NEC

# User's Manual

# SE-17012

## System Evaluation Board

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## Target Devices

$\mu$PD17012

$\mu$PD17P012

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J01.2

## Major Revisions in This Edition

| Page | Description |
|---|---|
| Throughout | Addition of descriptions of probes, conversion cables, and conversion sockets corresponding to the 80-pin plastic QFP package that is added. |
| p.40 | Addition of pin numbers of 80-pin plastic QFP package in **Table 5-1 J1 Connector Pin Table**. |
| p.41 | Addition of pin numbers of 80-pin plastic QFP package in **Table 5-2 J2 Connector Pin Table**. |
| p.43 | Addition of **Figure 6-2 Package Drawing of EP-17K80GC**. |
| p.45 | Addition of **Figure 6-4 Package Drawing of 80GC Conversion Cable**. |
| p.48 | Addition of **Figure 6-7 Package Drawing of EV-9200GC-80**. |
| p.49 | Addition of **Figure 6-8 Recommended Pattern for Mounting Board of EV-9200GC-80**. |
| p.50 | Addition of **APPENDIX REVISION HISTORY**. |

**The mark ★ shows major revised points.**

# PREFACE

**Readers** This manual is intended for users who are performing system evaluation of the μPD17012 using the SE-17012.

**Purpose** This manual is intended to give users a thorough understanding of the functions and usage of the SE-17012, which is the system evaluation board for the μPD17012.

**Organization** This manual is organized broadly as follows.

- Outline
- Specifications
- Block diagram
- Usage
- Connector pin table
- Emulation probe, conversion cable and conversion socket package information

**Conventions** **Note**: Footnote for items marked with **Note** in the text
**Caution**: Information requiring particular attention
**Remark**: Supplementary information

**CONTENTS**

## LIST OF FIGURES

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# CHAPTER 1 OUTLINE

The SE-17012 is the system evaluation board (SE board) for the 4-bit single-chip microcontroller μPD17012. Although the SE-17012 can be used as a single unit, program debugging can be performed more efficiently when it is used mounted on the IE-17K or IE-17K-ET[Note], which are the 17K Series common in-circuit emulators.

★ The μPD17012 is used as the interface with the target system. Therefore, the functions of the SE-17012 are equal to those of the μPD17012.

★ When connecting the SE-17012 to the target system, a combination of the 64GF conversion cable (provided) and the EP-17202GF (64-pin plastic QFP probe) (sold separately), or the 80GC conversion cable (provided) and the EP-17K80GC (80-pin plastic QFP probe) (sold separately) is used.

A level conversion chip built into the SE-17012 enables the evaluation of the μPD17012 chip over a range of +4.5 V to +5.5 V, not just at the nominal +5 V.

**Note** Economical version: External power supply type

★ **Table 1-1. SE-17012 Development Tool Correspondence Table**

| SE Board | Method of Use | Assembler (AS17K) Output File (Host Machine) | In-Circuit Emulator | Supported Software[Note 3] | Emulation Probe | Evaluation Target Product |
|---|---|---|---|---|---|---|
| SE-17012 | When used in conjunction with in-circuit emulator | ICE file[Note 1] (PC-9800 series / IBM PC/AT™) | IE-17K<br>IE-17K-ET | *SIMPLEHOST*® | EP-17202GF<br>EP-17K80GC | μPD17012GF<br>μPD17012GC |
| | When SE-17012 is used as a single unit | PRO file[Note 2] (PC-9800 series / IBM PC/AT) | Not necessary | Not necessary | | |

**Notes 1.** ICE file: File that is automatically output after the source program is assembled.

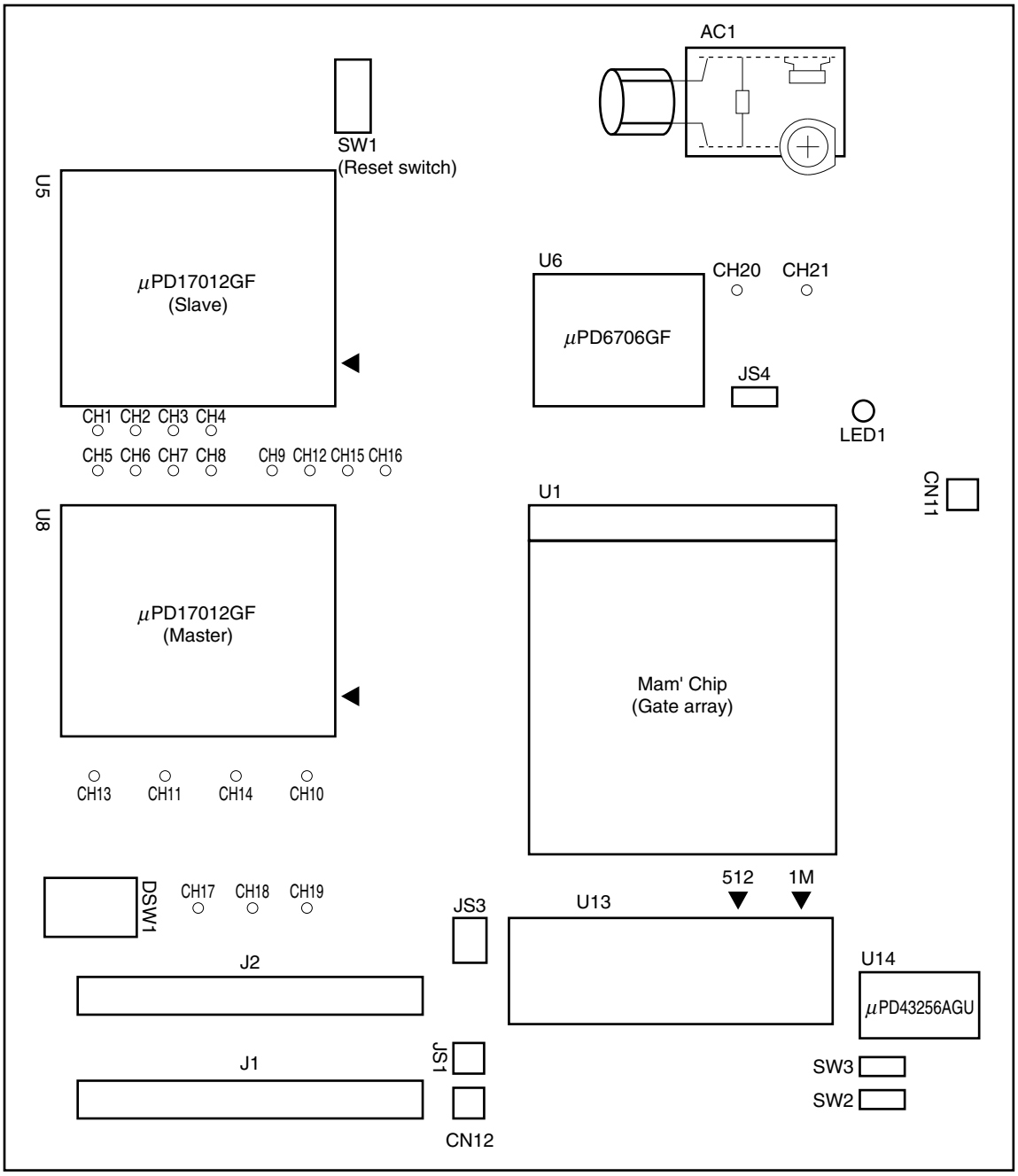
**2.** PRO file: File output when the assembler option (/PRO) is specified during assembly of the source program. For details of the ICE and PRO file formats, see the AS17K User's Manual.

**3.** *SIMPLEHOST* is Windows™-based debugger software for the in-circuit emulator. The man-machine interface uses a mouse for browsing the source code listings and tables on the screen.
For further details, see the *SIMPLEHOST* User's Manual. Note that any other commercial RS-232C communications program may be substituted, but doing so requires knowledge of baud-rate settings and in-circuit emulator commands. For further details, see the IE-17K or IE-17K-ET User's Manual.

# CHAPTER 2 SPECIFICATIONS

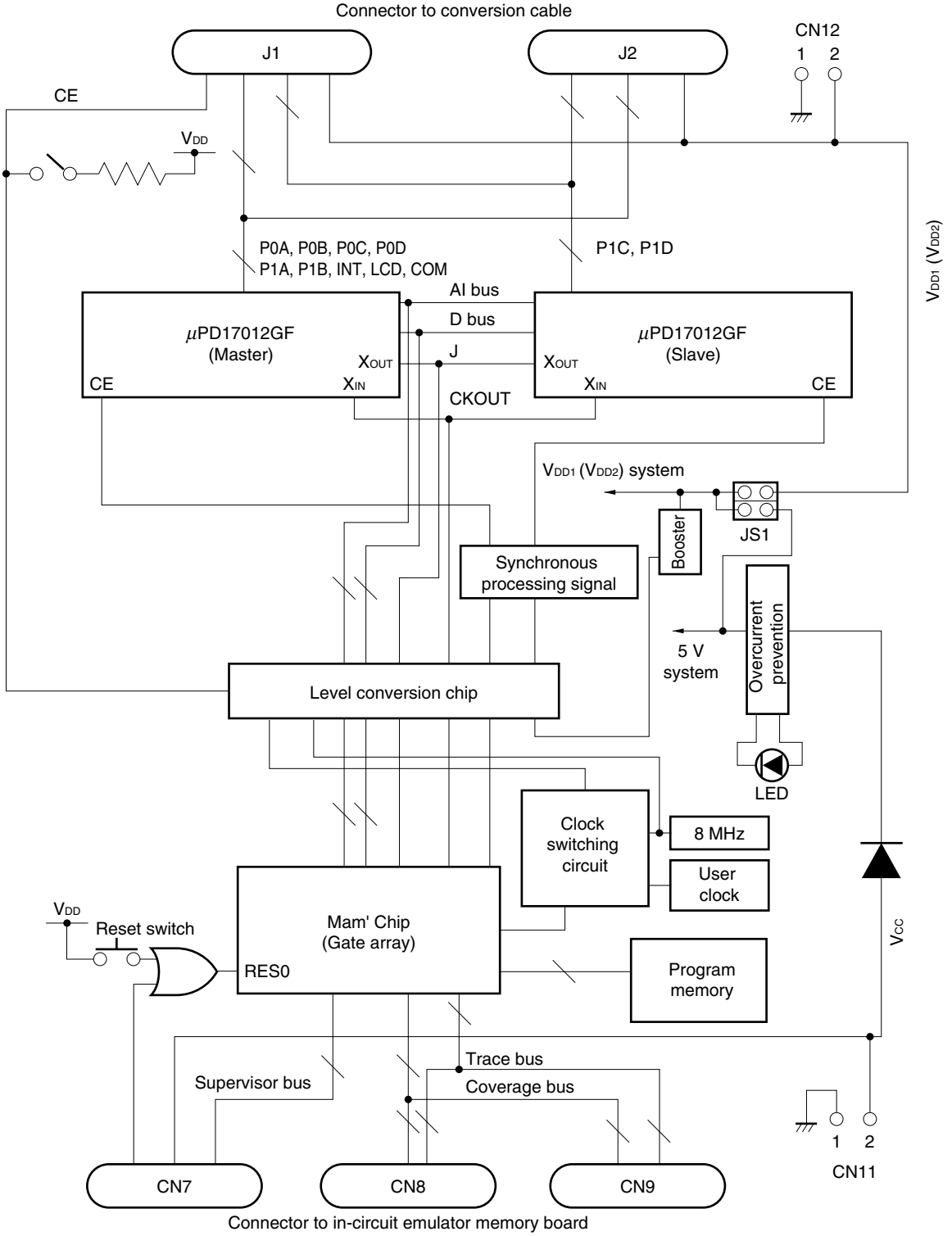
| | | |
|---|---|---|
| | Part number | SE-17012 |
| | Program memory | • When used mounted on the in-circuit emulator, use the μPD43256AGU.<br>• When used as a single unit, use the μPD27C256AD, 27C512D, or 27C1001AD with a program written, mounted on the SE-17012. |
| ★ | Data memory | The memory (316 × 4 bits) incorporated in the μPD17012 is used. |
| | Oscillation frequency | 4.5 MHz |
| | Instruction cycle | 4.4 μs (when a 4.5 MHz crystal resonator is used) |
| | Operating temperature | +10 to +40°C |
| | Storage temperature | −10 to +50°C (no condensation) |
| ★ | Power supply | • μPD17012 power supply ($V_{DD}$): +4.5 to 5.5 V<br>Supplied via the emulation probe (EP-17202GF) or CN12.<br>• SE-17012 power supply ($V_{CC}$): +5 V ±5%<br>Supplied by the in-circuit emulator when the SE-17012 is used mounted on the in-circuit emulator.<br>Supplied via CN11 when the SE-17012 is used as a single unit. |
| | Current consumption | 110 mA max.<br>(When the μPD27C256AD is used as the program memory without load) |
| | External dimensions | 150 × 175 × 33 mm |

