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Applications of "<u>Embedded -</u> <u>Microcontrollers</u>"

#### Details

Product Status	Obsolete
Core Processor	R8C
Core Size	16-Bit
Speed	20MHz
Connectivity	I <sup>2</sup> C, UART/USART
Peripherals	POR, PWM, Voltage Detect, WDT
Number of I/O	31
Program Memory Size	32KB (32K x 8)
Program Memory Type	FLASH
EEPROM Size	4K x 8
RAM Size	2.5K x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 12x10b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	40-XFQFN Exposed Pad
Supplier Device Package	40-HXQFN (5x5)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f213j6tnnp-w4

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# 1.1.2 Specifications

Tables 1.1 and 1.2 outline the Specifications for R8C/3JT Group.

Item	Function	Specification
CPU	Central processing unit	R8C CPU core• Number of fundamental instructions: 89• Minimum instruction execution time: 50 ns (f(XIN) = 20 MHz, VCC = 2.7 V to 5.5 V) 200 ns (f(XIN) = 5 MHz, VCC = 1.8 V to 5.5 V)• Multiplier: 16 bits × 16 bits $\rightarrow$ 32 bits• Multiply-accumulate instruction: 16 bits × 16 bits + 32 bits $\rightarrow$ 32 bits• Operation mode: Single-chip mode (address space: 1 Mbyte)
Memory	ROM, RAM, Data flash	Refer to Table 1.3 Product List for R8C/3JT Group.
Power Supply Voltage Detection	Voltage detection circuit	<ul> <li>Power-on reset</li> <li>Voltage detection 3 (detection level of voltage detection 0 and voltage detection 1 selectable)</li> </ul>
I/O Ports	Programmable I/O ports	<ul> <li>Input-only: 1 pin</li> <li>CMOS I/O ports: 31, selectable pull-up resistor</li> <li>High current drive ports: 31</li> </ul>
Clock	Clock generation circuits	<ul> <li>3 circuits: XIN clock oscillation circuit, High-speed on-chip oscillator (with frequency adjustment function), Low-speed on-chip oscillator</li> <li>Oscillation stop detection: XIN clock oscillation stop detection function</li> <li>Frequency divider circuit: Dividing selectable 1, 2, 4, 8, and 16</li> <li>Low power consumption modes: Standard operating mode (high-speed clock, high-speed on-chip oscillator, low-speed on-chip oscillator), wait mode, stop mode</li> </ul>
Interrupts		<ul> <li>Number of interrupt vectors: 69</li> <li>External Interrupt: 8 (INT × 4, Key input × 4)</li> <li>Priority levels: 7 levels</li> </ul>
Watchdog Tim	er	<ul> <li>14 bits × 1 (with prescaler)</li> <li>Reset start selectable</li> <li>Low-speed on-chip oscillator for watchdog timer selectable</li> </ul>
DTC (Data Tra	nsfer Controller)	<ul> <li>1 channel</li> <li>Activation sources: 22</li> <li>Transfer modes: 2 (normal mode, repeat mode)</li> </ul>
Timer	Timer RA	8 bits × 1 (with 8-bit prescaler) Timer mode (period timer), pulse output mode (output level inverted every period), event counter mode, pulse width measurement mode, pulse period measurement mode
	Timer RB	8 bits × 1 (with 8-bit prescaler) Timer mode (period timer), programmable waveform generation mode (PWM output), programmable one-shot generation mode, programmable wait one- shot generation mode
	Timer RC	16 bits × 1 (with 4 capture/compare registers) Timer mode (input capture function, output compare function), PWM mode (output 3 pins), PWM2 mode (PWM output pin)

## Table 1.1Specifications for R8C/3JT Group (1)



Current of Apr 2011

# 1.2 Product List

Table 1.3 lists Product List for R8C/3JT Group. Figure 1.1 shows a Part Number, Memory Size, and Package of R8C/3JT Group.

Part No.	ROM C	apacity	RAM	Package Type	Remarks
Fait NO.	Program ROM	Data flash	Capacity	Fackage Type	Remarks
R5F213J4TNNP	16 Kbytes	1 Kbyte × 4	1.5 Kbytes	PXQN0040LA-A	N version
R5F213J5TNNP	24 Kbytes	1 Kbyte × 4	2 Kbytes	PXQN0040LA-A	
R5F213J6TNNP	32 Kbytes	1 Kbyte × 4	2.5 Kbytes	PXQN0040LA-A	



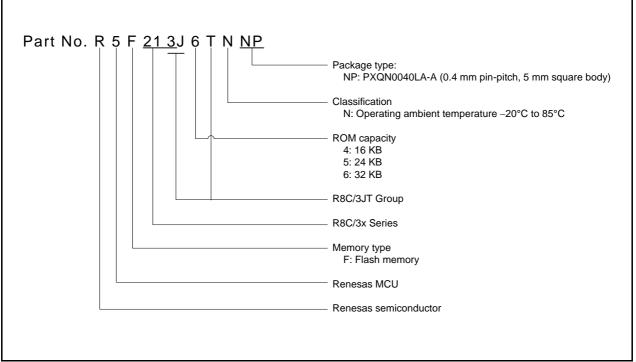


Figure 1.1 Part Number, Memory Size, and Package of R8C/3JT Group



# 2.1 Data Registers (R0, R1, R2, and R3)

R0 is a 16-bit register for transfer, arithmetic, and logic operations. The same applies to R1 to R3. R0 can be split into high-order bits (R0H) and low-order bits (R0L) to be used separately as 8-bit data registers. R1H and R1L are analogous to R0H and R0L. R2 can be combined with R0 and used as a 32-bit data register (R2R0). R3R1 is analogous to R2R0.

# 2.2 Address Registers (A0 and A1)

A0 is a 16-bit register for address register indirect addressing and address register relative addressing. It is also used for transfer, arithmetic, and logic operations. A1 is analogous to A0. A1 can be combined with A0 and as a 32-bit address register (A1A0).

# 2.3 Frame Base Register (FB)

FB is a 16-bit register for FB relative addressing.

# 2.4 Interrupt Table Register (INTB)

INTB is a 20-bit register that indicates the starting address of an interrupt vector table.

# 2.5 Program Counter (PC)

PC is 20 bits wide and indicates the address of the next instruction to be executed.

# 2.6 User Stack Pointer (USP) and Interrupt Stack Pointer (ISP)

The stack pointers (SP), USP and ISP, are each 16 bits wide. The U flag of FLG is used to switch between USP and ISP.

# 2.7 Static Base Register (SB)

SB is a 16-bit register for SB relative addressing.

# 2.8 Flag Register (FLG)

FLG is an 11-bit register indicating the CPU state.

# 2.8.1 Carry Flag (C)

The C flag retains carry, borrow, or shift-out bits that have been generated by the arithmetic and logic unit.

# 2.8.2 Debug Flag (D)

The D flag is for debugging only. Set it to 0.

# 2.8.3 Zero Flag (Z)

The Z flag is set to 1 when an arithmetic operation results in 0; otherwise to 0.

# 2.8.4 Sign Flag (S)

The S flag is set to 1 when an arithmetic operation results in a negative value; otherwise to 0.

# 2.8.5 Register Bank Select Flag (B)

Register bank 0 is selected when the B flag is 0. Register bank 1 is selected when this flag is set to 1.

# 2.8.6 Overflow Flag (O)

The O flag is set to 1 when an operation results in an overflow; otherwise to 0.



