NEC

USER'S MANUAL

SE-17072

SYSTEM EVALUATION BOARD

TARGET DEVICES:
μPD17071
μPD17072
μPD17073

Document No. U11406EJ2V0UM00
(Previous No. EEU-1525)
Date Published July 1996 P
Printed in Japan

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Major Revised in This Version

Page	Contents
Throughout	• μPD17071 has been added as an evaluation target • EP-17K64GB and EV-9500GB-64 have been added as development tools • The pin name of actual chip have been changed as follows: $V_{DD1} \rightarrow V_{DD}$ $V_{DD2} \rightarrow$ REG0, $V_{DD5} \rightarrow$ REG1 $V_{DD3} \rightarrow REG_{LCD}0$, $V_{DD4} \rightarrow REG_{LCD}1$ $CAP_0 \rightarrow CAP_{LCD}0$, $CAP_1 \rightarrow CAP_{LCD}1$
p.3	A note has been added to the item Instruction cycle in **CHAPTER 2 SPECIFICATIONS**
p.3	The value when the actual chip is the μPD17071GB has been added to the item Power supply in **CHAPTER 2 SPECIFICATIONS**
p.31	A note has been added to **Table 4-5. Monitor Pins and LEDs, and Their Functions**
p.33	A figure in **Table 4-6. Setting of Jumper Switches and Slide Switches (1/2)** has been changed.
p.35	(1) μPD17071 has been added to **CHAPTER 5**
p.37, 38	**Table 5-3. Connector Pins of JP1** and **Table 5-4. Connector Pins of JP2** has been changed

The mark ★ shows major revised points.

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CHAPTER 1 GENERAL

The SE-17072 is a system evaluation board (SE board) for 4-bit single-chip microcontrollers μPD17071, 17072 and 17073. ★

This SE board is used for debugging mounted to a 17K series in-circuit emulator (IE-17K or 17K-ET). It can also be used in stand alone mode for system evaluation.

To interface with the target system[Note 1], actual chips μPD17071GB-00x, μPD17072GB-00x or μPD17073GB-00x (hereafter referred to as the "actual chip"[Note 2]) is used; therefore, the functions of the SE-17072 are equivalent to the device to be evaluated.

To connect the SE-17072 and the target system, an optional emulation probe (EP-17K56GB[Note 3]) (separately available) or EP-17K64GB[Note 4] (separately available) and a set of a conversion socket and socket conversion adapters, EV-9500GB-56 or EV-9500GB-64, supplied as an accessory are necessary. ★ ★

Because the SE-17072 is equipped with a level conversion chip, evaluation can be also performed even when the supply voltage of the μPD17071, 17072 or 17073 is not +3 V[Note 5].

Notes 1. A system developed by the user and is subject to evaluation.

2. The actual chips are mounted in the sockets on the SE board for use. At the time of shipping, two μPD17072GB-00x chips are supplied mounted on the board. Please substitute two suitable chips (master and slave) to match the evaluation object device (μPD17071, 17072, 17073). (Refer to **Figure 2-1**)

3. This emulation probe can be used for 56-pin plastic QFP (10 × 10 mm, 0.65-mm pitch). Following two types are available.
For package with bent leads : EP-17K56GB-1
For package with inverted leads : EP-17K56GB-2

4. This emulation probe can be used for 64-pin plastic TQFP (10 × 10 mm, 0.65-mm pitch)
For package with bent leads

5. The supply voltages of the μPD17071, 17072, and 17073 are as follows:
μPD17071 : +1.85 V to +3.6 V
μPD17072, 17073 : +1.8 V to +3.6 V

Table 1-1. Development Tools for SE-17072

SE Board	Usage	Assembler Output File (host machine)	In-Circuit Emulator	Support Software[Note 3]	Emulation Probe	Product to Be Evaluated
SE-17072	When used with in-circuit emulator	ICE file[Note 1] (PC-9800 series, IBM PC/AT™)	IE-17K IE-17K-ET	*SIMPLEHOST*®	EP-17K56GB + EV-9500GB-56 or EP-17K64GB + EV-9500GB-64	μPD17071 or μPD17072 or μPD17073
	When SE-17072 alone is used	PRO file[Note 2] (PC-9800 series, IBM PC/AT)	Unnecessary	Unnecessary		

Notes 1. ICE file : Automatically output after the source file has been assembled.

2. PRO file : Output if an assembler option (/PRO) is specified when the source file is assembled.
For details on the ICE file and PRO file, refer to the User's Manual of the AS17K or RA17K.

3. *SIMPLEHOST* is software that serves as a man-machine interface when the in-circuit emulator is used. This software runs on Windows™ and allows you to debug, by using a mouse, the source lists, figures, and tables displayed on the CRT.
For details, refer to the User's Manual of the *SIMPLEHOST*.
Although commercially available RS-232-C communication software other than SIMPLEHOST can also be used for interfacing, knowledge on baud rate setting and in-circuit emulator's commands is required.
For details, refer to the User's Manual of the IE-17K or IE-17K-ET.

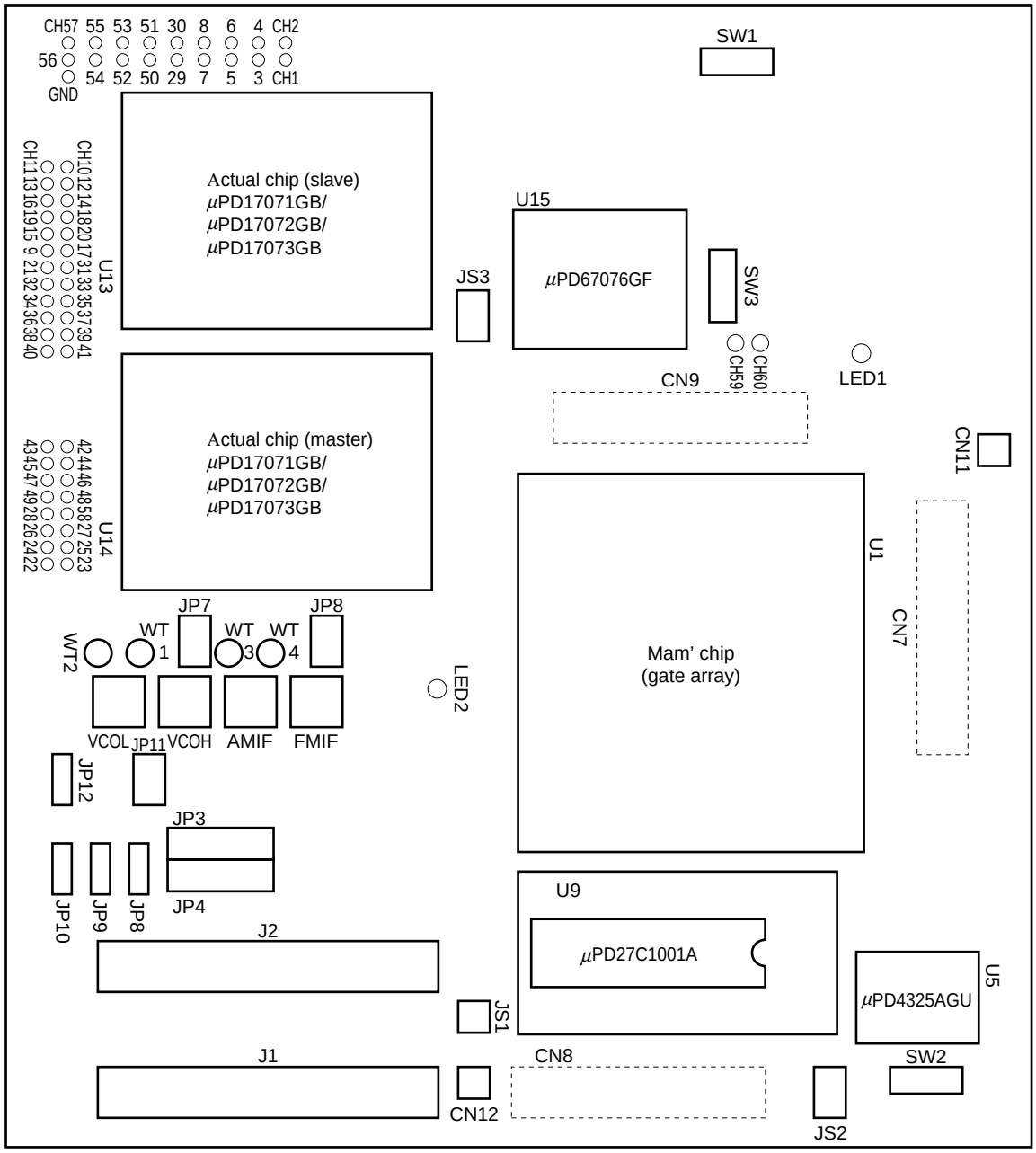
CHAPTER 2 SPECIFICATIONS

Here are the specifications of the SE-17072:

Product name	: SE-17072
Program memory	: • The μPD43256AGU mounted on board is used when the SE-17072 is used with an in-circuit emulator (IE-17K or IE-17K-ET). • When the SE-17072 alone is used, write program to the μPD27C512D or μPD27C1001AD and mount the memory onto a socket (U9) on the board.
Data memory	: The on-chip memory of the actual chips is used.
Operating frequency	: 75 kHz
Instruction cycle	: 53.3 μs (at 75 kHz and in normal mode), 106.6 μs**Note** (at 75 kHz in low-speed mode)
Operating temperature	: +10 to +40°C
Storage temperature	: –10 to +50°C (without condensation)
Power supply	: • For actual chips ($V_{DD}1$): +1.85 to +3.6 V (when the actual chips are the μPD17071GB) ★ +1.8 V to +3.6 V (when the actual chips are the μPD17072GB or 17073GB) Power is supplied from emulation probe or CN12 pin. • For SE-17072 (V_{CC}) : +5 V ±5% Power is supplied from the in-circuit emulator when the SE-17072 is used with an in-circuit emulator. When the SE-17072 alone is used, supply power from the CN11 pin.
Current consumption	: 110 mA (MAX.) (without load and with the μPD27C1001AD used as the program memory)
Dimensions	: 150 × 175 × 33 mm

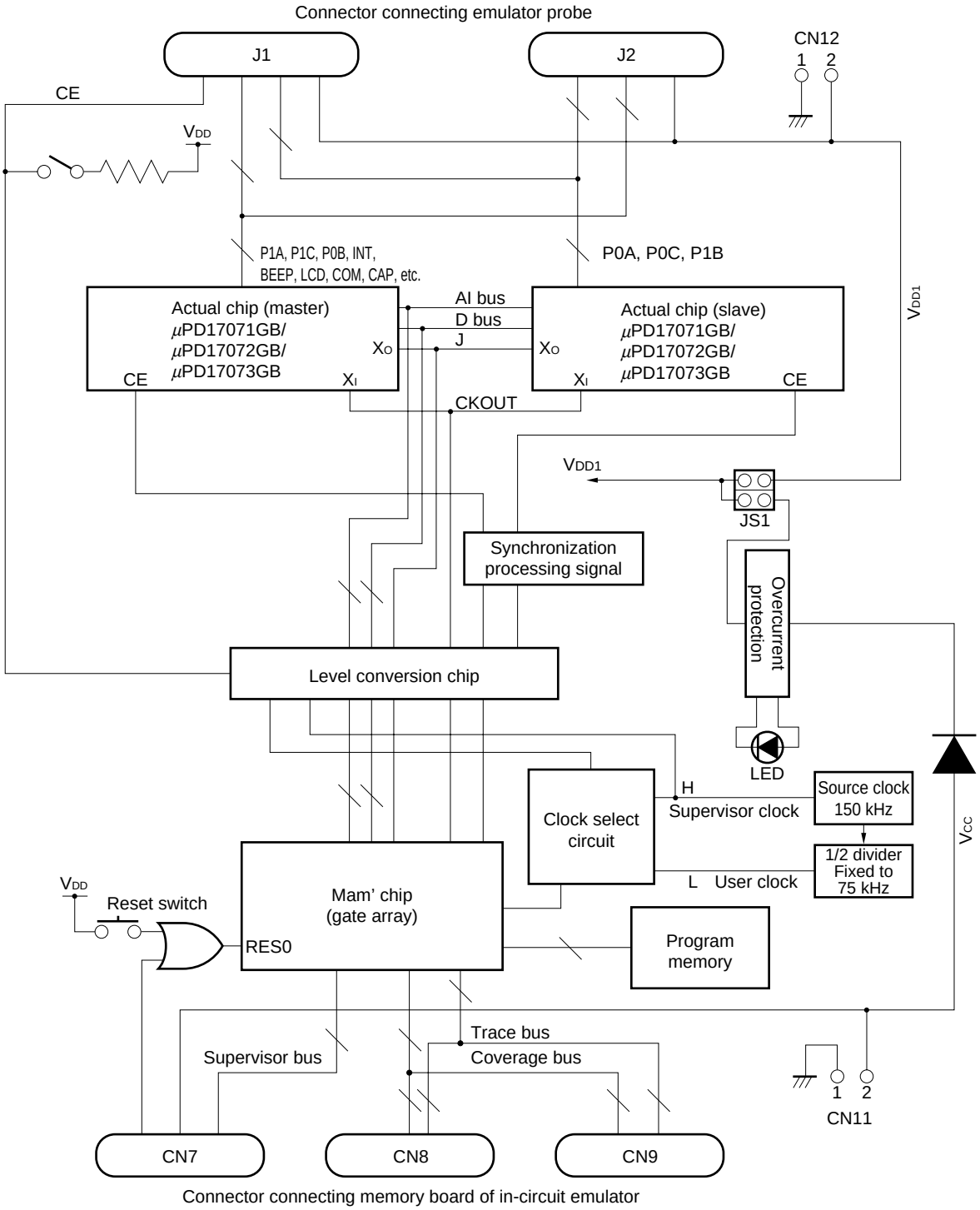
Note Note provided for the μPD17071GB. ★

Figure 2-1. SE-17072 Component Layout



CHAPTER 3 BLOCK DIAGRAM

Figure 3-1. SE-17072 Block Diagram



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CHAPTER 4 HOW TO USE

4.1 Using Level Conversion Chip (μPD6706GF)

(1) Outline of level conversion chip

The level conversion chip is an IC that converts a voltage level of the target system (or SE board) into the voltage at which the SE board (or target system) operates if the operating voltages of the target system and SE board are different from each other ($V_{DD}1 \neq V_{CC}$, V_{CC} = +5 V). Therefore, this IC allows smooth signal transfer between the target system and SE board even when the operating voltages of the two are different.

(2) Using level conversion chip

The level conversion chip automatically operates when a voltage other than 5 V is applied between the $V_{DD}1$ and GND pins of the emulation probe or to the CN12 pin of the SE board with the jumper switch JS1, which selects a method of supplying power to the SE board, set to the $V_{DD}1$ side.

Remarks 1. $V_{DD}1$ is the supply voltage of the target system to be used. Power can be supplied from the target system to the actual chips on the SE board from the CN12 pin or emulation probe. Consequently, debugging can be performed in an environment close to the actual environment.

2. V_{CC} is the voltage at which the SE board (except the actual chips) operates. Always supply +5 V as V_{CC}. When the SE board is mounted to an in-circuit emulator, V_{CC} is automatically supplied from the in-circuit emulator. When the SE board alone is used, supply V_{CC} from the CN11 pin.

