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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.

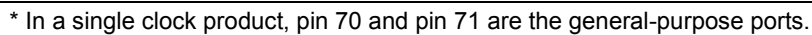
### Applications of "[Embedded - Microcontrollers](#)"

#### Details

|                            |                                                                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status             | Obsolete                                                                                                                                                                      |
| Core Processor             | FR81S                                                                                                                                                                         |
| Core Size                  | 32-Bit Single-Core                                                                                                                                                            |
| Speed                      | 80MHz                                                                                                                                                                         |
| Connectivity               | CANbus, CSIO, I <sup>2</sup> C, LINbus, SPI, UART/USART                                                                                                                       |
| Peripherals                | DMA, LVD, POR, PWM, WDT                                                                                                                                                       |
| Number of I/O              | 44                                                                                                                                                                            |
| Program Memory Size        | 1.0625MB (1.0625M x 8)                                                                                                                                                        |
| Program Memory Type        | FLASH                                                                                                                                                                         |
| EEPROM Size                | 64K x 8                                                                                                                                                                       |
| RAM Size                   | 136K x 8                                                                                                                                                                      |
| Voltage - Supply (Vcc/Vdd) | 2.7V ~ 5.5V                                                                                                                                                                   |
| Data Converters            | A/D 26x12b; D/A 1x8b                                                                                                                                                          |
| Oscillator Type            | External                                                                                                                                                                      |
| Operating Temperature      | -40°C ~ 105°C (TA)                                                                                                                                                            |
| Mounting Type              | Surface Mount                                                                                                                                                                 |
| Package / Case             | 64-LQFP                                                                                                                                                                       |
| Supplier Device Package    | 64-LQFP (10x10)                                                                                                                                                               |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/infineon-technologies/mb91f526bwbpmc1-gte1">https://www.e-xfl.com/product-detail/infineon-technologies/mb91f526bwbpmc1-gte1</a> |



MB91F522D, MB91F523D, MB91F524D, MB91F525D, MB91F526D



| Pin no.         |                 |                 |                  |     |     | Pin Name                       | Polarity | I/O circuit types*8 | Function*9                                        |
|-----------------|-----------------|-----------------|------------------|-----|-----|--------------------------------|----------|---------------------|---------------------------------------------------|
| 64              | 80              | 100             | 120              | 144 | 176 |                                |          |                     |                                                   |
| 3 <sup>*1</sup> | 3 <sup>*1</sup> | 3 <sup>*1</sup> | 6 <sup>*1</sup>  | 9   | 11  | P024                           | -        | F                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | WR0X <sup>*2, *3, *4, *5</sup> | -        |                     | External bus/Write strobe 0 output                |
|                 |                 |                 |                  |     |     | SIN4_1                         | -        |                     | Multi-function serial ch.4 serial data input (1)  |
|                 |                 |                 |                  |     |     | PPG24_0                        | -        |                     | PPG ch.24 output (0)                              |
|                 |                 |                 |                  |     |     | TIN1_0                         | -        |                     | Reload timer ch.1 event input (0)                 |
|                 |                 |                 |                  |     |     | RTO4_1                         | -        |                     | Waveform generator ch.4 output pin (1)            |
|                 |                 |                 |                  |     |     | INT15_0                        | -        |                     | INT15 External interrupt input (0)                |
| -               | -               | 4 <sup>*1</sup> | 7 <sup>*1</sup>  | 10  | 12  | P025                           | -        | A                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | WR1X <sup>*4, *5</sup>         | -        |                     | External bus/Write strobe 1 output                |
|                 |                 |                 |                  |     |     | SOT4_1                         | -        |                     | Multi-function serial ch.4 serial data output (1) |
|                 |                 |                 |                  |     |     | PPG25_0                        | -        |                     | PPG ch.25 output (0)                              |
|                 |                 |                 |                  |     |     | TIN2_0                         | -        |                     | Reload timer ch.2 event input (0)                 |
| -               | -               | -               | -                | -   | 13  | P172                           | -        | A                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | PPG38_1                        | -        |                     | PPG ch.38 output (1)                              |
| -               | 4 <sup>*1</sup> | 5 <sup>*1</sup> | 8 <sup>*1</sup>  | 11  | 14  | P026                           | -        | F                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | A00 <sup>*3, *4, *5</sup>      | -        |                     | External bus/Address bit0 output (0)              |
|                 |                 |                 |                  |     |     | SCK4_1                         | -        |                     | Multi-function serial ch.4 clock I/O (1)          |
|                 |                 |                 |                  |     |     | PPG26_0                        | -        |                     | PPG ch.26 output (0)                              |
|                 |                 |                 |                  |     |     | TIN3_0                         | -        |                     | Reload timer ch.3 event input (0)                 |
| 4 <sup>*1</sup> | 5 <sup>*1</sup> | 6 <sup>*1</sup> | 9 <sup>*1</sup>  | 12  | 15  | P027                           | -        | A                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | A01 <sup>*2, *3, *4, *5</sup>  | -        |                     | External bus/Address bit1 output (0)              |
|                 |                 |                 |                  |     |     | SCS40_1                        | -        |                     | Serial chip select 40 I/O (1)                     |
|                 |                 |                 |                  |     |     | PPG27_0                        | -        |                     | PPG ch.27 output (0)                              |
|                 |                 |                 |                  |     |     | TOT0_0                         | -        |                     | Reload timer ch.0 output (0)                      |
|                 |                 |                 |                  |     |     | RTO3_1                         | -        |                     | Waveform generator ch.3 output pin (1)            |
| -               | -               | -               | -                | -   | 16  | P173                           | -        | A                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | PPG39_1                        | -        |                     | PPG ch.39 output (1)                              |
| -               | -               | 7 <sup>*1</sup> | 10 <sup>*1</sup> | 13  | 17  | P030                           | -        | A                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | A02 <sup>*4, *5</sup>          | -        |                     | External bus/Address bit2 output (0)              |
|                 |                 |                 |                  |     |     | SCS41_1                        | -        |                     | Serial chip select 41 output (1)                  |
|                 |                 |                 |                  |     |     | PPG28_0                        | -        |                     | PPG ch.28 output (0)                              |
|                 |                 |                 |                  |     |     | TOT1_0                         | -        |                     | Reload timer ch.1 output (0)                      |
| -               | 6 <sup>*1</sup> | 8 <sup>*1</sup> | 11 <sup>*1</sup> | 14  | 18  | P031                           | -        | A                   | General-purpose I/O port                          |
|                 |                 |                 |                  |     |     | A03 <sup>*3, *4, *5</sup>      | -        |                     | External bus/Address bit3 output (0)              |
|                 |                 |                 |                  |     |     | SCS42_1                        | -        |                     | Serial chip select 42 output (1)                  |
|                 |                 |                 |                  |     |     | PPG29_0                        | -        |                     | PPG ch.29 output (0)                              |
|                 |                 |                 |                  |     |     | TOT2_0 <sup>*3</sup>           | -        |                     | Reload timer ch.2 output (0)                      |

