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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             | F <sup>2</sup> MC-16LX                                                                                                                                                          |
| Core Size                  | 16-Bit                                                                                                                                                                          |
| Speed                      | 24MHz                                                                                                                                                                           |
| Connectivity               | CANbus, EBI/EMI, LINbus, SCI, UART/USART                                                                                                                                        |
| Peripherals                | DMA, POR, WDT                                                                                                                                                                   |
| Number of I/O              | 82                                                                                                                                                                              |
| Program Memory Size        | 128KB (128K x 8)                                                                                                                                                                |
| Program Memory Type        | Mask ROM                                                                                                                                                                        |
| EEPROM Size                | -                                                                                                                                                                               |
| RAM Size                   | 6K x 8                                                                                                                                                                          |
| Voltage - Supply (Vcc/Vdd) | 3.5V ~ 5.5V                                                                                                                                                                     |
| Data Converters            | A/D 16x8/10b                                                                                                                                                                    |
| Oscillator Type            | External                                                                                                                                                                        |
| Operating Temperature      | -40°C ~ 105°C (TA)                                                                                                                                                              |
| Mounting Type              | Surface Mount                                                                                                                                                                   |
| Package / Case             | 100-LQFP                                                                                                                                                                        |
| Supplier Device Package    | 100-LQFP (14x14)                                                                                                                                                                |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/infineon-technologies/mb90347espmc-gs-657e1">https://www.e-xfl.com/product-detail/infineon-technologies/mb90347espmc-gs-657e1</a> |

| Pin No.  |           | Pin name                  | I/O Circuit type*3 | Function                                                                                                                                                                    |
|----------|-----------|---------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QFP100*1 | LQFP100*2 |                           |                    |                                                                                                                                                                             |
| 33       | 31        | AVRH                      | L                  | Reference voltage input pin for the A/D Converter. This power supply must be turned on or off while a voltage higher than or equal to AVRH is applied to AV <sub>CC</sub> . |
| 34       | 32        | AVRL                      | K                  | Lower reference voltage input pin for the A/D Converter                                                                                                                     |
| 35       | 33        | AV <sub>SS</sub>          | K                  | Analog GND pin for the A/D Converter                                                                                                                                        |
| 36 to 43 | 34 to 41  | P60 to P67                | I                  | General purpose I/O pins.                                                                                                                                                   |
|          |           | AN0 to AN7                |                    | Analog input pins for the A/D converter                                                                                                                                     |
|          |           | PPG0, 2, 4, 6, 8, A, C, E |                    | Output pins for PPGs                                                                                                                                                        |
| 44       | 42        | V <sub>SS</sub>           | —                  | GND pin                                                                                                                                                                     |
| 45 to 50 | 43 to 48  | P70 to P75                | I                  | General purpose I/O pins.                                                                                                                                                   |
|          |           | AN16 to AN21              |                    | Analog input pins for the A/D converter (devices with a C suffix in the part number)                                                                                        |
|          |           | INT0 to INT5              |                    | External interrupt request input pins                                                                                                                                       |
| 51       | 49        | MD2                       | D                  | Input pin for specifying the operating mode.                                                                                                                                |
| 52, 53   | 50, 51    | MD1, MD0                  | C                  | Input pins for specifying the operating mode.                                                                                                                               |
| 54       | 52        | RST                       | E                  | Reset input pin                                                                                                                                                             |
| 55, 56   | 53, 54    | P76, P77                  | I                  | General purpose I/O pins.                                                                                                                                                   |
|          |           | AN22, AN23                |                    | Analog input pins for the A/D converter (devices with a C suffix in the part number)                                                                                        |
|          |           | INT6, INT7                |                    | External interrupt request input pins                                                                                                                                       |
| 57       | 55        | P80                       | F                  | General purpose I/O pin.                                                                                                                                                    |
|          |           | TIN0                      |                    | Event input pin for the reload timer                                                                                                                                        |
|          |           | ADTG                      |                    | Trigger input pin for the A/D converter                                                                                                                                     |
|          |           | INT12R                    |                    | External interrupt request input pin                                                                                                                                        |
| 58       | 56        | P81                       | F                  | General purpose I/O pin.                                                                                                                                                    |
|          |           | TOT0                      |                    | Output pin for the reload timer                                                                                                                                             |
|          |           | CKOT                      |                    | Output pin for the clock monitor                                                                                                                                            |
|          |           | INT13R                    |                    | External interrupt request input pin                                                                                                                                        |
| 59       | 57        | P82                       | M                  | General purpose I/O pin.                                                                                                                                                    |
|          |           | SIN0                      |                    | Serial data input pin for UART0                                                                                                                                             |
|          |           | TIN2                      |                    | Event input pin for the reload timer                                                                                                                                        |
|          |           | INT14R                    |                    | External interrupt request input pin                                                                                                                                        |
| 60       | 58        | P83                       | F                  | General purpose I/O pin.                                                                                                                                                    |
|          |           | SOT0                      |                    | Serial data output pin for UART0                                                                                                                                            |
|          |           | TOT2                      |                    | Output pin for the reload timer                                                                                                                                             |

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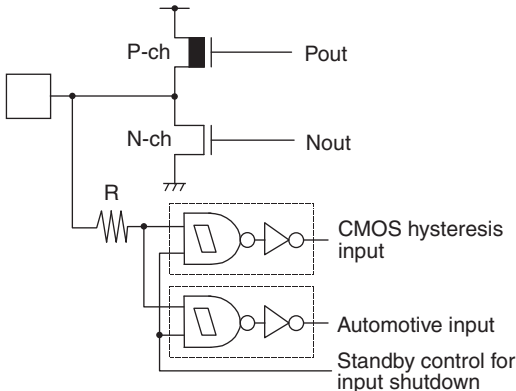
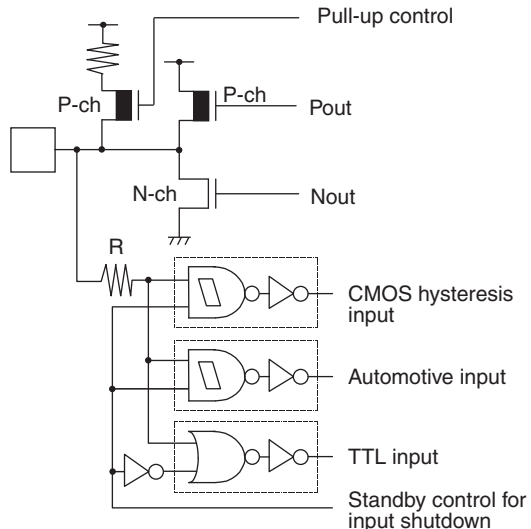
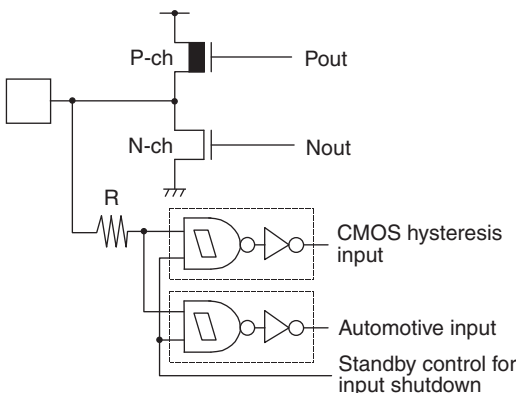
(Continued)

| Pin No.   |           | Pin name                   | I/O Circuit type*3 | Function                                                                                                                                                                                                                                                      |
|-----------|-----------|----------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QFP100*1  | LQFP100*2 |                            |                    |                                                                                                                                                                                                                                                               |
| 96        | 94        | P17                        | G                  | General purpose I/O pin. The register can be set to select whether to use a pull-up resistor.<br>This function is enabled in single-chip mode.                                                                                                                |
|           |           | AD15                       |                    | I/O pin for the external address/data bus. This function is enabled when the external bus is enabled.                                                                                                                                                         |
| 97 to 100 | 95 to 98  | P20 to P23                 | G                  | General purpose I/O pins. The register can be set to select whether to use a pull-up resistor. In external bus mode, the pin is enabled as a general-purpose I/O port when the corresponding bit in the external address output control register (HACR) is 1. |
|           |           | A16 to A19                 |                    | Output pins of the external address bus. When the corresponding bit in the external address output control register (HACR) is 0, the pins are enabled as high address output pins (A16 to A19).                                                               |
|           |           | PPG9, PPGB, PP<br>GD, PPGF |                    | Output pins for PPGs                                                                                                                                                                                                                                          |

