USER'S MANUAL

NEC

EP-78064

EMULATION PROBE

EP-78064GC-R
EP-78064GF-R

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PREFACE

Target: This manual is intended for the user who uses in-circuit emulator and EP-78064 to debug microcomputer.

> Refer to the documents of the individual devices and the selection guide of the development tools for the combination of the emulation probes and target devices.

Purpose: The purpose of the manual is for the user to understand the connection method of EP-78064 to in-circuit emulator.

Organization: This manual consists of following main parts:

- General description
- Connection method

Guidance: Before reading this manual, read the in-circuit emulator relevant manuals to understand the debug system configuration and function.

- To understand the **EP-78064** function and connection method in a general way

→Read the manual according to the table of contents.

- To understand the operation environment, configuration, and target device

→Read **CHAPTER 1 GENERAL DESCRIPTION.**

- To understand the specific connection method

→Read **CHAPTER 2 CONNECTION.**

> Unless contextually excluded, references in this user's manual to EP-78064 mean EP-78064GF-R and EP-78064GC-R. If this manual is used as a manual for the EP-78064GF-R or EP-78064GC-R, the EP-78064 must be regarded as the EP-78064GF-R or EP-78064GC-R.

Legend:

Note:	Explanation of indicated part of the text
Caution:	Information requiring the user's special attention
Remark:	Supplementary information

Check: Check the names and quantity of the EP-78064 accessories against the following:
(If the accessories are not complete, call the NEC sales person or agency.)

• Emulation probe	One
• Connector board	One
• User's manual (this manual)	One
• Mounting screws [Note 1]	Two pieces
• Conversion socket (EV-9200GF-100, attached to EP-78064GF-R) [Note 2]	Two
• Conversion adapter (EV-9500GC-100, attached to EP-78064GC-R) [Note 2]	Two

Notes
1. Use the mounting screws to connect the emulation probe and in-circuit emulator.
2. Use the conversion socket and the conversion adapter to connect the emulation probe and target system.

< Connector Board and Conversion Socket/Conversion Adapter Correspondence Table >

Emulation Probe	Connector Board	Conversion Socket/Conversion Adapter
EP-78064GF-R	100GF CONNECTOR	EV-9200GF-100
EP-78064GC-R	100GC CONNECTOR	EV-9500GC-100

CONTENTS

[MEMO]

CHAPTER 1 GENERAL DESCRIPTION

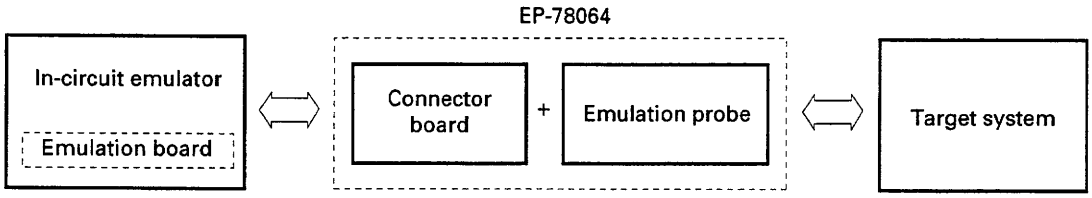
This chapter outlines the EP-78064.

1.1 Operation Environment

The EP-78064 is a probe set to connect in-circuit emulator and a target system. When they are connected by the EP-78064, a microcomputer environment is provided and the target system hardware and software can be debugged totally. See **CHAPTER 2 CONNECTION** for the specific connection method.

Figure 1-1. Operation Environment

- **Connection of in-circuit emulator and target system**



1.2 Configuration

The EP-78064 is a set of a emulation probe and connector board.

(1) Emulation probe

The emulation probe consists of the following:

☐ Probe
Connects in-circuit emulator and target system.
- EP-78064GF-R: 100-pin GF probe
- EP-78064GC-R: 100-pin GC probe

☐ Ground clip
The ground clip is connected to target system GND. In-circuit emulator and target system GND potentials become the same and resistance to static electricity and noise is provided.

☐ External sense clips
These eight sense clips are used to see the pin voltage levels of ICs mounted on the target system.

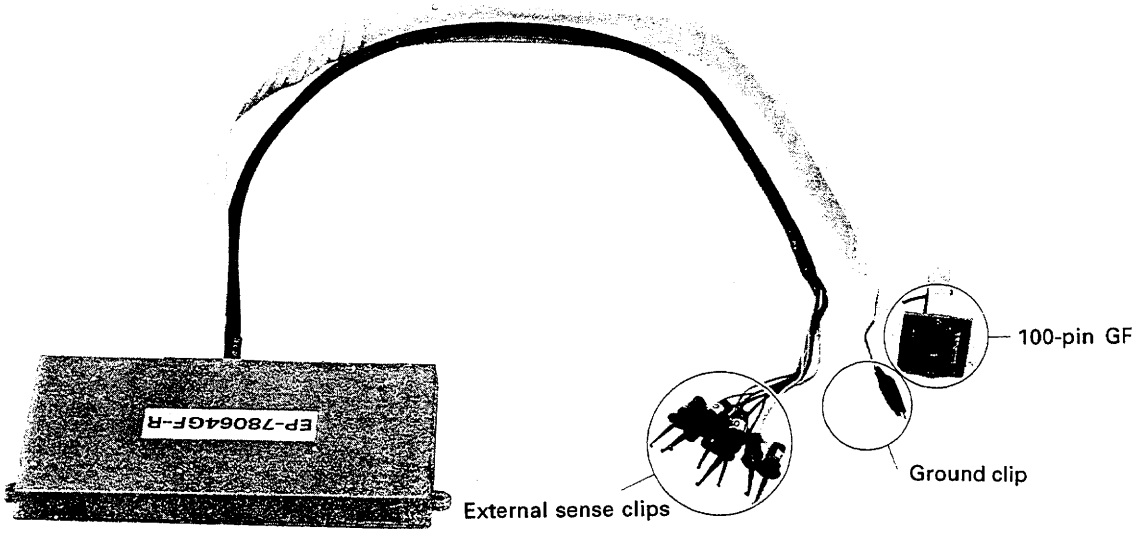
(2) Connector board

The connector board is a board used to connect the output pins to the emulation probe on the emulation board. The connector board is attached to the emulation board connector[Note].