| Pin no. |                  |                  |     |     |     | Pin Name                          | Polarity | I/O circuit types*8 | Function*9                                                                             |
|---------|------------------|------------------|-----|-----|-----|-----------------------------------|----------|---------------------|----------------------------------------------------------------------------------------|
| 64      | 80               | 100              | 120 | 144 | 176 |                                   |          |                     |                                                                                        |
| -       | -                | 40               | 46  | 54  | 68  | P070                              | -        | A                   | General-purpose I/O port                                                               |
| -       | -                | -                | -   | -   | -   | ICU0_2                            | -        |                     | Input capture ch.0 input (2)                                                           |
| 26      | 33               | 41               | 47  | 55  | 69  | P071                              | -        | G                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SCK4_2                            | -        |                     | Multi-function serial ch.4 clock I/O (2)                                               |
|         |                  |                  |     |     |     | AN35                              | -        |                     | ADC analog 35 input                                                                    |
|         |                  |                  |     |     |     | ICU1_2                            | -        |                     | Input capture ch.1 input (2)                                                           |
|         |                  |                  |     |     |     | MONCLK                            | -        |                     | Clock monitor output pin                                                               |
|         |                  |                  |     |     |     | -                                 | -        |                     | -                                                                                      |
| 27      | 34               | 42               | 48  | 56  | 70  | P072                              | -        | G                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SIN4_0                            | -        |                     | Multi-function serial ch.4 serial data input (0)                                       |
|         |                  |                  |     |     |     | AN34                              | -        |                     | ADC analog 34 input                                                                    |
|         |                  |                  |     |     |     | ICU2_2                            | -        |                     | Input capture ch.2 input (2)                                                           |
|         |                  |                  |     |     |     | INT5_0                            | -        |                     | INT5 External interrupt input (0)                                                      |
| -       | 35 <sup>-3</sup> | 43 <sup>-4</sup> | 49  | 57  | 71  | P073                              | -        | D                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SOT4_0/<br>SDA4 <sup>-3, -4</sup> | -        |                     | Multi-function serial ch.4 serial data output (0)/I <sup>2</sup> C bus serial data I/O |
|         |                  |                  |     |     |     | AN33                              | -        |                     | ADC analog 33 input                                                                    |
|         |                  |                  |     |     |     | ICU3_2                            | -        |                     | Input capture ch.3 input (2)                                                           |
| -       | -                | -                | -   | -   | 72  | P186                              | -        | A                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | PPG46_0                           | -        |                     | PPG ch.46 output (0)                                                                   |
| -       | -                | -                | -   | -   | 73  | P187                              | -        | A                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | PPG47_0                           | -        |                     | PPG ch.47 output (0)                                                                   |
| -       | -                | -                | 50  | 58  | 74  | P074                              | -        | E                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SCK4_0/<br>SCL4                   | -        |                     | Multi-function serial ch.4 clock I/O (0)/<br>I <sup>2</sup> C bus serial clock I/O     |
| -       | -                | -                | 51  | 59  | 75  | P075                              | -        | F                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SIN3_0                            | -        |                     | Multi-function serial ch.3 serial data input (0)                                       |
|         |                  |                  |     |     |     | INT4_0                            | -        |                     | INT4 External interrupt input (0)                                                      |
| -       | -                | -                | 52  | 60  | 76  | P076                              | -        | E                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SOT3_0/<br>SDA3                   | -        |                     | Multi-function serial ch.3 serial data output (0)/I <sup>2</sup> C bus serial data I/O |
| -       | -                | -                | 53  | 61  | 77  | P077                              | -        | E                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SCK3_0/<br>SCL3                   | -        |                     | Multi-function serial ch.3 clock I/O (0)/<br>I <sup>2</sup> C bus serial clock I/O     |
| -       | -                | 44               | 54  | 62  | 78  | P152                              | -        | A                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SCS53_0                           | -        |                     | Serial chip select 53 output (0)                                                       |
| 28      | 36               | 45               | 55  | 63  | 79  | P153                              | -        | G                   | General-purpose I/O port                                                               |
|         |                  |                  |     |     |     | SCK5_0/<br>SCL5                   | -        |                     | Multi-function serial ch.5 clock I/O (0)/<br>I <sup>2</sup> C bus serial clock I/O     |
|         |                  |                  |     |     |     | AN32                              | -        |                     | ADC analog 32 input                                                                    |
|         |                  |                  |     |     |     | FRCK1_1                           | -        |                     | Free-run timer 1 clock input (1)                                                       |
|         |                  |                  |     |     |     | INT4_1                            | -        |                     | INT4 External interrupt input (1)                                                      |

| Pin no. |    |     |     |     |     | Pin Name        | Polarity | I/O circuit types*8 | Function*9                                                                             |
|---------|----|-----|-----|-----|-----|-----------------|----------|---------------------|----------------------------------------------------------------------------------------|
| 64      | 80 | 100 | 120 | 144 | 176 |                 |          |                     |                                                                                        |
| -       | -  | -   | -   | 64  | 80  | P080            | -        | A                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SCS52_0         | -        |                     | Serial chip select 52 output (0)                                                       |
|         |    |     |     |     |     | PPG0_0          | -        |                     | PPG ch.0 output (0)                                                                    |
| 29      | 37 | 46  | 56  | 65  | 81  | P081            | -        | G                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SOT5_0/<br>SDA5 | -        |                     | Multi-function serial ch.5 serial data output (0)/I <sup>2</sup> C bus serial data I/O |
|         |    |     |     |     |     | AN0             | -        |                     | ADC analog 0 input                                                                     |
|         |    |     |     |     |     | PPG1_0          | -        |                     | PPG ch.1 output (0)                                                                    |
| 30      | 38 | 47  | 57  | 66  | 82  | P082            | -        | G                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SIN5_0          | -        |                     | Multi-function serial ch.5 serial data input (0)                                       |
|         |    |     |     |     |     | AN1             | -        |                     | ADC analog 1 input                                                                     |
|         |    |     |     |     |     | PPG2_0          | -        |                     | PPG ch.2 output (0)                                                                    |
| -       | -  | -   | -   | 67  | 83  | P083            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SCS50_0         | -        |                     | Serial chip select 50 I/O (0)                                                          |
|         |    |     |     |     |     | AN2             | -        |                     | ADC analog 2 input                                                                     |
|         |    |     |     |     |     | PPG3_0          | -        |                     | PPG ch.3 output (0)                                                                    |
| -       | -  | -   | -   | 68  | 84  | P084            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SCS51_0         | -        |                     | Serial chip select 51 output (0)                                                       |
|         |    |     |     |     |     | AN3             | -        |                     | ADC analog 3 input                                                                     |
|         |    |     |     |     |     | PPG4_0          | -        |                     | PPG ch.4 output (0)                                                                    |
| -       | -  | -   | -   | 69  | 85  | P085            | -        | A                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | PPG5_0          | -        |                     | PPG ch.5 output (0)                                                                    |
| -       | -  | 48  | 58  | 70  | 86  | P086            | -        | C                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | DAO1            | -        |                     | DAC analog 1 output                                                                    |
|         |    |     |     |     |     | PPG6_0          | -        |                     | PPG ch.6 output (0)                                                                    |
| 31      | 39 | 49  | 59  | 71  | 87  | P087            | -        | C                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | DAO0            | -        |                     | DAC analog 0 output                                                                    |
|         |    |     |     |     |     | PPG7_0          | -        |                     | PPG ch.7 output (0)                                                                    |
|         |    |     |     |     |     | INT8_0          | -        |                     | INT8 External interrupt input (0)                                                      |
| -       | -  | -   | -   | -   | 90  | P190            | -        | A                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | TIN0_1          | -        |                     | Reload timer ch.0 event input (1)                                                      |
| -       | -  | -   | -   | -   | 91  | P191            | -        | A                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | TIN1_1          | -        |                     | Reload timer ch.1 event input (1)                                                      |
| -       | -  | -   | -   | 74  | 92  | P090            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | AN4             | -        |                     | ADC analog 4 input                                                                     |
|         |    |     |     |     |     | ICU0_0          | -        |                     | Input capture ch.0 input (0)                                                           |
|         |    |     |     |     |     | TIN2_1          | -        |                     | Reload timer ch.2 event input (1)                                                      |
| -       | -  | -   | -   | 75  | 93  | P091            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | AN5             | -        |                     | ADC analog 5 input                                                                     |
|         |    |     |     |     |     | PPG41_1         | -        |                     | PPG ch.41 output (1)                                                                   |
|         |    |     |     |     |     | ICU1_0          | -        |                     | Input capture ch.1 input (0)                                                           |
|         |    |     |     |     |     | TIN3_1          | -        |                     | Reload timer ch.3 event input (1)                                                      |