4.2 Supplying Voltage to SE Board

Two types of voltages must be supplied to the SE board: V_{CC} and V_{DD1}. V_{CC} is the voltage at which the SE board (except the actual chips) operates. The actual chip operates at $V_{DD}1$.

Always supply +5 V as V_{CC}. As $V_{DD}1$, supply a voltage in the range of the operating voltage of the actual chips (+1.85 to +3.6 V: μPD17071, +1.8 to +3.6 V: μPD17072, 17073).

(1) Jumper switch selecting method of power supply to SE board (JS1)

Jumper switch JS1 selects whether the voltage supplied to the SE board (V_{CC} = +5 V) converted to +3 V, or the voltage supplied from the emulation probe or CN12 pin ($V_{DD}1$) is supplied to the actual chips.

Table 4-1 shows the function of JS1 when the SE board is mounted to an in-circuit emulator. Table 4-2 shows the function of JS1 when the SE board alone is used.

If the supply voltage of the target system is +3 V, set JS1 to the +3 V side. When the SE board is mounted to an in-circuit emulator, + 5 V supplied from the in-circuit emulator is automatically converted to +3 V and supplied. When the SE board alone is used, +5 V supplied from the CN11 pin is converted into +3 V. This brings a merit that supplying voltage is extremely easy.

If the supply voltage of the target system is other than +3 V, and if JS1 is set to the $V_{DD}1$ side, the voltage of the target system can be supplied to the actual chip from the emulation probe or CN12 pin, so that evaluation can be performed in an environment close the actual environment.

Table 4-1. Function of JS1 When SE Board Is Mounted to In-Circuit Emulator

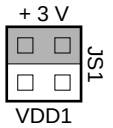
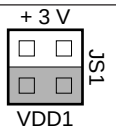
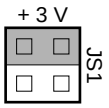
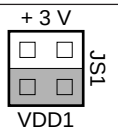
Type of Power / Setting of JS1	Power Supplied to Actual Chips ($V_{DD}1$)	Power to Operate SE Board (Except Actual Chips) (V_{CC})
	+5 V supplied from in-circuit emulator is converted to +3 V.	+5 V is supplied from in-circuit emulator.
	Power must be supplied from emulation probe or CN12 pin.	

Table 4-2. Function of JS1 When SE Board Alone Is Used

Type of Power / Setting of JS1	Power Supplied to Actual Chips ($V_{DD}1$)	Power to Operate SE Board (Except Actual Chips) (V_{CC})
	+5 V supplied from CN11 pin is converted to +3 V.	+5 V must be supplied from CN11 pin.
	Power must be supplied from emulation probe or CN12 pin.	

The shaded portions in the above figures indicate the selected switch positions.

(2) Power supply pins

The SE board has three pins through which power is supplied from external sources. Appropriate pin and power must be selected and used depending on the evaluation environment. Table 4-3 shows the functions of these pins.

Table 4-3. Power Supply Pins and Their Function

Pin Name	Type of Power (Range of Supplied Voltage)	Function
CN11	V_{CC} (+5 V ±5%)	This pin is used to supply power when SE board alone is used (except actual chips). Always supply +5 V to this pin. Do not supply power through this pin when SE board is mounted to in-circuit emulator.
CN12	$V_{DD}1$ (+1.85 to 3.6 V: μPD17071GB +1.8 to 3.6 V: μPD17072GB, 17073GB)	This pin supplies operating voltage to actual chips when voltage of target system is $V_{CC} \neq$ +3 V (JS1 is set to $V_{DD}1$ side).
Emulation probe ($V_{DD}1$ and GND pins)	$V_{DD}1$ (+1.85 to 3.6 V: μPD17071GB +1.8 to 3.6 V: μPD17072GB 17073GB)	Function equivalent to that of CN12 pin. CN12 pin of SE board is connected to power supply pin of emulation probe.

Remark Pin 1 of the CN11 pin is GND, and pin 2 is the power supply pin. To supply power, use the power supply cable supplied as an accessory.

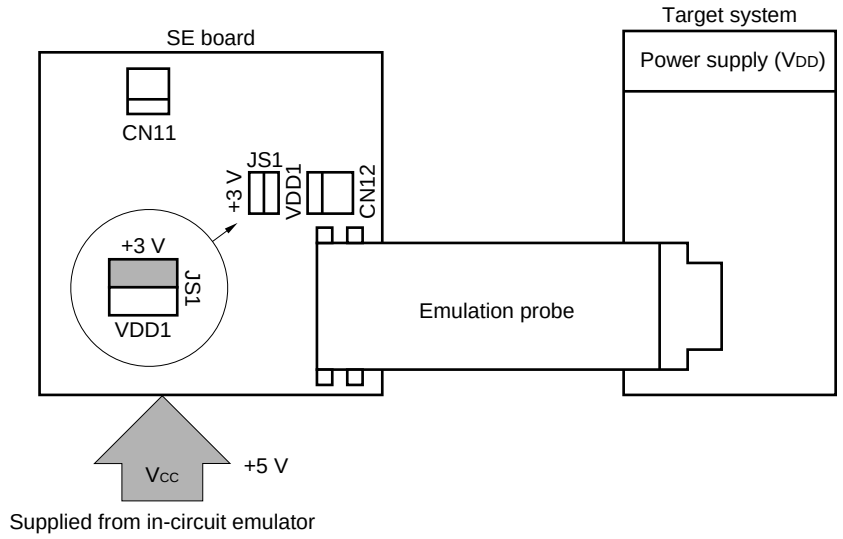
(3) Example of actual use

<1> When SE board is mounted to in-circuit emulator

(a) When SE board is mounted to in-circuit emulator, and $V_{DD}1$ = +3 V and V_{CC} = +5 V

Set JS1 to the +3-V side. V_{CC} and $V_{DD}1$ are supplied from the in-circuit emulator.

Figure 4-1. When SE Board Is Mounted to In-Circuit Emulator and $V_{DD}1$ = +3 V, V_{CC} = +5 V



(b) When SE board is mounted to in-circuit emulator, and $V_{DD}1 \neq$ +3 V and V_{CC} = +5 V

Set JS1 to the $V_{DD}1$ side. V_{CC} is supplied from the in-circuit emulator. $V_{DD}1$ is supplied from the CN12 pin or emulation probe.

Figure 4-2. When SE Board Is Mounted to In-Circuit Emulator, and $V_{DD}1$ Is Supplied from CN12 Pin

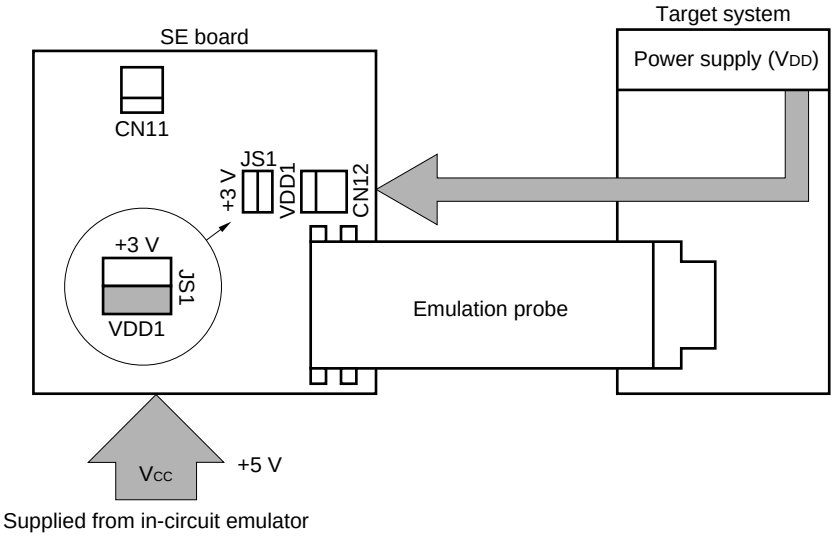
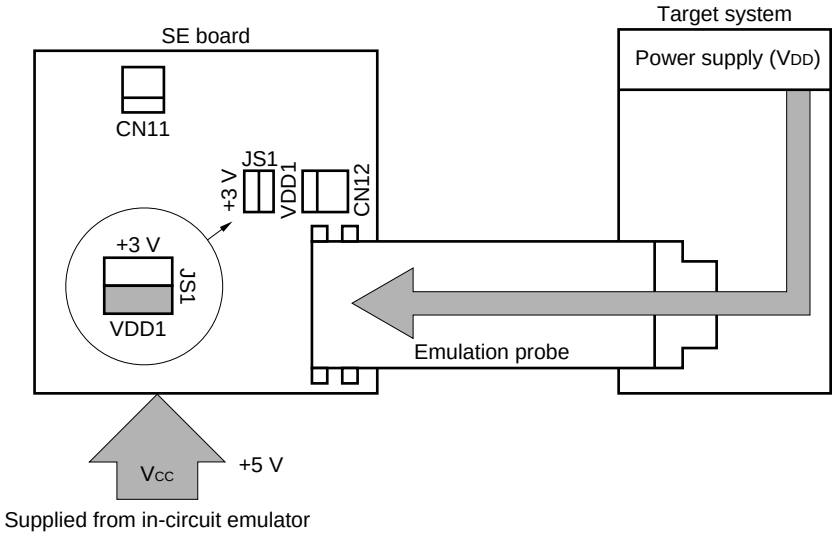


Figure 4-3. When SE Board Is Mounted to In-Circuit Emulator and $V_{DD}1$ Is Supplied from Emulation Probe

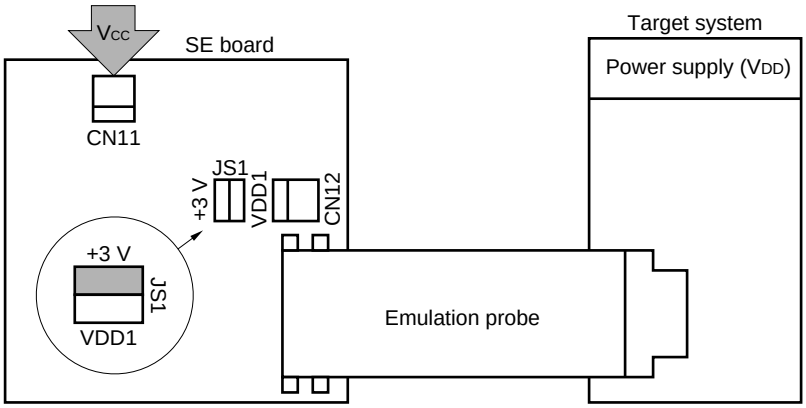


<2> When SE board alone is used

(a) When SE board alone is used, and $V_{DD}1$ = +3 V and V_{CC} = +5 V

Set JS1 to +3-V side. V_{CC} and $V_{DD}1$ are supplied from the CN11 pin.

Figure 4-4. When SE Board Alone Is Used, and $V_{DD}1$ = +3 V and V_{CC} = +5 V



(b) When SE board alone is used, and $V_{DD}1 \neq +3$ V and $V_{DD} = +5$ V

Set JS1 to the $V_{DD}1$ side. V_{CC} is supplied from the CN11 pin and $V_{DD}1$ from the CN12 pin or emulation probe.

Figure 4-5. When SE Board Alone Is used, and $V_{DD}1$ Is Supplied from CN12 Pin

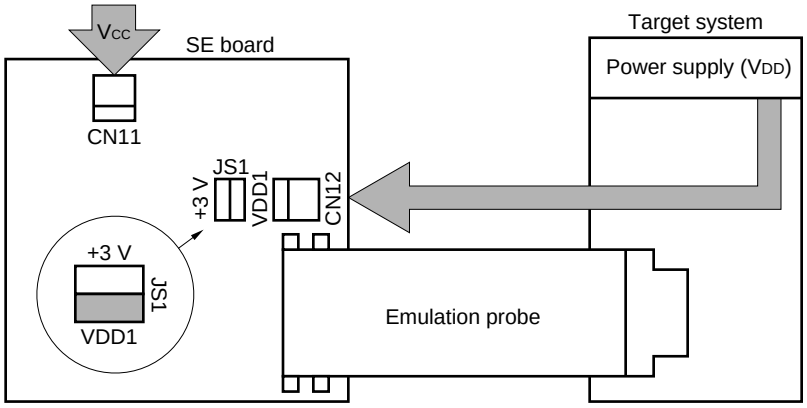
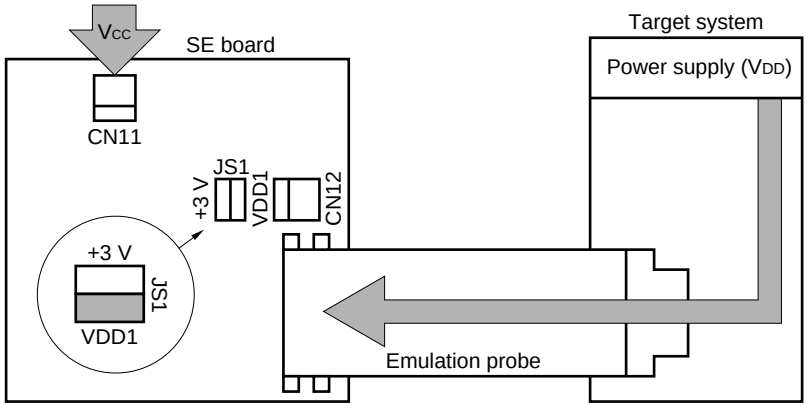


Figure 4-6. When SE Board Alone Is Used, and $V_{DD}1$ Is Supplied from Emulation Probe



4.3 Setting of Other Switches

(1) SW1: Reset switch

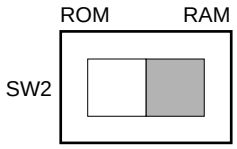
SW1 is the reset switch used when the SE board alone is used.
For details, refer to **4.5 Using SE Board Alone**.

(2) SW2: ROM/RAM selector slide switch

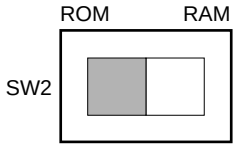
This switch selects the setting of the program memory to be used.

Figure 4-7. Setting of SW2

<1> When SE board is mounted to in-circuit emulator



<2> When SE board alone is used



This shaded portions in the above figure indicate the selected switch positions.

(3) SW3: CE pin pull-up select switch

This switch specifies whether the CE pin of the actual chips is pulled up or not.

When the SE-17072 is not connected to the target system, be sure to pull up the CE pin by setting this switch to the ON side.

Figure 4-8. Setting of SW3

<1> Pull up CE pin

<2> Not pull-up CE pin

Remark The shaded portions in the above figures indicate the selected switch positions.

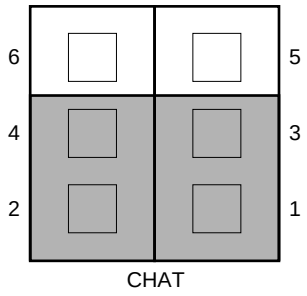
(4) JS3: Jumper switch for CE chattering prevention

When a low-level voltage of 200 μs or less is input to the CE pin due to influence of chattering, the SE board malfunctions or hangs up.

