NEC

User's Manual

EP-78012GK-R

Emulation Probe

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Major Revisions in This Edition

Page	Description
Throughout	Change of conversion adapter EV-9500GK-64 to TGK-064SBW of TOKYO ELETECH CORPORATION.
p. 25	Addition of package drawings in **APPENDIX B CONVERSION ADAPTER (TGK-064SBW)**
p. 27	Addition of **APPENDIX C REVISION HISTORY**

The mark ★ shows major revised points.

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INTRODUCTION

Target Readers

This manual is intended for users who wish to debug microcontrollers using an in-circuit emulator and the EP-78012GK-R.

> 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-78012GK-R to an in-circuit emulator.

Organization

This manual contains the following information:

- General
- Connections

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-78012GK-R:
→ Read this manual in the order of the **CONTENTS**.

To understand the operating environment and organization:
→ Read **CHAPTER 1 GENERAL**.

To understand the details of connections:
→ Read **CHAPTER 2 CONNECTION**.

Conventions

Note : Footnote for item marked with Note in the text

Caution: Information requiring particular attention

Remark: Supplementaly information

Unpacking Carton Box

The carton box of the EP-78012GK-R contains the following items. Confirm that all the items are included. If any item is missing or damaged, consult an NEC sales representative.

Emulation probe × 1
Connector board × 1
User's Manual (this manual) × 1
Mounting screw[Note 1] × 2
★ Conversion adapter (TGK-064SBW)[Note 2] × 1

Notes 1. These screws are used to connect the emulation probe to the in-circuit emulator.

2. This adapter is used to connect the emulation probe to the target system.
★ The TGK-064SBW is a product of TOKYO ELETECH CORPORATION.
Refer to: Daimaru Kogyo, Ltd. Tokyo Electronic Components Division (03-3820-7112)
TOKYO ELETECH CORPORATION (03-5295-1661)

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CHAPTER 1 GENERAL

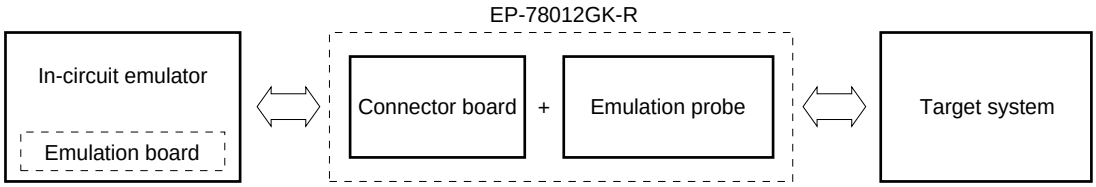
This chapter describes the EP-78012GK-R.

1.1 Operating Environment

The EP-78012GK-R is a probe set that connects an in-circuit emulator and a target system. By connecting the in-circuit emulator and target board with the EP-78012GK-R, 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-78012GK-R consists of an emulation probe and a connector board.

(1) Emulation probe

The emulation probe consists of the following three parts:

- **64-pin GK probe**

  Connects the in-circuit emulator and target system.

- **Ground clip**

  Connects 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 static electricity resistance and noise immunity of the system.

- **External sense clip**

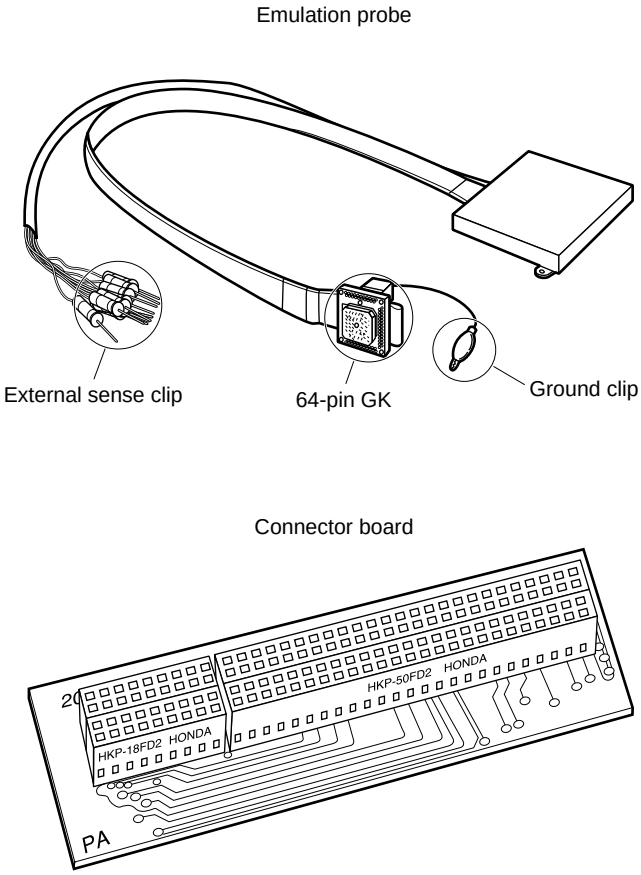
  Consists of eight sense clips which are used to check the voltage level of the pins of the IC mounted on the target system.

