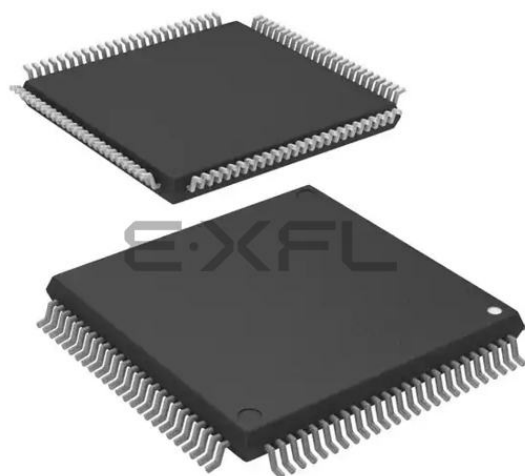




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### What is "[Embedded - Microcontrollers](#)"?

"[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             | Discontinued at Digi-Key                                                                                                                                                        |
| Core Processor             | RX                                                                                                                                                                              |
| Core Size                  | 32-Bit Single-Core                                                                                                                                                              |
| Speed                      | 100MHz                                                                                                                                                                          |
| Connectivity               | CANbus, I <sup>2</sup> C, LINbus, SCI, SPI                                                                                                                                      |
| Peripherals                | DMA, LVD, POR, PWM, WDT                                                                                                                                                         |
| Number of I/O              | 55                                                                                                                                                                              |
| Program Memory Size        | 256KB (256K x 8)                                                                                                                                                                |
| Program Memory Type        | FLASH                                                                                                                                                                           |
| EEPROM Size                | -                                                                                                                                                                               |
| RAM Size                   | 16K x 8                                                                                                                                                                         |
| Voltage - Supply (Vcc/Vdd) | 4V ~ 5.5V                                                                                                                                                                       |
| Data Converters            | A/D 12x10b, 8x12b                                                                                                                                                               |
| Oscillator Type            | Internal                                                                                                                                                                        |
| Operating Temperature      | -40°C ~ 85°C (TA)                                                                                                                                                               |
| Mounting Type              | Surface Mount                                                                                                                                                                   |
| Package / Case             | 100-LQFP                                                                                                                                                                        |
| Supplier Device Package    | 100-LFQFP (14x14)                                                                                                                                                               |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f562taadfp-v3">https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f562taadfp-v3</a> |

## 1.2 List of Products

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

**Table 1.3 List of Products (1 / 2)**

| Group | Part No.      | Order Part No.   | Package      | ROM Capacity | RAM Capacity | Data Flash Capacity | Power Supply Voltage                                                          | CAN                | Operating Temp. Range       |
|-------|---------------|------------------|--------------|--------------|--------------|---------------------|-------------------------------------------------------------------------------|--------------------|-----------------------------|
| RX62T | R5F562TAADFH  | R5F562TAADFH#V3  | PLQP0112JA-A | 256 Kbytes   | 16 Kbytes    | 32 Kbytes           | VCC/PLLVC<br>4.0 to 5.5 V<br>AVCC/AVCC0<br>4.0 to 5.5 V                       | Support-<br>ed     | -40 to +85°C<br>(D version) |
|       | R5F562TAADFP  | R5F562TAADFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAADFF  | R5F562TAADFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAGDFF  | R5F562TAGDFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAADFM  | R5F562TAADFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAADFK  | R5F562TAADFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7ADFH  | R5F562T7ADFH#V3  | PLQP0112JA-A | 128 Kbytes   | 8 Kbytes     | 8 Kbytes            |                                                                               |                    |                             |
|       | R5F562T7ADFP  | R5F562T7ADFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7ADFF  | R5F562T7ADFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7GDFF  | R5F562T7GDFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7ADFM  | R5F562T7ADFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7ADFK  | R5F562T7ADFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T6ADFF  | R5F562T6ADFF#V3  | PLQP0080JA-A | 64 Kbytes    | 8 Kbytes     |                     |                                                                               |                    |                             |
|       | R5F562T6ADFM  | R5F562T6ADFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T6ADFK  | R5F562T6ADFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TABDFH  | R5F562TABDFH#V3  | PLQP0112JA-A | 256 Kbytes   | 16 Kbytes    | 32 Kbytes           | VCC/PLLVC<br>2.7 to 3.6 V<br>AVCC/AVCC0<br>3.0 to 3.6 V<br>or<br>4.0 to 5.5 V |                    |                             |
|       | R5F562TABDFP  | R5F562TABDFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TABDFF  | R5F562TABDFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TABDFM  | R5F562TABDFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TABDFK  | R5F562TABDFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7BDFH  | R5F562T7BDFH#V3  | PLQP0112JA-A | 128 Kbytes   | 8 Kbytes     | 8 Kbytes            |                                                                               |                    |                             |
|       | R5F562T7BDFF  | R5F562T7BDFF#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7BDFP  | R5F562T7BDFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7BDFM  | R5F562T7BDFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7BDFK  | R5F562T7BDFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T6BDFF  | R5F562T6BDFF#V3  | PLQP0080JA-A | 64 Kbytes    | 8 Kbytes     |                     |                                                                               |                    |                             |
|       | R5F562T6BDFM  | R5F562T6BDFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T6BDFK  | R5F562T6BDFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TADDFH  | R5F562TADDFH#V3  | PLQP0112JA-A | 256 Kbytes   | 16 Kbytes    | 32 Kbytes           | 4.0 to 5.5 V                                                                  | Not Support-<br>ed |                             |
|       | R5F562TADDFP  | R5F562TADDFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TADDDFF | R5F562TADDDFF#V3 | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TADDDFM | R5F562TADDDFM#V3 | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TADDDFK | R5F562TADDDFK#V3 | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7DDFH  | R5F562T7DDFH#V3  | PLQP0112JA-A | 128 Kbytes   | 8 Kbytes     | 8 Kbytes            |                                                                               |                    |                             |
|       | R5F562T7DDFP  | R5F562T7DDFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7DDFF  | R5F562T7DDFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7DDFM  | R5F562T7DDFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T7DDFK  | R5F562T7DDFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T6DDFF  | R5F562T6DDFF#V3  | PLQP0080JA-A | 64 Kbytes    | 8 Kbytes     |                     |                                                                               |                    |                             |
|       | R5F562T6DDFM  | R5F562T6DDFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562T6DDFK  | R5F562T6DDFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAEDFH  | R5F562TAEDFH#V3  | PLQP0112JA-A | 256 Kbytes   | 16 Kbytes    | 32 Kbytes           | 2.7 to 3.6 V                                                                  |                    |                             |
|       | R5F562TAEDFP  | R5F562TAEDFP#V3  | PLQP0100KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAEDFF  | R5F562TAEDFF#V3  | PLQP0080JA-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAEDFM  | R5F562TAEDFM#V3  | PLQP0064KB-A |              |              |                     |                                                                               |                    |                             |
|       | R5F562TAEDFK  | R5F562TAEDFK#V3  | PLQP0064GA-A |              |              |                     |                                                                               |                    |                             |

