

USER'S MANUAL

NEC

EP-78024
EMULATION PROBE

EP-78024CW-R
EP-78024GF-R

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Major Revisions in This Edition

Page	Contents
Throughout	Combined with EP-78024GF-R User's Manual (EEU-1477)
p.6	Addition of Caution to 2.1 (1) Connecting emulation board and connector board
p.10	Addition of description and Caution on sense clip to 2.1 (4) Connecting external sense clip
p.13	Correction of Figure 2-6. Removing EP-78024CW-R
p.14	Correction of Figure 2-7. Removing EP-78024GF-R

The mark ★ shows revised points.

INTRODUCTION

Readers : This manual is intended for users who wish to debug microcontrollers using an in-circuit emulator and the EP-78024.

For the combination of the emulation probe and target device, refer to the documents of the respective devices and the selection guides of the development tools.



Purpose : This manual describes how to connect the EP-78024 to an in-circuit emulator.

Organization : This manual contains the following information:

General
Connection

How to Read This Manual : Before reading this manual, read the manuals related to the in-circuit emulator to be used and familiarize yourself with the organization and functions of the debugging system.

- To understand the overall functions and connections of the EP-78024
→ Read this manual in the order of the Table of Contents.
- To understand the operating environment and organization
→ Read "**CHAPTER 1 GENERAL**".
- To understand connection
→ Read "**CHAPTER 2 CONNECTION**".

Unless otherwise specified, the EP-78024CW-R and EP-78024GF-R are referred to as "EP-78024". Read "EP-78024" as EP-78024CW-R if you use this manual as the manual for the EP-78024CW-R. If you use this manual as that for the EP-78024GF-R, read "EP-78024" as EP-78024GF-R.



Notations used in this manual

Note : Footnote
Caution : Important information
Remark : Supplement

Unpacking Carton Box : The carton box of the EP-78024 contains the following items. Confirm that all the items are contained. If any item is missing or damaged, consult NEC.

- | | Qty |
|--|-----|
| • Emulation probe | 1 |
| • Connector board | 1 |
| • User's Manual (this manual) | 1 |
| • Mounting screw | 2 |
| • Used to connect the emulation probe and in-circuit emulator. | |
| • Conversion socket | 1 |
| • Used to connect the emulation probe and target system.
(EV-9200G-64 is supplied with the EP-78024GF-R). | |

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<<Correspondence between connector board and conversion socket>>

Emulation Probe	Connector Board	Conversion Socket
EP-78024GF-R	64GF CONNECTOR	EV-9200G-64
EP-78024CW-R	64CW CONNECTOR	Not supplied

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CHAPTER 1 GENERAL

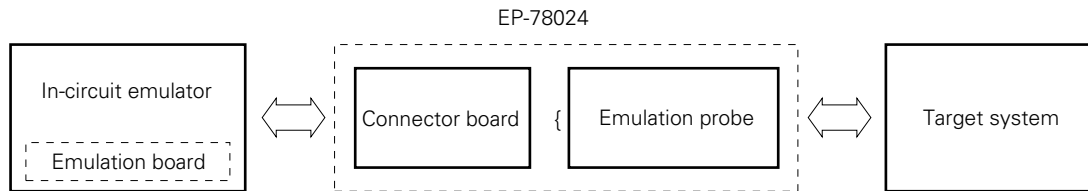
This chapter describes the outline of the EP-78024.

1.1 Operating Environment

The EP-78024 is a probe set that connects an in-circuit emulator and a target system. By connecting the in-circuit emulator and target system with the EP-78024, the debugging environment of a microcontroller is established and the hardware and software of the target system can be debugged. For details of connection, refer to **CHAPTER 2 CONNECTION**.

Figure 1-1. Operating Environment

- **Connecting in-circuit emulator and target system**



1.2 Organization

The EP-78024 consists of an emulation probe and a connector board.

(1) Emulation probe

The emulation probe consists of the following three parts:

Probe

Connects the in-circuit emulator and target system.

- EP-78024CW-R : 64-pin CW probe
- EP-78024GF-R : 64-pin GF probe

Ground clip

Connected to GND of the target system to make the GND potential of the in-circuit emulator the same as that of the target system and thereby improve the resistance to static electricity and the noise immunity of the system.

External sense clip

Consists of eight sense clips which are used to check the voltage level of the pins of the IC mounted on the target system.