0038h         Volage Monitor 2 Circuit Control Register         V2C         10000010B           0038h               0038h                0038h                 0038h                  0038h	Address	Register	Symbol	After Reset
0032h				
0030h	003Bh			
0038h	003Ch			
0039h	003Dh			
0040h         Flash Memory Ready Interrupt Control Register         FMRDYIC         XXXXX000b           0041h         Flash Memory Ready Interrupt Control Register         FMRDYIC         XXXXX000b           0044h				
0041h         Flish Memory Ready Interrupt Control Register         PMEDYIC         XXXXX000b           0043h         -				
0042h				
0044h         Image: Second Secon		Flash Memory Ready Interrupt Control Register	FMRDYIC	XXXXX000b
0044h             0044h             0044h             0047h         Tmer RC Interrupt Control Register         1RCIC         XXXXX000b           0048h              0048h              0048h              0048h              0048h              0048h         UART2 Transmit Interrupt Control Register         S2TIC         XXXXX00b           0040h         UART2 Transmit Interrupt Control Register         ADIC         XXXXX00b           0040h         UART0 Transmit Interrupt Control Register         ADIC         XXXXX00b           0050h               0051h         UART0 Receive Interrupt Control Register         S0RIC         XXXXX00b           0058h         Imer R4 Interrupt Control Register         TRAIC         XXXXX00b           0058h         Imer R4 Interrupt Control Register         TREIC         XXXXX00b           0058h         Imer R4 Interrupt Control Register         TREIC         XXXXX000b           0058h         I				
0046h         FCIC         XXXXX000b           0047h         Timer RC Interrupt Control Register         TRCIC         XXXXX000b           0048h         FCIC         XXXXX000b           0048h         FCIC         XXXXX000b           0048h         S2TIC         XXXXX000b           0048h         VART2 Receive Interrupt Control Register         S2TIC         XXXXX000b           0046h         VART2 Receive Interrupt Control Register         ADIC         XXXXX000b           0046h         VART2 Receive Interrupt Control Register         ADIC         XXXXX00b           0046h         VARTO Conversion Interrupt Control Register         S0TIC         XXXXX00b           0055h         VARTO Receive Interrupt Control Register         S0TIC         XXXXX00b           0055h         VARTO Receive Interrupt Control Register         S0TIC         XXXXX00b           0055h         INT2 Interrupt Control Register         TRAIC         XXXXX00b           0055h         INT2 Interrupt Control Register         TRAIC         XXXXX00b           0055h         INT1 Interrupt Control Register         INTIC         XXXXX00b           0055h         INT1 Interrupt Control Register         INTIC         XXXXX00b           0055h         INT3 Interrupt Control Register </td <td></td> <td></td> <td></td> <td></td>				
0044h         Imer RC Interrupt Control Register         TRGIC         XXXXX000b           0044h         Imer RC Interrupt Control Register         IRGIC         XXXXX000b           0044h         Imer RC Interrupt Control Register         SZTIC         XXXXX000b           0044h         Imer RC Interrupt Control Register         SZTIC         XXXXX000b           0044h         Imer RC Interrupt Control Register         SZTIC         XXXXX000b           0044h         ADI Conversion Interrupt Control Register         SZTIC         XXXXX000b           0044h         ADI Conversion Interrupt Control Register         SOTIC         XXXXX00b           0055h         UARTO Transmit Interrupt Control Register         SOTIC         XXXXX00b           0055h         UARTO Receive Interrupt Control Register         SOTIC         XXXXX00b           0055h         ITTE Interrupt Control Register         INT2IC         XX00X00b           0055h         ITTE Interrupt Control Register         INT3IC         XX00X00b <t< td=""><td></td><td></td><td></td><td></td></t<>				
0044h         TRCIC         XXXX000b           0044h             0044h             0044h             0044h         S2TIC         XXXX000b           0044h         S2TIC         XXXX000b           0046h         LART2 Receive Interrupt Control Register         S2TIC         XXXX000b           0046h         KUPIC         XXXX000b         XXXX000b           0046h         KupitC         XXXX000b         XXXX000b           0046h         KupitC         XXXX000b         XXXX000b           0046h         ADIC         XXXX000b         XXXX00b           0046h         LART0 Transmit Interrupt Control Register         SOTIC         XXXX000b           0055h         UART0 Transmit Interrupt Control Register         SOTIC         XXXX000b           0055h         INT2 Interrupt Control Register         SOTIC         XXXX000b           0055h         INTE Interrupt Control Register         TRAIC         XXXX000b           0055h         INTE R Interrupt Control Register         INTIC         XX00X000b           0055h         INTI Interrupt Control Register         INTIC         XX00X000b           0055h         INTO Interru				
0049h		Timer RC Interrupt Control Register	TRCIC	XXXXX000b
0040h				70000000
004Ah         S2TIC         XXXXX000b           004Bi         UART2 Transmit Interrupt Control Register         S2TIC         XXXXX000b           004Db         Kkp Input Interrupt Control Register         KUPIC         XXXXX000b           004Db         Kkp Input Interrupt Control Register         ADIC         XXXXX000b           004DF         AD Conversion Interrupt Control Register         ADIC         XXXXX000b           004Fh         ADIC         XXXXX000b         XXXXX000b           004Fh         ADIC         XXXXX000b         XXXXX000b           005h         UART0 Transmit Interrupt Control Register         SOFIC         XXXXX000b           005h         UART0 Teseive Interrupt Control Register         SOFIC         XXXXX000b           005h         IMT2 Interrupt Control Register         INT2IC         XX00X00b           005h         Immer R8 Interrupt Control Register         TRAIC         XXXXX000b           005h         Immer R8 Interrupt Control Register         INT11C         XX00X00bb           005h         INT1 Interrupt Control Register         INT11C         XX00X00bb           005h         INT1 Interrupt Control Register         INT0IC         XX00X00bb           005h         INT1 Interrupt Control Register         INT0IC <td< td=""><td></td><td></td><td></td><td></td></td<>				
0044h         UART2 Transmit Interrupt Control Register         \$211C         XXXXX000b           004Ch         UART2 Receive Interrupt Control Register         KUPIC         XXXXX000b           004Dh         Key Input Interrupt Control Register         ADIC         XXXXX000b           004Fh         AD Conversion Interrupt Control Register         ADIC         XXXXX000b           0051h         UART0 Transmit Interrupt Control Register         SOTIC         XXXXX000b           0055h         UART0 Receive Interrupt Control Register         SOTIC         XXXXX000b           0055h         IVART0 Transmit Interrupt Control Register         SOTIC         XXXXX000b           0055h         IVT2 Interrupt Control Register         TRAIC         XXXXX000b           0055h         IVT2 Interrupt Control Register         TRAIC         XXXXX000b           0055h         IVT2 Interrupt Control Register         TRAIC         XX0XX000b           0055h         IVT1 Interrupt Control Register         TRAIC         XX0XX000b           0055h         IVT1 Interrupt Control Register         IVT1         XX0XX000b           0055h         IVT1 Interrupt Control Register         IVT1         XX0XX000b           0055h         IVT1 Interrupt Control Register         IVT1         XX0XX000b				
004Ch         UART2 Receive Interrupt Control Register         SRIC         XXXXX000b           004Dh         Key Iput Interrupt Control Register         ADIC         XXXXX000b           004Eh         AD Conversion Interrupt Control Register         ADIC         XXXXX000b           004Fh         ADIC         XXXXX000b         XXXXX000b           004Fh         ADIC         XXXXX000b         XXXXX000b           005h         UART0 Transmit Interrupt Control Register         SOFIC         XXXXX000b           0055h         UART0 Receive Interrupt Control Register         SOFIC         XXXX000b           0055h         INT2 Interrupt Control Register         INT2IC         XX00X00b           0055h         INT2 Interrupt Control Register         TRAIC         XXXXX00Db           0055h         Immer R8 Interrupt Control Register         IRTIC         XXXXX00Db           0055h         INT1 Interrupt Control Register         INTIC         XX0XX00Db           0055h         INT3 Interrupt Control Register         INTIC         XX0XX00Db           0056h         INT0 Interrupt Control Register         INTIC         XX0XX00Db           0055h         INT3 Interrupt Control Register         INTIC         XX0XX00Db           0055h         INT0 Interrupt Control Register<		UART2 Transmit Interrupt Control Register	S2TIC	XXXXX000b
004Eh         AD Conversion Interrupt Control Register         ADIC         XXXXX000b           004Fh         ADIC         XXXXX00b         ADIC         XXXXX00b           0050h         IMRT0 Receive Interrupt Control Register         SORIC         XXXXX000b           0053h         IMRT0 Receive Interrupt Control Register         SORIC         XXXXX000b           0053h         Imer RA Interrupt Control Register         INT2IC         XXXX000b           0055h         INT2 Interrupt Control Register         TRAIC         XXXXX000b           0055h         Imer RA Interrupt Control Register         TRAIC         XXXXX000b           0055h         IINT1 Interrupt Control Register         INT1IC         XXXX000b           0055h         IINT3 Interrupt Control Register         INT1IC         XX0X000b           0055h         IINT3 Interrupt Control Register         INT3IC         XX0X000b           0055h         UART2 Bus Collision Detection Interrupt Control Register         UBCNIC         XXXXX000b           0055h         UART2 Bus Collision Detection Interrupt Control Register         UBCNIC         XXXXX000b           0055h         UART2 Bus Collision Detection Interrupt Control Register         UBCNIC         XXXXX000b           0065h         Imerupt Control Register         Imerupt Control	004Ch		S2RIC	XXXXX000b
004Fh            0050h         UART0 Transmit Interrupt Control Register         SOTIC         XXXXX000b           0051h         UART0 Receive Interrupt Control Register         SORIC         XXXXX000b           0053h         UART0 Receive Interrupt Control Register         SORIC         XXXXX000b           0053h         INT2 Interrupt Control Register         INT2IC         XX0000b           0055h         Timer RA Interrupt Control Register         TRAIC         XXXXX000b           0055h         Timer RB Interrupt Control Register         TRBIC         XXXX000b           0055h         Timer RB Interrupt Control Register         INT3IC         XX00000b           0055h         Timer RB Interrupt Control Register         INT3IC         XX00000b           0055h         INT1 Interrupt Control Register         INT3IC         XX00000b           0055h         INT0 Interrupt Control Register         INT0IC         XX0000b           0065h         INT0 Interrupt Control Register         INT0IC	004Dh	Key Input Interrupt Control Register	KUPIC	XXXXX000b
0050h	004Eh	A/D Conversion Interrupt Control Register	ADIC	XXXXX000b
0051h         UARTO Transmit Interrupt Control Register         SOTIC         XXXX000b           0052h         UARTO Receive Interrupt Control Register         SORIC         XXXX000b           0053h				
0052h         UART0 Receive Interrupt Control Register         SORIC         XXXX000b           0053h         INT2 Interrupt Control Register         INT2IC         XX0000b           0055h         INT2 Interrupt Control Register         INT2IC         XX0000b           0055h         Timer RA Interrupt Control Register         TRAIC         XXXX000b           0055h         Timer RA Interrupt Control Register         TRBIC         XXXX000b           0055h         INT1 Interrupt Control Register         TRBIC         XXXX000b           0055h         INT3 Interrupt Control Register         INT3IC         XX00X000b           0055h         INT0 Interrupt Control Register         INT0IC         XX00X00b           0055h         INT0 Interrupt Control Register         U2BCNIC         XXXX000b           0055h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXX000b           0055h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXX000b           0065h         Into Interrupt Control Register         U2BCNIC         XXXXX000b           0065h         Into Interrupt Control Register         U2BCNIC         XXXXX000b           0065h         Into Interrupt Control Register         UCIC         XXXXX000b				
0063h         interrupt Control Register         INT2i C         XX0000b           0056h         Timer RA Interrupt Control Register         TRAIC         XX0000b           0057h         Timer RA Interrupt Control Register         TRAIC         XX0000b           0058h         Timer RA Interrupt Control Register         TRAIC         XX0000b           0057h         Timer RA Interrupt Control Register         TRBIC         XX0000b           0058h         INT3 Interrupt Control Register         INT3iC         XX0000b           0058h         INT3 Interrupt Control Register         INT3iC         XX0000b           0058h         INT3 Interrupt Control Register         INT3iC         XX0000b           0058h         UART2 Bus Collision Detection Interrupt Control Register         U28CNIC         XXXXX000b           0058h         0061h				
0055h         INT2 Interrupt Control Register         INT2IC         XX00X000b           0055h         Timer RA Interrupt Control Register         TRAIC         XXXXX000b           0057h         Timer RB Interrupt Control Register         TRBIC         XXXXX000b           0058h         Timer RB Interrupt Control Register         TRBIC         XXXXX000b           0059h         INT3 Interrupt Control Register         INT3IC         XX00X000b           0055h         INT1 Interrupt Control Register         INT3IC         XX00X00b           0055h         INT0 Interrupt Control Register         INT0IC         XX00X00b           0055h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXXX000b           0056h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXXX000b           0066h		UART0 Receive Interrupt Control Register	SORIC	XXXXX000b
0055h         INT2 Interrupt Control Register         INT2IC         XX0X000b           0055h         Timer RA Interrupt Control Register         TRAIC         XXXXX00b           0057h         Timer RB Interrupt Control Register         INT1IC         XX0X00b           0058h         Timer RB Interrupt Control Register         INT1IC         XX000b           0058h         INT3 Interrupt Control Register         INT3IC         XX000b           0058h         INT3 Interrupt Control Register         INT3IC         XX00x00b           0058h         INT0 Interrupt Control Register         INT0IC         XX00x00b           0055h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXXx000b           0065h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXX00b           0065h         INT0 Interrupt Control Register         U2BCNIC         XXXX00b           0065h         INT0 Interrupt Control Register         U2BCNIC         XXXX00b           0065h         INT0         INT0         Interrupt Control Register         Interrupt Control Register           0066h         INT0         Interrupt Control Register         XXXXX00b         Interrupt Control Register           0066h         Interrupt Control Register				
0056h         Timer RA Interrupt Control Register         TRAIC         XXXX000b           0057h				
0057h         Tmer R Interrupt Control Register         TRBIC         XXXX000b           0058h         INT1 Interrupt Control Register         INT3IC         XX00X00b           0058h         INT3 Interrupt Control Register         INT3IC         XX00X00b           0056h         INT3 Interrupt Control Register         INT3IC         XX00X00b           0056h         INT0 Interrupt Control Register         INT0IC         XX00X00b           0057h         U2RCNIC         XXXX000b         XXXX00b           0057h         U2RCNIC         XXXX000b         XXX00b           0057h         U2RCNIC         XXXX00b         XXXX00b           0057h         U2RCNIC         XXXX00b         XXXX00b           0057h         U2RCNIC         XXXX00b         XXXX00b           0066h         INT0         INT0         INT0           0066h         INT0         INT0         INT0 </td <td></td> <td></td> <td>_</td> <td></td>			_	
0058h         Timer RB Interrupt Control Register         TRBIC         XXXXX000b           0059h         INT1 Interrupt Control Register         INT1IC         XX0000b           0058h         INT3 Interrupt Control Register         INT3IC         XX0000b           0058h         INT3 Interrupt Control Register         INT3IC         XX0000b           0058h         INT0 Interrupt Control Register         INT0IC         XX0000b           0058h         INT0 Interrupt Control Register         INT0IC         XX0000b           0058h         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXXX000b           0058h         INT0         INT0IC         XX000b         INT0           0066h         INT0         INT0IC         XX000b         INT0           0063h         INT0         INT0         INT0         INT0         INT0           0066h         INT0		Timer RA Interrupt Control Register	TRAIC	XXXXX000b
0059h         INT1 Interrupt Control Register         INT1IC         XX00X00b           005Ah         INT3 Interrupt Control Register         INT3IC         XX00X00b           005Ch              005Ch               005Ch                005Ch                 005Ch </td <td></td> <td></td> <td>TRNO</td> <td>XXXXXXX000h</td>			TRNO	XXXXXXX000h
005Ah         INT3 Interrupt Control Register         INT3IC         XX00X000b           005Bh				
005Bh		INT1 Interrupt Control Register		
006Ch         INTO Interrupt Control Register         INTOIC         XX00X000b           005Eh         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXXX000b           0066h         u2BCNIC         XXXXX000b         0060h           0061h         u2BCNIC         XXXXX00b           0062h         u2BCNIC         XXXXX00b           0063h         u2BCNIC         XXXXX00b           0064h         u2BCNIC         XXXXX00b           0065h         u2BCNIC         XXXXX00b           0066h         u2BCNIC         XXXX00b           0066h         u2BCNIC         XXXX00b           0066h         u2BCNIC         XXXX00b           0066h         u2BCNIC         XXXXX00b           0066h         u2BCNIC         XXXXX00b           0066h         u2BCNIC         XXXXX00b           0066h         u2BCNIC         XXXXX00b           0066h         u2BCNIC         XXXXX000b           0066h			INTSIC	XX00X000b
005Dh         INT0 Interrupt Control Register         INT0IC         XX00X000b           005Eh         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXXX000b           0067h				
006Eh         UART2 Bus Collision Detection Interrupt Control Register         U2BCNIC         XXXX000b           0067h		INTO Interrupt Control Register	INTOIC	XX00X000b
006Fh				
0060h         Image: Constraint of the second s		Over 12 Das Completing Delection interrupt Control Register	02801110	
0061h				
0062h				
0063h				
0065h				
0065h				
0067h				
0068hImage: control with a	0066h			
0069hSensor Control Unit Interrupt Control RegisterSCUICXXXXX00bb006BhScuicXXXXX00bb006ChScuicScuic006DhScienceScience006EhScienceScience006FhScienceScience006FhScienceScience0070hScienceScience0077hScienceScience0072hVoltage Monitor 1 Interrupt Control RegisterVCMP1IC0073hVoltage Monitor 2 Interrupt Control RegisterVCMP2IC0075hScienceScience0076hScienceScience0077hScienceScien	0067h			
006AhSensor Control Unit Interrupt Control RegisterSCUICXXXX000b006Bh </td <td>0068h</td> <td></td> <td></td> <td></td>	0068h			
006Bh	0069h			
006Ch		Sensor Control Unit Interrupt Control Register	SCUIC	XXXXX000b
006DhImage: constraint of the second sec				
006Eh				
006Fh       Image: Constraint of the second se				
0070h				
0071h        0072h     Voltage Monitor 1 Interrupt Control Register     VCMP1IC       0073h     Voltage Monitor 2 Interrupt Control Register     VCMP2IC       0074h         0075h         0076h         0077h         0078h         0079h         0077h				
0072h     Voltage Monitor 1 Interrupt Control Register     VCMP1IC     XXXX000b       0073h     Voltage Monitor 2 Interrupt Control Register     VCMP2IC     XXXX000b       0074h          0075h          0076h          0077h          0077h          0077h          0077h          0078h          0079h          007Ah				
0073h         Voltage Monitor 2 Interrupt Control Register         VCMP2IC         XXXX000b           0074h		Valle as Manifes & Intermet Original D	Venera	
0074h				
0075h			VCIVIPZIC	
0076h				
0077h		<u> </u>		
0078h		<u> </u>		
0079h 007Ah		<u> </u>		
007Ah				
007Ch				
007Dh				
007Eh				
007Fh				

