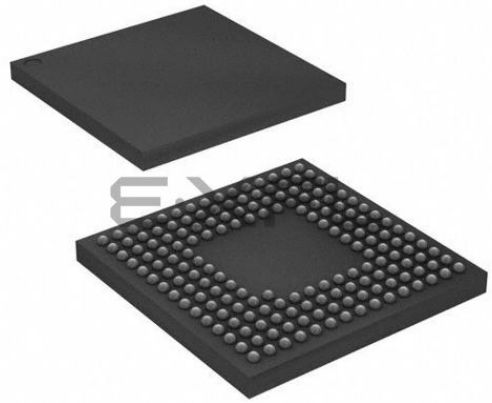
Renesas Electronics America Inc - R5F5630DCDLC#U0 Datasheet



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"

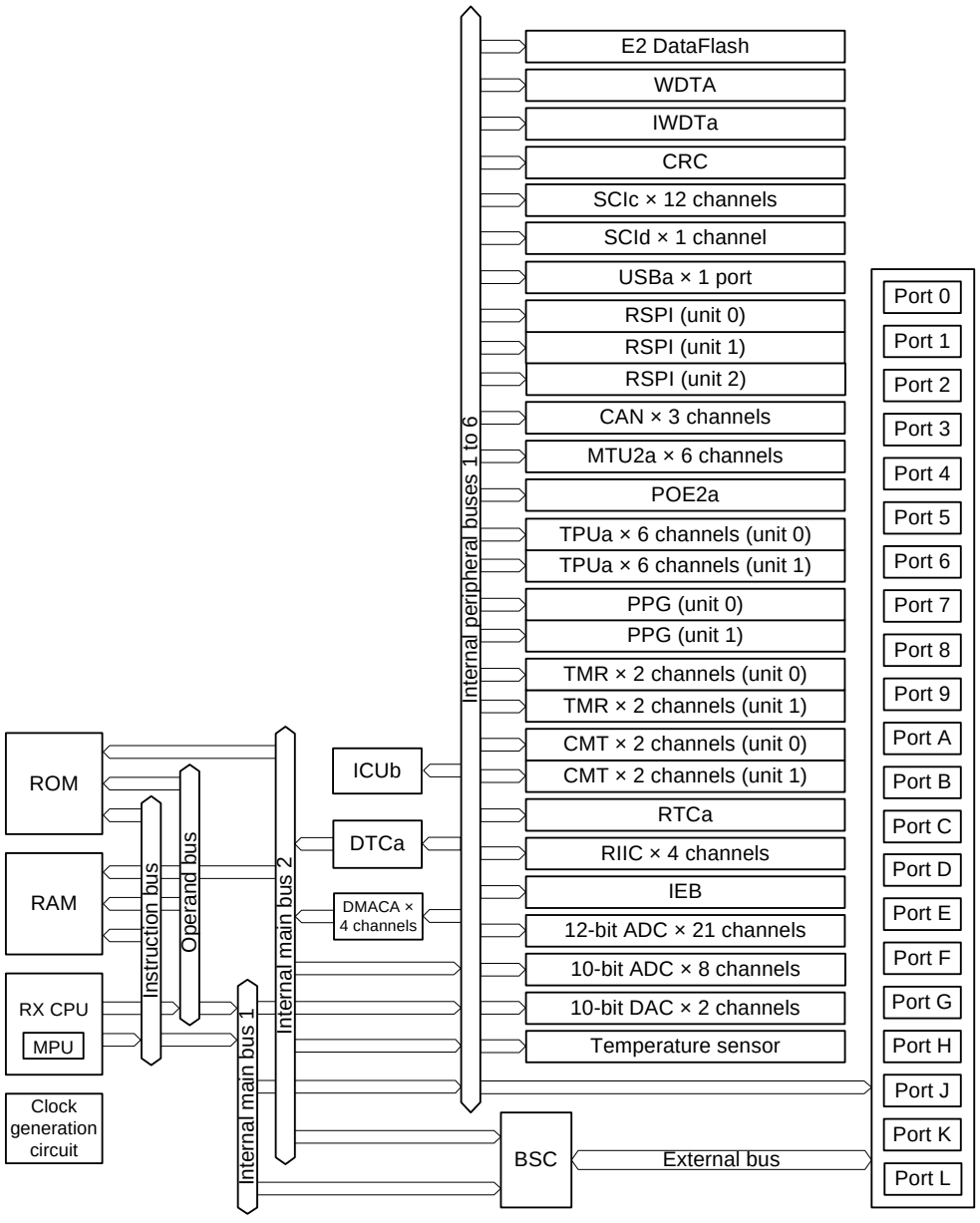
Details	
Product Status	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	EBI/EMI, I²C, LINbus, SCI, SPI, USB
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	148
Program Memory Size	1.5MB (1.5M x 8)
Program Memory Type	FLASH
EEPROM Size	32K x 8
RAM Size	128K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 8x10b, 21x12b; D/A 2x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	177-TFLGA
Supplier Device Package	177-TFLGA (8x8)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f5630dcdlc-u0

Table 1.1 Outline of Specifications (4/5)

Classification	Module/Function	Description
Communication function	USB 2.0 function module (USBa)	• Includes a UDC (USB Device Controller) and transceiver for USB 2.0 • Single port • Compliance with the USB 2.0 specification • Transfer rate: Full speed (12 Mbps) • Self-power mode and bus power are selectable • Incorporates 2 Kbytes of RAM as a transfer buffer
	Serial communications interfaces (SCIc, SCId)	• 13 channels (SCIc: 12 channels + SCId: 1 channel) • SCIc Serial communications modes: Asynchronous, clock synchronous, and smart-card interface Multi-processor function On-chip baud rate generator allows selection of the desired bit rate Choice of LSB-first or MSB-first transfer Average transfer rate clock can be input from TMR timers for SCI5, SCI6, and SCI12 Simple I^2C Simple SPI • SCId (The following functions are added to SCIc) Supports the serial communications protocol, which contains the start frame and information frame Supports the LIN format
	I^2C bus interfaces (RIIC)	• 4 channels (one of them is FM+) Communication formats I^2C bus format/SMBus format Supports the multi-master Max. transfer rate: 1 Mbps (channel 0)
	IEBus (IEB)	• 1 channel • Supports protocol control for the IEBus Half-duplex asynchronous transfer Multi-master operation Broadcast communications function Two selectable modes, differentiated by transfer rate
	CAN module (CAN)	• 3 channels • Compliance with the ISO11898-1 specification (standard frame and extended frame) • 32 mailboxes per channel
	Serial peripheral interfaces (RSPI)	• 3 channels • RSPI transfer facility Using the MOSI (master out, slave in), MISO (master in, slave out), SSL (slave select), and RSPCK (RSPI clock) signals enables serial transfer through SPI operation (four lines) or clock-synchronous operation (three lines) Capable of handling serial transfer as a master or slave • Data formats Switching between MSB first and LSB first The number of bits in each transfer can be changed to any number of bits from 8 to 16, or to 20, 24, or 32 bits. 128-bit buffers for transmission and reception Up to four frames can be transmitted or received in a single transfer operation (with each frame having up to 32 bits) • Buffered structure Double buffers for both transmission and reception
12-bit A/D converter (S12ADa)		• 1 unit (1 unit × 21 channels) • 12-bit resolution • Conversion time: 1.0 μs per channel (in operation with PCLK at 50 MHz) • Operating mode Scan mode (single scan mode or continuous scan mode) • Sample-and-hold function • Reference voltage generation • Three ways to start A/D conversion Conversion can be started by a software trigger, a trigger from a timer (MTU, TPU, or TMR), or an external trigger signal • A/D conversion of the temperature sensor output

1.3 Block Diagram

Figure 1.2 shows a block diagram.