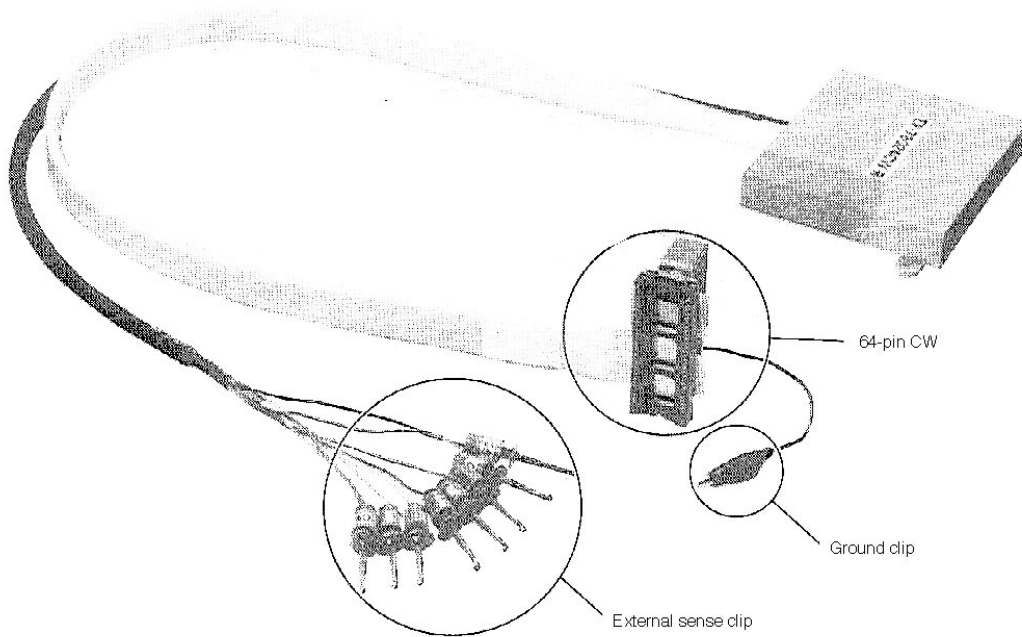
(2) Connector board

The connector board connects the pins on the emulation board which output signals to the emulation probe, and is connected to the connector^{Note} on the emulation board.

Note The location on the emulation board at which the connector board is to be connected differs depending on the emulation board. Refer to the User's Manuals of the in-circuit emulator or emulation board.

Figure 1-2. EP-78024 and Connector Board (1/2)

EP-78024CW-R



EP-78024GF-R

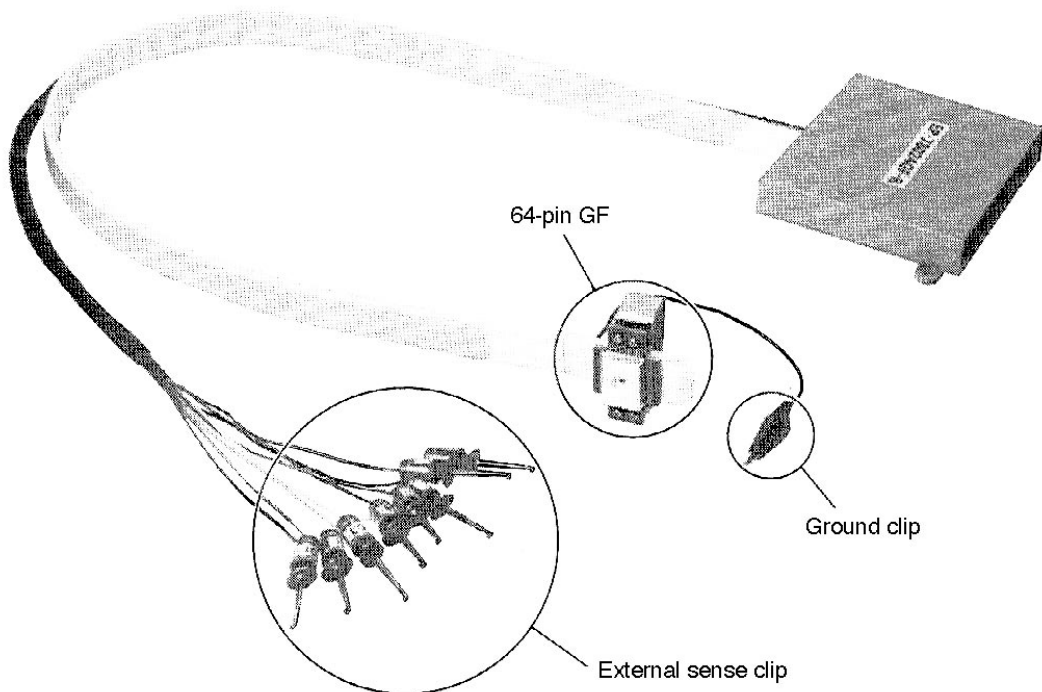
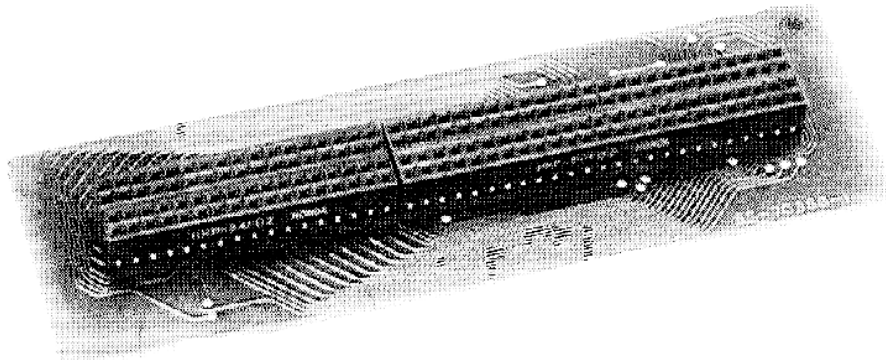


Figure 1-2. EP-78024 and Connector Board (2/2)

Connector board



CHAPTER 2 CONNECTION

This chapter describes how to connect the EP-78024, turn on/off the power, and remove the emulation probe from the target system.