SFR Information (2) <sup>(1)</sup> Table 4.2

X: Undefined Note: 1. The blank areas are reserved and cannot be accessed by users.



Address	Register	Symbol	After Reset
0080h	DTC Activation Control Register	DTCTL	00h
0081h			
0082h			
0083h			
0084h			
0085h			
0086h			
0087h		DTOFNO	
0088h	DTC Activation Enable Register 0	DTCEN0	00h
0089h	DTC Activation Enable Register 1	DTCEN1	00h
008Ah	DTC Activation Enable Register 2	DTCEN2	00h
008Bh	DTC Activation Enable Register 3	DTCEN3	00h
008Ch			
008Dh	DTC Activation Enable Register 5	DTCEN5	00h
008Eh	DTC Activation Enable Register 6	DTCEN6	00h
008Fh			
0090h			
0091h			
0091h 0092h			
0093h			
0094h			
0095h			
0096h			
0097h			
0098h			
0099h			
009Ah			
009Bh			
009Ch			
009Dh			
009Eh			
009Fh			
00A0h	UART0 Transmit/Receive Mode Register	U0MR	00h
00A1h	UART0 Bit Rate Register	U0BRG	XXh
00A2h	UART0 Transmit Buffer Register	U0TB	XXh
00A3h			XXh
00A4h	UART0 Transmit/Receive Control Register 0	UOCO	00001000b
00A5h	UART0 Transmit/Receive Control Register 1	U0C1	00000010b
00A6h	UARTO Receive Buffer Register	UORB	XXh
00A01		OOKB	
			XXh
00A8h	UART2 Transmit/Receive Mode Register	U2MR	00h
00A9h	UART2 Bit Rate Register	U2BRG	XXh
00AAh	UART2 Transmit Buffer Register	U2TB	XXh
00ABh			XXh
00ACh	UART2 Transmit/Receive Control Register 0	U2C0	00001000b
00ADh	UART2 Transmit/Receive Control Register 1	U2C1	00000010b
00AEh	UART2 Receive Buffer Register	U2RB	XXh
00AFh	1		XXh
00B0h	UART2 Digital Filter Function Select Register	URXDF	00h
00B1h			
00B2h			
00B3h			
00B4h			
00B5h			
00B6h			
00B7h			
00B8h			
00B9h			
00BAh			
	UADTO Special Made Desister 5	LIDOMDE	0.01
00BBh	UART2 Special Mode Register 5	U2SMR5	00h
0 0 D C .	UART2 Special Mode Register 4	U2SMR4	00h
00BCh			
00BDh	UART2 Special Mode Register 3	U2SMR3	000X0X0Xb
	UART2 Special Mode Register 3 UART2 Special Mode Register 2 UART2 Special Mode Register	U2SMR3 U2SMR2 U2SMR	000X0X0Xb X000000b X000000b