(2) Connector board

The connector board connects the pins that are output to the emulation probe, on the emulation board and is connected to the connector [Note] on the emulation board.

Note The place on the emulation board where 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-78012GK-R and Connector Board



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CHAPTER 2 CONNECTION

This chapter describes how to connect the EP-78012GK-R, turn on/off power, and remove the emulation probe from the target system.

2.1 Connecting In-Circuit Emulator and Target System

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

(1) Connecting the emulation board and connector board

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

(2) Connecting the in-circuit emulator and the emulation probe

(3) Connecting the emulation probe to the target system

<1> Turn off the power of the target system.
<2> Solder the conversion adapter to the target system.
<3> Insert the tip of the emulation probe into the conversion adapter.

(4) Connecting the external sense clip (if the external sense clip is used)

(5) Turning on the power

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

(1) Connecting emulation board and connector board

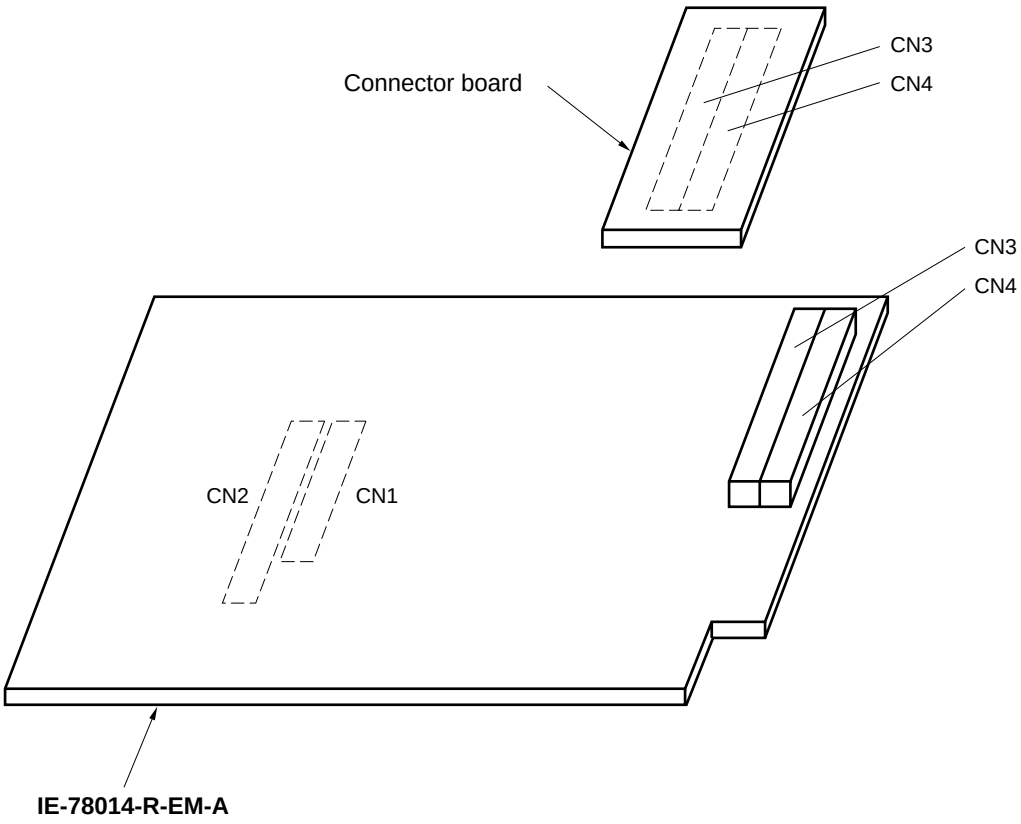
Connect the connector board to the emulation board.