Note The connecting parts depend on the emulation board used. Refer to the in-circuit emulator or emulation board User's Manual.

Figure 1-2. EP-78064 and Connector Board (1/2)

EP-78064GF-R



EP-78064GC-R

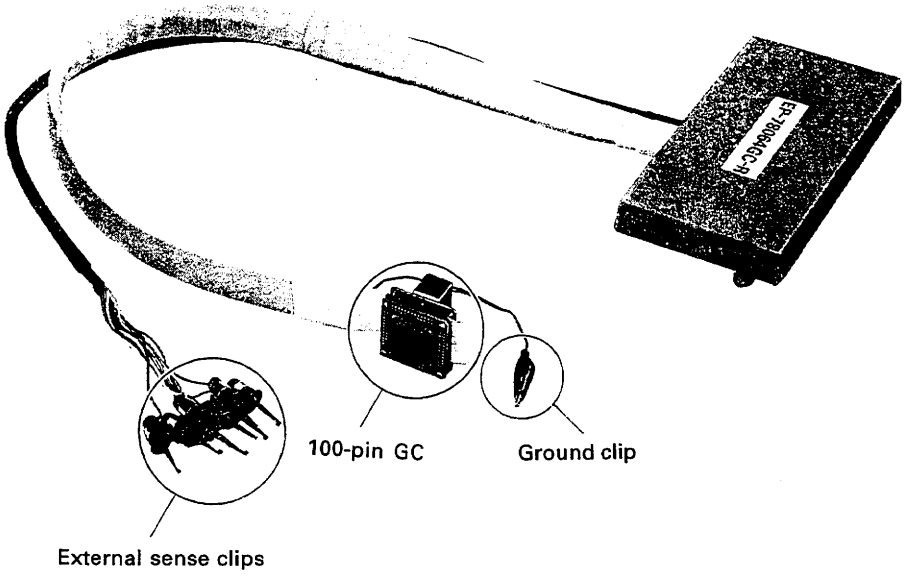
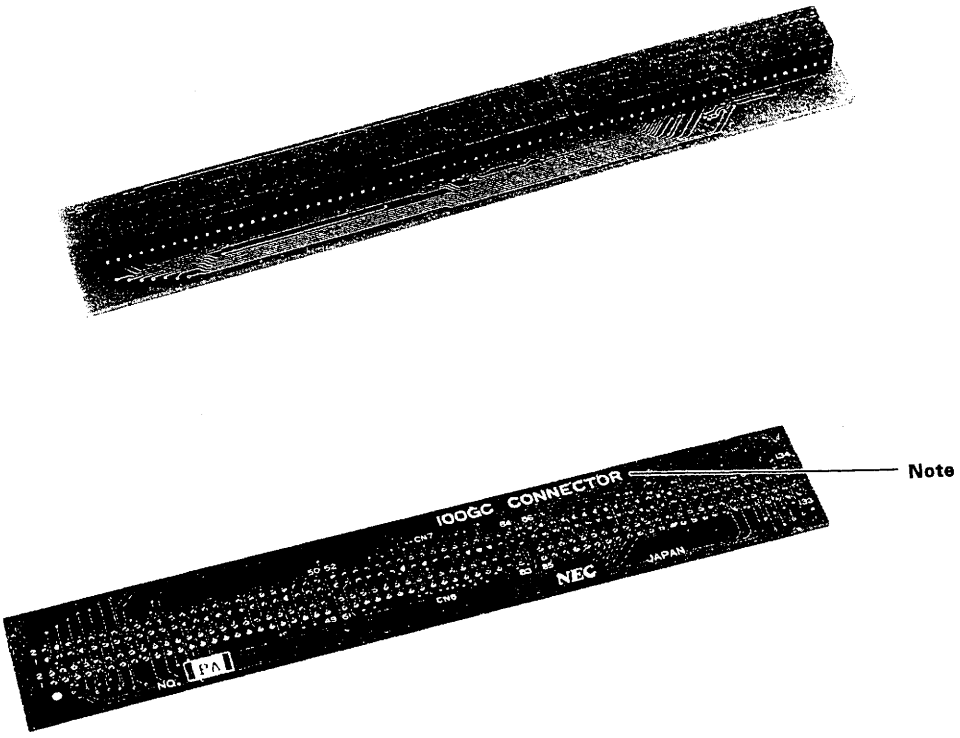


Figure 1-2. EP-78064 and Connector Board (2/2)

Connector Board



Note There is silk printing of the names corresponding to the probes. Confirm it is in pair with the probe.

CHAPTER 2 CONNECTION

This chapter explains the EP-78064 connection method, power on and off sequence, and emulation probe removal method from the target system.