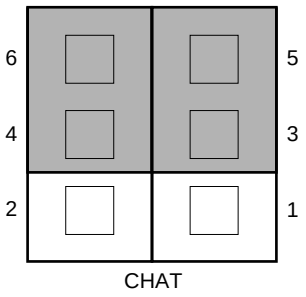
Therefore, set this switch to the CHAT side when a circuit that may generate chattering is used in the target system.

Figure 4-9. Setting of JS3

<1> If there is a possibility that chattering occurs in target system



<2> If there is no possibility that chattering occurs in target system



Remark The shaded portions in the above figures indicate the selected switch positions.

(5) JP6: Jumper switch selecting I/O modes of P0D2/AMIFC and P0D3/FMIFC/AMIFC pins

This switch selects whether signals are input/output to/from the P0D2/AMIFC and P0D3/FMIFC/AMIFC pins of the actual chips through a probe or a coaxial cable.

The P0D2/AMIFC and P0D3/FMIFC/AMIFC pins are I/O ports that can also implement an IF counter function.

Figure 4-10. Peripheral Circuit of JP6

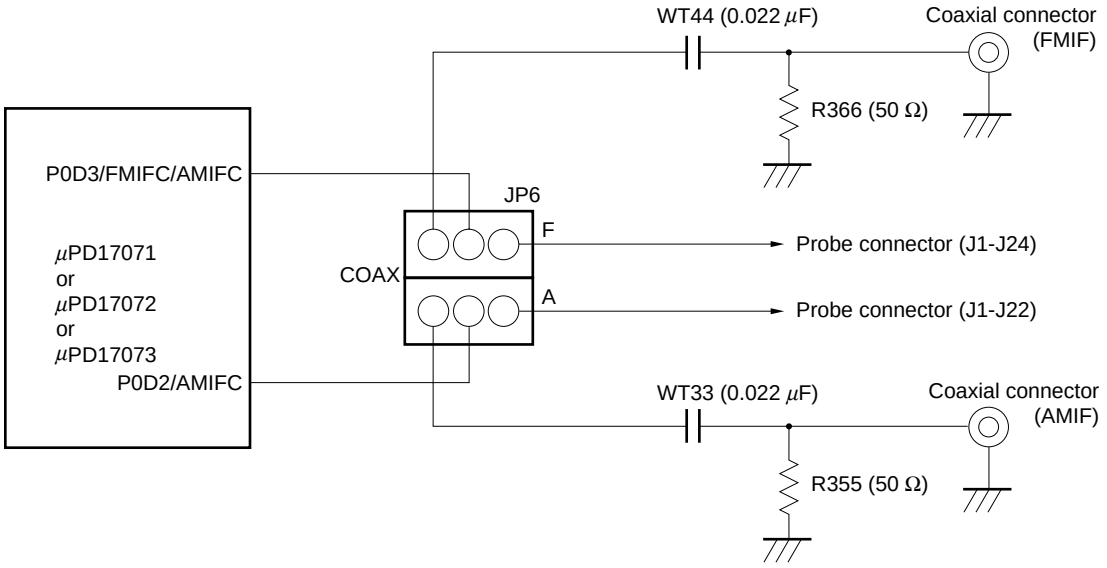
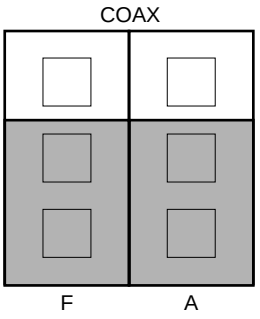
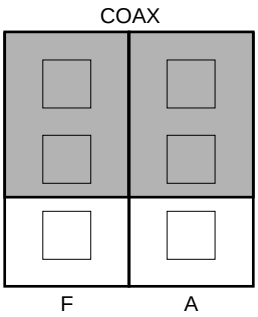


Figure 4-11. Setting of JP6

<1> Through probe



<2> Through coaxial cable



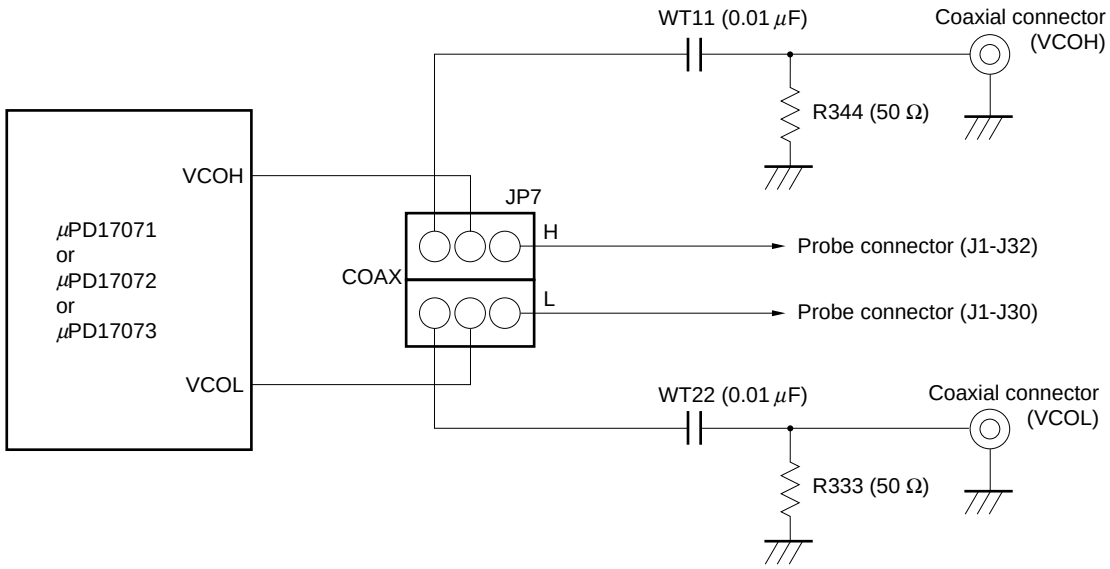
Remark The shaded portions in the above figures indicate the selected switch positions.

(6) JP7: Jumper switch selecting input mode of VCOL and VCOH pins

This switch selects whether signals are input to the VCOL and VCOH pins of the actual chips through a probe or a coaxial cable.

The VCOL and VCOH pins are input pins of PLL local oscillation signals.

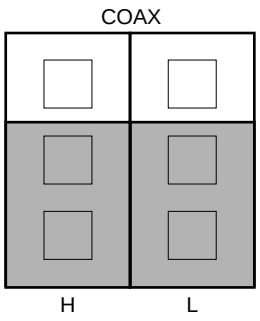
Figure 4-12. Peripheral Circuit of JP7



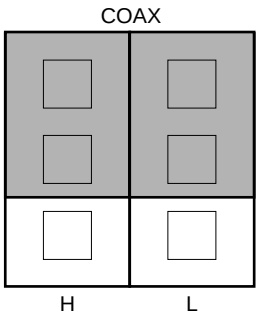
Remark If a signal is input to the VCO pin through a probe, the signal may not be correctly input due to the influence by the wiring capacitance of the probe and soon. When evaluating PLL, it is recommended to input signals the VCOL and VCOH pins through a coaxial cable.

Figure 4-13. Setting of JP7

<1> Signal input through probe



<2> Signal input through coaxial cable



Remark The shaded portions in the above figures indicate the selected switch positions.

(7) JP8: Jumper switch selecting capacitor for PLL

★ This switch selects whether the capacitor on the SE board or the capacitor on the target system is connected to the REG0 pins of the actual chips (for PLL voltage regulator output).

Figure 4-14. Peripheral Circuit of JP8

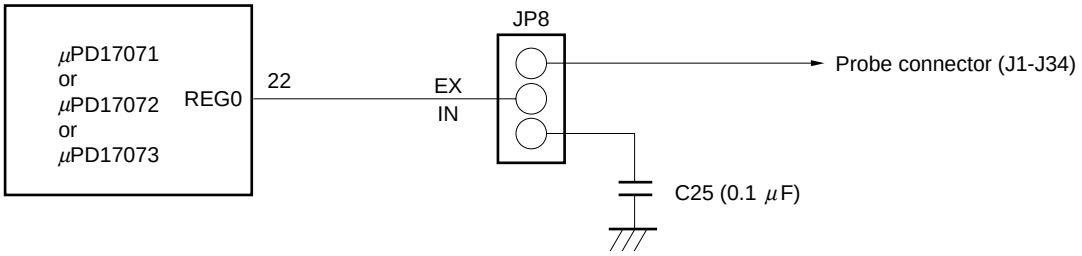
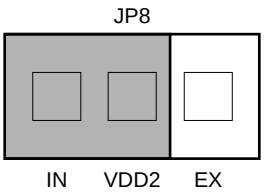
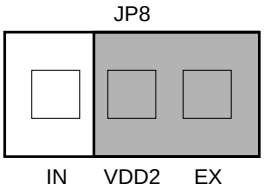


Figure 4-15. Setting of JP8

<1> To connect capacitor on SE board



<2> To connect capacitor on target system



Remarks 1. The shaded portions in the above figures indicate the selected switch positions.

2. VDD2 corresponds to REG0 pins of the actual chips.

(8) JP9: Jumper switch selecting capacitor for oscillation circuit regulator

This switch selects whether the capacitor on the SE board or the capacitor on the target system is connected to the REG1 pins of the actual chips (for oscillation circuit voltage regulator output). ★

Figure 4-16. Peripheral Circuit of JP9

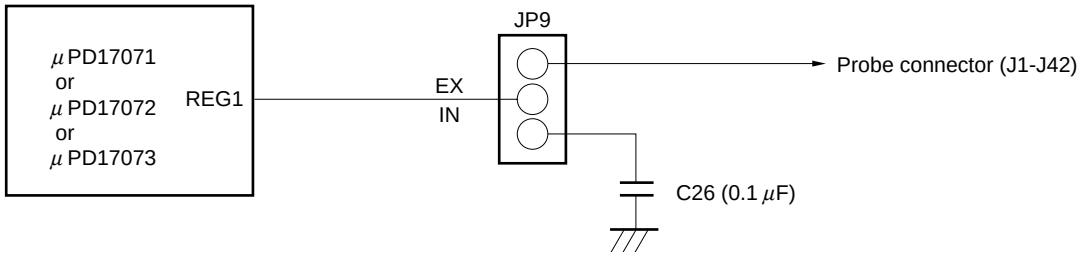
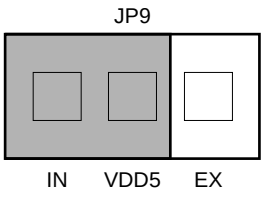
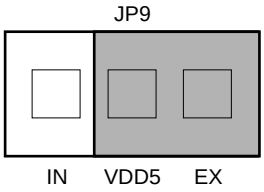


Figure 4-17. Setting of JP9

<1> To connect capacitor on SE board



<2> To connect capacitor on target system



Remarks 1. The shaded portions in the above figures indicate the selected switch positions.

2. VDD5 corresponds to REG1 pins of the actual chips.

(9) JP10-JP12: Jumper switches selecting capacitors for LCD driving power supply

These switches select whether the capacitor on the SE board or the capacitor on the target system is connected to the $REG_{LCD}0$, $REG_{LCD}1$, $CAP_{LCD}0$, and $CAP_{LCD}1$ pins of the actual chips. ★

The $CAP_{LCD}0$ and $CAP_{LCD}1$ pins are to connect capacitors for a doubler to create an LCD drive voltage.

Figure 4-18. Peripheral Circuit of JP10-JP12

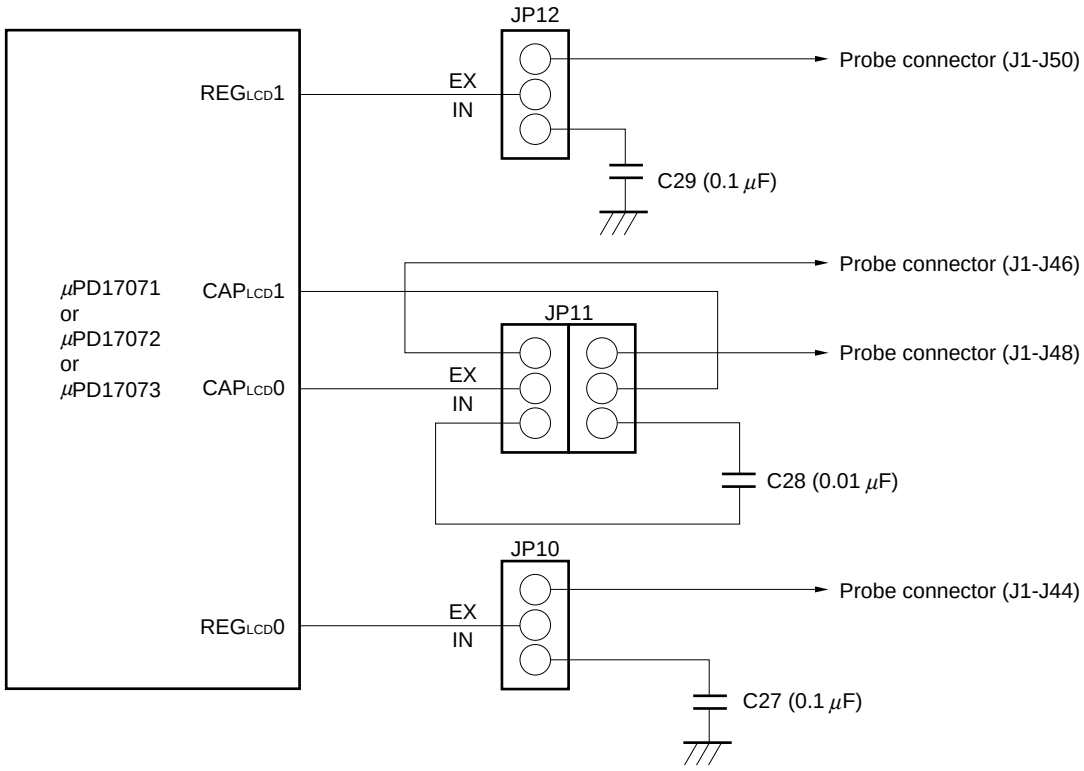
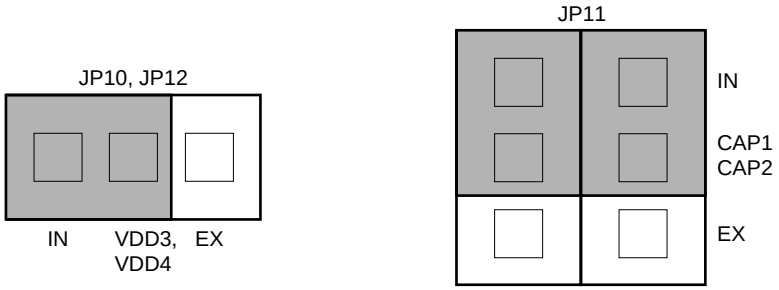
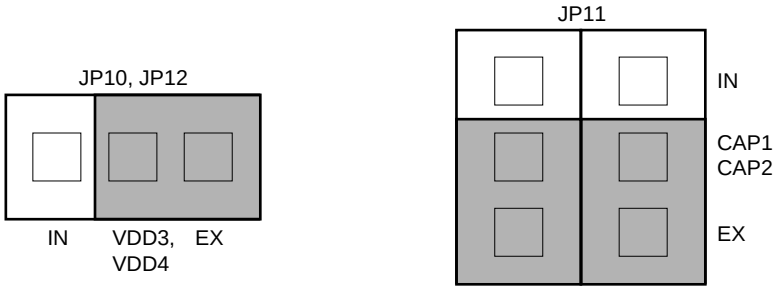


Figure 4-19. Setting of JP10-JP12

<1> To connect capacitor on SE board



<2> To connect capacitor on target system



Remarks 1. The shaded portions in the above figures indicate the selected switch positions.