1 : FPT-100P-M06

2 : FPT-100P-M20

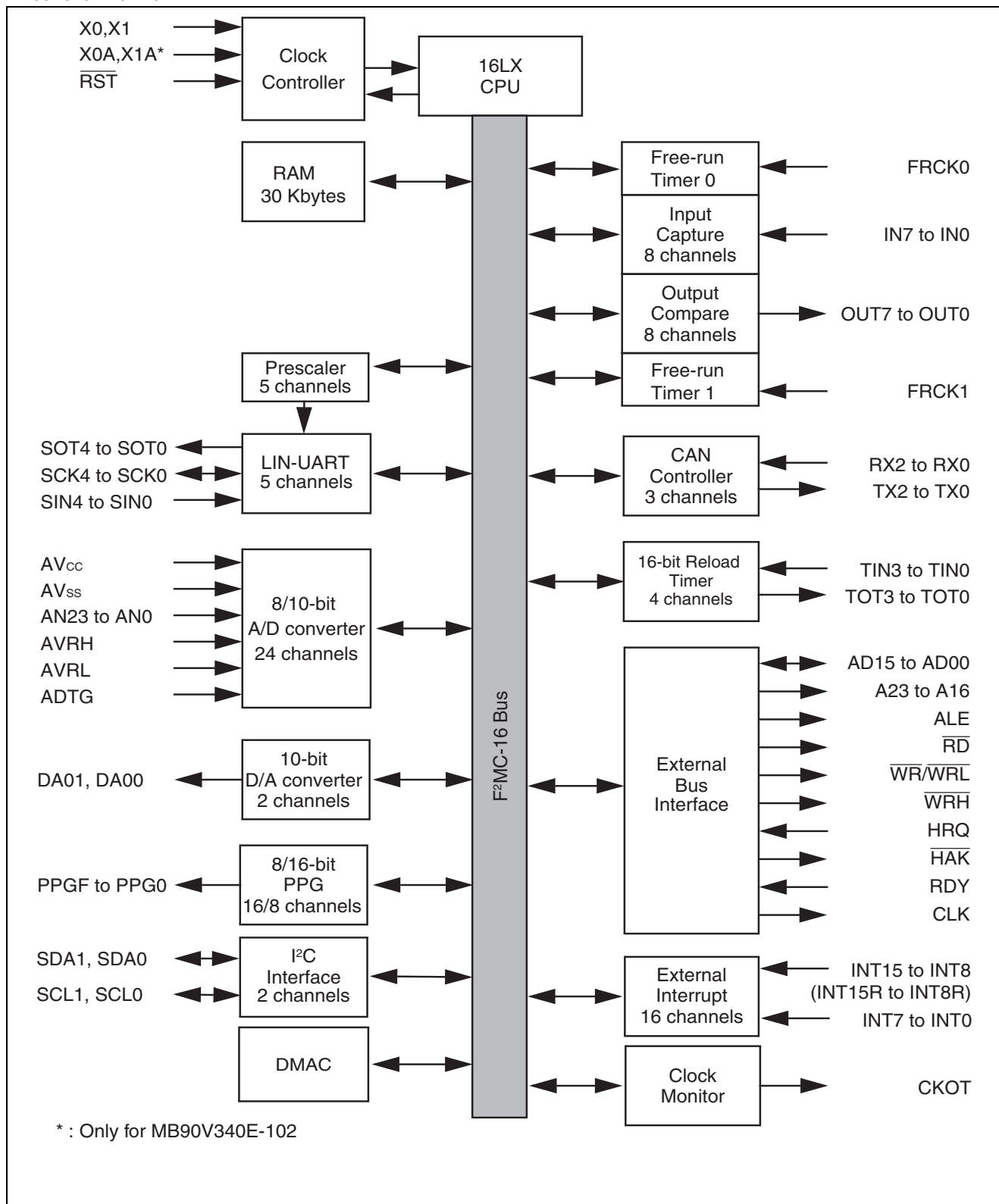
3 : For I/O circuit type, refer to "I/O Circuit Type".

| Type | Circuit                                                                             | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F    |    | <ul style="list-style-type: none"> <li>■ CMOS level output (<math>I_{OL} = 4 \text{ mA}</math>, <math>I_{OH} = -4 \text{ mA}</math>)</li> <li>■ CMOS hysteresis input (with function to disconnect input during standby)</li> <li>■ Automotive input (with function to disconnect input during standby)</li> </ul>                                                                                                                                                   |
| G    |   | <ul style="list-style-type: none"> <li>■ CMOS level output (<math>I_{OL} = 4 \text{ mA}</math>, <math>I_{OH} = -4 \text{ mA}</math>)</li> <li>■ CMOS hysteresis input (with function to disconnect input during standby)</li> <li>■ Automotive input (with function to disconnect input during standby)</li> <li>■ TTL input (with function to disconnect input during standby)</li> <li>■ Programmable pull-up resistor: 50 k<math>\Omega</math> approx.</li> </ul> |
| H    |  | <ul style="list-style-type: none"> <li>■ CMOS level output (<math>I_{OL} = 3 \text{ mA}</math>, <math>I_{OH} = -3 \text{ mA}</math>)</li> <li>■ CMOS hysteresis input (with function to disconnect input during standby)</li> <li>■ Automotive input (with function to disconnect input during standby)</li> </ul>                                                                                                                                                   |

(Continued)

## 6. Block Diagrams

### ■ MB90V340E-101/102



| Address             | Register                                 | Abbreviation | Access | Resource name      | Initial value         |
|---------------------|------------------------------------------|--------------|--------|--------------------|-----------------------|
| 000040 <sub>H</sub> | PPG 8 Operation Mode Control Register    | PPGC8        | W,R/W  | 16-bit PPG 8/9     | 0X000XX1 <sub>B</sub> |
| 000041 <sub>H</sub> | PPG 9 Operation Mode Control Register    | PPGC9        | W,R/W  |                    | 0X000001 <sub>B</sub> |
| 000042 <sub>H</sub> | PPG 8/PPG 9 Count Clock Control Register | PPG89        | R/W    |                    | 000000X0 <sub>B</sub> |
| 000043 <sub>H</sub> | Reserved                                 |              |        |                    |                       |
| 000044 <sub>H</sub> | PPG A Operation Mode Control Register    | PPGCA        | W,R/W  | 16-bit PPG A/B     | 0X000XX1 <sub>B</sub> |
| 000045 <sub>H</sub> | PPG B Operation Mode Control Register    | PPGCB        | W,R/W  |                    | 0X000001 <sub>B</sub> |
| 000046 <sub>H</sub> | PPG A/PPG B Count Clock Select Register  | PPGAB        | R/W    |                    | 000000X0 <sub>B</sub> |
| 000047 <sub>H</sub> | Reserved                                 |              |        |                    |                       |
| 000048 <sub>H</sub> | PPG C Operation Mode Control Register    | PPGCC        | W,R/W  | 16-bit PPG C/D     | 0X000XX1 <sub>B</sub> |
| 000049 <sub>H</sub> | PPG D Operation Mode Control Register    | PPGCD        | W,R/W  |                    | 0X000001 <sub>B</sub> |
| 00004A <sub>H</sub> | PPG C/PPG D Count Clock Select Register  | PPGCD        | R/W    |                    | 000000X0 <sub>B</sub> |
| 00004B <sub>H</sub> | Reserved                                 |              |        |                    |                       |
| 00004C <sub>H</sub> | PPG E Operation Mode Control Register    | PPGCE        | W,R/W  | 16-bit PPG E/F     | 0X000XX1 <sub>B</sub> |
| 00004D <sub>H</sub> | PPG F Operation Mode Control Register    | PPGCF        | W,R/W  |                    | 0X000001 <sub>B</sub> |
| 00004E <sub>H</sub> | PPG E/PPG F Count Clock Select Register  | PPGEF        | R/W    |                    | 000000X0 <sub>B</sub> |
| 00004F <sub>H</sub> | Reserved                                 |              |        |                    |                       |
| 000050 <sub>H</sub> | Input Capture Control Status 0/1         | ICS01        | R/W    | Input Capture 0/1  | 00000000 <sub>B</sub> |
| 000051 <sub>H</sub> | Input Capture Edge 0/1                   | ICE01        | R/W, R |                    | XXX0X0XX <sub>B</sub> |
| 000052 <sub>H</sub> | Input Capture Control Status 2/3         | ICS23        | R/W    | Input Capture 2/3  | 00000000 <sub>B</sub> |
| 000053 <sub>H</sub> | Input Capture Edge 2/3                   | ICE23        | R      |                    | XXXXXXXX <sub>B</sub> |
| 000054 <sub>H</sub> | Input Capture Control Status 4/5         | ICS45        | R/W    | Input Capture 4/5  | 00000000 <sub>B</sub> |
| 000055 <sub>H</sub> | Input Capture Edge 4/5                   | ICE45        | R      |                    | XXXXXXXX <sub>B</sub> |
| 000056 <sub>H</sub> | Input Capture Control Status 6/7         | ICS67        | R/W    | Input Capture 6/7  | 00000000 <sub>B</sub> |
| 000057 <sub>H</sub> | Input Capture Edge 6/7                   | ICE67        | R/W, R |                    | XXX000XX <sub>B</sub> |
| 000058 <sub>H</sub> | Output Compare Control Status 0          | OCS0         | R/W    | Output Compare 0/1 | 0000XX00 <sub>B</sub> |
| 000059 <sub>H</sub> | Output Compare Control Status 1          | OCS1         | R/W    |                    | 0XX00000 <sub>B</sub> |
| 00005A <sub>H</sub> | Output Compare Control Status 2          | OCS2         | R/W    | Output Compare 2/3 | 0000XX00 <sub>B</sub> |
| 00005B <sub>H</sub> | Output Compare Control Status 3          | OCS3         | R/W    |                    | 0XX00000 <sub>B</sub> |
| 00005C <sub>H</sub> | Output Compare Control Status 4          | OCS4         | R/W    | Output Compare 4/5 | 0000XX00 <sub>B</sub> |
| 00005D <sub>H</sub> | Output Compare Control Status 5          | OCS5         | R/W    |                    | 0XX00000 <sub>B</sub> |
| 00005E <sub>H</sub> | Output Compare Control Status 6          | OCS6         | R/W    | Output Compare 6/7 | 0000XX00 <sub>B</sub> |
| 00005F <sub>H</sub> | Output Compare Control Status 7          | OCS7         | R/W    |                    | 0XX00000 <sub>B</sub> |