2.1 Connection of In-circuit Emulator and Target System

The connection procedure is outlined below:

(1) Connection of emulation board and connector board

1) Turn off the in-circuit emulator power.
2) Connect emulation board and the connector board.
3) Install emulation baord (with the connector board) on in-circuit emulator.

(2) Connection of in-circuit emulator and emulation probe

(3) Connection of emulation probe and target system

1) Turn off the target system power.
2) Solder a conversion socket or an adapter on the target system.
3) Insert the emulation probe tip in the conversion socket or the conversion adapter.

(4) External sense clip connection (when external sense clips are used)

(5) Power on

Next, these connection procedures are explained in detail.

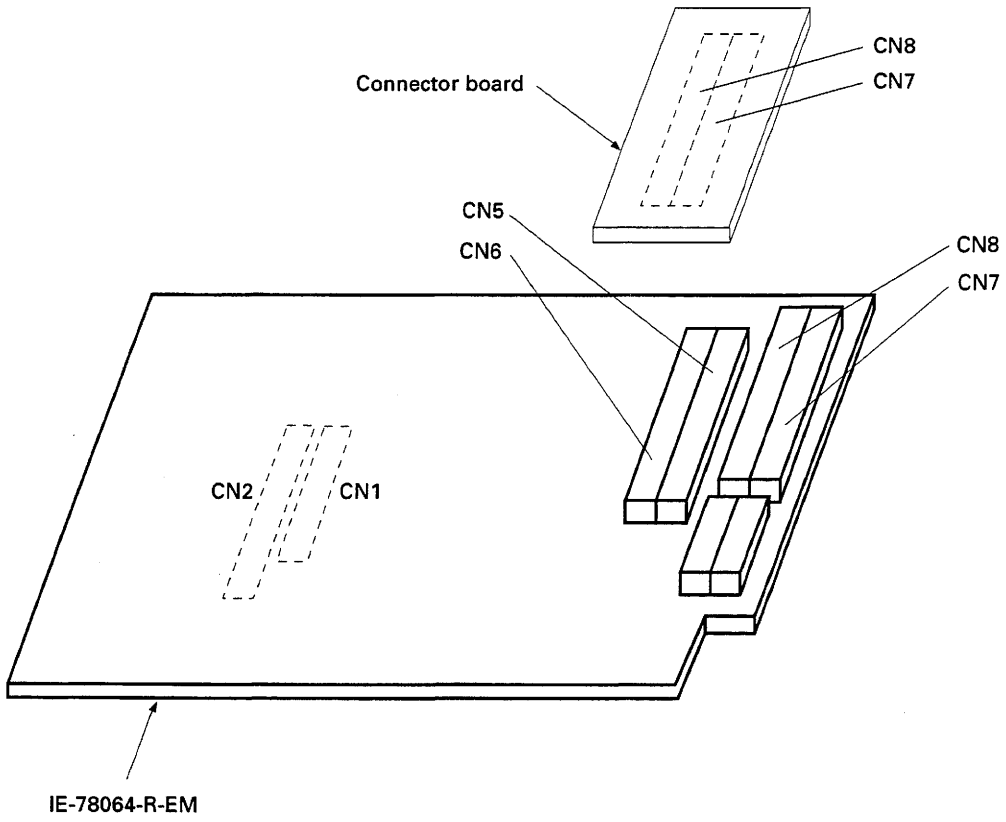
(1) Connection of emulation board and connector board

IE-78064-R-EM connection procedure are as follows:

Caution If the connector board is inserted with a wrong connector, the in-circuit emulator may be destroyed.

1) Connect IE-78064-R-EM CN7, CN8 to connector board CN7, CN8, respectively.
2) Turn off the IE-78000-R power.
3) Unscrew the six screws on the top of the IE-78000-R main unit and open the main unit top cover.
4) Pull the card pullers at both ends of the board toward you and draw out IE-78000-R-BK.
5) Screw IE-78064-R-EM and IE-78000-R-BK together.
6) Upon completion of the connection, restore IE-78000-R-BK with IE-78064-R-EM to the former position in the IE-78000-R main unit.

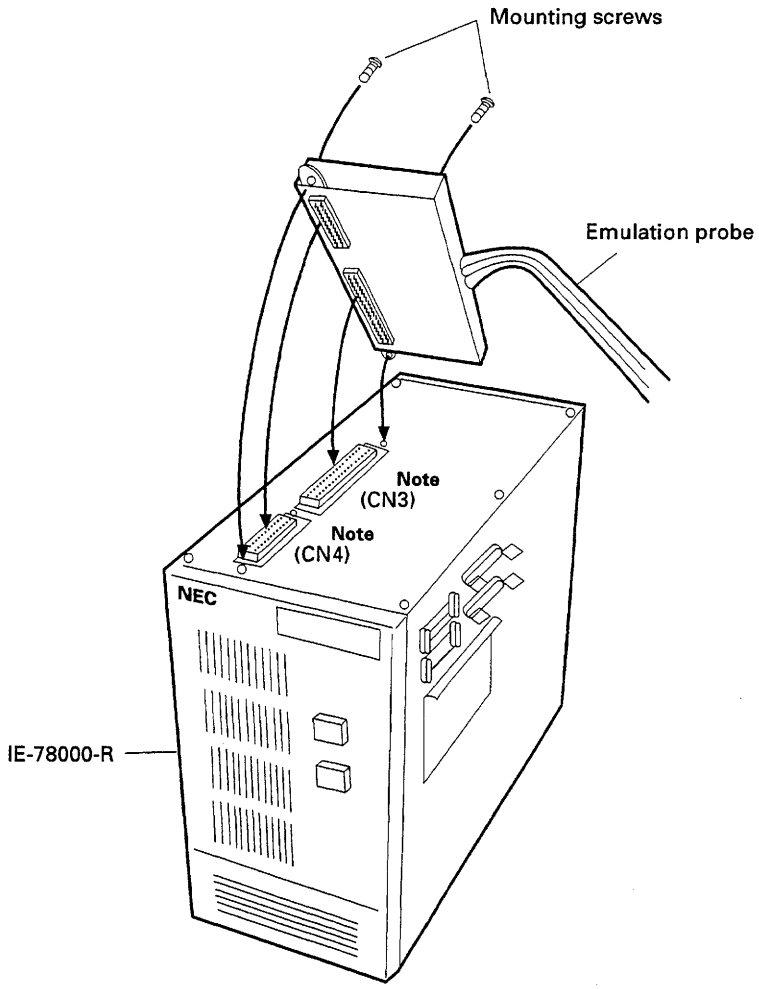
Figure 2-1. Connection of IE-78064-R-EM and Connector Board



