

## **Notification about the transfer of the semiconductor business**

The semiconductor business of Panasonic Corporation was transferred on September 1, 2020 to Nuvoton Technology Corporation (hereinafter referred to as "Nuvoton"). Accordingly, Panasonic Semiconductor Solutions Co., Ltd. became under the umbrella of the Nuvoton Group, with the new name of Nuvoton Technology Corporation Japan (hereinafter referred to as "NTCJ").

In accordance with this transfer, semiconductor products will be handled as NTCJ-made products after September 1, 2020. However, such products will be continuously sold through Panasonic Corporation.

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If you would find description "Panasonic" or "Panasonic semiconductor solutions", please replace it with NTCJ.

※ Except below description page

"Request for your special attention and precautions in using the technical information and semiconductors described in this book"

**Nuvoton Technology Corporation Japan**



## 1.1 Overview

The MN1M7 function is a 32-bit micro controller with internal Flash memory. It is intended for development of the C programming language with object-oriented program and is easy to use. It has fast feedback processing required for control of power supply and motor.

This LSI adopts the Arm Cortex-M7 to the 32-bit micro controller part and are equipped with internal memory(Flash and RAM) to instruction / data, DMA controller, clock generator, bus controller, interrupt controller, standard peripheral circuits (timer and serial interface and so on), PWM control circuit specialized for power supply and motor control, and high accuracy / high speed analog circuit.

As system safety design, this LSI has the various safety mechanisms (Memory-ECC, clock error detection, power supply voltage detection, window watchdog timer, etc.).

## 1.2 Product Summary

The LSI shown in Table [Table 1.2-1](#) is described in this manual.

Table 1.2-1 Product Summary

| LSI series      | LSI product number | Pins | ROM [KB]    |      | RAM [KB]    |      | CAN | VGA                            | Package                        |
|-----------------|--------------------|------|-------------|------|-------------|------|-----|--------------------------------|--------------------------------|
|                 |                    |      | Instruction | Date | Instruction | Date |     |                                |                                |
| MN1M7AF0 series | MN1M7AF00N         | 144  | 512         | 64   | 64          | 64   | -   | O                              | 144 pins HQFP<br>20 mm x 20 mm |
|                 | MN1M7AF00M         |      | 384         |      |             | 48   |     |                                |                                |
|                 | MN1M7AF00K         |      | 256         |      |             | 32   |     |                                |                                |
|                 | MN1M7AF01N         | 512  | 64          |      |             |      |     |                                |                                |
|                 | MN1M7AF01M         | 128  | 384         |      |             | 48   |     |                                | 128 pins HQFP<br>18 mm x 18 mm |
|                 | MN1M7AF01K         |      | 256         |      |             | 32   |     |                                |                                |
|                 | MN1M7AF02N         |      | 512         |      |             | 64   |     |                                |                                |
|                 | MN1M7AF02M         | 100  | 384         |      |             | 48   |     |                                |                                |
|                 | MN1M7AF02K         |      | 256         |      |             | 32   |     |                                |                                |
|                 | MN1M7AF03N         |      | 512         |      |             | 64   |     |                                |                                |
|                 | MN1M7AF03M         | 80   | 384         |      |             | 48   |     |                                | 80 pins HQFP<br>14 mm x 14 mm  |
|                 | MN1M7AF03K         |      | 256         |      |             | 32   |     |                                |                                |
| MN1M7AF10N      | 144                |      | 512         | 64   | 64          | -    | -   | 144 pins HQFP<br>20 mm x 20 mm |                                |
| MN1M7AF10M      |                    | 384  | 48          |      |             |      |     |                                |                                |
| MN1M7AF10K      |                    | 256  | 32          |      |             |      |     |                                |                                |
| MN1M7AF11N      | 512                | 64   |             |      |             |      |     |                                |                                |
| MN1M7AF11M      | 128                | 384  | 48          |      |             |      |     | 128 pins HQFP<br>18 mm x 18 mm |                                |
| MN1M7AF11K      |                    | 256  | 32          |      |             |      |     |                                |                                |
| MN1M7AF12N      |                    | 512  | 64          |      |             |      |     |                                |                                |
| MN1M7AF12M      | 100                | 384  | 48          |      |             |      |     | 100 pins HQFP<br>14 mm x 14 mm |                                |
| MN1M7AF12K      |                    | 256  | 32          |      |             |      |     |                                |                                |
| MN1M7AF13N      |                    | 512  | 64          |      |             |      |     |                                |                                |
| MN1M7AF13M      | 80                 | 384  | 48          |      |             |      |     | 80 pins HQFP<br>14 mm x 14 mm  |                                |
| MN1M7AF13K      |                    | 256  | 32          |      |             |      |     |                                |                                |



| LSI series      | LSI product number | Pins | ROM [KB]    |      | RAM [KB]    |                                | CAN | VGA | Package                        |
|-----------------|--------------------|------|-------------|------|-------------|--------------------------------|-----|-----|--------------------------------|
|                 |                    |      | Instruction | Date | Instruction | Date                           |     |     |                                |
| MN1M7AF5 series | MN1M7AF50N         | 144  | 512         | 64   | 64          | 64                             | O   | O   | 144 pins HQFP<br>20 mm x 20 mm |
|                 | MN1M7AF50M         |      | 384         |      |             | 48                             |     |     |                                |
|                 | MN1M7AF50K         |      | 256         |      |             | 32                             |     |     |                                |
|                 | MN1M7AF51N         | 512  | 64          |      |             | 128 pins HQFP<br>18 mm x 18 mm |     |     |                                |
|                 | MN1M7AF51M         | 384  | 48          |      |             |                                |     |     |                                |
|                 | MN1M7AF51K         | 256  | 32          |      |             |                                |     |     |                                |
|                 | MN1M7AF52N         | 100  | 512         |      |             | 64                             |     |     | 100 pins HQFP<br>14 mm x 14 mm |
|                 | MN1M7AF52M         |      | 384         |      |             | 48                             |     |     |                                |
|                 | MN1M7AF52K         |      | 256         |      |             | 32                             |     |     |                                |
|                 | MN1M7AF53N         | 80   | 512         |      |             | 64                             |     |     |                                |
|                 | MN1M7AF53M         |      | 384         |      |             | 48                             |     |     |                                |
|                 | MN1M7AF53K         |      | 256         |      |             | 32                             |     |     |                                |
| MN1M7AF6 series | MN1M7AF60N         | 144  | 512         | 64   | 64          | 64                             | O   | -   | 144 pins HQFP<br>20 mm x 20 mm |
|                 | MN1M7AF60M         |      | 384         |      |             | 48                             |     |     |                                |
|                 | MN1M7AF60K         |      | 256         |      |             | 32                             |     |     |                                |
|                 | MN1M7AF61N         | 512  | 64          |      |             | 128 pins HQFP<br>18 mm x 18 mm |     |     |                                |
|                 | MN1M7AF61M         | 384  | 48          |      |             |                                |     |     |                                |
|                 | MN1M7AF61K         | 256  | 32          |      |             |                                |     |     |                                |
|                 | MN1M7AF62N         | 100  | 512         |      |             | 64                             |     |     | 100 pins HQFP<br>14 mm x 14 mm |
|                 | MN1M7AF62M         |      | 384         |      |             | 48                             |     |     |                                |
|                 | MN1M7AF62K         |      | 256         |      |             | 32                             |     |     |                                |
|                 | MN1M7AF63N         | 80   | 512         |      |             | 64                             |     |     |                                |
|                 | MN1M7AF63M         |      | 384         |      |             | 48                             |     |     |                                |
|                 | MN1M7AF63K         |      | 256         |      |             | 32                             |     |     |                                |

**Hint:**

In this manual, the product names are classified as follows.

MN1M7AFxyz (x = 0, 1, 5, 6 y = 0, 1, 2, 3 z = N, M, K)



## 1.2.1 Function Summary

Table 1.2-2 shows the functions of each product.

Table 1.2-2 The List of Function

| Function                         |  | MN1M7AFx0z  | MN1M7AFx1z | MN1M7AFx2z | MN1M7AFx3z |
|----------------------------------|--|---|------------|------------|------------|
| Pins                             |  | 144 pins  | 128 pins   | 100 pins   | 80 pins    |
| CPU                              |  | Arm Cortex-M7   |            |            |            |
| General purpose pin              |  | 123   | 110        | 82         | 62         |
| Operation mode                   | Active mode                                      | NORMAL  |            |            |            |
|                                  | Standby mode                                     | SLEEP, DEEPSLEEP  |            |            |            |
| Debugger I/F                     | Interface  | SWD   |            |            |            |
| DMA                              | Module/CH number                                 | 2 / 16  |            |            |            |
| Interrupt                        | External interrupt                               | 20  |            | 18         | 15         |
| Timer                            | 16-bit timer<br>(timer 0 to 13)                  | 14  |            |            |            |
|                                  | 16-bit timer<br>(timer 20 to 25)                 | 6   |            |            | 5          |
|                                  | Power control PWM<br>(GPWM 0 to B)               | 12  |            | 10         | 8          |
| Noise filter                     | Target pin                                       | External interrupt, Timer input   |            |            |            |
| Communication I/F                | Clock synchronous/IIC<br>(serial 0)              | 1   |            |            |            |
|                                  | Clock synchronous/<br>UART/LIN<br>(serial 1)     | 1   |            |            |            |
|                                  | Clock synchronous/<br>UART<br>(serial 2, 5, 6)   | 3   |            | 2          |            |
|                                  | Clock synchronous/SPI/<br>UART<br>(serial 3, 4)  | 2   |            |            | 1          |
|                                  | Clock synchronous/SPI/<br>UART/IIC<br>(serial 7) | 1   |            |            |            |
|                                  | CAN FD   | 2 (*1)  |            |            |            |
|                                  | SM Bus   | 1   |            | -          |            |
| 12-bit A/D                       | AD0 CH number                                    | 16  | 14         | 12         | 11         |
|                                  | AD1 CH number                                    | 16  | 16         | 11         | 9          |
|                                  | AD2 CH number                                    | 16  | 16         | 13         | 9          |
|                                  | Total CH number                                  | 32  | 30         | 23         | 18         |
| Programmable gain amplifier(VGA) | Module number/CH number                          | 5 / 5 (*2)  |            |            |            |
| Comparator                       | Module number/CH number                          | 10 / 5  |            |            |            |
| 8-bit D/A                        | Module number                                    | 10 (for generating comparator reference voltage)<br>5 (for generating VGA reference voltage) (*2) |            |            |            |



| Function        |                         | MN1M7AFx0z  | MN1M7AFx1z | MN1M7AFx2z | MN1M7AFx3z |
|-----------------|-------------------------|---|------------|------------|------------|
| 10-bit D/A      | Module number/CH number | 2 / 2   |            |            | 1 / 1      |
| Safety function | Flash memory            | ECC, Data protection  |            |            |            |
|                 | RAM                     | ECC   |            |            |            |
|                 | Access area             | MPU (Area management, Protection), Register protect (Protection)      |            |            |            |
|                 | System                  | Window watchdog timer   |            |            |            |
|                 | Clock                   | Clock monitoring (External oscillation, PLL error detection)          |            |            |            |
|                 | Communication           | CRC calculation function  |            |            |            |
|                 | A/D converter           | A/D converter error detection   |            |            |            |
|                 | Power supply voltage    | POR, Power supply voltage detection                                   |            |            |            |
|                 | Reset                   | Detection of reset factor immediately before by reset factor register |            |            |            |

**Note:**

\*1 Only MN1M7AF5 series and MN1M7AF6 series are included.

**Note:**

\*2 Only MN1M7AF0 series and MN1M7AF5 series are included .



## 1.3 Features

The features of this LSI are described.

| Functions             | Features   |
|-----------------------|--|
| CPU                   | <ul style="list-style-type: none"> <li>- Arm Cortex-M7</li> <li>Equipped with FPU: Double precision floating point unit, IEEE754 compliant</li> <li>Equipped with MPU: Memory protect unit, 16 area can be set</li> <li>- Cache</li> <li>Instruction: 4 KB, Data: 4 KB</li> </ul>  |
| Memory                | <ul style="list-style-type: none"> <li>- ROM access</li> <li>I-FLASH area: 160 MHz 2 wait access</li> <li>D-FLASH area: 160 MHz 8 wait access</li> <li>- RAM access</li> <li>ITCM/DTCM area: 160 MHz No-wait access</li> </ul>   |
| Clock                 | <ul style="list-style-type: none"> <li>- Base clock(BASECLK)</li> <li>External oscillation (4 to 20 MHz), Internal oscillation(10 MHz)</li> <li>Multiplication by PLL circuit</li> <li>- CPU clock(CPUCLK)</li> <li>1 to 8 dividing of base clock</li> <li>- Peripheral clock(IOCLK)</li> <li>2 to 16 dividing of CPU clock Clock operation/stop can be selected for each peripheral module</li> </ul>   |
| Reset                 | <ul style="list-style-type: none"> <li>- Hardware reset</li> <li>Power-on reset</li> <li>- System reset</li> <li>Reset by external pin(NRST)</li> <li>Reset by register setting</li> <li>Reset by error detection(WDT overflow, Clock error detection)</li> <li>- CPU generation reset</li> <li>Reset by writing to AIRCR, Reset by CPU Lockup</li> <li>- Reset factor can be monitored</li> </ul>   |
| Low power consumption | <ul style="list-style-type: none"> <li>- SLEEP mode: Stop CPU clock only</li> <li>- DEEP SLEEP mode: Stop clocks including BASECLK</li> </ul>  |
| Interrupt             | <ul style="list-style-type: none"> <li>- Interrupt level: 16 levels</li> <li>- External interrupt:</li> <li>High/Low level, Rising/Falling/Both edge</li> </ul>  |
| DMA                   | <ul style="list-style-type: none"> <li>- Transfer mode: Single word transfer mode, Burst transfer mode</li> <li>- Transfer unit: 8 bits/16 bits/32 bits</li> <li>- Maximum transfer count: 65535 words</li> <li>- Transfer factor: External interrupt, Peripheral module factor</li> <li>- Register reload count: Maximum 65535 times</li> <li>- Interrupt: DMA completion, reload count completion, bus error, transfer request overflow, invalid DMA transfer request</li> </ul> |
| Noise filter          | <ul style="list-style-type: none"> <li>- External interrupt, sampling type noise filter is inserted to timer input</li> <li>- Select sampling clock</li> </ul>   |



| Functions                              | Features  |
|--|---|
| 16-bit timer<br>(timer 0 to timer 13)  | <ul style="list-style-type: none"> <li>- Interval timer count, Event count, Up-down pulse count, Phase difference pulse count</li> <li>- Timer Output, PWM/complement Output(wave mode: saw-tooth waves), 1-shot Output</li> <li>- Input capture by external input</li> <li>- Timer count start by start trigger</li> <li>- A/D conversion start trigger Output(only for timer 0 to 2)</li> <li>- 32-bit cascade connection</li> <li>- Output protection: High/Low/Hi-z Output can be selected</li> <li>- Timer interrupt Output control</li> </ul>   |
| 16-bit timer<br>(timer 20 to timer 25) | <ul style="list-style-type: none"> <li>- Interval timer count, Event count, Up-down pulse count, Phase difference pulse count</li> <li>- Timer Output, PWM/Complementary PWM Output (Wave mode: saw-tooth waves), 1-shot Output</li> <li>- Input capture by external input</li> <li>- Timer count start by start trigger</li> <li>- A/D conversion start trigger Output</li> <li>- 32-bit cascade connection</li> <li>- Output protection: H/L/Hi-z Output can be selected, reading edge blanking can be set</li> <li>- Timer interrupt Output control</li> <li>- Task overflow detection function</li> <li>- PWM Output: Dead time insert, Output shift, Duty cut, Period cut</li> </ul> |
| Power control PWM<br>(GPWM0 to GPWMB)  | <ul style="list-style-type: none"> <li>- Complementary PWM Output (Wave mode: Triangular and saw-tooth waves)</li> <li>- Dead time insert, Output shift, H/L level Output can be set</li> <li>- Synchronous A/D conversion trigger</li> <li>- Interrupt Output control</li> <li>- Output protection: H/L/Hi-z Output can be select</li> <li>- Duty cut, period cut</li> <li>- High resolution Output(duty, Output shift, cycle) (only for GPWM0 to 8)</li> <li>- Double buffer update</li> </ul>  |
| Synchronous SIF/SPI                    | <ul style="list-style-type: none"> <li>- 2-wire/3-wire(4-wire can be selected only at serial 3, 4, 7)</li> <li>- Transfer bits(2 bits to 8 bits)</li> <li>- MSB/LSB transfer</li> <li>- Clock polarity selection</li> <li>- Continuous communication</li> <li>- Output level after the final bit transmission(H/L/final data)</li> <li>- Maximum transfer rate: 5.0 Mbps, 10 Mbps(only for serial 7 master)</li> </ul>  |
| UART                                   | <ul style="list-style-type: none"> <li>- 1-wire/2-wire</li> <li>- Character bits(7-bit/8-bit)</li> <li>- Stop bits(1-bit/2-bit)</li> <li>- Parity bit: Enabled/Disabled, Parity bit type: 0/1/Even parity/Odd parity</li> <li>- MSB/LSB transfer</li> <li>- Maximum transfer rate: 2.5 Mbps, 3.3 Mbps(only for serial 7)</li> <li>- Output communication data which corresponding AMI driver IC(only for serial 5)</li> </ul>   |
| IIC                                    | <ul style="list-style-type: none"> <li>- Master/Slave communication</li> <li>- Start condition selection: Enable/Disable</li> <li>- MSB/LSB transfer selection</li> <li>- Transfer format: 7-bit address format, 10-bit address format(only for serial 7)</li> <li>- Maximum transfer rate: Standard Mode: 100 kbps, Fast Mode: 400 kbps, Fast Mode Plus: 1 Mbps(only for serial 7)</li> </ul>  |
| SMBus interface                        | <ul style="list-style-type: none"> <li>- Conform to System Management Bus v2.0</li> <li>- Timeout detection, Packet error detection</li> <li>- Return from CPU standby mode by detecting start condition</li> <li>- Maximum transfer rate: 100 kHz</li> </ul>   |