**Figure 2-1. SE-17012 Parts Layout**



# CHAPTER 3 BLOCK DIAGRAM

**Figure 3-1. SE-17012 Block Diagram**

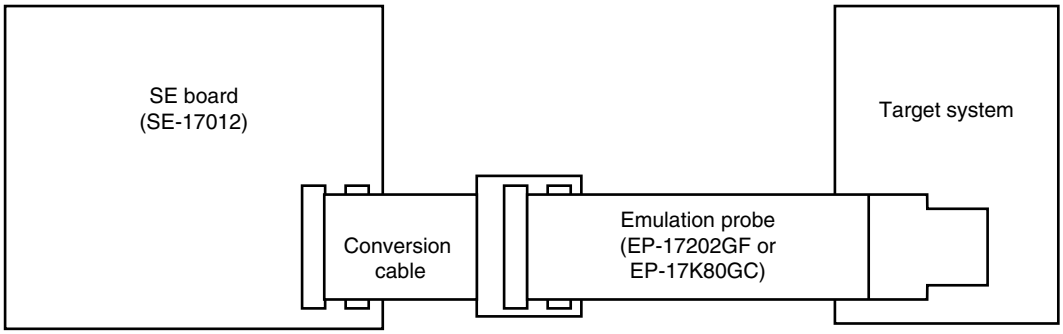


# CHAPTER 4 USAGE

## 4.1 Connection to Target System

Connect the SE-17012 to the target system with the conversion cable provided and the emulation probe (EP-
★ 17202GF or EP-17K80GC) (sold separately) as shown in Figure 4-1.

★ **Figure 4-1. Connection to Target System**



## 4.2 Level Conversion Chip (μPD6706GF)

### 4.2.1 Overview

The level conversion chip enables connection of the SE board with an operating voltage, $V_{CC}$, of +5 V to a target system with a different operating voltage, $V_{DD1}/V_{DD2}$, by converting signal levels in both directions so that both sides can communicate effectively.

**Remarks 1.** $V_{DD1}/V_{DD2}$ is the operating voltage of the target system. The SE board enables connection of this voltage to the μPD17012 chip via the emulation probe or CN12 for debugging under the actual operating conditions of the target system.

**2.** $V_{CC}$ is the power supply for all parts of the SE board except the μPD17012 chip. It must be +5 V. The SE board automatically takes its power from the in-circuit emulator when mounted, but requires a power supply connection to CN11 when used as a single unit.

### 4.2.2 Using the level conversion chip

- Set the JS1 jumper switch to the $V_{DD}$ side.
- The level conversion chip then automatically converts signal levels in both directions between the SE board and the target if a voltage other than +5 V is supplied from the emulation probe or CN12.

## 4.3 SE Board Power Supplies

The SE board requires two power supplies: $V_{CC}$, the power supply for all parts of the SE board except the μPD17012 chip, and $V_{DD1}/V_{DD2}$, the power supply for the μPD17012 chip. $V_{CC}$ must be +5 V. $V_{DD1}/V_{DD2}$ can be anywhere in the range supported by the μPD17012 chip: +4.5 V to +5.5 V.

Note that $V_{DD1}$ and $V_{DD2}$ are connected on the SE board.

### 4.3.1 Jumper switch for selecting power supply to SE board (JS1)

The JS1 jumper switch setting determines which power supply is supplied to the μPD17012 chip: the power supply supplied to the SE board (+5 V), or the power supply applied from the emulation probe or CN12.

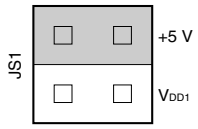
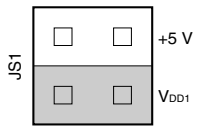
If the target system uses a +5 V power supply voltage, setting the JS1 jumper switch to the VDD side eliminates the need for a separate +5 V power supply because the μPD17012 chip then automatically draws power from the in-circuit emulator when it is mounted on the SE board. A power supply of +5 V must be supplied from CN11, however, when the μPD17012 chip is used as a single unit.

If, on the other hand, the target system uses a power supply voltage of other than +5 V, setting the JS1 jumper switch to the $V_{DD1}$ side connects the μPD17012 chip to that voltage, as supplied via the emulation probe or CN12, for debugging under the actual operating conditions of the target system.

Tables 4-1 and 4-2 summarize the JS1 jumper switch setting functions.

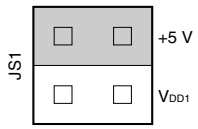
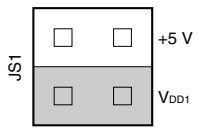
**Caution The supply voltage for the μPD17012 chip must be +4.5 to +5.5 V.**

**Table 4-1. JS1 Functions for SE Board Used with In-Circuit Emulator**

| Power Supply / JS1 Setting | Power Supply for $\mu$PD17012 Chip ($V_{DD1}$/$V_{DD2}$) | Power Supply for Other Parts of SE Board ($V_{CC}$) |
|---|---|---|
|  | +5 V power supply from in-circuit emulator | +5 V power supply from in-circuit emulator |
|  | Target system power supply from emulation probe or CN12 | |

**Remark** The shaded area indicates the selected switch position.

**Table 4-2. JS1 Functions for SE Board Used as Single Unit**

| Power Supply / JS1 Setting | Power Supply for $\mu$PD17012 Chip ($V_{DD1}$/$V_{DD2}$) | Power Supply for Other Parts of SE Board ($V_{CC}$) |
|---|---|---|
|  | +5 V power supply from CN11 | +5 V power supply from CN11 |
|  | Target system power supply from emulation probe or CN12 | |

**Remark** The shaded area indicates the selected switch position.

### 4.3.2 Power supply pins

The SE board provides three pins for connecting external power supplies, which must be used in accordance with the evaluation environment. These pins are described in Table 4-3.

**Table 4-3. Power Supply Pins**

| Pin | Power Supply Name (Range) | Function |
|---|---|---|
| CN11 | $V_{CC}$ (+5 V ±5%) | Power supply for all parts of the SE board except the μPD17012 chip. Must be +5 V. Only use when the SE board is used as a single unit. Do not use when the SE board is mounted on the in-circuit emulator, as power is then automatically supplied from the in-circuit emulator. |
| CN12 | $V_{DD1}$, $V_{DD2}$ (+4.5 to +5.5 V) | Chip power supply from a target system power supply of other than +5 V. (Range: +4.5 to 5.5 V) To use, set the JS1 jumper switch to the $V_{DD1}$ side. |
| Emulation probe ($V_{DD1}$/$V_{DD2}$ and GND pins) | $V_{DD1}$, $V_{DD2}$ (+4.5 to +5.5 V) | Equivalent to CN12 since the emulation probe power supply pin and CN12 are connected on the SE board. $V_{DD1}$ and $V_{DD2}$ are also connected on the SE board. |

**Remark** CN11 consists of 2 pins: a ground pin (pin 1) and a power supply pin (pin 2).
The cable supplied with the product is the most convenient means of connecting these power supplies.

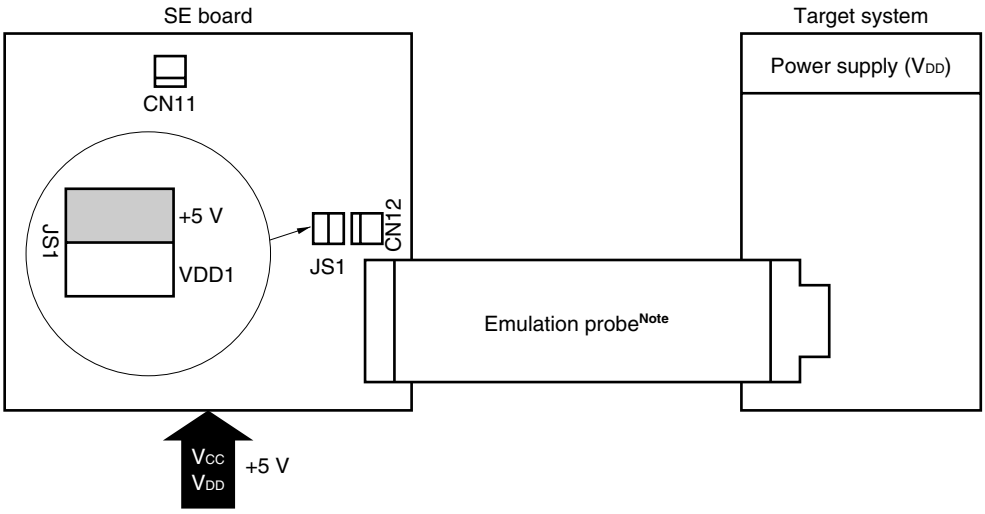
### 4.3.3 Application examples

#### (1) When used mounted on in-circuit emulator

**(a) When used mounted on in-circuit emulator and $V_{DD1}/V_{DD2} = V_{CC} = +5$ V**

Set the JS1 jumper switch to the $V_{CC}$ side to connect all power supplies ($V_{CC}$ and $V_{DD1}/V_{DD2}$) to the in-circuit emulator's +5 V power supply. Make sure that there is no power supplied from CN11. Power supply from the emulation probe (EP-17202GF) or CN12 is not necessary.

**Figure 4-2. Power Supply Method When Used Mounted on In-Circuit Emulator and $V_{DD1}/V_{DD2} = V_{CC} = +5$ V**




**Note** Including provided conversion cable.

**Caution Do not supply power from CN11.**

**Remark** Power supply from CN12 is not necessary.

**(b) When used mounted on in-circuit emulator and $V_{DD1}/V_{DD2} \neq V_{CC}$, $V_{CC}$ = +5 V**

Set the JS1 jumper switch to the $V_{DD1}$ side to connect $V_{CC}$ to the in-circuit emulator's +5 V power supply and the $\mu$PD17012 chip to the power supply from the emulation probe or CN12.

