 to 3 PCLK*8
0008 C068h	PORT8	Input buffer control register	ICR*6*7	8	8	2 to 3 PCLK*8
0008 C069h	PORT9	Input buffer control register	ICR*6*7	8	8	2 to 3 PCLK*8
0008 C06Ah	PORTA	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C06Bh	PORTB	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C06Ch	PORTC	Input buffer control register	ICR	8	8	2 to 3 PCLK*8
0008 C06Dh	PORTD	Input buffer control register	ICR	8	8	2 to 3 PCLK*8

5.3.1 Clock Timing

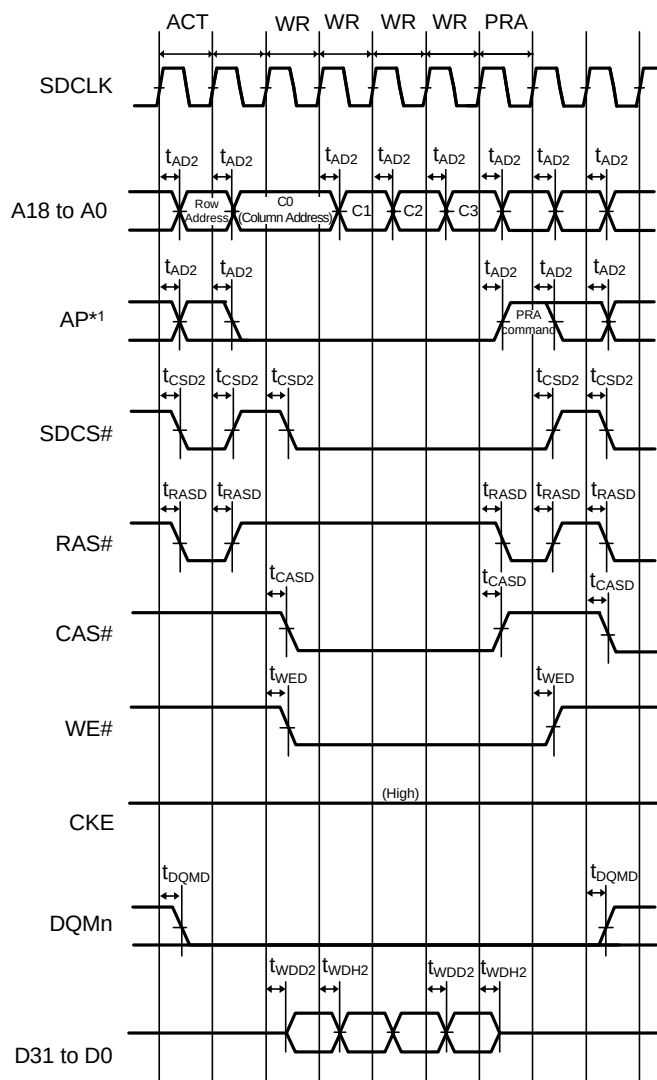
Table 5.8 Clock Timing

Conditions: VCC = PLLVCC = AVCC = VCC_USB = 2.7 to 3.6 V, VREFH = 2.7 V to AVCC

VSS = PLLVSS = AVSS = VREFL = VSS_USB = 0 V

T_a = -40 to +85°C

Item	Symbol	Min.	Max.	Unit	Test Conditions
BCLK pin output cycle time [176-pin LFBGA/145-pin TFLGA/144-pin LQFP]	t _{Bcyc}	20	125	ns	Figure 5.1
BCLK pin output cycle time [100-pin LQFP/85-pin TFLGA]	t _{Bcyc}	40	125	ns	
BCLK pin output high pulse width	t _{CH}	5	—	ns	
BCLK pin output low pulse width	t _{CL}	5	—	ns	
BCLK pin output rising time	t _{Cr}	—	5	ns	
BCLK pin output falling time	t _{Cf}	—	5	ns	
SDCLK pin output cycle time	t _{SDcyc}	20	125	ns	
SDCLK pin output high pulse width	t _{CH}	5	—	ns	
SDCLK pin output low pulse width	t _{CL}	5	—	ns	
SDCLK pin output rising time	t _{Cr}	—	5	ns	
SDCLK pin output falling time	t _{Cf}	—	5	ns	
Oscillation settling time after reset (crystal)	t _{OSC1}	10	—	ms	Figure 5.2
Oscillation settling time after leaving software standby mode (crystal)	t _{OSC2}	10	—	ms	Figure 5.3
Oscillation settling time after leaving deep software standby mode (crystal)	t _{OSC3}	10	—	ms	Figure 5.4
EXTAL external clock output delay settling time	t _{DEXT}	1	—	ms	Figure 5.2
EXTAL external clock input low pulse width	t _{EXL}	30.71	—	ns	Figure 5.5
EXTAL external clock input high pulse width	t _{EXH}	30.71	—	ns	
EXTAL external clock rising time	t _{EXr}	—	5	ns	
EXTAL external clock falling time	t _{EXf}	—	5	ns	
XCIN sub-clock oscillation settling time	t _{SUBOSC}	2	—	s	Figure 5.6
XCIN sub-clock oscillation frequency	f _{SUB}	32.768	—	kHz	
On-chip oscillator (IWDTCCLK) oscillation frequency	f _{IWDTCCLK}	62.5	187.5	kHz	



