

User's Manual

IE-78K4-R-EX2

Emulation Probe Conversion Board

Target Devices 78K/IV Series

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- Availability of related technical literature
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INTRODUCTION

Product Overview

The IE-78K4-R-EX2 is designed to be used with an in-circuit emulator (IE-784000-R), emulation board (IE-784000-R-EM), and I/O emulation board (IE-784xxx-NS-EM1) to debug 78K/IV Series 16-bit single-chip microcontrollers.

Target Readers

This manual is intended for engineers who will use an in-circuit emulator (IE-784000-R), emulation board (IE-784000-R-EM), and I/O emulation board (IE-784xxx-NS-EM1) with the IE-78K4-R-EX2 to perform system debugging.

Engineers who use this manual are expected to be thoroughly familiar with the target device's functions and usage methods and to be knowledgeable about debugging.

Organization

When using the IE-78K4-R-EX2, refer to not only this manual (supplied with the IE-78K4-R-EX2) but also the manuals that are supplied with the in-circuit emulator (IE-784000-R) and the I/O emulation board (IE-784xxx-NS-EM1).

IE-784000-R

User's Manual

- Basic specifications
- System configuration
- External interface functions

IE-784xxx-NS-EM1

User's Manual

- General
- Part names
- Installation
- Differences between target devices and target interface circuits

IE-78K4-R-EX2

User's Manual

- General
- Part names
- Installation

Purpose

This manual's purpose is to explain various debugging functions that can be performed when using the IE-78K4-R-EX2.

Terminology

The meanings of certain terms used in this manual are listed below.

Term	Meaning
Target device	This is the device that is the target for emulation.
Target system	This includes the target program and the hardware provided by the user. When defined narrowly, it includes only the hardware.
IE system	This refers to the combination of an in-circuit emulator (IE-784000-R), emulation probe conversion board (IE-78K4-R-EX2), emulation board (IE-784000-R-EM), and I/O emulation board (IE-784xxx-NS-EM1).

Conventions

Data significance: Higher digits on the left and lower digits on the right

Note: Footnote for item marked with **Note** in the text

Caution: Information requiring particular attention

Remark: Supplementary information

Related Documents

The related documents (user's manuals) indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name	Document No.
IE-784000-R In-Circuit Emulator	U12903E
IE-78K4-R-EX2 Emulation Probe Conversion Board	This manual
ID78K Series Integrated Debugger Ver. 2.30 or Later Operation (Windows™ Based)	U15185E

Caution The related documents listed above are subject to change without notice. Be sure to use the latest version of each document for designing.