In the following description, it is assumed that the IE-78014-R-EM-A is used as the emulation board.

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

(1) Connect CN3 and CN4 of the IE-78014-R-EM-A to CN3 and CN4 of the connector board.
(2) Turn off the power of the IE-78000-R.
(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 board, and pull out the IE-78000-R-BK.
(5) Fasten the IE-78014-R-EM-A and IE-78000-R-BK with screws.
(6) Return the IE-78000-R-BK, onto which the IE-78014-R-EM-A has been mounted, to the original position in the IE-78000-R.

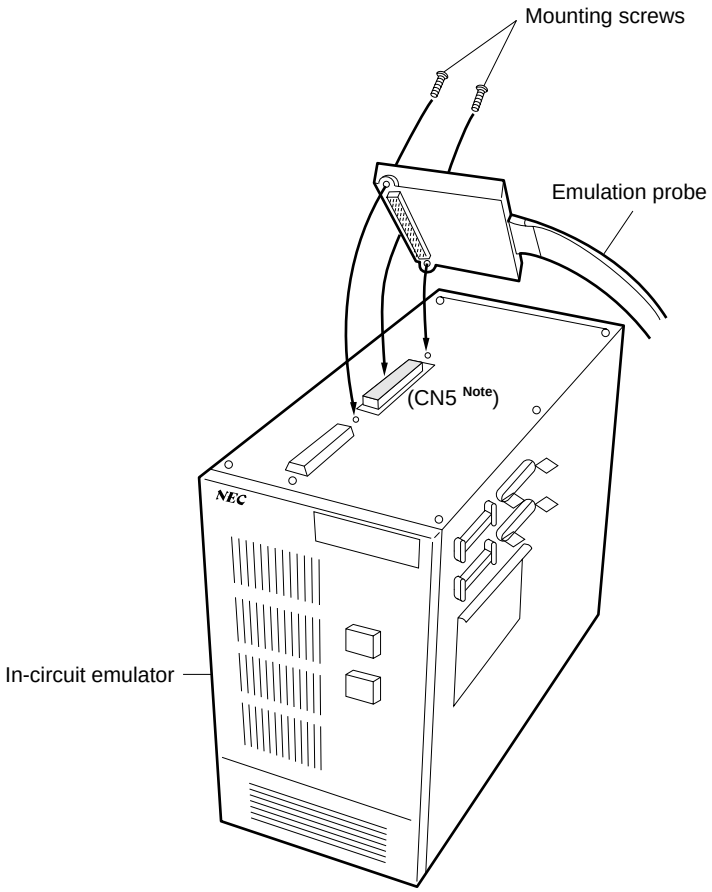
Figure 2-1. Connecting IE-78014-R-EM-A and Connector Board



(2) Connecting in-circuit emulator and emulation probe

(1) Connect the emulation probe to the DIN connector for emulation probe use that is on the top of the in-circuit emulator.
(2) After connection, be sure to fix the emulation probe and in-circuit emulator with screws.

Figure 2-2. Example of Connecting In-Circuit Emulator and Emulation Probe



Note This figure shows the case where the IE-78014-R-EM-A is used as the emulation board. The number of 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 to target system

Connect the emulation probe to the 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.**