| Pin no. |    |     |     |     |     | Pin Name        | Polarity | I/O circuit types*8 | Function*9                                                                             |
|---------|----|-----|-----|-----|-----|-----------------|----------|---------------------|----------------------------------------------------------------------------------------|
| 64      | 80 | 100 | 120 | 144 | 176 |                 |          |                     |                                                                                        |
| 44      | 54 | 67  | 79  | 95  | 115 | NMIX            | N        | M                   | Non-masking interrupt input                                                            |
| 45      | 55 | 68  | 80  | 96  | 116 | P110            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | TX1(64)         | -        |                     | CAN transmission data 1 output                                                         |
|         |    |     |     |     |     | SCS63_0         | -        |                     | Serial chip select 63 output (0)                                                       |
|         |    |     |     |     |     | AN22            | -        |                     | ADC analog 22 input                                                                    |
| -       | -  | 69  | 81  | 97  | 117 | P111            | -        | G                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | RX1(64)         | -        |                     | CAN reception data 1 input                                                             |
|         |    |     |     |     |     | SCS62_0         | -        |                     | Serial chip select 62 output (0)                                                       |
|         |    |     |     |     |     | AN23            | -        |                     | ADC analog 23 input                                                                    |
|         |    |     |     |     |     | INT1_0          | -        |                     | INT1 External interrupt input (0)                                                      |
| -       | -  | -   | 82  | 98  | 118 | P112            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | AN24            | -        |                     | ADC analog 24 input                                                                    |
|         |    |     |     |     |     | PPG16_0         | -        |                     | PPG ch.16 output (0)                                                                   |
|         |    |     |     |     |     | RTO0_0          | -        |                     | Waveform generator ch. 0 output pin (0)                                                |
| -       | -  | -   | 83  | 99  | 119 | P113            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | AN25            | -        |                     | ADC analog 25 input                                                                    |
|         |    |     |     |     |     | PPG17_0         | -        |                     | PPG ch.17 output (0)                                                                   |
|         |    |     |     |     |     | RTO1_0          | -        |                     | Waveform generator ch. 1 output pin (0)                                                |
| -       | -  | -   | -   | -   | 120 | P194            | -        | A                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | FRCK5_1         | -        |                     | Free-run timer 5 clock input (1)                                                       |
|         |    |     |     |     |     | PPG26_1         | -        |                     | PPG ch.26 output (1)                                                                   |
| -       | -  | -   | -   | -   | 121 | P195            | -        | A                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | FRCK4_1         | -        |                     | Free-run timer 4 clock input (1)                                                       |
|         |    |     |     |     |     | PPG27_1         | -        |                     | PPG ch.27 output (1)                                                                   |
| -       | 56 | 70  | 84  | 100 | 122 | P114            | -        | B                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SCS61_0         | -        |                     | Serial chip select 61 output (0)                                                       |
|         |    |     |     |     |     | AN26            | -        |                     | ADC analog 26 input                                                                    |
|         |    |     |     |     |     | PPG18_0         | -        |                     | PPG ch.18 output (0)                                                                   |
|         |    |     |     |     |     | RTO2_0          | -        |                     | Waveform generator ch.2 output pin (0)                                                 |
| 46      | 57 | 71  | 85  | 101 | 123 | P115            | -        | G                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | RX1_1           | -        |                     | CAN reception data 1 input (1)                                                         |
|         |    |     |     |     |     | SOT6_0/<br>SDA6 | -        |                     | Multi-function serial ch.6 serial data output (0)/I <sup>2</sup> C bus serial data I/O |
|         |    |     |     |     |     | AN27            | -        |                     | ADC analog 27 input                                                                    |
|         |    |     |     |     |     | PPG19_0         | -        |                     | PPG ch.19 output (0)                                                                   |
|         |    |     |     |     |     | RTO3_0          | -        |                     | Waveform generator ch.3 output pin (0)                                                 |
|         |    |     |     |     |     | INT1_1          | -        |                     | INT1 External interrupt input (1)                                                      |
| 47      | 58 | 72  | 86  | 102 | 124 | P116            | -        | G                   | General-purpose I/O port                                                               |
|         |    |     |     |     |     | SCK6_0/<br>SCL6 | -        |                     | Multi-function serial ch.6 clock I/O (0)/ I <sup>2</sup> C bus serial clock I/O        |
|         |    |     |     |     |     | AN28            | -        |                     | ADC analog 28 input                                                                    |
|         |    |     |     |     |     | PPG20_0         | -        |                     | PPG ch.20 output (0)                                                                   |
|         |    |     |     |     |     | RTO4_0          | -        |                     | Waveform generator ch.4 output pin (0)                                                 |

| Address                                          | Address offset value / Register name                        |    |                                  |    | Block                    |
|--------------------------------------------------|-------------------------------------------------------------|----|----------------------------------|----|--------------------------|
|                                                  | +0                                                          | +1 | +2                               | +3 |                          |
| 0008F4 <sub>H</sub>                              | WRDR14 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX       |    |                                  |    | Wild Register [S]        |
| 0008F8 <sub>H</sub>                              | WRAR15 [R/W] W<br>----- --XXXXXX XXXXXXXX XXXXXX--          |    |                                  |    |                          |
| 0008FC <sub>H</sub>                              | WRDR15 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX       |    |                                  |    |                          |
| 000900 <sub>H</sub>                              | TPUUNLOCK [R/W] W<br>00000000 00000000 00000000 00000000    |    |                                  |    | Time Protection Unit [S] |
| 000904 <sub>H</sub>                              | TPULST [R] B,H,W<br>-----0                                  | —  | TPUVST [R/W]<br>B,H,W<br>----000 | —  |                          |
| 000908 <sub>H</sub>                              | TPUCFG [R/W] B,H,W<br>-----0 0-000000 -----0                |    |                                  |    |                          |
| 00090C <sub>H</sub>                              | TPUTIR [R] B,H,W<br>00000000                                | —  | —                                | —  |                          |
| 000910 <sub>H</sub>                              | TPUTST [R] B,H,W<br>00000000                                | —  | —                                | —  |                          |
| 000914 <sub>H</sub>                              | TPUTIE [R/W] B,H,W<br>00000000                              | —  | —                                | —  |                          |
| 000918 <sub>H</sub>                              | TPUTMID [R] B,H,W<br>00000000 00000000 00000000 00000000    |    |                                  |    |                          |
| 00091C <sub>H</sub><br>to<br>00092C <sub>H</sub> | —                                                           | —  | —                                | —  |                          |
| 000930 <sub>H</sub>                              | TPUTCN00 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 000934 <sub>H</sub>                              | TPUTCN01 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 000938 <sub>H</sub>                              | TPUTCN02 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 00093C <sub>H</sub>                              | TPUTCN03 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 000940 <sub>H</sub>                              | TPUTCN04 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 000944 <sub>H</sub>                              | TPUTCN05 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 000948 <sub>H</sub>                              | TPUTCN06 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 00094C <sub>H</sub>                              | TPUTCN07 [R/W] B,H,W<br>000000-- 00000000 00000000 00000000 |    |                                  |    |                          |
| 000950 <sub>H</sub>                              | TPUTCN10 [R/W]<br>B,H,W<br>---00000                         | —  | —                                | —  |                          |

| Address             | Address offset value / Register name                 |    |                                    |    | Block                    |
|---------------------|------------------------------------------------------|----|------------------------------------|----|--------------------------|
|                     | +0                                                   | +1 | +2                                 | +3 |                          |
| 000C4C <sub>H</sub> | DDAR4 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    | DMA<br>Controller<br>[S] |
| 000C50 <sub>H</sub> | DCCR5 [R/W] W<br>0----000 --00--00 00000000 0-000000 |    |                                    |    |                          |
| 000C54 <sub>H</sub> | DCSR5 [R/W] H<br>0----- ----000                      |    | DTCR5 [R/W] H<br>00000000 00000000 |    |                          |
| 000C58 <sub>H</sub> | DSAR5 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C5C <sub>H</sub> | DDAR5 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C60 <sub>H</sub> | DCCR6 [R/W] W<br>0----000 --00--00 00000000 0-000000 |    |                                    |    |                          |
| 000C64 <sub>H</sub> | DCSR6 [R/W] H<br>0----- ----000                      |    | DTCR6 [R/W] H<br>00000000 00000000 |    |                          |
| 000C68 <sub>H</sub> | DSAR6 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C6C <sub>H</sub> | DDAR6 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C70 <sub>H</sub> | DCCR7 [R/W] W<br>0----000 --00--00 00000000 0-000000 |    |                                    |    |                          |
| 000C74 <sub>H</sub> | DCSR7 [R/W] H<br>0----- ----000                      |    | DTCR7 [R/W] H<br>00000000 00000000 |    |                          |
| 000C78 <sub>H</sub> | DSAR7 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C7C <sub>H</sub> | DDAR7 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C80 <sub>H</sub> | DCCR8 [R/W] W<br>0----000 --00--00 00000000 0-000000 |    |                                    |    |                          |
| 000C84 <sub>H</sub> | DCSR8 [R/W] H<br>0----- ----000                      |    | DTCR8 [R/W] H<br>00000000 00000000 |    |                          |
| 000C88 <sub>H</sub> | DSAR8 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C8C <sub>H</sub> | DDAR8 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C90 <sub>H</sub> | DCCR9 [R/W] W<br>0----000 --00--00 00000000 0-000000 |    |                                    |    |                          |
| 000C94 <sub>H</sub> | DCSR9 [R/W] H<br>0----- ----000                      |    | DTCR9 [R/W] H<br>00000000 00000000 |    |                          |
| 000C98 <sub>H</sub> | DSAR9 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |
| 000C9C <sub>H</sub> | DDAR9 [R/W] W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |                                    |    |                          |