**Figure 4-3. Power Supply Method When SE Board Is Used Mounted on In-Circuit Emulator and $V_{DD1}/V_{DD2}$ Is Supplied from CN12**

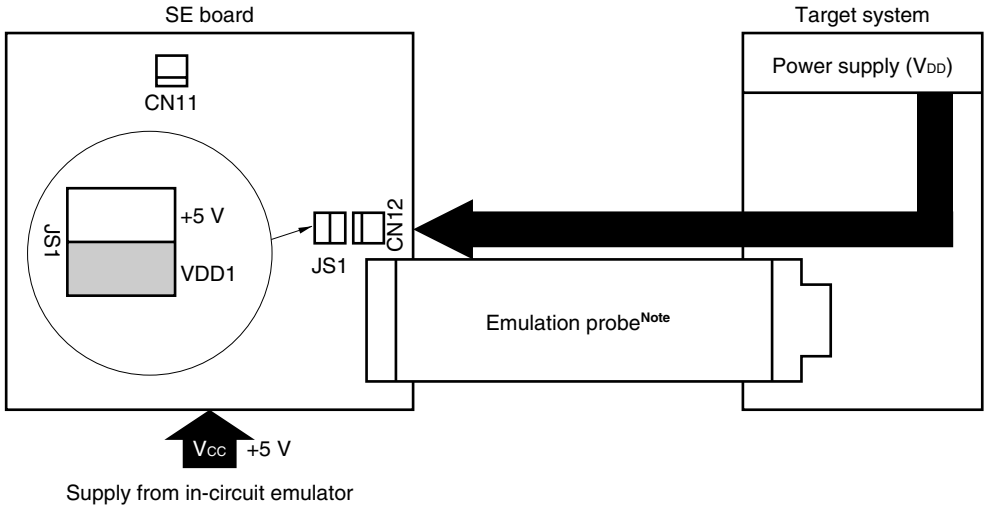
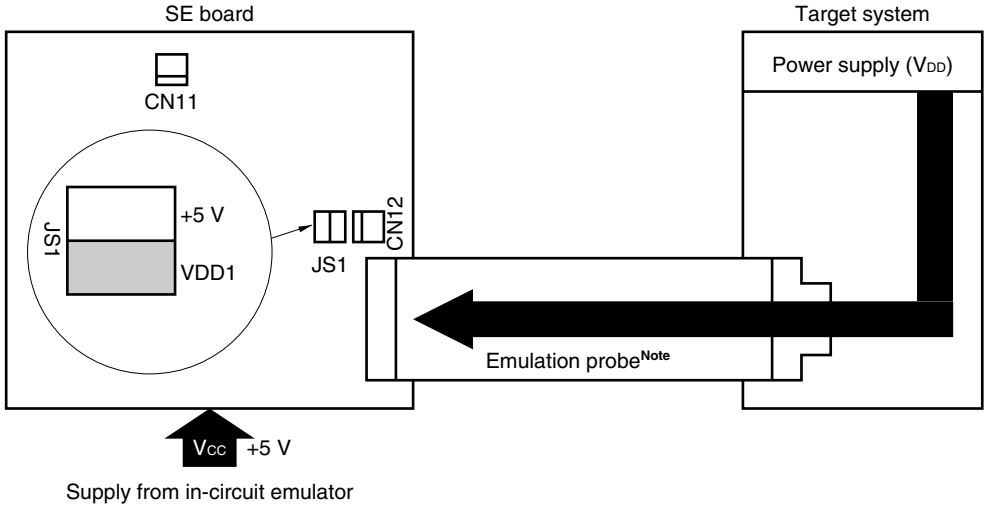



**Figure 4-4. Power Supply Method When SE Board Is Used Mounted on In-Circuit Emulator and $V_{DD1}/V_{DD2}$ Is Supplied from Emulation Probe**




**Note** Including provided conversion cable.

**Caution Do not supply power from CN11.**

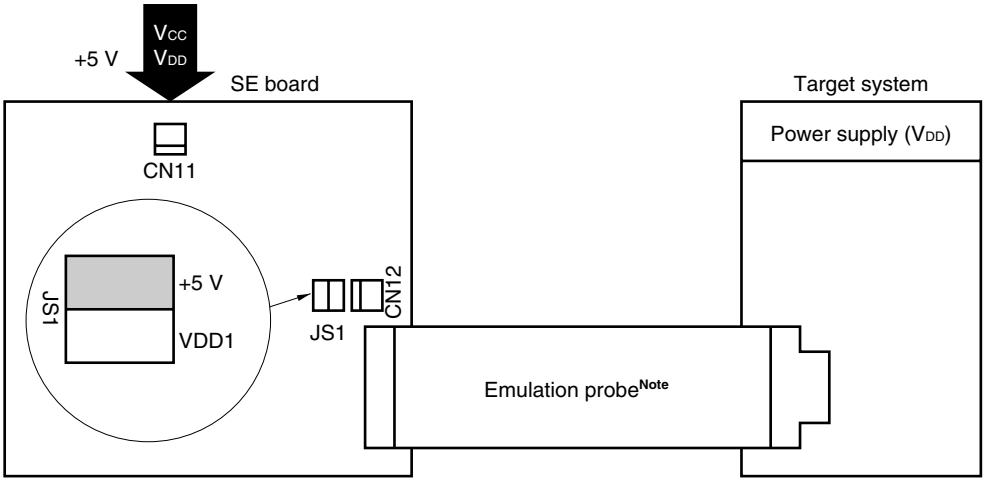
**Remark** Power supply from CN12 is not necessary.

### (2) When SE board is used as single unit

#### (a) When SE board is used as a single unit and $V_{DD1}/V_{DD2} = V_{CC} = +5$ V

Set the JS1 jumper switch to the +5 V side to connect all power supplies ($V_{CC}$ and $V_{DD1}/V_{DD2}$) to CN11.

**Figure 4-5. Power Supply Method When SE Board Is Used as Single Unit and $V_{DD1}/V_{DD2} = V_{CC} = +5$ V**




**Note** Including provided conversion cable.

**Remark** Power supply from CN12 and the emulation probe is not necessary.

**(b) When SE board is used as a single unit and $V_{DD1}/V_{DD2} \neq V_{CC}$, $V_{CC}$ = +5 V**

Set the JS1 jumper switch to the $V_{DD1}$ side. $V_{CC}$ and $V_{DD1}/V_{DD2}$ are supplied from CN11 and CN12 or the emulation probe, respectively.

**Figure 4-6. Power Supply Method When SE Board Is Used as Single Unit and $V_{DD1}/V_{DD2}$ Is Supplied from CN12**

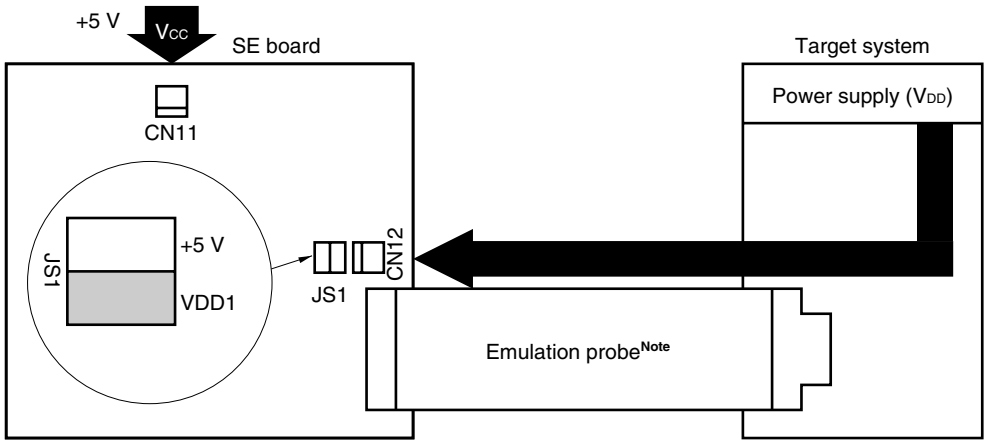
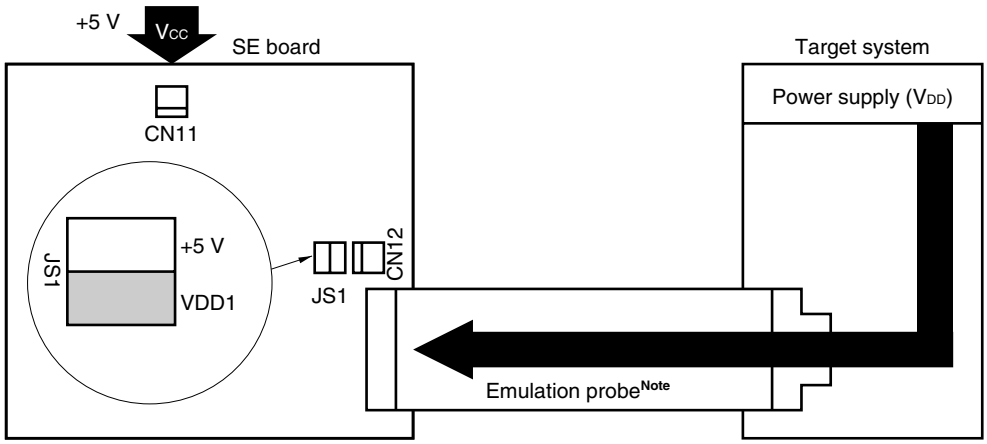



**Figure 4-7. Power Supply Method When SE Board Is Used as Single Unit and $V_{DD1}/V_{DD2}$ Is Supplied from Emulation Probe**




**Note** Including provided conversion cable.

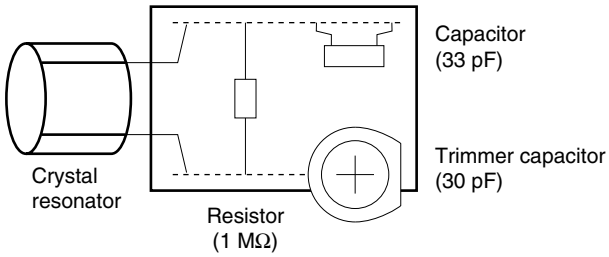
**Remark** Power supply from CN12 is not necessary.

## 4.4 Oscillation Frequency

### 4.4.1 Changing oscillation frequency

The main clock is fixed at 8 MHz, but the user frequency of 4.5 MHz may be changed by replacing the resonator attached to the parts board (see **Figure 4-8**).

**Figure 4-8. Parts Board Configuration**

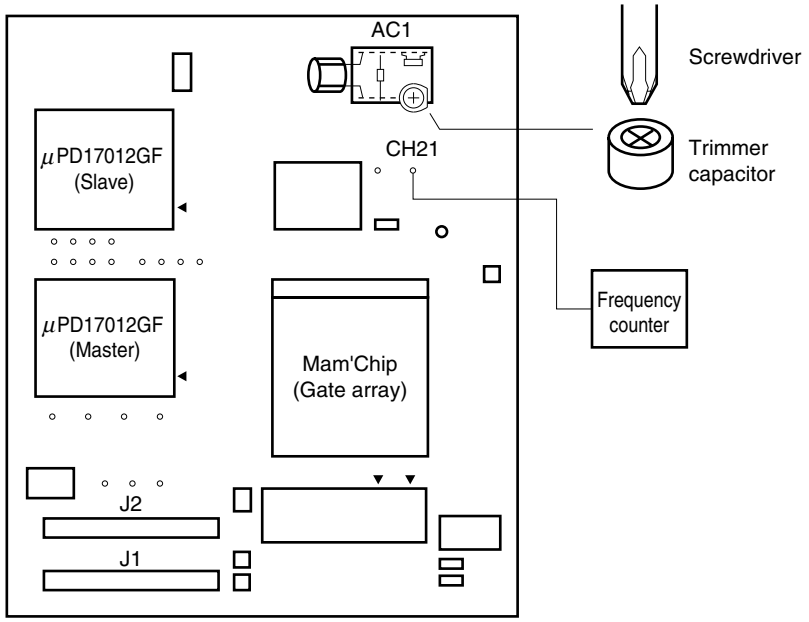



### 4.4.2 Fine adjustment of oscillation frequency

The oscillator frequencies for the main and user clocks at the time of shipment are 8 MHz ±20 ppm and 4.5 MHz ±20 ppm, respectively. The trimmer capacitor shown in Figure 4-9 is for fine-tuning the user clock frequency.