2. VDD3 corresponds to $REG_{LCD}0$ pins of the actual chips.
VDD4 corresponds to $REG_{LCD}1$ pins of the actual chips.
CAP1 and CAP2 correspond to $CAP_{LCD}0$ pins and $CAP_{LCD}1$ pins of the actual chips, respectively.

4.4 When SE Board Is Mounted to In-Circuit Emulator

The in-circuit emulator is connected to a host machine such as the PC-9800 series to debug the target system. For details on the operations of the in-circuit emulator, refer to the User's Manual of the IE-17K or IE-17K-ET.

(1) Mounting and removing SE board to/from in-circuit emulator

Mount the SE-17072 to the in-circuit emulator as follows:

<1> Remove the exterior and interior lids from the in-circuit emulator.

<2> When the interior lid has been removed, a memory board is visible. Insert connectors on the bottom of the SE-17072 (CN7, CN8, and CN9) into the three connectors on the memory board.

To remove the SE-17072 from the in-circuit emulator, lift the SE-17072 in the vertical direction.

Figure 4-20. Appearance of IE-17K (with exterior lid removed)

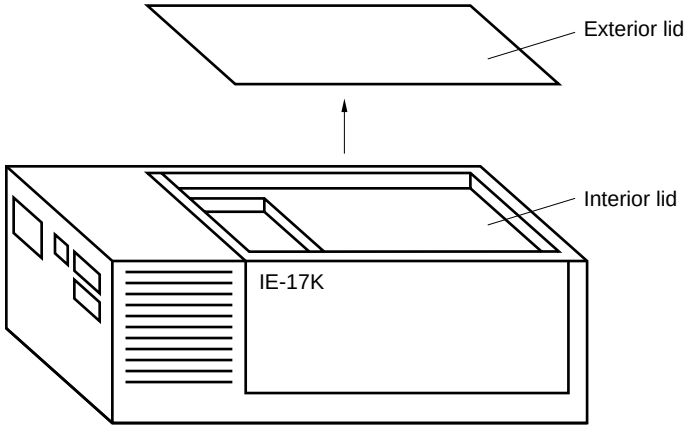
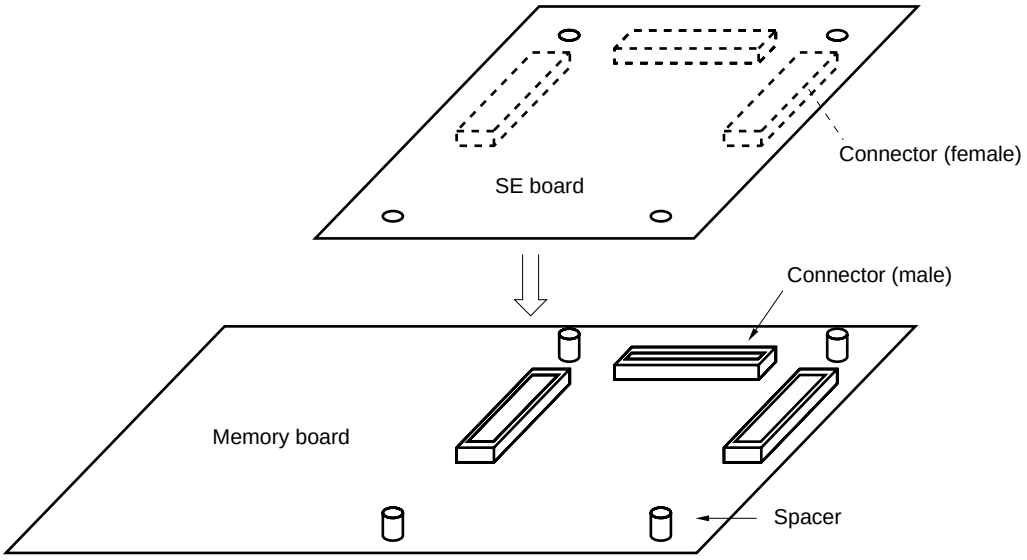


Figure 4-21. Mounting and Removing SE-17072



Next, connect the emulation probe to the connectors J1 and J2 on the SE-17072, to connect the target system. Then attach the interior and exterior lids to the in-circuit emulator.

(2) Supplying power

After the SE-17072 has been mounted to the in-circuit emulator and before attaching the exterior and interior lids of the in-circuit emulator, turn on power to the in-circuit emulator and confirm that LED1 on the SE-17072 lights. If the supply voltage of the target system is not +3 V, the supply voltage of the target system can be supplied to the actual chips on the SE board from the CN12 pin of the SE board or emulation probe. For details, refer to **4.1 Using Level Conversion Chip (μPD6706GF)** and **4.2 Supply Voltage to SE Board**.
If LED1 does not light, the possible causes are as follows:

- The power cable of the in-circuit emulator is not connected.
- An overcurrent flows to the SE-17072 (about 500 mA or higher).
- The SE-17072 is not correctly mounted to the in-circuit emulator.

If LED1 does not light, turn off power to the in-circuit emulator, and check to see if the SE-17072 is correctly mounted. If LED1 does not light nevertheless, the SE-17072 may be malfunctioning.

(3) Transferring ICE file to in-circuit emulator

The in-circuit emulator (IE-17K or IE-17K-ET) is connected to a host machine such as the PC-9800 series and used to debug the software and hardware of the target system. For details, refer to the User's Manual of the IE-17K or IE-17K-ET.

When using the *SIMPLEHOST*, refer to the User's Manual of the *SIMPLEHOST*.

The procedure to confirm that the SE-17072 has been correctly mounted to the in-circuit emulator when commercially available RS-232-C communication software is used is described below.

When the *SIMPLEHOST* is used, and if the SE-17072 has been correctly mounted, the message "LISTING" is displayed on the screen.

<1> Turn on power to the in-circuit emulator. If the power has been already supplied, press the reset switch for restart. The prompt (@@@>) will then be displayed.

<2> Next, load the ICE file of the program created with the assembler or the ICE file output by using the .SP0 or .SP1 command to the in-circuit emulator by using the .LP0 or .LP1 command.

The in-circuit emulator will not operate until this ICE file has been loaded to it.

If the SE board is correctly connected to the in-circuit emulator at this time, a prompt (BRK>) will be displayed as shown in the following example.

Example When ICE file for the μPD17072 is loaded

```
OK
D17072
BRK>
```

If the above messages are not displayed, the possible causes are as follows:

- The actual chips mounted to the SE-17072 does not correspond to the loaded ICE file.
- An SE board other than the SE-17072 is mounted to the in-circuit emulator.
- An ICE file other than that for the μPD17072 has been loaded.
- The SE-17072 is not completely connected to the in-circuit emulator.

If the in-circuit emulator makes no response, take the following measures:

<1> The SE board may not be connected correctly to the in-circuit emulator. Correctly connect the SE board.
<2> The target system and SE board may not be connected correctly with the emulation probe. Check the connections again.
<3> If JS1 is set to the $V_{DD}1$ side, power may not be supplied to the actual chip from the emulation probe or CN12 pin. Supply power from the emulation probe or CN12 pin to the actual chip, or set JS1 to the +3-V side. If JS1 is set to the +3-V side, the in-circuit emulator automatically converts +5 V to +3 V and supplies power to the SE board (refer to **4.2 Supplying Voltage to SE Board**).
<4> The reset circuit of the target system may not operate correctly. If this happens, the reset status of the SE board is not stable, and the in-circuit emulator cannot return a response.
In this case, turn ON SW3 that selects pull up of the CE pin, to start the in-circuit emulator again.
<5> Check the set baud rates of the in-circuit emulator and host machine. For the baud rate setting of the in-circuit emulator, refer to the User's Manual of the IE-17K or IE-17K-ET.

(4) Error message and remedial action

An error message is displayed if the correspondence between the actual chips mounted to the in-circuit emulator and SE board, and the loaded ICE file is wrong.
Moreover, an SE board number is registered to the SE-17072 and a device number is registered to the actual chips, so that debugging can be correctly executed.

Table 4-4. Device Number and SE Board Number

Evaluation Device	Device Number	SE Board Number
μPD17071	58	4C
μPD17072	4C	4C
μPD17073	4F	4C

Remarks 1. A device number is the registration number of each actual chip.
2. An SE board number is the registration number of the SE board.
3. A device number and an SE board number are contained in the data in the ICE file to be loaded and are used by the in-circuit emulator to check the development environment when the ICE file is loaded.
For example, an ICE file assembled by using the device file for the μPD17072 contain device number = 4C and SE board number = 4C.

Error messages that may be displayed and remedial action to be taken if an error message is displayed are described next.

(a) Error message to be displayed and remedial action when actual chip mounted to SE-17072 does not correspond to loaded ICE file.

[Error message]

?IDI INVALID DEVICE ID NUMBER [XX-**]

Remark XX indicates the device number of the actual chips actually mounted, and ** indicates the device number contained in the loaded ICE file.

If this message has been output, check to see if the correct actual chips are mounted on the SE board. If the actual chips are wrong, turn off power to the in-circuit emulator, replace the actual chip, and load the ICE file again.
If a wrong device file was selected at assembly time, assemble the source file again by using the correct device file, and load the ICE file again.

(b) Error message to be displayed and remedial action when SE board other than SE-17072 is mounted

[Error message]

?ISE INVALID SE BOARD NUMBER [##-VV]

Remark ## indicates the SE board number of the SE board actually mounted, and VV indicates the SE board number contained in the loaded ICE file.

(5) Cautions

<1> Turn on power to the in-circuit emulator and then to the target system.

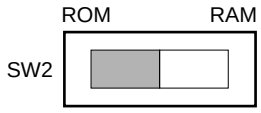
<2> Do not use the reset switch on the SE board.
To reset the in-circuit emulator, use the reset switch of the in-circuit emulator.

4.5 Using SE Board Alone

(1) Setting of ROM/RAM selector slide switch

Set the ROM/RAM selector slide switch (SW2) to the ROM side as shown in Figure 4-22.

Figure 4-22. Setting of ROM/RAM Selector Slide Switch



The shaded portion in the above figure indicates the selected switch position.

(2) Mounting PROM

To use the SE-17072 alone, mount a PROM (μPD27C512D or μPD27C1001AD) as a program memory. Use the PROM that satisfies the following conditions:

- ROM size
  512 Kbits: μPD27C512D-12, -15, -20, or equivalent
  1 Mbits : μPD27C1001AD-12, -15, -20, or equivalent

The following output files must be written to the PROM as a program:

- When the actual chips are the μPD17071: PROM file (.PRO) for the μPD17071 output by the 17K series assembler
- When the actual chips are the μPD17072: PROM file (.PRO) for the μPD17072 output by the 17K series assembler
- When the actual chips are the μPD17073: PROM file (.PRO) for the μPD17073 output by the 17K series assembler

Cautions 1. Do not write the ICE file (.ICE) that the assembler outputs to the in-circuit emulator. When the SE-17072 alone is used, the SE board does not operate with the ICE file.

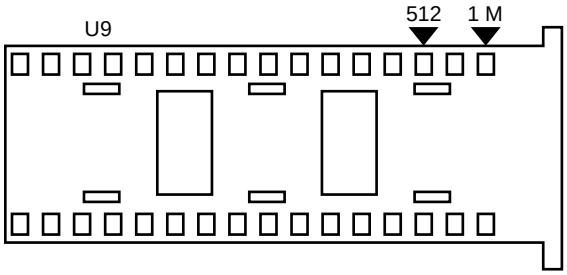
2. The last address of the program memory of the μPD17071, 17072 and μPD17073 is as follows:
μPD17071: 0BFFH
μPD17072: 0BFFH
μPD17073: 0FFFH

Mount the PROM to a socket (U9) on the SE board. Note that the mounting position differs depending on the number of pins of the PROM.

Notes on mounting PROM

- Mount the μPD27C512D (28-pin) so that pin 1 aligns with the number 512 with the up-side-down triangle below it.
- Mount the μPD27C1001AD (32-pin) so that pin 1 aligns with the number 1 M with the up-side-down triangle below it.

Figure 4-23. PROM (U9) Mounting Socket



(3) Supplying power

Be sure to supply +5 V ± 5% (V_{CC}) to the CN11 pin of the SE-17072 from an external power source. If the supply voltage of the target system used is not +3 V, the supply voltage of the target system can be supplied to the actual chips on the SE board from the CN12 pin or emulation probe. For details, refer to **4.1 Using Level Conversion Chips (μPD6706GF)** and **4.2 Supplying Voltage to SE Board**.

When V_{CC} is correctly supplied, LED1 on the SE-17072 lights.

If LED1 does not light, the possible causes are as follows:

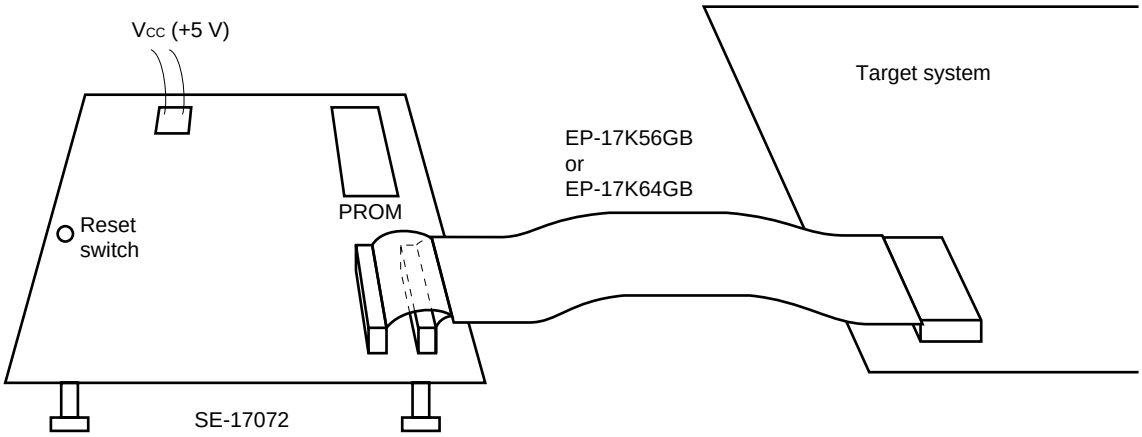
- Power is not supplied.
- Overcurrent flows (about 500 mA or higher).

(4) Executing program

Connect the SE-17072 and the target system as illustrated in **Figure 4-24** (refer to **CHAPTER 6 CONNECTING SE-17072 AND TARGET SYSTEM**). When power to the target system is turned on, power is also supplied to the SE-17072, power-ON reset is effected, and the program written to the PROM is executed starting from address 0H.

When the reset switch on the SE-17072 is pressed, the SE board is forcibly reset, and the program written to the PROM is executed starting from address 0H, in the same manner as when power-ON reset is effected.