Note 1: Address pins for output of the precharge-setting command (Precharge-sel) for SDRAM.

Figure 5.18 SDRAM Space Multiple Write Bus Timing

5.3.5 Timing of On-Chip Peripheral Modules

Table 5.13 Timing of On-Chip Peripheral Modules (1)

Conditions: VCC = PLLVCC = AVCC = VCC_USB = 2.7 to 3.6 V, VREFH = 2.7 V to AVCC

VSS = PLLVSS = AVSS = VREFL = VSS_USB = 0 V

PCLK = 8 to 50 MHz

T_a = -40 to +85°C

Item		Symbol	Min.	Max.	Unit	Test Conditions
I/O ports	Output data delay time	t _{PWD}	—	40	ns	Figure 5.25
	Input data setup time	t _{PRS}	25	—	ns	
	Input data hold time	t _{PRH}	25	—	ns	
MTU2	Output compare output delay time	t _{TOCD}	—	40	ns	Figure 5.26
	Input capture input setup time	t _{TICS}	20	—	ns	
	Input capture input pulse width (single-edge setting)	t _{TICW}	1.5 × t _{PCyc}	—	ns	
	Input capture input pulse width (both-edge setting)	t _{TICW}	2.5 × t _{PCyc}	—	ns	
	Timer input setup time	t _{TCKS}	20	—	ns	Figure 5.27
	Timer clock pulse width (single-edge setting)	t _{TCKWH/L}	1.5 × t _{PCyc}	—	ns	
	Timer clock pulse width (both-edge setting)	t _{TCKWH/L}	2.5 × t _{PCyc}	—	ns	
	Timer clock pulse width (phase counting mode)	t _{TCKWH/L}	2.5 × t _{PCyc}	—	ns	
POE2	POE# input setup time	t _{POES}	50	—	ns	Figure 5.28
	POE# input pulse width	t _{POEW}	1.5 × t _{PCyc}	—	ns	
PPG	Pulse output delay time	t _{POD}	—	40	ns	Figure 5.29
8-bit timer	Timer output delay time	t _{TMOD}	—	40	ns	Figure 5.30
	Timer reset input setup time	t _{TMRS}	25	—	ns	Figure 5.31
	Timer clock input setup time	t _{TMCS}	25	—	ns	Figure 5.32
	Timer clock pulse width	Single-edge setting	t _{TMCWH}	1.5 × t _{PCyc}	ns	
		Both-edge setting	t _{TMCWL}	2.5 × t _{PCyc}	ns	
WDT	Overflow output delay time	t _{WOVD}	—	40	ns	Figure 5.33

Table 5.15 Timing of On-Chip Peripheral Modules (5)