| Functions             | Features  |
|-----------------------|---|
| LIN controller        | <ul style="list-style-type: none"> <li>- Master/Slave communication</li> <li>- Wake Up signal transmission/reception</li> <li>- Synch Break field transmission/reception</li> <li>- Synch field transmission/reception</li> <li>- ID field transmission/reception</li> <li>- Error detection: Check sum error, Bit error, Timeout</li> </ul>  |
| CAN FD interfere      | <ul style="list-style-type: none"> <li>- Conform to ISO11898-1 (Bosch CAN specification 2.0 part A, B) and Bosh CAN FD specification V1.0</li> <li>- Maximum 64 byte data can be transmitted and received</li> <li>- Message RAM: 32 KB, ECC function is enabled</li> </ul>   |
| 12-bit A/D            | <ul style="list-style-type: none"> <li>- Timer 20 to 25, GPWM0 to B etc can be started synchronously</li> <li>- Conversion error detection</li> <li>- Conversion state Output</li> <li>- Start trigger reduction function</li> </ul>  |
| VGA                   | <ul style="list-style-type: none"> <li>- Gain selection(1, 2, 3, 4, 5, 6, 8, 10, 20 times)</li> <li>- Set Output offset voltage by 8-bit DAC</li> <li>- Offset cancellation by input Short-circuit</li> </ul>   |
| Comparator            | <ul style="list-style-type: none"> <li>- Hysteresis ON/OFF</li> <li>- Set reference voltage by 8-bit DAC</li> <li>- Sampling type noise filter is inserted to comparator Output</li> </ul>  |
| 8-bit D/A             | <ul style="list-style-type: none"> <li>- VGA Output offset voltage can be generated</li> <li>- Comparator reference voltage can be generated (Slope compensation operation)</li> </ul>  |
| 10-bit D/A            | <ul style="list-style-type: none"> <li>- Output the set DC voltage</li> </ul>   |
| Multi feedback assist | <ul style="list-style-type: none"> <li>- Set the start timing of timer 20 to 25, GPWM 0 to B individually</li> <li>- Detect/Automatically avoid the competition of timer 20 to 25, GPWM 0 to B and AD conversion start</li> <li>- Mask(Blanking) the external interrupt detection, comparator of GPWM0 to B Output</li> </ul>   |
| CRC caluculation      | <ul style="list-style-type: none"> <li>- CRC-32, CRC-16-CCITT, CRC-16, CRC-8-ATM symbol can be generated</li> </ul>   |
| Safety function       | <ul style="list-style-type: none"> <li>- ECC function</li> <li>Check area: Cache, I-FLASH, D-FLASH, ITCM, DTCM, Message RAM for CAN 1 bit correction, 2 bit random error detection</li> <li>- Flash Erase/Program protect function</li> <li>- Function to protect write access to main register</li> <li>- Clock monitor function</li> <li>- Window watchdog timer(internal oscillation count)</li> <li>- Power supply voltage detection</li> <li>- ADC fault diagnosis function which is used for internal power supply</li> </ul> |





# 1.4 Pins

The specifications of pins in this LSI are described as follows.

- Pin configuration
- Pin function

## 1.4.1 Pin Configuration

Figure 1.4-1 shows the pin configuration of MN1M7AFx0z(144 pins).

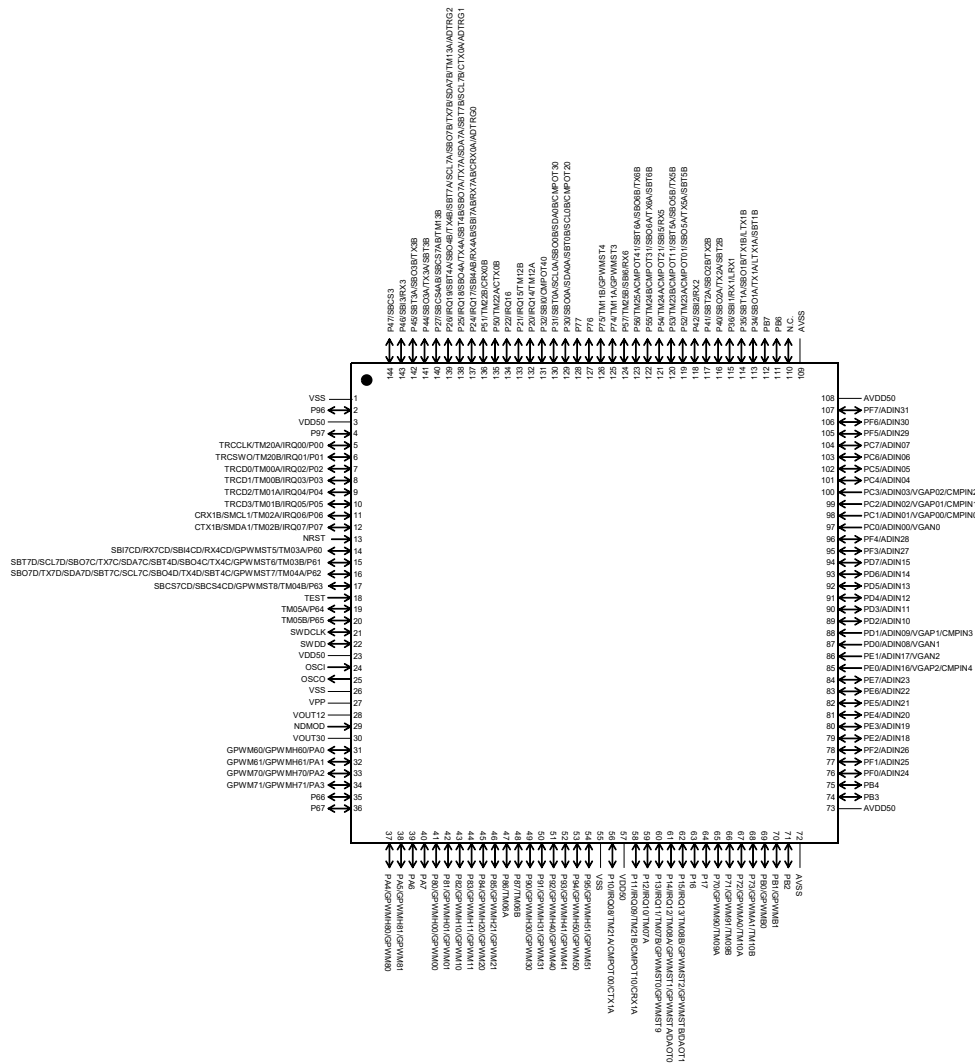


Figure 1.4-1 Pin Configuration Figure of MN1M7AFx0z(144 pins)



Figure 1.4-2 shows the pin configuration of MN1M7AFx1z(128 pins).

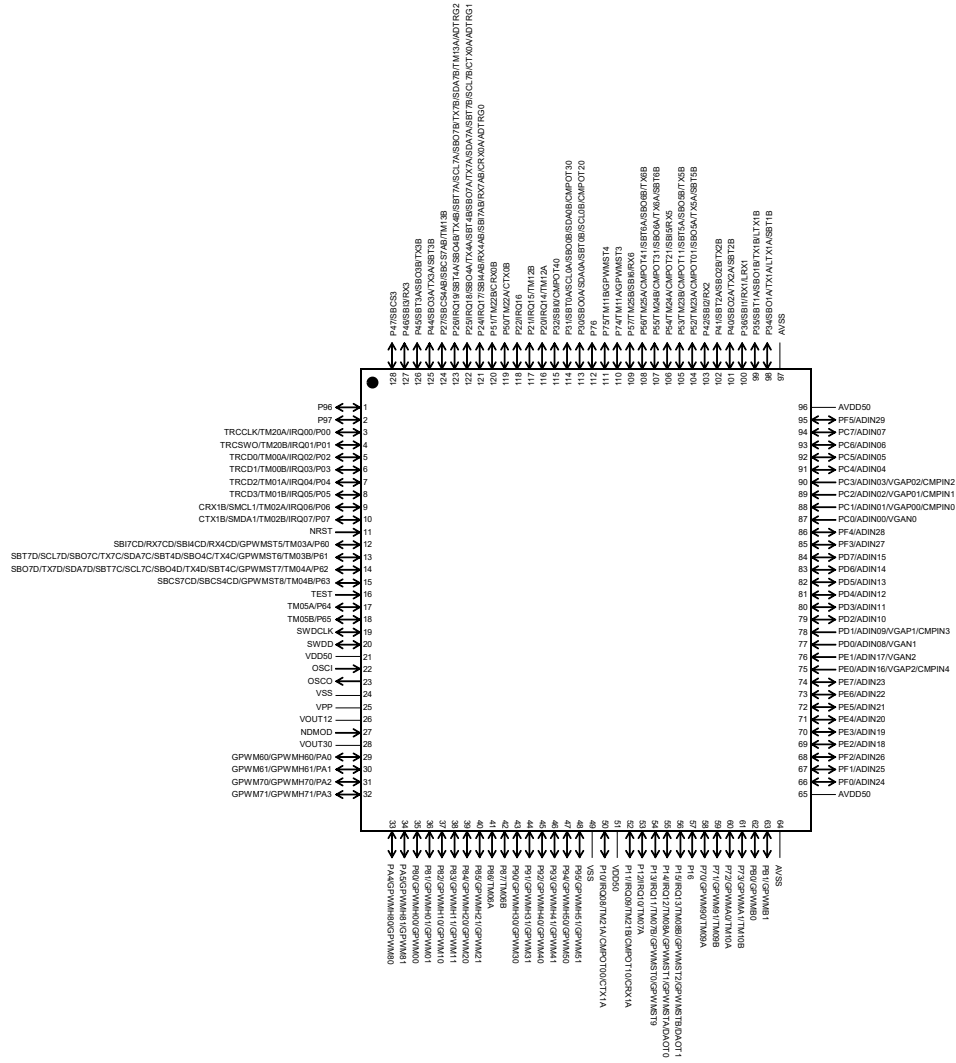


Figure 1.4-2 Pin Configuration figure of MN1M7AFx1z(128 pins)



Figure 1.4-3 shows the pin configuration of MN1M7AFx2z(100 pins).

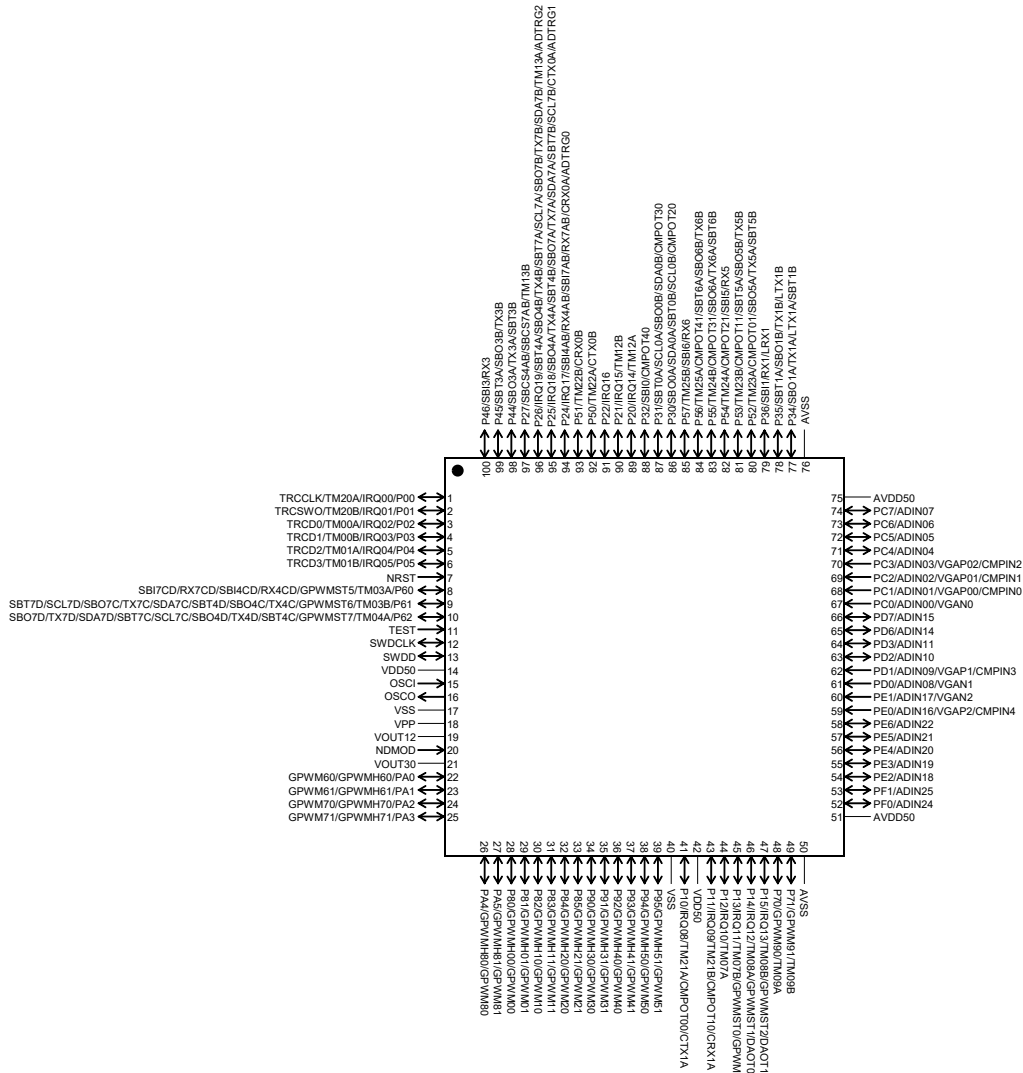


Figure 1.4-3 Pin Configuration Figure of MN1M7AFx2z(100 pins)



Figure 1.4-4 shows the pin configuration of MN1M7AFx3z(80 pins).

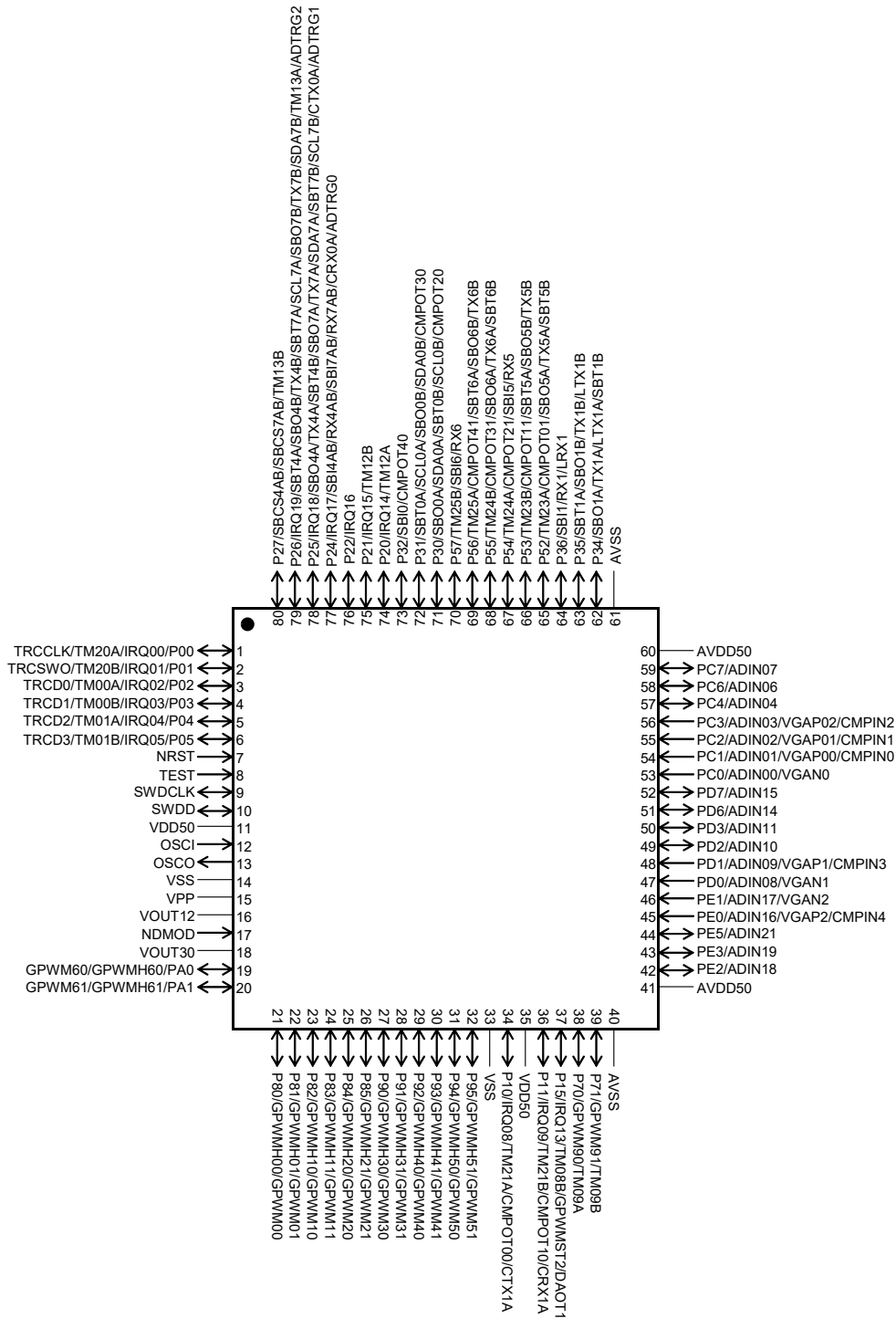


Figure 1.4-4 Pin Configuration Figure of MN1M7AFx3z(80 pins)



## 1.4.2 Pin Functions

The pin functions are listed in Table 1.4-1 .