(2) Connection of in-circuit emulator and emulation probe

1) Connect the emulation probe to the emulation probe connection DIN connector on the in-circuit emulator top.
2) After connection, be sure to fix the emulation probe and in-circuit emulator with mounting screws.

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



Note In case of using IE-78064-R-EM for the emulation board. The number of the connector connecting the emulation probe may be different, according to the emulation board used.
Refer to the in-circuit emulator or emulation board User's Manual.

(3) Connection of emulation probe and target system

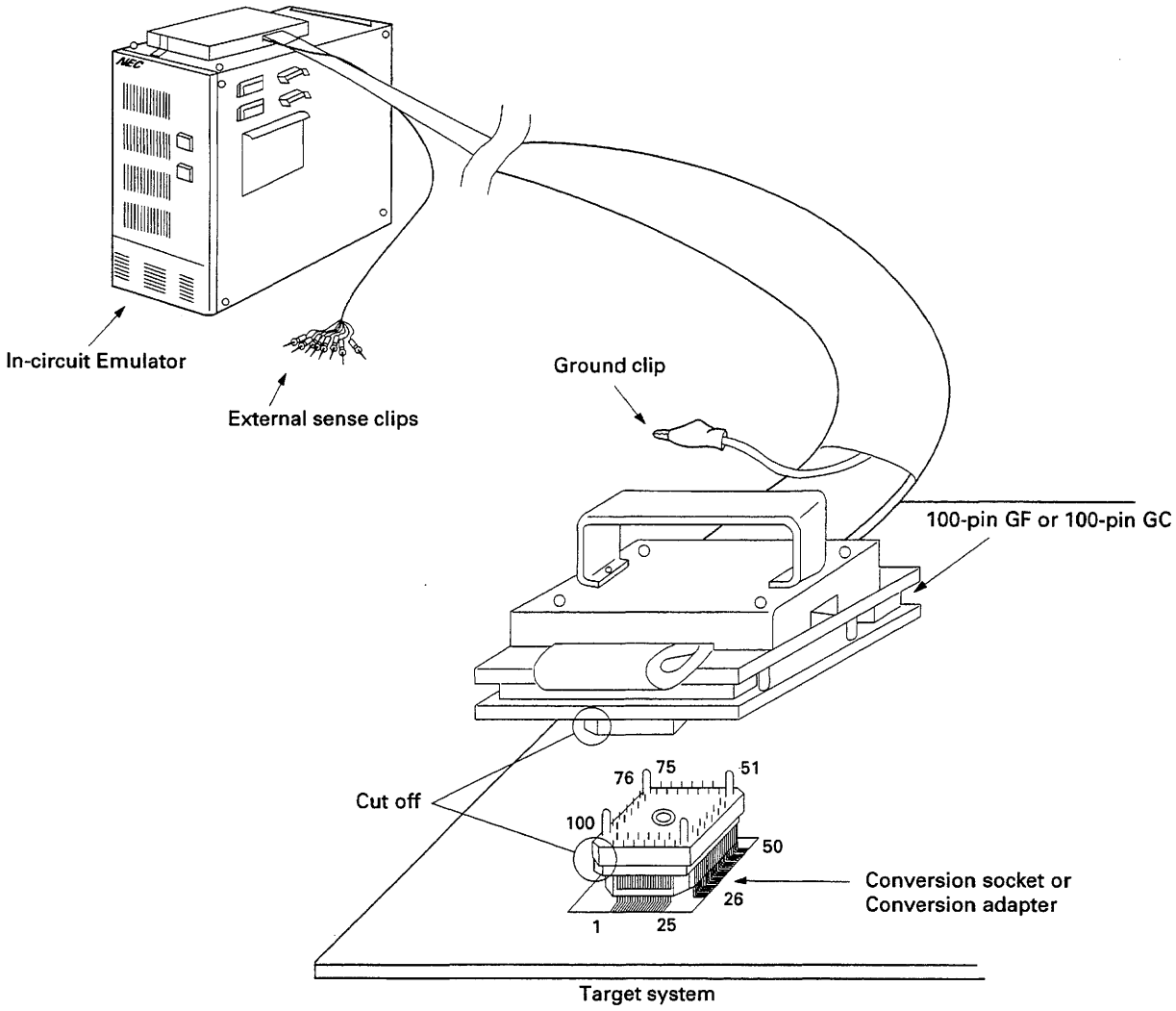
Connect the emulation probe and target system in the following sequence:

Cautions 1. Before connecting the emulation probe to the target system, be sure to connect the ground clip first. If the ground clip is not connected, in-circuit emulator may be destroyed due to static electricity, etc.