| Address             | Address offset value / Register name                 |                                                      |                                                      |                                                                | Block                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | +0                                                   | +1                                                   | +2                                                   | +3                                                             |                                                                                                                                                                                                                                                                                                                             |
| 001878 <sub>H</sub> | — /(SCSTR37)/<br>(LAMSR7)<br>[R/W] B,H,W<br>----- *3 | — /(SCSTR27)/<br>(LAMCR7)<br>[R/W] B,H,W<br>----- *3 | — /(SCSTR17)/<br>(SFLR17)<br>[R/W] B,H,W<br>----- *3 | — /(SCSTR07)/<br>(SFLR07)<br>[R/W] B,H,W<br>----- *3           | Multi-UART7<br><br>*3: Reserved because CSIO mode is not set immediately after reset.                                                                                                                                                                                                                                       |
| 00187C <sub>H</sub> | —                                                    | — /(SCSFR27)<br>[R/W] B,H,W<br>----- *3              | — /(SCSFR17)<br>[R/W] B,H,W<br>----- *3              | — /(SCSFR07)<br>[R/W] B,H,W<br>----- *3                        |                                                                                                                                                                                                                                                                                                                             |
| 001880 <sub>H</sub> | —/(TBYTE37)/<br>(LAMESR7)<br>[R/W] B,H,W<br>----- *3 | —/(TBYTE27)/<br>(LAMERT7)<br>[R/W] B,H,W<br>----- *3 | —/(TBYTE17)/<br>(LAMIER7)<br>[R/W] B,H,W<br>----- *3 | TBYTE07/(LAMRID7)<br>/<br>(LAMTID7)<br>[R/W] B,H,W<br>00000000 | *4: Reserved because LIN2.1 mode is not set immediately after reset.                                                                                                                                                                                                                                                        |
| 001884 <sub>H</sub> | BGR7[R/W] H, W<br>00000000 00000000                  |                                                      | — /(ISMK7)[R/W]<br>B,H,W<br>----- *2                 | — /(ISBA7)[R/W]<br>B,H,W<br>----- *2                           |                                                                                                                                                                                                                                                                                                                             |
| 001888 <sub>H</sub> | FCR17[R/W]<br>B,H,W<br>---00100                      | FCR07[R/W]<br>B,H,W<br>-0000000                      | FBYTE7[R/W] B,H,W<br>00000000 00000000               |                                                                | Multi-UART7                                                                                                                                                                                                                                                                                                                 |
| 00188C <sub>H</sub> | FTICR7[R/W] B,H,W<br>00000000 00000000               |                                                      | —                                                    | —                                                              |                                                                                                                                                                                                                                                                                                                             |
| 001890 <sub>H</sub> | SCR8/(IBCR8) [R/W]<br>B,H,W<br>0--00000              | SMR8[R/W] B,H,W<br>000-00-0                          | SSR8[R/W] B,H,W<br>0-000011                          | ESCR8/(IBSR8)[R/W]<br>] B,H,W<br>00000000                      | Multi-UART8<br><br>*1: Byte access is possible only for access to lower 8 bits.<br><br>*2: Reserved because I <sup>2</sup> C mode is not set immediately after reset.<br><br>*3: Reserved because CSIO mode is not set immediately after reset.<br><br>*4: Reserved because LIN2.1 mode is not set immediately after reset. |
| 001894 <sub>H</sub> | — /(RDR18/(TDR18))[R/W] B,H,W<br>----- *3            |                                                      | RDR08/(TDR08)[R/W] B,H,W<br>-----0 00000000 *1       |                                                                |                                                                                                                                                                                                                                                                                                                             |
| 001898 <sub>H</sub> | SACSR8[R/W] B,H,W<br>0----000 00000000               |                                                      | STMR8[R] B,H,W<br>00000000 00000000                  |                                                                |                                                                                                                                                                                                                                                                                                                             |
| 00189C <sub>H</sub> | STMCR8[R/W] B,H,W<br>00000000 00000000               |                                                      | — /(SCSCR8/SFUR8)[R/W] B,H,W<br>----- *3 *4          |                                                                |                                                                                                                                                                                                                                                                                                                             |
| 0018A0 <sub>H</sub> | — /(SCSTR38)/<br>(LAMSR8)<br>[R/W] B,H,W<br>----- *3 | — /(SCSTR28)/<br>(LAMCR8)<br>[R/W] B,H,W<br>----- *3 | — /(SCSTR18)/<br>(SFLR18)<br>[R/W] B,H,W<br>----- *3 | — /(SCSTR08)/<br>(SFLR08)<br>[R/W] B,H,W<br>----- *3           |                                                                                                                                                                                                                                                                                                                             |
| 0018A4 <sub>H</sub> | —                                                    | — /(SCSFR28)<br>[R/W] B,H,W<br>----- *3              | — /(SCSFR18)<br>[R/W] B,H,W<br>----- *3              | — /(SCSFR08)<br>[R/W] B,H,W<br>----- *3                        |                                                                                                                                                                                                                                                                                                                             |
| 0018A8 <sub>H</sub> | —/(TBYTE38)/<br>(LAMESR8)<br>[R/W] B,H,W<br>----- *3 | —/(TBYTE28)/<br>(LAMERT8)<br>[R/W] B,H,W<br>----- *3 | —/(TBYTE18)/<br>(LAMIER8)<br>[R/W] B,H,W<br>----- *3 | TBYTE08/(LAMRID8)<br>/<br>(LAMTID8)<br>[R/W] B,H,W<br>00000000 |                                                                                                                                                                                                                                                                                                                             |
| 0018AC <sub>H</sub> | BGR8[R/W] H,W<br>00000000 00000000                   |                                                      | — /(ISMK8)[R/W]<br>B,H,W<br>----- *2                 | — /(ISBA8)[R/W]<br>B,H,W<br>----- *2                           |                                                                                                                                                                                                                                                                                                                             |