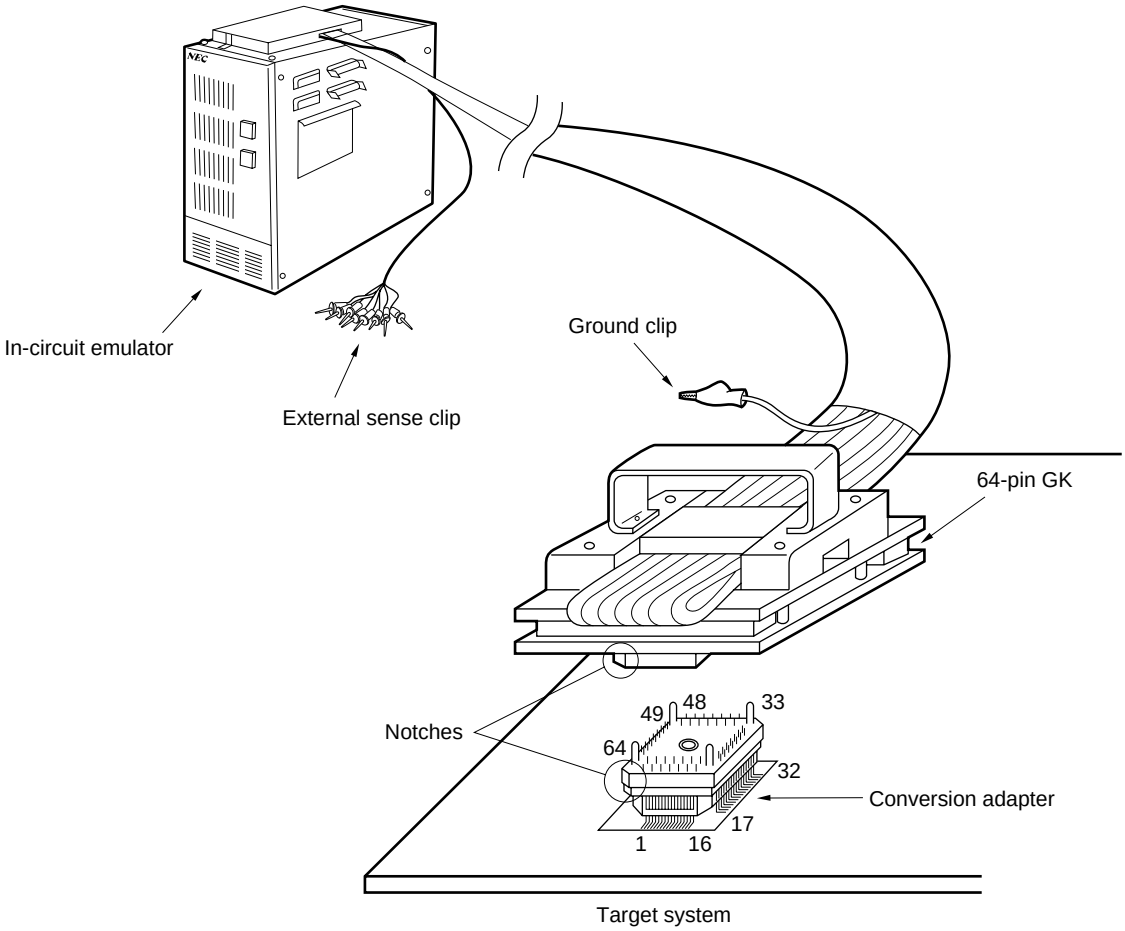
(1) Turn off the power of the target system.

★ (2) Solder the conversion adapter (accessory: TGK-064SBW) to the target system.

(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 64-pin GK at the tip of the emulation probe comes to the position of pin 1 of the conversion adapter soldered onto the target system in step (2) above.

Figure 2-3. Connecting Emulation Probe



(4) Connecting external sense clip

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

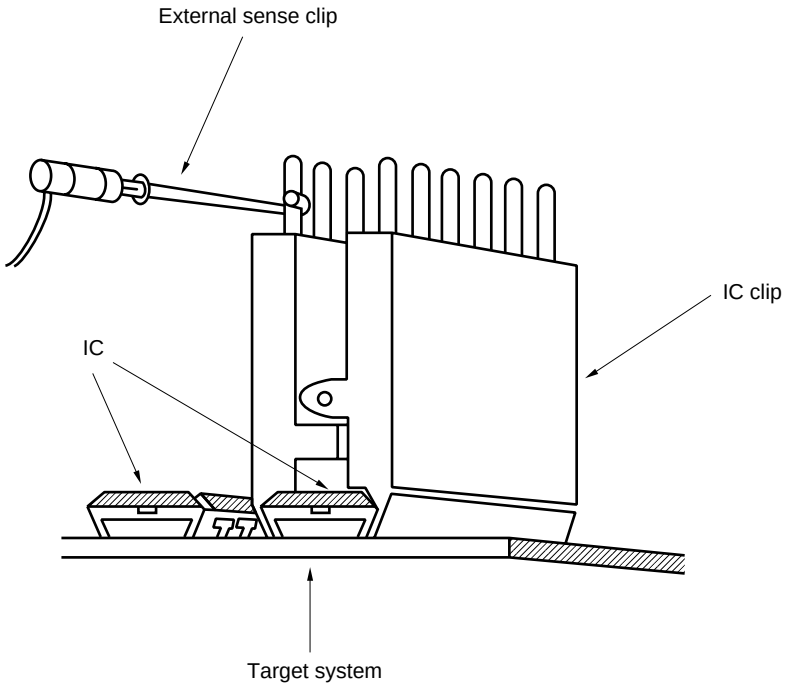
Cautions 1. Connect the external sense clips to the TTL level signal lines. If they are connected to other signal lines, the high and low levels of the signals cannot be accurately detected. In addition, the sensors of the in-circuit emulator may be damaged depending on the voltage level.