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CHAPTER 1 GENERAL

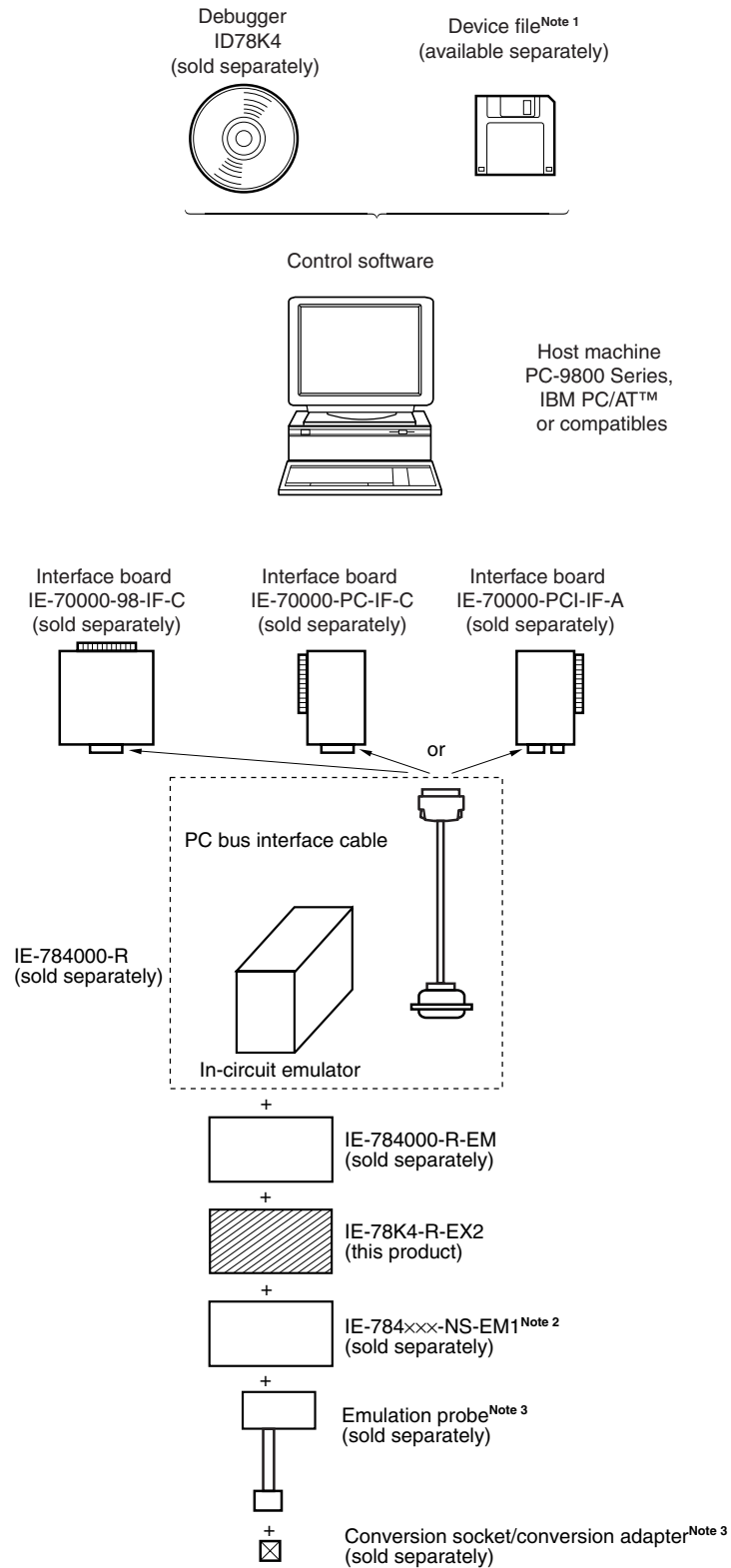
The IE-78K4-R-EX2 is a development tool for efficient debugging of hardware or software when using a 78K/IV Series 16-bit single-chip microcontroller.

This chapter describes the IE-78K4-R-EX2 system configuration and hardware configuration.

1.1 System Configuration

Figure 1-1 illustrates the IE-78K4-R-EX2 system configuration.

Figure 1-1. System Configuration



- Notes**
1. For the device file, refer to the IE-784xxx-NS-EM1 User's Manual.
 2. For the IE-784xxx-NS-EM1, refer to Table 1-1.

Table 1-1. I/O Emulation Board

I/O Emulation Board
IE-784225-NS-EM1 IE-784956-NS-EM1

3. For the emulation probe and conversion socket/conversion adapter, refer to Table 1-2.
The TGK-080SDW is a product of TOKYO ELETECH CORPORATION.

Inquiries: Daimaru Kogyo, Co., Ltd.