**Table 1.8 List of Pins and Pin Functions (64-Pin LQFP) (2 / 2)**

| Pin No.<br>(64-Pin<br>LQFP) | Power Supply<br>Clock<br>System Control | I/O Port | Analog           | Timer                  | Communi-<br>cation       | Interrupt | POE | Debuggi<br>ng |
|-----------------------------|-----------------------------------------|----------|------------------|------------------------|--------------------------|-----------|-----|---------------|
| 40                          |                                         | P33      |                  | MTIOC3A/<br>MTCLKA-A   | SSL3-A                   |           |     |               |
| 41                          |                                         | P32      |                  | MTIOC3C/<br>MTCLKB-A   | SSL2-A                   |           |     |               |
| 42                          | VCC                                     |          |                  |                        |                          |           |     |               |
| 43                          |                                         | P31      |                  | MTIOC0A-B/<br>MTCLKC-A | SSL1-A                   |           |     |               |
| 44                          | VSS                                     |          |                  |                        |                          |           |     |               |
| 45                          |                                         | P30      |                  | MTIOC0B-B/<br>MTCLKD-A | SSL0-A                   |           |     |               |
| 46                          |                                         | P24      |                  |                        | RSPCK-A                  |           |     |               |
| 47                          |                                         | P23      |                  |                        | CTX-B/<br>LTX/<br>MOSI-A |           |     |               |
| 48                          |                                         | P22      |                  |                        | CRX-B/<br>LRX/<br>MISO-A |           |     |               |
| 49                          |                                         | P47      | AN103/<br>CVREFH |                        |                          |           |     |               |
| 50                          |                                         | P46      | AN102            |                        |                          |           |     |               |
| 51                          |                                         | P45      | AN101            |                        |                          |           |     |               |
| 52                          |                                         | P44      | AN100            |                        |                          |           |     |               |
| 53                          |                                         | P43      | AN003/<br>CVREFL |                        |                          |           |     |               |
| 54                          |                                         | P42      | AN002            |                        |                          |           |     |               |
| 55                          |                                         | P41      | AN001            |                        |                          |           |     |               |
| 56                          |                                         | P40      | AN000            |                        |                          |           |     |               |
| 57                          | AVCC0                                   |          |                  |                        |                          |           |     |               |
| 58                          | VREFH0                                  |          |                  |                        |                          |           |     |               |
| 59                          | VREFL0                                  |          |                  |                        |                          |           |     |               |
| 60                          | AVSS0                                   |          |                  |                        |                          |           |     |               |
| 61                          |                                         | P11      |                  | MTCLKC-B               |                          | IRQ1-A    |     |               |
| 62                          |                                         | P10      |                  | MTCLKD-B               |                          | IRQ0-A    |     |               |
| 63                          |                                         | PA5      | ADTRG1#-A        | MTIOC1A                | MISO-B                   |           |     |               |
| 64                          |                                         | PA4      | ADTRG0#-A        | MTIOC1B                | RSPCK-B                  |           |     |               |

#### (4) Number of Access Cycles to I/O Registers

The number of access cycles to I/O registers is obtained by following equation.\*

$$\begin{aligned} \text{Number of access cycles to I/O registers} = & \text{Number of bus cycles for internal main bus 1} + \\ & \text{Number of divided cycles for clock synchronization} + \\ & \text{Number of bus cycles for internal peripheral buses 1, 2, 4, and 6} \end{aligned}$$

The number of bus cycles for internal peripheral buses 1, 2, 4, and 6 differs according to the register to be accessed. For the number of access cycles to each I/O register, see Table 4.1, List of I/O Registers.

When peripheral functions connected to internal peripheral bus 6 are accessed, the number of divided cycles for clock synchronization is added.

Although the number of divided cycles for clock synchronization differs depending on the number of frequency ratio between ICLK and PCLK or bus access timing, the sum of the number of bus cycles for internal main bus 1 and the number of divided cycles for clock synchronization will be one PCLK at a maximum. Therefore, one PCLK is added to the number of access cycles shown in Table 4.1.

Note: • This applies to the number of cycles when the access from the CPU does not conflict with the instruction fetching to the external memory or bus access from the different bus master (DTC).

**Table 4.1 List of I/O Registers (Address Order) (2 / 25)**

| Address    | Module Abbreviation | Register Name                          | Register Abbreviation | Number of Bits | Access Size | Number of Access Cycles |
|------------|---------------------|----------------------------------------|-----------------------|----------------|-------------|-------------------------|
| 0008 6526h | MPU                 | Region invalidation operation register | MPOPI                 | 16             | 16          | 1 ICLK                  |
| 0008 6528h | MPU                 | Instruction-hit region register        | MHITI                 | 32             | 32          | 1 ICLK                  |
| 0008 652Ch | MPU                 | Data-hit region register               | MHITD                 | 32             | 32          | 1 ICLK                  |
| 0008 7010h | ICU                 | Interrupt request register 016         | IR016                 | 8              | 8           | 2 ICLK                  |
| 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 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 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 703Ch | ICU                 | Interrupt request register 060         | IR060                 | 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                  |
| 0008 7044h | ICU                 | Interrupt request register 068         | IR068                 | 8              | 8           | 2 ICLK                  |
| 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 7060h | ICU                 | Interrupt request register 096         | IR096                 | 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 7067h | ICU                 | Interrupt request register 103         | IR103                 | 8              | 8           | 2 ICLK                  |
| 0008 706Ah | ICU                 | Interrupt request register 106         | IR106                 | 8              | 8           | 2 ICLK                  |
| 0008 7072h | ICU                 | Interrupt request register 114         | IR114                 | 8              | 8           | 2 ICLK                  |
| 0008 7073h | ICU                 | Interrupt request register 115         | IR115                 | 8              | 8           | 2 ICLK                  |
| 0008 7074h | ICU                 | Interrupt request register 116         | IR116                 | 8              | 8           | 2 ICLK                  |
| 0008 7075h | ICU                 | Interrupt request register 117         | IR117                 | 8              | 8           | 2 ICLK                  |
| 0008 7076h | ICU                 | Interrupt request register 118         | IR118                 | 8              | 8           | 2 ICLK                  |
| 0008 7077h | ICU                 | Interrupt request register 119         | IR119                 | 8              | 8           | 2 ICLK                  |
| 0008 7078h | ICU                 | Interrupt request register 120         | IR120                 | 8              | 8           | 2 ICLK                  |
| 0008 7079h | ICU                 | Interrupt request register 121         | IR121                 | 8              | 8           | 2 ICLK                  |
| 0008 707Ah | ICU                 | Interrupt request register 122         | IR122                 | 8              | 8           | 2 ICLK                  |
| 0008 707Bh | ICU                 | Interrupt request register 123         | IR123                 | 8              | 8           | 2 ICLK                  |
| 0008 707Ch | ICU                 | Interrupt request register 124         | IR124                 | 8              | 8           | 2 ICLK                  |

**Table 4.1 List of I/O Registers (Address Order) (12 / 25)**

| Address    | Module Abbreviation | Register Name                 | Register Abbreviation | Number of Bits | Access Size | Number of Access Cycles |
|------------|---------------------|-------------------------------|-----------------------|----------------|-------------|-------------------------|
| 0008 90A4h | S12AD1              | A/D data register 2           | ADDR2                 | 16             | 16          | 2, 3 PCLK*3             |
| 0008 90A6h | S12AD1              | A/D data register 3           | ADDR3                 | 16             | 16          | 2, 3 PCLK*3             |
| 0008 90B0h | S12AD1              | A/D data register 0B          | ADDR0B                | 16             | 16          | 2, 3 PCLK*3             |
| 0008 90E0h | S12AD1              | A/D sampling state register   | ADSSTR                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C001h | PORT1               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C002h | PORT2               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C003h | PORT3               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C007h | PORT7               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C008h | PORT8               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C009h | PORT9               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C00Ah | PORTA               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C00Bh | PORTB               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C00Dh | PORTD               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C00Eh | PORTE               | Data direction register       | DDR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C010h | PORTG               | Data direction register       | DDR*1                 | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C021h | PORT1               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C022h | PORT2               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C023h | PORT3               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C027h | PORT7               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C028h | PORT8               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C029h | PORT9               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C02Ah | PORTA               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C02Bh | PORTB               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C02Dh | PORTD               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C02Eh | PORTE               | Data register                 | DR                    | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C030h | PORTG               | Data register                 | DR*1                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C041h | PORT1               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C042h | PORT2               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C043h | PORT3               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C044h | PORT4               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C045h | PORT5               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C046h | PORT6               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C047h | PORT7               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C048h | PORT8               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C049h | PORT9               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C04Ah | PORTA               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C04Bh | PORTB               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C04Dh | PORTD               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C04Eh | PORTE               | Data register                 | PORT                  | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C050h | PORTG               | Port register                 | PORT*1                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C061h | PORT1               | Input buffer control register | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C062h | PORT2               | Input buffer control register | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C063h | PORT3               | Input buffer control register | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C064h | PORT4               | Input buffer control register | ICR                   | 8              | 8           | 2, 3 PCLK*3             |

