User's Manual

NEC

IE-178134-NS-EM1

Emulation Board

Target Devices
μPD178024 Subseries

[MEMO]

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- Development environment specifications (for example, specifications for third-party tools and components, host computers, power plugs, AC supply voltages, and so forth)

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NEC Electronics Inc. (U.S.)
Santa Clara, California
Tel: 408-588-6000
      800-366-9782
Fax: 408-588-6130
      800-729-9288

NEC do Brasil S.A.
Electron Devices Division
Guarulhos-SP, Brasil
Tel: 11-6462-6810
Fax: 11-6462-6829

NEC Electronics (Europe) GmbH
Duesseldorf, Germany
Tel: 0211-65 03 01
Fax: 0211-65 03 327

  • **Sucursal en España**
     Madrid, Spain
     Tel: 091-504 27 87
     Fax: 091-504 28 60

  • **Succursale Française**
     Vélizy-Villacoublay, France
     Tel: 01-30-67 58 00
     Fax: 01-30-67 58 99

• **Filiale Italiana**
   Milano, Italy
   Tel: 02-66 75 41
   Fax: 02-66 75 42 99

• **Branch The Netherlands**
   Eindhoven, The Netherlands
   Tel: 040-244 58 45
   Fax: 040-244 45 80

• **Branch Sweden**
   Taeby, Sweden
   Tel: 08-63 80 820
   Fax: 08-63 80 388

• **United Kingdom Branch**
   Milton Keynes, UK
   Tel: 01908-691-133
   Fax: 01908-670-290

NEC Electronics Hong Kong Ltd.
Hong Kong
Tel: 2886-9318
Fax: 2886-9022/9044

NEC Electronics Hong Kong Ltd.
Seoul Branch
Seoul, Korea
Tel: 02-528-0303
Fax: 02-528-4411

NEC Electronics Shanghai, Ltd.
Shanghai, P.R. China
Tel: 021-6841-1138
Fax: 021-6841-1137

NEC Electronics Taiwan Ltd.
Taipei, Taiwan
Tel: 02-2719-2377
Fax: 02-2719-5951

NEC Electronics Singapore Pte. Ltd.
Novena Square, Singapore
Tel: 253-8311
Fax: 250-3583

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Major Revisions in This Edition

Pages	Description
p.29	Modification of **Table 3-2 Jumper Settings on IE-78K0-NS**
pp.39, 40	Modification of the size on the adapter block in figures **B-2 Connection Conditions of Target System (When NP-80GC-TQ Is Used), B-3 Connection Conditions of Target System (When NP-H80GC-TQ Is Used), B-5 Connection Conditions of Target System (When NP-80GF-TQ Is Used)**

The Mark ★ shows major revised points.

INTRODUCTION

Product Overview   The IE-178134-NS-EM1 is designed to be used with the IE-78K0-NS or IE-78K0-NS-A to debug the following target devices that belong to the 178K Series of 8-bit single-chip microcontrollers.

 • μPD178024 Subseries: μPD178022, 178023, 178024, 178F124

Target Readers   This manual is intended for engineers who will use the IE-178134-NS-EM1 with the IE-78K0-NS or IE-78K0-NS-A to perform system debugging.
Engineers who use this manual are expected to be thoroughly familiar with the target device's functions and use methods and to be knowledgeable about debugging.

Organization   When using the IE-178134-NS-EM1, refer to not only this manual (supplied with the IE-178134-NS-EM1) but also the manual that is supplied with the IE-78K0-NS or IE-78K0-NS-A.
The IE-78K0-NS used in combination with the IE-78K0-NS-PA is functionally equivalent to the IE-78K0-NS-A. Therefore, as necessary, read IE-78K0-NS + IE-78K0-NS-PA for IE-78K0-NS-A in this document.

IE-78K0-NS or IE-78K0-NS-A User's Manual	IE-178134-NS-EM1 User's Manual
• Basic specifications	• General
• System configuration	• Part names
• External interface functions	• Installation
	• Differences between target devices and target interface circuits

Purpose   This manual's purpose is to explain various debugging functions that can be performed when using the IE-178134-NS-EM1.

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

Term	Meaning
Emulation device	This is a general term that refers to the device in the emulator that is used to emulate the target device. It includes the emulation CPU.
Emulation CPU	This is the CPU block in the emulator that is used to execute user-generated programs.
Target device	This is 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 the IE-78K0-NS or IE-78K0-NS-A and the IE-178134-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 Number
IE-78K0-NS In-Circuit Emulator	U13731E
IE-78K0-NS-A In-Circuit Emulator	U14889E
IE-178134-EM1 Emulation Board	This manual
ID78K Series Integrated Debugger Ver. 2.30 or Later Operation (Windows™ Based)	U15185E
μPD178024 Subseries	U13915E

Caution   **The documents listed above are subject to change without notice. Be sure to use the latest documents when designing.**

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 GENERAL

The IE-178134-NS-EM1 is a development tool for efficient debugging of hardware or software when using one of the following target devices that belong to the 178K Series of 8-bit single-chip microcontrollers.