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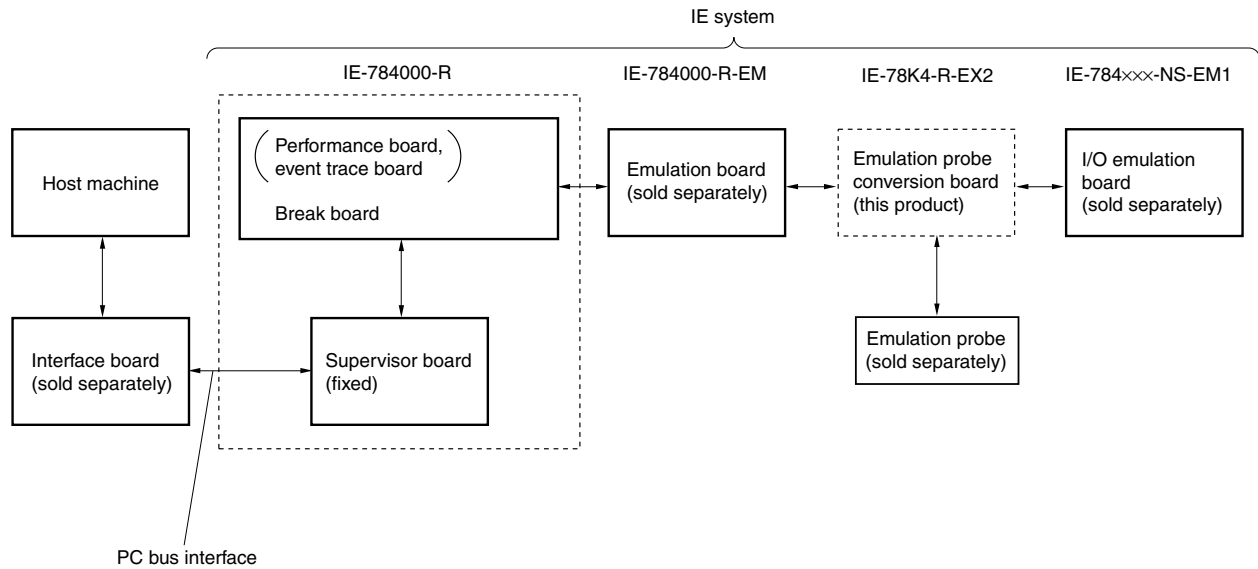
Table 1-2. Package Correspondence Table

Package	Emulation Probe	Conversion Socket/Conversion Adapter
80-pin QFP	EP-78230GC-R	EV-9200GC-80
80-pin TQFP	EP-78054GK-R	TGK-080SDW

1.2 Hardware Configuration

Figure 1-2 shows the IE-78K4-R-EX2's position in the basic hardware configuration.

Figure 1-2. Basic Hardware Configuration



CHAPTER 2 PART NAMES

This chapter introduces the parts of the IE-78K4-R-EX2 main unit.

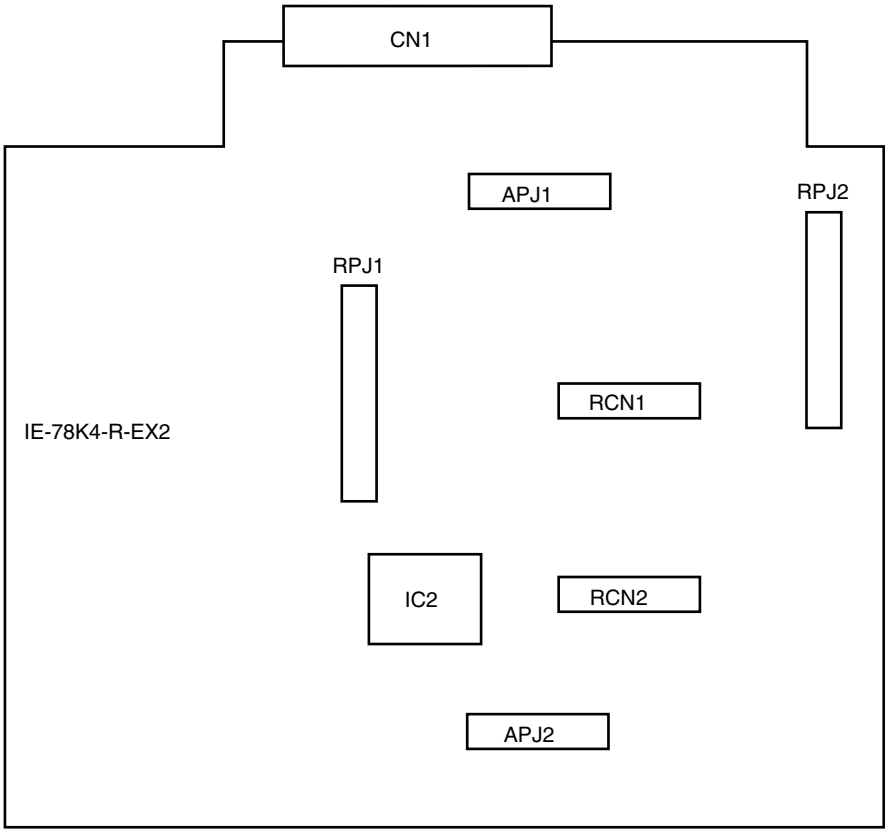
The packing box contains the emulation probe conversion board (IE-78K4-R-EX2), packing list, user's manual, and guarantee card.