**Table 4.1 List of I/O Registers (Address Order) (13 / 25)**

| Address    | Module Abbreviation | Register Name                                                | Register Abbreviation | Number of Bits | Access Size | Number of Access Cycles |
|------------|---------------------|--------------------------------------------------------------|-----------------------|----------------|-------------|-------------------------|
| 0008 C065h | PORT5               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C066h | PORT6               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C067h | PORT7               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C068h | PORT8               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C069h | PORT9               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C06Ah | PORTA               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C06Bh | PORTB               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C06Dh | PORTD               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C06Eh | PORTE               | Input buffer control register                                | ICR                   | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C070h | PORTG               | Input buffer control register                                | ICR*1                 | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C108h | IOPORT              | Port function register 8                                     | PF8IRQ                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C109h | IOPORT              | Port function register 9                                     | PF9IRQ                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C10Ah | IOPORT              | Port function register A                                     | PFAADC                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C10Ch | IOPORT              | Port function register C                                     | PFCMTU                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C10Dh | IOPORT              | Port function register D                                     | PFDGPT                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C10Fh | IOPORT              | Port function register F                                     | PFFSCI                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C110h | IOPORT              | Port function register G                                     | PFGSPI                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C111h | IOPORT              | Port function register H                                     | PFHSPI                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C113h | IOPORT              | Port function register J                                     | PFJCAN                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C114h | IOPORT              | Port function register K                                     | PFKLIN                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C116h | IOPORT              | Port function register M                                     | PFMPOE                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C117h | IOPORT              | Port function register N                                     | PFNPOE                | 8              | 8           | 2, 3 PCLK*3             |
| 0008 C280h | SYSTEM              | Deep standby control register                                | DPSBYCR               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C281h | SYSTEM              | Deep standby wait control register                           | DPSWCR                | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C282h | SYSTEM              | Deep standby interrupt enable register                       | DPSIER                | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C283h | SYSTEM              | Deep standby interrupt flag register                         | DPSIFR                | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C284h | SYSTEM              | Deep standby interrupt edge register                         | DPSIEGR               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C285h | SYSTEM              | Reset status register                                        | RSTSR                 | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C289h | FLASH               | Flash write erase protection register                        | FWEPROR               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C28Ch | SYSTEM              | Key code register for low-voltage detection control register | LVDKEYR               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C28Dh | SYSTEM              | Voltage detection control register                           | LVDCR                 | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C290h | SYSTEM              | Deep standby backup register 0                               | DPSBKR0               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C291h | SYSTEM              | Deep standby backup register 1                               | DPSBKR1               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C292h | SYSTEM              | Deep standby backup register 2                               | DPSBKR2               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C293h | SYSTEM              | Deep standby backup register 3                               | DPSBKR3               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C294h | SYSTEM              | Deep standby backup register 4                               | DPSBKR4               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C295h | SYSTEM              | Deep standby backup register 5                               | DPSBKR5               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C296h | SYSTEM              | Deep standby backup register 6                               | DPSBKR6               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C297h | SYSTEM              | Deep standby backup register 7                               | DPSBKR7               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C298h | SYSTEM              | Deep standby backup register 8                               | DPSBKR8               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C299h | SYSTEM              | Deep standby backup register 9                               | DPSBKR9               | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C29Ah | SYSTEM              | Deep standby backup register 10                              | DPSBKR10              | 8              | 8           | 4, 5 PCLK*3             |
| 0008 C29Bh | SYSTEM              | Deep standby backup register 11                              | DPSBKR11              | 8              | 8           | 4, 5 PCLK*3             |

**Table 4.1 List of I/O Registers (Address Order) (24 / 25)**

| Address    | Module Abbreviation | Register Name                                                  | Register Abbreviation | Number of Bits | Access Size | Number of Access Cycles   |
|------------|---------------------|----------------------------------------------------------------|-----------------------|----------------|-------------|---------------------------|
| 000C 22B6h | GPT3                | General PWM timer dead time control register                   | GTDTCCR               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 22B8h | GPT3                | General PWM timer dead time value register                     | GTDVU                 | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 22BAh | GPT3                | General PWM timer dead time value register                     | GTDVD                 | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 22BCh | GPT3                | General PWM timer dead time buffer register                    | GTDBU                 | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 22BEh | GPT3                | General PWM timer dead time buffer register                    | GTDBD                 | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 22C0h | GPT3                | General PWM timer output protection function status register   | GTSOS                 | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 22C2h | GPT3                | General PWM timer output protection temporary release register | GTSOTR                | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2300h | GPT0                | PWM output delay control register                              | GTDLYCR               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2302h | GPT1                | PWM output delay control register                              | GTDLYCR               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2304h | GPT2                | PWM output delay control register                              | GTDLYCR               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2306h | GPT3                | PWM output delay control register                              | GTDLYCR               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2318h | GPT0                | GTIOCA rising output delay register                            | GTDLYRA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 231Ah | GPT0                | GTIOCB rising output delay register                            | GTDLYRB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 231Ch | GPT1                | GTIOCA rising output delay register                            | GTDLYRA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 231Eh | GPT1                | GTIOCB rising output delay register                            | GTDLYRB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2320h | GPT2                | GTIOCA rising output delay register                            | GTDLYRA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2322h | GPT2                | GTIOCB rising output delay register                            | GTDLYRB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2324h | GPT3                | GTIOCA falling output delay register                           | GTDLYRA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2326h | GPT3                | GTIOCB falling output delay register                           | GTDLYRB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2328h | GPT0                | GTIOCA falling output delay register                           | GTDLYFA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 232Ah | GPT0                | GTIOCB falling output delay register                           | GTDLYFB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 232Ch | GPT1                | GTIOCA falling output delay register                           | GTDLYFA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 232Eh | GPT1                | GTIOCB falling output delay register                           | GTDLYFB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2330h | GPT2                | GTIOCA falling output delay register                           | GTDLYFA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2332h | GPT2                | GTIOCB falling output delay register                           | GTDLYFB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2334h | GPT3                | GTIOCA falling output delay register                           | GTDLYFA               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 000C 2336h | GPT3                | GTIOCB falling output delay register                           | GTDLYFB               | 16             | 16, 32      | 3 to 5 ICLK <sup>*4</sup> |
| 007F C402h | FLASH               | Flash mode register                                            | FMODR                 | 8              | 8           | 2, 3 PCLK <sup>*3</sup>   |
| 007F C410h | FLASH               | Flash access status register                                   | FASTAT                | 8              | 8           | 2, 3 PCLK <sup>*3</sup>   |
| 007F C411h | FLASH               | Flash access error interrupt enable register                   | FAEINT                | 8              | 8           | 2, 3 PCLK <sup>*3</sup>   |
| 007F C412h | FLASH               | Flash ready interrupt enable register                          | FRDYIE                | 8              | 8           | 2, 3 PCLK <sup>*3</sup>   |
| 007F C440h | FLASH               | Data flash read enable register 0                              | DFLRE0                | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F C442h | FLASH               | Data flash read enable register 1                              | DFLRE1                | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F C450h | FLASH               | Data flash programming/erasure enable register 0               | DFLWE0                | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F C452h | FLASH               | Data flash programming/erasure enable register 1               | DFLWE1                | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F C454h | FLASH               | FCU RAM enable register                                        | FCURAME               | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F FFB0h | FLASH               | Flash status register 0                                        | FSTATR0               | 8              | 8           | 2, 3 PCLK <sup>*3</sup>   |
| 007F FFB1h | FLASH               | Flash status register 1                                        | FSTATR1               | 8              | 8           | 2, 3 PCLK <sup>*3</sup>   |
| 007F FFB2h | FLASH               | Flash P/E mode entry register                                  | FENTRYR               | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F FFB4h | FLASH               | Flash protect register                                         | FPROTR                | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |
| 007F FFB6h | FLASH               | Flash reset register                                           | FRESETR               | 16             | 16          | 2, 3 PCLK <sup>*3</sup>   |



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

| Address    | Module<br>Abbreviation | Register Name                           | Register<br>Abbreviation | Number<br>of Bits | Access<br>Size | Number of<br>Access<br>Cycles |
|------------|------------------------|-----------------------------------------|--------------------------|-------------------|----------------|-------------------------------|
| 007F FFBAh | FLASH                  | FCU command register                    | FCMDR                    | 16                | 16             | 2, 3 PCLK <sup>*3</sup>       |
| 007F FFC8h | FLASH                  | FCU processing switching register       | FCPSR                    | 16                | 16             | 2, 3 PCLK <sup>*3</sup>       |
| 007F FFCAh | FLASH                  | Data flash blank check control register | DFLBCCNT                 | 16                | 16             | 2, 3 PCLK <sup>*3</sup>       |
| 007F FFCCh | FLASH                  | Flash P/E status register               | FPESTAT                  | 16                | 16             | 2, 3 PCLK <sup>*3</sup>       |
| 007F FFCEh | FLASH                  | Data flash blank check status register  | DFLBCSTAT                | 16                | 16             | 2, 3 PCLK <sup>*3</sup>       |
| 007F FFE8h | FLASH                  | Peripheral clock notification register  | PCKAR                    | 16                | 16             | 2, 3 PCLK <sup>*3</sup>       |

Note 1. This register is not supported by the 100-pin LQFP version.

Note 2. This register is not supported by the product without the CAN function.