Waveform monitoring or frequency measurement can be performed using the monitor pin CH21.

**Figure 4-9. Fine-Tuning User Clock Oscillation Frequency**



## 4.5 Other Switches

### 4.5.1 Reset switch (SW1)

The SW1 switch is for resetting the SE board when it is used as a single unit. For further details on using the SE board as a single unit, see **4.7 Use of SE Board as Single Unit**.

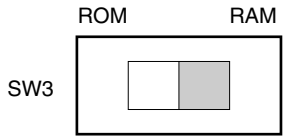
### 4.5.2 Slide switch for μPD27C256AD/μPD27C512D, 27C1001AD (SW2)

The SW2 switch specifies the type of program memory used when the SE board is used as a single unit: μPD27C256AD/μPD27C512D or 27C1001AD. For further details on using the SE board as a single unit, see **4.7 Use of SE Board as Single Unit**.

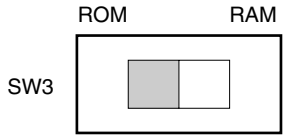
### 4.5.3 Slide switch for ROM/RAM (SW3)

**Figure 4-10. Slide Switch for ROM/RAM (SW3)**

**(a) When used mounted on IE-17K or IE-17K-ET**




**(b) When the SE board is used as a single unit**

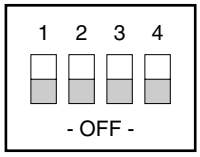



**Remark** The shaded area indicates the selected switch position.

### 4.5.4 DIP switch for $POC_0$ to $POC_3$ pull-up resistor setting (DSW1)

The DSW1 set of DIP switches controls the use of pull-up resistors on pins $POC_0$ to $POC_3$. Setting a switch to the ON position pulls up the corresponding pin.

**Figure 4-11. DIP Switch for $POC_0$ to $POC_3$ Pull-Up Resistor Setting (DSW1)**




### 4.5.5 Power LED (LED1)

This LED lights when the $V_{CC}$ power supply to the SE board is normal. For further details, see **4.6 Use with In-Circuit Emulator** and **4.7 Use of SE Board as Single Unit**.

## 4.6 Use with In-Circuit Emulator

### 4.6.1 Installing and removing the SE board

Use the following procedure to install the SE-17012 in the in-circuit emulator.

(1) Remove the outer and inner covers from the in-circuit emulator.
(2) Insert the three connectors (CN7, CN8, and CN9) on the underside of the SE-17012 into the matching connectors provided on top of the memory board inside the in-circuit emulator.
(3) To prepare for connection to the target system, connect the conversion cable to the SE-17012 connectors J1 and J2 and then connect the emulation probe (EP-17202GF) to the cable.
(4) Replace the outer and inner covers on the in-circuit emulator.

To remove the SE-17012 from the in-circuit emulator, simply reverse the above procedure. Take special care, however, not to exert sideways force when separating the SE-17012 and memory board connectors.

**Figure 4-12. External View of In-Circuit Emulator (with Outer Cover Opened)**

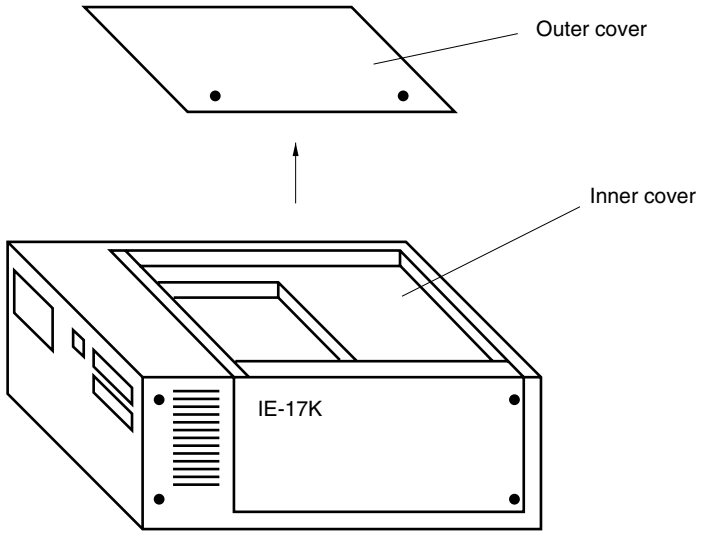
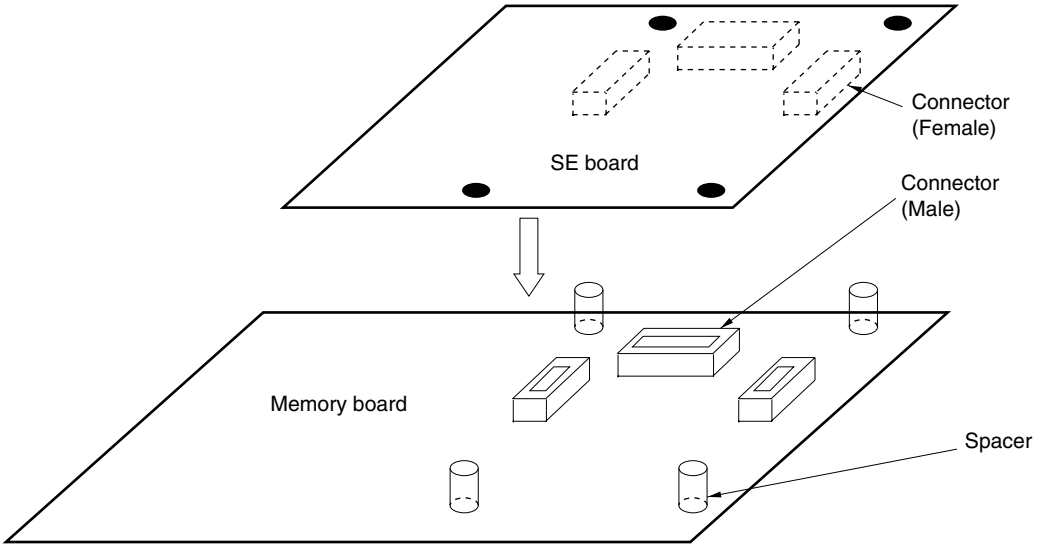


**Figure 4-13. Mounting and Removal of SE-17012**




### 4.6.2 Power Supplies

If the target system uses a power supply voltage other than +5 V, this voltage may be supplied to the μPD17012 chip on the SE board via the emulation probe or CN12. For further details, see the descriptions of the μPD6706GF level conversion chip and SE board power supply connections in **4.2 Level Conversion Chip (μPD6706GF)** and **4.3 SE Board Power Supplies**, respectively.

Before replacing the inner and outer covers of the in-circuit emulator after mounting the SE-17012, turn the power supply to the in-circuit emulator on and confirm that the LED on the SE-17012 lights.

If it does not light, the following causes can be considered.

- The power cord of the in-circuit emulator is not connected.
- An overcurrent (more than about 500 mA) is flowing to the SE-17012.
- The SE-17012 has not been properly installed.

If the LED does not light, turn off the power supply to the in-circuit emulator and reinstall the SE-17012. Thereafter, if the LED still does not light even when the power supply is turned on again, the LED is considered to be defective. In this case, contact an NEC sales office or representative.

### 4.6.3 Transfer of ICE file to in-circuit emulator

The in-circuit emulator (IE-17K, IE-17K-ET) is used to debug the hardware and software of a target system by connecting to a host machine such as the PC-9800 series. For the operation of the in-circuit emulator, see the user's manual for the IE-17K or IE-17K-ET.

With *SIMPLEHOST*, the source code listings automatically appear on the screen if the SE-17012 is properly installed in the in-circuit emulator. For details of *SIMPLEHOST*, see the *SIMPLEHOST* User's Manual. For a commercial RS-232C communications program, use the following procedure to check the connection.

(1) Turn on the power to the in-circuit emulator. If it is already on, press the in-circuit emulator RESET switch to restart it and display the command prompt (@@@>).

(2) Use the .LP command to load the ICE file (with the extension ICE) of the μPD17012 program created by the AS17K assembler or the ICE file output via the .SP command to the in-circuit emulator.

The in-circuit emulator does not function until the load is complete. If the SE-17012 is properly installed, the in-circuit emulator then displays the following messages followed by the BRK> prompt. At this point, the IE-17K or IE-17K-ET becomes the μPD17012 in-circuit emulator.

```
OK
D17012
BRK>
```

If the above message is not displayed, the following causes can be considered.

- The ICE file is not compatible with the μPD17012 chip on the SE-17012.
- An SE board other than SE-17012 has been mounted.
- An ICE file of other than the μPD17012 has been loaded.
- The option switch settings differ from those stored in the program memory.
- The SE-17012 has been improperly mounted on the in-circuit emulator.

### 4.6.4 Error messages and corresponding action

The in-circuit emulator and SE-17012 have the function to display an error message if the mounted μPD17012 chip and the loaded ICE file are erroneously combined.

Furthermore, to assure more positive debugging, an SE board number has been assigned to the SE-17012 and a ★ device number to the μPD17012GF-×××-3BE or μPD17012GC-×××-8BT.

The device number, SE board number and actions in response to error messages are described below.

**Table 4-4. Device No. and SE Board No.**

| Evaluation Device | Device No. | SE Board No. |
|---|---|---|
| μPD17012 | 3A | 3A |

**Remarks 1.** The device number is a registered number assigned to the chip.

**2.** The SE board number is a registered number assigned to the SE board.

**3.** The device number and SE board number are contained in data in the ICE file to be loaded and are used by the in-circuit emulator to check the development environment when loading the ICE file. For instance, Device No. = 3A and SE Board No. = 3A are contained in the ICE file assembled using the μPD17012 device file.

**(1) Error message and corresponding action when chip mounted on the SE-17012 and loaded ICE file are not compatible**

Error message example

```
? IDI INVALID DEVICE ID NUMBER [××-ΔΔ]
```

Here, ×× in this error message indicates the device number of the actually mounted μPD17012 chip and ΔΔ indicates the device number contained in the loaded ICE file.

When this error message is output, check the μPD17012 chip on the SE board again. If an erroneous chip is mounted, turn the power supply of the in-circuit emulator off once, replace the chip, and load the ICE file again from the beginning.

If an incorrect device file was selected during assembly, reassemble the source file using the correct device file and reload that ICE file.

**(2) Error message and corresponding action when and SE board other than the SE-17012 was mounted and an ICE file other than the μPD17012 was loaded**

Error message example

```
? ISE INVALID SE BOARD NUMBER [□□ -∇∇]
```

Here, □□ in this error message indicates the SE board number of the actually mounted SE board and ∇∇ indicates the SE board number contained in the loaded ICE file. In the case of the SE-17012, □□ becomes 3A and when the ICE file for the μPD17012 is loaded, ∇∇ becomes 3A.