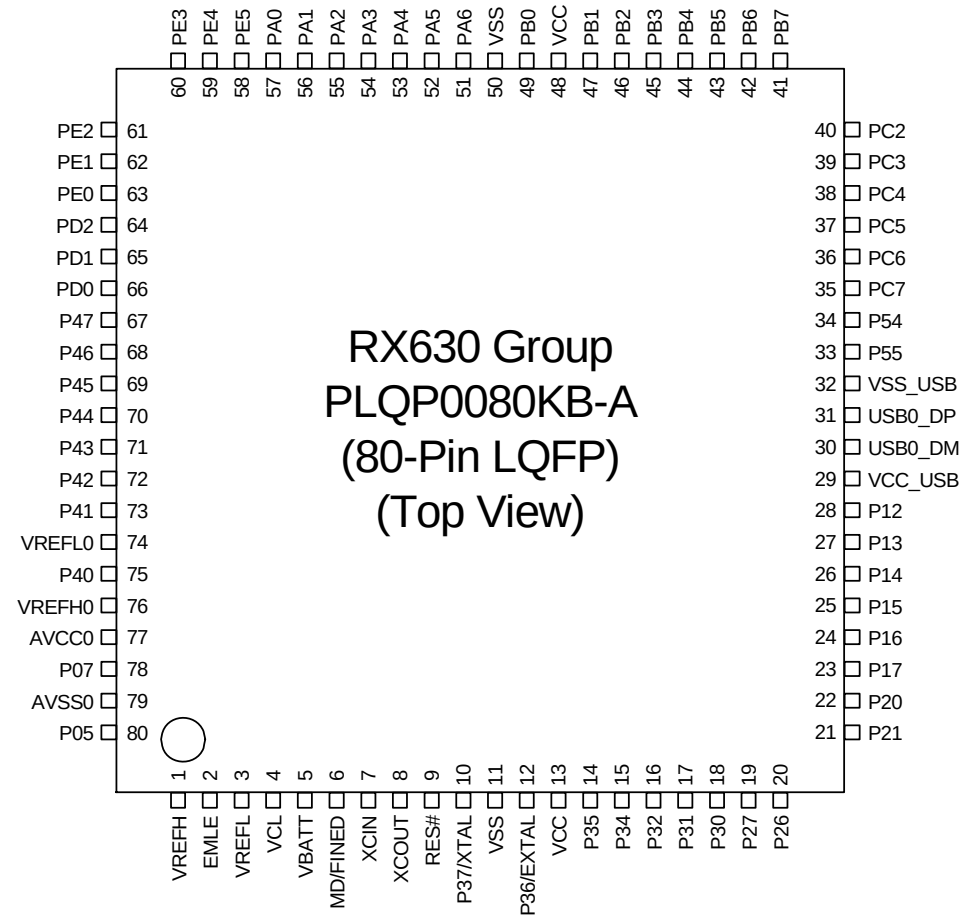


ICUb:	Interrupt controller	CAN:	CAN module
DTCa:	Data transfer controller	MTU2a:	Multi-function timer pulse unit 2
DMACA:	DMA controller	POE2a:	Port output enable 2
BSC:	Bus controller	TPUa:	16-bit timer pulse unit
WDTA:	Watchdog timer	PPG:	Programmable pulse generator
IWDTa:	Independent watchdog timer	TMR:	8-bit timer
CRC:	CRC (cyclic redundancy check) calculator	CMT:	Compare match timer
SCIc, SCId:	Serial communications interface	RTCa:	Realtime clock
USBa:	USB 2.0 function module	RIIC:	I^2C bus interface
RSPI:	Serial peripheral interface	IEB:	IEBus controller
MPU:	Memory protection unit		

Figure 1.2 Block Diagram

Table 1.4 Pin Functions (3/5)

Classifications	Pin Name	I/O	Description
16-bit timer pulse unit	TIOCA0, TIOCB0 TIOCC0, TIOCD0	I/O	The TGRA0 to TGRD0 input capture input/output compare output/ PWM output pins
	TIOCA1, TIOCB1	I/O	The TGRA1 and TGRB1 input capture input/output compare output/ PWM output pins
	TIOCA2, TIOCB2	I/O	The TGRA2 and TGRB2 input capture input/output compare output/ PWM output pins
	TIOCA3, TIOCB3 TIOCC3, TIOCD3	I/O	The TGRA3 to TGRD3 input capture input/output compare output/ PWM output pins
	TIOCA4, TIOCB4	I/O	The TGRA4 and TGRB4 input capture input/output compare output/ PWM output pins
	TIOCA5, TIOCB5	I/O	The TGRA5 and TGRB5 input capture input/output compare output/ PWM output pins
	TCLKA, TCLKB TCLKC, TCLKD	Input	Input pins for external clock signals
	TIOCA6, TIOCB6, TIOCC6, TIOCD6	I/O	The TGRA6 to TGRD6 input capture input/output compare output/ PWM output pins
	TIOCA7, TIOCB7	I/O	The TGRA7 and TGRB7 input capture input/output compare output/ PWM output pins
	TIOCA8, TIOCB8	I/O	The TGRA8 and TGRB8 input capture input/output compare output/ PWM output pins
	TIOCA9, TIOCB9, TIOCC9, TIOCD9	I/O	The TGRA9 to TGRD9 input capture input/output compare output/ PWM output pins
	TIOCA10, TIOCB10	I/O	The TGRA10 and TGRB10 input capture input/output compare output/PWM output pins
	TIOCA11, TIOCB11	I/O	The TGRA11 and TGRB11 input capture input/output compare output/PWM output pins
	TCLKE, TCLKF, TCLKG, TCLKH	Input	Input pins for external clock signals
Programmable pulse generator	PO0 to PO31	Output	Output pins for the pulse signals
8-bit timer	TMO0 to TMO3	Output	Compare match output pins
	TMCI0 to TMCI3	Input	Input pins for external clocks to be input to the counter
	TMRI0 to TMRI3	Input	Input pins for the counter reset
Serial communications interface (SCIc)	• Asynchronous mode/clock synchronous mode		
	SCK0 to SCK11	I/O	Input/output pins for the clock
	RXD0 to RXD11	Input	Input pins for received data
	TXD0 to TXD11	Output	Output pins for transmitted data
	CTS0# to CTS11#	Input	Input pins for controlling the start of transmission and reception
	RTS0# to RTS11#	Output	Output pins for controlling the start of transmission and reception
	• Simple I^2C mode		
	SSCL0 to SSCL11	I/O	Input/output pins for the I^2C clock
	SSDA0 to SSDA11	I/O	Input/output pins for the I^2C data
	• Simple SPI mode		
	SCK0 to SCK11	I/O	Input/output pins for the clock
	SMISO0 to SMISO11	I/O	Input/output pins for slave transmission of data
	SMOSI0 to SMOSI11	I/O	Input/output pins for master transmission of data
	SS0# to SS11#	Input	Chip-select input pins



Note: This figure indicates the power supply pins and I/O port pins. For the pin configuration, see Table 1.11, List of Pins and Pin Functions (80-Pin LQFP).

Figure 1.10 Pin Assignment (80-Pin LQFP)

Table 1.6 List of Pins and Pin Functions (176-Pin LQFP) (3/5)

Pin Number 176-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU, TPU, TMR, PPG, RTC, POE)	Communications (SCIc, SCId, RSPI, RIIC, CAN, IEB, USB)	Interrupt	S12AD, AD, DA
76		PC7	A23/CS0#	MTIOC3A/MTCLKB/ TIOCB6/TMO2/PO31	TXD8/SMOSI8/SSDA8/ MISOA	IRQ14	
77		PC6	A22/CS1#	MTIOC3C/MTCLKA/ TIOCA6/TMCI2/PO30	RXD8/SMISO8/SSCL8/ MOSIA	IRQ13	
78		PC5	A21/CS2#/ WAIT#	MTIOC3B/MTCLKD/ TIOCD6/TCLKF/TMRI2/ PO29	SCK8/RSPCKA		
79		P82		MTIOC4A/PO28	TXD10/SMOSI10/SSDA10		
80		P81		MTIOC3D/PO27	RXD10/SMISO10/ SSCL10		
81		P80		MTIOC3B/PO26	SCK10		
82		PC4	A20/CS3#	MTIOC3D/MTCLKC/ TIOCC6/TCLKE/TMCI1/ PO25/POE0#	SCK5/CTS8#/RTS8#/ SS8#/SSLA0		
83		PC3	A19	MTIOC4D/TCLKB/PO24	TXD5/SMOSI5/SSDA5/ IETXD		
84		P77	CS7#	PO23	TXD11/SMOSI11/SSDA11		
85		P76	CS6#	PO22	RXD11/SMISO11/SSCL11		
86		PC2	A18	MTIOC4B/TCLKA/PO21	RXD5/SMISO5/SSCL5/ SSLA3/IERXD		
87		P75	CS5#	PO20	SCK11		
88		P74	CS4#	PO19	CTS11#/RTS11#/SS11#		
89		PC1	A17	MTIOC3A/TCLKD/PO18	SCK5/SSLA2/SDA3	IRQ12	
90		PL1					
91		PC0	A16	MTIOC3C/TCLKC/PO17	CTS5#/RTS5#/SS5#/ SSLA1/SCL3	IRQ14	
92		PL0					
93		P73	CS3#	PO16			
94		PB7	A15	MTIOC3B/TIOCB5/PO31	TXD9/SMOSI9/SSDA9		
95		PB6	A14	MTIOC3D/TIOCA5/PO30	RXD9/SMISO9/SSCL9		
96		PB5	A13	MTIOC2A/MTIOC1B/ TIOCB4/TMRI1/PO29/ POE1#	SCK9		
97		PB4	A12	TIOCA4/PO28	CTS9#/RTS9#/SS9#		
98		PB3	A11	MTIOC0A/MTIOC4A/ TIOCD3/TCLKD/TMO0/ PO27/POE3#	SCK4/SCK6		
99		PB2	A10	TIOCC3/TCLKC/PO26	CTS4#/RTS4#/CTS6#/ RTS6#/SS4#/SS6#		
100		PB1	A9	MTIOC0C/MTIOC4C/ TIOCB3/TMCI0/PO25	TXD4/TXD6/SMOSI4/ SMOSI6/SSDA4/SSDA6	IRQ4-DS	
101		P72	CS2#				
102		P71	CS1#				
103		PK7					
104		PB0	A8	MTIC5W/TIOCA3/PO24	RXD4/RXD6/SMISO4/ SMISO6/SSCL4/SSCL6/ RSPCKA	IRQ12	
105		PK6					
106		PA7	A7	TIOCB2/PO23	MISOA		
107		PA6	A6	MTIC5V/MTCLKB/ TIOCA2/TMCI3/PO22/ POE2#	CTS5#/RTS5#/SS5#/ MOSIA		
108		PA5	A5	TIOCB1/PO21	RSPCKA		
109		PA4	A4	MTIC5U/MTCLKA/ TIOCA1/TMRI0/PO20	TXD5/SMOSI5/SSDA5/ SSLA0	IRQ5-DS	