(Continued)

| Address                                          | Register                                  | Abbreviation | Access      | Resource name            | Initial value         |
|--------------------------------------------------|-------------------------------------------|--------------|-------------|--------------------------|-----------------------|
| 007948 <sub>H</sub>                              | Timer 0/Reload 0                          | TMR0/TMRLR0  | R/W         | 16-bit Reload<br>Timer 0 | XXXXXXXX <sub>B</sub> |
| 007949 <sub>H</sub>                              |                                           |              | R/W         |                          | XXXXXXXX <sub>B</sub> |
| 00794A <sub>H</sub>                              | Timer 1/Reload 1                          | TMR1/TMRLR1  | R/W         | 16-bit Reload<br>Timer 1 | XXXXXXXX <sub>B</sub> |
| 00794B <sub>H</sub>                              |                                           |              | R/W         |                          | XXXXXXXX <sub>B</sub> |
| 00794C <sub>H</sub>                              | Timer 2/Reload 2                          | TMR2/TMRLR2  | R/W         | 16-bit Reload<br>Timer 2 | XXXXXXXX <sub>B</sub> |
| 00794D <sub>H</sub>                              |                                           |              | R/W         |                          | XXXXXXXX <sub>B</sub> |
| 00794E <sub>H</sub>                              | Timer 3/Reload 3                          | TMR3/TMRLR3  | R/W         | 16-bit Reload<br>Timer 3 | XXXXXXXX <sub>B</sub> |
| 00794F <sub>H</sub>                              |                                           |              | R/W         |                          | XXXXXXXX <sub>B</sub> |
| 007950 <sub>H</sub>                              | Serial Mode Register 3                    | SMR3         | W,R/W       | UART3                    | 00000000 <sub>B</sub> |
| 007951 <sub>H</sub>                              | Serial Control Register 3                 | SCR3         | W,R/W       |                          | 00000000 <sub>B</sub> |
| 007952 <sub>H</sub>                              | Reception/Transmission Data Register 3    | RDR3/TDR3    | R/W         |                          | 00000000 <sub>B</sub> |
| 007953 <sub>H</sub>                              | Serial Status Register 3                  | SSR3         | R,R/W       |                          | 00001000 <sub>B</sub> |
| 007954 <sub>H</sub>                              | Extended Communication Control Register 3 | ECCR3        | R,W,<br>R/W |                          | 000000XX <sub>B</sub> |
| 007955 <sub>H</sub>                              | Extended Status Control Register          | ESCR3        | R/W         |                          | 00000100 <sub>B</sub> |
| 007956 <sub>H</sub>                              | Baud Rate Generator Register 30           | BGR30        | R/W         |                          | 00000000 <sub>B</sub> |
| 007957 <sub>H</sub>                              | Baud Rate Generator Register 31           | BGR31        | R/W         |                          | 00000000 <sub>B</sub> |
| 007958 <sub>H</sub>                              | Serial Mode Register 4                    | SMR4         | W,R/W       | UART4                    | 00000000 <sub>B</sub> |
| 007959 <sub>H</sub>                              | Serial Control Register 4                 | SCR4         | W,R/W       |                          | 00000000 <sub>B</sub> |
| 00795A <sub>H</sub>                              | Reception/Transmission Data Register 4    | RDR4/TDR4    | R/W         |                          | 00000000 <sub>B</sub> |
| 00795B <sub>H</sub>                              | Serial Status Register 4                  | SSR4         | R,R/W       |                          | 00001000 <sub>B</sub> |
| 00795C <sub>H</sub>                              | Extended Communication Control Register 4 | ECCR4        | R,W,<br>R/W |                          | 000000XX <sub>B</sub> |
| 00795D <sub>H</sub>                              | Extended Status Control Register          | ESCR4        | R/W         |                          | 00000100 <sub>B</sub> |
| 00795E <sub>H</sub>                              | Baud Rate Generator Register 40           | BGR40        | R/W         |                          | 00000000 <sub>B</sub> |
| 00795F <sub>H</sub>                              | Baud Rate Generator Register 41           | BGR41        | R/W         |                          | 00000000 <sub>B</sub> |
| 007960 <sub>H</sub><br>to<br>00796B <sub>H</sub> | Reserved                                  |              |             |                          |                       |
| 00796C <sub>H</sub>                              | Clock Output Enable Register              | CLKR         | R/W         | Clock Monitor            | XXXX0000 <sub>B</sub> |
| 00796D <sub>H</sub>                              | Reserved                                  |              |             |                          |                       |
| 00796E <sub>H</sub>                              | CAN Direct Mode Register                  | CDMR         | R/W         | CAN Clock sync           | XXXXXXX0 <sub>B</sub> |
| 00796F <sub>H</sub>                              | CAN Switch Register                       | CANSWR       | R/W         | CAN 0/1                  | XXXXXXX0 <sub>B</sub> |

(Continued)

**List of Message Buffers (ID Registers) (1)**

| Address                                          |                                                  | Register                | Abbreviation | Access | Initial Value                                        |
|--------------------------------------------------|--------------------------------------------------|-------------------------|--------------|--------|------------------------------------------------------|
| CAN0                                             | CAN1                                             |                         |              |        |                                                      |
| 007A00 <sub>H</sub><br>to<br>007A1F <sub>H</sub> | 007C00 <sub>H</sub><br>to<br>007C1F <sub>H</sub> | General-<br>Purpose RAM | —            | R/W    | XXXXXXXX <sub>B</sub><br>to<br>XXXXXXXX <sub>B</sub> |
| 007A20 <sub>H</sub>                              | 007C20 <sub>H</sub>                              | ID Register 0           | IDR0         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A21 <sub>H</sub>                              | 007C21 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A22 <sub>H</sub>                              | 007C22 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A23 <sub>H</sub>                              | 007C23 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A24 <sub>H</sub>                              | 007C24 <sub>H</sub>                              | ID Register 1           | IDR1         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A25 <sub>H</sub>                              | 007C25 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A26 <sub>H</sub>                              | 007C26 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A27 <sub>H</sub>                              | 007C27 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A28 <sub>H</sub>                              | 007C28 <sub>H</sub>                              | ID Register 2           | IDR2         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A29 <sub>H</sub>                              | 007C29 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A2A <sub>H</sub>                              | 007C2A <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A2B <sub>H</sub>                              | 007C2B <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A2C <sub>H</sub>                              | 007C2C <sub>H</sub>                              | ID Register 3           | IDR3         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A2D <sub>H</sub>                              | 007C2D <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A2E <sub>H</sub>                              | 007C2E <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A2F <sub>H</sub>                              | 007C2F <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A30 <sub>H</sub>                              | 007C30 <sub>H</sub>                              | ID Register 4           | IDR4         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A31 <sub>H</sub>                              | 007C31 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A32 <sub>H</sub>                              | 007C32 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A33 <sub>H</sub>                              | 007C33 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A34 <sub>H</sub>                              | 007C34 <sub>H</sub>                              | ID Register 5           | IDR5         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A35 <sub>H</sub>                              | 007C35 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A36 <sub>H</sub>                              | 007C36 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A37 <sub>H</sub>                              | 007C37 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A38 <sub>H</sub>                              | 007C38 <sub>H</sub>                              | ID Register 6           | IDR6         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A39 <sub>H</sub>                              | 007C39 <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A3A <sub>H</sub>                              | 007C3A <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A3B <sub>H</sub>                              | 007C3B <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A3C <sub>H</sub>                              | 007C3C <sub>H</sub>                              | ID Register 7           | IDR7         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A3D <sub>H</sub>                              | 007C3D <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A3E <sub>H</sub>                              | 007C3E <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |
| 007A3F <sub>H</sub>                              | 007C3F <sub>H</sub>                              |                         |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub>       |