If there are any missing or damaged items, please contact an NEC sales representative.

Fill out and return the guarantee card that comes with the main unit.

2.1 Parts of Main Unit

Figure 2-1. Side Connected to IE-784000-R-EM and IE-784xxx-NS-EM1



CHAPTER 3 INSTALLATION

This chapter describes methods for connecting the IE-78K4-R-EX2 to the in-circuit emulator (IE-784000-R), emulation board (IE-784000-R-EM), emulation probe, etc. Mode setting methods are also described.

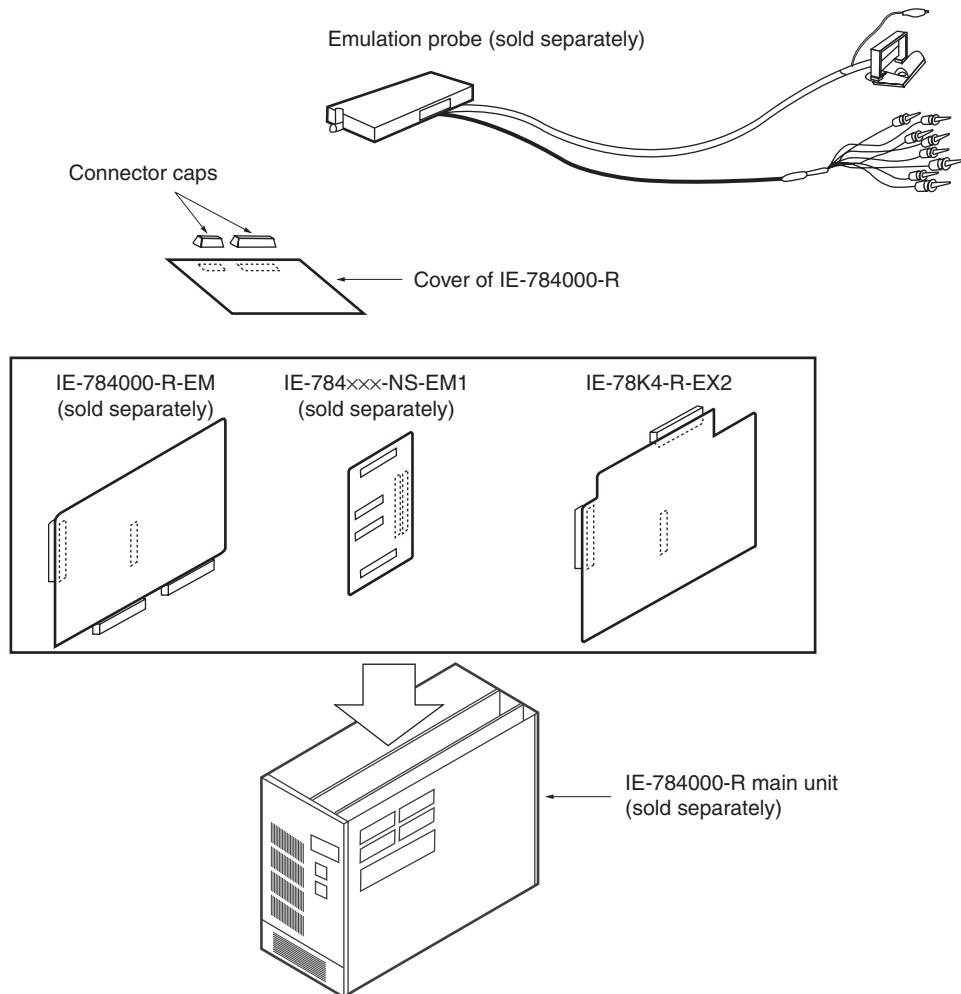
Caution **Connecting or removing components to or from the target system, or making switch or other setting changes must be carried out after the power supply to both the IE system and the target system has been switched OFF.**

3.1 Installation Procedure

When using the IE-78K4-R-EX2, install the IE-78K4-R-EX2 according to the following procedure (1) to (7) (note that the installation procedure is different from the procedure in the **IE-784000-R User's Manual (U12903E)**).