Note 3. The number of access states depends on the number of divided cycles for clock synchronization (0 to 1 PCLK).

Note 4. Reading the registers takes 3 cycles of ICLK and writing to the registers takes 5 cycles of ICLK.

**Table 4.2 List of I/O Registers (Bit Order) (5 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| ICU                 | IR144                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR145                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR146                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR149                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR150                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR151                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR152                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR153                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR170                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR171                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR172                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR173                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR174                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR175                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR176                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR177                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR178                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR179                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR180                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR181                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR182                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR183                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR184                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR186                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR187                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR188                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR189                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR190                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR192                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR193                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR194                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR195                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR196                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR214                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR215                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR216                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR217                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR218                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR219                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR220                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR221                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR222                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR223                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR224                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR225                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR246                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR247                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR248                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR249                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | IR254                 | —              | —              | —              | —              | —              | —              | —             | IR            |
| ICU                 | DTCE027               | —              | —              | —              | —              | —              | —              | —             | DTCE          |
| ICU                 | DTCE028               | —              | —              | —              | —              | —              | —              | —             | DTCE          |

**Table 4.2 List of I/O Registers (Bit Order) (11 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| SCI1                | SEMR                  | —              | —              | NFEN           | ABCS           | —              | —              | —             | —             |
| SMC11               | SMR                   | GM             | BLK            | PE             | PM             | (BCP[1:0])     |                |               | CKS[1:0]      |
| SMC11               | BRR                   |                |                |                |                |                |                |               |               |
| SMC11               | SCR                   | TIE            | RIE            | TE             | RE             | MPIE           | TEIE           | CKE[1:0]      |               |
| SMC11               | TDR                   |                |                |                |                |                |                |               |               |
| SMC11               | SSR                   | TDRE           | RDRF           | ORER           | ERS            | PER            | TEND           | MPB           | MPBT          |
| SMC11               | RDR                   |                |                |                |                |                |                |               |               |
| SMC11               | SCMR                  | BCP2           | —              | —              | —              | SDIR           | SINV           | —             | SMIF          |
| SCI2                | SMR                   | CM             | CHR            | PE             | PM             | STOP           | MP             | CKS[1:0]      |               |
| SCI2                | BRR                   |                |                |                |                |                |                |               |               |
| SCI2                | SCR                   | TIE            | RIE            | TE             | RE             | MPIE           | TEIE           | CKE[1:0]      |               |
| SCI2                | TDR                   |                |                |                |                |                |                |               |               |
| SCI2                | SSR                   | TDRE           | RDRF           | ORER           | FER            | PER            | TEND           | MPB           | MPBT          |
| SCI2                | RDR                   |                |                |                |                |                |                |               |               |
| SCI2                | SCMR                  | BCP2           | —              | —              | —              | SDIR           | SINV           | —             | SMIF          |
| SMC12               | SMR                   | GM             | BLK            | PE             | PM             | (BCP[1:0])     |                |               | CKS[1:0]      |
| SMC12               | BRR                   |                |                |                |                |                |                |               |               |
| SMC12               | SCR                   | TIE            | RIE            | TE             | RE             | MPIE           | TEIE           | CKE[1:0]      |               |
| SMC12               | TDR                   |                |                |                |                |                |                |               |               |
| SMC12               | SSR                   | TDRE           | RDRF           | ORER           | ERS            | PER            | TEND           | MPB           | MPBT          |
| SMC12               | RDR                   |                |                |                |                |                |                |               |               |
| SMC12               | SCMR                  | BCP2           | —              | —              | —              | SDIR           | SINV           | —             | SMIF          |
| CRC                 | CRCCR                 | DORCLR         | —              | —              | —              | —              | LMS            | GPS[1:0]      |               |
| CRC                 | CRCDIR                |                |                |                |                |                |                |               |               |
| CRC                 | CRCDOR                |                |                |                |                |                |                |               |               |
| RIIC0               | ICCR1                 | ICE            | IICRST         | CLO            | SOWP           | SCLO           | SDAO           | SCLI          | SDAI          |
| RIIC0               | ICCR2                 | BBSY           | MST            | TRS            | —              | SP             | RS             | ST            | —             |
| RIIC0               | ICMR1                 | MTWP           |                | CKS[2:0]       |                | BCWP           |                | BC[2:0]       |               |
| RIIC0               | ICMR2                 | DLCS           |                | SDDL[2:0]      |                | TMWE           | TMOH           | TMOL          | TMOS          |
| RIIC0               | ICMR3                 | SMBS           | WAIT           | RDRFS          | ACKWP          | ACKBT          | ACKBR          | NF[1:0]       |               |
| RIIC0               | ICFER                 | —              | SCLE           | NFE            | NACKE          | SALE           | NALE           | MALE          | TMOE          |
| RIIC0               | ICSER                 | HOAE           | —              | DIDE           | —              | GCAE           | SAR2E          | SAR1E         | SAR0E         |
| RIIC0               | ICIER                 | TIE            | TEIE           | RIE            | NAKIE          | SPIE           | STIE           | ALIE          | TMOIE         |
| RIIC0               | ICSR1                 | HOA            | —              | DID            | —              | GCA            | AAS2           | AAS1          | AAS0          |
| RIIC0               | ICSR2                 | TDRE           | TEND           | RDRF           | NACKF          | STOP           | START          | AL            | TMOF          |
| RIIC0               | SARL0                 |                |                |                | SVA[6:0]       |                |                |               | SVA0          |
| RIIC0               | TMOCNTL               |                |                |                |                |                |                |               |               |
| RIIC0               | SARU0                 | —              | —              | —              | —              | —              | SVA[1:0]       |               | FS            |
| RIIC0               | TMOCNTU               |                |                |                |                |                |                |               |               |
| RIIC0               | SARL1                 |                |                |                | SVA[6:0]       |                |                |               | SVA0          |
| RIIC0               | SARU1                 | —              | —              | —              | —              | —              | SVA[1:0]       |               | FS            |
| RIIC0               | SARL2                 |                |                |                | SVA[6:0]       |                |                |               | SVA0          |
| RIIC0               | SARU2                 | —              | —              | —              | —              | —              | SVA[1:0]       |               | FS            |
| RIIC0               | ICBRL                 | —              | —              | —              |                |                | BRL[4:0]       |               |               |
| RIIC0               | ICBRH                 | —              | —              | —              |                |                | BRH[4:0]       |               |               |
| RIIC0               | ICDRT                 |                |                |                |                |                |                |               |               |
| RIIC0               | ICDRR                 |                |                |                |                |                |                |               |               |
| RSP10               | SPCR                  | SPRIE          | SPE            | SPTIE          | SPEIE          | MSTR           | MODFEN         | TXMD          | SPMS          |