If this error message is output, recheck the SE board and the loaded ICE file.

**(3) Action when there is no response from in-circuit emulator**

- It is possible that the SE-17012 has not been properly mounted on the in-circuit emulator. Remount the SE-17012 properly.
- It is possible that user's target system and the SE board are not properly connected with the conversion cable ★ and emulation probe (EP-17202GF or EP-17K80GC). Check the connection again.
- It is possible that the reset circuit of user's target system is not operating properly. In this case, the SE board might be in an unstable reset status and the IE-17K might not be able to return a response.
  To determine whether this is indeed the case, install the CE pin pull-up jumper switch, JS4, and restart the in-circuit emulator.

If any of (1) to (3) above were found, immediately correct the user's target system so that the error message is no longer displayed.

### 4.6.5 Precautions

- When turning the power supply on, first turn on the power supply for the in-circuit emulator and then turn on the power supply for the target system.
- Do not use the reset switch (SW1) on the SE-17012. To reset the in-circuit emulator, use the reset switch of the in-circuit emulator.

## 4.7 Use of SE Board as Single Unit

### 4.7.1 Mounting of PROM

When the SE-17012 is used as a single unit, install a PROM (the μPD27C256AD, μPD27C512D or μPD27C1001AD) as the program memory.

A PROM satisfying the following conditions should be installed.

- $t_{ACC}$ < (Instruction cycle time/4)
  ($t_{ACC}$: Address setting → data output delay time)

- PROM size
  256 Kb: μPD27C256AD-12, -15, -20, and equivalent
  512 Kb: μPD27C512D-12, -15, -20, and equivalent
  1 Mb: μPD27C1001AD-12, -15, -20, and equivalent

It is necessary to write one of the following output files in the PROM in advance as the program.

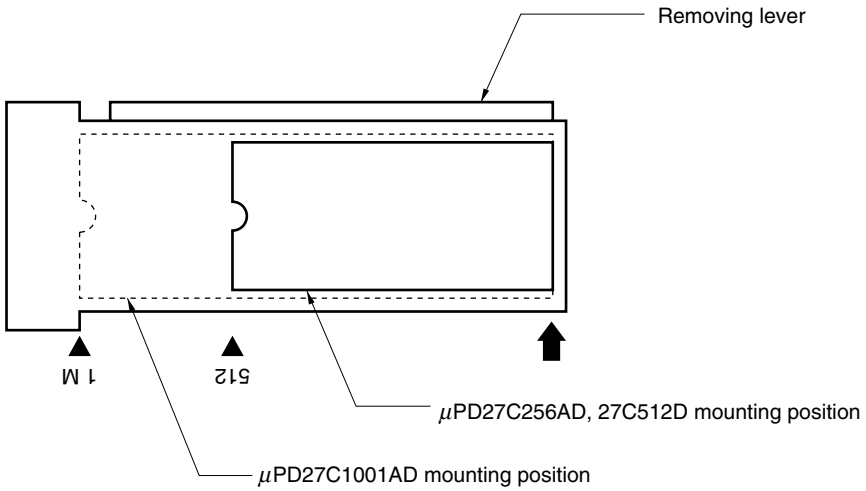
- PROM file (.PRO) for the μPD17012 output by the 17K Series assembler (AS17K)
- File output for PROM by the .XS0 or .XS1 command of the in-circuit emulator

**Cautions 1. Do not write the ICE file (.ICE) output by the AS17K to the in-circuit emulator in the PROM.**

**2. The last address of the μPD17012 program memory is 0FFFH.**

**3. Mount the μPD27C256AD, 27C512D, and 27C1001AD aligning the <↑> marks as shown in Figure 4-14, as the number of pins differs depending on the product.**

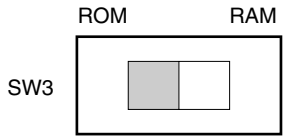
**Figure 4-14. Notes for Mounting PROM**




### 4.7.2 Setting of ROM/RAM selection slide switch (SW3)

The ROM/RAM selection slide switch (SW3) is the switch to set the program memory to be used.

**Figure 4-15. ROM/RAM Selection Slide Switch (SW3)**



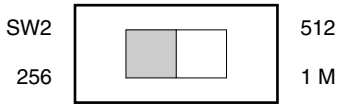

**Remark** The shaded area indicates the selected switch position.

### 4.7.3 Setting of μPD27C256AD, μPD27C512D, 27C1001AD selection slide switch (SW2)

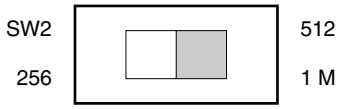
The setting of the slide switch (SW2) depends on which of the μPD27C256AD/μPD27C512D/27C1001AD is used, as shown in Figure 4-16.

**Figure 4-16. Setting of μPD27C256AD/μPD27C512D, 27C1001AD Selection Slide Switch (SW2)**

**(a) When μPD27C256AD is used**




**(b) When μPD27C512D or 27C1001AD is used**




**Remark** The shaded area indicates the selected switch position.

### 4.7.4 Supply of power

+5 V ±5% ($V_{CC}$) must be supplied to the SE-17012 from an external power supply via the CN11 pin.

If the target system uses a power supply voltage other than +5 V, this voltage may be supplied to the μPD17012 chip on the SE board via the emulation probe or CN12.

For further details, see the descriptions of the μPD6706GF level conversion chip and SE board power supply connections in **4.2 Level Conversion Chip (μPD6706GF)** and **4.3 SE Board Power Supplies**, respectively.

The LED on the SE-17012 lights if $V_{CC}$ is being supplied correctly. If this LED does not light, the following causes can be considered.

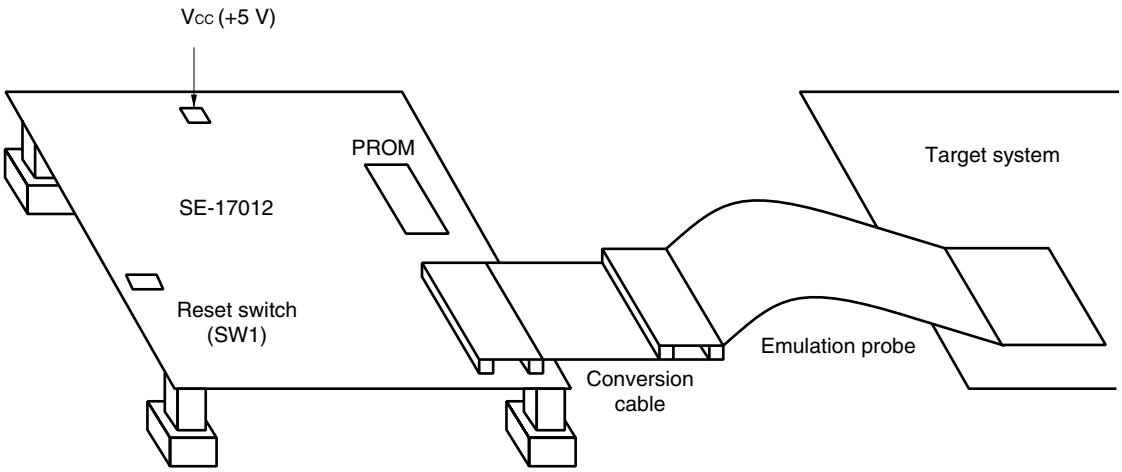
- No power is being supplied.
- An overcurrent is flowing (more than about 500 mA).

### 4.7.5 Program execution

Connect the SE-17012 and the target system as shown in Figure 4-17. When the power supply for the target system is turned on, the power is supplied to the SE-17012, the power-on reset works and a program is executed from address 0 of the program written on the PROM.

Furthermore, if the reset switch on the SE-17012 is pressed, the system is reset by force and the program written on the PROM is executed from address 0 in the same way as in a power-on reset.

**Figure 4-17. Example of Connection When SE-17012 Is Used as Single Unit**



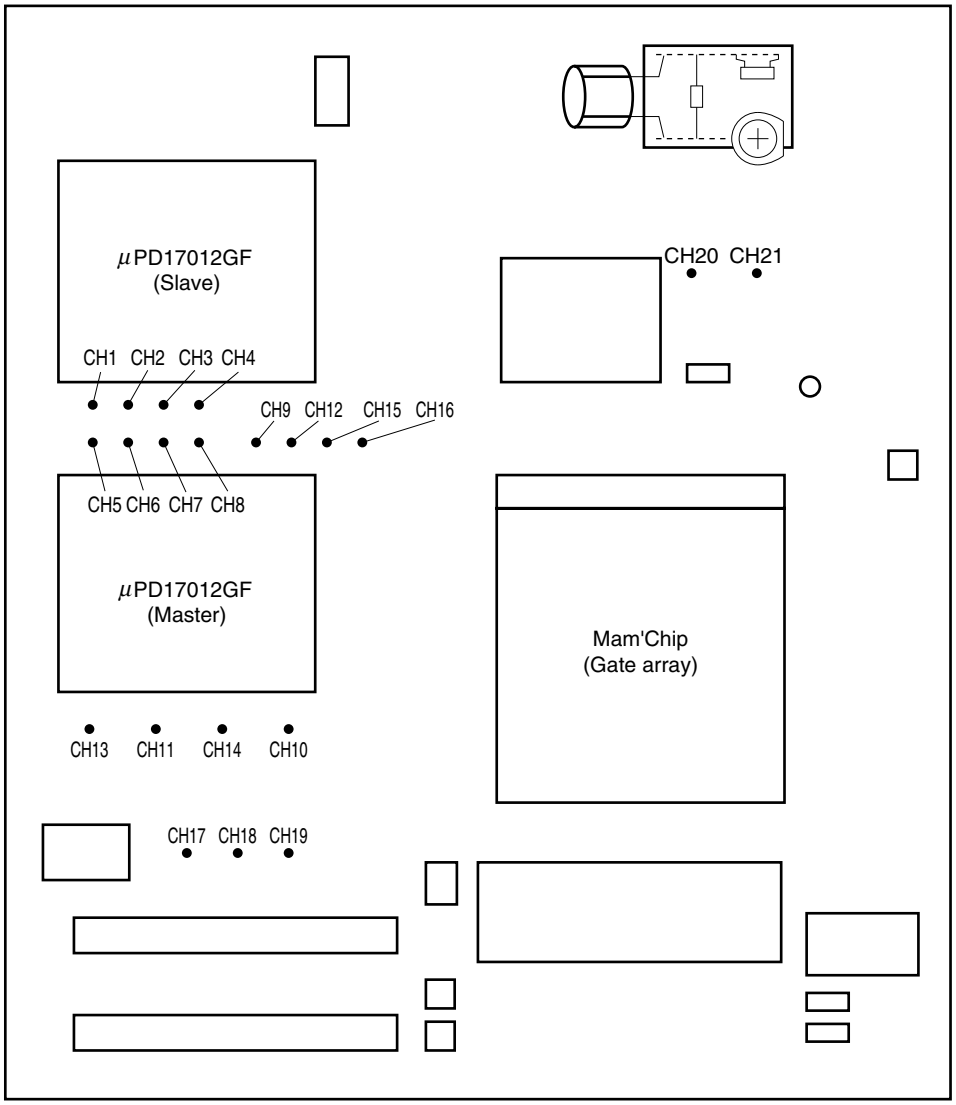
## 4.8 Monitor Pins

The SE-17012 is provided with monitor pins to monitor the status of the following pins of the $\mu$PD17012 chip. The monitor pin names and their functions are shown in Table 4-5 and the layout of the monitor pins is shown in Figure 4-18.