**List of Message Buffers (ID Registers) (2)**

| Address             |                     | Register       | Abbreviation | Access | Initial Value                                  |
|---------------------|---------------------|----------------|--------------|--------|------------------------------------------------|
| CAN0                | CAN1                |                |              |        |                                                |
| 007A40 <sub>H</sub> | 007C40 <sub>H</sub> | ID Register 8  | IDR8         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A41 <sub>H</sub> | 007C41 <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A42 <sub>H</sub> | 007C42 <sub>H</sub> |                |              |        |                                                |
| 007A43 <sub>H</sub> | 007C43 <sub>H</sub> |                |              |        |                                                |
| 007A44 <sub>H</sub> | 007C44 <sub>H</sub> | ID Register 9  | IDR9         | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A45 <sub>H</sub> | 007C45 <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A46 <sub>H</sub> | 007C46 <sub>H</sub> |                |              |        |                                                |
| 007A47 <sub>H</sub> | 007C47 <sub>H</sub> |                |              |        |                                                |
| 007A48 <sub>H</sub> | 007C48 <sub>H</sub> | ID Register 10 | IDR10        | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A49 <sub>H</sub> | 007C49 <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A4A <sub>H</sub> | 007C4A <sub>H</sub> |                |              |        |                                                |
| 007A4B <sub>H</sub> | 007C4B <sub>H</sub> |                |              |        |                                                |
| 007A4C <sub>H</sub> | 007C4C <sub>H</sub> | ID Register 11 | IDR11        | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A4D <sub>H</sub> | 007C4D <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A4E <sub>H</sub> | 007C4E <sub>H</sub> |                |              |        |                                                |
| 007A4F <sub>H</sub> | 007C4F <sub>H</sub> |                |              |        |                                                |
| 007A50 <sub>H</sub> | 007C50 <sub>H</sub> | ID Register 12 | IDR12        | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A51 <sub>H</sub> | 007C51 <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A52 <sub>H</sub> | 007C52 <sub>H</sub> |                |              |        |                                                |
| 007A53 <sub>H</sub> | 007C53 <sub>H</sub> |                |              |        |                                                |
| 007A54 <sub>H</sub> | 007C54 <sub>H</sub> | ID Register 13 | IDR13        | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A55 <sub>H</sub> | 007C55 <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A56 <sub>H</sub> | 007C56 <sub>H</sub> |                |              |        |                                                |
| 007A57 <sub>H</sub> | 007C57 <sub>H</sub> |                |              |        |                                                |
| 007A58 <sub>H</sub> | 007C58 <sub>H</sub> | ID Register 14 | IDR14        | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A59 <sub>H</sub> | 007C59 <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A5A <sub>H</sub> | 007C5A <sub>H</sub> |                |              |        |                                                |
| 007A5B <sub>H</sub> | 007C5B <sub>H</sub> |                |              |        |                                                |
| 007A5C <sub>H</sub> | 007C5C <sub>H</sub> | ID Register 15 | IDR15        | R/W    | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A5D <sub>H</sub> | 007C5D <sub>H</sub> |                |              |        | XXXXXXXX <sub>B</sub><br>XXXXXXXX <sub>B</sub> |
| 007A5E <sub>H</sub> | 007C5E <sub>H</sub> |                |              |        |                                                |
| 007A5F <sub>H</sub> | 007C5F <sub>H</sub> |                |              |        |                                                |

## 11. Electrical Characteristics

### 11.1 Absolute Maximum Ratings

| Parameter                                | Symbol             | Rating         |                | Unit | Remarks                                                |
|------------------------------------------|--------------------|----------------|----------------|------|--------------------------------------------------------|
|                                          |                    | Min            | Max            |      |                                                        |
| Power supply voltage*1                   | $V_{CC}$           | $V_{SS} - 0.3$ | $V_{SS} + 6.0$ | V    |                                                        |
|                                          | $AV_{CC}$          | $V_{SS} - 0.3$ | $V_{SS} + 6.0$ | V    | $V_{CC} = AV_{CC}$ *2                                  |
|                                          | $AVRH, AVRL$       | $V_{SS} - 0.3$ | $V_{SS} + 6.0$ | V    | $AV_{CC} \geq AVRH, AV_{CC} \geq AVRL, AVRH \geq AVRL$ |
| Input voltage*1                          | $V_I$              | $V_{SS} - 0.3$ | $V_{SS} + 6.0$ | V    | *3                                                     |
| Output voltage*1                         | $V_O$              | $V_{SS} - 0.3$ | $V_{SS} + 6.0$ | V    | *3                                                     |
| Maximum Clamp Current                    | $I_{CLAMP}$        | -4.0           | +4.0           | mA   | *5                                                     |
| Total Maximum Clamp Current              | $\sum  I_{CLAMP} $ | —              | 40             | mA   | *5                                                     |
| "L" level maximum output current         | $I_{OL}$           | —              | 15             | mA   | *4, *6                                                 |
| "L" level average output current         | $I_{OLAV}$         | —              | 4              | mA   | *4, *7                                                 |
| "L" level maximum overall output current | $\sum I_{OL}$      | —              | 100            | mA   | *4                                                     |
| "L" level average overall output current | $\sum I_{OLAV}$    | —              | 50             | mA   | *4, *8                                                 |
| "H" level maximum output current         | $I_{OH}$           | —              | -15            | mA   | *4, *6                                                 |
| "H" level average output current         | $I_{OHAV}$         | —              | -4             | mA   | *4, *7                                                 |
| "H" level maximum overall output current | $\sum I_{OH}$      | —              | -100           | mA   | *4                                                     |
| "H" level average overall output current | $\sum I_{OHAV}$    | —              | -50            | mA   | *4, *8                                                 |
| Power consumption                        | $P_D$              | —              | 450            | mW   |                                                        |
| Operating temperature                    | $T_A$              | -40            | +105           | °C   |                                                        |
| Storage temperature                      | $T_{STG}$          | -55            | +150           | °C   |                                                        |

\*1: This parameter is based on  $V_{SS} = AV_{SS} = 0$  V

\*2: Set  $AV_{CC}$  and  $V_{CC}$  to the same voltage. Make sure that  $AV_{CC}$  does not exceed  $V_{CC}$  and that the voltage at the analog inputs does not exceed  $AV_{CC}$  when the power is switched on.

\*3:  $V_I$  and  $V_O$  should not exceed  $V_{CC} + 0.3$  V.  $V_I$  should not exceed the specified ratings. However if the maximum current to/from an input is limited by some means with external components, the  $I_{CLAMP}$  rating supersedes the  $V_I$  rating.

\*4: Applicable to pins: P00 to P07, P10 to P17, P20 to P27, P30 to P37, P40 to P47, P50 to P57, P60 to P67, P70 to P77, P80 to P87, P90 to P97, PA0, PA1

\*5: ● Applicable to pins: P00 to P07, P10 to P17, P20 to P27, P30 to P37, P40 to P47, P50 to P57 (Evaluation device : P50 to P55), P60 to P67, P70 to P77, P80 to P87, P90 to P97, PA0 to PA1

● Use within recommended operating conditions.

● Use with DC voltage (current)

● The +B signal should always be applied by using a limiting resistance placed between the +B signal and the microcontroller.

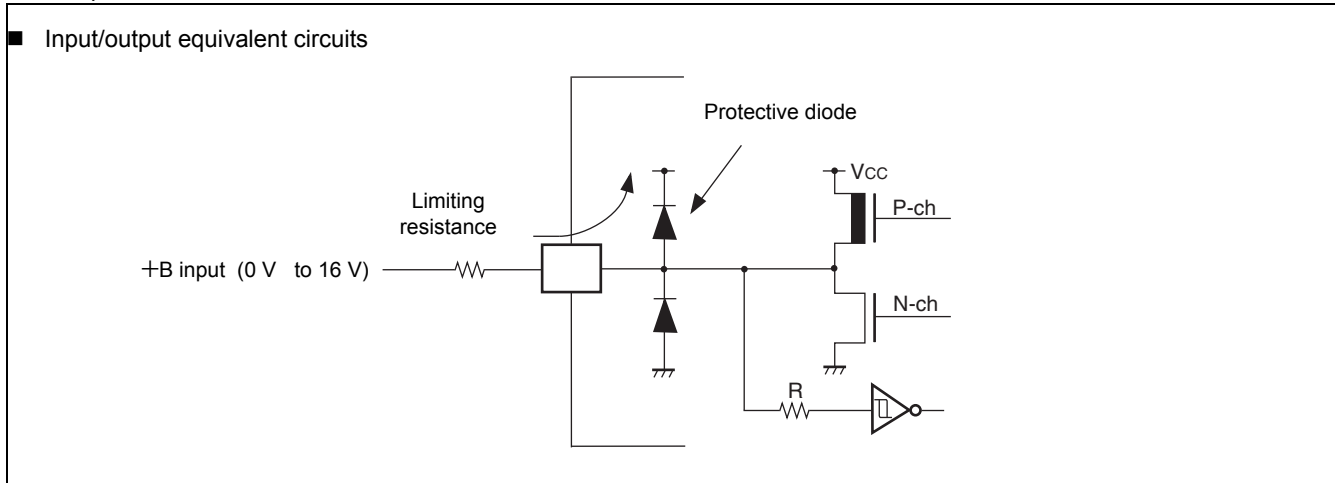
● The value of the limiting resistance should be set so that when the +B signal is applied, the input current to the microcontroller pin does not exceed the rated value, either instantaneously or for prolonged periods.