Table 1.4-1 Pin Functions

| Functions                       | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O                       | Other Pins               |
|---------------------------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|---------------------------|--------------------------|
| External power pin              | VDD50    | 3<br>23<br>57                       | 21<br>51                            | 14<br>42                            | 11<br>35                           | Input                     | -                        |
| Power pin for analog            | AVDD50   | 73<br>108                           | 65<br>96                            | 51<br>75                            | 41<br>60                           | Input                     | -                        |
| Power pin for internal circuit  | VOUT30   | 30                                  | 28                                  | 21                                  | 18                                 | Output                    | -                        |
|                                 | VOUT12   | 28                                  | 26                                  | 19                                  | 16                                 | Output                    | -                        |
| GND                             | VSS      | 1<br>26<br>55                       | 24<br>49                            | 17<br>40                            | 14<br>33                           | Input                     | -                        |
| GND for analog                  | AVSS     | 72<br>109                           | 64<br>97                            | 50<br>76                            | 40<br>61                           | Input                     | -                        |
| Debugger                        | NDMOD    | 29                                  | 27                                  | 20                                  | 17                                 | Input                     | -                        |
|                                 | SWDCLK   | 21                                  | 19                                  | 12                                  | 9                                  | Input                     | -                        |
|                                 | SWDD     | 22                                  | 20                                  | 13                                  | 10                                 | I/O                       | -                        |
|                                 | TRCCLK   | 5                                   | 3                                   | 1                                   | 1                                  | Output                    | P00/IRQ00/TM20A          |
|                                 | TRCSWO   | 6                                   | 4                                   | 2                                   | 2                                  | Output                    | P01/IRQ01/TM20B          |
|                                 | TRCD0    | 7                                   | 5                                   | 3                                   | 3                                  | Output                    | P02/IRQ02/TM00A          |
|                                 | TRCD1    | 8                                   | 6                                   | 4                                   | 4                                  | Output                    | P03/IRQ03/TM00B          |
|                                 | TRCD2    | 9                                   | 7                                   | 5                                   | 5                                  | Output                    | P04/IRQ04/TM01A          |
|                                 | TRCD3    | 10                                  | 8                                   | 6                                   | 6                                  | Output                    | P05/IRQ05/TM01B          |
| External oscillation Input pin  | OSCI     | 24                                  | 22                                  | 15                                  | 12                                 | Input                     | -                        |
| External oscillation Output pin | OSCO     | 25                                  | 23                                  | 16                                  | 13                                 | Output                    | -                        |
| Reset                           | NRST     | 13                                  | 11                                  | 7                                   | 7                                  | Input                     | -                        |
| Mode pin                        | TEST     | 18                                  | 16                                  | 11                                  | 8                                  | Input                     | -                        |
| Input pin for flash memory      | VPP      | 27                                  | 25                                  | 18                                  | 15                                 | Input                     | -                        |
| External interrupt              | IRQ00    | 5                                   | 3                                   | 1                                   | 1                                  | Input                     | P00/TM20A/TRCCLK         |
|                                 | IRQ01    | 6                                   | 4                                   | 2                                   | 2                                  | Input                     | P01/TM20B/TRCSWO         |
|                                 | IRQ02    | 7                                   | 5                                   | 3                                   | 3                                  | Input                     | P02/TM00A/TRCD0          |
|                                 | IRQ03    | 8                                   | 6                                   | 4                                   | 4                                  | Input                     | P03/TM00B/TRCD1          |
|                                 | IRQ04    | 9                                   | 7                                   | 5                                   | 5                                  | Input                     | P04/TM01A/TRCD2          |
|                                 | IRQ05    | 10                                  | 8                                   | 6                                   | 6                                  | Input                     | P05/TM01B/TRCD3          |
|                                 | IRQ06    | 11                                  | 9                                   | -                                   | -                                  | Input                     | P06/TM02A/SMCL1/CRX1B    |
|                                 | IRQ07    | 12                                  | 10                                  | -                                   | -                                  | Input                     | P07/TM02B/SMDA1/CTX1B    |
|                                 | IRQ08    | 56                                  | 50                                  | 41                                  | 34                                 | Input                     | P10/TM21A/COMPOT00/CTX1A |
|                                 | IRQ09    | 58                                  | 52                                  | 43                                  | 36                                 | Input                     | P11/TM21B/COMPOT10/CRX1A |
|                                 | IRQ10    | 59                                  | 53                                  | 44                                  | -                                  | Input                     | P12/TM07A                |
| IRQ11                           | 60       | 54                                  | 45                                  | -                                   | Input                              | P13/TM07B/GPWMST0/GPWMST9 |                          |



| Functions          | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O       | Other Pins   |
|--------------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-----------|--|
| External interrupt | IRQ12    | 61                                  | 55                                  | 46                                  | -                                  | Input     | P14/TM08A/GPWMST1/GPWMSTA/DAOT0                                |
|                    | IRQ13    | 62                                  | 56                                  | 47                                  | 37                                 | Input     | P15/TM08B/GPWMST2/GPWMSTB/DAOT1                                |
|                    | IRQ14    | 132                                 | 116                                 | 89                                  | 74                                 | Input     | P20/TM12A  |
|                    | IRQ15    | 133                                 | 117                                 | 90                                  | 75                                 | Input     | P21/TM12B  |
|                    | IRQ16    | 134                                 | 118                                 | 91                                  | 76                                 | Input     | P22  |
|                    | IRQ17    | 137                                 | 121                                 | 94                                  | 77                                 | Input     | P24/SB14AB/RX4AB/SB17AB/RX7AB/CRX0A/ADTRG0                     |
|                    | IRQ18    | 138                                 | 122                                 | 95                                  | 78                                 | Input     | P25/SBO4A/TX4A/SBT4B/SBO7A/TX7A/SDA7A/SBT7B/SCL7B/CTX0A/ADTRG1 |
|                    | IRQ19    | 139                                 | 123                                 | 96                                  | 79                                 | Input     | P26/SBT4A/SBO4B/TX4B/SBT7A/SCL7A/SBO7B/TX7B/SDA7B/TM13A/ADTRG2 |
| 16-bit timer       | TM00A    | 7                                   | 5                                   | 3                                   | 3                                  | I/O       | P02/IRQ02/TRCD0  |
|                    | TM00B    | 8                                   | 6                                   | 4                                   | 4                                  | I/O       | P03/IRQ03/TRCD1  |
|                    | TM01A    | 9                                   | 7                                   | 5                                   | 5                                  | I/O       | P04/IRQ04/TRCD2  |
|                    | TM01B    | 10                                  | 8                                   | 6                                   | 6                                  | I/O       | P05/IRQ05/TRCD3  |
|                    | TM02A    | 11                                  | 9                                   | -                                   | -                                  | I/O       | P06/IRQ06/SMCL1/CRX1B  |
|                    | TM02B    | 12                                  | 10                                  | -                                   | -                                  | I/O       | P07/IRQ07/SMDA1/CTX1B  |
|                    | TM03A    | 14                                  | 12                                  | 8                                   | -                                  | I/O       | P60/GPWMST5/RX4CD/SB14CD/RX7CD/SB17CD                          |
|                    | TM03B    | 15                                  | 13                                  | 9                                   | -                                  | I/O       | P61/GPWMST6/TX4C/SBO4C/SBT4D/SBO7C/TX7C/SDA7C/SBT7D/SCL7D      |
|                    | TM04A    | 16                                  | 14                                  | 10                                  | -                                  | I/O       | P62/GPWMST7/SBT4C/TX4D/SBO4D/SBT7C/SCL7C/SBO7D/TX7D/SDA7D      |
|                    | TM04B    | 17                                  | 15                                  | -                                   | -                                  | I/O       | P63/GPWMST8/SBCS4CD/SBCS7CD                                    |
|                    | TM05A    | 19                                  | 17                                  | -                                   | -                                  | I/O       | P64  |
|                    | TM05B    | 20                                  | 18                                  | -                                   | -                                  | I/O       | P65  |
|                    | TM06A    | 47                                  | 41                                  | -                                   | -                                  | I/O       | P86  |
|                    | TM06B    | 48                                  | 42                                  | -                                   | -                                  | I/O       | P87  |
|                    | TM07A    | 59                                  | 53                                  | 44                                  | -                                  | I/O       | P12/IRQ10  |
|                    | TM07B    | 60                                  | 54                                  | 45                                  | -                                  | I/O       | P13/IRQ11/GPWMST0/GPWMST9                                      |
|                    | TM08A    | 61                                  | 55                                  | 46                                  | -                                  | I/O       | P14/IRQ12/GPWMST1/GPWMSTA/DAOT0                                |
|                    | TM08B    | 62                                  | 56                                  | 47                                  | 37                                 | I/O       | P15/IRQ13/GPWMST2/GPWMSTB/DAOT1                                |
|                    | TM09A    | 65                                  | 58                                  | 48                                  | 38                                 | I/O       | P70/GPWM90   |
|                    | TM09B    | 66                                  | 59                                  | 49                                  | 39                                 | I/O       | P71/GPWM91   |
|                    | TM10A    | 67                                  | 60                                  | -                                   | -                                  | I/O       | P72/GPWMA0   |
|                    | TM10B    | 68                                  | 61                                  | -                                   | -                                  | I/O       | P73/GPWMA1   |
|                    | TM11A    | 125                                 | 110                                 | -                                   | -                                  | I/O       | P74/GPWMST3  |
|                    | TM11B    | 126                                 | 111                                 | -                                   | -                                  | I/O       | P75/GPWMST4  |
| TM12A              | 132      | 116                                 | 89                                  | 74                                  | I/O                                | P20/IRQ14 |  |
| TM12B              | 133      | 117                                 | 90                                  | 75                                  | I/O                                | P21/IRQ15 |  |



| Functions                    | Pin name       | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O              | Other Pins   |
|------------------------------|----------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|------------------|--|
| 16-bit timer                 | TM13A          | 139                                 | 123                                 | 96                                  | 79                                 | I/O              | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SBT7A/SCL7A/SBO7B<br>/TX7B/SDA7B/ADTRG2 |
|                              | TM13B          | 140                                 | 124                                 | 97                                  | 80                                 | I/O              | P27/SBCS4AB/SBCS7AB  |
|                              | TM20A          | 5                                   | 3                                   | 1                                   | 1                                  | I/O              | P00/IRQ00/TRCCLK   |
|                              | TM20B          | 6                                   | 4                                   | 2                                   | 2                                  | I/O              | P01/IRQ01/TRCSWO   |
|                              | TM21A          | 56                                  | 50                                  | 41                                  | 34                                 | I/O              | P10/IRQ08/CMPOT00/CTX1A  |
|                              | TM21B          | 58                                  | 52                                  | 43                                  | 36                                 | I/O              | P11/IRQ09/CMPOT10/CRX1A  |
|                              | TM22A          | 135                                 | 119                                 | 92                                  | -                                  | I/O              | P50/CTX0B  |
|                              | TM22B          | 136                                 | 120                                 | 93                                  | -                                  | I/O              | P51/CRX0B  |
|                              | TM23A          | 119                                 | 104                                 | 80                                  | 65                                 | I/O              | P52/CMPOT01/SBO5A/TX5A<br>/SBT5B                                       |
|                              | TM23B          | 120                                 | 105                                 | 81                                  | 66                                 | I/O              | P53/CMPOT11/SBT5A/SBO5B<br>/TX5B                                       |
|                              | TM24A          | 121                                 | 106                                 | 82                                  | 67                                 | I/O              | P54/CMPOT21/SBI5/RX5   |
|                              | TM24B          | 122                                 | 107                                 | 83                                  | 68                                 | I/O              | P55/CMPOT31/SBO6A/TX6A<br>/SBT6B                                       |
|                              | TM25A          | 123                                 | 108                                 | 84                                  | 69                                 | I/O              | P56/CMPOT41/SBT6A/SBO6B<br>/TX6B                                       |
|                              | TM25B          | 124                                 | 109                                 | 85                                  | 70                                 | I/O              | P57/SBI6/RX6   |
| Power control<br>PWM pin     | GPWM00/GPWMH00 | 41                                  | 35                                  | 28                                  | 21                                 | Output           | P80  |
|                              | GPWM01/GPWMH01 | 42                                  | 36                                  | 29                                  | 22                                 | Output           | P81  |
|                              | GPWM10/GPWMH10 | 43                                  | 37                                  | 30                                  | 23                                 | Output           | P82  |
|                              | GPWM11/GPWMH11 | 44                                  | 38                                  | 31                                  | 24                                 | Output           | P83  |
|                              | GPWM20/GPWMH20 | 45                                  | 39                                  | 32                                  | 25                                 | Output           | P84  |
|                              | GPWM21/GPWMH21 | 46                                  | 40                                  | 33                                  | 26                                 | Output           | P85  |
|                              | GPWM30/GPWMH30 | 49                                  | 43                                  | 34                                  | 27                                 | Output           | P90  |
|                              | GPWM31/GPWMH31 | 50                                  | 44                                  | 35                                  | 28                                 | Output           | P91  |
|                              | GPWM40/GPWMH40 | 51                                  | 45                                  | 36                                  | 29                                 | Output           | P92  |
|                              | GPWM41/GPWMH41 | 52                                  | 46                                  | 38                                  | 30                                 | Output           | P93  |
|                              | GPWM50/GPWMH50 | 53                                  | 47                                  | 38                                  | 31                                 | Output           | P94  |
|                              | GPWM51/GPWMH51 | 54                                  | 48                                  | 39                                  | 32                                 | Output           | P95  |
|                              | GPWM60/GPWMH60 | 31                                  | 29                                  | 22                                  | 19                                 | Output           | PA0  |
|                              | GPWM61/GPWMH61 | 32                                  | 30                                  | 23                                  | 20                                 | Output           | PA1  |
|                              | GPWM70/GPWMH70 | 33                                  | 31                                  | 24                                  | -                                  | Output           | PA2  |
|                              | GPWM71/GPWMH71 | 34                                  | 32                                  | 25                                  | -                                  | Output           | PA3  |
|                              | GPWM80/GPWMH80 | 37                                  | 33                                  | 26                                  | -                                  | Output           | PA4  |
|                              | GPWM81/GPWMH81 | 38                                  | 34                                  | 27                                  | -                                  | Output           | PA5  |
|                              | GPWM90         | 65                                  | 58                                  | 48                                  | 38                                 | Output           | P70/TM09A  |
|                              | GPWM91         | 66                                  | 59                                  | 49                                  | 39                                 | Output           | P71/TM09B  |
|                              | GPWMA0         | 67                                  | 60                                  | -                                   | -                                  | Output           | P72/TM10A  |
| GPWMA1                       | 68             | 61                                  | -                                   | -                                   | Output                             | P73/GPWMA1/TM10B |  |
| GPWMB0                       | 69             | 62                                  | -                                   | -                                   | Output                             | PB0              |  |
| GPWMB1                       | 70             | 63                                  | -                                   | -                                   | Output                             | PB1              |  |
| Power control<br>PWM monitor | GPWMST0        | 60                                  | 54                                  | 45                                  | -                                  | Output           | P13/IRQ11/TM07B/GPWMST9  |