2.1 Connecting In-Circuit Emulator and Target System

Connect the in-circuit emulator and target system following these steps:

- (1) Connect the emulation board and connector board.
Note that the board to be connected differs depending on the in-circuit emulator used.
- (2) Connect the in-circuit emulator and emulation probe.
- (3) Connect the emulation probe and target system.
- (4) Connect the external sense clip (when the external sense clip is used).
- (5) Turn on the power.

Each step, (1) to (5), is described in detail next.

(1) Connecting emulation board and connector board

- <1> Turn off the power to the in-circuit emulator.
- <2> Connect the emulation board and connector board.
- <3> Install the emulation board (with the connector board connected) to the in-circuit emulator.

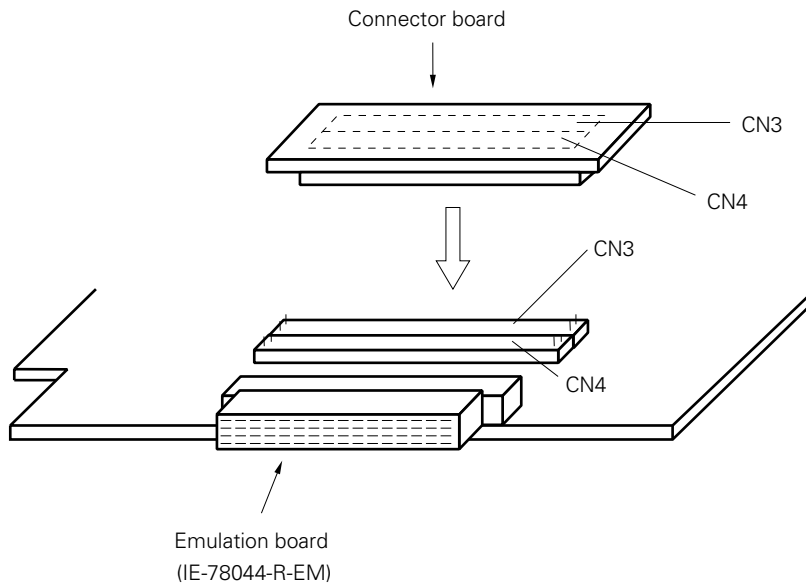
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Caution If the connector board is inserted to a wrong connector on the emulation board, the in-circuit emulator may be damaged.

In the following description, it is assumed that the emulation board IE-78044-R-EM is used.

- <1> Turn off the power to the IE-78000-R.
- <2> Connect CN3 and CN4 of the connector board to CN3 and CN4 of the IE-78044-R-EM.
- <3> Remove the screws (at six places) from the top of the IE-78000-R, and open the lid.
- <4> Pull the card pullers at both edges of the IE-78000-R-BK in the in-circuit emulator toward you to pull out the board.
- <5> Secure the IE-78044-R-EM and IE-78000-R-BK with screws.
- <6> Return the IE-78000-R-BK, onto which the IE-78044-R-EM has been mounted, to the original position in the IE-78000-R.

Figure 2-1. Connecting IE-78044-R-EM and Connector Board

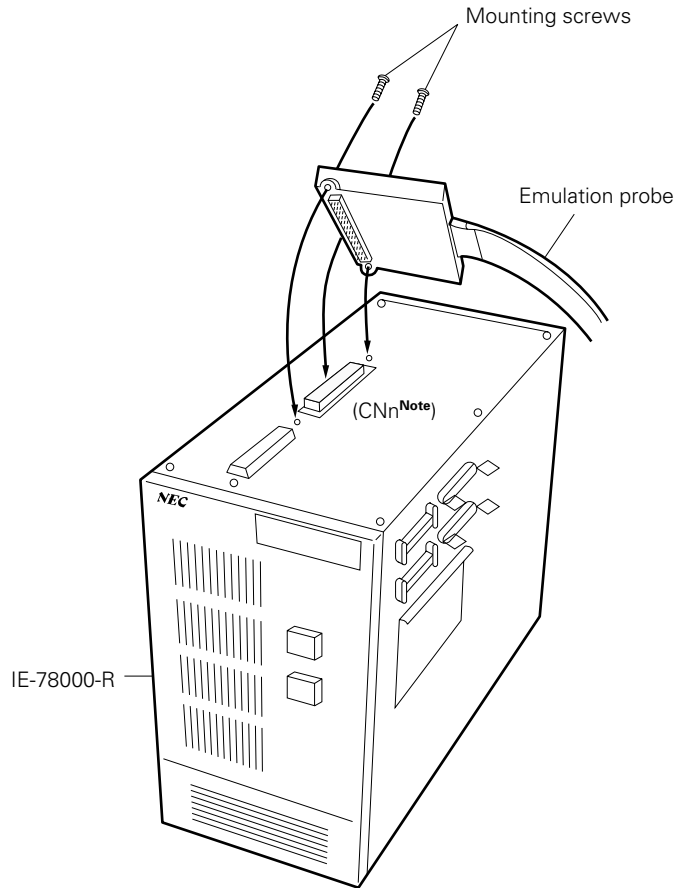


Remark The shape of the emulation board differs depending on the model, but connection between the emulation board and connector board is the same as shown in Figure 2-1. For details of how to mount the board to the in-circuit emulator, refer to the User's Manual of the in-circuit emulator.