Caution Connecting or removing components must be carried out after the power supply to both the IE-784000-R and the target system has been switched OFF.

Figure 3-1. Connection Outline of IE-78K4-R-EX2



(1) Setting clock

Set the clock referring the user's manual of the IE-784xxx-NS-EM1 in use.

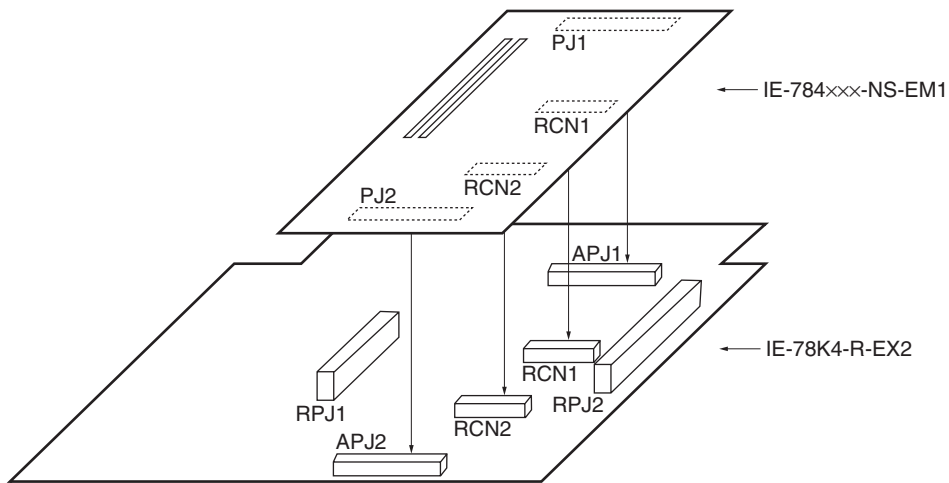
(2) Setting IE-784xxx-NS-EM1

Set the jumpers or switches in the IE-784xxx-NS-EM1, if necessary.

(3) Mounting IE-784xxx-NS-EM1 on IE-78K4-R-EX2

Connect the connectors RCN1 and RCN2 of the IE-78K4-R-EX2 and RCN1 and RCN2 of the IE-784xxx-NS-EM1, and the connectors APJ1 and APJ2 of the IE-78K4-R-EX2 and PJ1 and PJ2 of the IE-784xxx-NS-EM1.

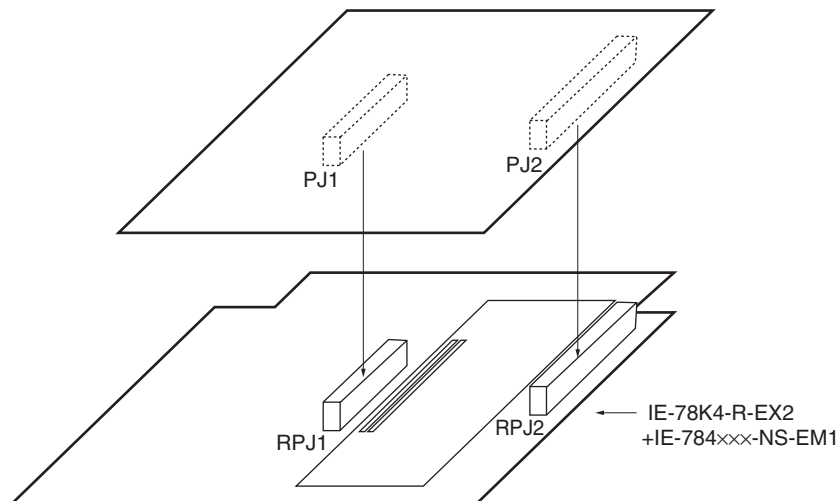
Figure 3-2. Connecting IE-78K4-R-EX2 and IE-784xxx-NS-EM1



(4) Mounting IE-78K4-R-EX2 + IE-784xxx-NS-EM1 on IE-784000-R-EM

Connect the connectors PJ1 and PJ2 of the IE-784000-R-EM and the connectors RPJ1 and RPJ2 of the IE-78K4-R-EX2.