Table 1.11 List of Pins and Pin Functions (80-Pin LQFP) (1/3)

Pin Number 100-Pin LQFP	Power Supply Clock System Control	I/O Port	Timer (MTU, TPU, TMR, PPG, RTC, POE)	Communications (SCIc, SCId, RSPI, RIIC, CAN, IEB, USB)	Interrupt	S12AD, AD, DA
1	VREFH					
2	EMLE					
3	VREFL					
4	VCL					
5	VBATT					
6	MD/FINED					
7	XCIN					
8	XCOUT					
9	RES#					
10	XTAL	P37				
11	VSS					
12	EXTAL	P36				
13	VCC					
14		P35			NMI	
15	TRST#	P34	MTIOC0A/TMCI3/PO12/ POE2#	SCK6	IRQ4	
16		P32	MTIOC0C/TIOCC0/TMO3/ PO10/RTCOUT/RTCIC2	TXD6/SMOSI6/SSDA6	IRQ2-DS	
17	TMS	P31	MTIOC4D/TMCI2/PO9/ RTCIC1	CTS1#/RTS1#/SS1#/ SSLB0	IRQ1-DS	
18	TDI	P30	MTIOC4B/TMRI3/PO8/ RTCIC0/POE8#	RXD1/SMISO1/SSCL1/ MISOB	IRQ0-DS	
19	TCK/FINEC	P27	MTIOC2B/TMCI3/PO7	SCK1/RSPCKB		
20	TDO	P26	MTIOC2A/TMO1/PO6	TXD1/SMOSI1/SSDA1/ MOSIB		
21		P21	MTIOC1B/TIOCA3/TMCI0/ PO1		IRQ9	
22		P20	MTIOC1A/TIOCB3/TMRI0/ PO0		IRQ8	
23		P17	MTIOC3A/MTIOC3B/ TIOCB0/TCLKD/TMO1/ PO15/POE8#	SCK1/MISOA/SDA2-DS/ IETXD	IRQ7	ADTRG#
24		P16	MTIOC3C/MTIOC3D/ TIOCB1/TCLKC/TMO2/ PO14/RTCOUT	TXD1/SMOSI1/SSDA1/ MOSIA/SCL2-DS/IERXD/ USB0_VBUS	IRQ6	ADTRG0#
25		P15	MTIOC0B/MTCLKB/ TIOCB2/TCLKB/TMCI2/ PO13	RXD1/SMISO1/SSCL1/ CRX1-DS	IRQ5	
26		P14	MTIOC3A/MTCLKA/ TIOCB5/TCLKA/TMRI2/ PO15	CTS1#/RTS1#/SS1#/ CTX1/USB0_DPUPE	IRQ4	
27		P13	MTIOC0B/TIOCA5/TMO3/ PO13	SDA0[FM+]	IRQ3	ADTRG#
28		P12	TMCI1	SCL0[FM+]	IRQ2	
29	VCC_USB					
30				USB0_DM		
31				USB0_DP		
32	VSS_USB					
33		P55	MTIOC4D/TMO3	CRX1	IRQ10	
34		P54	MTIOC4B/TMCI1	CTX1		
35		PC7	MTIOC3A/MTCLKB/TMO2/ PO31	TXD8/SMOSI8/SSDA8/ MISOA	IRQ14	
36		PC6	MTIOC3C/MTCLKA/ TMCI2/PO30	RXD8/SMISO8/SSCL8/ MOSIA	IRQ13	

2.1 General-Purpose Registers (R0 to R15)

This CPU has sixteen general-purpose registers (R0 to R15). R1 to R15 can be used as data registers or address registers. R0, a general-purpose register, also functions as the stack pointer (SP).
The stack pointer is switched to operate as the interrupt stack pointer (ISP) or user stack pointer (USP) by the value of the stack pointer select bit (U) in the processor status word (PSW).

2.2 Control Registers

(1) Interrupt Stack Pointer (ISP)/User Stack Pointer (USP)

The stack pointer (SP) can be either of two types, the interrupt stack pointer (ISP) or the user stack pointer (USP). Whether the stack pointer operates as the ISP or USP depends on the value of the stack pointer select bit (U) in the processor status word (PSW).
Set the ISP or USP to a multiple of four, as this reduces the numbers of cycles required to execute interrupt sequences and instructions entailing stack manipulation.

(2) Interrupt Table Register (INTB)

The interrupt table register (INTB) specifies the address where the relocatable vector table starts.

(3) Program Counter (PC)

The program counter (PC) indicates the address of the instruction being executed.

(4) Processor Status Word (PSW)

The processor status word (PSW) indicates the results of instruction execution or the state of the CPU.

(5) Backup PC (BPC)

The backup PC (BPC) is provided to speed up response to interrupts.
After a fast interrupt has been generated, the contents of the program counter (PC) are saved in the BPC register.

(6) Backup PSW (BPSW)

The backup PSW (BPSW) is provided to speed up response to interrupts.
After a fast interrupt has been generated, the contents of the processor status word (PSW) are saved in the BPSW. The allocation of bits in the BPSW corresponds to that in the PSW.

(7) Fast Interrupt Vector Register (FINTV)

The fast interrupt vector register (FINTV) is provided to speed up response to interrupts.
The FINTV register specifies a branch destination address when a fast interrupt has been generated.

(8) Floating-Point Status Word (FPSW)

The floating-point status word (FPSW) indicates the results of floating-point operations.
When an exception handling enable bit (Ej) enables the exception handling (Ej = 1), the exception cause can be identified by checking the corresponding Cj flag in the exception handling routine. If the exception handling is masked (Ej = 0), the occurrence of exception can be checked by reading the Fj flag at the end of a series of processing. Once the Fj flag has been set to 1, this value is retained until it is cleared to 0 by software (j = X, U, Z, O, or V).

Table 4.1 List of I/O Registers (Address Order) (4/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 6438h	MPU	Region-7 start page number register	RSPAGE7	32	32	1ICLK		MPU
0008 643Ch	MPU	Region-7 end page number register	REPAGE7	32	32	1ICLK		
0008 6500h	MPU	Memory-protection enable register	MPEN	32	32	1ICLK		
0008 6504h	MPU	Background access control register	MPBAC	32	32	1ICLK		
0008 6508h	MPU	Memory-protection error status-clearing register	MPECLR	32	32	1ICLK		
0008 650Ch	MPU	Memory-protection error status register	MPESTS	32	32	1ICLK		
0008 6514h	MPU	Data memory-protection error address register	MPDEA	32	32	1ICLK		
0008 6520h	MPU	Region search address register	MPSA	32	32	1ICLK		
0008 6524h	MPU	Region search operation register	MPOPS	16	16	1ICLK		
0008 6526h	MPU	Region invalidation operation register	MPOPI	16	16	1ICLK		
0008 6528h	MPU	Instruction-hit region register	MHITI	32	32	1ICLK		
0008 652Ch	MPU	Data-hit region register	MHITD	32	32	1ICLK		
0008 7010h	ICU	Interrupt request register 016	IR016	8	8	2 ICLK		ICUb
0008 7015h	ICU	Interrupt request register 021	IR021	8	8	2 ICLK		
0008 7017h	ICU	Interrupt request register 023	IR023	8	8	2 ICLK		
0008 701Bh	ICU	Interrupt request register 027	IR027	8	8	2 ICLK		
0008 701Ch	ICU	Interrupt request register 028	IR028	8	8	2 ICLK		
0008 701Dh	ICU	Interrupt request register 029	IR029	8	8	2 ICLK		
0008 701Eh	ICU	Interrupt request register 030	IR030	8	8	2 ICLK		
0008 701Fh	ICU	Interrupt request register 031	IR031	8	8	2 ICLK		
0008 7021h	ICU	Interrupt request register 033	IR033	8	8	2 ICLK		
0008 7022h	ICU	Interrupt request register 034	IR034	8	8	2 ICLK		
0008 7023h	ICU	Interrupt request register 035	IR035	8	8	2 ICLK		
0008 7027h	ICU	Interrupt request register 039	IR039	8	8	2 ICLK		
0008 7028h	ICU	Interrupt request register 040	IR040	8	8	2 ICLK		
0008 7029h	ICU	Interrupt request register 041	IR041	8	8	2 ICLK		
0008 702Ah	ICU	Interrupt request register 042	IR042	8	8	2 ICLK		
0008 702Bh	ICU	Interrupt request register 043	IR043	8	8	2 ICLK		
0008 702Ch	ICU	Interrupt request register 044	IR044	8	8	2 ICLK		
0008 702Dh	ICU	Interrupt request register 045	IR045	8	8	2 ICLK		
0008 702Eh	ICU	Interrupt request register 046	IR046	8	8	2 ICLK		
0008 702Fh	ICU	Interrupt request register 047	IR047	8	8	2 ICLK		
0008 7030h	ICU	Interrupt request register 048	IR048	8	8	2 ICLK		
0008 7031h	ICU	Interrupt request register 049	IR049	8	8	2 ICLK		
0008 7032h	ICU	Interrupt request register 050	IR050	8	8	2 ICLK		
0008 7033h	ICU	Interrupt request register 051	IR051	8	8	2 ICLK		
0008 7034h	ICU	Interrupt request register 052	IR052	8	8	2 ICLK		
0008 7035h	ICU	Interrupt request register 053	IR053	8	8	2 ICLK		
0008 7036h	ICU	Interrupt request register 054	IR054	8	8	2 ICLK		
0008 7037h	ICU	Interrupt request register 055	IR055	8	8	2 ICLK		
0008 7038h	ICU	Interrupt request register 056	IR056	8	8	2 ICLK		
0008 7039h	ICU	Interrupt request register 057	IR057	8	8	2 ICLK		
0008 703Ah	ICU	Interrupt request register 058	IR058	8	8	2 ICLK		
0008 703Bh	ICU	Interrupt request register 059	IR059	8	8	2 ICLK		
0008 703Eh	ICU	Interrupt request register 062	IR062	8	8	2 ICLK		
0008 7040h	ICU	Interrupt request register 064	IR064	8	8	2 ICLK		
0008 7041h	ICU	Interrupt request register 065	IR065	8	8	2 ICLK		
0008 7042h	ICU	Interrupt request register 066	IR066	8	8	2 ICLK		
0008 7043h	ICU	Interrupt request register 067	IR067	8	8	2 ICLK		