(2) Connecting in-circuit emulator and emulation probe

- <1> Connect the emulation probe to the emulation probe connecting DIN connector on the top of the in-circuit emulator.
- <2> After connection, be sure to secure the emulation probe and in-circuit emulator with screws.

Figure 2-2. Example of Connecting IE-78000-R and Emulation Probe



Note This figure shows the case where the IE-78044-R-EM is used as the emulation board. The connector to be connected differs depending on the emulation board. Refer to the User's Manual of the in-circuit emulator or emulation board.

(3) Connecting emulation probe and target system

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

- Cautions 1.** Before connecting the emulation probe to the target system, be sure to connect the ground clip first. Otherwise, the in-circuit emulator may be damaged by static electricity.
- 2.** Be sure to connect the pins in the correct direction. If they are connected in the wrong direction, the in-circuit emulator may be damaged.

- <1> Turn off the power to the target system.
- <2> Solder the conversion socket to the target system. Use the following socket:
- EP-78024CW-R : Shrink DIP socket commercially available
 - EP-78024GF-R : Socket supplied as an accessory (EV-9200G-64)
- <3> Connect the ground clip of the emulation probe to the ground (GND) of the target system.
- <4> Connect the emulation probe to the target system so that the position of the tip of the emulation probe comes to the position of pin 1 of the conversion socket solder onto the target system in step <2> above.