Figure 4-24. Example of Connection When SE-17072 Alone Is Used



4.6 Monitor Pins and LEDs

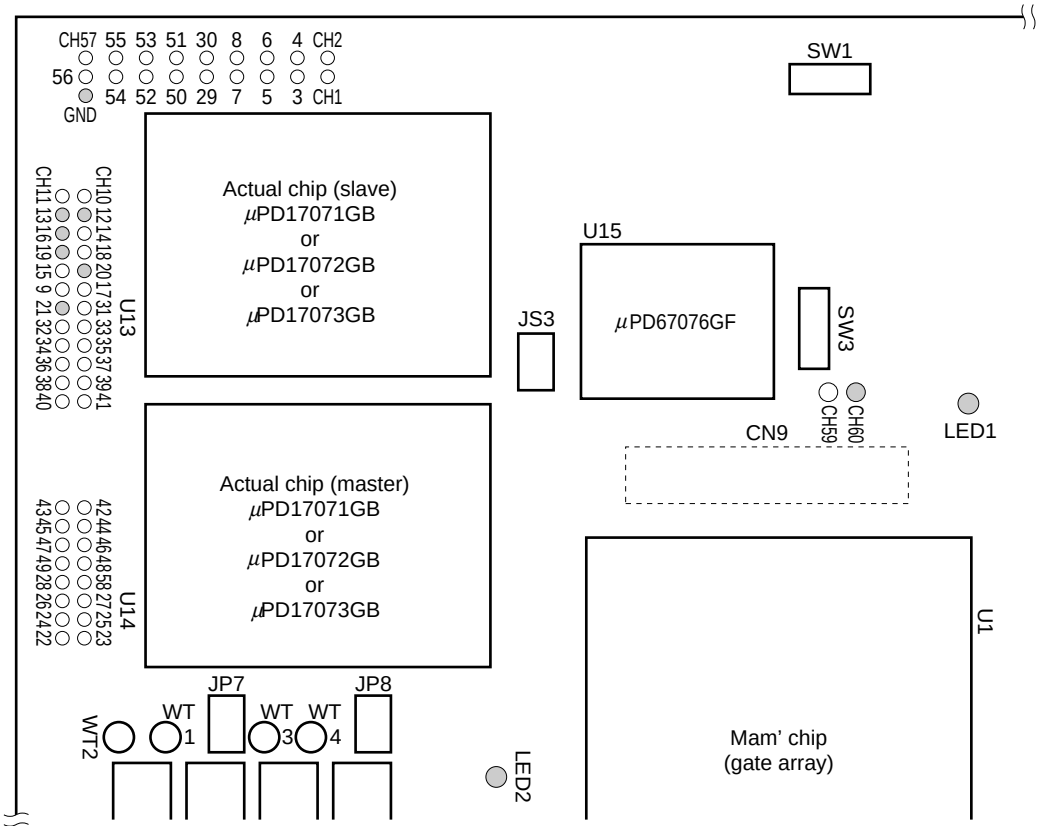
The SE-17072 is provided with monitor pins that check the pin status of the actual chips, and LEDs that indicate the operation status of the board. Table 4-5 lists the monitor pins and LEDs and their functions. Figure 4-25 shows the layout of the monitor pins and LEDs.

Table 4-5. Monitor Pins and LEDs, and Their Function

Monitor Pin, LED		Function
Monitor pin	CH12	To monitor P1A2/AD0
	CH13	To monitor P1A3/AD1
	CH16	To monitor REG0
	CH19	To monitor REG1
	CH20	To monitor $REG_{LCD}0$
	CH21	To monitor $REG_{LCD}1$
	CH60	To monitor source clock (150 kHz)
	GND	GND
LED	LED1	Light: Power ON Dark: Power OFF
	LED2	Light: Low-speed mode[Note] (instruction execution time: 106.6 μs) Dark: Normal mode (instruction execution time: 53.3 μs)

★ **Note** Not provided when the actual chips are the μPD17071GB.

Figure 4-25. Layout of Monitor Pins and LEDs



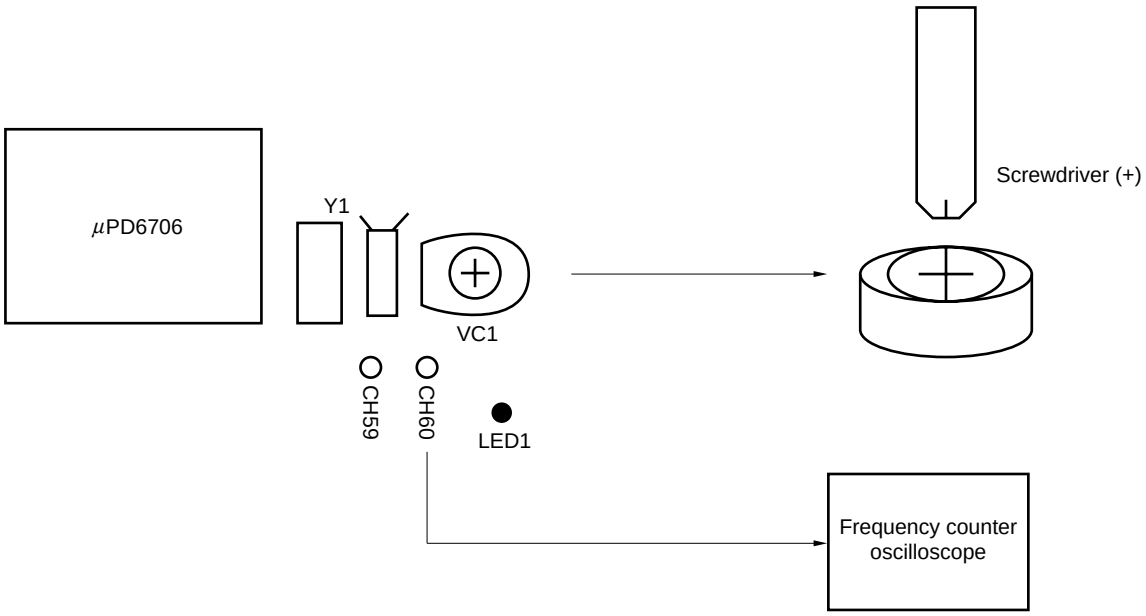
4.7 Fine-Tuning of Source Clock Oscillation Frequency (150 kHz)

The frequency of the source clock for the supervisor operation[Note] of the SE board is 150 kHz.

The clock (75 kHz) supplied to the actual chips is obtained by dividing the source clock by two.

To fine-tune the source clock frequency, use a trimmer capacitor (VC1) as shown in Figure 4-26. To monitor the oscillated waveform and measure oscillation, use monitor pin “CH60”.

Figure 4-26. Fine-Tuning of Source Clock

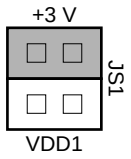
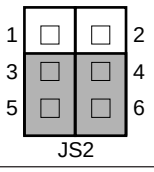
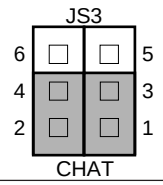
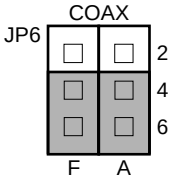
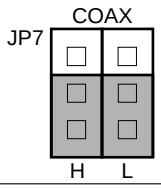
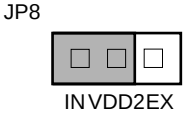
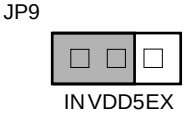


Note An operation to be executed on the in-circuit emulator when CLICE is used.

4.8 Setting of Jumper Switches and Slide Switches

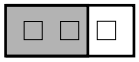
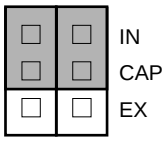
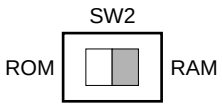
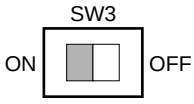
The jumper switches and slide switches of the SE-17072 are factory-set as indicated by Table 4-6 for shipment. Confirm the setting of these switches before using them.

Table 4-6. Setting of Jumper Switches and Slide Switches (1/2)

Switch Number	Factory Setting of Jumper Switch, Slide Switch	Set Conditions	Set Position	
JS1		Refer to **4.1 Using Level Conversion Chip (μPD6706GF)** and **4.2 Supplying Voltage to SE Board**.		
★ JS2		This switch sets the actual chips used. Do not change the factory-set conditions of this switch (072).	Do not change the setting of this switch	
JS3		If chattering may occur on the CE pin	CHAP side	
		If chattering does not occur on the CE pin	Opposite side to CHAT	
JP3 JP4		These switches are factory-set according to the delay of the actual chips	Do not change the setting of this switch.	
JP6		If signal is input/output to/from P0D3/FMIFC/AMIFC through probe	F	Opposite side to COAX
		If signal is input/output to/from P0D2/AMIFC through probe	A	
		If signal is input/output to/from P0D3/FMIFC/AMIFC through coaxial cable	F	COAX side
		If signal is input/output to/from P0D2/AMIFC through coaxial cable	A	
JP7		If VCOH is input through probe	H	Opposite side to COAX
		If VCOL is input through probe	L	
		If VCOH is input through coaxial cable	H	COAX side
		If VCOL is input through coaxial cable	L	
JP8		If capacitor on SE board is connected to PLL voltage regulator output pin (REG0)	IN side	
		If capacitor on target system is connected to PLL voltage regulator output pin (REG0)	EX side	
JP9		If capacitor on SE board is connected to oscillation circuit voltage regulator output pin (REG1)	IN side	
		If capacitor on target system is connected to oscillation circuit voltage regulator output pin (REG1)	Ex side	

Remark The shaded portions in the above figures indicate the factory-set conditions for shipment.

Table 4-6. Setting of Jumper Switches and Slide Switches (2/2)

Switch Number	Factory Setting of Jumper Switch, Slide Switch	Set Conditions	Set Position
JP10 JP11 JP12	JP10, JP12  JP11  	If capacitor on SE board is connected to pins connecting capacitors for LCD power supply $REG_{LCD}0$, $REG_{LCD}1$, $CAP_{LCD}0$, and $CAP_{LCD}1$	IN side
		If capacitor on target system is connected to pins connecting capacitors for LCD power supply $REG_{LCD}0$, $REG_{LCD}1$, $CAP_{LCD}0$, and $CAP_{LCD}1$	EX side
SW2	 	When SE board is mounted to in-circuit emulator for evaluation	RAM side
		When SE-17072 alone is used for evaluation	ROM side
SW3	 	Pull up CE pin	ON side
		Not pull up CE pin	OFF side

Remarks 1. The shaded portions in the above figures indicate the factory-set conditions for shipment.

2. VDD2 of JP8 corresponds to REG0 pins of the actual chips.
VDD5 of JP9 corresponds to REG1 pins of the actual chips.
VDD3 of JP10 corresponds to $REG_{LCD}0$ pins of the actual chips.
VDD4 of JP12 corresponds to $REG_{LCD}1$ pins of the actual chips.
CAP of JP11 corresponds to $CAP_{LCD}0$ pins and $CAP_{LCD}1$ pins of the actual chips.

[MEMO]

CHAPTER 5 CONNECTOR PIN LIST

(1) μPD17071

Table 5-1. Connector Pins of J1 ★

J1 Pin No.	Pin Name	Pin No. of IC 56-pin QFP	J1 Pin No.	Pin Name	Pin No. of IC 56-pin QFP	J1 Pin No.	Pin Name	Pin No. of IC 56-pin QFP
1	NC		21	GND		41	GND	
2	NC		22	P0D2/AMIFC	16	42	REG1	26
3	NC		23	GND		43	GND	
4	NC		24	P0D3/FMIFC/AMIFC	17	44	$REG_{LCD}0$	27
5	NC		25	GND		45	GND	
6	NC		26	GND		46	$CAP_{LCD}0$	28
7	NC		27	GND		47	GND	
8	NC		28	EO	19	48	$CAP_{LCD}1$	29
9	GND		29	GND		49	GND	
10	P1A0	10	30	VCOL	20	50	$REG_{LCD}1$	30
11	GND		31	GND		51	GND	
12	P1A1	11	32	VCOH	21	52	COM0	31
13	GND		33	GND		53	GND	
14	P1A2	12	34	REG0	22	54	COM1	32
15	GND		35	GND		55	GND	
16	P1A3	13	36	V_{DD}	23	56	COM2	33
17	GND		37	GND		57	GND	
18	P0C0	14	38	NC		58	COM3	34
19	GND		39	GND		59	GND	
20	P0C1	15	40	NC		60	LCD0	35

Table 5-2. Connector Pins of J2

J2 Pin No.	Pin Name	Pin No. of IC 56-pin QFP	J2 Pin No.	Pin Name	Pin No. of IC 56-pin QFP	J2 Pin No.	Pin Name	Pin No. of IC 56-pin QFP
1	GND		21	GND		41	GND	
2	P1B2	8	22	P0B2	55	42	LCD8	43
3	GND		23	GND		43	GND	
4	P1B3	9	24	P0B1	54	44	LCD7	42
5	GND		25	GND		45	GND	
6	P1B0	6	26	P0B0	53	46	LCD6	41
7	GND		27	GND		47	GND	
8	P1B1	7	28	BEEP	52	48	LCD5	40
9	GND		29	GND		49	GND	
10	P0A2	4	30	NC	51	50	LCD10	45
11	GND		31	GND		51	GND	
12	P0A3	5	32	CE	50	52	LCD9	44
13	GND		33	GND		53	GND	
14	P0A0	2	34	LCD14	49	54	LCD4	39
15	GND		35	GND		55	GND	
16	P0A1	3	36	LCD13	48	56	LCD3	38
17	GND		37	GND		57	GND	
18	P1C0	1	38	LCD12	47	58	LCD2	37
19	GND		39	GND		59	GND	
20	P0B3	56	40	LCD11	46	60	LCD1	36

(2) μPD17072 and 17073

Table 5-3. Connector Pins of J1 ★

J1 Pin No.	Pin Name	Pin No. of IC		J1 Pin No.	Pin Name	Pin No. of IC		J1 Pin No.	Pin Name	Pin No. of IC	
		56-pin QFP	64-pin TQFP			56-pin QFP	64-pin TQFP			56-pin QFP	64-pin TQFP
1	NC (GND)[Note]			21	GND			41	GND		
2	NC			22	P0D2/AMIFC	16	18	42	REG1	26	30
3	NC (GND)[Note]			23	GND			43	GND		
4	NC (GND)[Note]			24	P0D3/FMIFC/AMIFC	17	19	44	$REG_{LCD}0$	27	31
5	NC (GND)[Note]			25	GND			45	GND		
6	NC (GND)[Note]			26	GND		21	46	$CAP_{LCD}0$	28	32
7	NC			27	GND			47	GND		
8	NC (GND)[Note]			28	EO	19	22	48	$CAP_{LCD}1$	29	33
9	GND			29	GND			49	GND		
10	P1A0	10	11	30	VCOL	20	23	50	$REG_{LCD}1$	30	34
11	GND			31	GND			51	GND		
12	P1A1	11	13	32	VCOH	21	24	52	COM0	31	35
13	GND			33	GND			53	GND		
14	P1A2/AD0	12	14	34	REG0	22	25	54	COM1	32	36
15	GND			35	GND			55	GND		
16	P1A3/AD1	13	15	36	V_{DD}	23	26, 27	56	COM2	33	37
17	GND			37	GND			57	GND		
18	P0C0	14	16	38	NC			58	COM3	34	39
19	GND			39	GND			59	GND		
20	P0C1	15	17	40	NC (GND)[Note]			60	LCD0	35	40

Note (GND) is the case when the actual chip is 64-pin plastic TQFP.