| Address             | Address offset value / Register name   |    |                                       |    | Block                          |
|---------------------|----------------------------------------|----|---------------------------------------|----|--------------------------------|
|                     | +0                                     | +1 | +2                                    | +3 |                                |
| 001A30 <sub>H</sub> | —                                      | —  | —                                     | —  | Reserved                       |
| 001A34 <sub>H</sub> | —                                      | —  | —                                     | —  |                                |
| 001A38 <sub>H</sub> | GTREN0 [R/W] H,W<br>00000000 00000000  |    | GTREN1 [R/W] H,W<br>00000000 00000000 |    | PPG<br>controller              |
| 001A3C <sub>H</sub> | GTREN2 [R/W] H,W<br>00000000 00000000  |    | —                                     | —  |                                |
| 001A40 <sub>H</sub> | PCN0 [R/W] B,H,W<br>00000000 000000-0  |    | PCSR0 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PPG0<br>* for<br>communication |
| 001A44 <sub>H</sub> | PDUT0 [W] H,W<br>XXXXXXXX XXXXXXXX     |    | PTMR0 [R] H,W<br>11111111 11111111    |    |                                |
| 001A48 <sub>H</sub> | PCN200 [R/W] B,H,W<br>--000000 ----110 |    | PSDR0 [R/W] H,W<br>00000000 00000000  |    |                                |
| 001A4C <sub>H</sub> | PTPC0 [R/W] H,W<br>00000000 00000000   |    | PCMDWD0 [R/W] B,H,W<br>----- ----0000 |    |                                |
| 001A50 <sub>H</sub> | PHCSR0 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PLCSR0 [W] H,W<br>XXXXXXXX XXXXXXXX   |    |                                |
| 001A54 <sub>H</sub> | PHDUT0 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PLDUT0 [W] H,W<br>XXXXXXXX XXXXXXXX   |    |                                |
| 001A58 <sub>H</sub> | PCMDDT0 [R/W] H,W<br>00000000 00000000 |    | —                                     | —  |                                |
| 001A5C <sub>H</sub> | PCN1 [R/W] B,H,W<br>00000000 000000-0  |    | PCSR1 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PPG1<br>* for<br>communication |
| 001A60 <sub>H</sub> | PDUT1 [W] H,W<br>XXXXXXXX XXXXXXXX     |    | PTMR1 [R] H,W<br>11111111 11111111    |    |                                |
| 001A64 <sub>H</sub> | PCN201 [R/W] B,H,W<br>--000000 ----110 |    | PSDR1 [R/W] H,W<br>00000000 00000000  |    | PPG1<br>* for<br>communication |
| 001A68 <sub>H</sub> | PTPC1 [R/W] H,W<br>00000000 00000000   |    | PCMDWD1 [R/W] B,H,W<br>----- ----0000 |    |                                |
| 001A6C <sub>H</sub> | PHCSR1 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PLCSR1 [W] H,W<br>XXXXXXXX XXXXXXXX   |    |                                |
| 001A70 <sub>H</sub> | PHDUT1 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PLDUT1 [W] H,W<br>XXXXXXXX XXXXXXXX   |    |                                |
| 001A74 <sub>H</sub> | PCMDDT1 [R/W] H,W<br>00000000 00000000 |    | —                                     | —  |                                |
| 001A78 <sub>H</sub> | PCN2 [R/W] B,H,W<br>00000000 000000-0  |    | PCSR2 [W] H,W<br>XXXXXXXX XXXXXXXX    |    | PPG2<br>* for<br>communication |
| 001A7C <sub>H</sub> | PDUT2 [W] H,W<br>XXXXXXXX XXXXXXXX     |    | PTMR2 [R] H,W<br>11111111 11111111    |    |                                |

| Address                                          | Address offset value / Register name      |    |                                           |    | Block           |
|--------------------------------------------------|-------------------------------------------|----|-------------------------------------------|----|-----------------|
|                                                  | +0                                        | +1 | +2                                        | +3 |                 |
| 002254 <sub>H</sub>                              | IF2DTB12 [R/W] B,H,W<br>00000000 00000000 |    | IF2DTB22 [R/W] B,H,W<br>00000000 00000000 |    | CAN2<br>(64msb) |
| 002258 <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 00225C <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 002260 <sub>H</sub> ,<br>002264 <sub>H</sub>     | Reserved (IF2 data mirror)                |    |                                           |    |                 |
| 002268 <sub>H</sub><br>to<br>00227C <sub>H</sub> | —                                         |    |                                           |    |                 |
| 002280 <sub>H</sub>                              | TREQR22 [R] B,H,W<br>00000000 00000000    |    | TREQR12 [R] B,H,W<br>00000000 00000000    |    |                 |
| 002284 <sub>H</sub>                              | TREQR42 [R] B,H,W<br>00000000 00000000    |    | TREQR32 [R] B,H,W<br>00000000 00000000    |    |                 |
| 002288 <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 00228C <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 002290 <sub>H</sub>                              | NEWDT22 [R] B,H,W<br>00000000 00000000    |    | NEWDT12 [R] B,H,W<br>00000000 00000000    |    |                 |
| 002294 <sub>H</sub>                              | NEWDT42 [R] B,H,W<br>00000000 00000000    |    | NEWDT32 [R] B,H,W<br>00000000 00000000    |    |                 |
| 002298 <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 00229C <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 0022A0 <sub>H</sub>                              | INTPND22 [R] B,H,W<br>00000000 00000000   |    | INTPND12 [R] B,H,W<br>00000000 00000000   |    |                 |
| 0022A4 <sub>H</sub>                              | INTPND42 [R] B,H,W<br>00000000 00000000   |    | INTPND32 [R] B,H,W<br>00000000 00000000   |    |                 |
| 0022A8 <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 0022AC <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 0022B0 <sub>H</sub>                              | MSGVAL22 [R] B,H,W<br>00000000 00000000   |    | MSGVAL12 [R] B,H,W<br>00000000 00000000   |    |                 |
| 0022B4 <sub>H</sub>                              | MSGVAL42 [R] B,H,W<br>00000000 00000000   |    | MSGVAL32 [R] B,H,W<br>00000000 00000000   |    |                 |
| 0022B8 <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 0022BC <sub>H</sub>                              | —                                         | —  | —                                         | —  |                 |
| 0022C0 <sub>H</sub><br>to<br>0022EC <sub>H</sub> | —                                         |    |                                           |    |                 |

| Address                                                        | Address offset value / Register name                    |    |    |    | Block        |
|----------------------------------------------------------------|---------------------------------------------------------|----|----|----|--------------|
|                                                                | +0                                                      | +1 | +2 | +3 |              |
| 006000 <sub>H</sub><br>to<br>00E <sub>FF</sub> C <sub>H</sub>  | —                                                       | —  | —  | —  | Reserved     |
| 00F000 <sub>H</sub><br>to<br>00FE <sub>FF</sub> C <sub>H</sub> | —                                                       | —  | —  | —  | Reserved [S] |
| 00FF00 <sub>H</sub>                                            | DSUCR [R/W] B,H,W<br>-----0                             |    | —  | —  | OCDU [S]     |
| 00FF04 <sub>H</sub><br>to<br>00FF0C <sub>H</sub>               | —                                                       |    |    |    | Reserved [S] |
| 00FF10 <sub>H</sub>                                            | PCSR [R/W] B,H,W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |    |    | OCDU [S]     |
| 00FF14 <sub>H</sub>                                            | PSSR [R/W] B,H,W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX |    |    |    | OCDU [S]     |
| 00FF18 <sub>H</sub><br>to<br>00FF <sub>FF</sub> 4 <sub>H</sub> | —                                                       |    |    |    | Reserved [S] |
| 00FF <sub>FF</sub> 8 <sub>H</sub>                              | EDIR1 [R] B,H,W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX  |    |    |    | OCDU [S]     |
| 00FF <sub>FF</sub> C <sub>H</sub>                              | EDIR0 [R] B,H,W<br>XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX  |    |    |    |              |

[S]: It is a system register. The illegal instruction exception (data access error) is generated in these registers in the user mode when reading and writing to it.