● Note that when the microcontroller drive current is low, such as in the power saving modes, the +B input potential may pass through the protective diode and increase the potential at the  $V_{CC}$  pin, and this may affect other devices.

(Continued)

(Continued)

- Note that if a +B signal is input when the microcontroller power supply is off (not fixed at 0 V) , the power supply is provided from the pins, so that incomplete operation may result.
- Note that if the +B input is applied during power-on, the power supply is provided from the pins and the resulting supply voltage may not be sufficient to operate the power-on reset.
- Care must be taken not to leave the +B input pin open.
- Sample recommended circuits:



- \*6: The maximum output current is defined as the peak value of the current of any one of the corresponding pins.
- \*7: The average output current is defined as the value of the average current flowing over 100 ms at any one of the corresponding pins.
- \*8: The average total output current is defined as the value of the average current flowing over 100 ms at all of the corresponding pins.

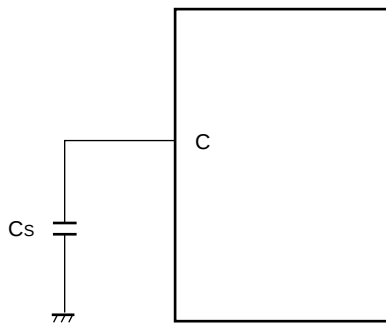
**WARNING:** Semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.

## 11.2 Recommended Operating Conditions

( $V_{SS} = AV_{SS} = 0\text{ V}$ )

| Parameter             | Symbol            | Value |     |      | Unit               | Remarks                                                                                                                             |
|-----------------------|-------------------|-------|-----|------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|                       |                   | Min   | Typ | Max  |                    |                                                                                                                                     |
| Power supply voltage  | $V_{CC}, AV_{CC}$ | 4.0   | 5.0 | 5.5  | V                  | Under normal operation                                                                                                              |
|                       |                   | 3.5   | 5.0 | 5.5  | V                  | Under normal operation, when not using the A/D converter and not Flash programming.                                                 |
|                       |                   | 4.5   | 5.0 | 5.5  | V                  | When External bus is used.                                                                                                          |
|                       |                   | 3.0   | —   | 5.5  | V                  | Maintains RAM data in stop mode                                                                                                     |
| Smoothing capacitor   | $C_S$             | 0.1   | —   | 1.0  | $\mu\text{F}$      | Use a ceramic capacitor or capacitor of better AC characteristics. Capacitor at the $V_{CC}$ should be greater than this capacitor. |
| Operating temperature | $T_A$             | -40   | —   | +105 | $^{\circ}\text{C}$ |                                                                                                                                     |

C Pin Connection Diagram



**WARNING:** The recommended operating conditions are required in order to ensure the normal operation of the semiconductor device. All of the device's electrical characteristics are warranted when the device is operated within these ranges.

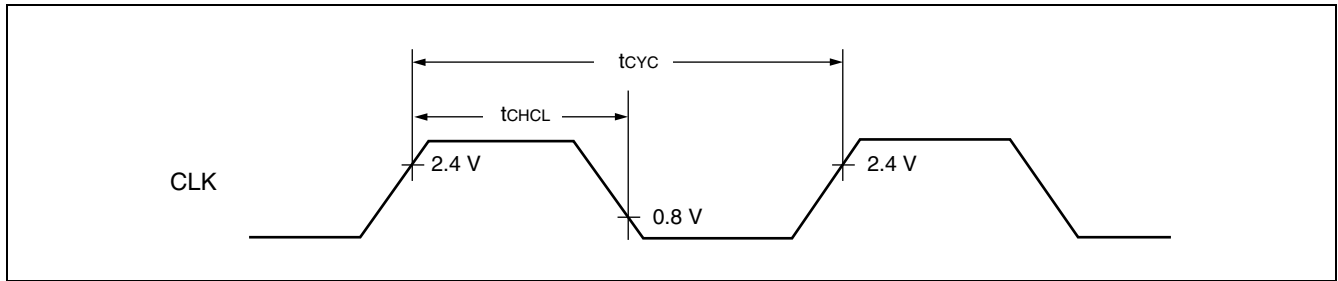
Always use semiconductor devices within their recommended operating condition ranges. Operation outside these ranges may adversely affect reliability and could result in device failure.

No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their representatives beforehand.

**11.3 DC Characteristics**
 $(T_A = -40^{\circ}\text{C to } +105^{\circ}\text{C}, V_{CC} = 5.0\text{ V} \pm 10\%, f_{CP} \leq 24\text{ MHz}, V_{SS} = AV_{SS} = 0\text{ V})$ 

| Parameter                                               | Symbol    | Pin                              | Condition                                        | Value          |     |                | Unit | Remarks                                                                                                  |
|---------------------------------------------------------|-----------|----------------------------------|--------------------------------------------------|----------------|-----|----------------|------|----------------------------------------------------------------------------------------------------------|
|                                                         |           |                                  |                                                  | Min            | Typ | Max            |      |                                                                                                          |
| Input H voltage<br>(At $V_{CC} = 5\text{ V} \pm 10\%$ ) | $V_{IHS}$ | —                                | —                                                | $0.8 V_{CC}$   | —   | $V_{CC} + 0.3$ | V    | Port inputs if CMOS hysteresis input levels are selected (except P12, P44, P45, P46, P47, P50, P82, P85) |
|                                                         | $V_{IHA}$ | —                                | —                                                | $0.8 V_{CC}$   | —   | $V_{CC} + 0.3$ | V    | Port inputs if Automotive input levels are selected                                                      |
|                                                         | $V_{IHT}$ | —                                | —                                                | 2.0            | —   | $V_{CC} + 0.3$ | V    | Port inputs if TTL input levels are selected                                                             |
|                                                         | $V_{IHS}$ | —                                | —                                                | $0.7 V_{CC}$   | —   | $V_{CC} + 0.3$ | V    | P12, P50, P82, P85 inputs if CMOS input levels are selected                                              |
|                                                         | $V_{IHI}$ | —                                | —                                                | $0.7 V_{CC}$   | —   | $V_{CC} + 0.3$ | V    | P44, P45, P46, P47 inputs if CMOS hysteresis input levels are selected                                   |
|                                                         | $V_{IHR}$ | —                                | —                                                | $0.8 V_{CC}$   | —   | $V_{CC} + 0.3$ | V    | $\overline{\text{RST}}$ input pin (CMOS hysteresis)                                                      |
|                                                         | $V_{IHM}$ | —                                | —                                                | $V_{CC} - 0.3$ | —   | $V_{CC} + 0.3$ | V    | MD input pin                                                                                             |
| Input L voltage<br>(At $V_{CC} = 5\text{ V} \pm 10\%$ ) | $V_{ILS}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | $0.2 V_{CC}$   | V    | Port inputs if CMOS hysteresis input levels are selected (except P12, P44, P45, P46, P47, P50, P82, P85) |
|                                                         | $V_{ILA}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | $0.5 V_{CC}$   | V    | Port inputs if Automotive input levels are selected                                                      |
|                                                         | $V_{ILT}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | 0.8            | V    | Port inputs if TTL input levels are selected                                                             |
|                                                         | $V_{ILS}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | $0.3 V_{CC}$   | V    | P12, P50, P82, P85 inputs if CMOS input levels are selected                                              |
|                                                         | $V_{ILI}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | $0.3 V_{CC}$   | V    | P44, P45, P46, P47 inputs if CMOS hysteresis input levels are selected                                   |
|                                                         | $V_{ILR}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | $0.2 V_{CC}$   | V    | $\overline{\text{RST}}$ input pin (CMOS hysteresis)                                                      |
|                                                         | $V_{ILM}$ | —                                | —                                                | $V_{SS} - 0.3$ | —   | $V_{SS} + 0.3$ | V    | MD input pin                                                                                             |
| Output H voltage                                        | $V_{OH}$  | Normal outputs                   | $V_{CC} = 4.5\text{ V}, I_{OH} = -4.0\text{ mA}$ | $V_{CC} - 0.5$ | —   | —              | V    |                                                                                                          |
| Output H voltage                                        | $V_{OHI}$ | I <sup>2</sup> C current outputs | $V_{CC} = 4.5\text{ V}, I_{OH} = -3.0\text{ mA}$ | $V_{CC} - 0.5$ | —   | —              | V    |                                                                                                          |
| Output L voltage                                        | $V_{OL}$  | Normal outputs                   | $V_{CC} = 4.5\text{ V}, I_{OL} = 4.0\text{ mA}$  | —              | —   | 0.4            | V    |                                                                                                          |
| Output L voltage                                        | $V_{OLI}$ | I <sup>2</sup> C current outputs | $V_{CC} = 4.5\text{ V}, I_{OL} = 3.0\text{ mA}$  | —              | —   | 0.4            | V    |                                                                                                          |