# Table 4.3SFR Information (3) (1)

X: Undefined

Note:



Address         Register         Symbol         ADR Register           00Cinh         ADR Register 1         ADD         00000XAb           00Cinh         ADR Register 1         ADD         00000XAb           00Cinh         ADR Register 2         ADD         00000XAb           00Cinh         ADR Register 3         00000XAb         00000XAb           00Cinh         ADR Register 3         ADD         00000XAb           00Cinh         ADR Register 3         ADD         00000XAb           00Cinh         ADR Register 3         ADD         00000XAb           00Cinh         ADR Register 5         ADS         Xh           00Cinh         ADR Register 6         ADF         Xh           00Cinh         ADR Register 7         AD7         00000XAb           00Cinh         ADR Register 7         AD7 <td< th=""><th>Address</th><th>Bogistor</th><th>Symbol</th><th>After Reset</th></td<>	Address	Bogistor	Symbol	After Reset
00C1h         AD Register 1         AD1         XNh           00C3h         AD Register 2         AD2         XNh           00C3h         AD Register 2         AD2         00000Xb           00C3h         AD Register 3         AD3         XNh           00C3h         AD Register 3         AD3         XNh           00C3h         AD Register 4         AD4         XNh           00C3h         AD Register 5         AD5         XNh           00C3h         AD Register 6         000000Xb         00000Xb           00C5h         AD Register 7         AD7         XNh           00C6h         AD Register 7         00000Xb         00000Xb           00C5h         AD Register 7         AD7         XNh           000000         -         -         -           000000         -         -         -           000000         -         -         -           000000         -         -         -           000000         -         -         -           000000         -         -         -           000000         -         -         -           000000         -				
0002h         ADI Register 1         AD1         XNh           0002h         AD Register 2         AD2         XNh           0002h         AD Register 3         AD3         XNh           0002h         AD Register 3         AD3         XNh           0002h         AD Register 3         AD3         XNh           0002h         AD Register 4         AD4         XNh           0002h         AD Register 5         AD5         XNh           0002h         AD Register 5         AD5         XNh           0002h         AD Register 7         AD7         XNh           0002h         AD Register 7         AD7         XNh           0002h         AD Register 7         AD7         XNh           0002h         -         -         -           0002h         -         -         -           0002h         -         -         -           0002h         AD Register 7         ADMOD         00h           0002h         AD Register 7         ADMOD         00h           0002h         AD Register 1         ADMOD         00h           0002h         AD Register 1         ADMOD         00h		A/D Register 0	ADO	
00CAT         AD Register 2         ODOCOMA 20000XXb           00CEh         AD Register 3         AD3         XNn           00CEh         AD Register 3         AD3         XNn           00CEh         AD Register 4         AD4         XNn           00CEh         AD Register 4         AD4         XNn           00CEh         AD Register 5         AD5         XNn           00CEh         AD Register 5         AD5         XNn           00CEh         AD Register 6         AD6         COD000XXb           00CEh         AD Register 7         AD7         COD00XXb           00CEh         AD Register 7         AD7         COD000XXb           00CEh         AD Register 7         AD7         COD00XXb           00CEh         AD Register 7         AD7         COD00XXb           00CEh         AD Register 1         AD7         COD00XB           00DFh         AD Control Register 1         AD100D         COD1           00DFh         AD Control Register 1         ADC0N1         COD1           00DFh         AD Control Register 1         ADC0N1         COD1           00DFh         AD Control Register 1         ADC0N1         COD1           <				
00C4h         AD Register 2         AD2         N/h           00C5h         AD Register 3         AD3         X/h           00C6h         AD Register 3         AD3         X/h           00C6h         AD Register 3         AD4         X/h           00C6h         AD Register 4         AD4         X/h           00C6h         AD Register 5         AD5         X/h           00C6h         AD Register 5         AD6         X0000XXb           00C6h         AD Register 6         AD7         XXh           00C6h         AD Register 7         AD7         XXh           00C7h         AD Register 7         AD7         XXh           00C7h         AD Register 7         AD7         XXh           00D1h         P         P         XXh           00D2h         P         P         XNh           00D2h         XD Input Steat Register         ADNOD         Oh           00D2h <t< td=""><td>00C2h</td><td>A/D Register 1</td><td>AD1</td><td>XXh</td></t<>	00C2h	A/D Register 1	AD1	XXh
00C4h         AD Register 2         AD2         N/h           00C5h         AD Register 3         AD3         X/h           00C6h         AD Register 3         AD3         X/h           00C6h         AD Register 3         AD4         X/h           00C6h         AD Register 4         AD4         X/h           00C6h         AD Register 5         AD5         X/h           00C6h         AD Register 5         AD6         X0000XXb           00C6h         AD Register 6         AD7         XXh           00C6h         AD Register 7         AD7         XXh           00C7h         AD Register 7         AD7         XXh           00C7h         AD Register 7         AD7         XXh           00D1h         P         P         XXh           00D2h         P         P         XNh           00D2h         XD Input Steat Register         ADNOD         Oh           00D2h <t< td=""><td>00C3h</td><td></td><td></td><td>000000XXb</td></t<>	00C3h			000000XXb
0005h         AD Register 3         AD Register 4         000000Xb           007ch         AD Register 4         AD K         XN           007ch         AD Register 4         XD         XD           007ch         AD Register 5         ADS         XN           007ch         AD Register 5         ADS         XD           007ch         AD Register 6         ADS         XD           007ch         AD Register 7         AD7         XD           007ch         AD Fourt Register 7         AD7         XD           007ch         AD Fourt Register 7         AD7         XD           007ch         AD Fourt Register 7         <		A/D Register 2		
00CCh         AD Register 3         AD3         XXh           00CSh         AD Register 4         AD4         XXh           00CSh         AD Register 5         AD5         XXh           00CSh         AD Register 6         AD5         XXh           00CSh         AD Register 6         AD6         XXh           00CCh         AD Register 7         AD7         XXh           00CCh         AD Register 7         000000Xb         000000Xb           00CCh         AD Register 7         0000000Xb         0000000Xb           00CCh         AD Register 7         0000000Xb         000000000000000000000000000000000000			102	
000000000000000000000000000000000000				
00Cbh         AD         Register 4         AD4         XKh           00CAh         AD Register 5         AD5         XKh         000000Xb           00CBh         AD Register 6         AD6         XKh         000000Xb           00CCh         AD Register 6         AD6         XKh         000000Xb           00CCh         AD Register 7         AD7         XKh         000000Xb           00CDh         COFFi         AD7         XKh         000000Xb           00D0h         COFFi         AD7         XKh         000000Xb           00D3h         COFFi         COM0000000         COM00000000000         000h           00D3h         AD Input Select Register         ADINDEL         11000000         00h           00D3h         AD Comol Register 1         ADICONI         00h         0		A/D Register 3	AD3	
00C3h         AD Register 5         ADS         XXh           00C3h         AD Register 5         ADS         XXh           00CCh         AD Register 6         ADS         XXh           00CCh         AD Register 7         ADS         XXh           00CCh         AD Register 7         ADT         XXh           00CCh         AD Register 7         ADT         XXh           00CCh         AD Register 7         ADT         XXh           00D0h	00C7h			00000XXb
00C3h         AD Register 5         ADS         XXh           00C3h         AD Register 5         ADS         XXh           00CCh         AD Register 6         ADS         XXh           00CCh         AD Register 7         ADS         XXh           00CCh         AD Register 7         ADT         XXh           00CCh         AD Register 7         ADT         XXh           00CCh         AD Register 7         ADT         XXh           00D0h	00C8h	A/D Register 4	AD4	XXh
00CAR         AD Register 5         ADS         XXh           00CCR         AD Register 6         ADG         00000Xb           00CCR         AD Register 7         AD7         000000Xb           00CCR         AD Register 7         000000Xb         000000Xb           00CDn         -         000000Xb         000000Xb           00D0n         -         000000Xb         000000Xb           00D01         -         -         000000Xb           00D3R         -         -         000000Xb           00D3R         -         -         -           00D3R         -         -         -           00D3R         -         -         -           00D3R         AD Control Register         ADICON1         00h           00D3R         -         -         -           00D5R         -         -         -           00D5R         -         -         -	00C9h			000000XXb
000Eh         000000Xb           000Ch         AD Register 6         AD           000Ch         AD Register 7         AD           000Ch         AD Register 7         AD           000Ch         AD         00000Xb           000Dh         Image: 20000Xb         00000Xb           000Dh         Image: 20000Xb         00000Xb           00Dh         Image: 20000Xb         00000Xb           00Dh         Image: 20000Xb         000h           00Dh         Image: 20000Xb         00h           00Dh         Image: 20000Xb         Image: 20000Xb           00Dh         Image: 20000Xb         Image: 20000Xb         Image: 20000Xb           00Dh         Image: 20000Xb         Image: 20000Xb         Image: 20000Xb           00Dh         Image: 20000Xb         Image: 20000Xb         Image: 20000Xb           00Dbh         Image: 20000Xb         Image: 2000Xb         Image: 20000Xb		A/D Pagistar 5	AD5	
00CCh         AD Register 6         AD6         XXh           00CCh         AD7         XXh         00000Xb           00CFh         AD7         XXh         00000Xb           00CFh         AD7         00000Xb         00000Xb           00D7h         -         -         00000Xb           00D7h         -         -         000000Xb           00D7h         -         -         000000Xb           00D7h         -         -         000000Xb           00D7h         AD Mode Register         ADMOD         00h           00D7h         AD Control Register 1         ADCONU         00h           00D7h         -         -         -           00D7h		A/D Register 5	ADS	
000Cbr00000XXb00CbrAD7XXh00CbrAD7XXh00CbrAD7XXh00D0hImage: Construction of the second of the s				
00CEh         AD Register 7         AD 7         Xth         000000XXb           00CFh         000000XXb         000000XXb         000000XXb         000000XXb           00D5h         0005h         AD Mode Register         ADMOD         00h           00D5h         AD Mode Register         ADMOD         00h           00D5h         AD Control Register 0         ADCON0         00h           00D5h         AD Control Register 1         ADCON1         00h           00D5h         00DCh         00DCh         00DCh         00DCh           00D5h         00DCh         00DCh         00h         00h           00D5h         00CFh         PO1         Xh         00c           00D5h         00h         PD1         00h         00h           00D5h         Port PO Register         P1         Xxh         00c           00D5h         Port PO Register         P2         Xxh         00c           00E5h         Port P2 Register		A/D Register 6	AD6	
0002h         00000k         0000           0001h         0001h         0000           0002h         0001         0000           0002h         0000         000           0002h         000         000           0002h         AD Mode Register         ADMOD           0005h         AD Control Register 0         ADCON0         00h           0002h         AD Control Register 0         ADCON1         00h           0002h         AD Control Register 1         ADCON1         00h           0002h         AD Control Register 1         ADCON1         00h           0002h         000         00         0000         00h           0002h         000         00         000         00h           0002h         00         00         000         00h           0002h         00         00         00h         00h           0002h         00         00         00h         00h           0002h         00         00         00h         00h           0002h         00         00h         00h         00h           002Eh         001 P0 P0 Register         P1         Xh	00CDh			00000XXb
0002h         00000k         0000           0001h         0001h         0000           0002h         0001         0000           0002h         0000         000           0002h         000         000           0002h         AD Mode Register         ADMOD           0005h         AD Control Register 0         ADCON0         00h           0002h         AD Control Register 0         ADCON1         00h           0002h         AD Control Register 1         ADCON1         00h           0002h         AD Control Register 1         ADCON1         00h           0002h         000         00         0000         00h           0002h         000         00         000         00h           0002h         00         00         000         00h           0002h         00         00         00h         00h           0002h         00         00         00h         00h           0002h         00         00         00h         00h           0002h         00         00h         00h         00h           002Eh         001 P0 P0 Register         P1         Xh	00CEh	A/D Register 7	AD7	XXh