★ **Table 5-4. Connector Pins of J2**

J2 Pin No.	Pin Name	Pin No. of IC		J2 Pin No.	Pin Name	Pin No. of IC		J2 Pin No.	Pin Name	Pin No. of IC	
		56-pin QFP	64-pin TQFP			56-pin QFP	64-pin TQFP			56-pin QFP	64-pin TQFP
1	GND			21	GND			41	GND		
2	P1B2	8	9	22	P0B2/$\overline{\text{SCK}}$	55	63	42	LCD8	43	49
3	GND			23	GND			43	GND		
4	P1B3	9	10	24	P0B1	54	62	44	LCD7	42	48
5	GND			25	GND			45	GND		
6	P1B0	6	7	26	P0B0	53	61	46	LCD6	41	47
7	GND			27	GND			47	GND		
8	P1B1	7	8	28	BEEP	52	60	48	LCD5	40	46
9	GND			29	GND			49	GND		
10	P0A2	4	4	30	INT	51	58	50	LCD10	45	51
11	GND			31	GND			51	GND		
12	P0A3	5	6	32	CE	50	57	52	LCD9	44	50
13	GND			33	GND			53	GND		
14	P0A0	2	2	34	LCD14	49	56	54	LCD4	39	44
15	GND			35	GND			55	GND		
16	P0A1	3	3	36	LCD13	48	55	56	LCD3	38	43
17	GND			37	GND			57	GND		
18	P1C0/SO0	1	1	38	LCD12	47	53	58	LCD2	37	42
19	GND			39	GND			59	GND		
20	P0B3/SI/SO1	56	64	40	LCD11	46	52	60	LCD1	36	41

CHAPTER 6 CONNECTING SE-17072 AND TARGET SYSTEM

This chapter describes how to connect the SE-17072 to the target system, turn on/off power, and remove the emulation probe from the target system, when the SE-17072 alone is used.

To connect the SE-17072 and target system, follow these steps:

(1) To connect SE-17072 and emulation probe

(a) Turn off power to the SE-17072.
(b) Connect the emulation probe to the SE-17072.

(2) To connect the emulation probe and target system

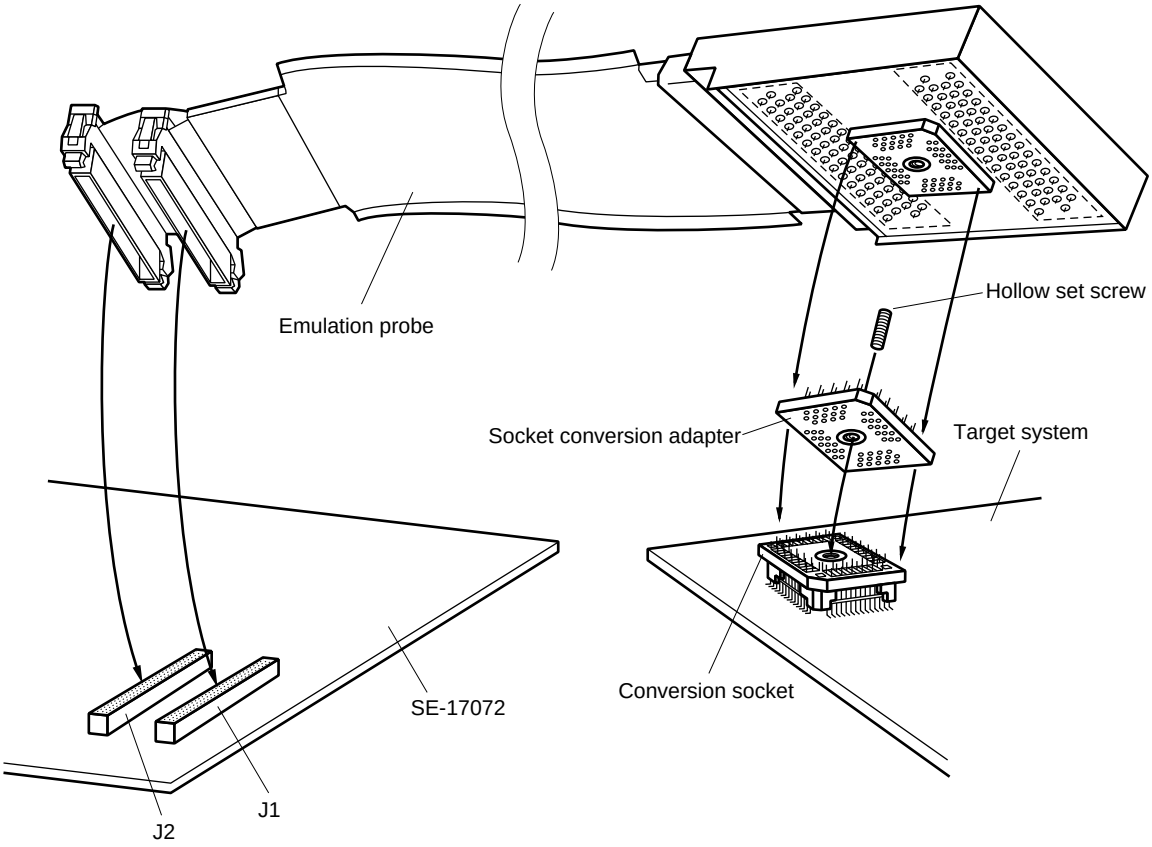
(a) Turn off power to the target system.
(b) Solder the conversion socket to the target system.
(c) Insert the socket conversion adapter into the conversion socket and secure the adapter with a screw.

Caution As a factory-set condition for shipment, the socket conversion adapter and conversion socket are connected and secured with a screw. Therefore, step (c) is not necessary. In this case, solder the conversion socket with the socket conversion adapter connected, to the target system.

(d) Insert the tip of the emulation probe into the socket conversion adapter.

(3) Turn on power

Figure 6-1. Connecting SE-17072 and Target System

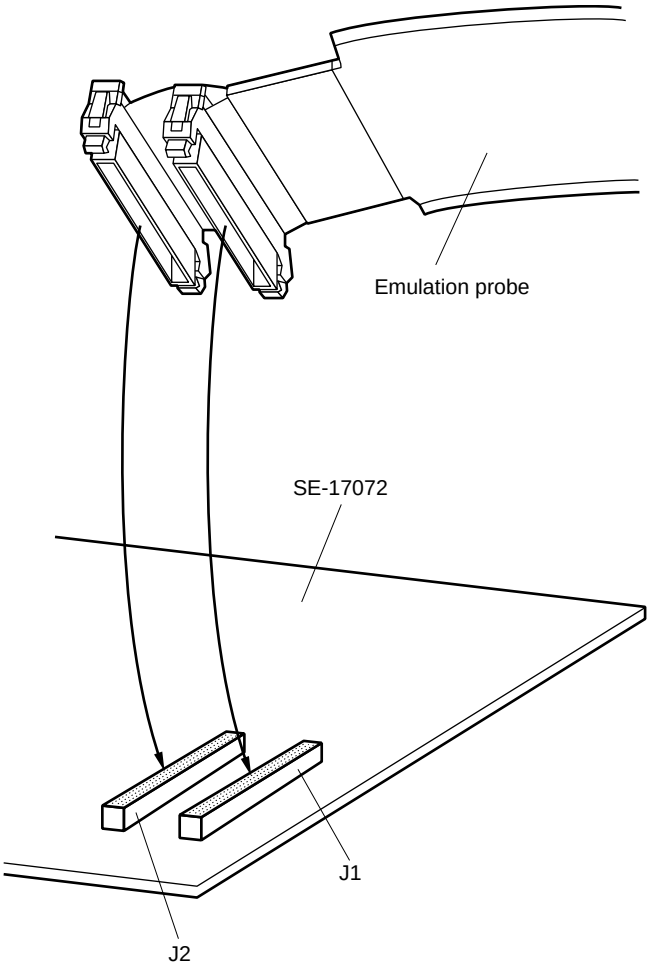


6.1 Connecting SE-17072 and Emulation Probe

Connect the SE-17072 and emulation probe in the following procedure:

<1> Turn off power to the SE-17072.
<2> Connect the emulation probe to the connectors (J1 and J2) on the SE-17072.

Figure 6-2. Connecting SE-17072 and Emulation Probe



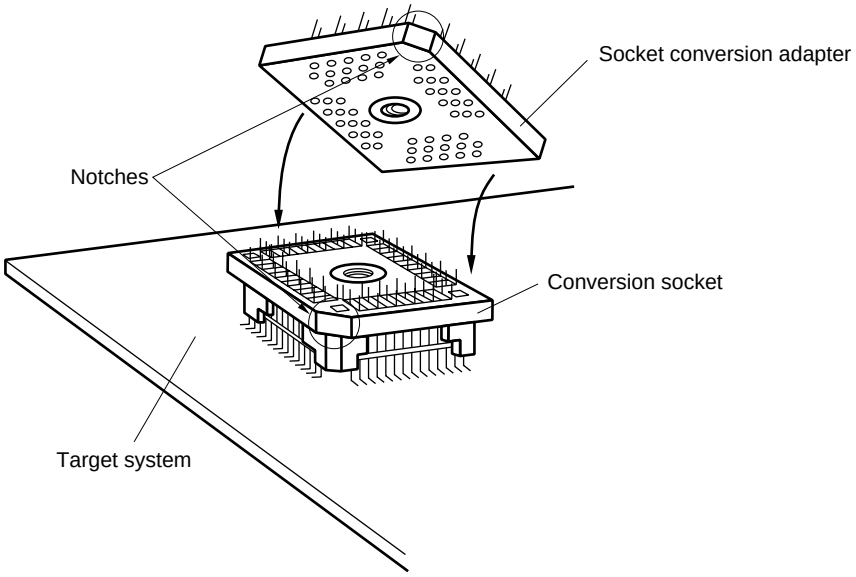
6.2 Connecting Emulation Probe and Target System

Connect the emulation probe and target system in the following procedure:

Caution As a factory-set condition for shipment, the socket conversion adapter and conversion socket are connected and secured with a screw. Therefore, steps <3> and <4> below are not necessary. In this case, solder the conversion socket with the socket conversion adapter connected, to the target system.

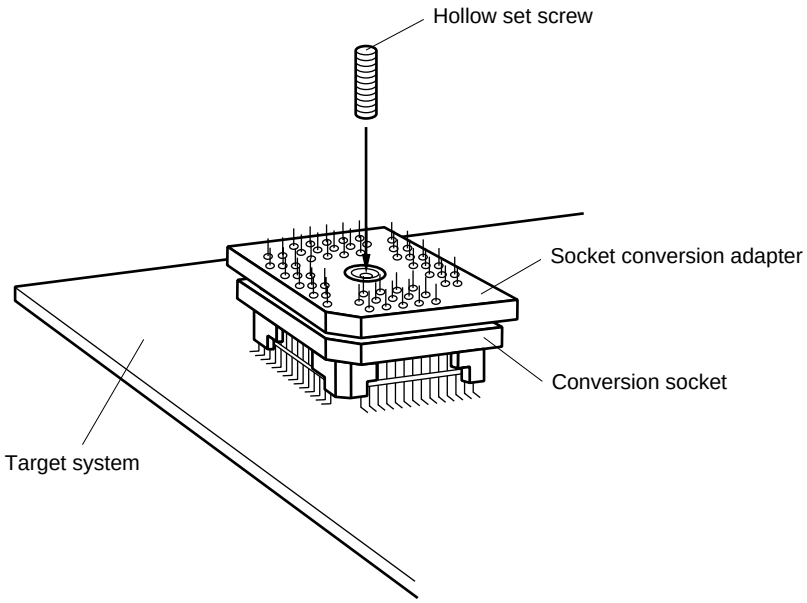
<1> Turn off power to the target system.
<2> Solder the conversion socket to the target system.
<3> Insert the socket conversion adapter to the conversion socket soldered to the target system. At this time, be sure to match the positions of the notches of the conversion socket and socket conversion adapter.

Figure 6-3. Connecting Socket Conversion Adapter and Conversion Socket



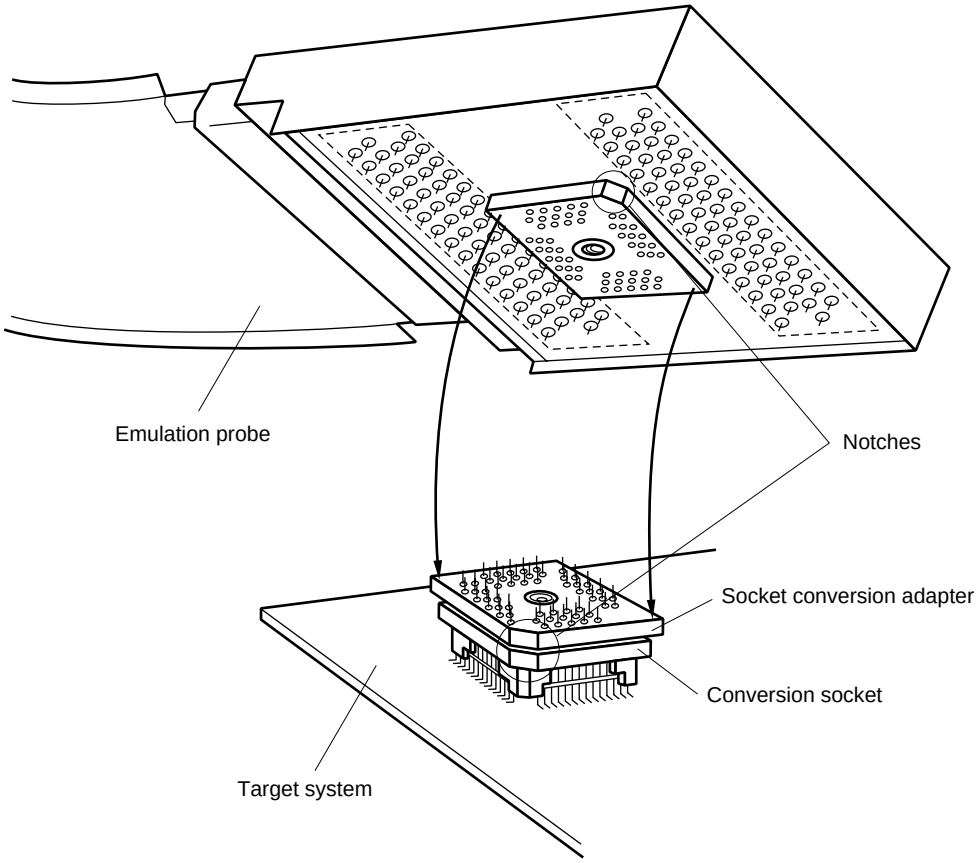
<4> Secure the connected socket conversion adapter and conversion socket with a hollow set screw (securing screw with hexagon hole) supplied as an accessory.