2. In connection, be careful so as not to insert the pins oppositely. If erroneous connection is made, in-circuit emulator may be destroyed.

1) Turn off the target system power.
2) Solder the conversion socket (accessory: EV-9200GF-100) or the conversion adapter (accessory: EV-9500GC-100) to the target system.
3) Connect the emulation probe ground clip to the target system ground (GND).
4) Insert the emulation probe so that pin 1 of the 100-pin GF or of the 100-pin GC at the tip of the emulation probe main unit couples with pin 1 of the conversion socket or of the conversion adapter soldered on the target system in 2).

Figure 2-3. Connection of Emulation Probe and Target System



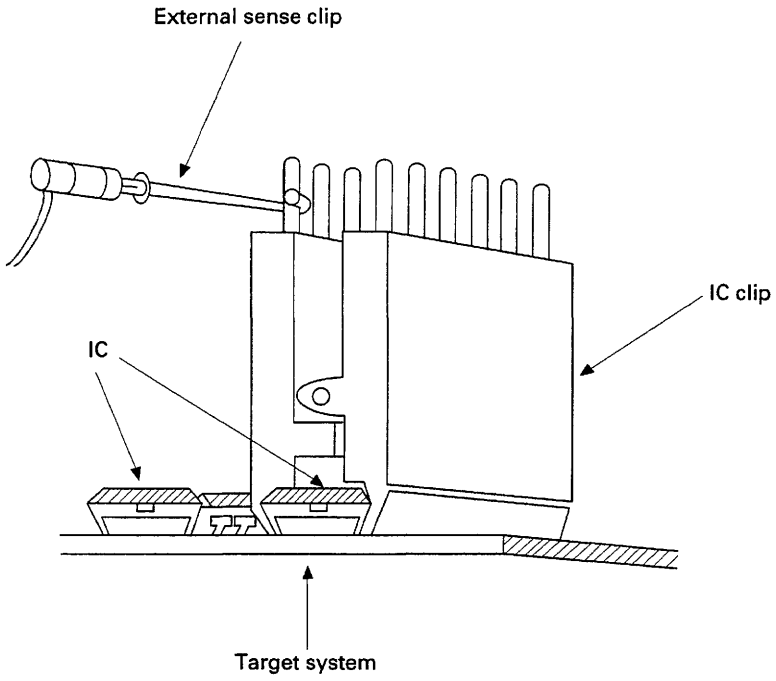
(4) External sense clip connection

The emulation probe has eight external sense clips that can trace the hardware signals on the target system in realtime.
The external sense clips are directly connected to the input buffer HCT244 installed in the in-circuit emulator main unit, therefore their input levels are TTL levels.
The eight external sense clips are usually input signal lines, but the signal line of the No.1 external sense clip can be used as the trigger output signal line to the external circuit at the time an event is generated by setting an in-circuit emulator OUT command (refer to the in-circuit emulator User's Manual).
To use the external sense clips, connect in the following sequence:

Cautions
1. **Connect the external sense clips only to TTL level signal lines. If the external sense clip is connected to any other signal line than the TTL level, accurate high or low level cannot be detected. The in-circuit emulator sensor may be destroyed depending on the voltage level.**
2. **When the No.1 external sense clip is used as an external trigger output, be sure the No.1 external sense clip is not connected to the signal output line. Negligence in this may result in trouble.**

1) Turn off the target system power and the in-circuit emulator power in order.
2) Attach a commercially available IC clip to any IC to be traced on the target system.
3) Connect the external sense clip to the attached IC clip.
4) Turn on the in-circuit emulator power and the target system power in order.

Figure 2-4. External Sense Clip Connection



Remark To connect the external sense clips, preferably use IC clips. Touch mistake can be prevented to improve operability.

2.2 Power On and Off Sequence

Upon completion of connection of the emulation probe and target system, next turn on the power. The power on and off sequence is as follows:

Caution **Be sure to turn on and off the power in the sequence described below. If you turn on and off the power in erroneous sequence, in-circuit emulator may be destroyed.**

- Power on sequence
  1) Turn on the in-circuit emulator power.
  2) Turn on the target system power.