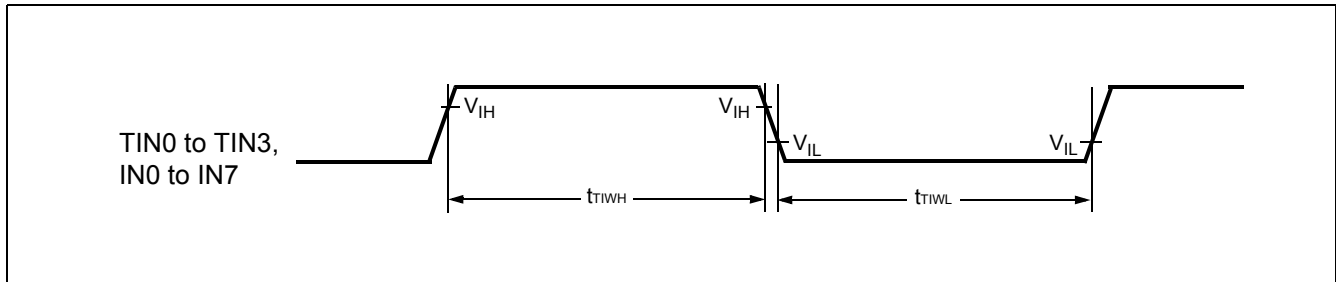
(Continued)



#### 11.4.11 Timer Related Resource Input Timing

( $T_A = -40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ ,  $V_{CC} = 5.0\text{ V} \pm 10\%$ ,  $f_{CP} \leq 24\text{ MHz}$ ,  $V_{SS} = 0\text{ V}$ )

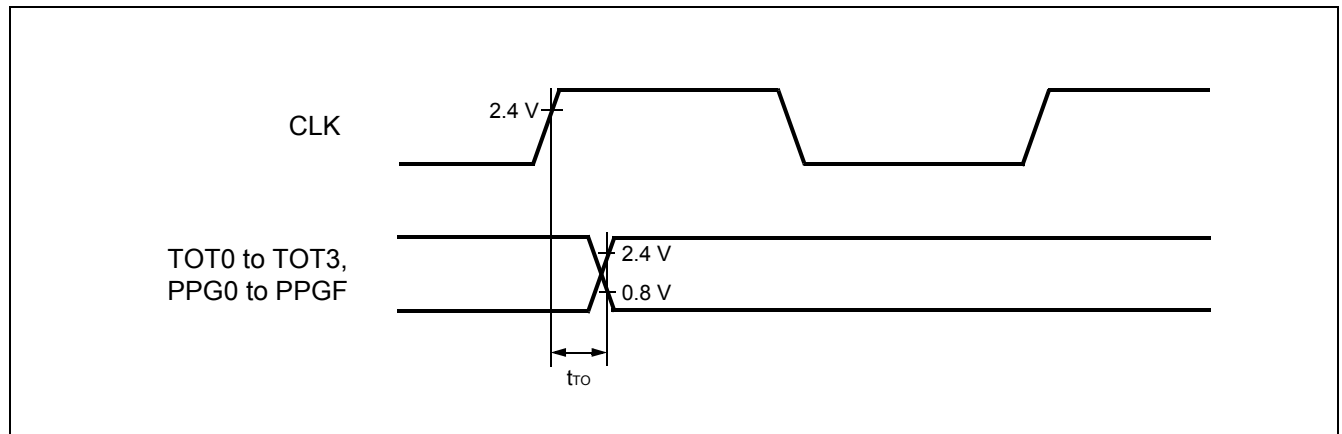
| Parameter         | Symbol     | Pin                         | Condition | Value      |     | Unit |
|-------------------|------------|-----------------------------|-----------|------------|-----|------|
|                   |            |                             |           | Min        | Max |      |
| Input pulse width | $t_{TIWH}$ | TIN0 to TIN3,<br>IN0 to IN7 | —         | $4 t_{CP}$ | —   | ns   |
|                   | $t_{TIWL}$ |                             |           |            |     |      |



#### 11.4.12 Timer Related Resource Output Timing

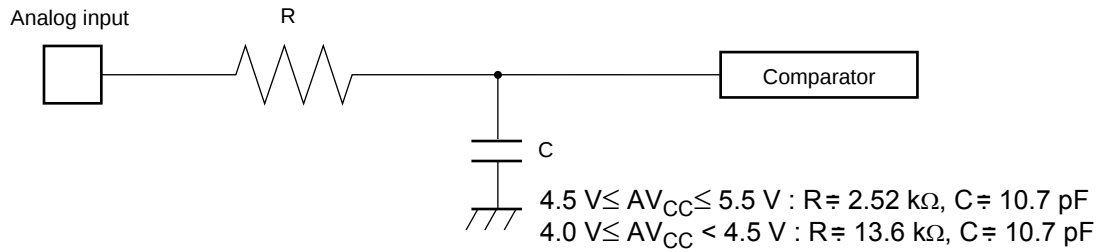
( $T_A = -40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ ,  $V_{CC} = 5.0\text{ V} \pm 10\%$ ,  $f_{CP} \leq 24\text{ MHz}$ ,  $V_{SS} = 0.0\text{ V}$ )

| Parameter                                      | Symbol   | Pin                           | Condition | Value |     | Unit |
|------------------------------------------------|----------|-------------------------------|-----------|-------|-----|------|
|                                                |          |                               |           | Min   | Max |      |
| CLK $\uparrow \rightarrow T_{OUT}$ change time | $t_{TO}$ | TOT0 to TOT3,<br>PPG0 to PPGF | —         | 30    | —   | ns   |



If the output impedance of the external circuit is too high, a sampling period for an analog voltage may be insufficient.