0000h		······································		
0001h				0000000000
0002h         000           0003h         AD Mode Register         ADMOD         00h           0005h         AD Input Select Register         ADINSEL         1100000b           0005h         AD Control Register 0         ADCON0         00h           0005h         AD Control Register 1         ADCON1         00h           0005h         Port PR Register P1         AD         ADCON1           0005h         Port PD Register P1         PO         XXh           005Eh         Port P1 Register P1         PO1         00h           005Eh         Port P2 Register P2         Xh         Xh           005Eh         Port P3 Direction Register P3         P3         Xh           005Eh         Port P3 Register P4         P4         Xh <td></td> <td></td> <td></td> <td></td>				
0003h         AD Mode Register         ADMOD         Ooh           0005h         AD Input Salect Register         ADINSEL         11000000b           0015h         AD Control Register 0         ADCON         Ooh           0015h         AD Control Register 1         ADCON1         Ooh           00107h         AD Control Register 1         ADCON1         Ooh           0005h         Image: ADD Control Register 1         Image: ADD Control Register 1         Image: ADD Control Register 1           0005h         Port PD Register         P1         XXh         Image: ADD Control Register 1           0005h         Port P0 Register         P1         XXh         Image: ADD Control Register 1         P1         XXh           0055h         Port P1 Register         P2         XXh         Image: ADD Control Register 1         P2         Xh           0055h         Port P2 Register         P3         XXh         Image: ADD Control Register 1         P2         Xh           0055h         Port P3 Register				
00D4h         AD Input Select Register         ADIOD         00h           00D5h         AD Control Register 0         ADCON0         00h           00D5h         AD Control Register 0         ADCON1         00h           00D5h         AD Control Register 1         ADCON1         00h           00D5h				
00D4h         AD Input Select Register         ADIOD         00h           00D5h         AD Control Register 0         ADCON0         00h           00D5h         AD Control Register 0         ADCON1         00h           00D5h         AD Control Register 1         ADCON1         00h           00D5h	00D3h			
0005h         A/D Iontril Register         A/D Control Register 0         A/D Control Register 1         00h           0005h         A/D Control Register 1         A/D Control Register 1         00h         00h           0005h		A/D Mode Register	ADMOD	00h
0006h         A/D Control Register 0         ADCON         00h           0007h         A/D Control Register 1         ADCON1         00h           0008h		A/D Input Select Register		
0007h         A/D Control Register 1         00h           0008h				
0008h				
0009h		A/D Control Register 1	ADCON1	00h
000Ah	00D8h			
000Ah	00D9h			
000Bh			1	
00DCh				
00DDh				
00DEh            000Eh         Port P0 Register         P0         XXh           00E1h         Port P1 Register         P1         XXh           00E2h         Port P0 Direction Register         PD0         00h           00E3h         Port P1 Direction Register         PD1         00h           00E3h         Port P2 Register         P2         XXh           00E5h         Port P2 Register         P3         XXh           00E6h         Port P2 Register         P3         XXh           00E6h         Port P2 Register         P3         XXh           00E6h         Port P2 Direction Register         PD2         00h           00E7h         Port P4 Register         P3         00h           00E8h         Port P4 Register         P4         XXh           00E9h               00E6h                00E6h                 00E6h                  00E6h </td <td></td> <td></td> <td></td> <td></td>				
00DFh         Pott P1 Register         P0         XXh           00E1h         Pott P1 Register         P1         XXh           00E2h         Pott P0 Direction Register         PD0         00h           00E3h         Pott P1 Direction Register         PD1         00h           00E3h         Pott P2 Register         P2         XXh           00E5h         Pott P3 Register         P2         XXh           00E5h         Pott P3 Register         P2         00h           00E5h         Pott P4 Register         PD2         00h           00E5h         Pott P4 Register         P4         XXh           00E6h         P0t P4 Direction Register         PD4         00h           00E5h         P0t P4 Direction Register         PD4         00h           00E6h         P0t P4 Direction Register         PD4         00h           00E6h         P0t P4 Direction Register         PD4         0h           00E6h         P00E6h         P01         P01	00DDh			
00DFh         Pott P1 Register         P0         XXh           00E1h         Pott P1 Register         P1         XXh           00E2h         Pott P0 Direction Register         PD0         00h           00E3h         Pott P1 Direction Register         PD1         00h           00E3h         Pott P2 Register         P2         XXh           00E5h         Pott P3 Register         P2         XXh           00E5h         Pott P3 Register         P2         00h           00E5h         Pott P4 Register         PD2         00h           00E5h         Pott P4 Register         P4         XXh           00E6h         P0t P4 Direction Register         PD4         00h           00E5h         P0t P4 Direction Register         PD4         00h           00E6h         P0t P4 Direction Register         PD4         00h           00E6h         P0t P4 Direction Register         PD4         0h           00E6h         P00E6h         P01         P01	00DEh			
ODECh         Port P0 Register         P0         XXh           ODE1h         Port P1 Register         P1         XXh           ODE2h         Port P0 Direction Register         PD0         00h           ODE3h         Port P1 Direction Register         PD1         00h           ODE4h         Port P2 Register         P2         XXh           ODE5h         Port P3 Register         P3         XXh           ODE5h         Port P3 Direction Register         PD2         00h           ODE5h         Port P3 Direction Register         PD3         00h           ODE5h         Port P4 Register         PD4         XXh           ODE5h         Port P4 Register         PD3         00h           ODE5h         Port P4 Register         PD4         0Ah           ODE5h         Port P4 Direction Register         PD4         0Ah           ODE6h         PO1 P4 Direction Register         PD4         0Ah           ODE5h         PO1 P4 Direction Register	00DFh			
00E1h         Port P1 Register         P1         XXh           00E2h         Port P0 Direction Register         PD0         00h           00E3h         Port P1 Direction Register         PD1         00h           00E3h         Port P2 Register         P2         XXh           00E5h         Port P3 Register         P3         XXh           00E5h         Port P3 Register         P3         XXh           00E5h         Port P3 Register         PD2         00h           00E5h         Port P3 Register         PD2         00h           00E5h         Port P3 Direction Register         PD3         00h           00E5h         Port P4 Register         P4         XXh           00E5h         Port P4 Register         PD4         00h           00E6h               00E5h                00E6h                 00E5h                  00E6h		Port P0 Pogistor	PO	YYh
ODE2h         Port PD Direction Register         PD0         O0h           ODE3h         Port P1 Direction Register         PD1         O0h           ODE4h         Port P2 Register         P2         XXh           ODE5h         Port P3 Register         P3         XXh           ODE6h         Port P2 Direction Register         PD2         O0h           ODE7h         Port P3 Direction Register         PD3         00h           ODE8h         Port P4 Register         PD3         00h           ODE8h         Port P4 Register         PD3         00h           ODE8h         Port P4 Register         PD4         XXh           ODE8h         Port P4 Direction Register         PD4         00h           ODE6h               O0E2h                O0E7h                 O0E7h                   O0F1h				
00E3h         Port P1 Direction Régister         PD1         00h           00E4h         Port P2 Register         P2         XXh           00E5h         Port P3 Register         P3         XXh           00E6h         Port P2 Direction Régister         PD2         00h           00E7h         Port P3 Direction Régister         PD3         00h           00E8h         Port P4 Register         PD3         00h           00E8h         Port P4 Register         PD4         XXh           00E8h         Port P4 Direction Régister         PD4         00h           00E8h         POT P4 Direction Régister         PD4         00h           00F3h         PD		Port P1 Register		
O0E4h         Port P2 Register         P2         XXh           00E5h         Port P3 Register         P3         XXh           00E6h         Port P3 Direction Register         PD2         00h           00E7h         Port P3 Direction Register         PD3         00h           00E8h         Port P4 Register         P4         XXh           00E8h         Port P4 Register         P4         XXh           00E8h         Port P4 Direction Register         PD4         00h           00E8h         Port P4 Direction Register         PD4         00F           00F7h				
00E4h         Port P2 Register         P2         XXh           00E5h         Port P3 Register         P3         XXh           00E6h         Port P3 Direction Register         PD2         00h           00E7h         Port P3 Direction Register         PD3         00h           00E8h         Port P4 Register         P4         XXh           00E9h               00E6h         Port P4 Direction Register         PD4         00h            00E8h         Port P4 Direction Register         PD4         00h            00E6h                00E7h                 00E7h <td>00E3h</td> <td>Port P1 Direction Register</td> <td>PD1</td> <td>00h</td>	00E3h	Port P1 Direction Register	PD1	00h
00E5h         Port P3 Register         P3         XXh           00E6h         Port P2 Direction Register         PD2         00h           00E7h         Port P4 Register         PD3         00h           00E8h         Port P4 Register         P4         XXh           00E9h         PD4         00h         00h           00E8h         Port P4 Direction Register         P4         00h           00E8h         PD4         00h         00h           00E6h         PD4         00h         00h           00E6h         PD4         00h         00E           00E6h         PD4         PD4         00h           00E7h         PD4         PD4         PD4           00E7h         PD4         PD4         PD4           00E7h         PD4         PD4         PD4           00F7h         PD4         PD4         PD4           00F7h         PD4         PD4         PD4           00F7h         PD4         PD4         PD4           00F6h         PD4         PD4         PD4           00F7h         PD4         PD4         PD4           00F7h         PD4         PD4 <td>00E4h</td> <td></td> <td>P2</td> <td>XXh</td>	00E4h		P2	XXh
ODE6h         Port P2 Direction Register         PD2         O0h           00E7h         Port P3 Direction Register         PD3         O0h           00E8h         Port P4 Register         P4         XXh           00E9h				
O0E7h         Port P3 Direction Register         PD3         00h           00E8h         Port P4 Register         P4         XXh           00E9h		Port D2 Direction Degister		
O0E8h         Port P4 Register         P4         XXh           O0E9h				
O0E9h				00h
00E9h             00EAh         Port P4 Direction Register         PD4         00h           00EBh              00ECh               00EFh                00EFh                  00EFh	00E8h	Port P4 Register	P4	XXh
O0EAh         Port P4 Direction Register         PD4         00h           00EBh	00E9h			
00EBh		Port P4 Direction Register	PD4	00h
00ECh				
00EDh				ļ
O0Eh         Image: constraint of the second se				
O0EFh         Image: Constraint of the system         Image: Consthe system         I				
O0EFh         Image: Constraint of the system         Image: Consthe system         I	00EEh			
00F0h			1	
00F1h             00F2h             00F3h             00F4h             00F5h             00F6h             00F7h             00F8h             00F0h             00F1h				+
00F2h             00F3h             00F4h             00F5h             00F6h             00F7h             00F8h             00F9h             00F8h             00FBh             00FCh             00FDh             00FFh				<u> </u>
00F3h             00F4h             00F5h             00F6h             00F7h             00F8h             00F9h             00F8h             00F8h             00F8h             00FBh             00FCh             00FDh             00FFh				
00F4h             00F5h             00F6h             00F7h             00F8h             00F9h             00F8h             00F9h             00F8h             00FBh             00FCh             00FDh             00FFh	00F2h			
00F4h             00F5h             00F6h             00F7h             00F8h             00F9h             00F8h             00F9h             00F8h             00FBh             00FCh             00FDh             00FFh	00F3h			
00F5h         Image: mail of the second				1
00F6h             00F7h             00F8h             00F9h             00F9h             00FAh             00FBh             00FCh             00FDh             00FEh             00FFh			1	+
00F7h			+	
00F8h				
00F9h				
00F9h	00F8h			
00FAh				1
00FBh				+
00FCh			+	<u> </u>
00FDh				
00FEh 00FFh 00FFh				
00FEh 00FFh 00FFh	00FDh			
00FFh				1
				+
				1