Table 4.1 List of I/O Registers (Address Order) (5/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 7044h	ICU	Interrupt request register 068	IR068	8	8	2 ICLK		ICUb
0008 7045h	ICU	Interrupt request register 069	IR069	8	8	2 ICLK		
0008 7046h	ICU	Interrupt request register 070	IR070	8	8	2 ICLK		
0008 7047h	ICU	Interrupt request register 071	IR071	8	8	2 ICLK		
0008 7048h	ICU	Interrupt request register 072	IR072	8	8	2 ICLK		
0008 7049h	ICU	Interrupt request register 073	IR073	8	8	2 ICLK		
0008 704Ah	ICU	Interrupt request register 074	IR074	8	8	2 ICLK		
0008 704Bh	ICU	Interrupt request register 075	IR075	8	8	2 ICLK		
0008 704Ch	ICU	Interrupt request register 076	IR076	8	8	2 ICLK		
0008 704Dh	ICU	Interrupt request register 077	IR077	8	8	2 ICLK		
0008 704Eh	ICU	Interrupt request register 078	IR078	8	8	2 ICLK		
0008 704Fh	ICU	Interrupt request register 079	IR079	8	8	2 ICLK		
0008 705Ah	ICU	Interrupt request register 090	IR090	8	8	2 ICLK		
0008 705Ch	ICU	Interrupt request register 092	IR092	8	8	2 ICLK		
0008 705Dh	ICU	Interrupt request register 093	IR093	8	8	2 ICLK		
0008 7062h	ICU	Interrupt request register 098	IR098	8	8	2 ICLK		
0008 7066h	ICU	Interrupt request register 102	IR102	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 706Dh	ICU	Interrupt request register 109	IR109	8	8	2 ICLK		
0008 706Eh	ICU	Interrupt request register 110	IR110	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 7072h	ICU	Interrupt request register 114	IR114	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 7081h	ICU	Interrupt request register 129	IR129	8	8	2 ICLK		
0008 7082h	ICU	Interrupt request register 130	IR130	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 7087h	ICU	Interrupt request register 135	IR135	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 708Fh	ICU	Interrupt request register 143	IR143	8	8	2 ICLK		
0008 7090h	ICU	Interrupt request register 144	IR144	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		

Table 4.1 List of I/O Registers (Address Order) (9/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 719Ah	ICU	DTC activation enable register 154	DTCER154	8	8	2 ICLK		ICUb
0008 719Bh	ICU	DTC activation enable register 155	DTCER155	8	8	2 ICLK		
0008 719Ch	ICU	DTC activation enable register 156	DTCER156	8	8	2 ICLK		
0008 719Dh	ICU	DTC activation enable register 157	DTCER157	8	8	2 ICLK		
0008 719Eh	ICU	DTC activation enable register 158	DTCER158	8	8	2 ICLK		
0008 719Fh	ICU	DTC activation enable register 159	DTCER159	8	8	2 ICLK		
0008 71A0h	ICU	DTC activation enable register 160	DTCER160	8	8	2 ICLK		
0008 71A1h	ICU	DTC activation enable register 161	DTCER161	8	8	2 ICLK		
0008 71A2h	ICU	DTC activation enable register 162	DTCER162	8	8	2 ICLK		
0008 71A3h	ICU	DTC activation enable register 163	DTCER163	8	8	2 ICLK		
0008 71A4h	ICU	DTC activation enable register 164	DTCER164	8	8	2 ICLK		
0008 71A5h	ICU	DTC activation enable register 165	DTCER165	8	8	2 ICLK		
0008 71AAh	ICU	DTC activation enable register 170	DTCER170	8	8	2 ICLK		
0008 71ABh	ICU	DTC activation enable register 171	DTCER171	8	8	2 ICLK		
0008 71ADh	ICU	DTC activation enable register 173	DTCER173	8	8	2 ICLK		
0008 71AEh	ICU	DTC activation enable register 174	DTCER174	8	8	2 ICLK		
0008 71B0h	ICU	DTC activation enable register 176	DTCER176	8	8	2 ICLK		
0008 71B1h	ICU	DTC activation enable register 177	DTCER177	8	8	2 ICLK		
0008 71B3h	ICU	DTC activation enable register 179	DTCER179	8	8	2 ICLK		
0008 71B4h	ICU	DTC activation enable register 180	DTCER180	8	8	2 ICLK		
0008 71B7h	ICU	DTC activation enable register 183	DTCER183	8	8	2 ICLK		
0008 71B8h	ICU	DTC activation enable register 184	DTCER184	8	8	2 ICLK		
0008 71BBh	ICU	DTC activation enable register 187	DTCER187	8	8	2 ICLK		
0008 71BCh	ICU	DTC activation enable register 188	DTCER188	8	8	2 ICLK		
0008 71BFh	ICU	DTC activation enable register 191	DTCER191	8	8	2 ICLK		
0008 71C0h	ICU	DTC activation enable register 192	DTCER192	8	8	2 ICLK		
0008 71C3h	ICU	DTC activation enable register 195	DTCER195	8	8	2 ICLK		
0008 71C4h	ICU	DTC activation enable register 196	DTCER196	8	8	2 ICLK		
0008 71C6h	ICU	DTC activation enable register 198	DTCER198	8	8	2 ICLK		
0008 71C7h	ICU	DTC activation enable register 199	DTCER199	8	8	2 ICLK		
0008 71C8h	ICU	DTC activation enable register 200	DTCER200	8	8	2 ICLK		
0008 71C9h	ICU	DTC activation enable register 201	DTCER201	8	8	2 ICLK		
0008 71D6h	ICU	DTC activation enable register 214	DTCER214	8	8	2 ICLK		
0008 71D7h	ICU	DTC activation enable register 215	DTCER215	8	8	2 ICLK		
0008 71D9h	ICU	DTC activation enable register 217	DTCER217	8	8	2 ICLK		
0008 71DAh	ICU	DTC activation enable register 218	DTCER218	8	8	2 ICLK		
0008 71DCh	ICU	DTC activation enable register 220	DTCER220	8	8	2 ICLK		
0008 71DDh	ICU	DTC activation enable register 221	DTCER221	8	8	2 ICLK		
0008 71DFh	ICU	DTC activation enable register 223	DTCER223	8	8	2 ICLK		
0008 71E0h	ICU	DTC activation enable register 224	DTCER224	8	8	2 ICLK		
0008 71E2h	ICU	DTC activation enable register 226	DTCER226	8	8	2 ICLK		
0008 71E3h	ICU	DTC activation enable register 227	DTCER227	8	8	2 ICLK		
0008 71E5h	ICU	DTC activation enable register 229	DTCER229	8	8	2 ICLK		
0008 71E6h	ICU	DTC activation enable register 230	DTCER230	8	8	2 ICLK		
0008 71E8h	ICU	DTC activation enable register 232	DTCER232	8	8	2 ICLK		
0008 71E9h	ICU	DTC activation enable register 233	DTCER233	8	8	2 ICLK		
0008 71EBh	ICU	DTC activation enable register 235	DTCER235	8	8	2 ICLK		
0008 71ECh	ICU	DTC activation enable register 236	DTCER236	8	8	2 ICLK		
0008 71EEh	ICU	DTC activation enable register 238	DTCER238	8	8	2 ICLK		
0008 71EFh	ICU	DTC activation enable register 239	DTCER239	8	8	2 ICLK		