| Interrupt factor                                               | Interrupt number |              | Interrupt level | Offset           | Default address for TBR | RN                  |
|----------------------------------------------------------------|------------------|--------------|-----------------|------------------|-------------------------|---------------------|
|                                                                | Decimal          | Hexa decimal |                 |                  |                         |                     |
| Clock calibration unit (sub oscillation)                       | 47               | 2F           | ICR31           | 340 <sub>H</sub> | 000FFF40 <sub>H</sub>   | 31* <sup>1,*4</sup> |
| Multi-function serial interface ch.9 (reception completed)     |                  |              |                 |                  |                         |                     |
| Multi-function serial interface ch.9 (status)                  |                  |              |                 |                  |                         |                     |
| A/D converter<br>0/1/7/10/11/14/15/16/17/22/27/28/31           | 48               | 30           | ICR32           | 33C <sub>H</sub> | 000FFF3C <sub>H</sub>   | 32                  |
| Clock calibration unit (CR oscillation)                        | 49               | 31           | ICR33           | 338 <sub>H</sub> | 000FFF38 <sub>H</sub>   | 33                  |
| Multi-function serial interface ch.9 (transmission completed)  |                  |              |                 |                  |                         |                     |
| 16-bit OCU 0 (match) / 16-bit OCU 1 (match)                    |                  |              |                 |                  |                         |                     |
| 32-bit Free-run timer 4                                        | 50               | 32           | ICR34           | 334 <sub>H</sub> | 000FFF34 <sub>H</sub>   | 34* <sup>5</sup>    |
| 16-bit OCU 2 (match) / 16-bit OCU 3 (match)                    |                  |              |                 |                  |                         |                     |
| 16-bit OCU 4 (match) / 16-bit OCU 5 (match)                    |                  |              |                 |                  |                         |                     |
| 32-bit ICU6 (fetching/measurement)                             | 51               | 33           | ICR35           | 330 <sub>H</sub> | 000FFF30 <sub>H</sub>   | 35                  |
| Multi-function serial interface ch.10 (reception completed)    |                  |              |                 |                  |                         |                     |
| Multi-function serial interface ch.10 (status)                 |                  |              |                 |                  |                         |                     |
| Multi-function serial interface ch.10 (transmission completed) | 52               | 34           | ICR36           | 32C <sub>H</sub> | 000FFF2C <sub>H</sub>   | 36* <sup>1</sup>    |
| 32-bit ICU8 (fetching/measurement)                             | 53               | 35           | ICR37           | 328 <sub>H</sub> | 000FFF28 <sub>H</sub>   | 37                  |
| Multi-function serial interface ch.11 (reception completed)    |                  |              |                 |                  |                         |                     |
| Multi-function serial interface ch.11 (status)                 |                  |              |                 |                  |                         |                     |
| 32-bit ICU9 (fetching/measurement)                             | 54               | 36           | ICR38           | 324 <sub>H</sub> | 000FFF24 <sub>H</sub>   | 38* <sup>1</sup>    |
| WG dead timer underflow 0 / 1/ 2                               |                  |              |                 |                  |                         |                     |
| WG dead timer reload 0 / 1/ 2                                  |                  |              |                 |                  |                         |                     |
| WG DTTI 0                                                      | 55               | 37           | ICR39           | 320 <sub>H</sub> | 000FFF20 <sub>H</sub>   | 39                  |
| 32-bit ICU4 (fetching/measurement)                             |                  |              |                 |                  |                         |                     |
| Multi-function serial interface ch.11 (transmission completed) |                  |              |                 |                  |                         |                     |
| 32-bit ICU5 (fetching/measurement)                             | 56               | 38           | ICR40           | 31C <sub>H</sub> | 000FFF1C <sub>H</sub>   | 40                  |
| A/D converter<br>32/34/35/37/38/40/41/42/43/44/45/46/47        |                  |              |                 |                  |                         |                     |
| 32-bit OCU7/11 (match)                                         |                  |              |                 |                  |                         |                     |
| 32-bit OCU8/9 (match)                                          | 57               | 39           | ICR41           | 318 <sub>H</sub> | 000FFF18 <sub>H</sub>   | 41                  |
| -                                                              | 58               | 3A           | ICR42           | 314 <sub>H</sub> | 000FFF14 <sub>H</sub>   | 42                  |
| -                                                              | 59               | 3B           | ICR43           | 310 <sub>H</sub> | 000FFF10 <sub>H</sub>   | 43                  |
| -                                                              | 60               | 3C           | ICR44           | 30C <sub>H</sub> | 000FFF0C <sub>H</sub>   | -* <sup>6</sup>     |
| -                                                              | 61               | 3D           | ICR45           | 308 <sub>H</sub> | 000FFF08 <sub>H</sub>   | -                   |
| -                                                              |                  |              |                 |                  |                         |                     |
| -                                                              |                  |              |                 |                  |                         |                     |
| DMAC0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15                      | 62               | 3E           | ICR46           | 304 <sub>H</sub> | 000FFF04 <sub>H</sub>   | -                   |
| Delay interrupt                                                | 63               | 3F           | ICR47           | 300 <sub>H</sub> | 000FFF00 <sub>H</sub>   | -                   |
| System reserved<br>(Used for REALOS™* <sup>8</sup> )           | 64               | 40           | -               | 2FC <sub>H</sub> | 000FFEFC <sub>H</sub>   | -                   |
| System reserved<br>(Used for REALOS)                           | 65               | 41           | -               | 2F8 <sub>H</sub> | 000FFE8 <sub>H</sub>    | -                   |

| Interrupt factor                                                 | Interrupt number |              | Interrupt level | Offset           | Default address for TBR | RN      |
|------------------------------------------------------------------|------------------|--------------|-----------------|------------------|-------------------------|---------|
|                                                                  | Decimal          | Hexa decimal |                 |                  |                         |         |
| Clock calibration unit (sub oscillation)                         | 47               | 2F           | ICR31           | 340 <sub>H</sub> | 000FFF40 <sub>H</sub>   | 31*1,*4 |
| Multi-function serial interface ch.9 (reception completed)       |                  |              |                 |                  |                         |         |
| Multi-function serial interface ch.9 (status)                    |                  |              |                 |                  |                         |         |
| A/D converter<br>0/1/7/10/11/12/14/15/16/17/19/22/26/27/28/31    | 48               | 30           | ICR32           | 33C <sub>H</sub> | 000FFF3C <sub>H</sub>   | 32      |
| Clock calibration unit (CR oscillation)                          | 49               | 31           | ICR33           | 338 <sub>H</sub> | 000FFF38 <sub>H</sub>   | 33      |
| Multi-function serial interface ch.9 (transmission completed)    |                  |              |                 |                  |                         |         |
| 16-bit OCU 0 (match) / 16-bit OCU 1 (match)                      |                  |              |                 |                  |                         |         |
| 32-bit Free-run timer 4                                          | 50               | 32           | ICR34           | 334 <sub>H</sub> | 000FFF34 <sub>H</sub>   | 34*5    |
| 16-bit OCU 2 (match) / 16-bit OCU 3 (match)                      |                  |              |                 |                  |                         |         |
| 32-bit Free-run timer 5                                          | 51               | 33           | ICR35           | 330 <sub>H</sub> | 000FFF30 <sub>H</sub>   | 35*5    |
| 16-bit OCU 4 (match) / 16-bit OCU 5 (match)                      |                  |              |                 |                  |                         |         |
| 32-bit ICU6 (fetching/measurement)                               | 52               | 34           | ICR36           | 32C <sub>H</sub> | 000FFF2C <sub>H</sub>   | 36*1    |
| Multi-function serial interface ch.10 (reception completed)      |                  |              |                 |                  |                         |         |
| Multi-function serial interface ch.10 (status)                   |                  |              |                 |                  |                         |         |
| Multi-function serial interface ch.10 (transmission completed)   | 53               | 35           | ICR37           | 328 <sub>H</sub> | 000FFF28 <sub>H</sub>   | 37      |
| 32-bit ICU8 (fetching/measurement)                               | 54               | 36           | ICR38           | 324 <sub>H</sub> | 000FFF24 <sub>H</sub>   | 38*1    |
| Multi-function serial interface ch.11 (reception completed)      |                  |              |                 |                  |                         |         |
| Multi-function serial interface ch.11 (status)                   |                  |              |                 |                  |                         |         |
| 32-bit ICU9 (fetching/measurement)                               | 55               | 37           | ICR39           | 320 <sub>H</sub> | 000FFF20 <sub>H</sub>   | 39      |
| WG dead timer underflow 0 / 1/ 2                                 |                  |              |                 |                  |                         |         |
| WG dead timer reload 0 / 1/ 2                                    |                  |              |                 |                  |                         |         |
| WG DTTI 0                                                        |                  |              |                 |                  |                         |         |
| 32-bit ICU4 (fetching/measurement)                               | 56               | 38           | ICR40           | 31C <sub>H</sub> | 000FFF1C <sub>H</sub>   | 40      |
| Multi-function serial interface ch.11 (transmission completed)   |                  |              |                 |                  |                         |         |
| 32-bit ICU5 (fetching/measurement)                               | 57               | 39           | ICR41           | 318 <sub>H</sub> | 000FFF18 <sub>H</sub>   | 41      |
| A/D converter<br>32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47 |                  |              |                 |                  |                         |         |
| 32-bit OCU7/11 (match)                                           | 58               | 3A           | ICR42           | 314 <sub>H</sub> | 000FFF14 <sub>H</sub>   | 42      |
| 32-bit OCU8/9 (match)                                            | 59               | 3B           | ICR43           | 310 <sub>H</sub> | 000FFF10 <sub>H</sub>   | 43      |
| -                                                                | 60               | 3C           | ICR44           | 30C <sub>H</sub> | 000FFF0C <sub>H</sub>   | -*6     |
| Base timer 1 IRQ0                                                | 61               | 3D           | ICR45           | 308 <sub>H</sub> | 000FFF08 <sub>H</sub>   | 45      |
| Base timer 1 IRQ1                                                |                  |              |                 |                  |                         |         |
| -                                                                |                  |              |                 |                  |                         |         |
| -                                                                |                  |              |                 |                  |                         |         |
| DMAC<br>0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15                    | 62               | 3E           | ICR46           | 304 <sub>H</sub> | 000FFF04 <sub>H</sub>   | -       |
| Delay interrupt                                                  | 63               | 3F           | ICR47           | 300 <sub>H</sub> | 000FFF00 <sub>H</sub>   | -       |