Figure 2-3. Connecting EP-78024CW-R and Target System

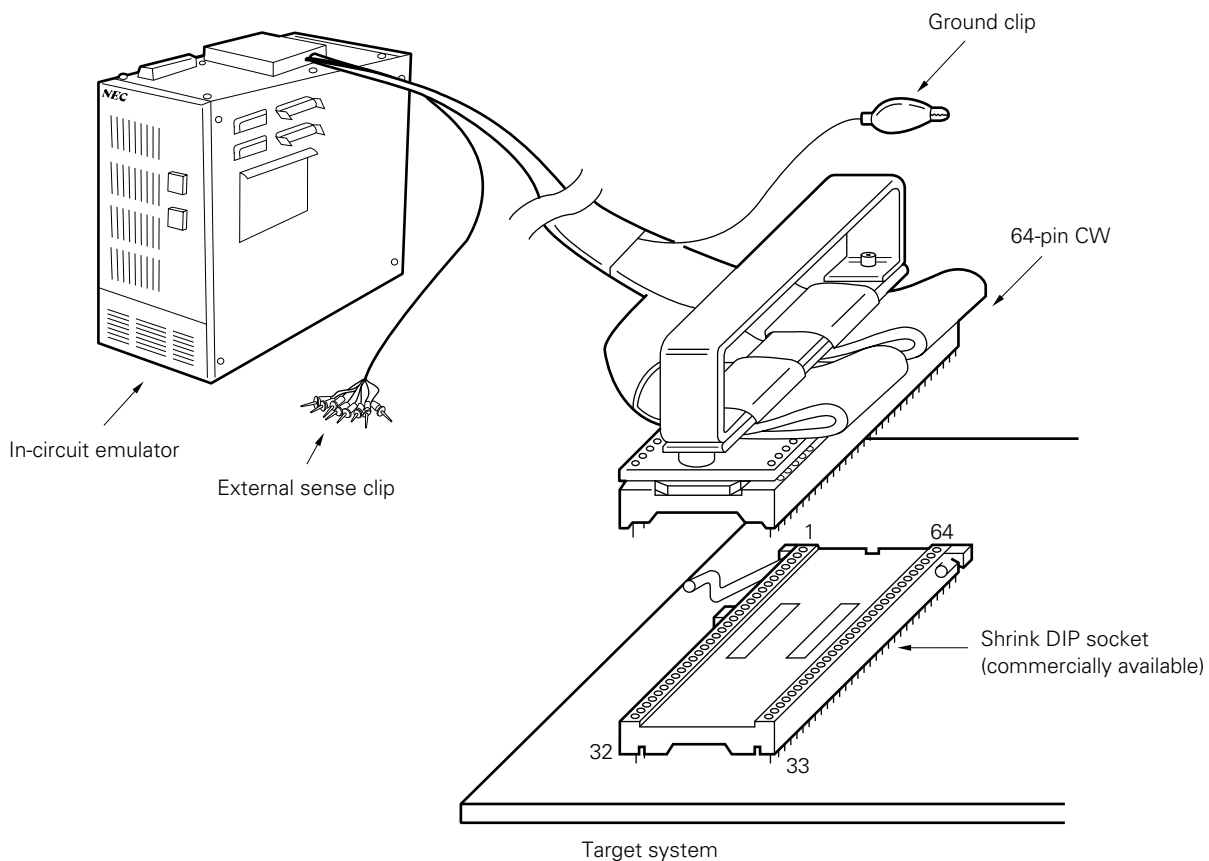
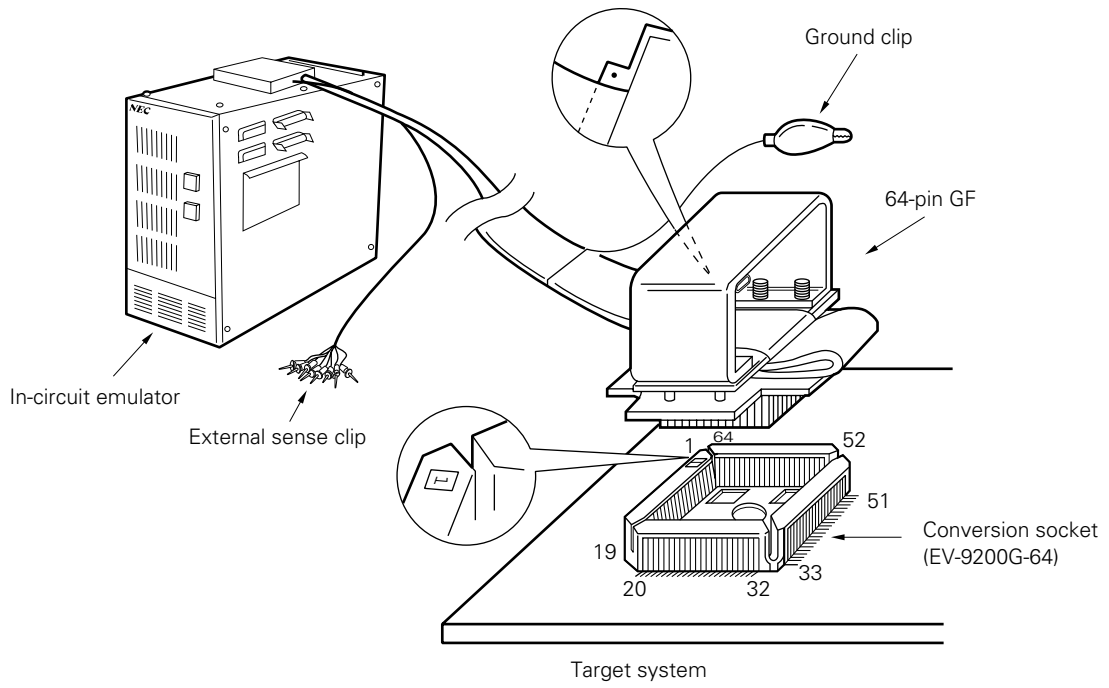


Figure 2-4. Connecting EP-78024GF-R and Target System



(4) Connecting external sense clip (when external sense clip is used)

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The emulation probe is provided with an external sense clip that consists of eight clips and can trace the signals of the hardware on the target system in real time.

Because the external sense clip is directly connected to the input buffer HCT244 in the in-circuit emulator, its input is TTL level.

Usually, the eight external sense clips are used as input signal lines. Depending on the setting of the OUT command of the in-circuit emulator, however, the signal line of external sense clip 1 can be used to output a trigger signal to an external device when an event occurs (for details, refer to the manual of the in-circuit emulator).

Cautions 1. Connect the external sense clips to the signal lines of TTL level. If they are connected to the other signal lines, the high and low levels of signals cannot be accurately detected. In addition, the sensors of the in-circuit emulator may be damaged depending on the voltage level.

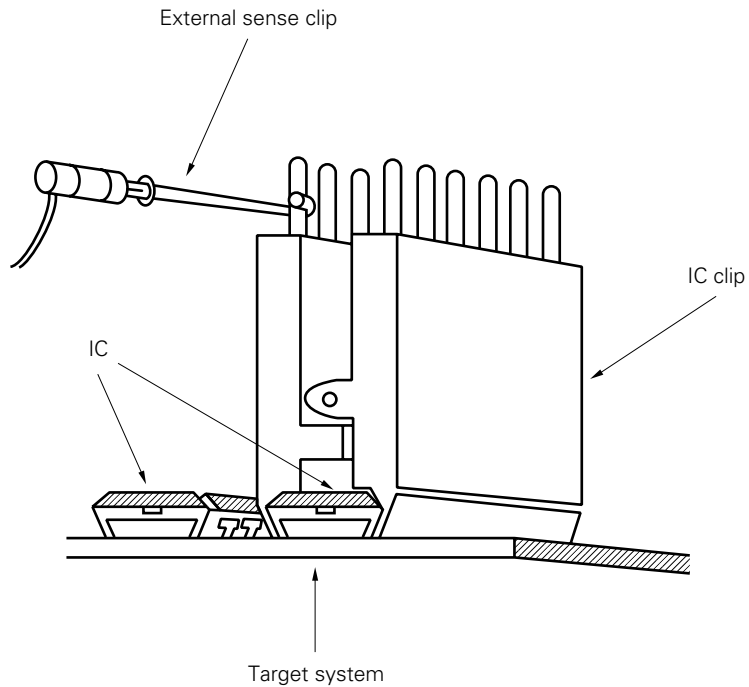
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2. When using external sense clip 1 as a trigger output line, make sure that external sense clip 1 is not connected to a signal output line. Otherwise, malfunction may occur.