**Table 4.2 List of I/O Registers (Bit Order) (21 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| MTU7                | TIORL                 | IOD[3:0]       |                |                |                | IOC[3:0]       |                |               |               |
| MTU6                | TIER                  | TTEG           | —              | —              | TCIEV          | TGIED          | TGIEC          | TGIEB         | TGIEA         |
| MTU7                | TIER                  | TTEG           | TTEG2          | —              | TCIEV          | TGIED          | TGIEC          | TGIEB         | TGIEA         |
| MTU                 | TOERB                 | —              | —              | OE7D           | OE7C           | OE6D           | OE7B           | OE7A          | OE6B          |
| MTU                 | TOCR1B                | —              | PSYE           | —              | —              | TOCL           | TOCS           | OLSN          | OLSP          |
| MTU6                | TCNT                  |                |                |                |                |                |                |               |               |
| MTU7                | TCNT                  |                |                |                |                |                |                |               |               |
| MTU                 | TCDRB                 |                |                |                |                |                |                |               |               |
| MTU                 | TDDRB                 |                |                |                |                |                |                |               |               |
| MTU6                | TGRA                  |                |                |                |                |                |                |               |               |
| MTU6                | TGRB                  |                |                |                |                |                |                |               |               |
| MTU7                | TGRA                  |                |                |                |                |                |                |               |               |
| MTU7                | TGRB                  |                |                |                |                |                |                |               |               |
| MTU                 | TCNTSB                |                |                |                |                |                |                |               |               |
| MTU                 | TCBRB                 |                |                |                |                |                |                |               |               |
| MTU6                | TGRC                  |                |                |                |                |                |                |               |               |
| MTU6                | TGRD                  |                |                |                |                |                |                |               |               |
| MTU7                | TGRC                  |                |                |                |                |                |                |               |               |
| MTU7                | TGRD                  |                |                |                |                |                |                |               |               |
| MTU6                | TSR                   | TCFD           | —              | —              | TCFV           | TGFD           | TGFC           | TGFB          | TGFA          |
| MTU7                | TSR                   | TCFD           | —              | —              | TCFV           | TGFD           | TGFC           | TGFB          | TGFA          |
| MTU                 | TITCR1B               | T6AEN          | T6ACOR[2:0]    |                |                | T7VEN          | T7VCOR[2:0]    |               |               |
| MTU                 | TITCNT1B              | —              | T6ACNT[2:0]    |                |                | —              | T7VCNT[2:0]    |               |               |
| MTU                 | TBTERB                | —              | —              | —              | —              | —              | —              | BTE[1:0]      |               |
| MTU                 | TDERB                 | —              | —              | —              | —              | —              | —              | —             | TDER          |
| MTU                 | TOLBRB                | —              | —              | OLS3N          | OLS3P          | OLS2N          | OLS2P          | OLS1N         | OLS1P         |
| MTU6                | TBTM                  | —              | —              | —              | —              | —              | —              | TTSB          | TTSA          |
| MTU7                | TBTM                  | —              | —              | —              | —              | —              | —              | TTSB          | TTSA          |
| MTU                 | TITMRB                | —              | —              | —              | —              | —              | —              | —             | TITM          |
| MTU                 | TITCR2B               | —              | —              | —              | —              | —              | TRGCR[2:0]     |               |               |
| MTU                 | TITCNT2B              | —              | —              | —              | —              | —              | TRG7CNT[2:0]   |               |               |
| MTU7                | TADCR                 | BF[1:0]        |                | —              | —              | —              | —              | —             | —             |
|                     |                       | UT7AE          | DT7AE          | UT7BE          | DT7BE          | ITA6AE         | ITA7VE         | ITB6AE        | ITB7VE        |
| MTU7                | TADCORA               |                |                |                |                |                |                |               |               |
| MTU7                | TADCORB               |                |                |                |                |                |                |               |               |
| MTU7                | TADCOBRA              |                |                |                |                |                |                |               |               |

**Table 4.2 List of I/O Registers (Bit Order) (22 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| MTU7                | TADCOBRB              |                |                |                |                |                |                |               |               |
| MTU                 | TSYCR                 | CE0A           | CE0D           | CE0C           | CE0D           | CE1A           | CE1B           | CE2A          | CE2B          |
| MTU                 | TWCRB                 | CCE            | —              | —              | —              | —              | —              | SCC           | WRE           |
| MTU                 | TMDR2B                | —              | —              | —              | —              | —              | —              | —             | DRS           |
| MTU6                | TGRE                  |                |                |                |                |                |                |               |               |
| MTU7                | TGRE                  |                |                |                |                |                |                |               |               |
| MTU7                | TGRF                  |                |                |                |                |                |                |               |               |
| MTU                 | TSTRB                 | CST7           | CST6           | —              | —              | —              | —              | —             | —             |
| MTU                 | TSYRB                 | SYNC7          | SYNC6          | —              | —              | —              | —              | —             | —             |
| MTU                 | TRWERB                | —              | —              | —              | —              | —              | —              | —             | RWE           |
| MTU5                | TCNTU                 |                |                |                |                |                |                |               |               |
| MTU5                | TGRU                  |                |                |                |                |                |                |               |               |
| MTU5                | TCRU                  | —              | —              | —              | —              | —              | —              | TPSC[1:0]     |               |
| MTU5                | TIORU                 | —              | —              | —              | IOC[4:0]       |                |                |               |               |
| MTU5                | TCNTV                 |                |                |                |                |                |                |               |               |
| MTU5                | TGRV                  |                |                |                |                |                |                |               |               |
| MTU5                | TCRV                  | —              | —              | —              | —              | —              | —              | TPSC[1:0]     |               |
| MTU5                | TIORV                 | —              | —              | —              | IOC[4:0]       |                |                |               |               |
| MTU5                | TCNTW                 |                |                |                |                |                |                |               |               |
| MTU5                | TGRW                  |                |                |                |                |                |                |               |               |
| MTU5                | TCRW                  | —              | —              | —              | —              | —              | —              | TPSC[1:0]     |               |
| MTU5                | TIORW                 | —              | —              | —              | IOC[4:0]       |                |                |               |               |
| MTU5                | TSR                   | —              | —              | —              | —              | —              | CMFU5          | CMFV5         | CMFW5         |
| MTU5                | TIER                  | —              | —              | —              | —              | —              | TGIE5U         | TGIE5V        | TGIE5W        |
| MTU5                | TSTR                  | —              | —              | —              | —              | —              | CSTU5          | CSTV5         | CSTW5         |
| MTU5                | TCNTCMPCLR            | —              | —              | —              | —              | —              | CMPCLR5U       | CMPCLR5V      | CMPCLR5W      |
| GPT                 | GTSTR                 | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | CST3           | CST2           | CST1          | CST0          |
| GPT                 | GTHSCR                | CPHW3[1:0]     |                | CPHW2[1:0]     |                | CPHW1[1:0]     |                | CPHW0[1:0]    |               |
|                     |                       | CSHW3[1:0]     |                | CSHW2[1:0]     |                | CSHW1[1:0]     |                | CSHW0[1:0]    |               |
| GPT                 | GTHCCR                | —              | —              | —              | —              | CCSW3          | CCSW2          | CCSW1         | CCSW0         |
|                     |                       | CCHW3[1:0]     |                | CCHW2[1:0]     |                | CCHW1[1:0]     |                | CCHW0[1:0]    |               |
| GPT                 | GTHSSR                | CSHSL3[3:0]    |                |                |                | CSHSL2[3:0]    |                |               |               |
|                     |                       | CSHSL1[3:0]    |                |                |                | CSHSL0[3:0]    |                |               |               |
| GPT                 | GTHPSR                | CSHPL3[3:0]    |                |                |                | CSHPL2[3:0]    |                |               |               |
|                     |                       | CSHPL1[3:0]    |                |                |                | CSHPL0[3:0]    |                |               |               |
| GPT                 | GTWP                  | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | WP3            | WP2            | WP1           | WP0           |
| GPT                 | GTSYNC                | —              | —              | SYNC3[1:0]     |                | —              | —              | SYNC2[1:0]    |               |
|                     |                       | —              | —              | SYNC1[1:0]     |                | —              | —              | SYNC0[1:0]    |               |
| GPT                 | GTETINT               | —              | —              | —              | —              | —              | —              | ETINF         | ETIPF         |
|                     |                       | —              | —              | —              | —              | —              | —              | ETINEN        | ETIPEN        |

**Table 4.2 List of I/O Registers (Bit Order) (23 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| GPT                 | GTBDR                 | BD33           | BD32           | BD31           | BD30           | BD23           | BD22           | BD21          | BD20          |
|                     |                       | BD13           | BD12           | BD11           | BD10           | BD03           | BD02           | BD01          | BD00          |
| GPT                 | GTSWP                 | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | SWP3           | SWP2           | SWP1          | SWP0          |
| GPT                 | LCCR                  | LPSC[1:0]      |                | TPSC[1:0]      |                | LCNTAT         |                | LCTQ[2:0]     |               |
|                     |                       | —              | LCINTO         | LCINTD         | LCINTC         | —              | LCNTS          | LCNTCR        | LCNTE         |
| GPT                 | LCST                  | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | —              | LISO           | LISD          | LISC          |
| GPT                 | LCNTA                 |                |                |                |                |                |                |               |               |
| GPT                 | LCNT00                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT01                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT02                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT03                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT04                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT05                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT06                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT07                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT08                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT09                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT10                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT11                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT12                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT13                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT14                |                |                |                |                |                |                |               |               |
| GPT                 | LCNT15                |                |                |                |                |                |                |               |               |
| GPT                 | LCNTDU                |                |                |                |                |                |                |               |               |
| GPT                 | LCNTDL                |                |                |                |                |                |                |               |               |
| GPT0                | GTIOR                 | OBHLD          | OBDFLT         |                |                | GTIOB[5:0]     |                |               |               |
|                     |                       | OAHL           | OADFLT         |                |                | GTIOA[5:0]     |                |               |               |
| GPT0                | GTINTAD               | ADTRBDEN       | ADTRBUEN       | ADTRADEN       | ADTRAUEN       | EINT           | —              | —             | —             |
|                     |                       | GTINTPR[1:0]   |                | GTINTF         | GTINTE         | GTINTD         | GTINTC         | GTINTB        | GTINTA        |