| Functions                      | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O                               | Other Pins  |
|--------------------------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-----------------------------------|---|
| Power control<br>PWM monitor   | GPWMST1  | 61                                  | 55                                  | 46                                  | -                                  | Output                            | P14/IRQ12/TM08A/GPWMSTA<br>/DAOT0                                     |
|                                | GPWMST2  | 62                                  | 56                                  | 47                                  | 37                                 | Output                            | P15/IRQ13/TM08B/GPWMSTB<br>/DAOT1                                     |
|                                | GPWMST3  | 125                                 | 110                                 | -                                   | -                                  | Output                            | P74/TM11A   |
|                                | GPWMST4  | 126                                 | 111                                 | -                                   | -                                  | Output                            | P75/TM11B   |
|                                | GPWMST5  | 14                                  | 12                                  | 8                                   | -                                  | Output                            | P60/TM03A/RX4CD/SBI4CD<br>/RX7CD/SBI7CD                               |
|                                | GPWMST6  | 15                                  | 13                                  | 9                                   | -                                  | Output                            | P61/TM03B/TX4C/SBO4C<br>/SBT4D/SBO7C/TX7C/SDA7C<br>/SBT7D/SCL7D       |
|                                | GPWMST7  | 16                                  | 14                                  | 10                                  | -                                  | Output                            | P62/TM04A/SBT4C/TX4D<br>/SBO4D/SBT7C/SCL7C/SBO7D<br>/TX7D/SDA7D       |
|                                | GPWMST8  | 17                                  | 15                                  | -                                   | -                                  | Output                            | P63/TM04B/SBCS4CD/SBCS7CD   |
|                                | GPWMST9  | 60                                  | 54                                  | 45                                  | -                                  | Output                            | P13/IRQ11/TM07B/GPWMST0   |
|                                | GPWMSTA  | 61                                  | 55                                  | -                                   | -                                  | Output                            | P14/IRQ12/TM08A/GPWMST1<br>/DAOT0                                     |
| GPWMSTB                        | 62       | 56                                  | -                                   | -                                   | Output                             | P15/IRQ13/TM08B/GPWMST2<br>/DAOT1 |   |
| Clock Synchron-<br>ous SIF/SPI | SBO0A    | 129                                 | 113                                 | 86                                  | 71                                 | I/O                               | P30/SDA0A/SBT0B/SCL0B<br>/CMPOT20                                     |
|                                | SBT0A    | 130                                 | 114                                 | 87                                  | 72                                 | I/O                               | P31/SCL0A/SBO0B/SDA0B<br>/CMPOT30                                     |
|                                | SBO0B    | 130                                 | 114                                 | 87                                  | 72                                 | I/O                               | P31/SBT0A/SCL0A/SDA0B<br>/CMPOT30                                     |
|                                | SBT0B    | 129                                 | 113                                 | 86                                  | 71                                 | I/O                               | P30/SBO0A/SDA0A/SCL0B<br>/CMPOT20                                     |
|                                | SBI0     | 131                                 | 115                                 | 88                                  | 73                                 | Input                             | P32/CMPOT40   |
|                                | SBO1A    | 113                                 | 98                                  | 77                                  | 62                                 | I/O                               | P34/TX1A/LTX1A/SBT1B  |
|                                | SBT1A    | 114                                 | 99                                  | 78                                  | 63                                 | I/O                               | P35/SBO1B/TX1B/LTX1B  |
|                                | SBO1B    | 114                                 | 99                                  | 78                                  | 63                                 | I/O                               | P35/SBT1A/TX1B/LTX1B  |
|                                | SBT1B    | 113                                 | 98                                  | 77                                  | 62                                 | I/O                               | P34/SBO1A/TX1A/LTX1A  |
|                                | SBI1     | 115                                 | 100                                 | 79                                  | 64                                 | Input                             | P36/RX1/LRX1  |
|                                | SBO2A    | 116                                 | 101                                 | -                                   | -                                  | I/O                               | P40/TX2A/SBT2B  |
|                                | SBT2A    | 117                                 | 102                                 | -                                   | -                                  | I/O                               | P41/SBO2B/TX2B  |
|                                | SBO2B    | 117                                 | 102                                 | -                                   | -                                  | I/O                               | P41/SBT2A/TX2B  |
|                                | SBT2B    | 116                                 | 101                                 | -                                   | -                                  | I/O                               | P40/SBO2A/TX2A  |
|                                | SBI2     | 118                                 | 103                                 | -                                   | -                                  | Input                             | P42/RX2   |
|                                | SBCS3    | 144                                 | 128                                 | -                                   | -                                  | Output                            | P47   |
|                                | SBO3A    | 141                                 | 125                                 | 98                                  | -                                  | I/O                               | P44/TX3A/SBT3B  |
|                                | SBT3A    | 142                                 | 126                                 | 99                                  | -                                  | I/O                               | P45/SBO3B/TX3B  |
|                                | SBO3B    | 142                                 | 126                                 | 99                                  | -                                  | I/O                               | P45/SBT3A/TX3B  |
|                                | SBT3B    | 141                                 | 125                                 | 98                                  | -                                  | I/O                               | P44/SBO3A/TX3A  |
|                                | SBI3     | 143                                 | 127                                 | 100                                 | -                                  | I/O                               | P46/RX3   |
|                                | SBCS4AB  | 140                                 | 124                                 | 97                                  | 80                                 | Input                             | P27/SBCS7AB/TM13B   |
|                                | SBO4A    | 138                                 | 122                                 | 95                                  | 78                                 | I/O                               | P25/IRQ18/TX4A/SBT4B<br>/SBO7A/TX7A/SDA7A/SBT7B<br>SCL7B/CTX0A/ADTRG1 |





| Functions                 | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O   | Other Pins   |
|---------------------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-------|--|
| Clock Synchronous SIF/SP1 | SBT4A    | 139                                 | 123                                 | 96                                  | 79                                 | I/O   | P26/IRQ19/SBO4B/TX4B<br>/SBT7A/SCL7A/SBO7B/TX7B<br>/SDA7B/TM13A/ADTRG2 |
|                           | SBO4B    | 139                                 | 123                                 | 96                                  | 79                                 | I/O   | P26/IRQ19/SBT4A/TX4B<br>/SBT7A/SCL7A/SBO7B/TX7B<br>/SDA7B/TM13A/ADTRG2 |
|                           | SBT4B    | 138                                 | 122                                 | 95                                  | 78                                 | I/O   | P25/IRQ18/SBO4A/TX4A<br>/SBO7A/TX7A/SDA7A/SBT7B<br>/SCL7B/CTX0A/ADTRG1 |
|                           | SBI4AB   | 137                                 | 121                                 | 94                                  | 77                                 | Input | P24/IRQ17/RX4AB/SBI7AB<br>/RX7AB/CRX0A/ADTRG0                          |
|                           | SBCS4CD  | 17                                  | 15                                  | -                                   | -                                  | Input | P63/TM04B/GPWMST8/SBCS7CD  |
|                           | SBO4C    | 15                                  | 13                                  | 9                                   | -                                  | I/O   | P61/TM03B/GPWMST6/TX4C<br>/SBT4D/SBO7C/TX7C/SDA7C<br>/SBT7D/SCL7D      |
|                           | SBT4C    | 16                                  | 14                                  | 10                                  | -                                  | I/O   | P62/TM04A/GPWMST7/TX4D<br>/SBO4D/SBT7C/SCL7C/SBO7D<br>/TX7D/SDA7D      |
|                           | SBO4D    | 16                                  | 14                                  | 10                                  | -                                  | I/O   | P62/TM04A/GPWMST7/SBT4C<br>/TX4D/SBT7C/SCL7C/SBO7D<br>/TX7D/SDA7D      |
|                           | SBT4D    | 15                                  | 13                                  | 9                                   | -                                  | I/O   | P61/TM03B/PWMST6/TX4C<br>/SBO4C/SBO7C/TX7C/SDA7C<br>/SBT7D/SCL7D       |
|                           | SBI4CD   | 14                                  | 12                                  | 8                                   | -                                  | Input | P60/TM03A/GPWMST5/RX4CD<br>/RX7CD/SBI7CD                               |
|                           | SBO5A    | 119                                 | 104                                 | 80                                  | 65                                 | I/O   | P52/TM23A/CMPOT01/TX5A<br>/SBT5B                                       |
|                           | SBT5A    | 120                                 | 105                                 | 81                                  | 66                                 | I/O   | P53/TM23B/CMPOT11/SBO5B<br>/TX5B                                       |
|                           | SBO5B    | 120                                 | 105                                 | 81                                  | 66                                 | I/O   | P53/TM23B/CMPOT11/SBT5A<br>/TX5B                                       |
|                           | SBT5B    | 119                                 | 104                                 | 80                                  | 65                                 | I/O   | P52/TM23A/CMPOT01/SBO5A<br>/TX5A                                       |
|                           | SBI5     | 121                                 | 106                                 | 82                                  | 67                                 | Input | P54/TM24A/CMPOT21/RX5  |
|                           | SBO6A    | 122                                 | 107                                 | 83                                  | 68                                 | I/O   | P55/TM24B/CMPOT31/TX6A<br>/SBT6B                                       |
|                           | SBT6A    | 123                                 | 108                                 | 84                                  | 69                                 | I/O   | P56/TM25A/CMPOT41/SBO6B<br>/TX6B                                       |
|                           | SBO6B    | 123                                 | 108                                 | 84                                  | 69                                 | I/O   | P56/TM25A/CMPOT41/SBT6A<br>/TX6B                                       |
|                           | SBT6B    | 122                                 | 107                                 | 83                                  | 68                                 | I/O   | P55/TM24B/CMPOT31/SBO6A<br>/TX6A                                       |
|                           | SBI6     | 124                                 | 109                                 | 85                                  | 70                                 | Input | P57/TM25B/RX6  |
|                           | SBCS7AB  | 140                                 | 124                                 | 97                                  | 80                                 | Input | P27/SBCS4AB/TM13B  |
|                           | SBO7A    | 138                                 | 122                                 | 95                                  | 78                                 | I/O   | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/TX7A/SCL7A/SBT7B<br>SCL7B/CTX0A/ADTRG1  |
|                           | SBT7A    | 139                                 | 123                                 | 96                                  | 79                                 | I/O   | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SCL7A/SBO7B/TX7B<br>/SDA7B/TM13A/ADTRG2 |
|                           | SBO7B    | 139                                 | 123                                 | 96                                  | 79                                 | I/O   | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SBT7A/SCL7A/TX7B<br>/SDA7B/TM13A/ADTRG2 |



| Functions                 | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O            | Other Pins  |
|---------------------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|----------------|---|
| Clock Synchronous SIF/SPI | SBT7B    | 138                                 | 122                                 | 95                                  | 78                                 | I/O            | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/SBO7A/TX7A/SDA7A<br>/SCL7B/CTX0A/ADTRGI  |
|                           | SBI7AB   | 137                                 | 121                                 | 94                                  | 77                                 | Input          | P24/IRQ17/SBI4AB/RX4AB<br>/RX7AB/CRX0A/ADTRG0                           |
|                           | SBCS7CD  | 17                                  | 15                                  | -                                   | -                                  | Input          | P63/TM04B/GPWMST8/SBCS4CD   |
|                           | SBO7C    | 15                                  | 13                                  | 9                                   | -                                  | I/O            | P61/TM03B/GPWMST6/TX4C<br>/SBO4C/SBT4D/TX7C/SDA7C<br>/SBT7D/SCL7D       |
|                           | SBT7C    | 16                                  | 14                                  | 10                                  | -                                  | I/O            | P62/TM04A/GPWMST7/SBT4C<br>/TX4D/SBO4D/SCL7C/SBO7D<br>/TX7D/SDA7D       |
|                           | SBO7D    | 16                                  | 14                                  | 10                                  | -                                  | I/O            | P62/TM04A/GPWMST7/SBT4C<br>/TX4D/SBO4D/SBT7C/SCL7C<br>/TX7D/SDA7D       |
|                           | SBT7D    | 15                                  | 13                                  | 9                                   | -                                  | I/O            | P61/TM03B/GPWMST6/TX4C<br>/SBO4C/SBT4D/SBO7C/TX7C<br>/SCL7D             |
|                           | SBI7CD   | 14                                  | 12                                  | 8                                   | -                                  | Input          | P60/TM03A/GPWMST5/RX4CD<br>/SBI4CD/RX7CD                                |
| UART                      | TX1A     | 113                                 | 98                                  | 77                                  | 62                                 | I/O            | P34/SBO1A/LTX1A/SBT1B   |
|                           | TX1B     | 114                                 | 99                                  | 78                                  | 63                                 | I/O            | P35/SBT1A/SBO1B/LTX1B   |
|                           | RX1      | 115                                 | 100                                 | 79                                  | 64                                 | Input          | P36/SBI1/LRX1   |
|                           | TX2A     | 116                                 | 101                                 | -                                   | -                                  | I/O            | P40/SBO2A/SBT2B   |
|                           | TX2B     | 117                                 | 102                                 | -                                   | -                                  | I/O            | P41/SBT2A/SBO2B   |
|                           | RX2      | 118                                 | 103                                 | -                                   | -                                  | Input          | P42/SBI2  |
|                           | TX3A     | 141                                 | 125                                 | 98                                  | -                                  | I/O            | P44/SBO3A/SBT3B   |
|                           | TX3B     | 142                                 | 126                                 | 99                                  | -                                  | I/O            | P45/SBT3A/SBO3B   |
|                           | RX3      | 143                                 | 127                                 | 100                                 | -                                  | Input          | P46/SBI3  |
|                           | TX4A     | 138                                 | 122                                 | 95                                  | 78                                 | I/O            | P25/IRQ18/SBO4A/SBT4B<br>/SBO7A/TX7A/SDA7A/SBT7B<br>/SCL7B/CTX0A/ADTRGI |
|                           | TX4B     | 139                                 | 123                                 | 96                                  | 79                                 | I/O            | P26/IRQ19/SBT4A/SBO4B<br>/SBT7A/SCL7A/SBO7B/TX7B<br>/SDA7B/TM13A/ADTRG2 |
|                           | RX4AB    | 137                                 | 121                                 | 94                                  | 77                                 | Input          | P24/IRQ17/SBI4AB/SBI7AB<br>/RX7AB/CRX0A/ADTRG0                          |
|                           | TX4C     | 15                                  | 13                                  | 9                                   | -                                  | I/O            | P61/TM03B/GPWMST6/SBO4C<br>/SBT4D/SBO7C/TX7C/SDA7C<br>/SBT7D/SCL7D      |
|                           | TX4D     | 16                                  | 14                                  | 10                                  | -                                  | I/O            | P62/TM04A/GPWMST7/SBT4C<br>/SBO4D/SBT7C/SCL7C/SBO7D<br>/TX7D/SDA7D      |
|                           | RX4CD    | 14                                  | 12                                  | 8                                   | -                                  | Input          | P60/TM03A/GPWMST5/SBI4CD<br>/RX7CD/SBI7CD                               |
|                           | TX5A     | 119                                 | 104                                 | 80                                  | 65                                 | I/O            | P52/TM23A/CMPOT01/SBO5A<br>/SBT5B                                       |
|                           | TX5B     | 120                                 | 105                                 | 81                                  | 66                                 | I/O            | P53/TM23B/CMPOT11/SBT5A<br>/SBO5B                                       |
|                           | RX5      | 121                                 | 106                                 | 82                                  | 67                                 | Input          | P54/TM24A/CMPOT21/SBI5  |
|                           | TX6A     | 122                                 | 107                                 | 83                                  | 68                                 | I/O            | P55/TM24B/CMPOT31/SBO6A<br>/SBT6B                                       |
|                           | TX6B     | 123                                 | 108                                 | 84                                  | 69                                 | I/O            | P56/TM25A/CMPOT41/SBT6A<br>/SBO6B                                       |
| RX6                       | 124      | 109                                 | 85                                  | 70                                  | Input                              | P57/TM25B/SBI6 |   |



| Functions | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O    | Other Pins  |
|-----------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|--------|---|
| UART      | TX7A     | 138                                 | 122                                 | 95                                  | 78                                 | I/O    | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/SBO7A/SDA7A/SBT7B<br>/SCL7B/CTX0A/ADTRG1 |
|           | TX7B     | 139                                 | 123                                 | 96                                  | 79                                 | I/O    | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SBT7A/SCL7A/SBO7B<br>/SDA7B/TM13A/ADTRG2 |
|           | RX7AB    | 137                                 | 121                                 | 94                                  | 77                                 | Input  | P24/IRQ17/SBI4AB/RX4AB<br>/SBI7AB/CRX0A/ADTRG0                          |
|           | TX7C     | 15                                  | 13                                  | 9                                   | -                                  | I/O    | P61/TM03B/GPWMST6/TX4C<br>/SBO4C/SBT4D/SBO7C/SDA7C<br>/SBT7D/SCL7D      |
|           | TX7D     | 16                                  | 14                                  | 10                                  | -                                  | I/O    | P62/TM04A/GPWMST7/SBT4C<br>/TX4D/SBO4D/SBT7C/SCL7C<br>/SBO7D/SCL7D      |
|           | RX7CD    | 14                                  | 12                                  | 8                                   | -                                  | Input  | P60/TM03A/GPWMST5/RX4CD<br>/SBI4CD/SBI7CD                               |
| LIN       | LTX1A    | 113                                 | 98                                  | 77                                  | 62                                 | Output | P34/SBO1A/TX1A/SBT1B  |
|           | LTX1B    | 114                                 | 99                                  | 78                                  | 63                                 | Output | P35/SBT1A/SBO1B/TX1B  |
|           | LRX1     | 115                                 | 100                                 | 79                                  | 64                                 | Input  | P36/SBI1/RX1  |
| IIC       | SDA0A    | 129                                 | 113                                 | 86                                  | 71                                 | I/O    | P30/SBO0A/SBT0B/SCL0B<br>/CMPOT20                                       |
|           | SCL0A    | 130                                 | 114                                 | 87                                  | 72                                 | I/O    | P31/SBT0A/SBO0B/SDA0B<br>/CMPOT30                                       |
|           | SDA0B    | 130                                 | 114                                 | 87                                  | 72                                 | I/O    | P31/SBT0A/SCL0A/SBO0B<br>/CMPOT30                                       |
|           | SCL0B    | 129                                 | 113                                 | 86                                  | 71                                 | I/O    | P30/SBO0A/SDA0A/SBT0B<br>/CMPOT20                                       |
|           | SDA7A    | 138                                 | 122                                 | 95                                  | 78                                 | I/O    | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/SBO7A/TX7A/SBT7B<br>/SCL7B/CTX0A/ADTRG1  |
|           | SCL7A    | 139                                 | 123                                 | 96                                  | 79                                 | I/O    | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SBT7A/SBO7B/TX7B<br>/SDA7B/TM13A/ADTRG2  |
|           | SDA7B    | 139                                 | 123                                 | 96                                  | 79                                 | I/O    | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SBT7A/SCL7A/SBO7B<br>/TX7B/TM13A/ADTRG2  |
|           | SCL7B    | 138                                 | 122                                 | 95                                  | 78                                 | I/O    | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/SBO7A/TX7A/SDA7A<br>/SBT7B/CTX0A/ADTRG1  |
|           | SDA7C    | 15                                  | 13                                  | 9                                   | -                                  | I/O    | P61/TM03B/GPWMST6/SBO4C<br>/TX4C/SBT4D/SBO7C/TX7C<br>/SBT7D/SCL7D       |
|           | SCL7C    | 16                                  | 14                                  | 10                                  | -                                  | I/O    | P62/TM04A/GPWMST7/SBT4C<br>/SBO4D/TX4D/SBT7C/SBO7D<br>/TX7D/SDA7D       |
|           | SDA7D    | 16                                  | 14                                  | 10                                  | -                                  | I/O    | P62/TM04A/GPWMST7/SBT4C<br>/SBO4D/TX4D/SBT7C/SCL7C<br>/SBO7D/TX7D       |
|           | SCL7D    | 15                                  | 13                                  | 9                                   | -                                  | I/O    | P61/TM03B/GPWMST6/SBO4C<br>/TX4C/SBT4D/SBO7C/TX7C<br>/SDA7C/SBT7D       |
| CAN FD    | CTX0A    | 138                                 | 122                                 | 95                                  | 78                                 | Output | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/SBO7A/TX7A/SDA7A<br>/SBT7B/SCL7B/ADTRG1  |
|           | CRX0A    | 137                                 | 121                                 | 94                                  | 77                                 | Input  | P24/IRQ17/SBI4AB/RX4AB<br>/SBI7AB/RX7AB/ADTRG0                          |
|           | CTX0B    | 135                                 | 119                                 | 92                                  | -                                  | Output | P50/TM22A   |
|           | CRX0B    | 136                                 | 120                                 | 93                                  | -                                  | Input  | P51/TM22B   |
|           | CTX1A    | 56                                  | 50                                  | 41                                  | 34                                 | Output | P10/IRQ08/TM21A/CMPOUT00  |
|           | CRX1A    | 58                                  | 52                                  | 43                                  | 36                                 | Input  | P11/IRQ09/TM21B/CMPT010   |
|           | CTX1B    | 12                                  | 10                                  | -                                   | -                                  | Output | P07/IRQ07/TM02B/SMDA1   |
|           | CRX1B    | 11                                  | 9                                   | -                                   | -                                  | Input  | P06/IRQ06/TM02A/SMCL1   |