Connect the external sense clip in the following sequence:

- <1> Turn off the power to the target system and then to the in-circuit emulator.
- <2> Mount a commercially available IC clip to the IC on the target system to be traced.
- <3> Connect the external sense clip to the IC clip.
- <4> Turn on the power to the in-circuit emulator and then to the target system.

Figure 2-5. Connecting External Sense Clip



Remark To connect the external sense clip, use an IC clip whenever possible, to prevent bad contact and improve operability.

2.2 Turning On/Off Power

After connecting the emulation probe and target system, turn on the power. Be sure to turn on or off the power in the sequence described below.

Caution Be sure to turn on/off the power in the correct sequence; otherwise, the in-circuit emulator may be damaged.

(1) Power-on sequence

- <1> Turn on power to the in-circuit emulator.
- <2> Turn on power to the target system.

(2) Power-off sequence

- <1> Turn off power to the target system.
- <2> Turn off power to the in-circuit emulator.

2.3 Removing Emulation Probe from Target System

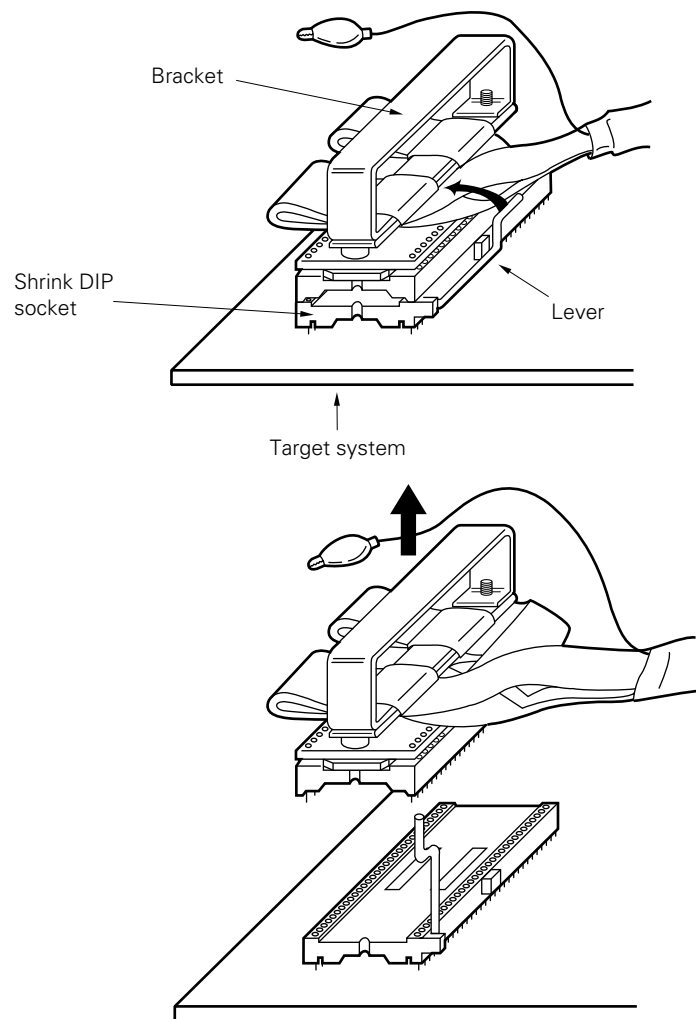
Remove the emulation probe from the target system in the following sequence:

(a) With EP-78024CW-R

- <1> Turn off power to the target system.
- <2> Turn off power to the in-circuit emulator.
- <3> Pull up the lever on the shrink DIP socket.
- <4> Pull up the bracket at the tip of the emulation probe at right angles to the target system, to remove the emulation probe from the shrink DIP socket.