**Table 4.2 List of I/O Registers (Bit Order) (24 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| GPT0                | GTCR                  | —              | —              | CCLR[1:0]      |                | —              | —              | TPCS[1:0]     |               |
|                     |                       | —              | —              | —              | —              | —              | —              | MD[2:0]       |               |
| GPT0                | GTBER                 | —              | ADTDB          | ADTTB[1:0]     |                | —              | ADTDA          | ADTTA[1:0]    |               |
|                     |                       | —              | CCRSWT         | PR[1:0]        |                | CCRB[1:0]      |                | CCRA[1:0]     |               |
| GPT0                | GTUDC                 | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | —              | —              | UDF           | UD            |
| GPT0                | GTITC                 | —              | ADTBL          | —              | ADTAL          | —              | IVTT[2:0]      |               | —             |
|                     |                       | IVTC[1:0]      |                | ITLF           | ITLE           | ITLD           | ITLC           | ITLB          | ITLA          |
| GPT0                | GTST                  | TUCF           |                | —              | —              | DTEF           |                | ITCNT[2:0]    |               |
|                     |                       | TCFPU          | TCFPO          | TCFF           | TCFE           | TCFD           | TCFC           | TCFB          | TCFA          |
| GPT0                | GTCNT                 |                |                |                |                |                |                |               |               |
| GPT0                | GTCCRA                |                |                |                |                |                |                |               |               |
| GPT0                | GTCCRB                |                |                |                |                |                |                |               |               |
| GPT0                | GTCCRC                |                |                |                |                |                |                |               |               |
| GPT0                | GTCCRD                |                |                |                |                |                |                |               |               |
| GPT0                | GTCCRE                |                |                |                |                |                |                |               |               |
| GPT0                | GTCCRF                |                |                |                |                |                |                |               |               |
| GPT0                | GTPR                  |                |                |                |                |                |                |               |               |
| GPT0                | GTPBR                 |                |                |                |                |                |                |               |               |
| GPT0                | GTPDBR                |                |                |                |                |                |                |               |               |
| GPT0                | GTADTRA               |                |                |                |                |                |                |               |               |
| GPT0                | GTADTBRA              |                |                |                |                |                |                |               |               |
| GPT0                | GTADTDBRA             |                |                |                |                |                |                |               |               |
| GPT0                | GTADTRB               |                |                |                |                |                |                |               |               |
| GPT0                | GTADTBRB              |                |                |                |                |                |                |               |               |
| GPT0                | GTADTDBRB             |                |                |                |                |                |                |               |               |
| GPT0                | GTONCR                | OBE            | OAE            | —              | SWN            | —              | —              | —             | NFV           |
|                     |                       | NFS[3:0]       |                |                |                | NVB            | NVA            | NEB           | NEA           |
| GPT0                | GTDTCR                | —              | —              | —              | —              | —              | —              | —             | TDFER         |
|                     |                       | —              | —              | TDBDE          | TDBUE          | —              | —              | —             | TDE           |
| GPT0                | GTDVU                 |                |                |                |                |                |                |               |               |
| GPT0                | GTDVD                 |                |                |                |                |                |                |               |               |

**Table 4.2 List of I/O Registers (Bit Order) (26 / 30)**

| Module Abbreviation | Register Abbreviation | Bit 31/23/15/7 | Bit 30/22/14/6 | Bit 29/21/13/5 | Bit 28/20/12/4 | Bit 27/19/11/3 | Bit 26/18/10/2 | Bit 25/17/9/1 | Bit 24/16/8/0 |
|---------------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| GPT1                | GTADTBRB              |                |                |                |                |                |                |               |               |
| GPT1                | GTADTDBRB             |                |                |                |                |                |                |               |               |
| GPT1                | GTONCR                | OBE            | OAE            | —              | SWN            | —              | —              | —             | NFV           |
|                     |                       | NFS[3:0]       |                |                |                | NVB            | NVA            | NEB           | NEA           |
| GPT1                | GTDTCCR               | —              | —              | —              | —              | —              | —              | —             | TDFER         |
|                     |                       | —              | —              | TDBDE          | TDBUE          | —              | —              | —             | TDE           |
| GPT1                | GTDVU                 |                |                |                |                |                |                |               |               |
| GPT1                | GTDVD                 |                |                |                |                |                |                |               |               |
| GPT1                | GTDBU                 |                |                |                |                |                |                |               |               |
| GPT1                | GTDBD                 |                |                |                |                |                |                |               |               |
| GPT1                | GTSOS                 | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | —              | —              | SOS[1:0]      | —             |
| GPT1                | GTSOTR                | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | —              | —              | —             | SOTR          |
| GPT2                | GTIOR                 | OBHLD          | OBDFLT         | GTIOB[5:0]     |                |                |                |               |               |
|                     |                       | OAHL           | OADFLT         | GTIOA[5:0]     |                |                |                |               |               |
| GPT2                | GTINTAD               | ADTRBDEN       | ADTRBUEN       | ADTRADEN       | ADTRAUEN       | EINT           | —              | —             | —             |
|                     |                       | GTINTPR[1:0]   |                | GTINTF         | GTINTE         | GTINTD         | GTINTC         | GTINTB        | GTINTA        |
| GPT2                | GTCR                  | —              | —              | CCLR[1:0]      |                | —              | —              | TPCS[1:0]     |               |
|                     |                       | —              | —              | —              | —              | —              | —              | MD[2:0]       |               |
| GPT2                | GTBER                 | —              | ADTDB          | ADTTB[1:0]     |                | —              | ADTDA          | ADTTA[1:0]    |               |
|                     |                       | —              | CCRSWT         | PR[1:0]        |                | CCRB[1:0]      |                | CCRA[1:0]     |               |
| GPT2                | GTUDC                 | —              | —              | —              | —              | —              | —              | —             | —             |
|                     |                       | —              | —              | —              | —              | —              | —              | UDF           | UD            |
| GPT2                | GTITC                 | —              | ADTBL          | —              | ADTAL          | —              | —              | IVTT[2:0]     |               |
|                     |                       | IVTC[1:0]      |                | ITLF           | ITLE           | ITLD           | ITLC           | ITLB          | ITLA          |
| GPT2                | GTST                  | TUCF           | —              | —              | —              | DTEF           | —              | ITCNT[2:0]    |               |
|                     |                       | TCFPU          | TCFPO          | TCFF           | TCFE           | TCFD           | TCFC           | TCFB          | TCFA          |
| GPT2                | GT CNT                |                |                |                |                |                |                |               |               |
| GPT2                | GTCCRA                |                |                |                |                |                |                |               |               |
| GPT2                | GTCCRB                |                |                |                |                |                |                |               |               |
| GPT2                | GTCCRC                |                |                |                |                |                |                |               |               |
| GPT2                | GTCCRD                |                |                |                |                |                |                |               |               |
| GPT2                | GTCCRE                |                |                |                |                |                |                |               |               |
| GPT2                | GTCCRF                |                |                |                |                |                |                |               |               |
| GPT2                | GTPR                  |                |                |                |                |                |                |               |               |