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 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 power to the in-circuit emulator and then to the target system.

Figure 2-4. Connecting External Sense Clip



Remark To connect the external sense clip, use an IC clip whenever possible, to prevent mis-touch and improve operability.

2.2 Turning on/off power

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

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

(1) Power-on sequence

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

(2) Power-off sequence

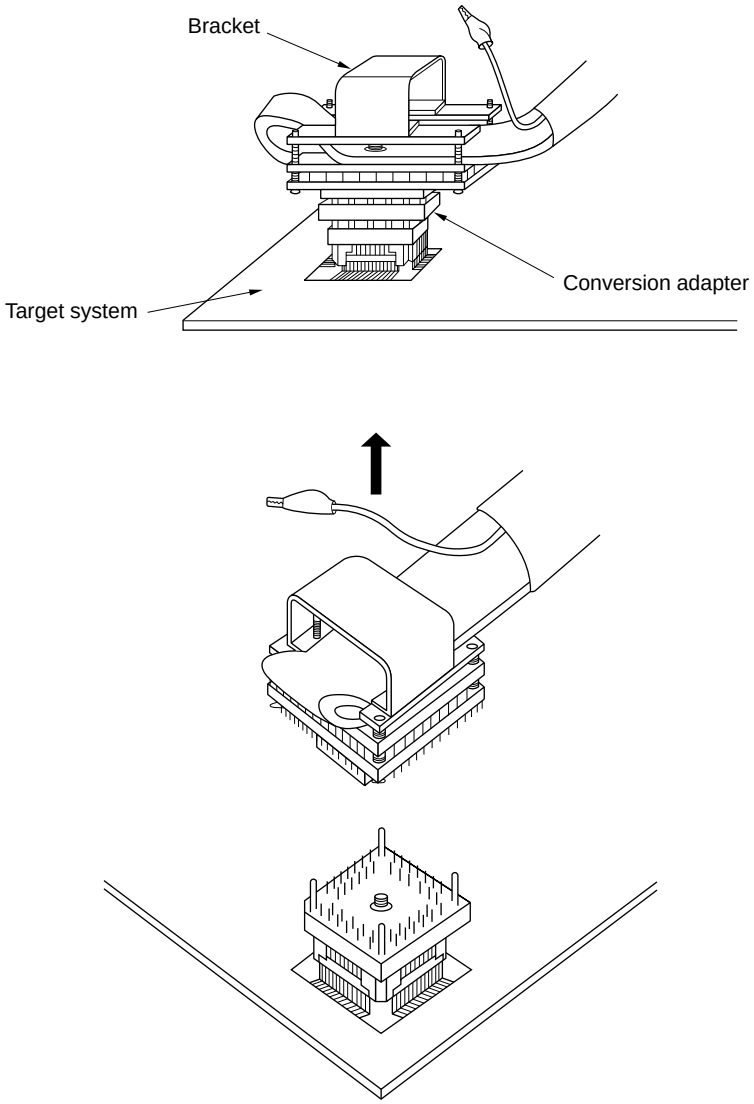
<1> Turn off the power of the target system.
<2> Turn off the power of the in-circuit emulator.

2.3 How to Remove Emulation Probe from Target System

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

(1) Turn off the power of the target system.
(2) Turn off the power of 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 adapter.

Figure 2-5. Removing Emulation Probe



APPENDIX A PIN NUMBER OF 64-PIN GK EMULATION PROBE

CN5 Pin No.	Emulation Probe	CN5 Pin No.	Emulation Probe	CN5 Pin No.	Emulation Probe	CN5 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. CN5: connector connecting the emulation probe

In the above table, it is assumed that the emulation board IE-78014-R-EM-A is used.