Table 4.1 List of I/O Registers (Address Order) (10/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 71F1h	ICU	DTC activation enable register 241	DTCER241	8	8	2 ICLK		ICUb
0008 71F2h	ICU	DTC activation enable register 242	DTCER242	8	8	2 ICLK		
0008 71F4h	ICU	DTC activation enable register 244	DTCER244	8	8	2 ICLK		
0008 71F5h	ICU	DTC activation enable register 245	DTCER245	8	8	2 ICLK		
0008 71F7h	ICU	DTC activation enable register 247	DTCER247	8	8	2 ICLK		
0008 71F8h	ICU	DTC activation enable register 248	DTCER248	8	8	2 ICLK		
0008 71FAh	ICU	DTC activation enable register 250	DTCER250	8	8	2 ICLK		
0008 71FBh	ICU	DTC activation enable register 251	DTCER251	8	8	2 ICLK		
0008 7202h	ICU	Interrupt request enable register 02	IER02	8	8	2 ICLK		
0008 7203h	ICU	Interrupt request enable register 03	IER03	8	8	2 ICLK		
0008 7204h	ICU	Interrupt request enable register 04	IER04	8	8	2 ICLK		
0008 7205h	ICU	Interrupt request enable register 05	IER05	8	8	2 ICLK		
0008 7206h	ICU	Interrupt request enable register 06	IER06	8	8	2 ICLK		
0008 7207h	ICU	Interrupt request enable register 07	IER07	8	8	2 ICLK		
0008 7208h	ICU	Interrupt request enable register 08	IER08	8	8	2 ICLK		
0008 7209h	ICU	Interrupt request enable register 09	IER09	8	8	2 ICLK		
0008 720Bh	ICU	Interrupt request enable register 0B	IER0B	8	8	2 ICLK		
0008 720Ch	ICU	Interrupt request enable register 0C	IER0C	8	8	2 ICLK		
0008 720Dh	ICU	Interrupt request enable register 0D	IER0D	8	8	2 ICLK		
0008 720Eh	ICU	Interrupt request enable register 0E	IER0E	8	8	2 ICLK		
0008 720Fh	ICU	Interrupt request enable register 0F	IER0F	8	8	2 ICLK		
0008 7210h	ICU	Interrupt request enable register 10	IER10	8	8	2 ICLK		
0008 7211h	ICU	Interrupt request enable register 11	IER11	8	8	2 ICLK		
0008 7212h	ICU	Interrupt request enable register 12	IER12	8	8	2 ICLK		
0008 7213h	ICU	Interrupt request enable register 13	IER13	8	8	2 ICLK		
0008 7214h	ICU	Interrupt request enable register 14	IER14	8	8	2 ICLK		
0008 7215h	ICU	Interrupt request enable register 15	IER15	8	8	2 ICLK		
0008 7216h	ICU	Interrupt request enable register 16	IER16	8	8	2 ICLK		
0008 7217h	ICU	Interrupt request enable register 17	IER17	8	8	2 ICLK		
0008 7218h	ICU	Interrupt request enable register 18	IER18	8	8	2 ICLK		
0008 7219h	ICU	Interrupt request enable register 19	IER19	8	8	2 ICLK		
0008 721Ah	ICU	Interrupt request enable register 1A	IER1A	8	8	2 ICLK		
0008 721Bh	ICU	Interrupt request enable register 1B	IER1B	8	8	2 ICLK		
0008 721Ch	ICU	Interrupt request enable register 1C	IER1C	8	8	2 ICLK		
0008 721Dh	ICU	Interrupt request enable register 1D	IER1D	8	8	2 ICLK		
0008 721Eh	ICU	Interrupt request enable register 1E	IER1E	8	8	2 ICLK		
0008 721Fh	ICU	Interrupt request enable register 1F	IER1F	8	8	2 ICLK		
0008 72E0h	ICU	Software interrupt activation register	SWINTR	8	8	2 ICLK		
0008 72F0h	ICU	Fast interrupt set register	FIR	16	16	2 ICLK		
0008 7300h	ICU	Interrupt source priority register 000	IPR000	8	8	2 ICLK		
0008 7301h	ICU	Interrupt source priority register 001	IPR001	8	8	2 ICLK		
0008 7302h	ICU	Interrupt source priority register 002	IPR002	8	8	2 ICLK		
0008 7303h	ICU	Interrupt source priority register 003	IPR003	8	8	2 ICLK		
0008 7304h	ICU	Interrupt source priority register 004	IPR004	8	8	2 ICLK		
0008 7305h	ICU	Interrupt source priority register 005	IPR005	8	8	2 ICLK		
0008 7306h	ICU	Interrupt source priority register 006	IPR006	8	8	2 ICLK		
0008 7307h	ICU	Interrupt source priority register 007	IPR007	8	8	2 ICLK		
0008 7321h	ICU	Interrupt source priority register 033	IPR033	8	8	2 ICLK		
0008 7322h	ICU	Interrupt source priority register 034	IPR034	8	8	2 ICLK		
0008 7323h	ICU	Interrupt source priority register 035	IPR035	8	8	2 ICLK		