| Functions   | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O        | Other Pins  |
|-------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|------------|---|
| SM Bus      | SMDA1    | 12                                  | 10                                  | -                                   | -                                  | I/O        | P07/IRQ07/TM02B/CTX1B   |
|             | SMCL1    | 11                                  | 9                                   | -                                   | -                                  | I/O        | P06/IRQ06/TM02A/CRX1B   |
| A/D Input   | ADIN00   | 97                                  | 87                                  | 67                                  | 53                                 | Input      | PC0/VGAN0   |
|             | ADIN01   | 98                                  | 88                                  | 68                                  | 54                                 | Input      | PC1/VGAP00/CMPIN0   |
|             | ADIN02   | 99                                  | 89                                  | 69                                  | 55                                 | Input      | PC2/VGAP01/CMPIN1   |
|             | ADIN03   | 100                                 | 90                                  | 70                                  | 56                                 | Input      | PC3/VGAP02/CMPIN2   |
|             | ADIN04   | 101                                 | 91                                  | 71                                  | 57                                 | Input      | PC4   |
|             | ADIN05   | 102                                 | 92                                  | 72                                  | -                                  | Input      | PC5   |
|             | ADIN06   | 103                                 | 93                                  | 73                                  | 58                                 | Input      | PC6   |
|             | ADIN07   | 104                                 | 94                                  | 74                                  | 59                                 | Input      | PC7   |
|             | ADIN08   | 87                                  | 77                                  | 61                                  | 47                                 | Input      | PD0/VGAN1   |
|             | ADIN09   | 88                                  | 78                                  | 62                                  | 48                                 | Input      | PD1/VGAP1/CMPIN3  |
|             | ADIN10   | 89                                  | 79                                  | 63                                  | 49                                 | Input      | PD2   |
|             | ADIN11   | 90                                  | 80                                  | 64                                  | 50                                 | Input      | PD3   |
|             | ADIN12   | 91                                  | 81                                  | -                                   | -                                  | Input      | PD4   |
|             | ADIN13   | 92                                  | 82                                  | -                                   | -                                  | Input      | PD5   |
|             | ADIN14   | 93                                  | 83                                  | 65                                  | 51                                 | Input      | PD6   |
|             | ADIN15   | 94                                  | 84                                  | 66                                  | 52                                 | Input      | PD7   |
|             | ADIN16   | 85                                  | 75                                  | 59                                  | 45                                 | Input      | PE0/VGAP2/CMPIN4  |
|             | ADIN17   | 86                                  | 76                                  | 60                                  | 46                                 | Input      | PE1/VGAN2   |
|             | ADIN18   | 79                                  | 69                                  | 54                                  | 42                                 | Input      | PE2   |
|             | ADIN19   | 80                                  | 70                                  | 55                                  | 43                                 | Input      | PE3   |
|             | ADIN20   | 81                                  | 71                                  | 56                                  | -                                  | Input      | PE4   |
|             | ADIN21   | 82                                  | 72                                  | 57                                  | 44                                 | Input      | PE5   |
|             | ADIN22   | 83                                  | 73                                  | 58                                  | -                                  | Input      | PE6   |
|             | ADIN23   | 84                                  | 74                                  | -                                   | -                                  | Input      | PE7   |
|             | ADIN24   | 76                                  | 66                                  | 52                                  | -                                  | Input      | PF0   |
|             | ADIN25   | 77                                  | 67                                  | 53                                  | -                                  | Input      | PF1   |
|             | ADIN26   | 78                                  | 68                                  | -                                   | -                                  | Input      | PF2   |
|             | ADIN27   | 95                                  | 85                                  | -                                   | -                                  | Input      | PF3   |
|             | ADIN28   | 96                                  | 86                                  | -                                   | -                                  | Input      | PF4   |
|             | ADIN29   | 105                                 | 95                                  | -                                   | -                                  | Input      | PF5   |
|             | ADIN30   | 106                                 | -                                   | -                                   | -                                  | Input      | PF6   |
| ADIN31      | 107      | -                                   | -                                   | -                                   | Input                              | PF7        |   |
| A/D monitor | ADTRG0   | 137                                 | 121                                 | 94                                  | 77                                 | Output     | P24/IRQ17/SBI4AB/RX4AB<br>/SBI7AB/RX7AB/CRX0A                         |
|             | ADTRG1   | 138                                 | 122                                 | 95                                  | 78                                 | Output     | P25/IRQ18/SBO4A/TX4A<br>/SBT4B/SBO7A/TX7A/SDA7A<br>/SBT7B/SCL7B/CTX0A |
|             | ADTRG2   | 139                                 | 123                                 | 96                                  | 79                                 | Output     | P26/IRQ19/SBT4A/SBO4B<br>/TX4B/SBT7A/SCL7A/SBO7B<br>/SDA7B/TX7B/TM13A |
| VGA Input   | VGAP00   | 98                                  | 88                                  | 68                                  | 54                                 | Input      | PC1/ADIN01/CMPIN0   |
|             | VGAP01   | 99                                  | 89                                  | 69                                  | 55                                 | Input      | PC2/ADIN02/CMPIN1   |
|             | VGAP02   | 100                                 | 90                                  | 70                                  | 56                                 | Input      | PC3/ADIN03/CMPIN2   |
|             | VGAN0    | 97                                  | 87                                  | 67                                  | 53                                 | Input      | PC0/ADIN00  |
|             | VGAP1    | 88                                  | 78                                  | 62                                  | 48                                 | Input      | PD1/ADIN09/CMPIN3   |
|             | VGAN1    | 87                                  | 77                                  | 61                                  | 47                                 | Input      | PD0/ADIN08  |
|             | VGAP2    | 85                                  | 75                                  | 59                                  | 45                                 | Input      | PE0/ADIN16/CMPIN4   |
| VGAN2       | 86       | 76                                  | 60                                  | 46                                  | Input                              | PE1/ADIN17 |   |



| Functions         | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O    | Other Pins                        |
|-------------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|--------|-----------------------------------|
| Comparator Input  | CMPIN0   | 98                                  | 88                                  | 68                                  | 54                                 | Input  | PC1/ADIN01/VGAP00                 |
|                   | CMPIN1   | 99                                  | 89                                  | 69                                  | 55                                 | Input  | PC2/ADIN02/VGAP01                 |
|                   | CMPIN2   | 100                                 | 90                                  | 70                                  | 56                                 | Input  | PC3/ADIN03/VGAP02                 |
|                   | CMPIN3   | 88                                  | 78                                  | 62                                  | 48                                 | Input  | PD1/ADIN09/VGAP1                  |
|                   | CMPIN4   | 85                                  | 75                                  | 59                                  | 45                                 | Input  | PE0/ADIN16/VGAP2                  |
| Comparator Output | CMPOT00  | 56                                  | 50                                  | 41                                  | 34                                 | Output | P10/IRQ08/TM21A/CTX1A             |
|                   | CMPOT01  | 119                                 | 104                                 | 80                                  | 65                                 | Output | P52/TM23A/SBO5A/TX5A/SBT5B        |
|                   | CMPOT10  | 58                                  | 52                                  | 43                                  | 36                                 | Output | P11/IRQ09/TM21B/CRX1A             |
|                   | CMPOT11  | 120                                 | 105                                 | 81                                  | 66                                 | Output | P53/TM23B/SBT5A/SBO5B/TX5B        |
|                   | CMPOT20  | 129                                 | 113                                 | 86                                  | 71                                 | Output | P30/SBO0A/SDA0A/SBT0B/SCL0B       |
|                   | CMPOT21  | 121                                 | 106                                 | 82                                  | 67                                 | Output | P54/TM24A/SB15/RX5                |
|                   | CMPOT30  | 130                                 | 114                                 | 87                                  | 72                                 | Output | P31/SBT0A/SCL0A/SBO0B/SDA0B       |
|                   | CMPOT31  | 122                                 | 107                                 | 83                                  | 68                                 | Output | P55/TM24B/SBO6A/TX6A/SBT6B        |
|                   | CMPOT40  | 131                                 | 115                                 | 88                                  | 73                                 | Output | P32/SB10                          |
|                   | CMPOT41  | 123                                 | 108                                 | 84                                  | 69                                 | Output | P56/TM25A/SBT6A/SBO6B/TX6B        |
| D/A Output        | DAOT0    | 61                                  | 55                                  | 46                                  | -                                  | Output | P14/IRQ12/TM08A/GPWMST1/GPWMSTA   |
|                   | DAOT1    | 62                                  | 56                                  | 47                                  | 37                                 | Output | P15/IRQ13/TM08B/GPWMST2/GPWMSTB   |
| I/O port          | P00      | 5                                   | 3                                   | 1                                   | 1                                  | I/O    | IRQ00/TM20A/TRCCLK                |
|                   | P01      | 6                                   | 4                                   | 2                                   | 2                                  | I/O    | IRQ01/TM20B/TRCSWO                |
|                   | P02      | 7                                   | 5                                   | 3                                   | 3                                  | I/O    | IRQ02/TM00A/TRCD0                 |
|                   | P03      | 8                                   | 6                                   | 4                                   | 4                                  | I/O    | IRQ03/TM00B/TRCD1                 |
|                   | P04      | 9                                   | 7                                   | 5                                   | 5                                  | I/O    | IRQ04/TM01A/TRCD2                 |
|                   | P05      | 10                                  | 8                                   | 6                                   | 6                                  | I/O    | IRQ05/TM01B/TRCD3                 |
|                   | P06      | 11                                  | 9                                   | -                                   | -                                  | I/O    | IRQ06/TM02A/SMCL1/CRX1B           |
|                   | P07      | 12                                  | 10                                  | -                                   | -                                  | I/O    | IRQ07/TM02B/SDA1/CTX1B            |
|                   | P10      | 56                                  | 50                                  | 41                                  | 34                                 | I/O    | IRQ08/TM21A/CMPOT00/CTX1A         |
|                   | P11      | 58                                  | 52                                  | 43                                  | 36                                 | I/O    | IRQ09/TM21B/CMPOT10/CRX1A         |
|                   | P12      | 59                                  | 53                                  | 44                                  | -                                  | I/O    | IRQ10/TM07A                       |
|                   | P13      | 60                                  | 54                                  | 45                                  | -                                  | I/O    | IRQ11/TM07B/GPWMST0/GPWMST9       |
|                   | P14      | 61                                  | 55                                  | 46                                  | -                                  | I/O    | IRQ12/TM08A/GPWMST1/GPWMSTA/DAOT0 |
|                   | P15      | 62                                  | 56                                  | 47                                  | 37                                 | I/O    | IRQ13/TM08B/GPWMST2/GPWMSTB/DAOT1 |
|                   | P16      | 63                                  | 57                                  | -                                   | -                                  | I/O    | -                                 |
|                   | P17      | 64                                  | -                                   | -                                   | -                                  | I/O    | -                                 |



| Functions | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O   | Other Pins   |
|-----------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-------|--|
| I/O port  | P20      | 132                                 | 116                                 | 89                                  | 74                                 | I/O   | IRQ14/TM12A  |
|           | P21      | 133                                 | 117                                 | 90                                  | 75                                 | I/O   | IRQ15/TM12B  |
|           | P22      | 134                                 | 118                                 | 91                                  | 76                                 | I/O   | IRQ16  |
|           | P24      | 137                                 | 121                                 | 94                                  | 77                                 | I/O   | IRQ17/SBI4AB/RX4AB/SBI7AB<br>/RX7AB/CRX0A/ADTRG0                         |
|           | P25      | 138                                 | 122                                 | 95                                  | 78                                 | I/O   | IRQ18/SBO4A/TX4A/SBT4B<br>/SBO7A/TX7A/SDA7A/SBT7B<br>/SCL7B/CTX0A/ADTRG1 |
|           | P26      | 139                                 | 123                                 | 96                                  | 79                                 | I/O   | IRQ19/SBT4A/SBO4B/TX4B<br>/SBT7A/SCL7A/SBO7B/TX7B<br>/SDA7B/TM13A/ADTRG2 |
|           | P27      | 140                                 | 124                                 | 97                                  | 80                                 | I/O   | SBCS4AB/SBCS7AB/TM13B  |
|           | P30      | 129                                 | 113                                 | 86                                  | 71                                 | I/O   | SBO0A/SDA0A/SBT0B/SCL0B<br>/CMPOT20                                      |
|           | P31      | 130                                 | 114                                 | 87                                  | 72                                 | I/O   | SBT0A/SCL0A/SBO0B/SDA0B<br>/CMPOT30                                      |
|           | P32      | 131                                 | 115                                 | 88                                  | 73                                 | I/O   | SBI0/CMPOT40   |
|           | P34      | 113                                 | 98                                  | 77                                  | 62                                 | I/O   | SBO1A/TX1A/LTX1A/SBT1B   |
|           | P35      | 114                                 | 99                                  | 78                                  | 63                                 | I/O   | SBT1A/SBO1B/TX1B/LTX1B   |
|           | P36      | 115                                 | 100                                 | 79                                  | 64                                 | I/O   | SBI1/RX1/LRX1  |
|           | P40      | 116                                 | 101                                 | -                                   | -                                  | I/O   | SBO2A/TX2A/SBT2B   |
|           | P41      | 117                                 | 102                                 | -                                   | -                                  | I/O   | SBT2A/SBO2B/TX2B   |
|           | P42      | 118                                 | 103                                 | -                                   | -                                  | I/O   | SBI2/RX2   |
|           | P44      | 141                                 | 125                                 | 98                                  | -                                  | I/O   | SBO3A/TX3A/SBT3B   |
|           | P45      | 142                                 | 126                                 | 99                                  | -                                  | I/O   | SBT3A/SBO3B/TX3B   |
|           | P46      | 143                                 | 127                                 | 100                                 | -                                  | I/O   | SBI3/RX3   |
|           | P47      | 144                                 | 128                                 | -                                   | -                                  | I/O   | SBCS3  |
|           | P50      | 135                                 | 119                                 | 92                                  | -                                  | I/O   | TM22A/CTX0B  |
|           | P51      | 136                                 | 120                                 | 93                                  | -                                  | I/O   | TM22B/CRX0B  |
|           | P52      | 119                                 | 104                                 | 80                                  | 65                                 | I/O   | TM23A/CMPOT01/SBO5A/TX5A<br>/SBT5B                                       |
|           | P53      | 120                                 | 105                                 | 81                                  | 66                                 | I/O   | TM23B/CMPOT11/SBT5A/SBO5B<br>/TX5B                                       |
|           | P54      | 121                                 | 106                                 | 82                                  | 67                                 | I/O   | TM24A/CMPOT21/SBI5/RX5   |
|           | P55      | 122                                 | 107                                 | 83                                  | 68                                 | I/O   | TM24B/CMPOT31/SBO6A/TX6A<br>/SBT6B                                       |
|           | P56      | 123                                 | 108                                 | 84                                  | 69                                 | I/O   | TM25A/CMPOT41/SBT6A/SBO6B<br>/TX6B                                       |
|           | P57      | 124                                 | 109                                 | 85                                  | 70                                 | I/O   | TM25B/SBI6/RX6   |
|           | P60      | 14                                  | 12                                  | 8                                   | -                                  | I/O   | TM03A/GPWMST5/RX4CD/SBI4CD<br>/RX7CD/SBI7CD                              |
|           | P61      | 15                                  | 13                                  | 9                                   | -                                  | I/O   | TM03B/GPWMST6/TX4C/SBO4C<br>/SBT4D/SBO7C/TX7C/SDA7C<br>/SBT7D/SCL7D      |
|           | P62      | 16                                  | 14                                  | 10                                  | -                                  | I/O   | TM04A/GPWMST7/SBT4C/TX4D<br>/SBO4D/SBT7C/SCL7C/SBO7D<br>/TX7D/SDA7D      |
|           | P63      | 17                                  | 15                                  | -                                   | -                                  | I/O   | TM04B/GPWMST8/SBCS4CD/SBCS7CD  |
| P64       | 19       | 17                                  | -                                   | -                                   | I/O                                | TM05A |  |