**Table 4-5. Monitor Pin Names and Functions**

| Monitor Pin Name | Function | Monitor Pin Name | Function |
|---|---|---|---|
| CH1 | $AIB_0$ monitor | CH12 | CE monitor |
| CH2 | $AIB_1$ monitor | CH13 | FMIFC monitor |
| CH3 | $AIB_2$ monitor | CH14 | AMIFC monitor |
| CH4 | $AIB_3$ monitor | CH15 | $F1B_1$ monitor |
| CH5 | $DB_0$ monitor | CH16 | $PIB_0$ monitor |
| CH6 | $DB_1$ monitor | CH17 | $P0C_0$ monitor |
| CH7 | $DB_2$ monitor | CH18 | $P0C_1$ monitor |
| CH8 | $DB_3$ monitor | CH19 | $P1A_2$ monitor |
| CH9 | E0 monitor | CH20 | AIN monitor |
| CH10 | VCOL monitor | CH21 | User check monitor |
| CH11 | VCOH monitor | | |

**Figure 4-18. Layout of Monitor Pins**



## 4.9 Setting at Shipment

When the SE-17012 is shipped, the crystal resonator, jumper switches and slide switches are set as shown below.

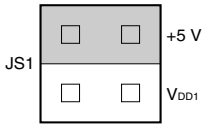
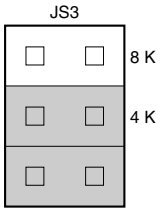
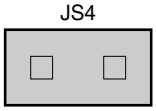
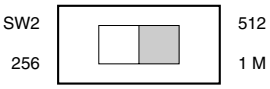
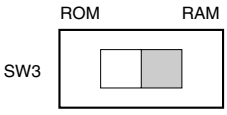
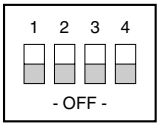
**(1) Crystal resonator**

8 MHz and 4.5 MHz crystal resonators are mounted for the main clock and user clock, respectively.

**(2) Jumper switches and slide switches**

These switches are set as shown in the figures in Table 4-6. Use these switches after checking the set conditions.

**Table 4-6. Setting of Jumper Switches and Slide Switches**

| SW No. | Jumper SW, Slide SW | Set Conditions | | Set Position |
|---|---|---|---|---|
| JS1 |  | Refer to in **4.2 Level Conversion Chip (μPD6706GF)** and **4.3 SE Board Power Supplies**. | | |
| JS3 |  | Do not change the shipment setting. | | |
| JS4 |  | When the CE pin is pulled up | | Install |
| | | When the CE pin is not pulled up | | Remove |
| SW2 |  | When evaluating with SE-17012 mounted on the in-circuit emulator | | Can be set to either the 256 side or the 512 side |
| | | When evaluating with SE-17012 as single unit | When the μPD27C256AD is used | 256 side |
| | | | When the μPD27C512D or 27C1001AD is used | 512/1M side |
| SW3 |  | When evaluating with SE-17012 mounted on the in-circuit emulator | | RAM side |
| | | When evaluating with SE-17012 as single unit | | ROM side |
| DSW1 |  | When the P0C0 to P0C3 are pulled up | | ON side |
| | | When the P0C0 to P0C3 are not pulled up | | OFF side |

**Remark** The shaded area indicates the setting at shipment.

# CHAPTER 5 CONNECTOR PIN TABLE

★ **Table 5-1. J1 Connector Pin Table**

| J1 Pin No. | Pin Name [Pin No. of 80-Pin $\mu$PD17012 Chip] (Pin No. of 64-Pin $\mu$PD17012 Chip) | J1 Pin No. | Pin Name [Pin No. of 80-Pin $\mu$PD17012 Chip] (Pin No. of 64-Pin $\mu$PD17012 Chip) | J1 Pin No. | Pin Name [Pin No. of 80-Pin $\mu$PD17012 Chip] (Pin No. of 64-Pin $\mu$PD17012 Chip) |
|---|---|---|---|---|---|
| 1 | GND | 21 | GND | 41 | $LCD_4/KS_4/PYA_4$ [63] (53) |
| 2 | $P1C_0$ [26] (23) | 22 | $V_{DD1}$ [3] (4) | 42 | GND |
| 3 | GND | 23 | $P1A_0$ [1] (2) | 43 | GND |
| 4 | $P0B_0/BEEP_0$ [21] (19) | 24 | GND | 44 | $LCD_5/KS_5/PYA_5$ [62] (52) |
| 5 | $P0B_1/BEEP_1$ [20] (18) | 25 | $P1A_1$ [80] (1) | 45 | GND |
| 6 | GND | 26 | GND | 46 | $LCD_6/KS_6/PYA_6$ [61] (51) |
| 7 | GND | 27 | GND | 47 | $LCD_8/KS_8/PYA_8$ [59] (49) |
| 8 | CE [7] (7) | 28 | INT [78] (64) | 48 | GND |
| 9 | GND | 29 | $P0D_1/K_1$ [75] (61) | 49 | $LCD_9/KS_9/PYA_9$ [58] (48) |
| 10 | $P1B_1/ADC_1$ [16] (14) | 30 | GND | 50 | GND |
| 11 | NC | 31 | GND | 51 | GND |
| 12 | GND | 32 | $P0D_3/K_3$ [73] (59) | 52 | $LCD_{10}/KS_{10}/PYA_{10}$ [57] (47) |
| 13 | $P0A_0/SI_1$ [12] (11) | 33 | GND | 53 | $LCD_{12}/KS_{12}/PYA_{12}$ [55] (45) |
| 14 | GND | 34 | $LCD_0/KS_0/PYA_0$ [67] (57) | 54 | GND |
| 15 | GND | 35 | $LCD_1/KS_1/PYA_1$ [66] (56) | 55 | $LCD_{14}/KS_{14}/PYA_{14}$ [52] (43) |
| 16 | $P0A_2/\overline{SCK}_1$ [10] (9) | 36 | GND | 56 | $LCD_{13}/KS_{13}/PYA_{13}$ [53] (44) |
| 17 | P0B3/FCG1 [18] (16) | 37 | $LCD_2/KS_2/PYA_2$ [65] (55) | 57 | GND |
| 18 | GND | 38 | GND | 58 | $LCD_{15}/KS_{15}/PYA_{15}$ [50] (42) |
| 19 | GND | 39 | GND | 59 | $LCD_{11}/KS_{11}/PYA_{11}$ [56] (46) |
| 20 | NC | 40 | $LCD_3/KS_3/PYA_3$ [64] (54) | 60 | GND |

**Remark** The signals VCOL, VCOH, FMIFC, and AMIFC are output from a BNC connector.

★ **Table 5-2. J2 Connector Pin Table**

| J2 Pin No. | Pin Name [Pin No. of 80-Pin μPD17012 Chip] (Pin No. of 64-Pin μPD17012 Chip) | J2 Pin No. | Pin Name [Pin No. of 80-Pin μPD17012 Chip] (Pin No. of 64-Pin μPD17012 Chip) | J2 Pin No. | Pin Name [Pin No. of 80-Pin μPD17012 Chip] (Pin No. of 64-Pin μPD17012 Chip) |
|---|---|---|---|---|---|
| 1 | $P1C_3$ [22] (20) | 21 | GND | 41 | $LCD_{19}/P2H_0$ [46] (38) |
| 2 | $P0B_2/FCG_0$ [19] (17) | 22 | NC | 42 | GND |
| 3 | GND | 23 | $P1A_2$ [77] (63) | 43 | GND |
| 4 | $P1B_0/ADC_0$ [17] (15) | 24 | GND | 44 | $COM_2$ [42] (35) |
| 5 | $P1C_2$ [24] (21) | 25 | $P0D_0/K_0$ [76] (62) | 45 | GND |
| 6 | GND | 26 | GND | 46 | P1D1 [40] (33) |
| 7 | GND | 27 | GND | 47 | $P0C_2$ [34] (28) |
| 8 | NC | 28 | $P0D_2/K_2$ [74] (60) | 48 | GND |
| 9 | GND | 29 | $P0C_3$ [33] (27) | 49 | $P1D_3$ [38] (31) |
| 10 | $P1C_1$ [25] (22) | 30 | GND | 50 | GND |
| 11 | $P0A_1/SO_1$ [11] (10) | 31 | GND | 51 | GND |
| 12 | GND | 32 | $LCD_{16}/P2E_0$ [49] (41) | 52 | $P0C_1/PWM_1$ [35] (29) |
| 13 | $V_{DD2}$ [8, 9] (8) | 33 | GND | 53 | $P1D_0$ [41] (34) |
| 14 | GND | 34 | GND | 54 | GND |
| 15 | GND | 35 | $LCD_{18}/P2G_0$ [47] (39) | 55 | $P1D_2$ [39] (32) |
| 16 | NC | 36 | GND | 56 | $P0C_0/PWM_0$ [37] (30) |
| 17 | NC | 37 | $LCD_{17}/P2F_0$ [48] (40) | 57 | GND |
| 18 | GND | 38 | GND | 58 | $COM_1$ [44] (36) |
| 19 | GND | 39 | GND | 59 | $LCD_7/KS_7/PYA_7$ [60] (50) |
| 20 | EO [2] (3) | 40 | $COM_0$ [45] (37) | 60 | GND |