(3-2) [MB9152xxxE]

(T<sub>A</sub>: -40°C to +125°C, V<sub>SS</sub>=0.0V)

| Parameter                                                   | Symbol            | Pin name        | Conditions                                                         | Value |     |       | Unit  | Remarks |
|-------------------------------------------------------------|-------------------|-----------------|--------------------------------------------------------------------|-------|-----|-------|-------|---------|
|                                                             |                   |                 |                                                                    | Min   | Typ | Max   |       |         |
| Level detection voltage                                     | —                 | V <sub>CC</sub> | —                                                                  | 2.024 | 2.2 | 2.376 | V     |         |
| Level detection hysteresis width                            | —                 | V <sub>CC</sub> | —                                                                  | —     | 100 | —     | mV    |         |
| Level detection time                                        | —                 | —               | —                                                                  | —     | —   | 30    | μs    | *1      |
| Power off time                                              | t <sub>OFF1</sub> | V <sub>CC</sub> | V <sub>CC</sub> ≤ 0.2V                                             | 50    | —   | —     | ms    | *2      |
|                                                             | t <sub>OFF2</sub> | V <sub>CC</sub> | V <sub>CC</sub> ≤ 1.3V                                             | 100   | —   | —     | μs    | *4      |
| Power ramp rate                                             | dV/dt             | V <sub>CC</sub> | V <sub>CC</sub> :<br>0.2V to 2.376V<br>(t <sub>OFF1</sub> < 50ms)  | —     | —   | 50    | mV/μs | *3      |
|                                                             | dV/dt             | V <sub>CC</sub> | V <sub>CC</sub> :<br>1.3V to 2.376V<br>(t <sub>OFF2</sub> ≥ 100μs) | —     | —   | 1000  | mV/μs | *4      |
| C pin voltage at Power-on                                   | —                 | C               | —                                                                  | —     | —   | 60    | mV    | *5      |
| Maximum ramp rate guaranteed to not generate power-on reset | dV/dt             | V <sub>CC</sub> | V <sub>CC</sub> :<br>Between 2.4V and 4.5V                         | —     | —   | 50    | mV/μs | *6      |

\*1: The specified level detection time applies only for power ramp rate of 1000mV/μs or less.

\*2: V<sub>CC</sub> must be held below 0.2V for a minimum period of t<sub>OFF1</sub>.

\*3: Power-on can detect by satisfying power ramp rate when t<sub>OFF1</sub> is not satisfied.

\*4: V<sub>CC</sub> must be held below 1.3V for a minimum period of t<sub>OFF2</sub>.

Power ramp rate must be 1000mV/μs or less from 1.3V to 2.376V.

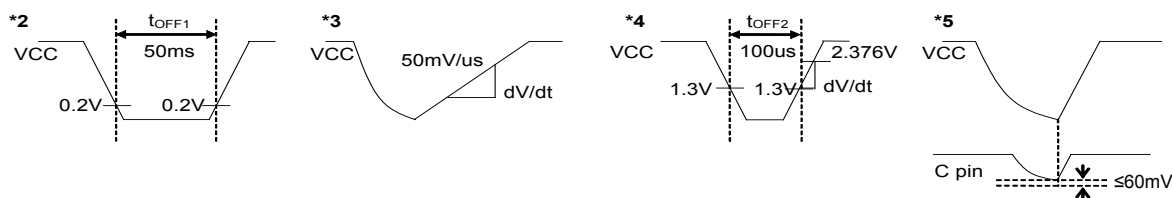
Power-on can detect by satisfying power ramp rate and power off time.

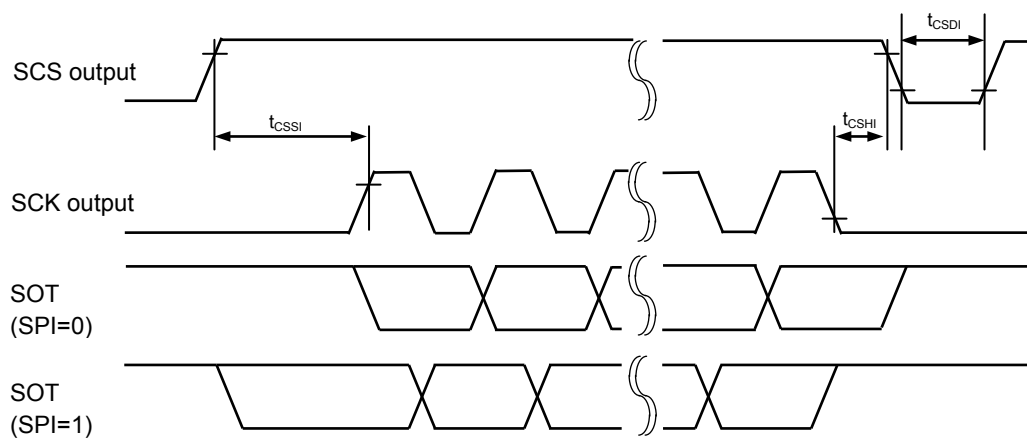
\*5: C-pin voltage is below 60 mV when V<sub>CC</sub> is turned on again.

\*6: This specification is specified the power supply fluctuation after power on detection. When V<sub>CC</sub> voltage is between 2.4V and 4.5V, the power supply fluctuation is below 50mV/us, the detection of power-on is suppressed. The power-on does not detect in any power fluctuation between 4.5V and 5.5V.

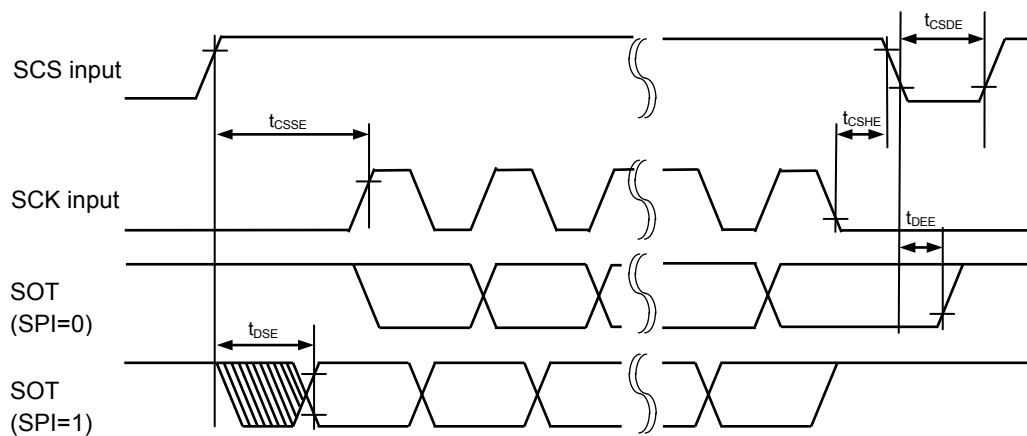
Note: When using MB91F52xxxE, either \*2 or \*3 or \*4 or \*5 must be satisfied. When neither \*2 nor \*3 nor \*4 nor \*5 can be satisfied, assert external reset (RSTX) at power-up and at any brownout event.