Table 4.4SFR Information (4) (1)

X: Undefined

Note:

Address	Register	Symbol	After Reset
0180h	Timer RA Pin Select Register	TRASR	00h
0181h	Timer RB/RC Pin Select Register	TRBRCSR	00h
0182h	Timer RC Pin Select Register 0	TRCPSR0	00h
0183h	Timer RC Pin Select Register 1	TRCPSR1	00h
0184h			
0185h			
0186h			
0187h			
0188h	UART0 Pin Select Register	U0SR	00h
0189h		0001	0011
018Ah	UART2 Pin Select Register 0	U2SR0	00h
018Bh	UART2 Pin Select Register 1	U2SR1	00h
018Ch		020111	
018Dh			
018Eh	INT Interrupt Input Pin Select Register	INTSR	00h
018Fh	I/O Function Pin Select Register	PINSR	00h
0190h	Low-Voltage Signal Mode Control Register	TSMR	00h
0191h			
0192h			
0192h			
0193h 0194h			
0194n 0195h			
0196h			
0196h			
0197h 0198h			
0199h			
0199h			
019An			
019Bh			
019Dh			
019Eh			
019Eh			
0131 h			
01A0h			
01A1h			
01A2h			
01A3h			
01A4n			
01A6h			
01A0h			
01A7h 01A8h			
01A8h			
01AAh 01ABh			
01ACh 01ADh			
01AEh			
01AFh			
01B0h			
01B1h	Flack Manager Otatus Dagistas	FOT	40000V00F
01B2h	Flash Memory Status Register	FST	10000X00b
01B3h	Flack Manager Constant Depicture C	EMDO	0.01
01B4h	Flash Memory Control Register 0	FMR0	00h
01B5h	Flash Memory Control Register 1	FMR1	00h
01B6h	Flash Memory Control Register 2	FMR2	00h
01B7h			
01B8h			
01B9h			
01BAh			
01BBh			
01BCh			
01BDh			
01BEh			
01BFh			
X: Undefined			

# Table 4.7SFR Information (7) (1)

X: Undefined

Note:

Address	Degister	Cump of	After Deast
Address	Register	Symbol	After Reset
2C50h	DTC Control Data 2	DTCD2	XXh
2C51h			XXh
2C52h			XXh
2C53h			XXh
2C54h			XXh
2C55h			XXh
2C56h	-		XXh
2C57h	-		XXh
2C58h	DTC Control Data 3	DTCD3	XXh
2C59h	BIC Control Data 5	DICDS	XXh
2C5Ah			XXh
2C5Bh			XXh
2C5Ch			XXh
2C5Dh			XXh
2C5Eh			XXh
2C5Fh			XXh
2C60h	DTC Control Data 4	DTCD4	XXh
2C61h			XXh
2C62h	1		XXh
2C63h	4		XXh
2C63h	4		XXh
	4		
2C65h	4		XXh
2C66h			XXh
2C67h			XXh
2C68h	DTC Control Data 5	DTCD5	XXh
2C69h			XXh
2C6Ah			XXh
2C6Bh			XXh
2C6Ch			XXh
2C6Dh	-		XXh
2C6Eh	-		XXh
2C6Fh			XXh
2C70h	DTC Control Data 6	DTCD6	XXh
2C71h			XXh
2C72h			XXh
2C73h			XXh
2C74h			XXh
2C75h	1		XXh
2C76h			XXh
2C77h	-		XXh
2C78h	DTO Ocustual Data 7	DTCD7	XXh
	DTC Control Data 7	DICDI	
2C79h			XXh
2C7Ah	4		XXh
2C7Bh			XXh
2C7Ch			XXh
2C7Dh	]		XXh
2C7Eh	1		XXh
2C7Fh	1		XXh
2C80h	DTC Control Data 8	DTCD8	XXh
2C81h		51050	XXh
2C82h	4		XXh
	4		
2C83h	4		XXh
2C84h	4		XXh
2C85h	1		XXh
2C86h			XXh
2C87h	]		XXh
2C88h	DTC Control Data 9	DTCD9	XXh
2C89h	1		XXh
2C8Ah	1		XXh
2C8Bh	1		XXh
	4		XXh
2C8Ch	4		
2C8Dh	4		XXh
2C8Eh	4		XXh
2C8Fh			XXh
Y: Undofined			

Table 4.10SFR Information (10) (1)

X: Undefined

Note:

Address	Area Name	Symbol	After Reset
:			
FFDBh	Option Function Select Register 2	OFS2	(Note 1)
:			
FFDFh	ID1		(Note 2)
:			
FFE3h	ID2		(Note 2)
:			
FFEBh	ID3		(Note 2)
:			
FFEFh	ID4		(Note 2)
:			
FFF3h	ID5		(Note 2)
:	100		
FFF7h	ID6		(Note 2)
:			
FFFBh	ID7		(Note 2)
:	Ortion Function Colort Devictor	1050	(NI=4= 4)
FFFFh	Option Function Select Register	OFS	(Note 1)

Table 4.13 ID Code Areas and Option Function Select Area

Notes:

 The option function select area is allocated in the flash memory, not in the SFRs. Set appropriate values as ROM data by a program. Do not write additions to the option function select area. If the block including the option function select area is erased, the option function select area is set to FFh.

When blank products are shipped, the option function select area is set to FFh. It is set to the written value after written by the user. When factory-programming products are shipped, the value of the option function select area is the value programmed by the user.