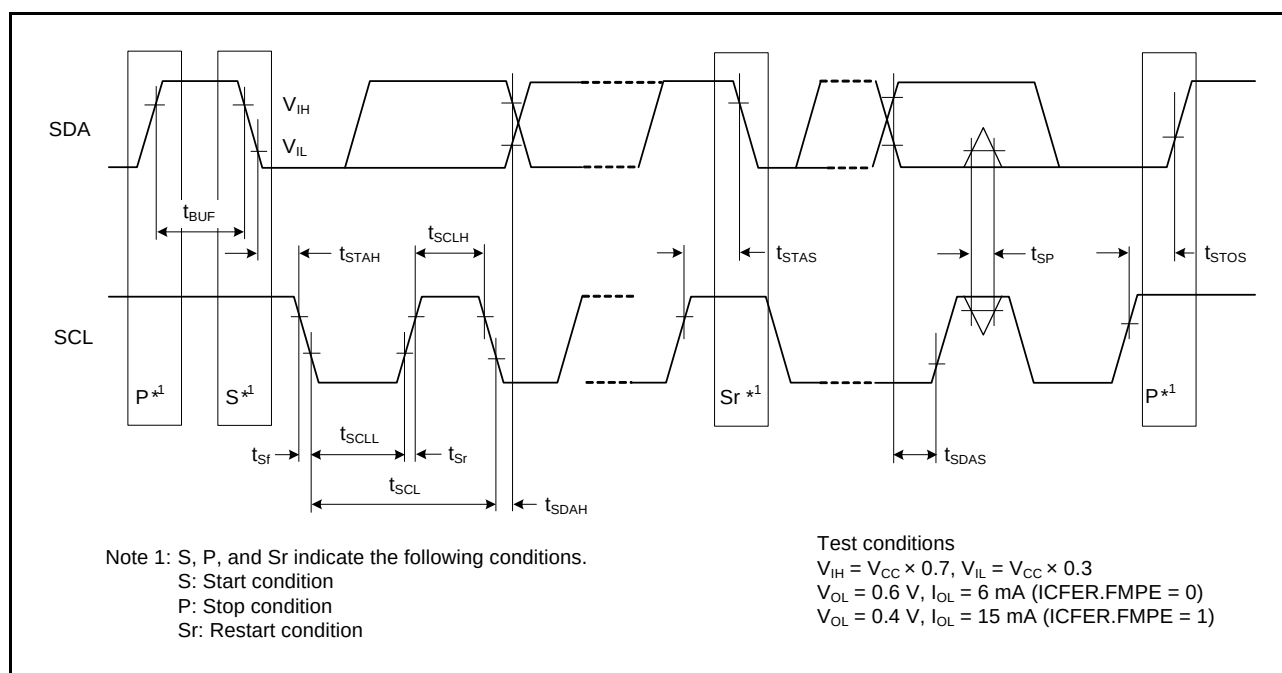


Figure 5.10 I2C Bus Interface Input/Output Timing

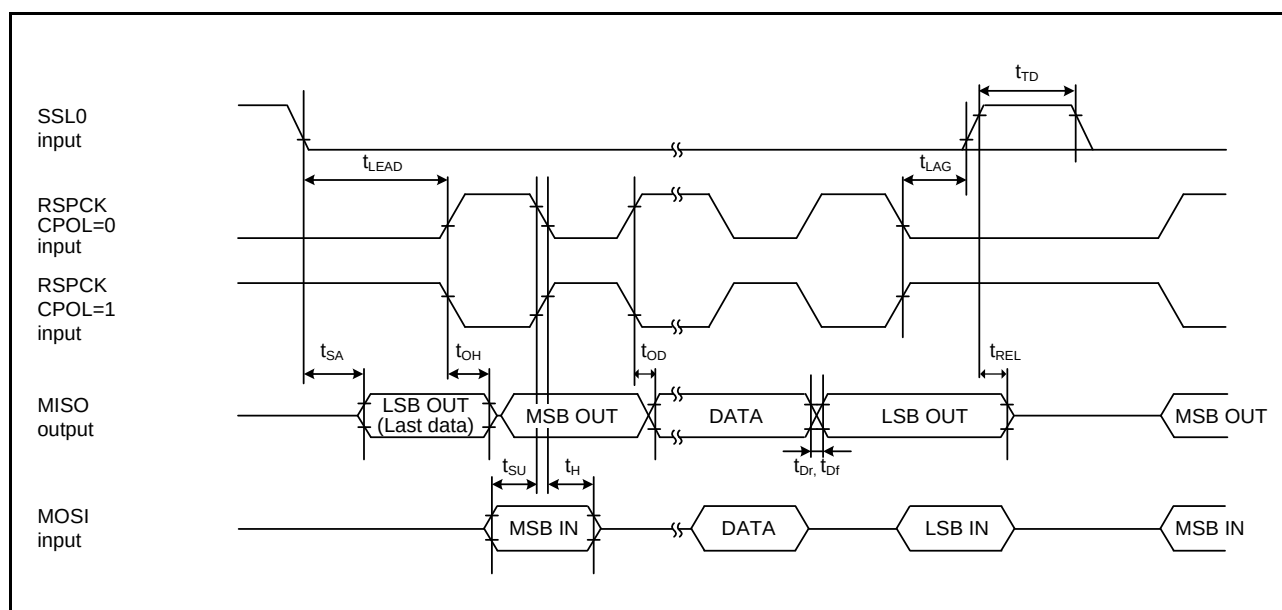


Figure 5.15 RSPI Timing (Slave, CPHA = 1)

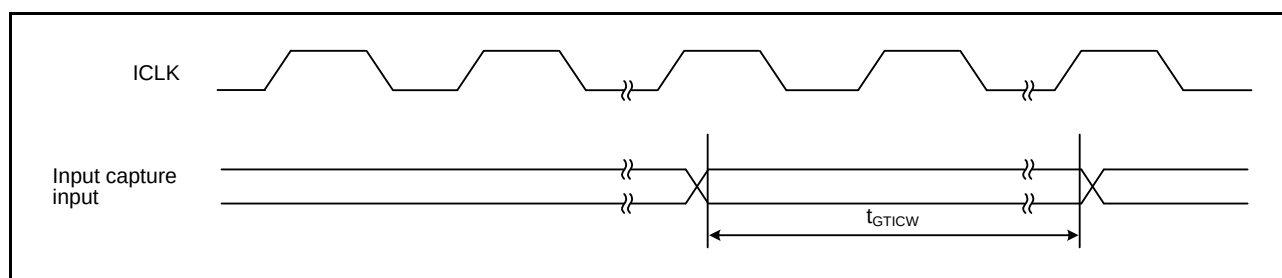


Figure 5.18 GPT Input/Output Timing

**Table 5.13 Timing of On-Chip Peripheral Modules (5)**

Note: Items for which test conditions are not specifically stated in the table below have the same values under conditions 1 to 3.

Condition 1: VCC = PLLVCC = 2.7 to 3.6 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0, VREF = 3.0 V to AVCC

Condition 2: VCC = PLLVCC = 2.7 to 3.6 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Ta = Topr. Ta is the same under conditions 1 to 3.

| Item |                        | Symbol            | Min. | Max. | Unit              | Test Conditions |
|------|------------------------|-------------------|------|------|-------------------|-----------------|
| POE3 | POE# input pulse width | t <sub>POEW</sub> | 1.5  | -    | t <sub>Pcyc</sub> | Figure 5.19     |

Note: • t<sub>Pcyc</sub>: PCLK cycle

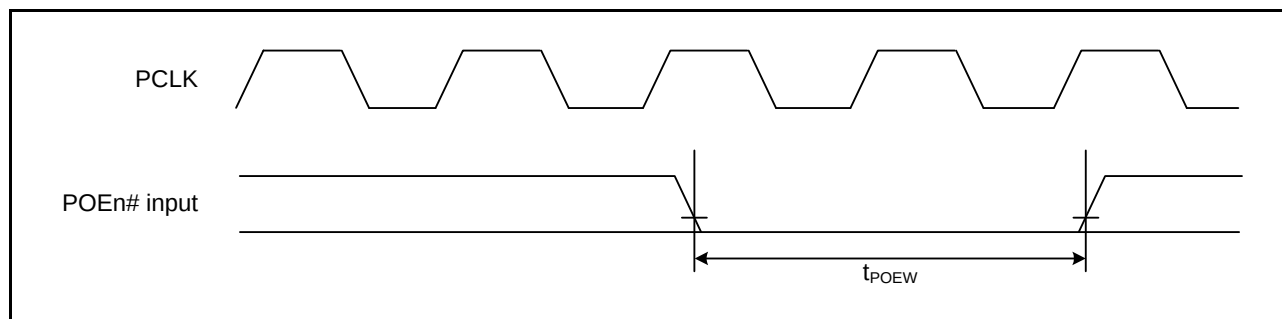


Figure 5.19 POE3# Clock Timing

### 5.3.4 Timing of PWM Delay Generation Circuit

**Table 5.14 Timing of the PWM Delay Generation Circuit**

Note: Items for which test conditions are not specifically stated in the table below have the same values under conditions 1 to 3.