| Functions | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O   | Other Pins     |
|-----------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-------|----------------|
| I/O port  | P65      | 20                                  | 18                                  | -                                   | -                                  | I/O   | TM05B          |
|           | P66      | 35                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | P67      | 36                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | P70      | 65                                  | 58                                  | 48                                  | 38                                 | I/O   | GPWM90/TM09A   |
|           | P71      | 66                                  | 59                                  | 49                                  | 39                                 | I/O   | GPWM91/TM09B   |
|           | P72      | 67                                  | 60                                  | -                                   | -                                  | I/O   | GPWMA0/TM10A   |
|           | P73      | 68                                  | 61                                  | -                                   | -                                  | I/O   | GPWMA1/TM10B   |
|           | P74      | 125                                 | 110                                 | -                                   | -                                  | I/O   | TM11A/GPWMST3  |
|           | P75      | 126                                 | 111                                 | -                                   | -                                  | I/O   | TM11B/GPWMST4  |
|           | P76      | 127                                 | 112                                 | -                                   | -                                  | I/O   | -              |
|           | P77      | 128                                 | -                                   | -                                   | -                                  | I/O   | -              |
|           | P80      | 41                                  | 35                                  | 28                                  | 21                                 | I/O   | GPWM00/GPWMH00 |
|           | P81      | 42                                  | 36                                  | 29                                  | 22                                 | I/O   | GPWM01/GPWMH01 |
|           | P82      | 43                                  | 37                                  | 30                                  | 23                                 | I/O   | GPWM10/GPWMH10 |
|           | P83      | 44                                  | 38                                  | 31                                  | 24                                 | I/O   | GPWM11/GPWMH11 |
|           | P84      | 45                                  | 39                                  | 32                                  | 25                                 | I/O   | GPWM20/GPWMH20 |
|           | P85      | 46                                  | 40                                  | 33                                  | 26                                 | I/O   | GPWM21/GPWMH21 |
|           | P86      | 47                                  | 41                                  | -                                   | -                                  | I/O   | TM06A          |
|           | P87      | 48                                  | 42                                  | -                                   | -                                  | I/O   | TM06B          |
|           | P90      | 49                                  | 43                                  | 34                                  | 27                                 | I/O   | GPWM30/GPWMH30 |
|           | P91      | 50                                  | 44                                  | 35                                  | 28                                 | I/O   | GPWM31/GPWMH31 |
|           | P92      | 51                                  | 45                                  | 36                                  | 29                                 | I/O   | GPWM40/GPWMH40 |
|           | P93      | 52                                  | 46                                  | 37                                  | 30                                 | I/O   | GPWM41/GPWMH41 |
|           | P94      | 53                                  | 47                                  | 38                                  | 31                                 | I/O   | GPWM50/GPWMH50 |
|           | P95      | 54                                  | 48                                  | 39                                  | 32                                 | I/O   | GPWM51/GPWMH51 |
|           | P96      | 2                                   | 1                                   | -                                   | -                                  | I/O   | -              |
|           | P97      | 4                                   | 2                                   | -                                   | -                                  | I/O   | -              |
|           | PA0      | 31                                  | 29                                  | 22                                  | 19                                 | I/O   | GPWM60/GPWMH60 |
|           | PA1      | 32                                  | 30                                  | 23                                  | 20                                 | I/O   | GPWM61/GPWMH61 |
|           | PA2      | 33                                  | 31                                  | 24                                  | -                                  | I/O   | GPWM70/GPWMH70 |
|           | PA3      | 34                                  | 32                                  | 25                                  | -                                  | I/O   | GPWM71/GPWMH71 |
|           | PA4      | 37                                  | 33                                  | 26                                  | -                                  | I/O   | GPWM80/GPWMH80 |
|           | PA5      | 38                                  | 34                                  | 27                                  | -                                  | I/O   | GPWM81/GPWMH81 |
|           | PA6      | 39                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | PA7      | 40                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | PB0      | 69                                  | 62                                  | -                                   | -                                  | I/O   | GPWMB0         |
|           | PB1      | 70                                  | 63                                  | -                                   | -                                  | I/O   | GPWMB1         |
|           | PB2      | 71                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | PB3      | 74                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | PB4      | 75                                  | -                                   | -                                   | -                                  | I/O   | -              |
|           | PB6      | 111                                 | -                                   | -                                   | -                                  | I/O   | -              |
|           | PB7      | 112                                 | -                                   | -                                   | -                                  | I/O   | -              |
|           | PC0      | 97                                  | 87                                  | 67                                  | 53                                 | Input | ADIN00/VGAN0   |



| Functions | Pin name | MN1M7AFx0z<br>(144 pins)<br>Pin No. | MN1M7AFx1z<br>(128 pins)<br>Pin No. | MN1M7AFx2z<br>(100 pins)<br>Pin No. | MN1M7AFx3z<br>(80 pins)<br>Pin No. | I/O   | Other Pins           |
|-----------|----------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-------|----------------------|
| I/O port  | PC1      | 98                                  | 88                                  | 68                                  | 54                                 | Input | ADIN01/VGAP00/CMPIN0 |
|           | PC2      | 99                                  | 89                                  | 69                                  | 55                                 | Input | ADIN02/VGAP01/CMPIN1 |
|           | PC3      | 100                                 | 90                                  | 70                                  | 56                                 | Input | ADIN03/VGAP02/CMPIN2 |
|           | PC4      | 101                                 | 91                                  | 71                                  | 57                                 | I/O   | ADIN04               |
|           | PC5      | 102                                 | 92                                  | 72                                  | -                                  | I/O   | ADIN05               |
|           | PC6      | 103                                 | 93                                  | 73                                  | 58                                 | I/O   | ADIN06               |
|           | PC7      | 104                                 | 94                                  | 74                                  | 59                                 | I/O   | ADIN07               |
|           | PD0      | 87                                  | 77                                  | 61                                  | 47                                 | Input | ADIN08/VGAN1         |
|           | PD1      | 88                                  | 78                                  | 62                                  | 48                                 | Input | ADIN09/VGAP1/CMPIN3  |
|           | PD2      | 89                                  | 79                                  | 63                                  | 49                                 | I/O   | ADIN10               |
|           | PD3      | 90                                  | 80                                  | 64                                  | 50                                 | I/O   | ADIN11               |
|           | PD4      | 91                                  | 81                                  | -                                   | -                                  | I/O   | ADIN12               |
|           | PD5      | 92                                  | 82                                  | -                                   | -                                  | I/O   | ADIN13               |
|           | PD6      | 93                                  | 83                                  | 65                                  | 51                                 | I/O   | ADIN14               |
|           | PD7      | 94                                  | 84                                  | 66                                  | 52                                 | I/O   | ADIN15               |
|           | PE0      | 85                                  | 75                                  | 59                                  | 45                                 | Input | ADIN16/VGAP2/CMPIN4  |
|           | PE1      | 86                                  | 76                                  | 60                                  | 46                                 | Input | ADIN17/VGAN2         |
|           | PE2      | 79                                  | 69                                  | 54                                  | 42                                 | I/O   | ADIN18               |
|           | PE3      | 80                                  | 70                                  | 55                                  | 43                                 | I/O   | ADIN19               |
|           | PE4      | 81                                  | 71                                  | 56                                  | -                                  | I/O   | ADIN20               |
|           | PE5      | 82                                  | 72                                  | 57                                  | 44                                 | I/O   | ADIN21               |
|           | PE6      | 83                                  | 73                                  | 58                                  | -                                  | I/O   | ADIN22               |
|           | PE7      | 84                                  | 74                                  | -                                   | -                                  | I/O   | ADIN23               |
|           | PF0      | 76                                  | 66                                  | 52                                  | -                                  | I/O   | ADIN24               |
|           | PF1      | 77                                  | 67                                  | 53                                  | -                                  | I/O   | ADIN25               |
|           | PF2      | 78                                  | 68                                  | -                                   | -                                  | I/O   | ADIN26               |
|           | PF3      | 95                                  | 85                                  | -                                   | -                                  | I/O   | ADIN27               |
|           | PF4      | 96                                  | 86                                  | -                                   | -                                  | I/O   | ADIN28               |
|           | PF5      | 105                                 | 95                                  | -                                   | -                                  | I/O   | ADIN29               |
|           | PF6      | 106                                 | -                                   | -                                   | -                                  | I/O   | ADIN30               |
|           | PF7      | 107                                 | -                                   | -                                   | -                                  | I/O   | ADIN31               |





## 1.5 Electrical Characteristics

About electrical specifications, standard specifications are described in the manual of this LSI. When using this LSI, consult the staff in our sales offices for the product specifications.

### 1.5.1 Absolute Maximum Ratings

| Parameter |                                 | Symbol            | Rating                                     | Unit     |    |
|-----------|---------------------------------|-------------------|--|----------|----|
| A1        | Power supply voltage 1          | $V_{DD5A}$        | -0.3 to 7.0                                | V        |    |
| A2        | Power supply voltage 2          | $AV_{DD5A}$       | -0.3 to 7.0                                | V        |    |
| A3        | Internal power supply voltage 1 | $V_{OUT3A}$       | -0.3 to 4.6                                | V        |    |
| A4        | Internal power supply voltage 2 | $V_{OUT12A}$      | -0.3 to 1.6                                | V        |    |
| A5        | Input pin voltage               | $V_{I1}$          | -0.3 to $V_{DD5} + 0.3$ (Upper limit: 7.0) | V        |    |
| A6        | VGA input pin voltage           | $V_{I2}$          | -2.5 to $V_{DD5} + 0.3$ (Upper limit: 7.0) | V        |    |
| A7        | I/O pin voltage                 | $V_{I3}$          | -0.3 to $V_{DD5} + 0.3$ (Upper limit: 7.0) | V        |    |
| A8        | Average Output current          | I/O pin 1 *1      | $I_{O1}(\text{avg})$                       | $\pm 12$ | mA |
| A9        |                                 | I/O pin 2 *2      | $I_{O2}(\text{avg})$                       | $\pm 24$ | mA |
| A10       |                                 | Total of all pins | $I_{O3}$                                   | $\pm 70$ | mA |
| A11       | Power dissipation               | $P_D$             | 1.04                                       | W        |    |
| A12       | Operating case temperature      | $T_{\text{copr}}$ | -40 to 110                                 | °C       |    |
| A13       | Storage temperature             | $T_{\text{stg}}$  | -40 to +125                                | °C       |    |

#### Note:

Although this LSI has internal ESD protection circuit, it may still sustain permanent damage if not handled properly. Therefore, proper ESD precautions are recommended to avoid electrostatic damage to the MOS gate.

This product may sustain permanent damage if it gets stress which is higher than the above stated absolute maximum rating even only for a second. This rating is the maximum rating and device operating at this range is not guaranteed as it is higher than our stated recommended operating range.

#### Note:

\*1 I/O pin 1 is I/O pin 1 and I/O pin 3 of [1.5.3 DC Characteristics](#).

#### Note:

\*2 I/O pin 2 is I/O pin 2 and I/O pin 4 to 6 of [1.5.3 DC Characteristics](#).



## 1.5.2 Operation Conditions

| Power supply voltage during operation |                                 |             | $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C to } 110\text{ }^\circ\text{C}$ |           |     |      |
|---------------------------------------|---------------------------------|-------------|--|-----------|-----|------|
| Parameter                             |                                 | Symbol      | Rating   |           |     | Unit |
|                                       |                                 |             | MIN  | TYP       | MAX |      |
| B1                                    | External power supply voltage 1 | $V_{DD5}$   | $V_{RST5N}$  | 5.0       | 5.5 | V    |
| B2                                    | External power supply voltage 2 | $AV_{DD5}$  | -  | $V_{DD5}$ | -   |      |
| B3                                    | Internal power supply voltage 1 | $V_{OUT3}$  | -  | 2.9       | -   |      |
| B4                                    | Internal power supply voltage 2 | $V_{OUT12}$ | -  | 1.25      | -   |      |

### Note:

Supply the external power supply pin  $V_{DD50}$  and the analog power supply pin  $AV_{DD50}$  from the same external power supply.

| Oscillation pin |  |           | $V_{DD5} = AV_{DD5} = V_{RST5N}$ to $5.5\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C to } 110\text{ }^\circ\text{C}$ |     |      |           |
|-----------------|--|-----------|---|-----|------|-----------|
| Parameter       |  | Symbol    | Rating  |     |      | Unit      |
|                 |  |           | MIN   | TYP | MAX  |           |
| B5              | External oscillation frequency (Ceramic/Crystal) | $F_{OSC}$ | 4.0   | -   | 20.0 | MHz       |
| B6              | External oscillation Feedback resistor           | $R_{FB}$  | -   | 1.0 | -    | $M\Omega$ |

### Note:

Oscillation circuit characteristics and peripheral parts (load capacity, damping resistor, and feedback resistor) are different by each oscillator and substrate. To decide appropriate capacity value for circuit constant, please consult the oscillator manufacturer.

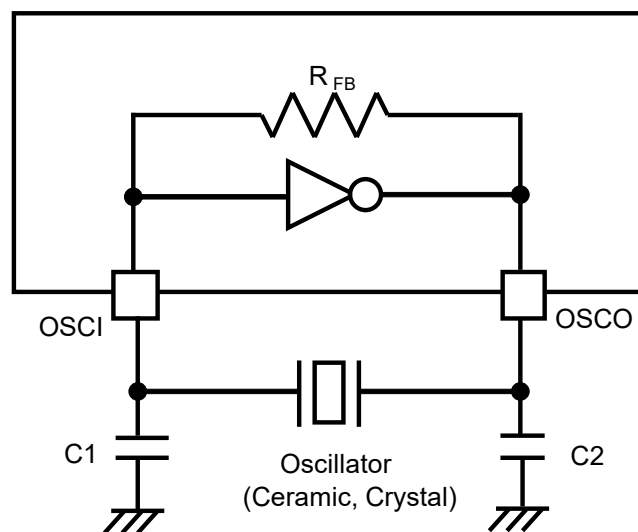


Figure 1.5-1 Oscillation Circuit



| External clock input OSCI (OSCO left open) |                        |           | $V_{DD5} = AV_{DD5} = V_{RST5N}$ to 5.5 V, $V_{SS} = AV_{SS} = 0.0$ V<br>$T_c = -40$ °C to 110 °C |     |      |     |
|--|------------------------|-----------|---|-----|------|-----|
| Parameter                                  | Symbol                 | Rating    |   |     | Unit |     |
|  |                        | MIN       | TYP   | MAX |      |     |
| B7   | Clock frequency        | $F_{CP}$  | 4.0   | -   | 20.0 | MHz |
| B8   | High level pulse width | $t_{wh1}$ | 20  | -   | -    | ns  |
| B9   | Low level pulse width  | $t_{wl1}$ | 20  | -   | -    |     |
| B10  | Rising time            | $t_{wr1}$ | -   | -   | 5    |     |
| B11  | Falling time           | $t_{wf1}$ | -   | -   | 5    |     |

**Note:**

It is necessary to set clock duty ratio from 45 % to 55 %.