## • Power off time, Power ramp rate, C pin voltage at Power-on

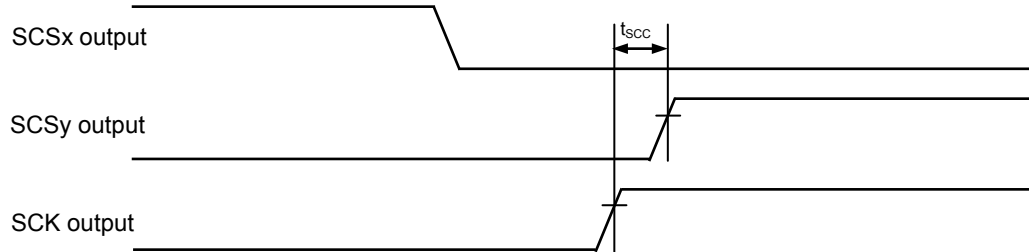




When Serial chip select is used , Serial clock output mark level "L",  
Serial chip select Inactive level "L"  
Master mode



When Serial chip select is used , Serial clock output mark level "L",  
Serial chip select Inactive level "L"  
Slave mode



When Serial chip select is used , Serial clock output mark level "L",  
Serial chip select Inactive level "L"  
Master mode, Example of switching clock by round operation (x,y=0,1,2,3)

**D/A converter**

(T<sub>A</sub>: -40°C to +125°C, V<sub>CC</sub>=AV<sub>CC</sub>=5.0V±10%/V<sub>CC</sub>=AV<sub>CC</sub>=3.3V±0.3V, V<sub>SS</sub>=AV<sub>SS</sub>=0.0V)

| Parameter                    | Symbol          | Pin name | Condition | Value |      |       | Unit | Remarks                        |
|------------------------------|-----------------|----------|-----------|-------|------|-------|------|--------------------------------|
|                              |                 |          |           | Min   | Typ  | Max   |      |                                |
| Resolution                   | -               | -        | —         | —     | —    | 8     | bit  |                                |
| Differential linearity error | -               | -        | —         | —     | —    | ± 3.0 | LSB  |                                |
| Conversion time              | -               | -        | —         | 0.47  | 0.58 | 0.69  | μs   | C <sub>L</sub> =20             |
|                              |                 |          | —         | 2.37  | 2.90 | 3.43  | μs   | C <sub>L</sub> =100            |
| Output impedance             | R <sub>o</sub>  | DA0, DA1 | —         | 3.1   | 3.8  | 4.5   | kΩ   |                                |
| Power supply current<br>*1   | I <sub>A</sub>  | AVCC     | —         | —     | 475  | 580   | μA   | Each channel                   |
|                              | I <sub>AH</sub> | AVCC     | —         | —     | —    | 7.5   | μA   | When powerdown<br>Each channel |

\*1: The power supply current described only current value on D/A converter.

The total AV<sub>CC</sub> current value must be calculated the power supply current for D/A converter and A/D converter.

| Part number     | Sub clock | CSV Initial value | LVD Initial value | Package*                 |
|-----------------|-----------|-------------------|-------------------|--------------------------|
| MB91F526BWDPMC1 | Yes       | ON                | ON                | LQD • 64 pin,<br>Plastic |
| MB91F526BJDPMC1 |           | OFF               | ON                |                          |
| MB91F525BWDPMC1 |           | ON                | ON                |                          |
| MB91F525BJDPMC1 |           | OFF               | ON                |                          |
| MB91F524BWDPMC1 |           | ON                | ON                |                          |
| MB91F524BJDPMC1 |           | OFF               | ON                |                          |
| MB91F523BWDPMC1 |           | ON                | ON                |                          |
| MB91F523BJDPMC1 |           | OFF               | ON                |                          |
| MB91F522BWDPMC1 |           | ON                | ON                |                          |
| MB91F522BJDPMC1 |           | OFF               | ON                |                          |
| MB91F526BSDPMC1 | None      | ON                | ON                |                          |
| MB91F526BHDPHC1 |           | OFF               | ON                |                          |
| MB91F525BSDPMC1 |           | ON                | ON                |                          |
| MB91F525BHDPHC1 |           | OFF               | ON                |                          |
| MB91F524BSDPMC1 |           | ON                | ON                |                          |
| MB91F524BHDPHC1 |           | OFF               | ON                |                          |
| MB91F523BSDPMC1 |           | ON                | ON                |                          |
| MB91F523BHDPHC1 |           | OFF               | ON                |                          |
| MB91F522BSDPMC1 |           | ON                | ON                |                          |
| MB91F522BHDPHC1 |           | OFF               | ON                |                          |

\*: For details of the package, see "■ PACKAGE DIMENSIONS".

| Page                      | Section                                                                      | Change Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 143                       | ■Electrical Characteristics<br>1. Absolute Maximum Ratings                   | The following note added.<br><br>(Correct)<br>*9: Corresponding pins: General-purpose ports other than those of P103, P104, P105 and P106.<br>*10: Corresponding pins: General-purpose ports of P103, P104, P105 and P106.                                                                                                                                                                                                                                                                                         |
| 155                       | ■Electrical Characteristics<br>AC Characteristics<br>(2) Reset Input         | Added the At power-on <sup>2</sup> condition to the remarks in Reset input time.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 156                       | ■Electrical Characteristics<br>AC Characteristics<br>(3) Power-on Conditions | Deleted the Slope detection undetected specification.<br>Added the Power ramp rate and C pin voltage at Power-on.<br>*1, *2: Changed the sentence.<br>Added *3, *4, Note, Figure at the Power off time, Power ramp rate, C pin voltage at Power-on.                                                                                                                                                                                                                                                                |
| 6 to 11,<br>203 to<br>216 | ■Product lineup<br>■Ordering information                                     | Package description modified to JEDEC description.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 47                        | ■During Power-on                                                             | The following sentence modified as fdeleted from Interrupt (Error)<br>To prevent a malfunction of the voltage step-down circuit built in the device, set the voltage rising time to have 50μs or longer (between 0.2V and 2.7V) during power-on.<br><br>(Correct)<br>To prevent a malfunction of the voltage step-down circuit built in the device, the voltage rising must be monotonic increasing during power-on.<br>Power-on prohibits that the voltage goes up and down and voltage rising stops temporarily. |
| 49, 50                    | ■Block Diagram                                                               | The following Block diagram modified as follows:<br>●MB91F522B, MB91F523B, MB91F524B, MB91F525B, MB91F526B<br>●MB91F522D, MB91F523D, MB91F524D, MB91F525D, MB91F526D<br>(Error)<br>CAN (2ch).<br><br>(Correct)<br>CAN (3ch)                                                                                                                                                                                                                                                                                        |
| 217 to<br>220             | ■Ordering Information                                                        | Added the following description.<br>■ORDERING INFORMATION MB91F52xxxD                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 221 to<br>227             | ■Package Dimensions                                                          | Package Dimensions modified to JEDEC description.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Page       | Section                                                                                      | Change Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 188        | 11. Electrical Characteristics<br>(9) Low voltage detection (Internal low-voltage detection) | <p>The following sentence modified as following:</p> <p>(Error)<br/>(9) Low voltage detection (RAM retention low-voltage detection)</p> <p>(Correct)<br/>(9) Low voltage detection (Internal low-voltage detection)</p>                                                                                                                                                                                                                                                                                              |
|            |                                                                                              | <p>The following symbol should be modified as follows:</p> <p>(Error)<br/>*</p> <p>(Correct)<br/>*1</p>                                                                                                                                                                                                                                                                                                                                                                                                              |
|            |                                                                                              | <p>Note of Detection voltage should be added as follows:</p> <p>(Correct)<br/>Detection voltage *2</p> <p>*2: The detection voltage of the internal low voltage detection is 0.9V±0.1V. This LVD cannot be used to reliably generate a reset before voltage dips below minimum guaranteed MCU operation voltage, as this detection level is below the minimum guaranteed MCU operation voltage. Below the minimum guaranteed MCU operation voltage, MCU operations are not guaranteed with the exception of LVD.</p> |
| 233 to 235 | 18. Errata                                                                                   | Limitation for Watch mode (power off) should be added in Errata.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Document History

Document Title: MB91520 Series 32-bit FR81S Microcontroller

Document Number: 002-04662

| Revision | ECN | Orig. of Change | Submission Date | Description of Change                                                                                                                                                                                                                                                                                                                                             |
|----------|-----|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| **       | —   | —               | —               | Initial release                                                                                                                                                                                                                                                                                                                                                   |
|          | —   | —               | 2/20/2014       | <p>Features:<br/>Corrected the following description.<br/>5V tolerant input: 4 channels ch.6, ch.8, ch.9, ch.11 Automotive input<br/>↓<br/>5V tolerant input: 4 channels ch.6, ch.8, ch.9, ch.11 CMOS hysteresis input</p> <p>I/O CIRCUIT TYPE:<br/>Corrected the following description to "Type F, G, I, J, K, M".<br/>Schmitt input → CMOS hysteresis input</p> |