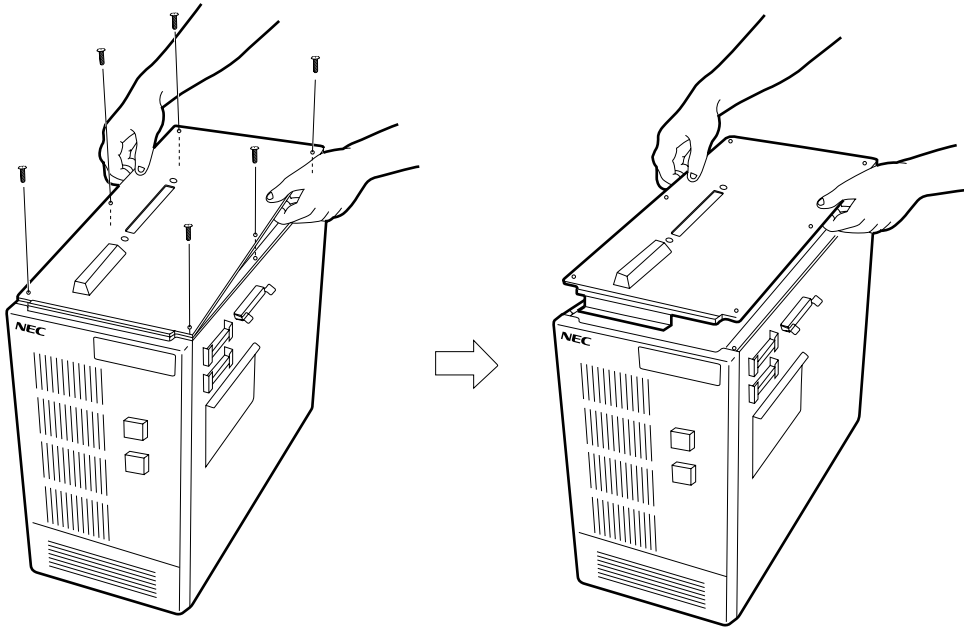
Figure 3-3. Connecting IE-784000-R-EM and IE-78K4-R-EX2 + IE-784xxx-NS-EM1



(5) Removing top cover

Remove the six screws on the top of the main unit as shown in Figure 3-4, and then remove the top cover.

Figure 3-4. Removing Top Cover



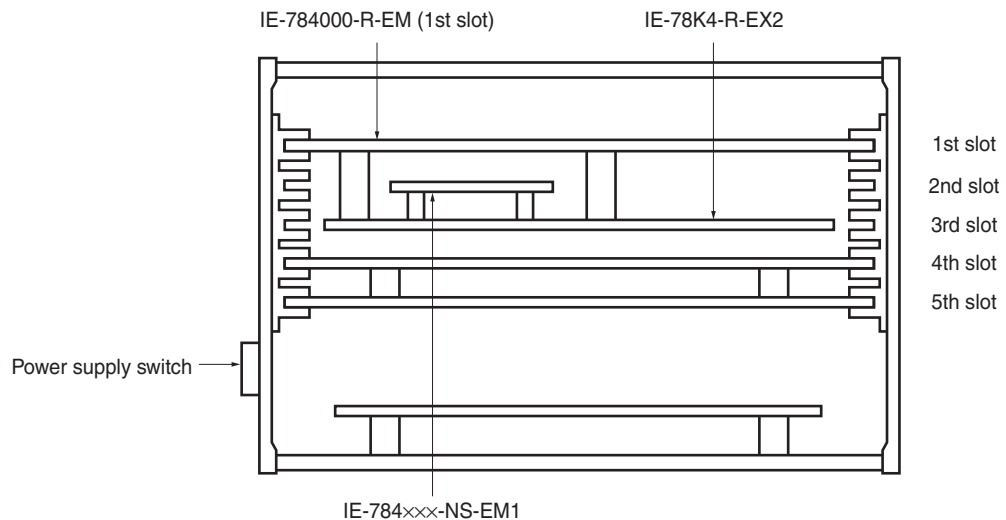
(6) Removing rubber cover on top cover

Remove the rubber cover on the top cover.