Figure 6-4. Securing Socket Conversion Adapter and Conversion Socket with Screw



<5> Insert the emulation probe to the conversion adapter. At this time, be sure to match the positions of the notches on the emulation probe and conversion adapter.

Figure 6-5. Connecting Socket Conversion Adapter and Emulation Probe



6.3 Turning ON/OFF Power

After connecting the SE-17072 and target system, turn on power.
Be sure to turn on/off power in the following sequence:

Caution Be sure to observe the sequence of turning on/off power. Otherwise, the SE-17072 or target system may be damaged.

(1) Power-up sequence

<1> Turn on power to the SE-17072.
<2> Turn on power to the target system.

(2) Power-down sequence

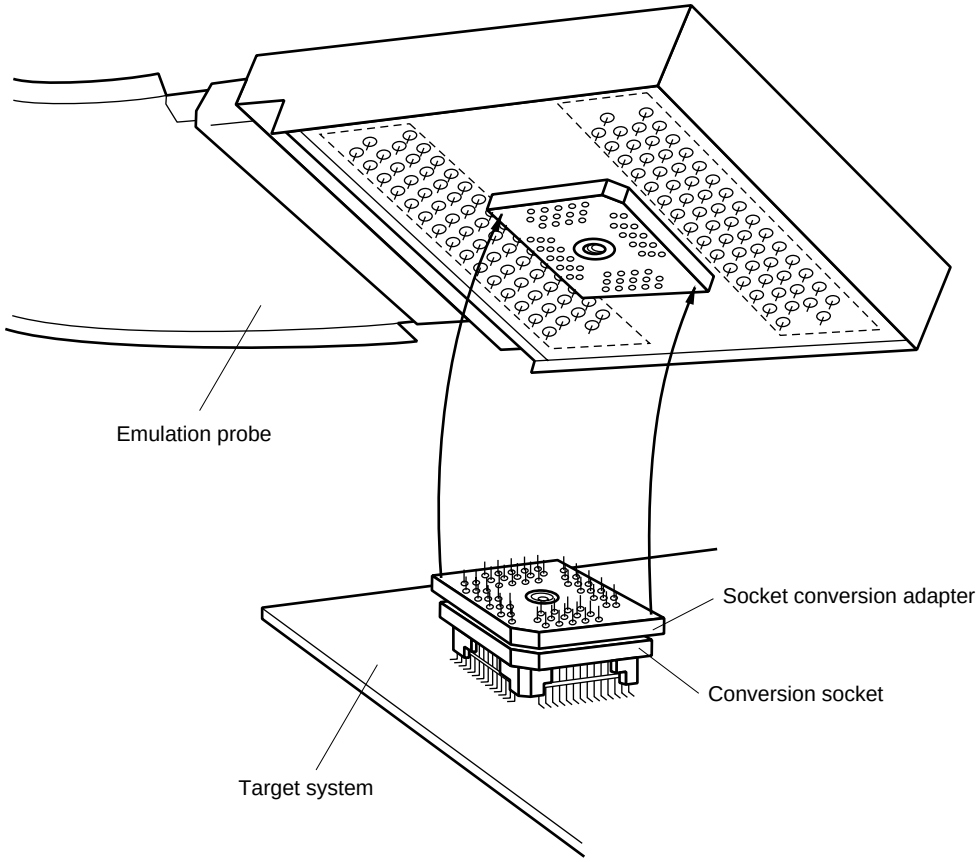
<1> Turn off power to the target system.
<2> Turn off power to the SE-17072.

6.4 Removing Emulation Probe from Target System

Remove the emulation probe from the target system in the following sequence:

<1> Turn off power to the target system.
<2> Turn off power to the SE-17072.
<3> Hold the emulation probe with your fingers and pull-up the emulation probe at right angles.

Figure 6-6. Removing Emulation Probe

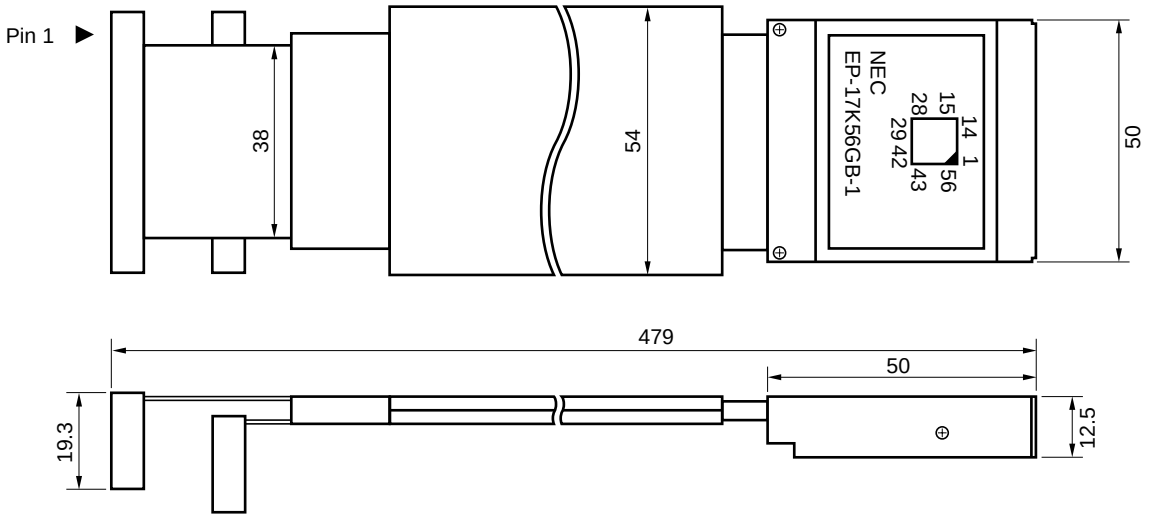


[MEMO]

CHAPTER 7 DIMENSIONS OF PROBE, CONVERSION SOCKET, AND SOCKET CONVERSION ADAPTER

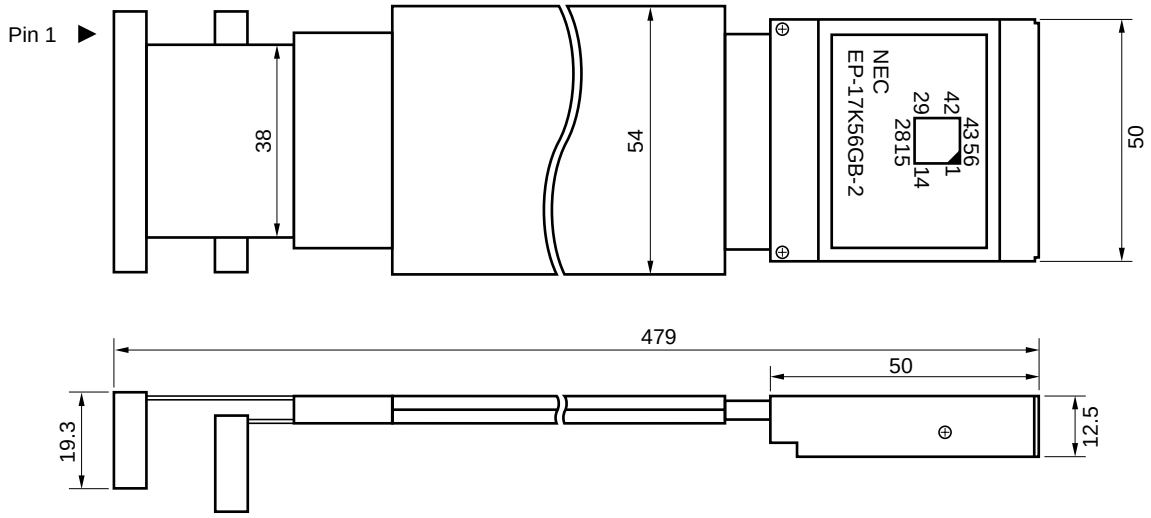
7.1 Dimensions of Probe

(1) EP-17K56GB-1 (Package with bent leads)



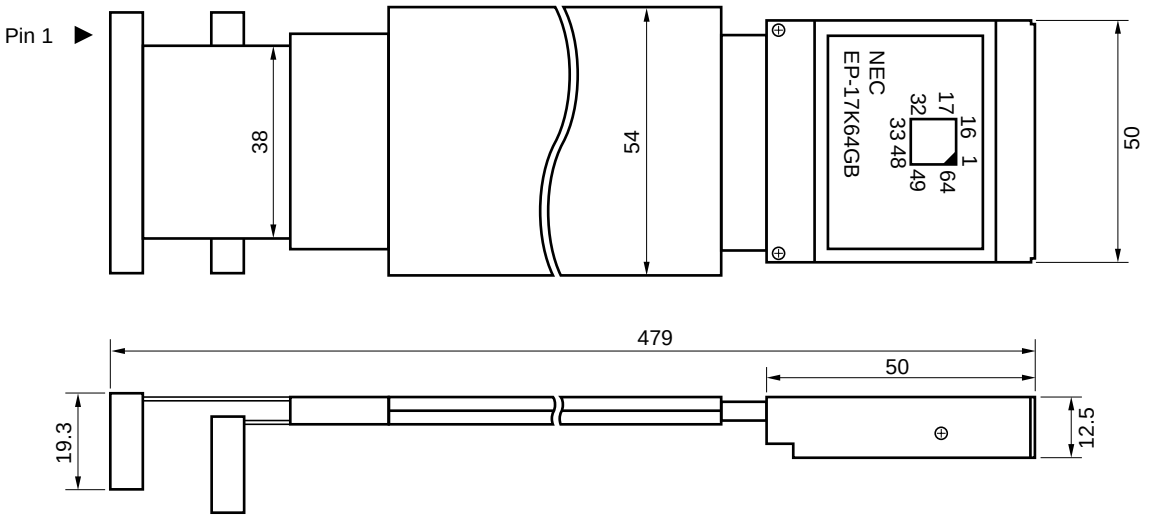
(Unit: mm)

(2) EP-17K56GB-2 (Package with inverted leads)



(Unit: mm)

★ **(3) EP-17K64GB (Package with bent leads)**



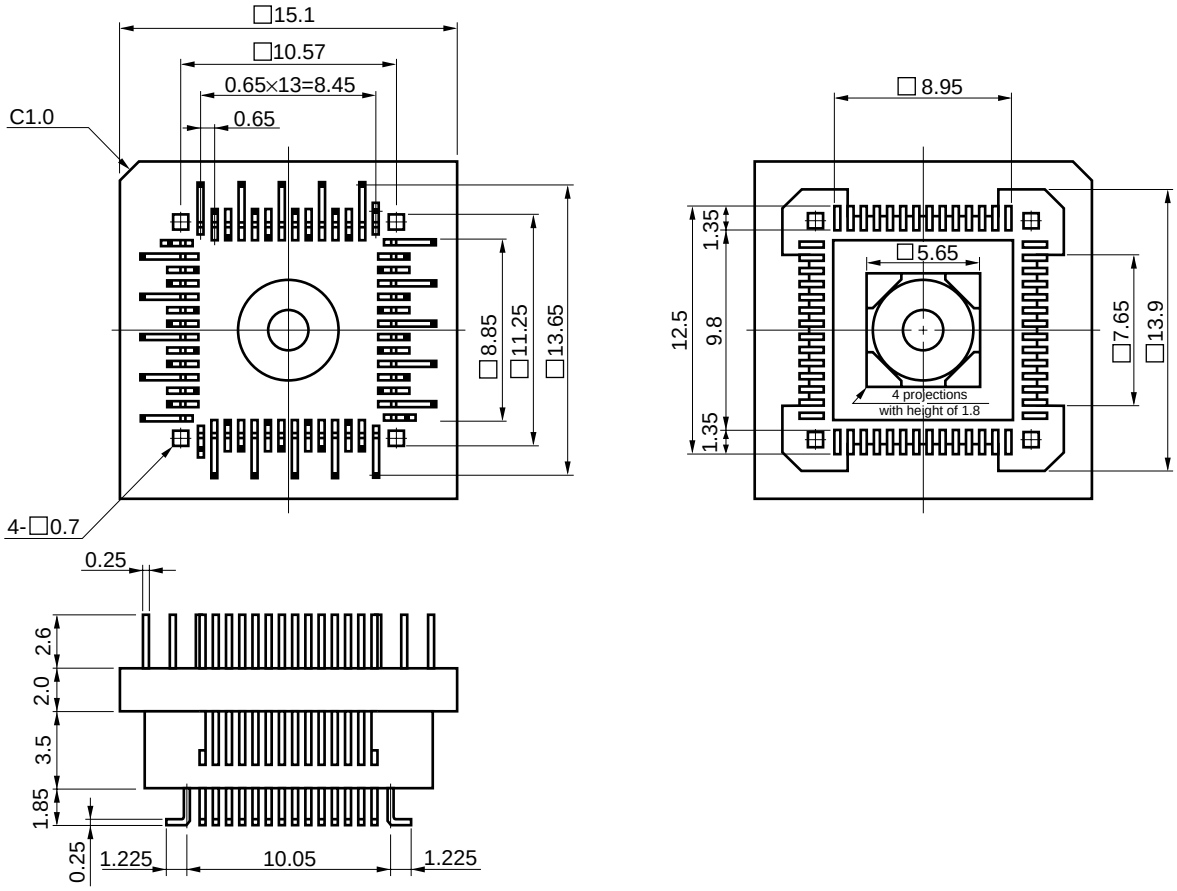
(Unit: mm)

7.2 Dimensions of Conversion Socket and Socket Conversion Adapter

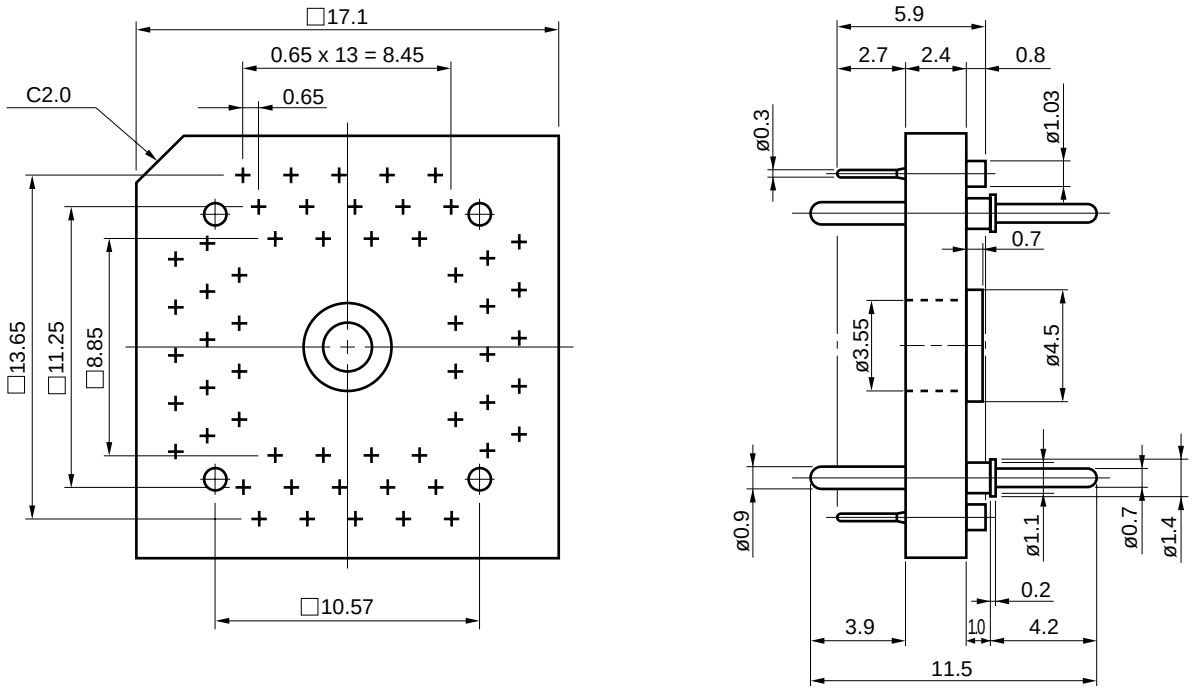
7.2.1 EV-9500GB-56

Remark The EV-9500GB-56 is a set of the conversion socket and socket conversion adapter (socket and adapter are secured with a screw).