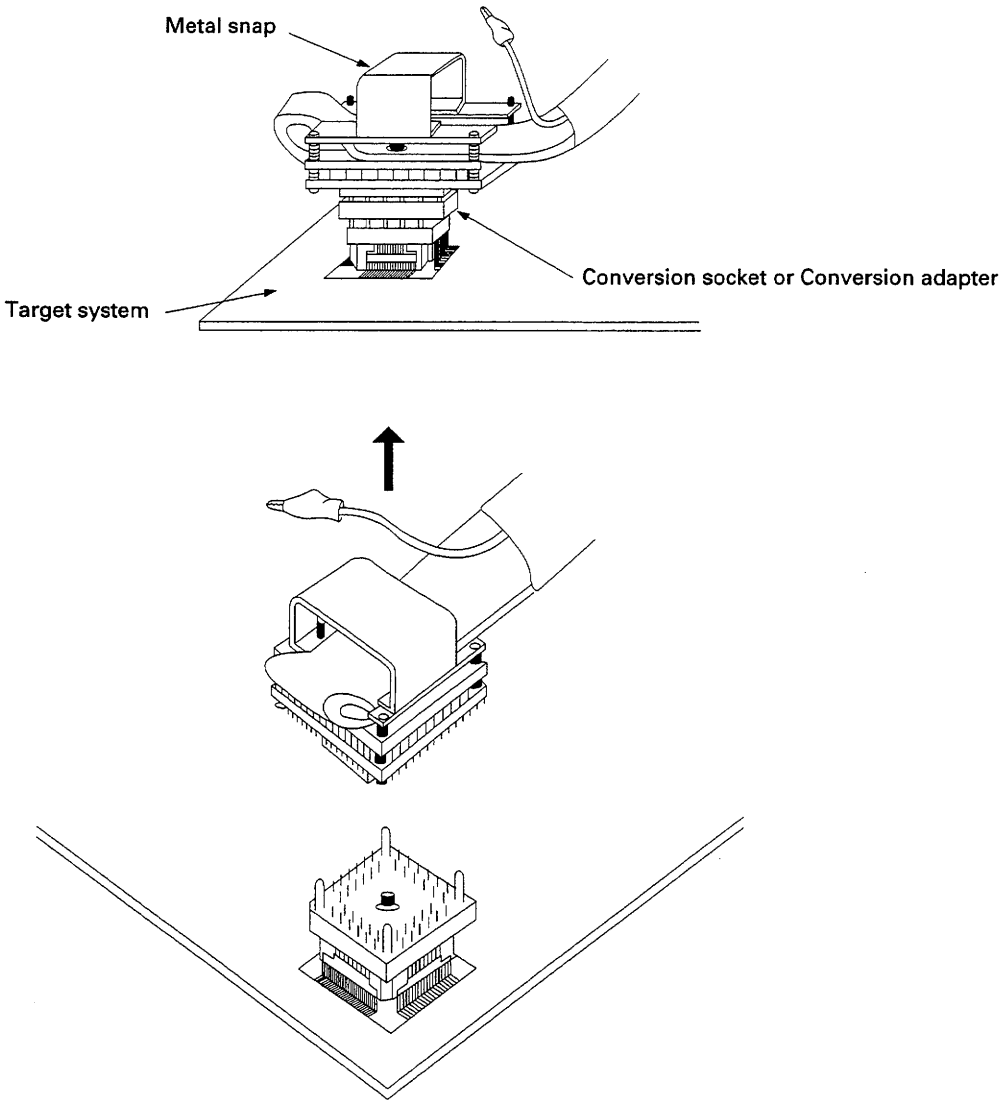
- Turn off sequence
  1) Turn off the target system power.
  2) Turn off the in-circuit emulator power.

2.3 Removal of Emulation Probe from Target System

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

1) Turn off the target system power.
2) Turn off the in-circuit emulator power.
3) Pull the metal snap at the emulation probe tip just above and draw out the emulation probe from the conversion socket or the conversion adapter.

Figure 2-5. Removal of Emulation Probe from Target System



[MEMO]

APPENDIX A EMULATION PROBE PIN CORRESPONDENCE TABLE

A.1 100-pin GF Emulation Probe

CN_3 Pin No.	Emulation probe	CN_3 Pin No.	Emulation probe	CN_3 Pin No.	Emulation probe	CN_3 Pin No.	Emulation probe
1	GND	25	3	49	15	73	45
2		26	2	50	14	74	46
3	30	27	1	51	100	75	47
4	29	28	NC	52	99	76	48
5	28	29		53	98	77	49
6	27	30		54	97	78	50
7	26	31		55	96	79	63
8	25	32		56	95	80	64
9	24	33		57	94	81	65
10	23	34		58	93	82	66
11	22	35		59	92	83	67
12	21	36	40	60	91	84	81
13	20	37	39	61	NC	85	82
14	19	38	38	62		86	83
15	13	39	37	63		87	84
16	12	40	36	64		88	85
17	11	41	35	65		89	86
18	10	42	34	66		90	87
19	9	43	33	67		91	88
20	8	44	32	68		92	89
21	7	45	31	69	41	93	90
22	6	46	18	70	42	94	NC
23	5	47	17	71	43	95	
24	4	48	16	72	44	96	

Remarks 1. CN_3: Connector connecting the emulation probe.
In case of using IE-78064-R-EM for the emulation board. The number of the connector connecting the emulation probe may be different, according to the emulation board connected. Refer to the emulation board or in-circuit emulator User's Manual.

2. The symbols and number under emulation probe have the following meanings.

GND : Ground clip (GND)
1-100 : Pin numbers of 100-pin GF at emulation probe tip
NC : No connection

CN_4 Pin No.	Emulation probe	CN_4 Pin No.	Emulation probe	CN_4 Pin No.	Emulation probe	CN_4 Pin No.	Emulation probe
1	NC	13	58	25	75	37	NC
2		14	59	26	76	38	
3		15	60	27	77	39	EXT0
4		16	61	28	78	40	EXT1
5		17	62	29	79	41	EXT2
6	51	18	68	30	80	42	EXT3
7	52	19	69	31	NC	43	EXT4
8	53	20	70	32		44	EXT5
9	54	21	71	33		45	EXT6
10	55	22	72	34		46	EXT7
11	56	23	73	35		47	GND
12	57	24	74	36		48	

Remarks 1. CN_4: Connector connecting the emulation probe.
In case of using IE-78064-R-EM for the emulation board. The number of the connector connecting the emulation probe may be different, according to the emulation board connected. Refer to the emulation board or in-circuit emulator User's Manual.