Table 4.1 List of I/O Registers (Address Order) (23/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 9032h	S12AD	A/D data register 9	ADDR9	16	16	2, 3 PCLKB	2 ICLK	S12ADa
0008 9034h	S12AD	A/D data register 10	ADDR10	16	16	2, 3 PCLKB	2 ICLK	
0008 9036h	S12AD	A/D data register 11	ADDR11	16	16	2, 3 PCLKB	2 ICLK	
0008 9038h	S12AD	A/D data register 12	ADDR12	16	16	2, 3 PCLKB	2 ICLK	
0008 903Ah	S12AD	A/D data register 13	ADDR13	16	16	2, 3 PCLKB	2 ICLK	
0008 903Ch	S12AD	A/D data register 14	ADDR14	16	16	2, 3 PCLKB	2 ICLK	
0008 903Eh	S12AD	A/D data register 15	ADDR15	16	16	2, 3 PCLKB	2 ICLK	
0008 9040h	S12AD	A/D data register 16	ADDR16	16	16	2, 3 PCLKB	2 ICLK	
0008 9042h	S12AD	A/D data register 17	ADDR17	16	16	2, 3 PCLKB	2 ICLK	
0008 9044h	S12AD	A/D data register 18	ADDR18	16	16	2, 3 PCLKB	2 ICLK	
0008 9046h	S12AD	A/D data register 19	ADDR19	16	16	2, 3 PCLKB	2 ICLK	
0008 9048h	S12AD	A/D data register 20	ADDR20	16	16	2, 3 PCLKB	2 ICLK	
0008 9060h	S12AD	A/D sampling state register 01	ADSSTR01	16	16	2, 3 PCLKB	2 ICLK	
0008 9070h	S12AD	A/D sampling state register 23	ADSSTR23	16	16	2, 3 PCLKB	2 ICLK	
0008 9800h	AD	A/D data register A	ADDRA	16	16	2, 3 PCLKB	2 ICLK	ADb
0008 9802h	AD	A/D data register B	ADDRB	16	16	2, 3 PCLKB	2 ICLK	
0008 9804h	AD	A/D data register C	ADDRC	16	16	2, 3 PCLKB	2 ICLK	
0008 9806h	AD	A/D data register D	ADDRD	16	16	2, 3 PCLKB	2 ICLK	
0008 9808h	AD	A/D data register E	ADDRE	16	16	2, 3 PCLKB	2 ICLK	
0008 980Ah	AD	A/D data register F	ADDRF	16	16	2, 3 PCLKB	2 ICLK	
0008 980Ch	AD	A/D data register G	ADDRG	16	16	2, 3 PCLKB	2 ICLK	
0008 980Eh	AD	A/D data register H	ADDRH	16	16	2, 3 PCLKB	2 ICLK	
0008 9810h	AD	A/D control/status register	ADCSR	8	8	2, 3 PCLKB	2 ICLK	
0008 9811h	AD	A/D control register	ADCR	8	8	2, 3 PCLKB	2 ICLK	
0008 9812h	AD	A/D control register 2	ADCR2	8	8	2, 3 PCLKB	2 ICLK	
0008 9813h	AD	A/D sampling state register	ADSSTR	8	8	2, 3 PCLKB	2 ICLK	
0008 981Fh	AD	A/D self-diagnostic register	ADDIAGR	8	8	2, 3 PCLKB	2 ICLK	
0008 A000h	SCI0	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	SCIc, SCId
0008 A001h	SCI0	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A002h	SCI0	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A003h	SCI0	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A004h	SCI0	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A005h	SCI0	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A006h	SCI0	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A007h	SCI0	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A008h	SCI0	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A009h	SCI0	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Ah	SCI0	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Bh	SCI0	I^2C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Ch	SCI0	I^2C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A00Dh	SCI0	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A020h	SCI1	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A021h	SCI1	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A022h	SCI1	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A023h	SCI1	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A024h	SCI1	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A025h	SCI1	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A026h	SCI1	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A027h	SCI1	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A028h	SCI1	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (25/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 A0A3h	SCI5	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	SCIc, SCId
0008 A0A4h	SCI5	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A5h	SCI5	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A6h	SCI5	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A7h	SCI5	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A8h	SCI5	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0A9h	SCI5	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A0AAh	SCI5	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ABh	SCI5	I^2C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ACh	SCI5	I^2C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ADh	SCI5	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C0h	SCI6	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C1h	SCI6	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C2h	SCI6	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C3h	SCI6	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C4h	SCI6	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C5h	SCI6	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C6h	SCI6	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C7h	SCI6	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C8h	SCI6	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0C9h	SCI6	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CAh	SCI6	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CBh	SCI6	I^2C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CCh	SCI6	I^2C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0CDh	SCI6	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E0h	SCI7	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E1h	SCI7	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E2h	SCI7	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E3h	SCI7	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E4h	SCI7	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E5h	SCI7	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E6h	SCI7	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E7h	SCI7	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E8h	SCI7	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0E9h	SCI7	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A0EAh	SCI7	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	
0008 A0EBh	SCI7	I^2C mode register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK	
0008 A0ECh	SCI7	I^2C status register	SISR	8	8	2, 3 PCLKB	2 ICLK	
0008 A0EDh	SCI7	SPI mode register	SPMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A100h	SCI8	Serial mode register	SMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A101h	SCI8	Bit rate register	BRR	8	8	2, 3 PCLKB	2 ICLK	
0008 A102h	SCI8	Serial control register	SCR	8	8	2, 3 PCLKB	2 ICLK	
0008 A103h	SCI8	Transmit data register	TDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A104h	SCI8	Serial status register	SSR	8	8	2, 3 PCLKB	2 ICLK	
0008 A105h	SCI8	Receive data register	RDR	8	8	2, 3 PCLKB	2 ICLK	
0008 A106h	SCI8	Smart card mode register	SCMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A107h	SCI8	Serial extended mode register	SEMR	8	8	2, 3 PCLKB	2 ICLK	
0008 A108h	SCI8	Noise filter setting register	SNFR	8	8	2, 3 PCLKB	2 ICLK	
0008 A109h	SCI8	I^2C mode register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK	
0008 A10Ah	SCI8	I^2C mode register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (28/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 B332h	SCI12	Timer prescaler register	TPRE	8	8	2, 3 PCLKB	2 ICLK	I/O Ports
0008 B333h	SCI12	Timer count register	TCNT	8	8	2, 3 PCLKB	2 ICLK	
0008 C000h	PORT0	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C001h	PORT1	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C002h	PORT2	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C003h	PORT3	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C004h	PORT4	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C005h	PORT5	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C006h	PORT6	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C007h	PORT7	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C008h	PORT8	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C009h	PORT9	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C00Ah	PORTA	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C00Bh	PORTB	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C00Ch	PORTC	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C00Dh	PORTD	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C00Eh	PORTE	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C00Fh	PORTF	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C010h	PORTG	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C011h	PORTH	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C012h	PORTJ	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C013h	PORTK	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C014h	PORTL	Port direction register	PDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C020h	PORT0	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C021h	PORT1	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C022h	PORT2	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C023h	PORT3	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C024h	PORT4	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C025h	PORT5	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C026h	PORT6	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C027h	PORT7	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C028h	PORT8	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C029h	PORT9	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C02Ah	PORTA	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C02Bh	PORTB	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C02Ch	PORTC	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C02Dh	PORTD	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C02Eh	PORTE	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C02Fh	PORTF	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C030h	PORTG	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C031h	PORTH	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C032h	PORTJ	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C033h	PORTK	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C034h	PORTL	Port output data register	PODR	8	8	2, 3 PCLKB	2 ICLK	
0008 C040h	PORT0	Port input data register	PIDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C041h	PORT1	Port input data register	PIDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C042h	PORT2	Port input data register	PIDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C043h	PORT3	Port input data register	PIDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C044h	PORT4	Port input data register	PIDR	8	8	2, 3 PCLKB	2 ICLK	
0008 C045h	PORT5	Port input data register	PIDR	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (32/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0008 C164h	MPC	P44 pin function control register	P44PFS	8	8	2, 3 PCLKB	2 ICLK	MPC
0008 C165h	MPC	P45 pin function control register	P45PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C166h	MPC	P46 pin function control register	P46PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C167h	MPC	P47 pin function control register	P47PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C168h	MPC	P50 pin function control register	P50PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C169h	MPC	P51 pin function control register	P51PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Ah	MPC	P52 pin function control register	P52PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Ch	MPC	P54 pin function control register	P54PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Dh	MPC	P55 pin function control register	P55PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C16Eh	MPC	P56 pin function control register	P56PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C170h	MPC	P60 pin function control register	P60PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C171h	MPC	P61 pin function control register	P61PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C176h	MPC	P66 pin function control register	P66PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C177h	MPC	P67 pin function control register	P67PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C178h	MPC	P70 pin function control register	P70PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C17Bh	MPC	P73 pin function control register	P73PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C17Ch	MPC	P74 pin function control register	P74PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C17Dh	MPC	P75 pin function control register	P75PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C17Eh	MPC	P76 pin function control register	P76PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C17Fh	MPC	P77 pin function control register	P77PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C180h	MPC	P80 pin function control register	P80PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C181h	MPC	P81 pin function control register	P81PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C182h	MPC	P82 pin function control register	P82PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C183h	MPC	P83 pin function control register	P83PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C186h	MPC	P86 pin function control register	P86PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C187h	MPC	P87 pin function control register	P87PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C188h	MPC	P90 pin function control register	P90PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C189h	MPC	P91 pin function control register	P91PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C18Ah	MPC	P92 pin function control register	P92PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C18Bh	MPC	P93 pin function control register	P93PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C190h	MPC	PA0 pin function control register	PA0PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C191h	MPC	PA1 pin function control register	PA1PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C192h	MPC	PA2 pin function control register	PA2PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C193h	MPC	PA3 pin function control register	PA3PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C194h	MPC	PA4 pin function control register	PA4PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C195h	MPC	PA5 pin function control register	PA5PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C196h	MPC	PA6 pin function control register	PA6PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C197h	MPC	PA7 pin function control register	PA7PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C198h	MPC	PB0 pin function control register	PB0PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C199h	MPC	PB1 pin function control register	PB1PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C19Ah	MPC	PB2 pin function control register	PB2PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C19Bh	MPC	PB3 pin function control register	PB3PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C19Ch	MPC	PB4 pin function control register	PB4PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C19Dh	MPC	PB5 pin function control register	PB5PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C19Eh	MPC	PB6 pin function control register	PB6PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C19Fh	MPC	PB7 pin function control register	PB7PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1A0h	MPC	PC0 pin function control register	PC0PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1A1h	MPC	PC1 pin function control register	PC1PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1A2h	MPC	PC2 pin function control register	PC2PFS	8	8	2, 3 PCLKB	2 ICLK	
0008 C1A3h	MPC	PC3 pin function control register	PC3PFS	8	8	2, 3 PCLKB	2 ICLK	

Table 4.1 List of I/O Registers (Address Order) (36/42)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Related Function
						ICLK ≥ PCLK	ICLK < PCLK	
0009 0853h	CAN0	Mailbox search mode register	MSMR	8	8	2, 3 PCLKB	2 ICLK	CAN
0009 0854h	CAN0	Time stamp register	TSR	16	16	2, 3 PCLKB	2 ICLK	
0009 0856h	CAN0	Acceptance filter support register	AFSR	16	16	2, 3 PCLKB	2 ICLK	
0009 0858h	CAN0	Test control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0009 1200h to 0009 13FFh	CAN1	Mailbox registers 0 to 31	MB0 to 31	128	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 1400h to 0009 141Fh	CAN1	Mask register 0 to 7	MKR0 to 7	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 1420h	CAN1	FIFO received ID compare register 0	FIDCR0	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 1424h	CAN1	FIFO received ID compare register 1	FIDCR1	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 1428h	CAN1	Mask invalid register	MKIVLR	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 142Ch	CAN1	Mailbox interrupt enable register	MIER	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 1820h to 0009 183Fh	CAN1	Message control registers 0 to 31	MCTL0 to 31	8	8	2, 3 PCLKB	2 ICLK	
0009 1840h	CAN1	Control register	CTLR	16	8, 16	2, 3 PCLKB	2 ICLK	
0009 1842h	CAN1	Status register	STR	16	8, 16	2, 3 PCLKB	2 ICLK	
0009 1844h	CAN1	Bit configuration register	BCR	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 1848h	CAN1	Receive FIFO control register	RFCR	8	8	2, 3 PCLKB	2 ICLK	
0009 1849h	CAN1	Receive FIFO pointer control register	RFPCR	8	8	2, 3 PCLKB	2 ICLK	
0009 184Ah	CAN1	Transmit FIFO control register	TFCR	8	8	2, 3 PCLKB	2 ICLK	
0009 184Bh	CAN1	Transmit FIFO pointer control register	TFPCR	8	8	2, 3 PCLKB	2 ICLK	
0009 184Ch	CAN1	Error interrupt enable register	EIER	8	8	2, 3 PCLKB	2 ICLK	
0009 184Dh	CAN1	Error interrupt factor judge register	EIFR	8	8	2, 3 PCLKB	2 ICLK	
0009 184Eh	CAN1	Receive error count register	RECR	8	8	2, 3 PCLKB	2 ICLK	
0009 184Fh	CAN1	Transmit error count register	TECR	8	8	2, 3 PCLKB	2 ICLK	
0009 1850h	CAN1	Error code store register	ECSR	8	8	2, 3 PCLKB	2 ICLK	
0009 1851h	CAN1	Channel search support register	CSSR	8	8	2, 3 PCLKB	2 ICLK	
0009 1852h	CAN1	Mailbox search status register	MSSR	8	8	2, 3 PCLKB	2 ICLK	
0009 1853h	CAN1	Mailbox search mode register	MSMR	8	8	2, 3 PCLKB	2 ICLK	
0009 1854h	CAN1	Time stamp register	TSR	16	8, 16	2, 3 PCLKB	2 ICLK	
0009 1856h	CAN1	Acceptance filter support register	AFSR	16	8, 16	2, 3 PCLKB	2 ICLK	
0009 1858h	CAN1	Test control register	TCR	8	8	2, 3 PCLKB	2 ICLK	
0009 2200h to 0009 23FFh	CAN2	Mailbox registers 0 to 31	MB0 to 31	128	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 2400h to 0009 241Fh	CAN2	Mask register 0 to 7	MKR0 to 7	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 2420h	CAN2	FIFO received ID compare register 0	FIDCR0	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 2424h	CAN2	FIFO received ID compare register 1	FIDCR1	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 2428h	CAN2	Mask invalid register	MKIVLR	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 242Ch	CAN2	Mailbox interrupt enable register	MIER	32	8, 16, 32	2, 3 PCLKB	2 ICLK	
0009 2820h to 0009 283Fh	CAN2	Message control registers 0 to 31	MCTL0 to 31	8	8	2, 3 PCLKB	2 ICLK	
0009 2820h to 0009 283Fh	CAN2	Message control registers 0 to 31	MCTL0 to 31	8	8	2, 3 PCLKB	2 ICLK	
0009 2840h	CAN2	Control register	CTLR	16	8, 16	2, 3 PCLKB	2 ICLK	
0009 2842h	CAN2	Status register	STR	16	8, 16	2, 3 PCLKB	2 ICLK	
0009 2844h	CAN2	Bit configuration register	BCR	32	8, 16, 32	2, 3 PCLKB	2 ICLK	