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Figure 2-6. Removing EP-78024CW-R

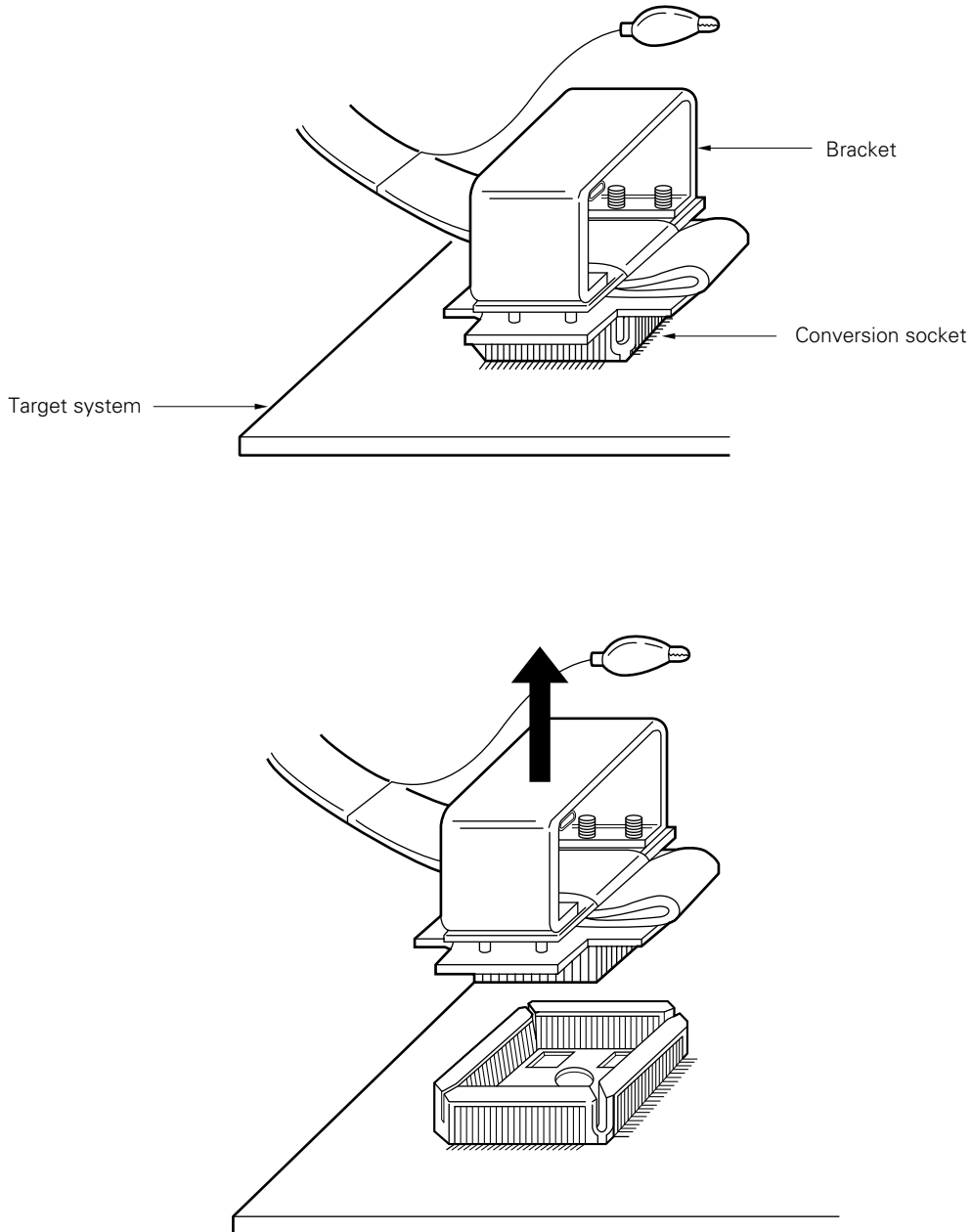


(b) With EP-78024GF-R

- <1> Turn off power to the target system.
- <2> Turn off power to the in-circuit emulator.
- <3> Pull up the bracket at the tip of the emulation probe at right angles to the target system, to remove the emulation probe from the conversion socket.

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Figure 2-7. Removing EP-78024GF-R



APPENDIX A PIN NUMBER OF EACH EMULATION PROBE

A.1 64-Pin CW and 64-Pin GF Emulation Probes

CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe	CNn Pin No.	Emulation Probe
1	GND	25	15	49	39	73	63
2		26	16	50	40	74	64
3	EXT0	27	17	51	41	75	NC
4	EXT1	28	18	52	42	76	
5	EXT2	29	19	53	43	77	
6	EXT3	30	20	54	44	78	
7	EXT4	31	21	55	45	79	
8	EXT5	32	22	56	46	80	
9	EXT6	33	23	57	47	81	
10	EXT7	34	24	58	48	82	
11	1	35	25	59	49	83	
12	2	36	26	60	50	84	
13	3	37	27	61	51	85	
14	4	38	28	62	52	86	
15	5	39	29	63	53	87	
16	6	40	30	64	54	88	
17	7	41	31	65	55	89	
18	8	42	32	66	56	90	
19	9	43	33	67	57	91	
20	10	44	34	68	58	92	
21	11	45	35	69	59	93	
22	12	46	36	70	60	94	
23	13	47	37	71	61	95	GND
24	14	48	38	72	62	96	

Remarks 1. CNn: connector connecting the emulation probe.

In the above table, it is assumed that the emulation board IE-78044-R-EM is used. The value of n differs depending on the emulation board connected. For details, refer to the User's Manual of the emulation board or in-circuit emulator.