2. The ID code areas are allocated in the flash memory, not in the SFRs. Set appropriate values as ROM data by a program. Do not write additions to the ID code areas. If the block including the ID code areas is erased, the ID code areas are set to FFh. When blank products are shipped, the ID code areas are set to FFh. They are set to the written value after written by the user. When factory-programming products are shipped, the value of the ID code areas is the value programmed by the user.



# 5. Electrical Characteristics

# Table 5.1 Absolute Maximum Ratings

Symbol	Parameter	Condition	Rated Value	Unit
Vcc/AVcc	Supply voltage		–0.3 to 6.5	V
Vi	Input voltage		-0.3 to Vcc + 0.3	V
Vo	Output voltage		-0.3 to Vcc + 0.3	V
Pd	Power dissipation	$-20^{\circ}C \le Topr \le 85^{\circ}C$	500	mW
Topr	Operating ambient temperature		-20 to 85 (N version)	°C
Tstg	Storage temperature		-65 to 150	°C



0	Parameter		Qualitization		Standard	ł	11.27		
Symbol		Pa	arameter		Conditions	Min.	Тур.	Max.	Unit
Vcc/AVcc	Supply voltage					1.8	_	5.5	V
Vss/AVss	Supply voltage					_	0	—	V
Viн	Input "H" voltage		nan CMOS in	•		0.8 Vcc	—	Vcc	V
			Input level	Input level selection		0.5 Vcc	—	Vcc	V
		input	switching	: 0.35 Vcc	$2.7~V \leq Vcc < 4.0~V$	0.55 Vcc		Vcc	V
			function (I/O port)		$1.8~V \leq Vcc < 2.7~V$	0.65 Vcc	—	Vcc	V
			(1/0 port)	Input level selection		0.65 Vcc	—	Vcc	V
				: 0.5 Vcc	$2.7~V \leq Vcc < 4.0~V$	0.7 Vcc	_	Vcc	V
					$1.8~V \leq Vcc < 2.7~V$	0.8 Vcc	_	Vcc	V
				Input level selection		0.85 Vcc	_	Vcc	V
				: 0.7 Vcc	$2.7~V \leq Vcc < 4.0~V$	0.85 Vcc	_	Vcc	V
					1.8 V $\leq$ Vcc $<$ 2.7 V	0.85 Vcc	—	Vcc	V
			I clock input			1.2	_	Vcc	V
VIL	Input "L" voltage	Other th	nan CMOS ir	•		0	_	0.2 Vcc	V
		CMOS	Input level			0	_	0.2 Vcc	V
		input	switching	: 0.35 Vcc	$2.7~V \leq Vcc < 4.0~V$	0	—	0.2 Vcc	V
			function (I/O port)		$1.8~V \leq Vcc < 2.7~V$	0	—	0.2 Vcc	V
			(1/0 port)	Input level selection		0	—	0.4 Vcc	V
				: 0.5 Vcc	$2.7~V \leq Vcc < 4.0~V$	0	—	0.3 Vcc	V
					1.8 V $\leq$ Vcc $<$ 2.7 V	0	—	0.2 Vcc	V
				Input level selection : 0.7 Vcc		0	—	0.55 Vcc	V
					$2.7~V \leq Vcc < 4.0~V$	0	—	0.45 Vcc	V
					1.8 V $\leq$ Vcc $<$ 2.7 V	0	—	0.35 Vcc	V
			I clock input			0	_	0.4 Vcc	V
IOH(sum)	Peak sum output "H" current	Sum of	all pins IOH(p	beak)		—	—	-160	mA
IOH(sum)	Average sum output "H" current	Sum of	all pins IOH(a	avg)		_		-80	mA
IOH(peak)	Peak output "H"	Drive ca	apacity Low			—		-10	mA
	current	Drive ca	apacity High			—	—	-40	mA
IOH(avg)	Average output	Drive ca	apacity Low			—	—	-5	mA
	"H" current	Drive ca	apacity High			—	—	-20	mA
IOL(sum)	Peak sum output "L" current	Sum of	all pins IOL(p	eak)		—	_	160	mA
IOL(sum)	Average sum output "L" current	Sum of	all pins IOL(a	vg)		—		80	mA
IOL(peak)	Peak output "L"	Drive ca	apacity Low			_	_	10	mA
	current		apacity High			_	_	40	mA
IOL(avg)	Average output	Drive ca	apacity Low			_	_	5	mA
	"L" current	Drive ca	apacity High			_	_	20	mA
f(XIN)	XIN clock input os	cillation fi	requency		$2.7~V \leq Vcc \leq 5.5~V$	—	—	20	MHz
					$1.8~V \leq Vcc < 2.7~V$	—	—	5	MHz
fOCO40M	When used as the	count so	urce for time	er RC <sup>(3)</sup>	$2.7~V \leq Vcc \leq 5.5~V$	32	_	40	MHz
fOCO-F	fOCO-F frequency	,			$2.7~V \leq Vcc \leq 5.5~V$	_	_	20	MHz
					$1.8 \text{ V} \le \text{Vcc} < 2.7 \text{ V}$	—	—	5	MHz
_	System clock frequ	lency			$2.7 \text{ V} \leq \text{Vcc} \leq 5.5 \text{ V}$	—	—	20	MHz
		-			$1.8 \text{ V} \le \text{Vcc} < 2.7 \text{ V}$	—	—	5	MHz
f(BCLK)	CPU clock frequer	су			$2.7~V \leq Vcc \leq 5.5~V$	_	_	20	MHz
					$1.8 \text{ V} \le \text{Vcc} < 2.7 \text{ V}$	_	_	5	MHz

### Table 5.2 Recommended Operating Conditions

Notes:

1. Vcc = 1.8 V to 5.5 V at Topr =  $-20^{\circ}$ C to 85°C (N version), unless otherwise specified.

2. The average output current indicates the average value of current measured during 100 ms.

3. fOCO40M can be used as the count source for timer RC in the range of Vcc = 2.7 V to 5.5 V.



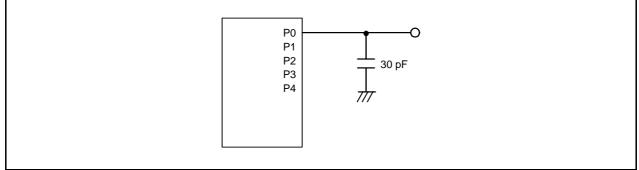


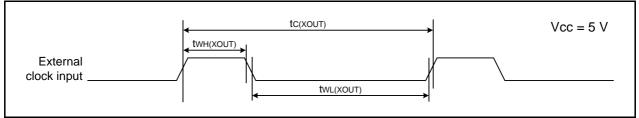
Figure 5.1 Ports P0 to P4 Timing Measurement Circuit



### Timing Requirements (Unless Otherwise Specified: Vcc = 5 V, Vss = 0 V at Topr = 25°C)

### Table 5.15 External Clock Input (XOUT)

Symbol	Parameter		Standard		
Symbol	Falanielei	Min.	Max.	Unit	
tc(XOUT)	KOUT input cycle time		_	ns	
twh(xout)	XOUT input "H" width		—	ns	
twl(xout)	XOUT input "L" width		—	ns	



# Figure 5.4 External Clock Input Timing Diagram when Vcc = 5 V

#### Table 5.16 TRAIO Input

Symbol	Parameter	Stan	Standard	
Symbol	Symbol Farameter		Max.	Unit
tc(TRAIO)	TRAIO input cycle time	100	_	ns
twh(traio)	TRAIO input "H" width	40	_	ns
twl(traio)	TRAIO input "L" width	40	-	ns

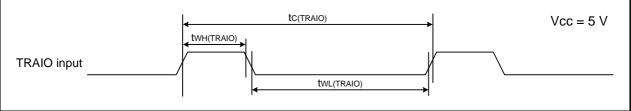


Figure 5.5 TRAIO Input Timing Diagram when Vcc = 5 V



#### Table 5.17Serial Interface

Symbol	Parameter	Stan	dard	Unit
Symbol	Parameter	Min.	Max.	Unit
tc(CK)	CLKi input cycle time	200	—	ns
tW(CKH)	CLKi input "H" width	100	—	ns
tW(CKL)	CLKi input "L" width	100	—	ns
td(C-Q)	TXDi output delay time	—	50	ns
th(C-Q)	TXDi hold time	0	—	ns
tsu(D-C)	RXDi input setup time	50	—	ns
th(C-D)	RXDi input hold time	90	—	ns

i = 0, 2

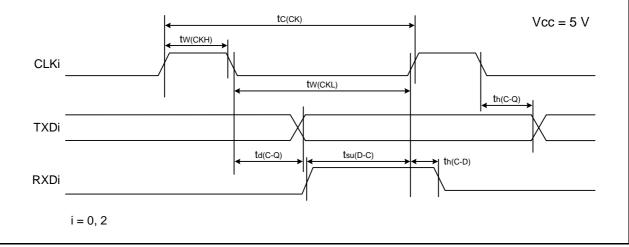


Figure 5.6 Serial Interface Timing Diagram when Vcc = 5 V

### Table 5.18 External Interrupt INTi (i = 0 to 3) Input, Key Input Interrupt Kli (i = 0 to 3)

Symbol	Parameter	Stan	Standard	Unit
Symbol	Falameter	Min.	Max.	Unit
tw(INH)	INTi input "H" width, Kli input "H" width	250 <sup>(1)</sup>	_	ns
tw(INL)	INTi input "L" width, Kli input "L" width	250 <sup>(2)</sup>		ns

Notes:

1. When selecting the digital filter by the INTi input filter select bit, use an INTi input HIGH width of either (1/digital filter clock frequency × 3) or the minimum value of standard, whichever is greater.