**Remark** The signals VCOL, VCOH, FMIFC, and AMIFC are output from a BNC connector.

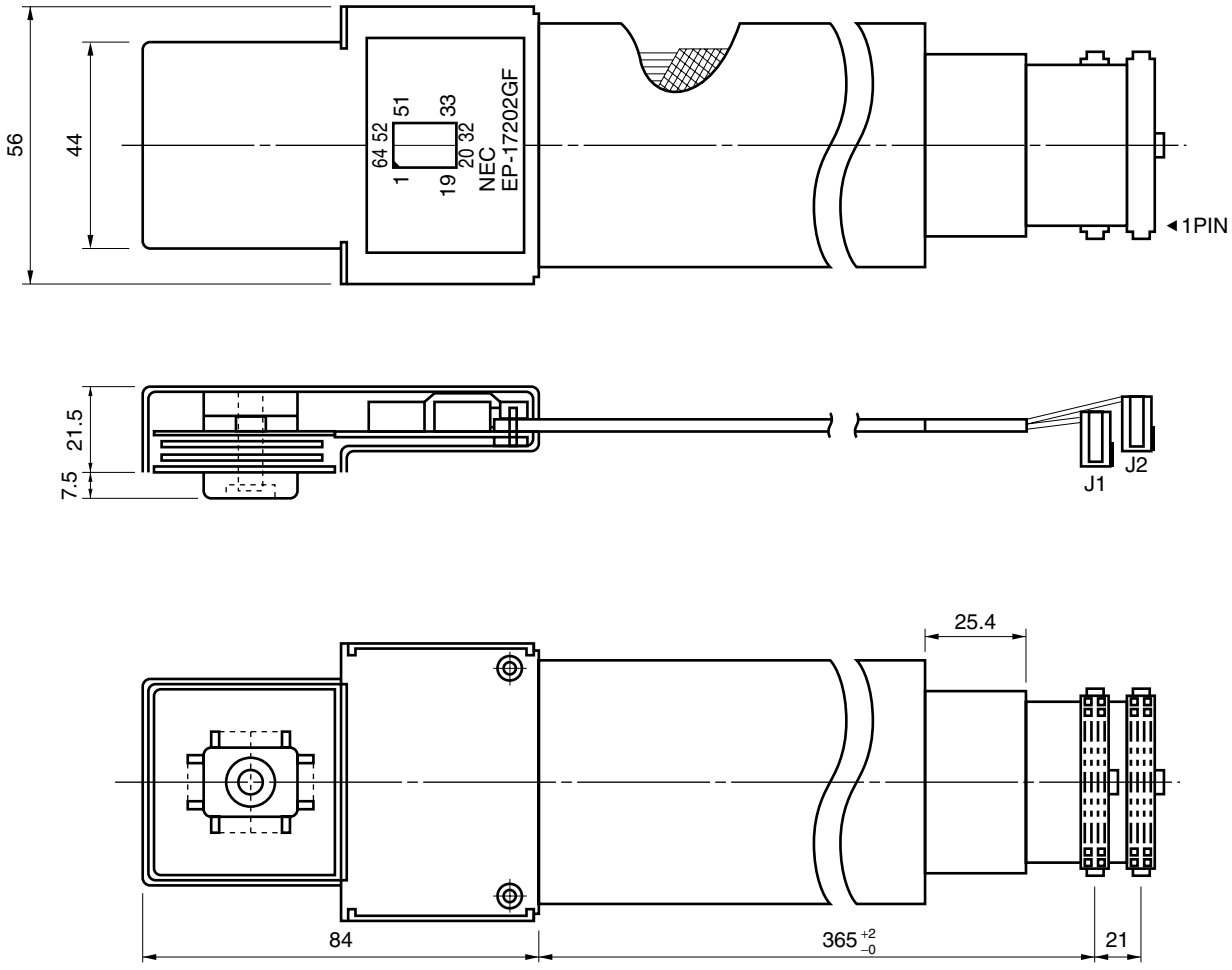
# CHAPTER 6 PACKAGE DRAWING OF EMULATION PROBE, CONVERSION CABLE, AND CONVERSION SOCKET

## 6.1 Package Drawing of Emulation Probe

### (1) Probe for 64-pin plastic QFP

Part number: EP-17202GF

**Figure 6-1. Package Drawing of EP-17202GF**

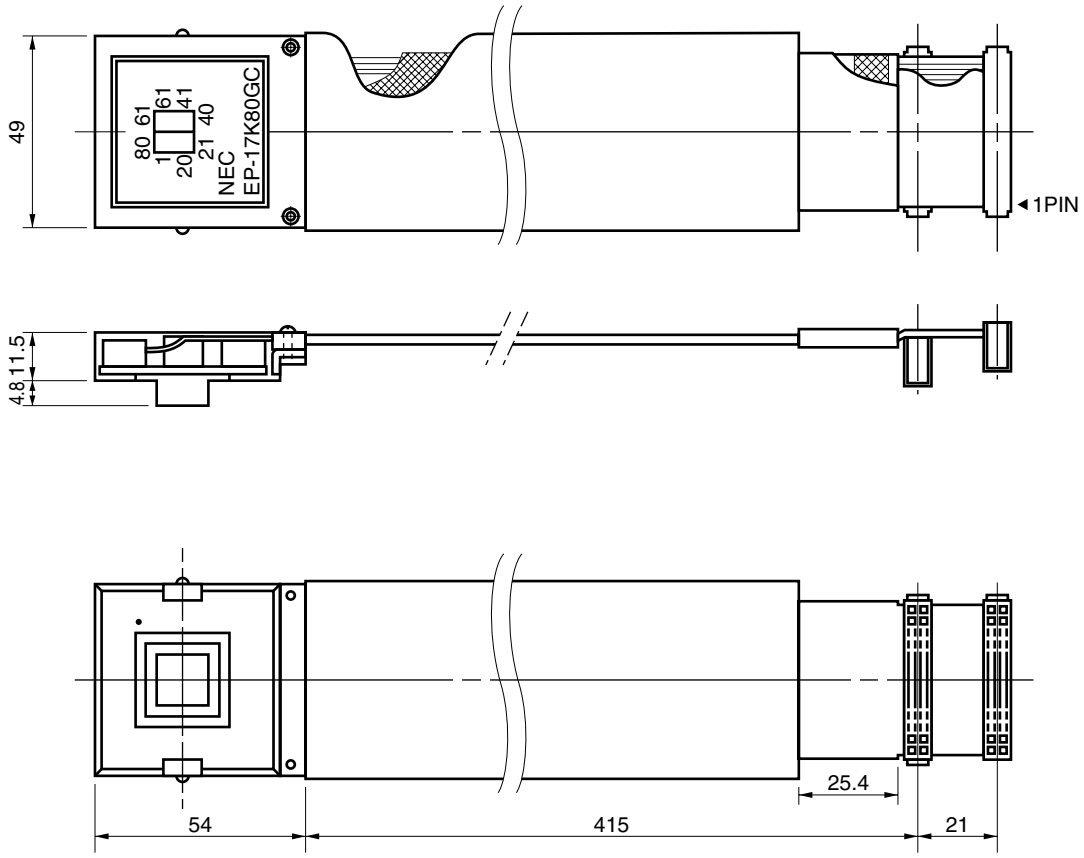



**Remark** Unit: mm

★ **(2) Probe for 80-pin plastic QFP**

Part number: EP-17K80GC

**Figure 6-2. Package Drawing of EP-17K80GC**

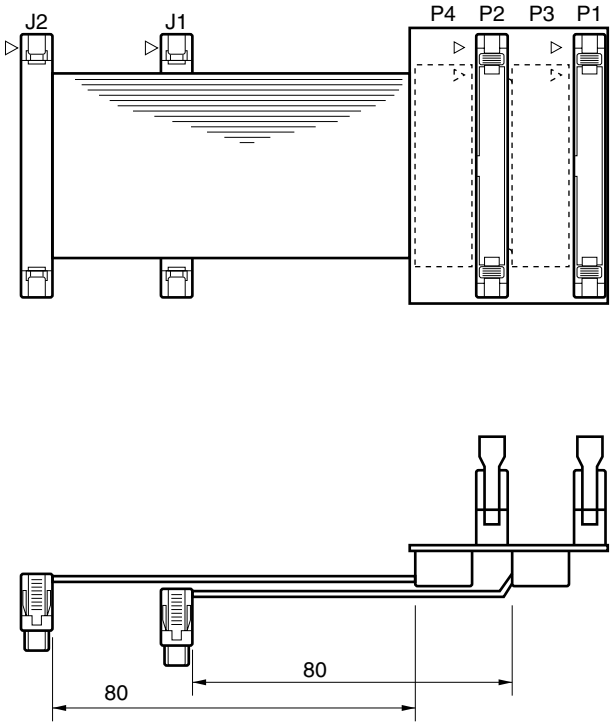



**Remark** Unit: mm

## 6.2 Package Drawing of Conversion Cable

### (1) 64GF conversion cable

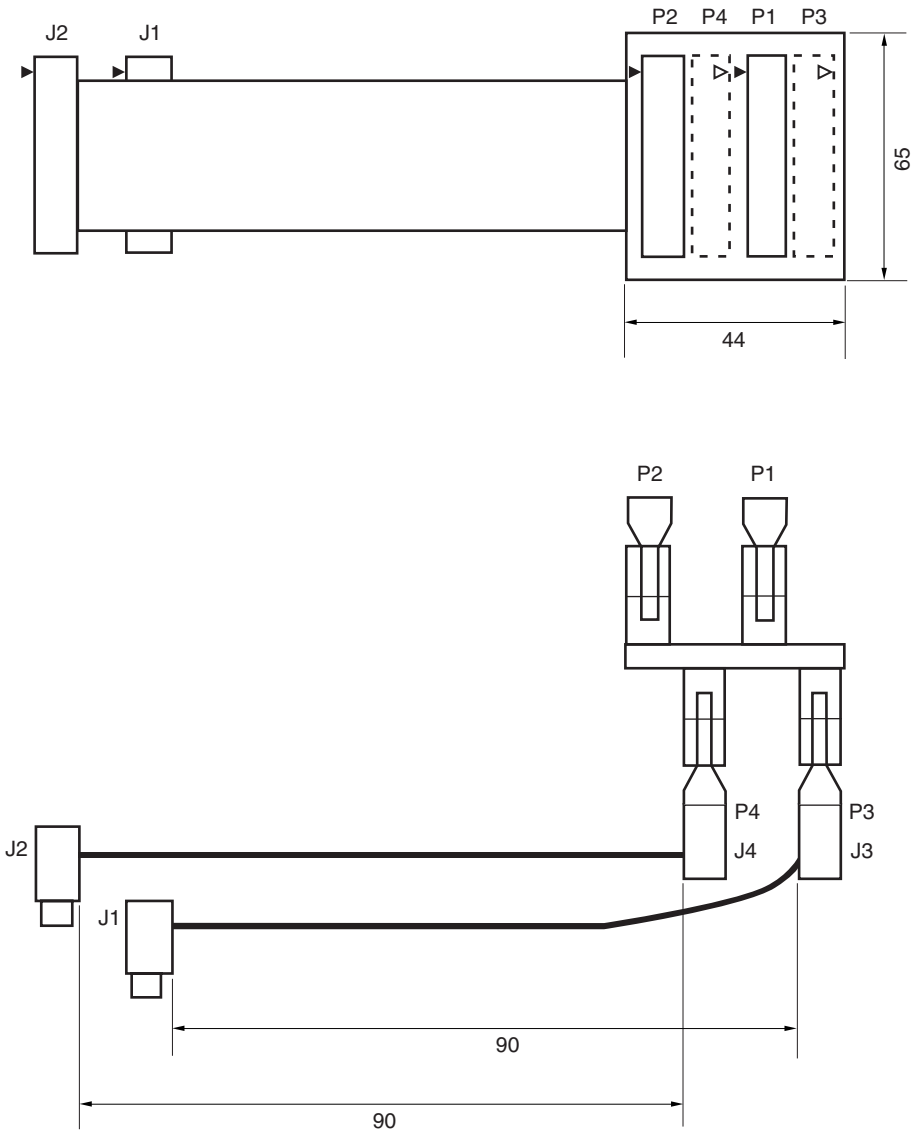
**Figure 6-3. Package Drawing of 64GF Conversion Cable**