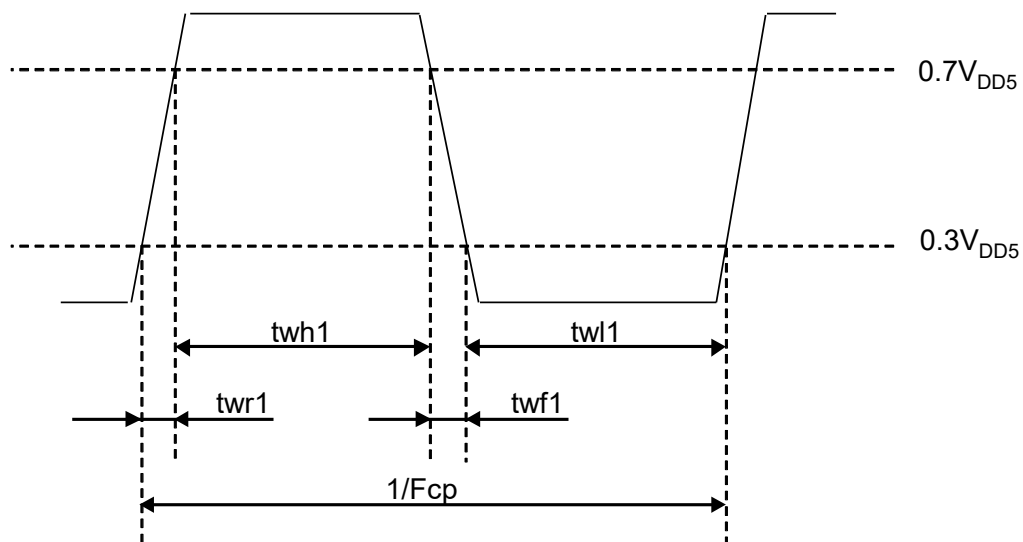


Figure 1.5-2 OSCI Timing Chart



## 1.5.3 DC Characteristics

| Power supply current during operation |                 | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$<br>Output pins left open                                    |        |     |      |
|---------------------------------------|-----------------|---|--------|-----|------|
| Parameter                             | Sym-<br>bol     | Conditions  | Rating |     | Unit |
|                                       |                 |   | TYP    | MAX |      |
| C1                                    | NORMAL mode     | $I_{DD1}$<br>$F_{OSC} = 10\text{ MHz}$ , PLL is used<br>$CPUCCLK = 160\text{ MHz}$ , $IOCLK = 80\text{ MHz}$<br>CPU and Peripheral circuits are operating.<br>Analog circuits are stopped.              | 90     | 190 | mA   |
| C2                                    | SLEEP mode      | $I_{DD2}$<br>$F_{OSC} = 10\text{ MHz}$ , PLL is used<br>$CPUCCLK = 160\text{ MHz}$ , $IOCLK = 80\text{ MHz}$<br>CPU is stopped, Peripheral circuits are oper-<br>ating.<br>Analog circuits are stopped. | 60     | 160 |      |
| C3                                    | DEEP SLEEP mode | $I_{DD3}$<br>$F_{OSC} = 10\text{ MHz}$ , PLL is stopped,<br>$CPUCCLK = IOCLK = \text{Stop}$ ,<br>CPU and Peripheral circuits are stopped.<br>Analog circuits are stopped.                               | 12     | 120 |      |
| C4                                    |                 | $I_{DD4}$<br>$F_{OSC}$ is stopped, PLL is stopped.  | 10     | 120 |      |

### Note:

- \*1 The measurement conditions are as follows.
- All I/O pins are output state. (No load)

| Input pin 1<br>TEST |                            | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |                      |     |                      |               |
|---------------------|----------------------------|---|----------------------|-----|----------------------|---------------|
| Parameter           | Sym-<br>bol                | Conditions  | Rating               |     |                      | Unit          |
|                     |                            |   | MIN                  | TYP | MAX                  |               |
| C5                  | Input voltage "High level" | $V_{IH1}$<br>$V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to $5.5\text{ V}$  | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V             |
| C6                  | Input voltage "Low level"  | $V_{IL1}$<br>$V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to $5.5\text{ V}$  | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |               |
| C7                  | Input leakage current      | $I_{LK1}$<br>$V_{IN} = 0\text{ V}$ to $V_{DD5}$   | -                    | -   | $\pm 10$             | $\mu\text{A}$ |

| Input pin 2<br>NDMOD, SWDCLK |                            | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |                      |     |                      |                  |
|------------------------------|----------------------------|---|----------------------|-----|----------------------|------------------|
| Parameter                    | Sym-<br>bol                | Conditions  | Rating               |     |                      | Unit             |
|                              |                            |   | MIN                  | TYP | MAX                  |                  |
| C8                           | Input voltage "High level" | $V_{IH2}$<br>$V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to $5.5\text{ V}$  | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V                |
| C9                           | Input voltage "Low level"  | $V_{IH2}$<br>$V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to $5.5\text{ V}$  | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |                  |
| C10                          | Internal pull-up resistor  | $R_{IO2}$<br>$V_{IN} = 0\text{ V}$  | 15                   | 30  | 60                   | $\text{k}\Omega$ |



| Input pin 3<br>PC0 to PC3, PD0, PD1, PE0, PE1 |                            | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |  |                      |     |                      |               |
|---|----------------------------|---|--|----------------------|-----|----------------------|---------------|
| Parameter                                     |                            | Sym-<br>bol   | Conditions                                   | Rating               |     |                      | Unit          |
|   |                            |   |  | MIN                  | TYP | MAX                  |               |
| C11   | Input voltage "High level" | $V_{IH3}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V             |
| C12   | Input voltage "Low level"  | $V_{IL3}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |               |
| C13   | Input leakage current      | $I_{LK3}$   | $V_{IN} = 0\text{ V}$ to $V_{DD5}$           | -                    | -   | $\pm 15$             | $\mu\text{A}$ |
| C14   | Input voltage range        | $V_{IN3}$   | VGA is used                                  | -2.0                 | -   | $V_{DD5}$            | V             |

| I/O pin 1<br>NRST |                            | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |   |                      |     |                      |                  |
|-------------------|----------------------------|---|---|----------------------|-----|----------------------|------------------|
| Parameter         |                            | Sym-<br>bol   | Conditions  | Rating               |     |                      | Unit             |
|                   |                            |   |   | MIN                  | TYP | MAX                  |                  |
| C15               | Input voltage "High level" | $V_{IH4}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V      | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V                |
| C16               | Input voltage "Low level"  | $V_{IL4}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V      | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |                  |
| C17               | Internal pull-up resistor  | $R_{IO4}$   | $V_{IN} = 0\text{ V}$                             | 15                   | 30  | 60                   | $\text{k}\Omega$ |
| C18               | Output voltage "Low level" | $V_{OL4}$   | $V_{DD5} = V_{RST5P}$<br>$I_{OL} = 3.0\text{ mA}$ | -                    | -   | 0.5                  | V                |

| I/O pin 2<br>SWDD |                             | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |  |                      |     |                      |                  |
|-------------------|-----------------------------|---|--|----------------------|-----|----------------------|------------------|
| Parameter         |                             | Sym-<br>bol   | Conditions                                   | Rating               |     |                      | Unit             |
|                   |                             |   |  | MIN                  | TYP | MAX                  |                  |
| C19               | Input voltage "High level"  | $V_{IH5}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V                |
| C20               | Input voltage "Low level"   | $V_{IL5}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |                  |
| C21               | Internal pull-up resistor   | $R_{IO5}$   | $V_{IN} = 0\text{ V}$                        | 15                   | 30  | 60                   | $\text{k}\Omega$ |
| C22               | Output voltage "High level" | $V_{OH5}$   | $I_{OH} = -6.0\text{ mA}$                    | 4.5                  | -   | -                    | V                |
| C23               | Output voltage "Low level"  | $V_{OL5}$   | $I_{OL} = 6.0\text{ mA}$                     | -                    | -   | 0.5                  |                  |



| Parameter  |                             | Sym-<br>bol   | Conditions                                   | Rating               |     |                      | Unit             |
|--|-----------------------------|---|--|----------------------|-----|----------------------|------------------|
|  |                             |   |  | MIN                  | TYP | MAX                  |                  |
| I/O pin 3<br>P16, P17, P22, P24, P36, P42,<br>P47, P60, P64 to P67, P70 to P77,<br>P86, P87, P96, P97, PA6, PA7,<br>PB0 to PB4, PB6, PB7, PC4 to PC7, PD2<br>to PD7,<br>PE2 to PE7, PF0 to PF7 |                             | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |  |                      |     |                      |                  |
| C24  | Input voltage "High level"  | $V_{IH6}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V                |
| C25  | Input voltage "Low level"   | $V_{IL6}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |                  |
| C26  | Input leakage current       | $I_{LK6}$   | $V_{IN} = 0\text{ V}$ to $V_{DD5}$           | -                    | -   | $\pm 10$             | $\mu\text{A}$    |
| C27  | Internal pull-up resistor   | $R_{IO6}$   | $V_{IN} = 0\text{ V}$                        | 15                   | 30  | 60                   | $\text{k}\Omega$ |
| C28  | Output voltage "High level" | $V_{OH6}$   | $I_{OH} = -3.0\text{ mA}$                    | 4.5                  | -   | -                    | V                |
| C29  | Output voltage "Low level"  | $V_{OL6}$   | $I_{OL} = 3.0\text{ mA}$                     | -                    | -   | 0.5                  |                  |

| Parameter   |                             | Sym-<br>bol   | Conditions                                   | Rating               |     |                      | Unit             |
|---|-----------------------------|---|--|----------------------|-----|----------------------|------------------|
|   |                             |   |  | MIN                  | TYP | MAX                  |                  |
| I/O pin 4<br>P00 to P05, P10, P11, P25 to P27,<br>P30 to P32, P34, P35, P40, P41,<br>P44 to P46, P50, P51, P54 to P57,<br>P61 to P63, P80 to P85, P90 to P95,<br>PA0 to PA5 |                             | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |  |                      |     |                      |                  |
| C30   | Input voltage "High level"  | $V_{IH7}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V                |
| C31   | Input voltage "Low level"   | $V_{IL7}$   | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |                  |
| C32   | Input leakage current       | $I_{LK7}$   | $V_{IN} = 0\text{ V}$ to $V_{DD5}$           | -                    | -   | $\pm 10$             | $\mu\text{A}$    |
| C33   | Internal pull-up resistor   | $R_{IO7}$   | $V_{IN} = 0\text{ V}$                        | 15                   | 30  | 60                   | $\text{k}\Omega$ |
| C34   | Output voltage "High level" | $V_{OH7}$   | $I_{OH} = -6.0\text{ mA}$                    | 4.5                  | -   | -                    | V                |
| C35   | Output voltage "Low level"  | $V_{OL7}$   | $I_{OL} = 6.0\text{ mA}$                     | -                    | -   | 0.5                  |                  |



| I/O pin 5<br>P06, P07, P52, P53 |                                 | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |  |                      |     |                      |               |
|---------------------------------|---------------------------------|---|--|----------------------|-----|----------------------|---------------|
| Parameter                       |                                 | Sym-<br>bol   | Conditions   | Rating               |     |                      | Unit          |
|                                 |                                 |   |  | MIN                  | TYP | MAX                  |               |
| C36                             | Input voltage "High level"<br>1 | $V_{IH81}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=0 | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V             |
| C37                             | Input voltage "High level"<br>2 | $V_{IH82}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=1 | 1.35                 | -   | $V_{DD5}$            |               |
| C38                             | Input voltage "Low level"<br>1  | $V_{IL81}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=0 | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |               |
| C39                             | Input voltage "Low level"<br>2  | $V_{IL82}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=1 | $V_{SS}$             | -   | 0.8                  |               |
| C40                             | Input leakage current           | $I_{LK8}$   | $V_{IN} = 0\text{ V}$ to $V_{DD5}$                               | -                    | -   | $\pm 10$             | $\mu\text{A}$ |
| C41                             | Internal pull-up resistor       | $R_{IO8}$   | $V_{IN} = 0\text{ V}$  | 15                   | 30  | 60                   | k $\Omega$    |
| C42                             | Output voltage "High level"     | $V_{OH8}$   | $I_{OH} = -6.0\text{ mA}$  | 4.5                  | -   | -                    | V             |
| C43                             | Output voltage "Low level"      | $V_{OL8}$   | $I_{OL} = 6.0\text{ mA}$   | -                    | -   | 0.5                  |               |

| I/O pin 6<br>P12 to P15, P20, P21 |                                 | $V_{DD5} = AV_{DD5} = 5.0\text{ V}$ , $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C}$ to $110\text{ }^\circ\text{C}$ |  |                      |     |                      |               |
|-----------------------------------|---------------------------------|---|--|----------------------|-----|----------------------|---------------|
| Parameter                         |                                 | Sym-<br>bol   | Conditions   | Rating               |     |                      | Unit          |
|                                   |                                 |   |  | MIN                  | TYP | MAX                  |               |
| C44                               | Input voltage "High level"<br>1 | $V_{IH91}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=0 | $V_{DD5} \times 0.7$ | -   | $V_{DD5}$            | V             |
| C45                               | Input voltage "High level"<br>2 | $V_{IH92}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=1 | $V_{DD5} \times 0.8$ | -   | $V_{DD5}$            |               |
| C46                               | Input voltage "Low level"<br>1  | $V_{IL91}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=0 | $V_{SS}$             | -   | $V_{DD5} \times 0.3$ |               |
| C47                               | Input voltage "Low level"<br>2  | $V_{IL92}$  | $V_{DD5} = AV_{DD5} = V_{RST5N}$<br>to 5.5 V<br>Register PnILV=1 | $V_{SS}$             | -   | $V_{DD5} \times 0.2$ |               |
| C48                               | Input leakage current           | $I_{LK9}$   | $V_{IN} = 0\text{ V}$ to $V_{DD5}$                               | -                    | -   | $\pm 10$             | $\mu\text{A}$ |
| C49                               | Internal pull-up resistor       | $R_{IO9}$   | $V_{IN} = 0\text{ V}$  | 15                   | 30  | 60                   | k $\Omega$    |
| C50                               | Output voltage "High level"     | $V_{OH9}$   | $I_{OH} = -6.0\text{ mA}$  | 4.5                  | -   | -                    | V             |
| C51                               | Output voltage "Low level"      | $V_{OL9}$   | $I_{OL} = 6.0\text{ mA}$   | -                    | -   | 0.5                  |               |



## 1.5.4 Analog Characteristics

This LSI Manual shows the electrical characteristics of analog.

### 1.5.4.1 12bit A/D Converter

| ADC0, ADC1, ADC2 |                                       |                        | V <sub>DD5</sub> = AV <sub>DD5</sub> = 5.0 V, V <sub>SS</sub> = AV <sub>SS</sub> = 0.0 V<br>T <sub>c</sub> = -40 °C to 110 °C |     |                   |      |         |
|------------------|---------------------------------------|------------------------|---|-----|-------------------|------|---------|
| Parameter        | Symbol                                | Conditions             | Rating  |     |                   | Unit |         |
|                  |                                       |                        | MIN   | TYP | MAX               |      |         |
| D1               | Resolution                            | -                      | -   | -   | 12                | Bits |         |
| D2               | Conversion clock                      | -                      | 10  | -   | 40                | MHz  |         |
| D3               | Integral non-linearity error          | INLE <sub>AD</sub>     | -   | -   | ±3                | LSB  |         |
| D4               | Differential non-linearity error      | DNLE <sub>A</sub><br>D | -   | -   | ±3                | LSB  |         |
| D5               | Zero transition voltage               | -                      | -20   | -   | 20                | mV   |         |
| D6               | Full-scale transition voltage         | -                      | 4980  | -   | 5020              | mV   |         |
| D7               | A/D conversion time                   | -                      | 0.5   | -   | -                 | μs   |         |
| D8               | Input dynamic range                   | V <sub>IA</sub>        | AV <sub>SS</sub>  | -   | AV <sub>DD5</sub> | V    |         |
| D9               | Power supply current during operation | I <sub>AD</sub>        | Conversion clock = 40 MHz   | -   | 2.5               | -    | mA/unit |





### 1.5.4.2 Programmable Gain Amplifier (VGA)

| VGA00 to 02, VGA1, VGA2 |                                       |             | $V_{DD5} = AV_{DD5} = 5.0 \text{ V}$ , $V_{SS} = AV_{SS} = 0.0 \text{ V}$<br>$T_c = -40 \text{ }^\circ\text{C}$ to $110 \text{ }^\circ\text{C}$ |        |           |           |             |
|-------------------------|---------------------------------------|-------------|---|--------|-----------|-----------|-------------|
| Parameter               |                                       | Sym-<br>bol | Conditions  | Rating |           |           | Unit        |
|                         |                                       |             |   | MIN    | TYP       | MAX       |             |
| D10                     | Gain                                  | $G_{VGA}$   |   | 1      | -         | 20        | times       |
| D11                     | Gain error                            | $G_{ERR1}$  | $G_{VGA} = 1$ to 10 times   | -      | $\pm 0.7$ | $\pm 1.5$ | %           |
|                         |                                       | $G_{ERR2}$  | $G_{VGA} = 20$ times  | -      | $\pm 1.2$ | $\pm 2.0$ |             |
| D12                     | Output offset voltage                 | $V_{OFFG1}$ | $G_{VGA} = 1$ to 10 times   | -      | $\pm 80$  | $\pm 120$ | mV          |
|                         |                                       | $V_{OFFG2}$ | $G_{VGA} = 20$ times  | -      | $\pm 130$ | $\pm 180$ |             |
| D13                     | Output reference voltage range        | $V_{REFG}$  |   | 1.0    | -         | 4.0       | V           |
| D14                     | Output dynamic range                  | $V_{OG}$    |   | 1.0    | -         | 4.0       |             |
| D15                     | Input dynamic range                   | $V_{IG1}$   | $G_{VGA}=1$ time  | -2.0   | -         | 3.0       |             |
|                         |                                       | $V_{IG2}$   | $G_{VGA}=2$ times   | -1.5   | -         | 1.5       |             |
|                         |                                       | $V_{IG3}$   | $G_{VGA}=3$ times   | -1.0   | -         | 1.0       |             |
|                         |                                       | $V_{IG4}$   | $G_{VGA}=4$ times   | -0.75  | -         | 0.75      |             |
|                         |                                       | $V_{IG5}$   | $G_{VGA}=5$ times   | -0.6   | -         | 0.6       |             |
|                         |                                       | $V_{IG6}$   | $G_{VGA}=6$ times   | -0.5   | -         | 0.5       |             |
|                         |                                       | $V_{IG7}$   | $G_{VGA}=8$ times   | -0.375 | -         | 0.375     |             |
|                         |                                       | $V_{IG8}$   | $G_{VGA}=10$ times  | -0.3   | -         | 0.3       |             |
| $V_{IG9}$               | $G_{VGA}=20$ times                    | -0.15       | -   | 0.15   |           |           |             |
| D16                     | Power supply current during operation | $I_G$       | $G_{VGA}=10$ times,<br>$V_{INP}=V_{INN}=0.0 \text{ V}$  | -      | 2.6       | -         | mA/<br>Unit |



### 1.5.4.3 Comparator

| CMP00 to CMP41 |                                       |             | $V_{DD5} = AV_{DD5} = 5.0 \text{ V}$ , $V_{SS} = AV_{SS} = 0.0 \text{ V}$<br>$T_c = -40 \text{ }^\circ\text{C}$ to $110 \text{ }^\circ\text{C}$ |        |     |          |             |
|----------------|---------------------------------------|-------------|---|--------|-----|----------|-------------|
| Parameter      |                                       | Sym-<br>bol | Conditions  | Rating |     |          | Unit        |
|                |                                       |             |   | MIN    | TYP | MAX      |             |
| D17            | Input offset voltage                  | $V_{OFFC}$  |   | -      | -   | $\pm 20$ | mV          |
| D18            | Input dynamic range                   | $V_{IC}$    |   | 50     | -   | 4950     |             |
| D19            | Input hysteresis width                | $V_{HYSC}$  | CMPNn = 2.5 V   | -      | 30  | 50       |             |
| D20            | Minimum comparison voltage            | $V_{MINC}$  |   | 20     | -   | -        |             |
| D21            | Power supply current during operation | $I_C$       |   | -      | 0.3 | -        | mA/<br>Unit |