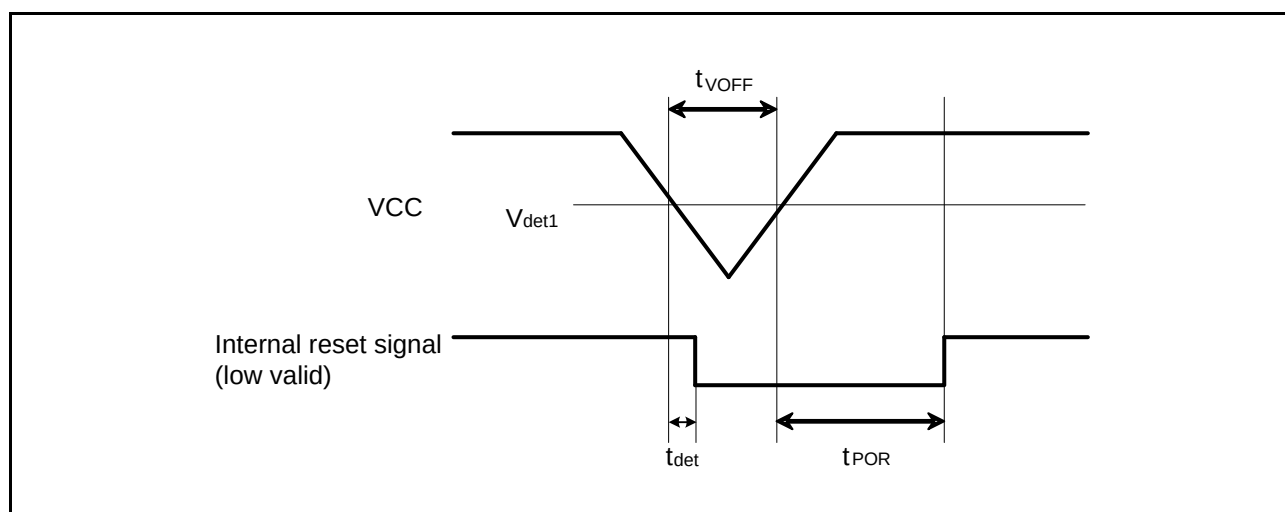
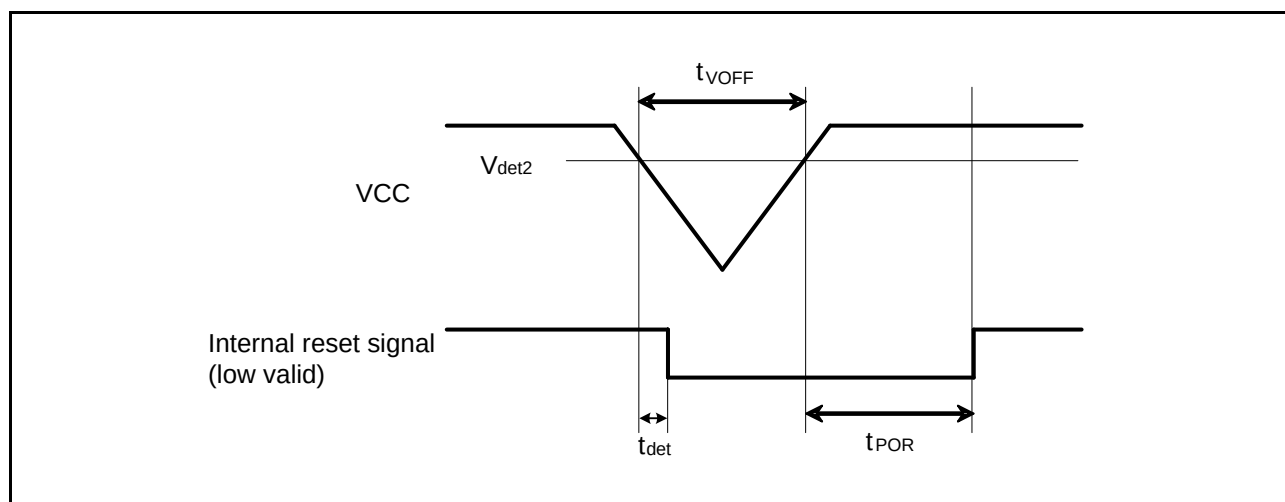
Condition 1: VCC = PLLVCC = 4.0 to 5.5 V, VSS = PLLVSS = AVSS = VREL0 = 0 V

AVCC = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Ta = Topr.

| Item       | Symbol | Typ.  | Max. | Unit | Test Conditions |
|------------|--------|-------|------|------|-----------------|
| Resolution | —      | 312.5 | —    | ps   | ICLK = 100 MHz  |
| DNL *1     | —      | ±2.0  | —    | LSB  |                 |

Note 1. This value is correct when the difference between each code and the next is a resolution of one bit (1 LSB).

**Figure 5.21 Voltage Detection Circuit Timing (Vdet1)****Figure 5.22 Voltage Detection Circuit Timing (Vdet2)**

## 5.7 ROM (Flash Memory for Code Storage) Characteristics

**Table 5.21 ROM (Flash Memory for Code Storage) Characteristics (1)**

Note: Items for which test conditions are not specifically stated in the table below have the same values under conditions 1 to 3.

Condition 1: VCC = PLLVCC = 2.7 to 3.6 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0, VREF = 3.0 V to AVCC

Condition 2: VCC = PLLVCC = 2.7 to 3.6 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Temperature range for the programming/erasure operation:

Ta = Topr. Ta is the same under conditions 1 to 3.

| Item                              | Symbol           | Min.             | Typ. | Max. | Unit  | Test Conditions |
|-----------------------------------|------------------|------------------|------|------|-------|-----------------|
| Rewrite/erase cycle <sup>*1</sup> | N <sub>PEC</sub> | 1000             | —    | —    | Times |                 |
| Data hold time                    | t <sub>DRP</sub> | 30 <sup>*2</sup> | —    | —    | Year  | Ta = +85C°      |

Note 1. Definition of rewrite/erase cycle:

The rewrite/erase cycle is the number of erasing for each block. When the rewrite/erase cycle is n times (n = 1000), erasing can be performed n times for each block. For instance, when 256-byte writing is performed 16 times for different addresses in 4-Kbyte block and then the entire block is erased, the rewrite/erase cycle is counted as one. However, writing to the same address for several times as one erasing is not enabled (overwriting is prohibited).

Note 2. The value is obtained from the reliability test.

**Table 5.22 ROM (Flash Memory for Code Storage) Characteristics (2)**

Note: Items for which test conditions are not specifically stated in the table below have the same values under conditions 1 to 3.

Condition 1: VCC = PLLVCC = 2.7 to 3.6 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0, VREF = 3.0 V to AVCC

Condition 2: VCC = PLLVCC = 2.7 to 3.6 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VSS = PLLVSS = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0, VREF = 4.0 V to AVCC

Temperature range for the programming/erasure operation:

Ta = Topr. Ta is the same under conditions 1 to 3.

| Item                                                                |           | Symbol             | Min. | Typ. | Max. | Unit | Test Conditions                         |
|---------------------------------------------------------------------|-----------|--------------------|------|------|------|------|-----------------------------------------|
| Programming time                                                    | 256 bytes | t <sub>P256</sub>  | —    | 2    | 12   | ms   | PCLK = 50 MHz<br>N <sub>PEC</sub> ≤ 100 |
|                                                                     | 4 Kbytes  | t <sub>P4K</sub>   | —    | 23   | 50   | ms   |                                         |
|                                                                     | 16 Kbytes | t <sub>P16K</sub>  | —    | 90   | 200  | ms   |                                         |
|                                                                     | 256 byte  | t <sub>P256</sub>  | —    | 2.4  | 14.4 | ms   | PCLK = 50 MHz<br>N <sub>PEC</sub> > 100 |
|                                                                     | 4 Kbytes  | t <sub>P4K</sub>   | —    | 27.6 | 60   | ms   |                                         |
|                                                                     | 16 Kbytes | t <sub>P16K</sub>  | —    | 108  | 240  | ms   |                                         |
| Erasure time                                                        | 4 Kbytes  | t <sub>E4K</sub>   | —    | 25   | 60   | ms   | PCLK = 50 MHz<br>N <sub>PEC</sub> ≤ 100 |
|                                                                     | 16 Kbytes | t <sub>E16K</sub>  | —    | 100  | 240  | ms   |                                         |
|                                                                     | 4 Kbytes  | t <sub>E4K</sub>   | —    | 30   | 72   | ms   | PCLK = 50 MHz<br>N <sub>PEC</sub> > 100 |
|                                                                     | 16 Kbytes | t <sub>E16K</sub>  | —    | 120  | 288  | ms   |                                         |
| Suspend delay time during writing                                   |           | t <sub>SPD</sub>   | —    | —    | 120  | μs   | Figure 5.24<br>PCLK = 50 MHz            |
| First suspend delay time during erasing (in suspend priority mode)  |           | t <sub>SESD1</sub> | —    | —    | 120  | μs   |                                         |
| Second suspend delay time during erasing (in suspend priority mode) |           | t <sub>SESD2</sub> | —    | —    | 1.7  | ms   |                                         |
| Suspend delay time during erasing (in erasure priority mode)        |           | t <sub>SEED</sub>  | —    | —    | 1.7  | ms   |                                         |