(1) Conversion socket



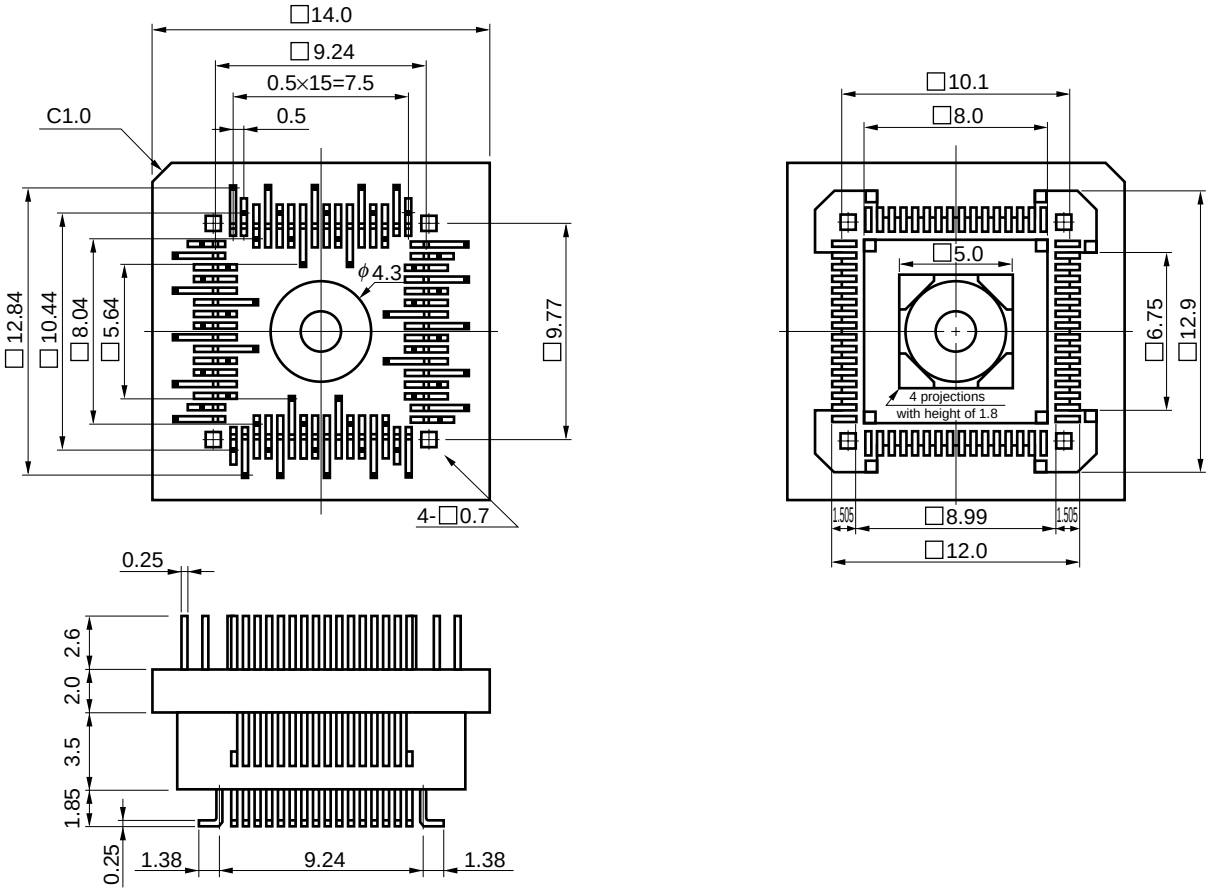
(2) Socket conversion adapter



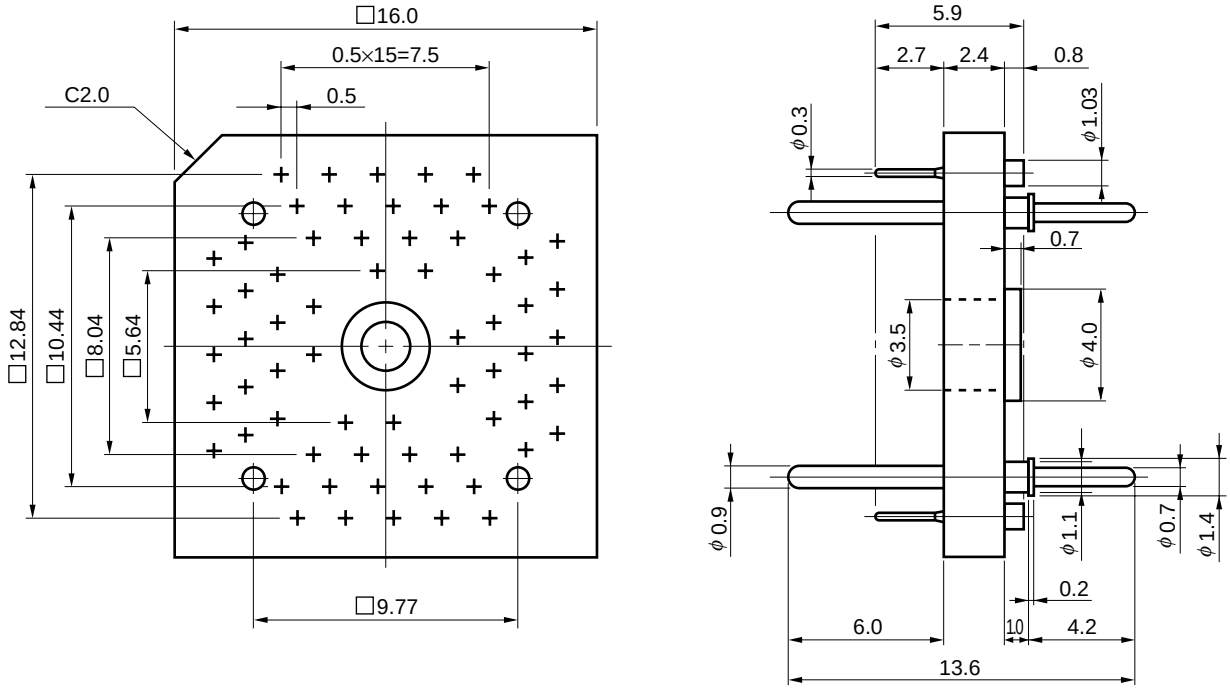
7.2.2 EV-9500GB-64 ★

Remark The EV-9500GB-64 is a set of the conversion socket and socket conversion adapter (socket and adapter are secured with a screw).

(1) Conversion socket

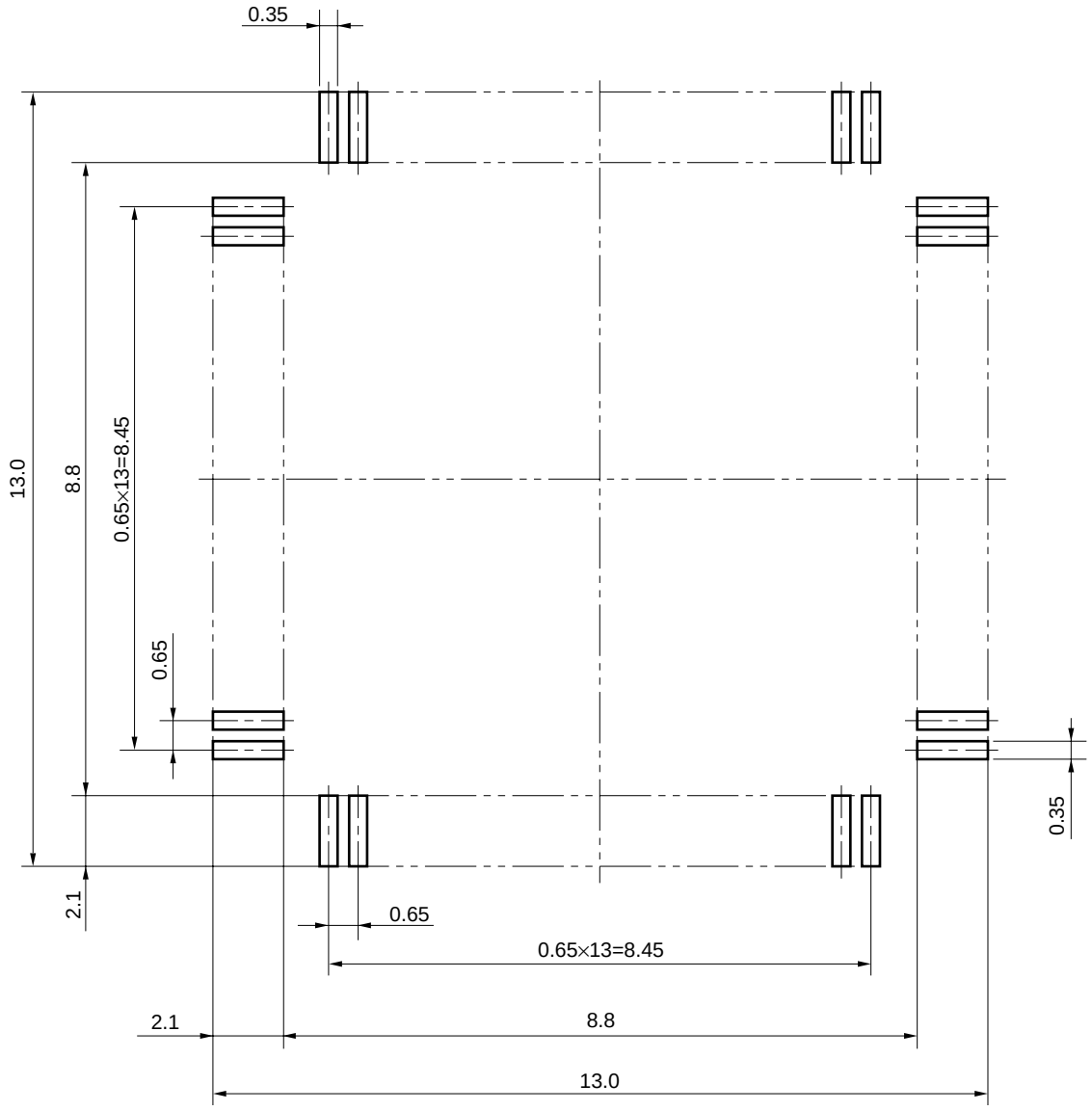


(2) Socket conversion adapter

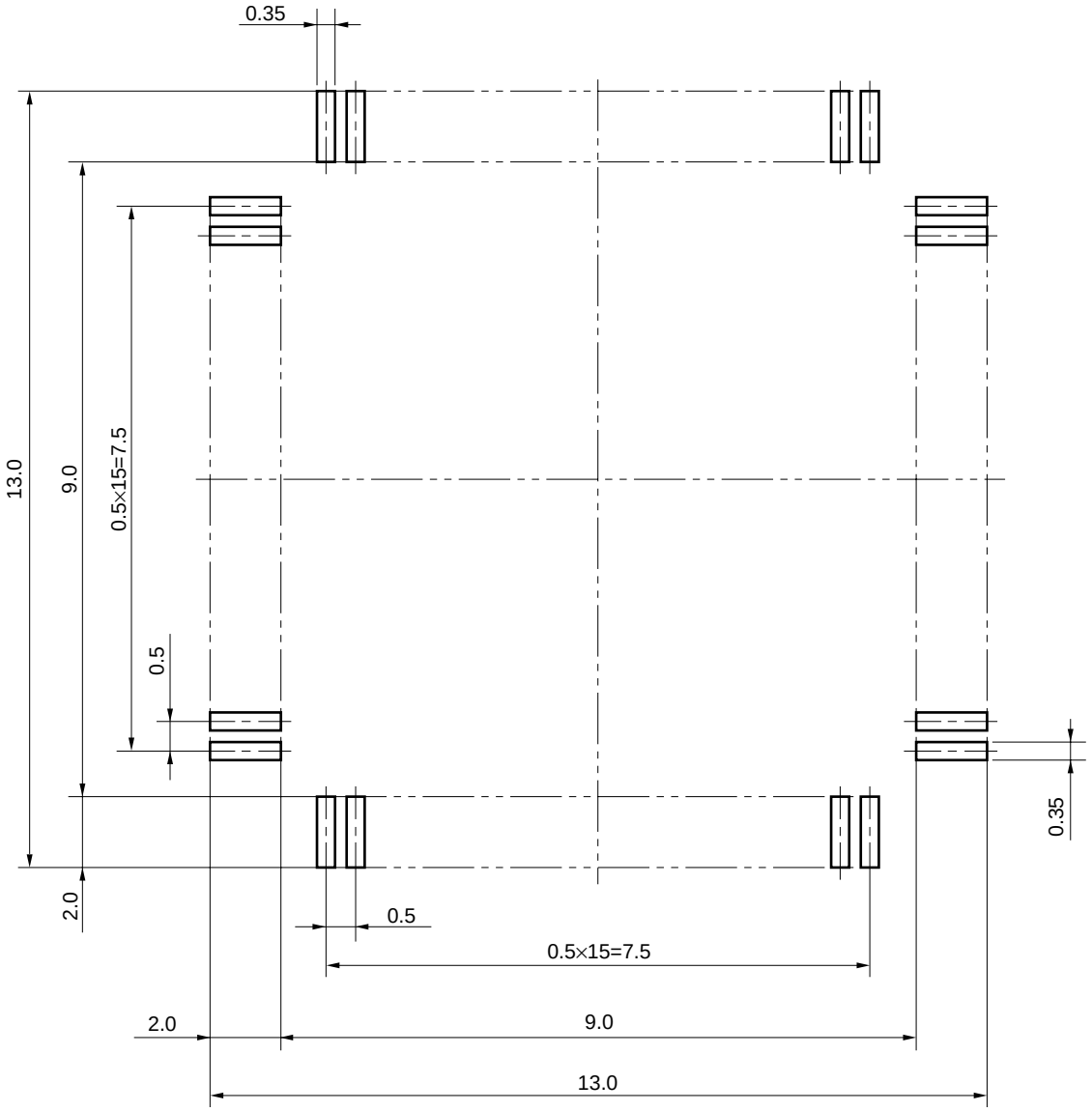


7.3 Recommended Mounting Pattern of Conversion Socket on Printed Circuit Board

(1) EV-9500GB-56



★ **(2) EV-9500GB-64**



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