(7) Inserting in IE-784000-R

Insert the IE-784000-R-EM, IE-784xxx-NS-EM1, and IE-78K4-R-EX2 connected in (4) in the IE-784000-R (setting the IE-784000-R-EM to the first slot), replace the top cover, and return the screws to their original positions. (The IE-78K4-R-EX2 does not use a slot.)

Figure 3-5. Inserting in IE-784000-R



CHAPTER 4 CAUTIONS

When connecting with the IE-784225-NS-EM1, set the SW3-5 (NMI interrupt mask) of the IE-784225-NS-EM1 to OFF.

APPENDIX A EMULATION PROBE PIN ASSIGNMENT TABLE

Table A-1. EP-78230GC-R Pin Assignment Table

CN1 Pin No.	Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.	Emulation Probe
1	GND	25	15	49	34	73	61
2	GND	26	16	50	33	74	NC
3	EXT0	27	17	51	32	75	NC
4	EXT1	28	18	52	31	76	70
5	EXT2	29	19	53	41	77	69
6	EXT3	30	20	54	42	78	68
7	EXT4	31	21	55	43	79	67
8	EXT5	32	NC	56	44	80	66
9	EXT6	33	NC	57	45	81	65
10	EXT7	34	30	58	46	82	64
11	1	35	29	59	47	83	63
12	2	36	28	60	48	84	62
13	3	37	27	61	49	85	80
14	4	38	26	62	50	86	79
15	5	39	25	63	51	87	78
16	6	40	24	64	52	88	77
17	7	41	23	65	53	89	76
18	8	42	22	66	54	90	75
19	9	43	40	67	55	91	74
20	10	44	39	68	56	92	73
21	11	45	38	69	57	93	72
22	12	46	37	70	58	94	71
23	13	47	36	71	59	95	GND
24	14	48	35	72	60	96	GND

Remark The meanings of the symbols and numbers in the “Emulation Probe” column are as follows.

GND: Earth clip (GND)

EXT0 to EXT7: External sense clip No. 1 to No. 8

1 to 80: Pin number of emulation probe tip

NC: No connection

Table A-2. EP-78054GK-R Pin Assignment Table

CN1 Pin No.	Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.	Emulation Probe
1	GND	25	15	49	34	73	61
2	GND	26	16	50	33	74	NC
3	EXT0	27	17	51	32	75	NC
4	EXT1	28	18	52	31	76	70
5	EXT2	29	19	53	41	77	69
6	EXT3	30	20	54	42	78	68
7	EXT4	31	21	55	43	79	67
8	EXT5	32	NC	56	44	80	66
9	EXT6	33	NC	57	45	81	65
10	EXT7	34	30	58	46	82	64
11	1	35	29	59	47	83	63
12	2	36	28	60	48	84	62
13	3	37	27	61	49	85	80
14	4	38	26	62	50	86	79
15	5	39	25	63	51	87	78
16	6	40	24	64	52	88	77
17	7	41	23	65	53	89	76
18	8	42	22	66	54	90	75
19	9	43	40	67	55	91	74
20	10	44	39	68	56	92	73
21	11	45	38	69	57	93	72
22	12	46	37	70	58	94	71
23	13	47	36	71	59	95	GND
24	14	48	35	72	60	96	GND

Remark The meanings of the symbols and numbers in the “Emulation Probe” column are as follows.

GND: Earth clip (GND)
EXT0 to EXT7: External sense clip No. 1 to No. 8
1 to 80: Pin number of emulation probe tip
NC: No connection

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