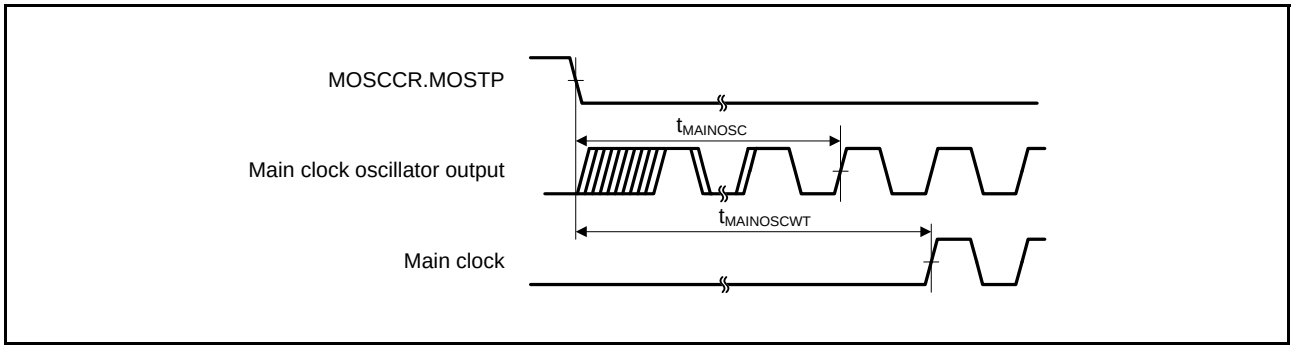


Figure 5.5 Main Clock Oscillation Start Timing

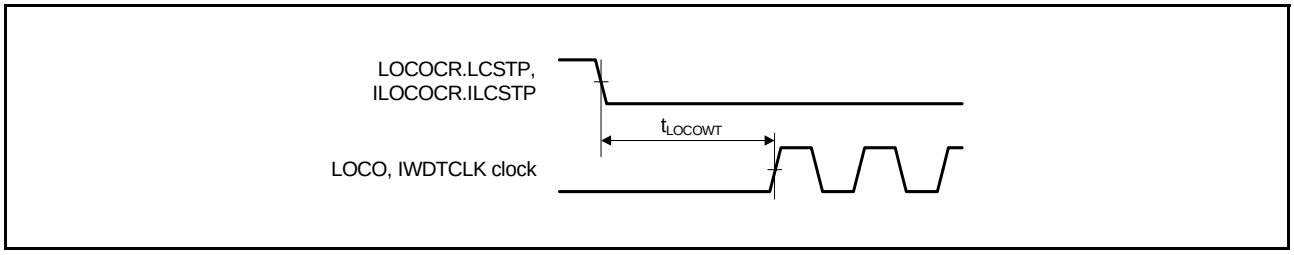


Figure 5.6 LOCO, IWDTCLK Oscillation Start Timing

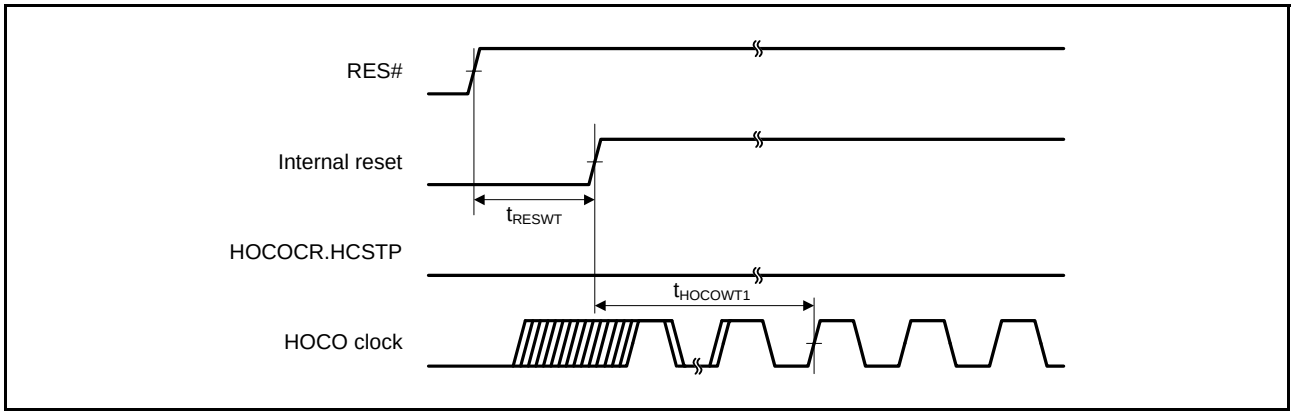


Figure 5.7 HOCO Oscillation Start Timing (After Reset is Canceled by Setting the OFS1.HOCOEN Bit to 0)

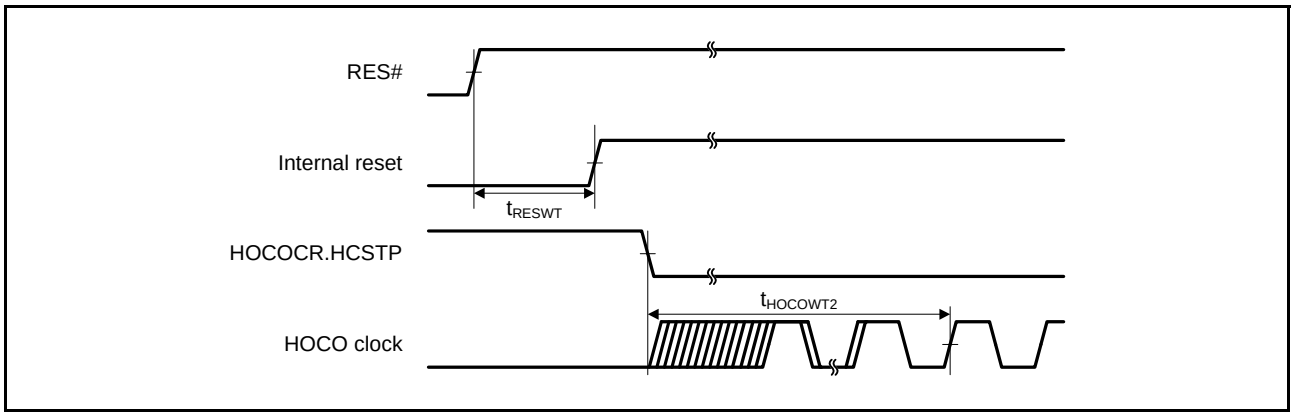


Figure 5.8 HOCO Clock Oscillation Start Timing (Oscillation is Started by Setting the HOCOCR.HCSTP Bit)