The numbers of the connectors used differ 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 to EXT7 : external sense clip 1 to 8

1 to 64 : emulation probe pin number

NC : No connection

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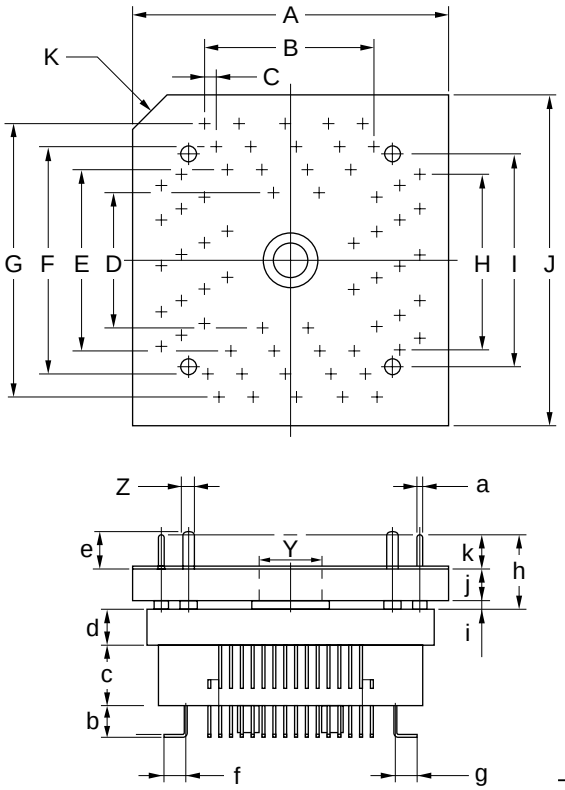
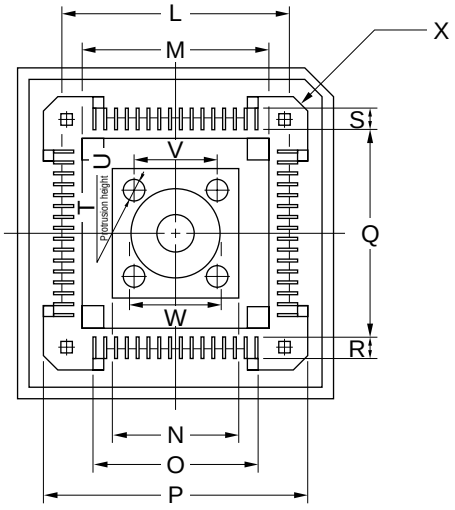
TGK-064SBW (TQPACK064SB + TQSOCKET064SBW)
Package dimension (unit: mm)





ITEM	MILLIMETERS	INCHES
A	18.4	0.724
B	0.65x15=9.75	0.026x0.591=0.384
C	0.65	0.026
D	7.75	0.305
E	10.15	0.400
F	12.55	0.494
G	14.95	0.589
H	0.65x15=9.75	0.026x0.591=0.384
I	11.85	0.467
J	18.4	0.724
K	C 2.0	C 0.079
L	12.45	0.490
M	10.25	0.404
N	7.7	0.303
O	10.02	0.394
P	14.92	0.587
Q	11.1	0.437
R	1.45	0.057
S	1.45	0.057
T	4-ϕ1.3	4-ϕ0.051
U	1.8	0.071
V	5.0	0.197
W	ϕ5.3	ϕ0.209
X	4-C 1.0	4-C 0.039
Y	ϕ3.55	ϕ0.140
Z	ϕ0.9	ϕ0.035

ITEM	MILLIMETERS	INCHES
a	ϕ0.3	ϕ0.012
b	1.85	0.073
c	3.5	0.138
d	2.0	0.079
e	3.9	0.154
f	1.325	0.052
g	1.325	0.052
h	5.9	0.232
i	0.8	0.031
j	2.4	0.094
k	2.7	0.106

TGK-064SBW-G1E

Note The TGK-064SBW is a product incorporating TQPACK064B and TQSOCKET064SBW of TOKYO ELETECH CORPORATION.

[MEMO]

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APPENDIX C REVISION HISTORY

The revision history of this edition is shown below. “Chapter” indicates the chapter of the preceding edition where the revision was made.

Edition	Revisions	Chapter
2nd	Change of conversion adapter EV-9500GK-64 to TGK-064SBW of TOKYO ELETECH CORPORATION.	Throughout
	Addition	**APPENDIX B CONVERSION ADAPTER** package drawings of (TGK-064SBW)

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