Conditions: VCC = PLLVCC = AVCC = VCC_USB = 2.7 to 3.6 V, VREFH = 2.7 V to AVCC

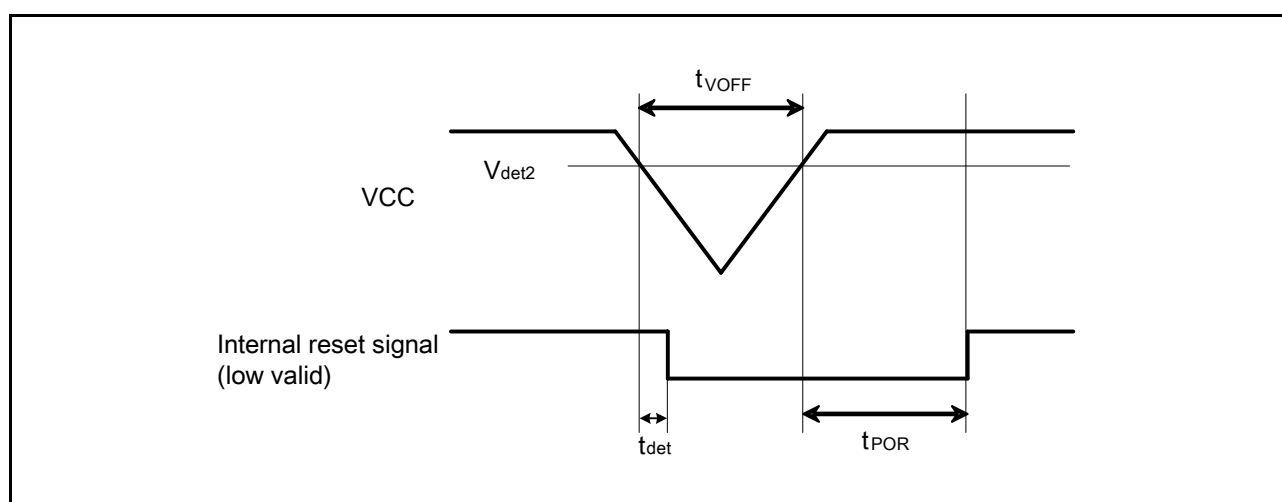
VSS = PLLVSS = AVSS = VREFL = VSS_USB = 0 V

PCLK = 8 to 50 MHz

T_a = -40 to +85°C

Item			Symbol	Min.	Max.	Unit	Test Conditions
RSPi	Data output hold time	Master	t _{OH}	0	—	ns	Figure 5.39 to Figure 5.42
		Slave		0	—		
	Successive transmission delay time	Master	t _{TD}	t _{SPcyc} +2 × t _{p_{cyc}}	8 × t _{SPcyc} +2 × t _{p_{cyc}}	ns	
		Slave		4 × t _{p_{cyc}}	—		
	MOSI, MISO rise/fall time	Output [176-pin LFBGA/ 145-pin TFLGA/ 144-pin LQFP]	t _{Dr} , t _{Df}	—	5	ns	
		Output [100-pin LQFP/ 85-pin TFLGA]		—	10		
		Input		—	1	μs	
	SSL rise/fall time	Output [176-pin LFBGA 145-pin TFLGA 144-pin LQFP]	t _{SSLr} , t _{SSLf}	—	5	ns	
		Output [100-pin LQFP/ 85-pin TFLGA]		—	10		
		Input		—	1	μs	
	Slave access time		t _{SA}	—	4	t _{Pcyc}	Figure 5.41 and Figure 5.42
	Slave output release time		t _{REL}	—	3	t _{Pcyc}	