2. The symbols and number under emulation probe have the following meanings.

GND	:	Ground clip (GND)
EXT0-EXT7	:	External sense clip 1 - 8
51-80	:	Pin numbers of 100-pin GF at emulation probe tip
NC	:	No connection

A.2 100-pin GC Emulation Probe

CN_3 Pin No.	Emulation probe	CN_3 Pin No.	Emulation probe	CN_3 Pin No.	Emulation probe	CN_3 Pin No.	Emulation probe
1	GND	25	3	49	15	73	45
2		26	2	50	14	74	46
3	30	27	1	51	100	75	47
4	29	28	NC	52	99	76	48
5	28	29		53	98	77	49
6	27	30		54	97	78	50
7	26	31		55	96	79	63
8	25	32		56	95	80	64
9	24	33		57	94	81	65
10	23	34		58	93	82	66
11	22	35		59	92	83	67
12	21	36	40	60	91	84	81
13	20	37	39	61	NC	85	82
14	19	38	38	62		86	83
15	13	39	37	63		87	84
16	12	40	36	64		88	85
17	11	41	35	65		89	86
18	10	42	34	66		90	87
19	9	43	33	67		91	88
20	8	44	32	68		92	89
21	7	45	31	69	41	93	90
22	6	46	18	70	42	94	NC
23	5	47	17	71	43	95	
24	4	48	16	72	44	96	

Remarks 1. CN_3: Connector connecting the emulation probe.
In case of using IE-78064-R-EM for the emulation board. The number of the connector connecting the emulation probe may be different, according to the emulation board connected. Refer to the emulation board or in-circuit emulator User's Manual.

2. The symbols and number under emulation probe have the following meanings.

GND : Ground clip (GND)
1-100 : Pin numbers of 100-pin GC at emulation probe tip
NC : No connection

CN_4 Pin No.	Emulation probe	CN_4 Pin No.	Emulation probe	CN_4 Pin No.	Emulation probe	CN_4 Pin No.	Emulation probe
1	NC	**13**	58	**25**	75	**37**	NC
2		**14**	59	**26**	76	**38**	
3		**15**	60	**27**	77	**39**	EXT0
4		**16**	61	**28**	78	**40**	EXT1
5		**17**	62	**29**	79	**41**	EXT2
6	51	**18**	68	**30**	80	**42**	EXT3
7	52	**19**	69	**31**	NC	**43**	EXT4
8	53	**20**	70	**32**		**44**	EXT5
9	54	**21**	71	**33**		**45**	EXT6
10	55	**22**	72	**34**		**46**	EXT7
11	56	**23**	73	**35**		**47**	GND
12	57	**24**	74	**36**		**48**	

Remarks 1. CN_4: Connector connecting the emulation probe.
In case of using IE-78064-R-EM for the emulation board. The number of the connector connecting the emulation probe may be different, according to the emulation board connected. Refer to the emulation board or in-circuit emulator User's Manual.

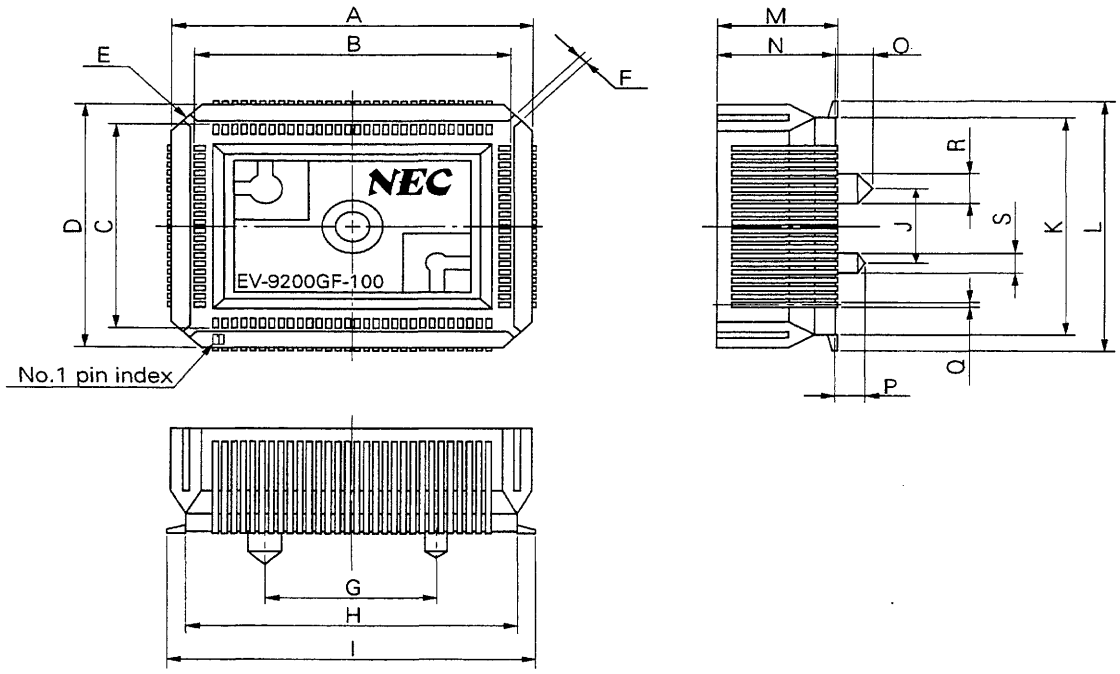
2. The symbols and number under emulation probe have the following meanings.