2. The meanings of the symbols and numbers in the column "Emulation Probe" are as follows:

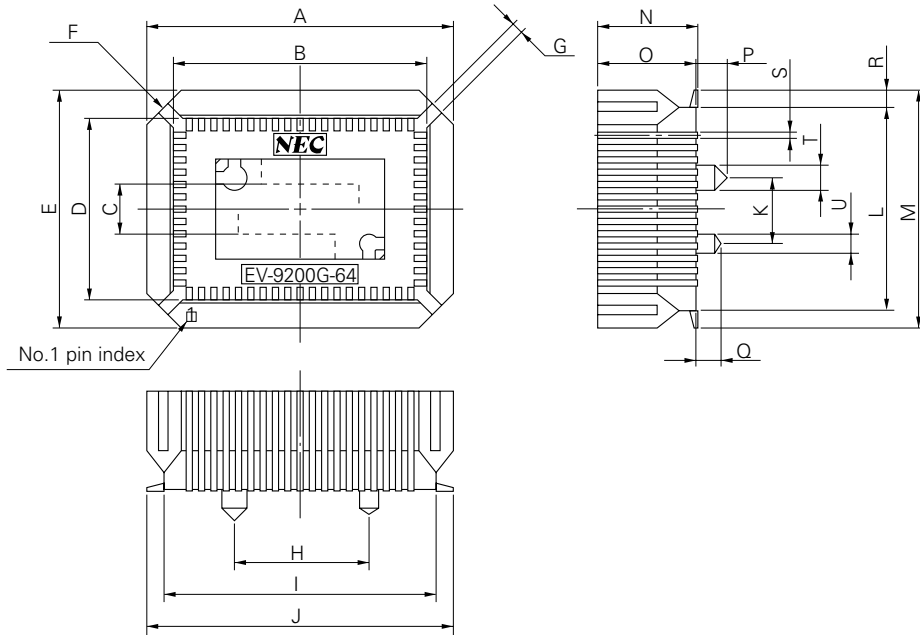
- GND : ground clip (GND)
- EXT0-EXT7 : external sense clip 1 to 8
- 1-64 : emulation probe pin number
- NC : No connection

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APPENDIX B SOCKET DRAWING AND FOOTPRINT OF CONVERSION SOCKET

B.1 EV-9200G-64

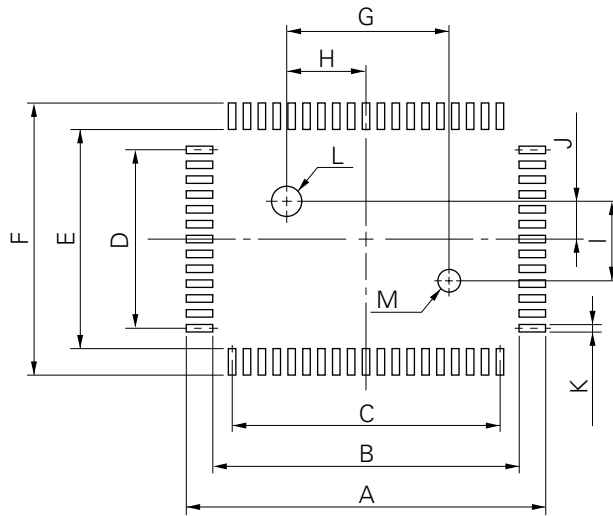
Figure B-1. Socket Drawing of EV-9200G-64 (Reference)



EV-9200G-64-G0

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
O	8.0	0.315
N	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	ƒ2.3	ƒ0.091
U	ƒ1.5	ƒ0.059

Figure B-2. Footprint of EV-9200G-64 (Reference)



EV-9200G-64-P0

ITEM	MILLIMETERS	INCHES
A	25.7	1.012
B	21.0	0.827
C	$1.0 \pm 0.02 \cdot 18 = 18.0 \pm 0.05$	$0.039^{+0.002}_{-0.001} \cdot 0.709 = 0.709^{+0.002}_{-0.003}$
D	$1.0 \pm 0.02 \cdot 12 = 12.0 \pm 0.05$	$0.039^{+0.002}_{-0.001} \cdot 0.472 = 0.472^{+0.003}_{-0.002}$
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	$\varnothing 2.36 \pm 0.03$	$\varnothing 0.093^{+0.001}_{-0.002}$
M	$\varnothing 1.57 \pm 0.03$	$\varnothing 0.062^{+0.001}_{-0.002}$

Caution Dimensions of mount pad for EV-9200 and that for target device (QFP) may be different in some parts. For the recommended mount pad dimensions for QFP, refer to "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (IEI-1207).

APPENDIX C REVISION HISTORY

The following table shows the revision history of this manual. The “Place” column indicates the chapter of each edition that was revised.

Edition	Revision	Place
2nd edition	Combined with EP-78024GF-R User’s Manual (EEU-1477)	Throughout
	Addition of Caution to description on connection between emulation board and connector board	CHAPTER 2 CONNECTION
	Addition of description and Caution to description on connection of external sense clip	
	Correction of Figure illustrating removal of emulation probe	

[MEMO]