Note 1. t_{Pcyc}: PCLK cycle

**Figure 5.65 Voltage Detection Circuit Timing (Vdet2)**

Appendix 1. Package Dimensions

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

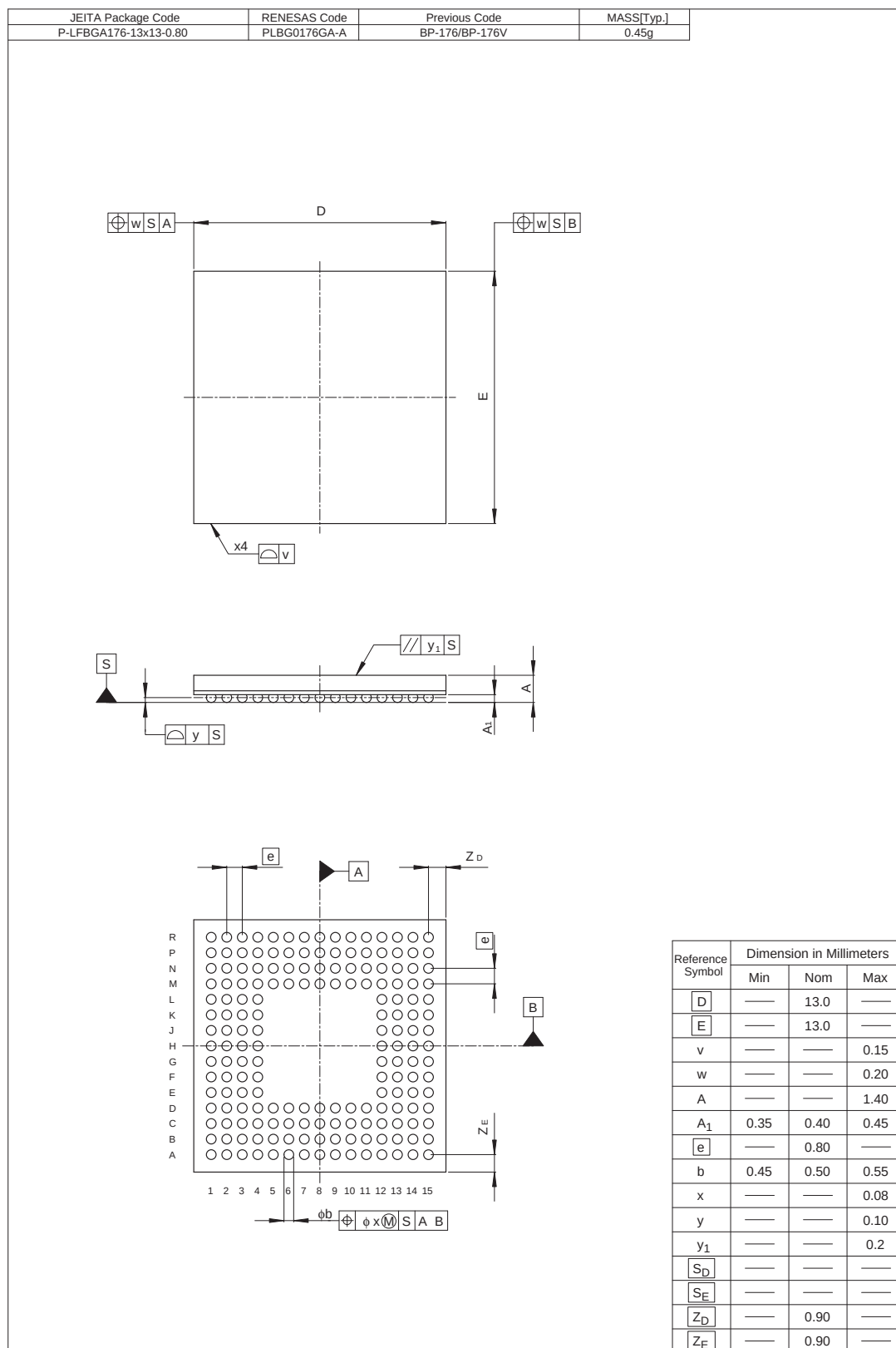


Figure A 176-Pin LFBGA (PLBG0176GA-A) Package Dimensions

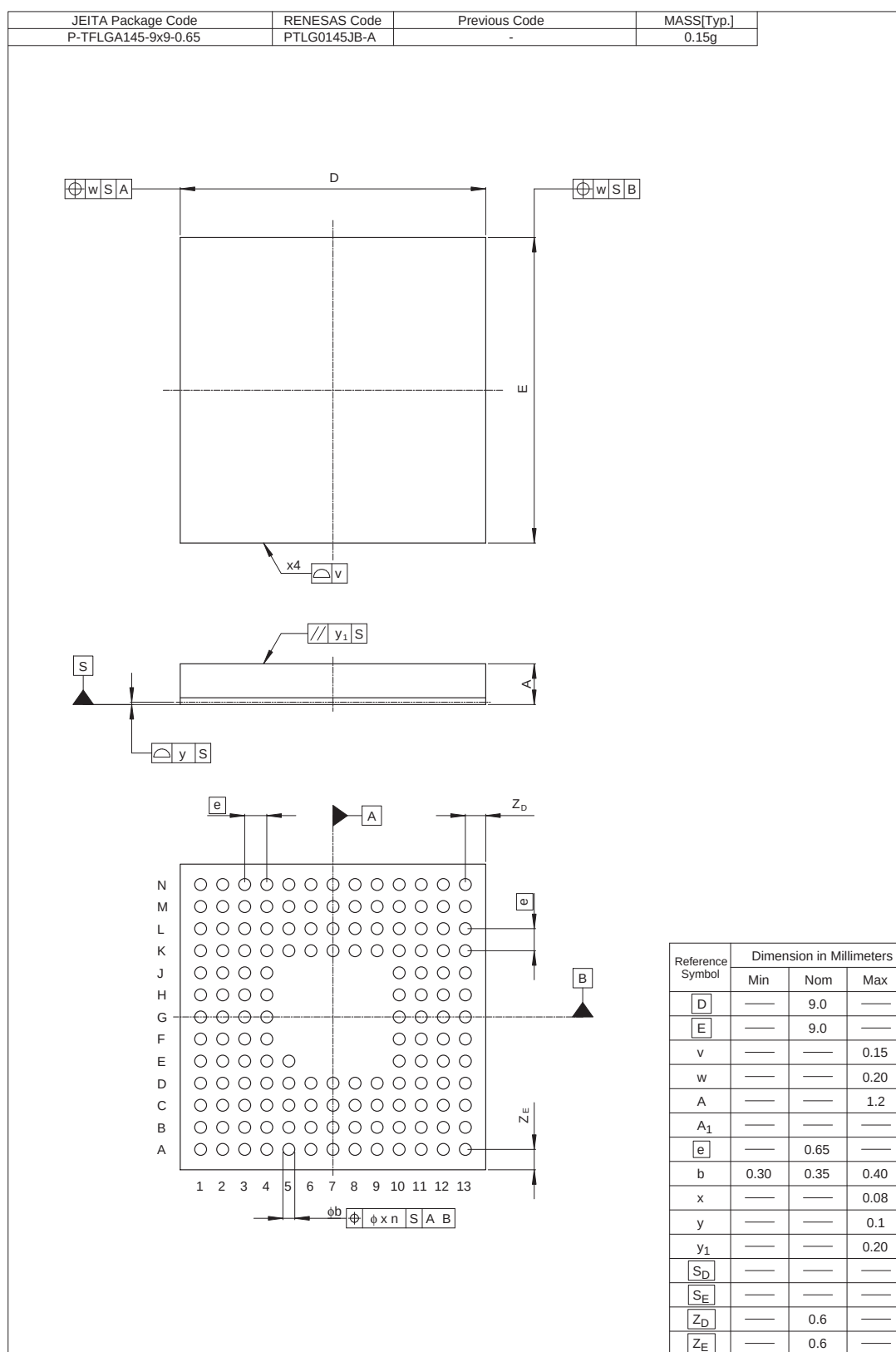


Figure B 145-Pin TFLGA (PTLG0145JB-A) Package Dimensions

REVISION HISTORY	RX62N Group, RX621 Group Datasheet
------------------	------------------------------------

Rev.	Date	Description	
		Page	Summary
1.00	2011.02.04	—	First Edition issued
1.10	2011.02.10	—	Features reviewed
1.20	2011.06.10		1. Overview
		2 to 5	Table 1.1 Outline of Specification, Description changed
		40 to 46	Table 1.9 Pin Functions, Description changed
			4. I/O Registers
		52 to 86	Table 4.1 List of I/O Registers (Address Order), Description changed
			5. Electrical Characteristics
		90	Table 5.2 DC Characteristics (3) , changed
		111	Figure 5.23 EDACK0 and EDACK1 Single-Address Transfer Timing (for a CS Area), changed
		111	Figure 5.24 EDACK0 and EDACK1 Single-Address Transfer Timing (for SDRAM), changed
1.30	2012.01.11		1. Overview
		2	Table 1.1 Outline of Specifications (1/4), changed, note 1, note 2 deleted
		13	Figure 1.6 Pin Assignment of the 144-Pin LQFP (Assistance Diagram), changed
		15	Figure 1.8 Pin Assignment of the 100-Pin LQFP (Assistance Diagram), changed
		33	Table 1.7 List of Pins and Pin Functions (100-Pin LQFP) (1/4), changed
		37	Table 1.8 List of Pins and Pin Functions (85-Pin TFLGA) (2/3), changed
			4. I/O Registers
		52 to 87	Table 4.1 List of I/O Registers (Address Order), Description changed
			5. Electrical Characteristics
		91	Table 5.4 DC Characteristics (3), specification added
		98	Table 5.9 Control Signal Timing, note changed
		122	Table 5.18 Timing of On-Chip Peripheral Modules (6), conditions changed

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
 2. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
 3. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
 4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
 5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc.

Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.
 6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
 7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
 8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
 9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
 10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
 11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
 12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.
- (Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.
- (Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.



SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

Renesas Electronics America Inc.

2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited

Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.

13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.

80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.

12F., 234 Teheran-ro, Gangnam-Ku, Seoul, 135-920, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141