### 1.5.4.4 D/A Converter

| 8bit D/A Converter<br>DAC00 to DAC41,<br>DACV00 to 02,<br>DACV1, DACV2 |                                       |              | $V_{DD5} = AV_{DD5} = 5.0 \text{ V}$ , $V_{SS} = AV_{SS} = 0.0 \text{ V}$<br>$T_c = -40 \text{ }^\circ\text{C}$ to $110 \text{ }^\circ\text{C}$ |        |     |         |             |
|--|---------------------------------------|--------------|---|--------|-----|---------|-------------|
| Parameter  |                                       | Sym-<br>bol  | Conditions  | Rating |     |         | Unit        |
|  |                                       |              |   | MIN    | TYP | MAX     |             |
| D22  | Resolution                            |              |   | -      | -   | 8       | Bits        |
| D23  | Integral non-linearity error          | $INLE_{DA1}$ |   | -      | -   | $\pm 1$ | LSB         |
| D24  | Differential linearity error          | $DNLE_{DA1}$ |   | -      | -   | $\pm 1$ |             |
| D25  | Zero scale voltage                    | -            |   | -20    | -   | 80      | mV          |
| D26  | Full scale voltage                    | -            |   | 4900   | -   | 5020    |             |
| D27  | Power supply current during operation | $I_{DA1}$    |   | -      | 0.5 | -       | mA/<br>Unit |

| 10bit D/A Converter<br>DACA0, DACA1 |                                       |              | $V_{DD5} = AV_{DD5} = 5.0 \text{ V}$ , $V_{SS} = AV_{SS} = 0.0 \text{ V}$<br>$T_c = -40 \text{ }^\circ\text{C}$ to $110 \text{ }^\circ\text{C}$ |        |     |         |             |
|-------------------------------------|---------------------------------------|--------------|---|--------|-----|---------|-------------|
| Parameter                           |                                       | Sym-<br>bol  | Conditions  | Rating |     |         | Unit        |
|                                     |                                       |              |   | MIN    | TYP | MAX     |             |
| D28                                 | Resolution                            |              |   | -      | -   | 10      | Bits        |
| D29                                 | Integral non-linearity error          | $INLE_{DA2}$ |   | -      | -   | $\pm 3$ | LSB         |
| D30                                 | Differential linearity error          | $DNLE_{DA2}$ |   | -      | -   | $\pm 3$ |             |
| D31                                 | Zero scale voltage                    | -            |   | -20    | -   | 80      | mV          |
| D32                                 | Full scale voltage                    | -            |   | 4950   | -   | 5035    |             |
| D33                                 | Power supply current during operation | $I_{DA2}$    |   | -      | 0.5 | -       | mA/<br>Unit |



### 1.5.4.5 Power Supply Voltage Detection(LVD)

| Parameter  |  | Symbol            | Conditions | Rating |     |     | Unit |
|--|--|-------------------|------------|--------|-----|-----|------|
|  |  |                   |            | MIN    | TYP | MAX |      |
| $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C to } 110\text{ }^\circ\text{C}$ |  |                   |            |        |     |     |      |
| D34  | Power supply voltage detection level             | $V_{LVDP}$        | At rising  | 4.0    | 4.2 | 4.4 | V    |
| D35  |  | $V_{LVDN}$        | At falling | 3.9    | 4.1 | 4.3 |      |
| D36  | Change rate of power supply voltage( $V_{DD5}$ ) | $\Delta V_{DD5P}$ | At rising  |        |     | 5   | V/ms |
| D37  |  | $\Delta V_{DD5N}$ | At falling |        |     | 1   |      |

### 1.5.4.6 Power-on Reset

| Parameter  |  | Symbol            | Conditions | Rating |      |      | Unit |
|--|--|-------------------|------------|--------|------|------|------|
|  |  |                   |            | MIN    | TYP  | MAX  |      |
| $V_{SS} = AV_{SS} = 0.0\text{ V}$<br>$T_c = -40\text{ }^\circ\text{C to } 110\text{ }^\circ\text{C}$ |  |                   |            |        |      |      |      |
| D38  | Power supply voltage de-tection level            | $V_{RST5P}$       | At rising  | 3.6    | 3.8  | 4.1  | V    |
| D39  |  | $V_{RST5N}$       | At falling | 3.5    | 3.7  | 4.0  |      |
| D40  |  | $V_{RST3P}$       | At rising  | 2.40   | 2.55 | 2.70 |      |
| D41  |  | $V_{RST3N}$       | At falling | 2.35   | 2.50 | 2.65 |      |
| D42  | Change rate of power supply voltage( $V_{DD5}$ ) | $\Delta V_{DD5P}$ | At rising  | -      | -    | 5    | V/ms |
| D43  |  | $\Delta V_{DD5N}$ | At falling | -      | -    | 1    |      |

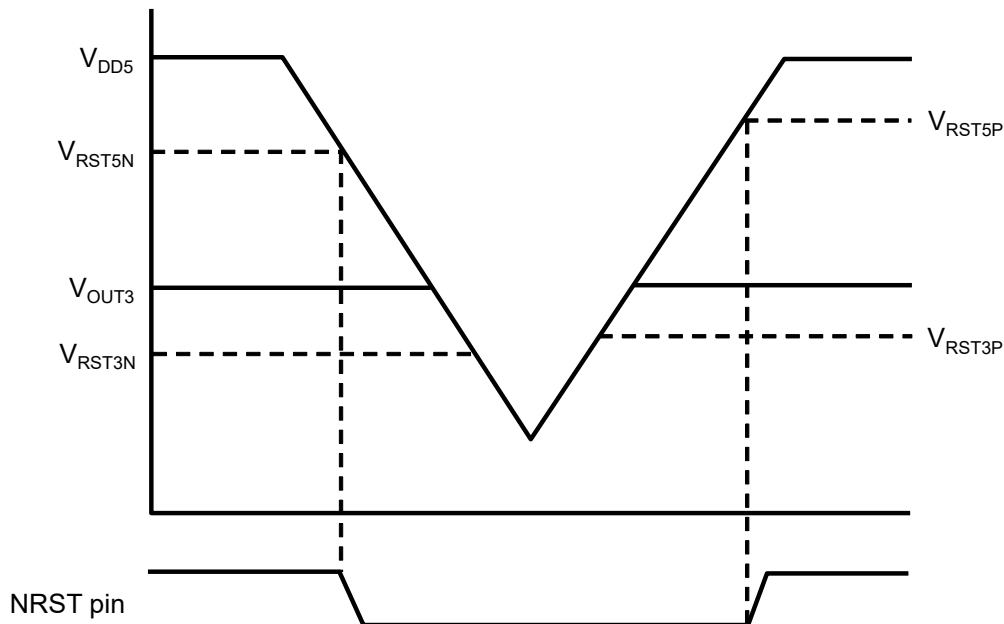


Figure 1.5-3 Characteristics of Power-on Reset Circuit



### 1.5.4.7 Internal Oscillation

| Parameter   |                       | Sym-<br>bol | Conditions | Rating |     |     | Unit |
|---|-----------------------|-------------|------------|--------|-----|-----|------|
|   |                       |             |            | MIN    | TYP | MAX |      |
| $V_{DD5} = AV_{DD5} = V_{RST5N}$ to 5.5 V, $V_{SS} = AV_{SS} = 0.0$ V<br>$T_c = -40$ °C to 110 °C |                       |             |            |        |     |     |      |
| D44   | Oscillation frequency | $F_{RC}$    |            | 9      | 10  | 11  | MHz  |

### 1.5.5 AC Characteristics

| Parameter   |                          | Sym-<br>bol | Conditions | Rating |     |     | Unit |
|---|--------------------------|-------------|------------|--------|-----|-----|------|
|   |                          |             |            | MIN    | TYP | MAX |      |
| $V_{DD5} = AV_{DD5} = V_{RST5N}$ to 5.5 V, $V_{SS} = AV_{SS} = 0.0$ V<br>$T_c = -40$ °C to 110 °C |                          |             |            |        |     |     |      |
| E1  | Reset signal pulse width | $t_{NRSTW}$ |            | 1      | -   | -   | µs   |

### 1.5.6 Flash EEPROM Characteristics

| Parameter   |                                 | Sym-<br>bol | Conditions   | Rating |         |     | Unit  |
|---|---------------------------------|-------------|--|--------|---------|-----|-------|
|   |                                 |             |  | MIN    | TYP     | MAX |       |
| $V_{DD5} = AV_{DD5} = V_{RST5N}$ to 5.5 V, $V_{SS} = AV_{SS} = 0.0$ V<br>$T_c = -40$ °C to 110 °C |                                 |             |  |        |         |     |       |
| F1  | Allowable time of re-writing:1  | $E_{MAX1}$  | I-Flash, ECC function enabled                        | 10,000 | -       | -   | times |
| F2  | Allowable times of re-writing:2 | $E_{MAX2}$  | D-Flash, ECC function enabled                        | 30,000 | 100,000 | -   |       |
| F3  | Data retention period 1 (*1)    | $T_{HLD1}$  | I-Flash<br>After rewriting<br>$E_{MAX1}$ (MIN) times | 20     | -       | -   | years |
| F4  | Data retention period 2 (*1)    | $T_{HLD2}$  | D-Flash<br>After rewriting<br>$E_{MAX2}$ (MIN) times | 5      | -       | -   |       |
| F5  | Data retention period 3 (*1)    | $T_{HLD3}$  | D-Flash<br>After rewriting 1,000 times               | 10     | -       | -   |       |

**Note:**

\*1 Including time when power is turned off.

# Panasonic

## 1.6 Package Dimension

External dimensions of package are shown as follows.

- HQFP144-20 □ Figure 1.6-1

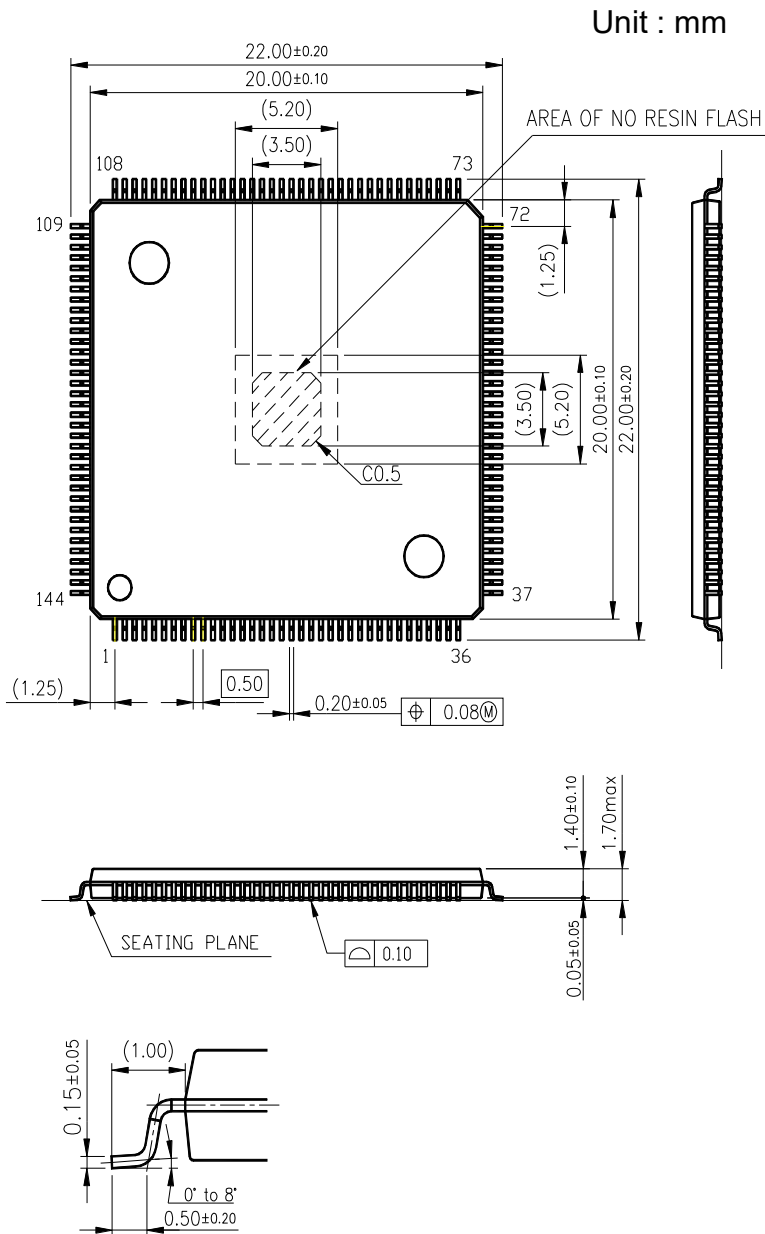


Figure 1.6-1 Package Dimension of HQFP144-20 □ (Unit: mm)



- HQFP100-14 □ Figure 1.6-2

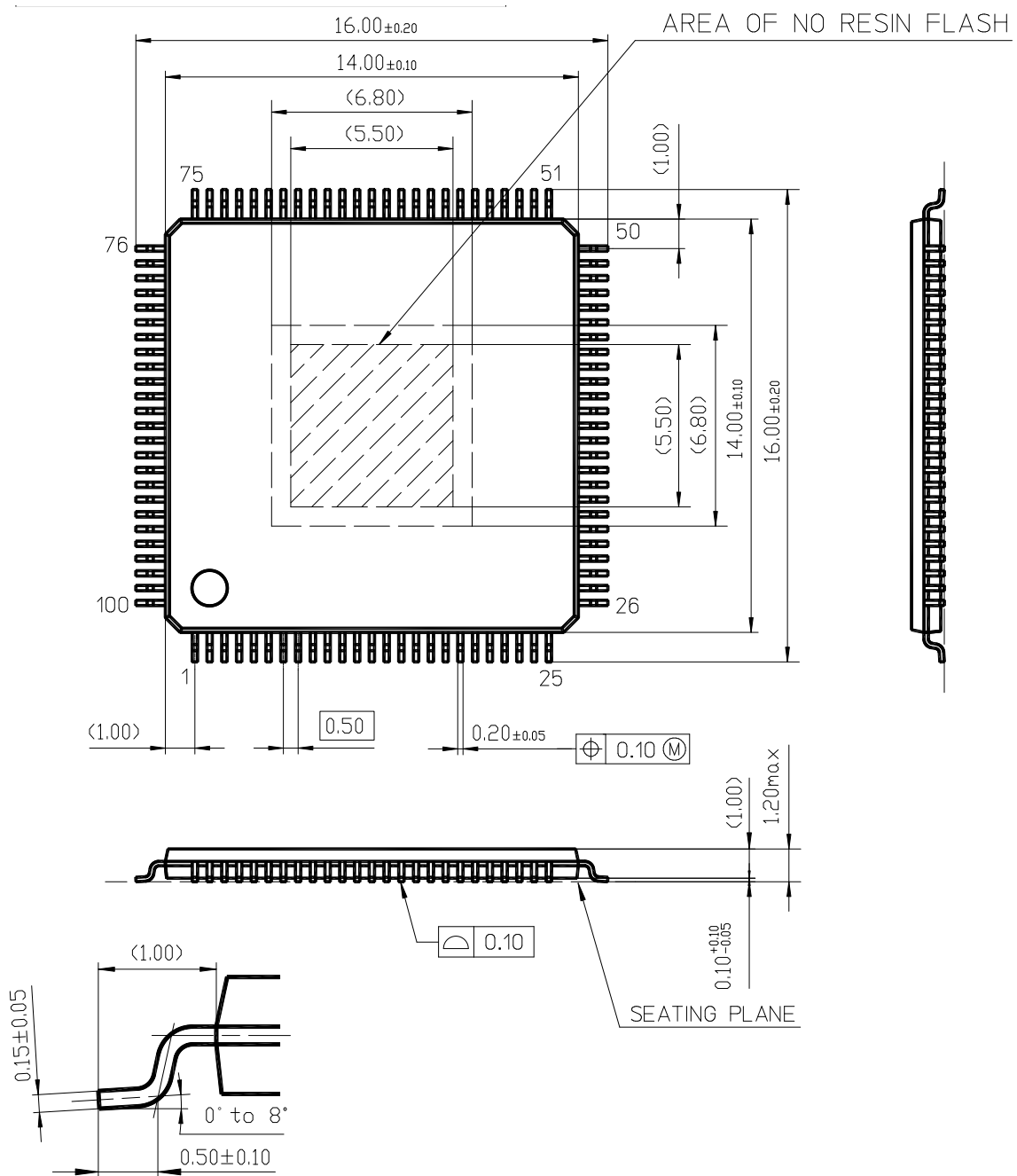


Figure 1.6-2 Package Dimension of HQFP100-14 □ (Unit: mm)

**Note:**

The external dimensions of the package are subject to change. Before using this product, please obtain product specifications from the sales offices.

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- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. We do not guarantee quality for disassembled products or the product re-mounted after removing from the mounting board.  
When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
- (7) When reselling products described in this book to other companies without our permission and receiving any claim of request from the resale destination, please understand that customers will bear the burden.
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