2. When selecting the digital filter by the INTi input filter select bit, use an INTi input LOW width of either (1/digital filter clock frequency x 3) or the minimum value of standard, whichever is greater.



Figure 5.7 Input Timing for External Interrupt INTi and Key Input Interrupt Kli when Vcc = 5 V

Symbol		Parameter	Condition			Unit		
Symbol		Parameter	Conditio	in a state of the	Min.	Тур.	Max.	Unit
Vон	Output "H"	Other than XOUT	Drive capacity High	Iон = -5 mA	Vcc - 0.5	_	Vcc	V
	voltage		Drive capacity Low	Iон = -1 mA	Vcc - 0.5	_	Vcc	V
		XOUT		Іон = -200 μА	1.0	_	Vcc	V
Vol	Output "L"	Other than XOUT	Drive capacity High	IoL = 5 mA	—	_	0.5	V
	voltage		Drive capacity Low	IoL = 1 mA	—	_	0.5	V
		XOUT		IoL = 200 μA	—	_	0.5	V
VT+-VT-	Hysteresis	INTO, INT1, INT2, INT3, KI0, KI1, KI2, KI3, TRAIO, TRBO, TRCIOA, TRCIOB, TRCIOC, TRCIOD, TRCTRG, TRCCLK, ADTRG, RXD0, RXD2, CLK0, CLK2, SCL2, SDA2	Vcc = 3.0 V		0.1	0.4	_	V
		RESET	Vcc = 3.0 V		0.1	0.5	—	V
Ін	Input "H" cu	rrent	VI = 3 V, Vcc = 3.0 V		—		4.0	μA
lı∟	Input "L" current		VI = 0 V, Vcc = 3.0 V		_	_	-4.0	μA
Rpullup	Pull-up resistance		VI = 0 V, Vcc = 3.0 V		42	84	168	kΩ
Rfxin	Feedback resistance	XIN			—	0.3	_	MΩ
Vram	RAM hold v	oltage	During stop mode		1.8	_	—	V

Table 5.19	Electrical Characteristics (3) [2.7 V $\leq$ Vcc $<$ 4.2 V]
------------	---

Note:

1. 2.7 V  $\leq$  Vcc < 4.2 V at Topr = -20°C to 85°C (N version), f(XIN) = 10 MHz, unless otherwise specified.



Table 5		Characteristics (4) [2.7 V $\leq$ Vcc $<$ 3.3 V] $^{\circ}$ C to 85 $^{\circ}$ C (N version), unless otherwise specified.)

0		Ì	0		Standar	d	
Symbol	Parameter		Condition	Min.	Тур.	Max.	Uni
сс	Power supply current (Vcc = 2.7 V to 3.3 V) Single-chip mode, output pins are open,	High-speed clock mode	XIN = 10 MHz (square wave) High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz No division	-	3.5	10	mA
	other pins are Vss		XIN = 10 MHz (square wave) High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz Divide-by-8	—	1.5	7.5	mA
		High-speed on-chip oscillator mode	XIN clock off High-speed on-chip oscillator on fOCO-F = 20 MHz Low-speed on-chip oscillator on = 125 kHz No division	—	7	15	mA
			XIN clock off High-speed on-chip oscillator on fOCO-F = 20 MHz Low-speed on-chip oscillator on = 125 kHz Divide-by-8	_	3		mA
			XIN clock off High-speed on-chip oscillator on fOCO-F = 10 MHz Low-speed on-chip oscillator on = 125 kHz No division	—	4		mA
			XIN clock off High-speed on-chip oscillator on fOCO-F = 10 MHz Low-speed on-chip oscillator on = 125 kHz Divide-by-8	_	1.5	_	mA
			XIN clock off High-speed on-chip oscillator on fOCO-F = 4 MHz Low-speed on-chip oscillator on = 125 kHz Divide-by-16 MSTTRD = MSTTRC = 1	_	1		mA
		Low-speed on-chip oscillator mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz Divide-by-8, FMR27 = 1, VCA20 = 0	—	90	390	μA
		Wait mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz While a WAIT instruction is executed Peripheral clock operation VCA27 = VCA26 = VCA25 = 0, VCA20 = 1	_	15	90	μA
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz While a WAIT instruction is executed Peripheral clock off VCA27 = VCA26 = VCA25 = 0, VCA20 = 1	_	4	80	μA
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator off While a WAIT instruction is executed VCA27 = VCA26 = VCA25 = 0, VCA20 = 1	_	3.5		μA
		Stop mode	XIN clock off, Topr = 25°C High-speed on-chip oscillator off Low-speed on-chip oscillator off CM10 = 1 Peripheral clock off VCA27 = VCA26 = VCA25 = 0	_	2	5.0	μA
			XIN clock off, Topr = 85°C High-speed on-chip oscillator off Low-speed on-chip oscillator off CM10 = 1 Peripheral clock off VCA27 = VCA26 = VCA25 = 0	_	5	_	μA



Table 5.26	Electrical Characteristics (6) [1.8 V $\leq$ Vcc $<$ 2.7 V]
	(Topr = -20°C to 85°C (N version), unless otherwise specified.)

Symbol	Parameter		Condition		Standar	b	Unit
Symbol	Falameter		Condition	Min.	Тур.	Max.	Unit
Icc	Power supply current (Vcc = 1.8 V to 2.7 V) Single-chip mode, output pins are open,	High-speed clock mode	XIN = 5 MHz (square wave) High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz No division	_	2.2	_	mA
	other pins are Vss		XIN = 5 MHz (square wave) High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz Divide-by-8	_	0.8	—	mA
		High-speed on-chip oscillator mode	XIN clock off High-speed on-chip oscillator on fOCO-F = 5 MHz Low-speed on-chip oscillator on = 125 kHz No division	_	2.5	10	mA
			XIN clock off High-speed on-chip oscillator on fOCO-F = 5 MHz Low-speed on-chip oscillator on = 125 kHz Divide-by-8	_	1.7	_	mA
			XIN clock off High-speed on-chip oscillator on fOCO-F = 4 MHz Low-speed on-chip oscillator on = 125 kHz Divide-by-16 MSTTRD = MSTTRC = 1	_	1	_	mA
		Low-speed on-chip oscillator mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz Divide-by-8, FMR27 = 1, VCA20 = 0	_	90	300	μA
		Wait mode	XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz While a WAIT instruction is executed Peripheral clock operation VCA27 = VCA26 = VCA25 = 0, VCA20 = 1	_	15	90	μΑ
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator on = 125 kHz While a WAIT instruction is executed Peripheral clock off VCA27 = VCA26 = VCA25 = 0, VCA20 = 1	-	4	80	μΑ
			XIN clock off High-speed on-chip oscillator off Low-speed on-chip oscillator off While a WAIT instruction is executed VCA27 = VCA26 = VCA25 = 0, VCA20 = 1	_	3.5		μΑ
		Stop mode	XIN clock off, Topr = 25°C High-speed on-chip oscillator off Low-speed on-chip oscillator off CM10 = 1 Peripheral clock off VCA27 = VCA26 = VCA25 = 0		2	5	μA
			XIN clock off, Topr = $85^{\circ}$ C High-speed on-chip oscillator off Low-speed on-chip oscillator off CM10 = 1 Peripheral clock off VCA27 = VCA26 = VCA25 = 0		5		μΑ



#### Table 5.29Serial Interface

Symbol	Parameter	Stan	dard	Unit
Symbol	Parameter	Min.	Max.	Unit
tc(CK)	CLKi input cycle time	800	—	ns
tW(CKH)	CLKi input "H" width	400	—	ns
tW(CKL)	CLKi input "L" width	400	—	ns
td(C-Q)	TXDi output delay time	_	200	ns
th(C-Q)	TXDi hold time	0	—	ns
tsu(D-C)	RXDi input setup time	150	—	ns
th(C-D)	RXDi input hold time	90	_	ns

i = 0, 2

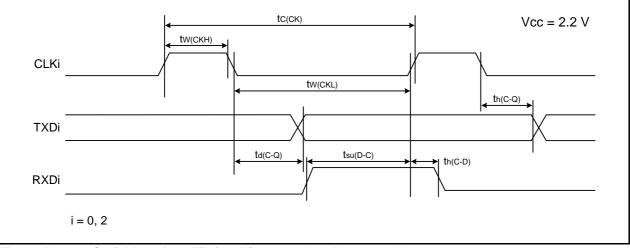


Figure 5.14 Serial Interface Timing Diagram when Vcc = 2.2 V

### Table 5.30 External Interrupt $\overline{INTi}$ (i = 0 to 3) Input, Key Input Interrupt $\overline{Kli}$ (i = 0 to 3)

Symbol	Parameter	Stan	Standard	Unit
Symbol	Falameter	Min.	Max.	Unit
tw(INH)	INTi input "H" width, Kli input "H" width	1000 (1)	_	ns
tw(INL)	INTi input "L" width, Kli input "L" width	1000 (2)		ns

Notes:

1. When selecting the digital filter by the INTi input filter select bit, use an INTi input HIGH width of either (1/digital filter clock frequency × 3) or the minimum value of standard, whichever is greater.

2. When selecting the digital filter by the INTi input filter select bit, use an INTi input LOW width of either (1/digital filter clock frequency × 3) or the minimum value of standard, whichever is greater.

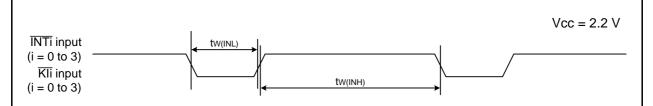


Figure 5.15 Input Timing for External Interrupt INTi and Key Input Interrupt Kli when Vcc = 2.2 V

# General Precautions in the Handling of MPU/MCU Products

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

1. Handling of Unused Pins

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

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

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

- The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
  - In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.

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

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

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

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

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

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

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

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