**Remark** Unit: mm

★ **(2) 80GF conversion cable**

**Figure 6-4. Package Drawing of 80GC Conversion Cable**

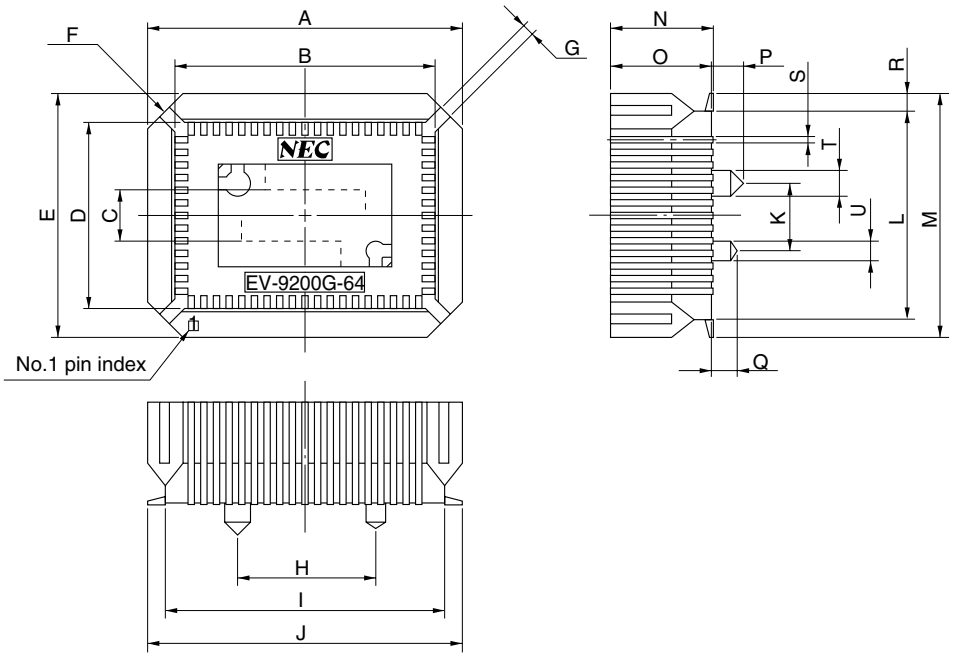



**Remark** Unit: mm

## 6.3 Package Drawing of Conversion Socket and Recommended Pattern for Board Mounting

### (1) EV-9200G-64 and recommended pattern for board mounting

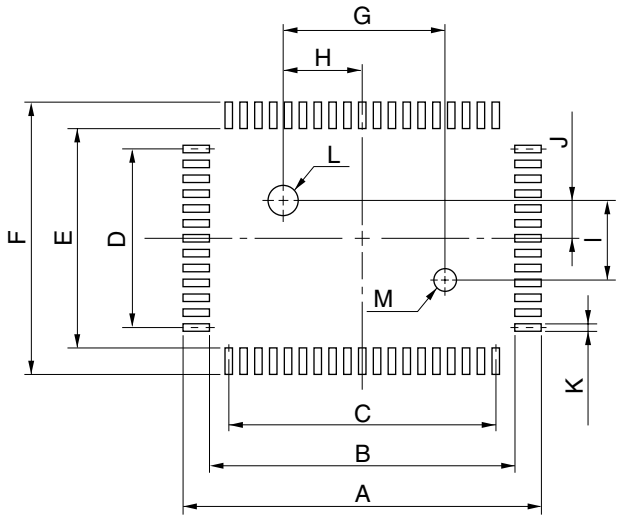
**Figure 6-5. Package Drawing of EV-9200G-64**




EV-9200G-64-G0E

| ITEM | MILLIMETERS | INCHES |
|---|---|---|
| A | 25.0 | 0.984 |
| B | 20.30 | 0.799 |
| C | 4.0 | 0.157 |
| D | 14.45 | 0.569 |
| E | 19.0 | 0.748 |
| F | 4-C 2.8 | 4-C 0.11 |
| G | 0.8 | 0.031 |
| H | 11.0 | 0.433 |
| I | 22.0 | 0.866 |
| J | 24.7 | 0.972 |
| K | 5.0 | 0.197 |
| L | 16.2 | 0.638 |
| M | 18.9 | 0.744 |
| N | 8.0 | 0.315 |
| O | 7.8 | 0.307 |
| P | 2.5 | 0.098 |
| Q | 2.0 | 0.079 |
| R | 1.35 | 0.053 |
| S | 0.35±0.1 | $0.014^{+0.004}_{-0.005}$ |
| T | $\phi$2.3 | $\phi$0.091 |
| U | $\phi$1.5 | $\phi$0.059 |

**Figure 6-6. Recommended Pattern for Mounting Board of EV-9200G-64**



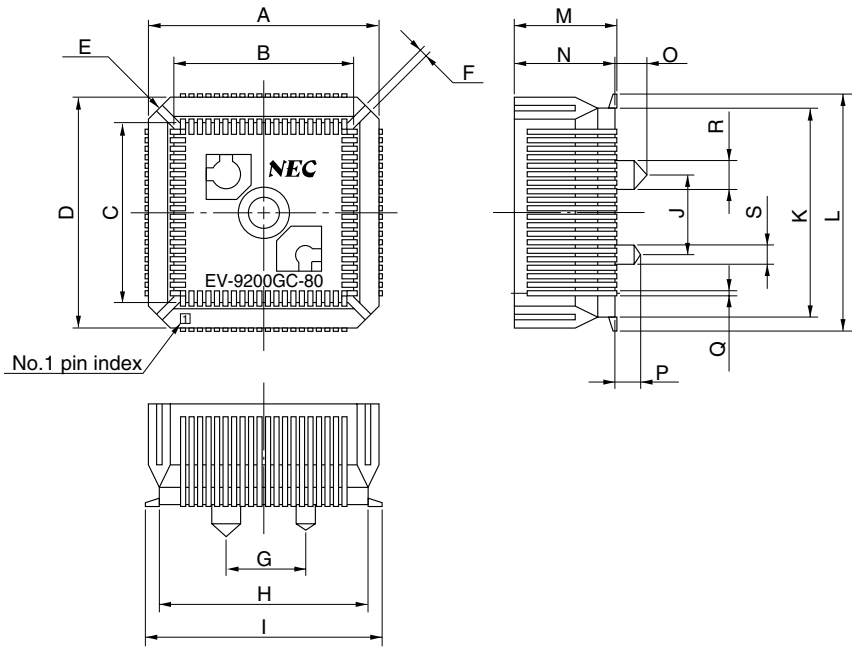

EV-9200G-64-P1E

| ITEM | MILLIMETERS | INCHES |
|---|---|---|
| A | 25.7 | 1.012 |
| B | 21.0 | 0.827 |
| C | 1.0±0.02 × 18=18.0±0.05 | $0.039^{+0.002}_{-0.001} \times 0.709 = 0.709^{+0.002}_{-0.003}$ |
| D | 1.0±0.02 × 12=12.0±0.05 | $0.039^{+0.002}_{-0.001} \times 0.472 = 0.472^{+0.003}_{-0.002}$ |
| E | 15.2 | 0.598 |
| F | 19.9 | 0.783 |
| G | 11.00±0.08 | $0.433^{+0.004}_{-0.003}$ |
| H | 5.50±0.03 | $0.217^{+0.001}_{-0.002}$ |
| I | 5.00±0.08 | $0.197^{+0.003}_{-0.004}$ |
| J | 2.50±0.03 | $0.098^{+0.002}_{-0.001}$ |
| K | 0.6±0.02 | $0.024^{+0.001}_{-0.002}$ |
| L | $\phi$2.36±0.03 | $\phi 0.093^{+0.001}_{-0.002}$ |
| M | $\phi$1.57±0.03 | $\phi 0.062^{+0.001}_{-0.002}$ |

**Caution Some of the recommended dimensions of the mount pad for the conversion socket may differ from those of the mount pad for the target device. When a device is to be mounted, be sure to also take the recommended dimensions of the mount pad for the device into consideration when designing.**

★ **(2) Package drawing of EV-9500GC-80 and recommended pattern for board mounting**

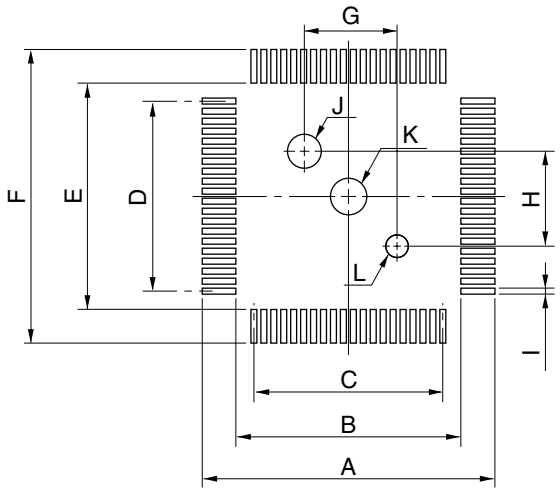
**Figure 6-7. Package Drawing of EV-9200GC-80**




EV-9200GC-80-G1E

| ITEM | MILLIMETERS | INCHES |
|---|---|---|
| A | 18.0 | 0.709 |
| B | 14.4 | 0.567 |
| C | 14.4 | 0.567 |
| D | 18.0 | 0.709 |
| E | 4-C 2.0 | 4-C 0.079 |
| F | 0.8 | 0.031 |
| G | 6.0 | 0.236 |
| H | 16.0 | 0.63 |
| I | 18.7 | 0.736 |
| J | 6.0 | 0.236 |
| K | 16.0 | 0.63 |
| L | 18.7 | 0.736 |
| M | 8.2 | 0.323 |
| N | 8.0 | 0.315 |
| O | 2.5 | 0.098 |
| P | 2.0 | 0.079 |
| Q | 0.35 | 0.014 |
| R | $\phi$2.3 | $\phi$0.091 |
| S | $\phi$1.5 | $\phi$0.059 |

★ **Figure 6-8. Recommended Pattern for Mounting Board of EV-9200GC-80**




EV-9200GC-80-P1E

| ITEM | MILLIMETERS | INCHES |
|---|---|---|
| A | 19.7 | 0.776 |
| B | 15.0 | 0.591 |
| C | 0.65±0.02 × 19=12.35±0.05 | $0.026^{+0.001}_{-0.002} \times 0.748 = 0.486^{+0.003}_{-0.002}$ |
| D | 0.65±0.02 × 19=12.35±0.05 | $0.026^{+0.001}_{-0.002} \times 0.748 = 0.486^{+0.003}_{-0.002}$ |
| E | 15.0 | 0.591 |
| F | 19.7 | 0.776 |
| G | 6.0±0.05 | $0.236^{+0.003}_{-0.002}$ |
| H | 6.0±0.05 | $0.236^{+0.003}_{0.002}$ |
| I | 0.35±0.02 | $0.014^{+0.001}_{-0.001}$ |
| J | $\phi$2.36±0.03 | $\phi 0.093^{+0.001}_{-0.002}$ |
| K | $\phi$2.3 | $\phi$0.091 |
| L | $\phi$1.57±0.03 | $\phi 0.062^{+0.001}_{-0.002}$ |

**Caution Some of the recommended dimensions of the mount pad for the conversion socket may differ from those of the mount pad for the target device. When a device is to be mounted, be sure to also take the recommended dimensions of the mount pad for the device into consideration when designing.**

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# APPENDIX REVISION HISTORY

| Edition | Major Revised Contents from Previous Version | Location |
|---|---|---|
| 2nd Edition | Addition of descriptions of probes, conversion cables, and conversion sockets corresponding to the 80-pin plastic QFP package that is added. | Throughout |
| | Addition of pin numbers of 80-pin plastic QFP package in **Table 5-1 J1 Connector Pin Table**. | **CHAPTER 5 CONNECTOR PIN TABLE** |
| | Addition of pin numbers of 80-pin plastic QFP package in **Table 5-2 J2 Connector Pin Table**. | |
| | Addition of **Figure 6-2 Package Drawing of EP-17K80GC**. | **CHAPTER 6 PACKAGE DRAWING OF EMULATION PROBE, CONVERSIO CABLE, AND CONVERSION SOCKET** |
| | Addition of **Figure 6-4 Package Drawing of 80GC Conversion Cable**. | |
| | Addition of **Figure 6-7 Package Drawing of EV-9200GC-80**. | |
| | Addition of **Figure 6-8 Recommended Pattern for Mounting Board of EV-9200GC-80**. | |

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