GND	:	Ground clip (GND)
EXT0-EXT7	:	External sense clip 1 - 8
51-80	:	Pin numbers of 100-pin GC at emulation probe tip
NC	:	No connection

APPENDIX B DRAWINGS AND FOOTPRINT OF CONVERSION SOCKET AND ADAPTER

B.1 EV-9200GF-100 Conversion Socket

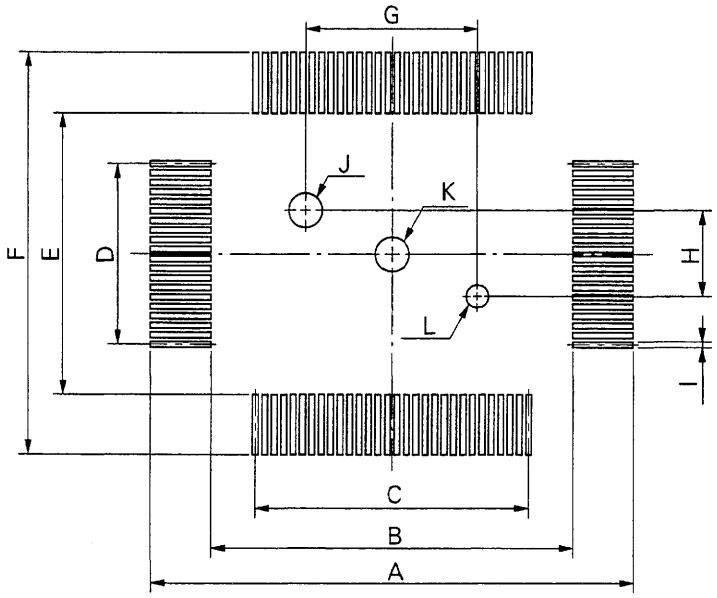
Figure B-1. Socket Drawing of EV-9200GF-100 (Reference)



EV-9200GF-100-G0

ITEM	MILLIMETERS	INCHES
A	24.6	0.969
B	21	0.827
C	15	0.591
D	18.6	0.732
E	4-C 2	4-C 0.079
F	0.8	0.031
G	12.0	0.472
H	22.6	0.89
I	25.3	0.996
J	6.0	0.236
K	16.6	0.654
L	19.3	076
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	ϕ2.3	ϕ0.091
S	ϕ1.5	ϕ0.059

Figure B-2. EV-9200GF-100 Footprint (Reference)

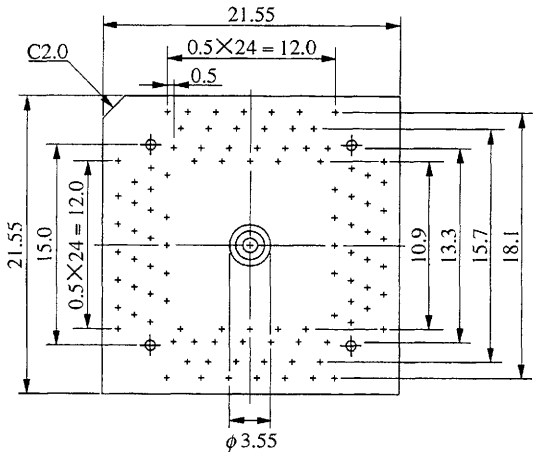


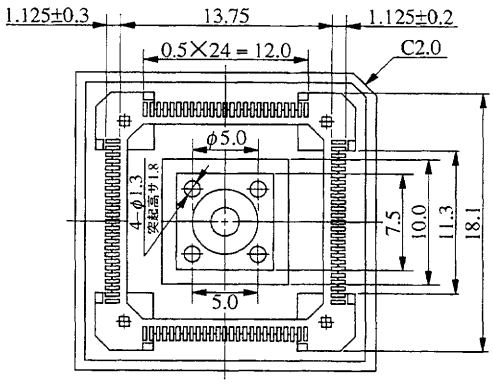
EV-9200GF-100-P0

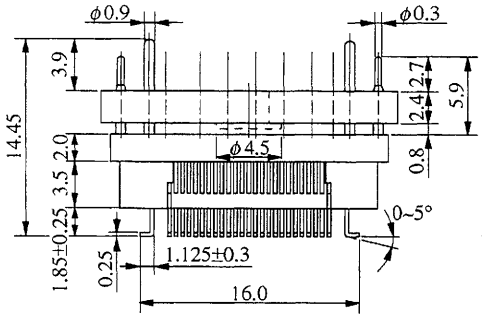
ITEM	MILLIMETERS	INCHES
A	26.3	1.035
B	21.6	0.85
C	0.65±0.02 × 29=18.85±0.05	$0.026^{+0.001}_{-0.002} \times 1.142 = 0.742^{+0.002}_{-0.002}$
D	0.65±0.02 × 19=12.35±0.05	$0.026^{+0.001}_{-0.002} \times 0.748 = 0.486^{+0.003}_{-0.002}$
E	15.6	0.614
F	20.3	0.799
G	12±0.05	$0.472^{+0.003}_{-0.002}$
H	6±0.05	$0.236^{+0.003}_{-0.002}$
I	0.35±0.02	$0.014^{+0.001}_{-0.001}$
J	φ2.36±0.03	$\phi 0.093^{+0.001}_{-0.002}$
K	φ2.3	φ0.091
L	φ1.57±0.03	$\phi 0.062^{+0.001}_{-0.002}$

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).

B.2 EV-9500GC-100 Conversion Adapter







EV-9500GC-100-G0

[MEMO]