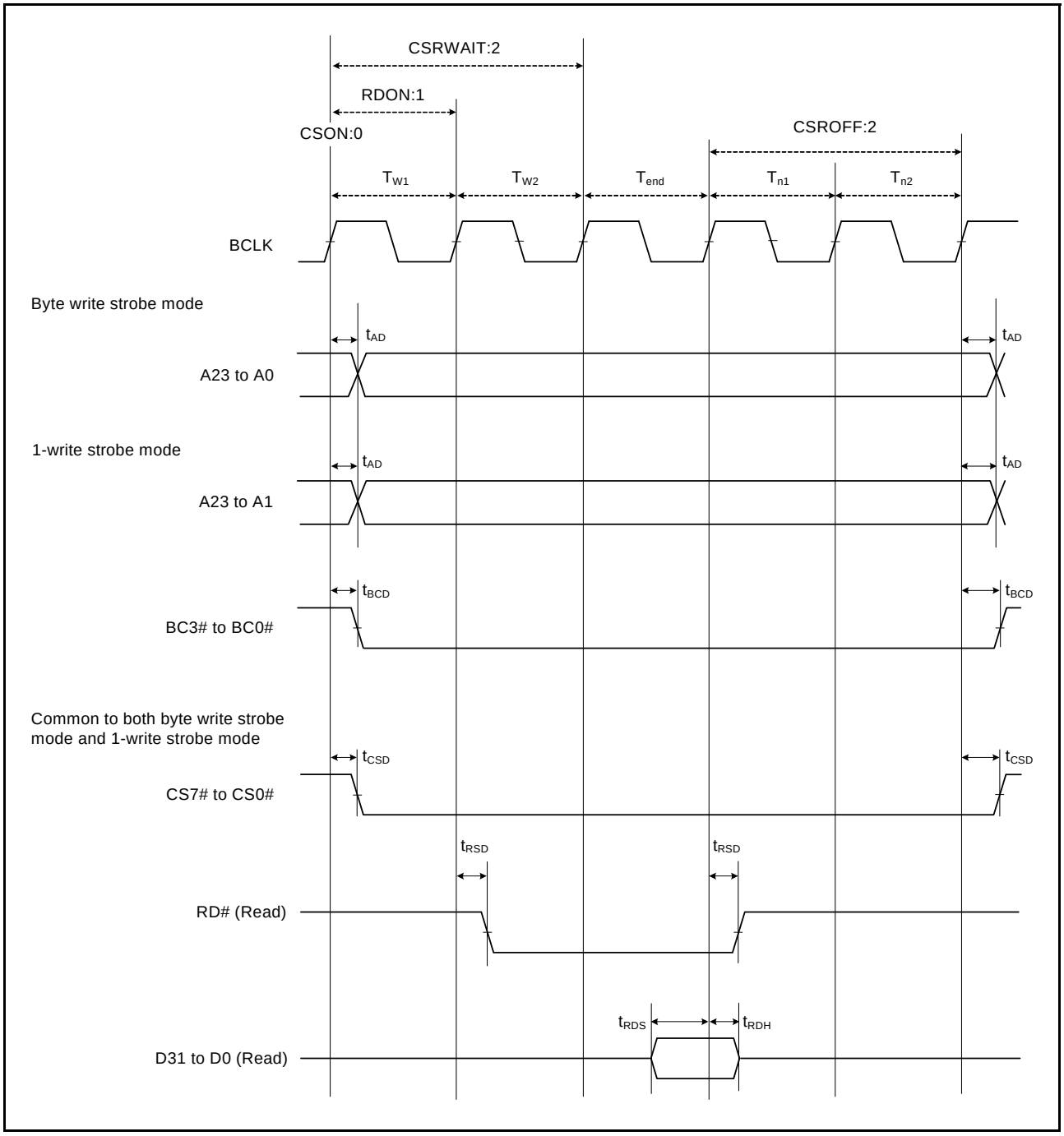


Figure 5.19 External Bus Timing/Normal Read Cycle (Bus Clock Synchronized)

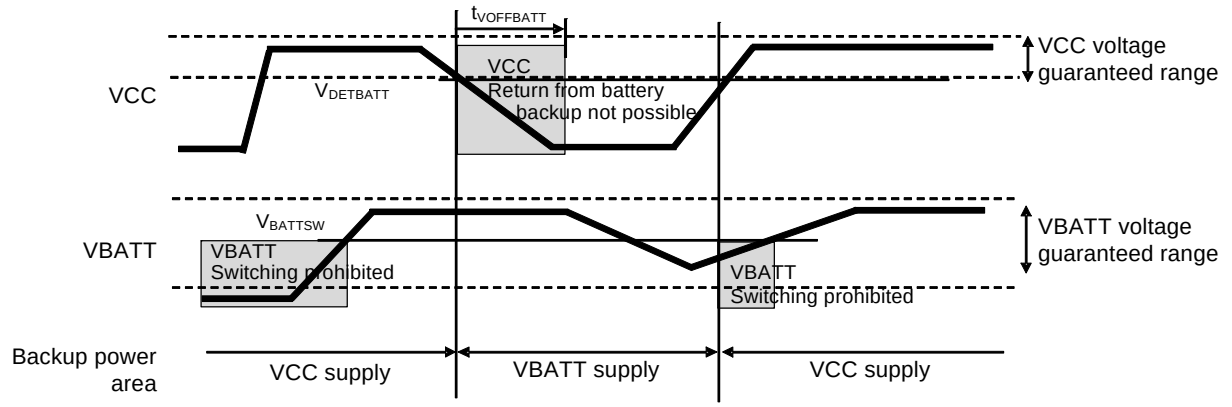
5.10 Battery Backup Function Characteristics

Table 5.29 Battery Backup Function Characteristics

Conditions: VCC = AVCC0 = VREFH = VCC_USB = 2.7 to 3.6 V, VREFH0 = 2.7 V to AVCC0, V_{BATT} = 2.3 to 3.6 V
VSS = AVSS0 = VREFL/VREFL0 = VSS_USB = 0 V
$T_a = T_{opr}$

Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Voltage level for switching to battery backup	$V_{DETBATT}$	2.50	2.60	2.70	V	Figure 5.45
Lower-limit VBATT voltage for power supply switching due to VCC voltage drop	V_{BATTSW}	2.70	—	—		
VCC-off period for starting power supply switching	$t_{VOFFBATT}$	200	—	—	µs	

Note: The VCC-off period for starting power supply switching indicates the period in which VCC is below the minimum value of the voltage level for switching to battery backup ($V_{DETBATT}$).

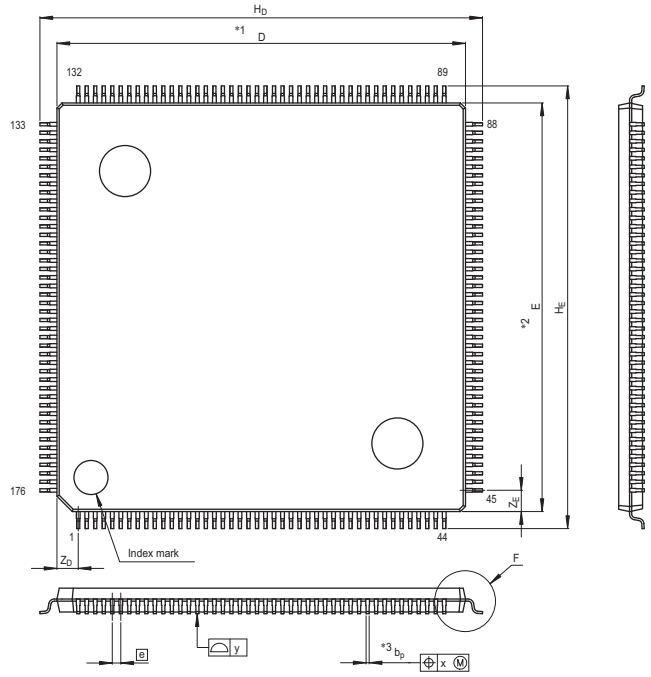


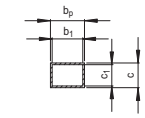
Note. When VCC falls below $V_{DETBATT}$, the voltage for switching to battery backup, make sure that VCC does not rise above $V_{DETBATT}$ during the VCC-off period required to start switching between power supplies.

The VBATT voltage when the supplied power source switches from Vcc to V_{BATT} should not be lower than V_{BATTSW}, the lower-limit VBATT voltage for switching between power supplies due to a drop in the VCC voltage.

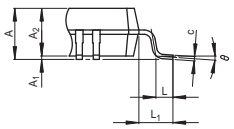
Figure 5.45 Battery Backup Function Characteristics

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-LQFP176-24x24-0.50	PLQP0176KB-A	176P6Q-A / FP-176E / FP-176EV	1.8g





Terminal cross section



Detail F

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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	23.9	24.0	24.1
E	23.9	24.0	24.1
A_2	—	1.4	—
H_D	25.8	26.0	26.2
H_E	25.8	26.0	26.2
A	—	—	1.7
A_1	0.05	0.1	0.15
b_p	0.15	0.20	0.25
b_1	—	0.18	—
c	0.09	0.145	0.20
c_1	—	0.125	—
θ	0°	—	8°
e	—	0.5	—
x	—	—	0.08
y	—	—	0.10
Z_D	—	1.25	—
Z_E	—	1.25	—
L	0.35	0.5	0.65
L_1	—	1.0	—

Figure C 176-Pin LQFP (PLQP0176KB-A)