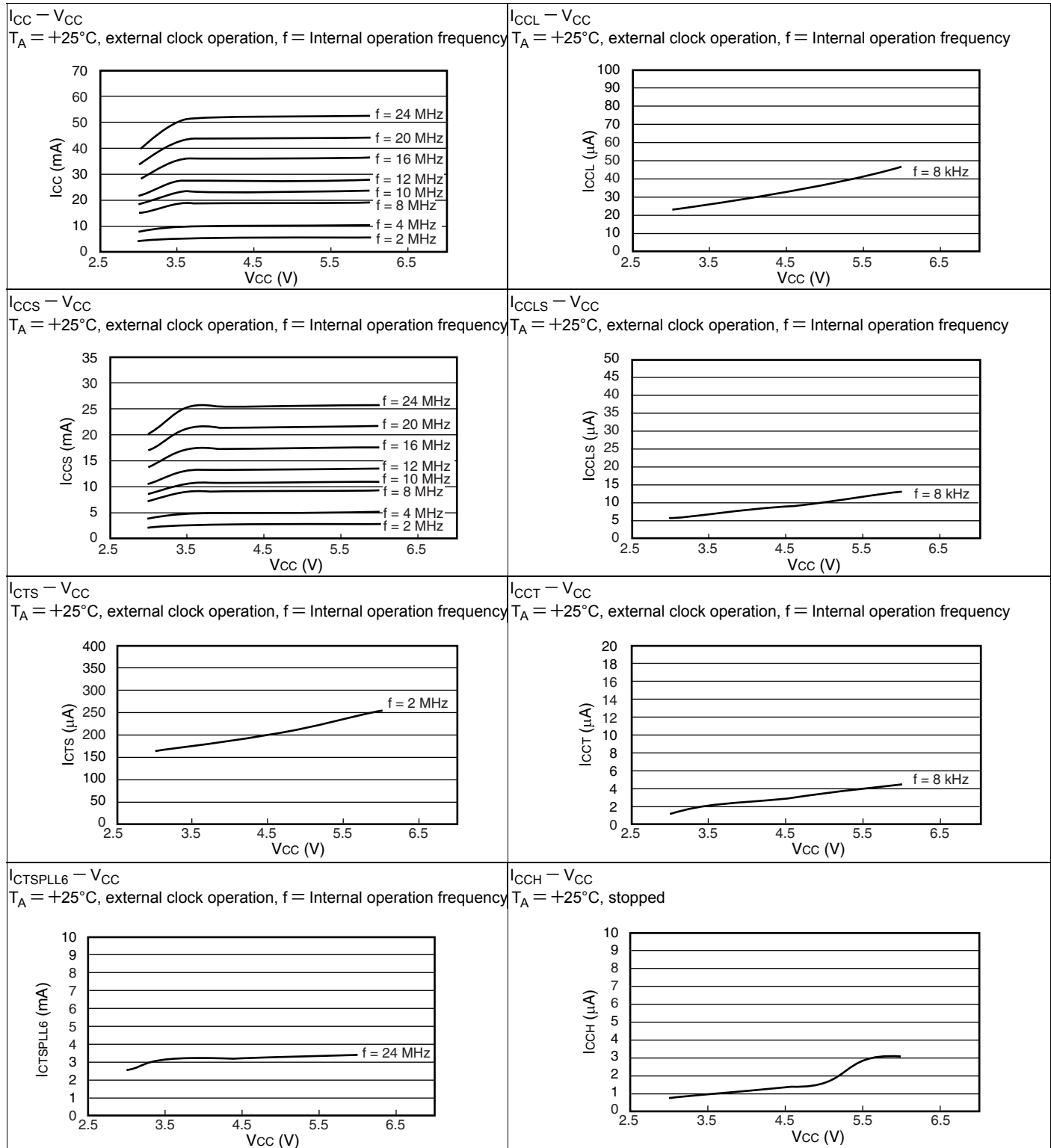
• Analog input circuit model



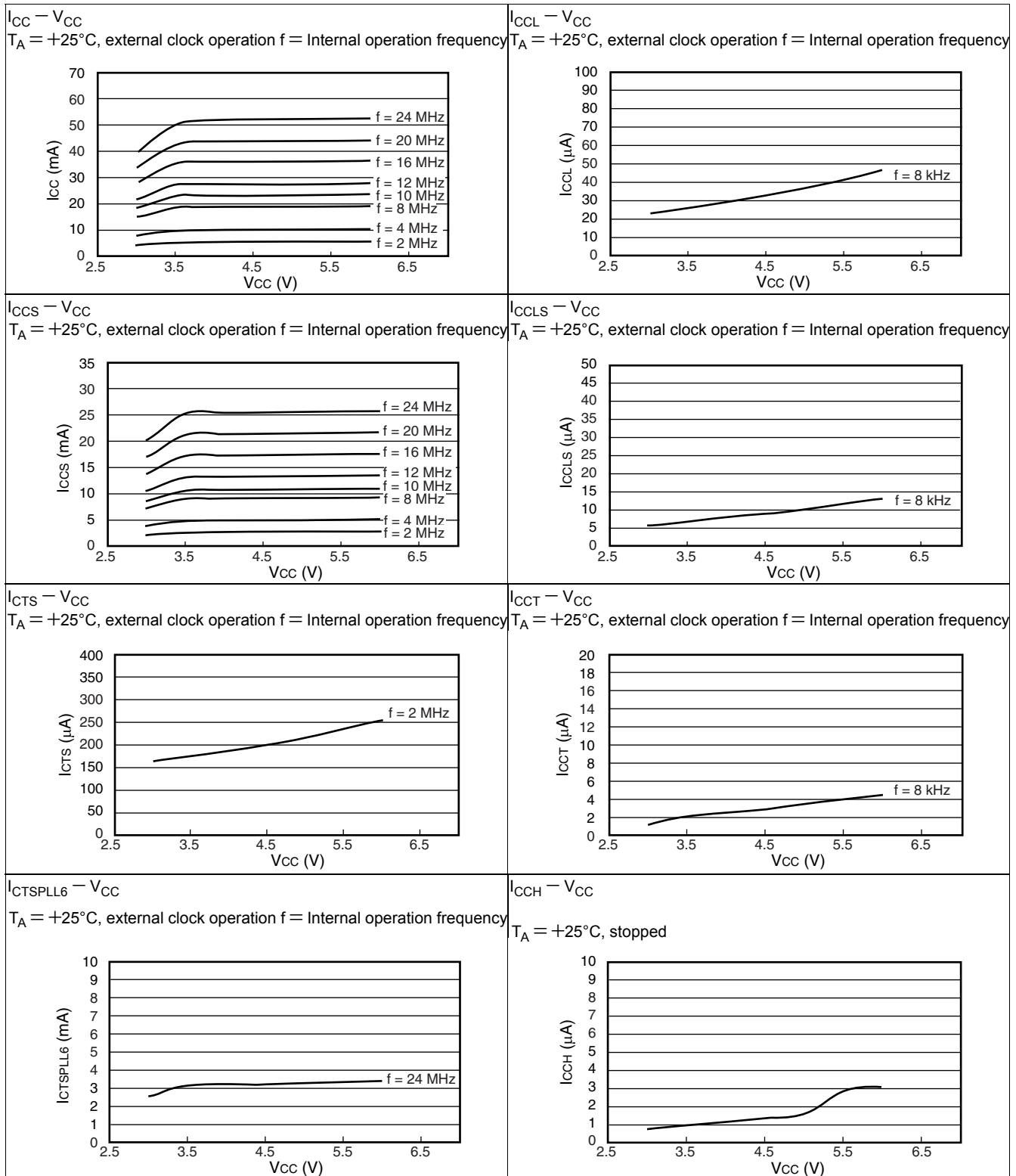
**Note:** : Use the values in the figure only as a guideline.

## 12. Example Characteristics

■ MB90F346E, MB90F346ES, MB90F346CE, MB90F346CES

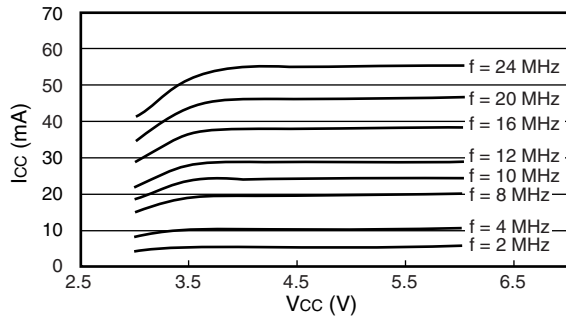


■ MB90F347E, MB90F347ES, MB90F347CE, MB90F347CES

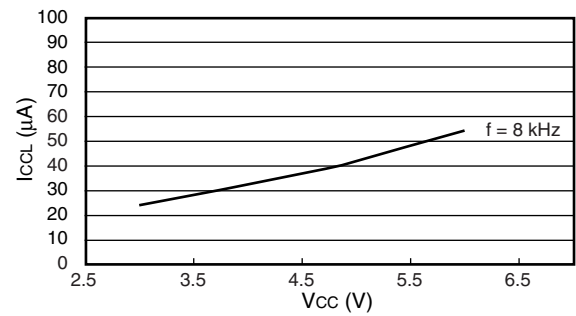


■ MB90346E, MB90346ES, MB90346CE, MB90346CES

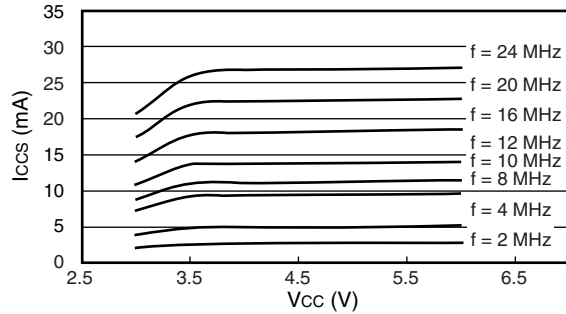
$I_{CC} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency



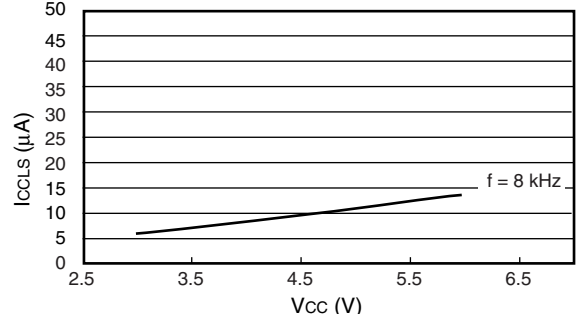
$I_{CCL} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency



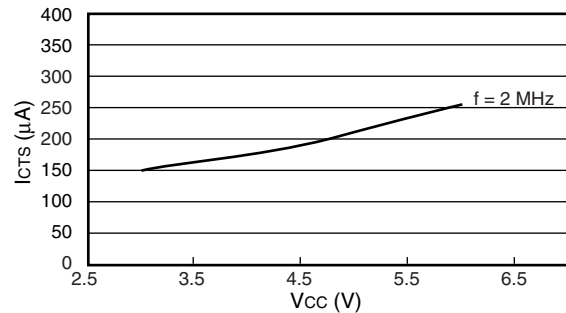
$I_{CCS} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency



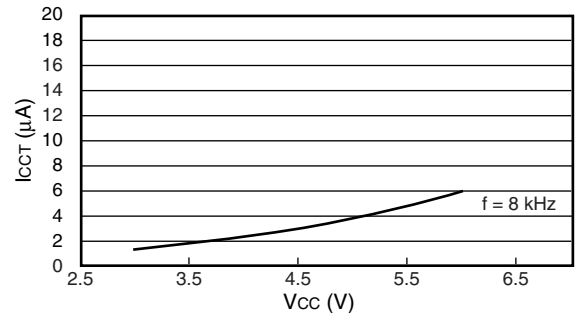
$I_{CCLS} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency



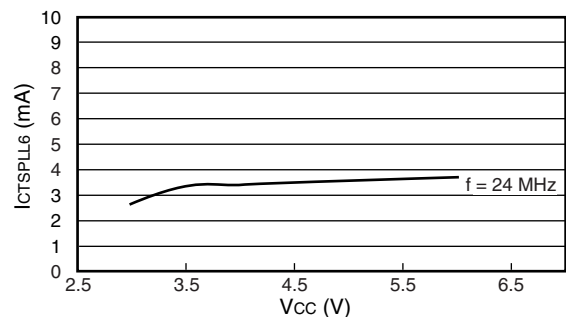
$I_{CTS} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency



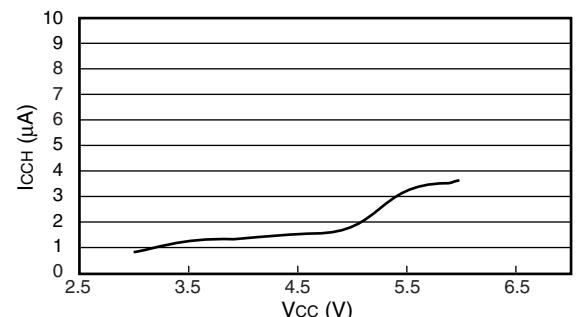
$I_{CCT} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency



$I_{CTSPLL6} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f =$  Internal operation frequency

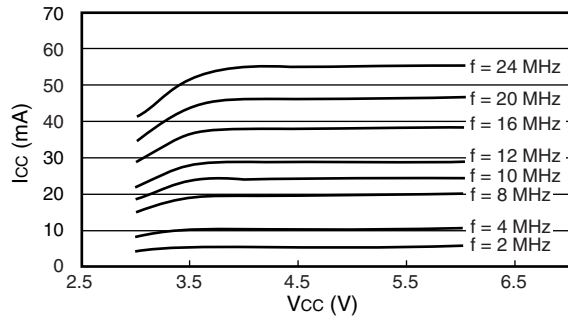


$I_{CCH} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , stopped

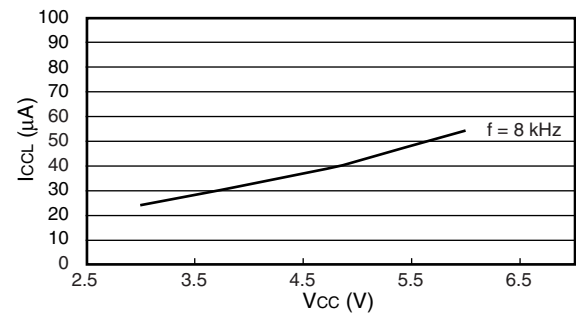


■ MB90347E, MB90347ES, MB90347CE, MB90347CES

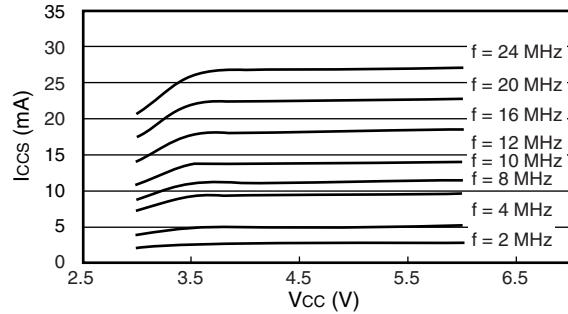
$I_{CC} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



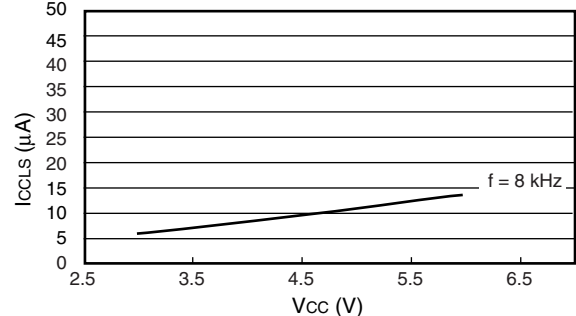
$I_{CCL} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



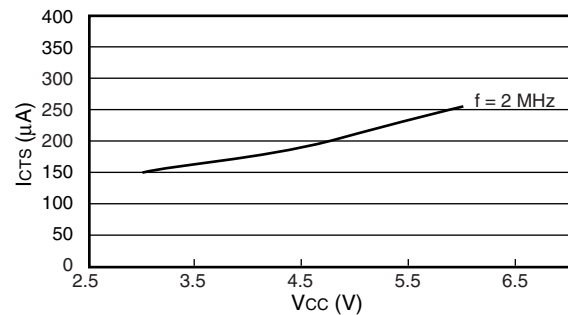
$I_{CCS} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



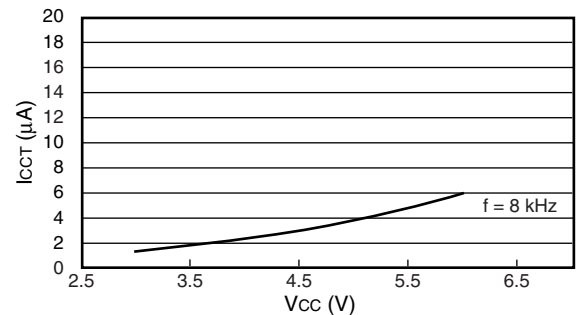
$I_{CCLS} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



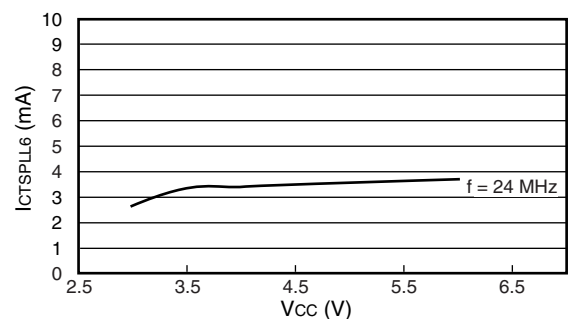
$I_{CTS} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



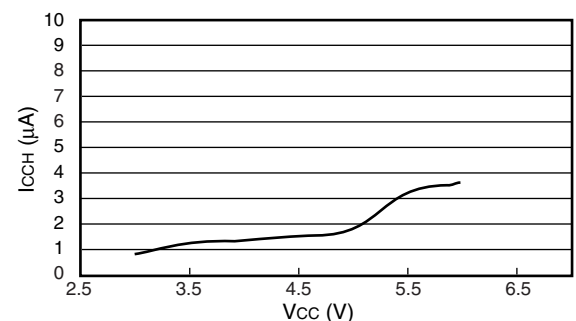
$I_{CCT} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



$I_{CTSPLL6} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , external clock operation  $f$  = Internal operation frequency



$I_{CCH} - V_{CC}$   
 $T_A = +25^\circ\text{C}$ , stopped



### 13. Ordering Information

| Part number    | Package                                | Remarks |
|----------------|----------------------------------------|---------|
| MB90F342EPF    | 100-pin plastic QFP<br>(FPT-100P-M06)  |         |
| MB90F342ESPF   |                                        |         |
| MB90F342CEPF   |                                        |         |
| MB90F342CESPF  |                                        |         |
| MB90F342EPMC   | 100-pin plastic LQFP<br>(FPT-100P-M20) |         |
| MB90F342ESPMC  |                                        |         |
| MB90F342CEPMC  |                                        |         |
| MB90F342CESPMC |                                        |         |
| MB90F345EPF    | 100-pin plastic QFP<br>(FPT-100P-M06)  |         |
| MB90F345ESPF   |                                        |         |
| MB90F345CEPF   |                                        |         |
| MB90F345CESPF  |                                        |         |
| MB90F345EPMC   | 100-pin plastic LQFP<br>(FPT-100P-M20) |         |
| MB90F345ESPMC  |                                        |         |
| MB90F345CEPMC  |                                        |         |
| MB90F345CESPMC |                                        |         |
| MB90F346EPF    | 100-pin plastic QFP<br>(FPT-100P-M06)  |         |
| MB90F346ESPF   |                                        |         |
| MB90F346CEPF   |                                        |         |
| MB90F346CESPF  |                                        |         |
| MB90F346EPMC   | 100-pin plastic LQFP<br>(FPT-100P-M20) |         |
| MB90F346ESPMC  |                                        |         |
| MB90F346CEPMC  |                                        |         |
| MB90F346CESPMC |                                        |         |

(Continued)