This chapter describes the IE-178134-NS-EM1's system configuration and basic specifications.

- Target device
  - μPD178024 Subseries

1.1 System Configuration

Figure 1-1 illustrates the IE-178134-NS-EM1's system configuration.

Figure 1-1. System Configuration
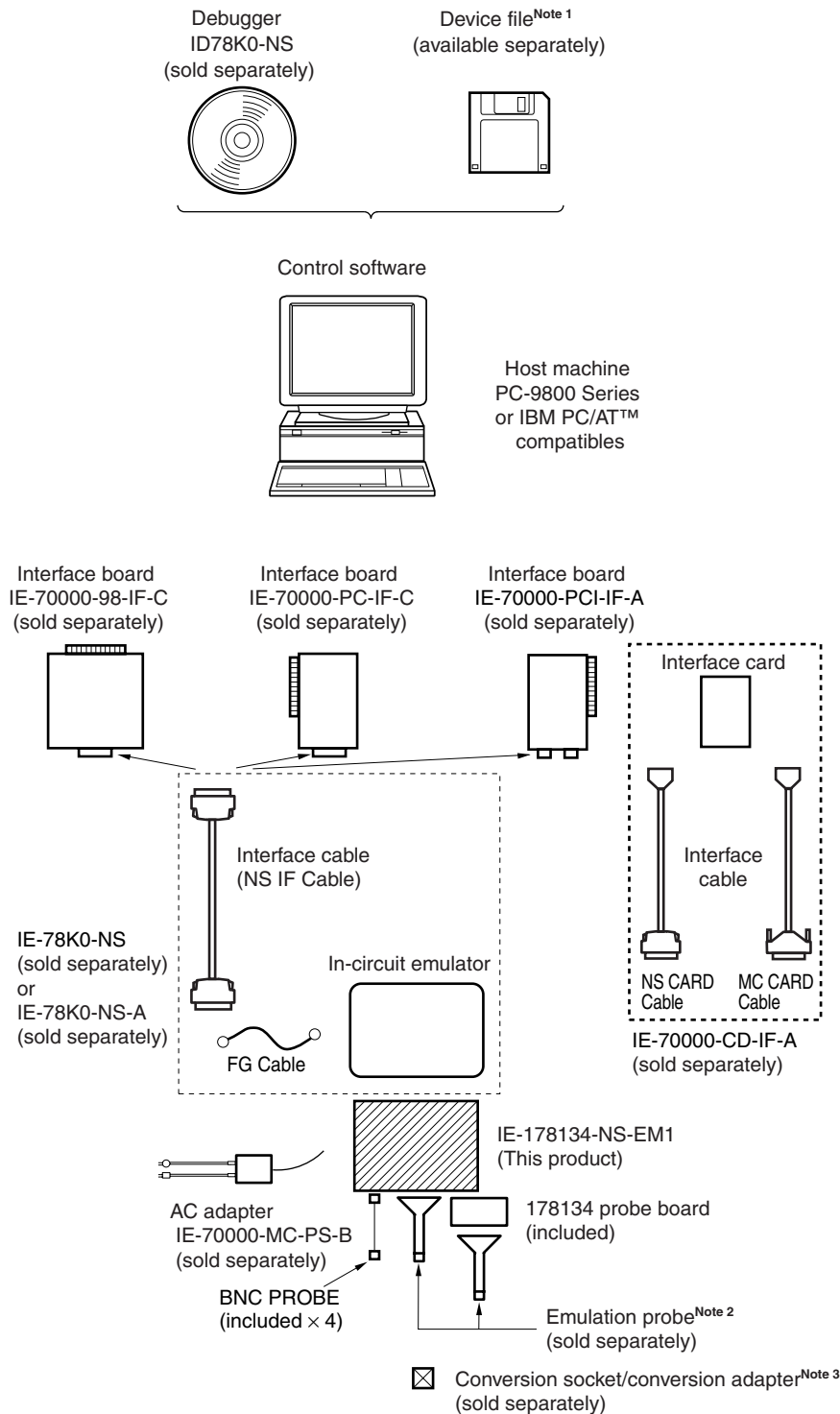
Notes 1. The device file is as follows, in accordance with the subseries.

μS××××DF178024: μPD178024 Subseries

The device file can be downloaded from the web site of NEC Electron Devices

(http://www.ic.nec.co.jp/micro/)

2. The emulation probes NP-80GC, NP-80GC-TQ, NP-H80GC-TQ, NP-80GF, and NP-80GF-TQ are products of Naito Densei Machida Mfg. Co., Ltd.

For further information, contact Naito Densei Machida Mfg. Co., Ltd. (TEL: +81-45-475-4191)

3. The conversion sockets/conversion adapters TGC-080SBP and TGF-080RAP are products of TOKYO ELETECH CORPORATION.

For further information, contact Daimaru Kogyo Co., Ltd.

Tokyo Electronics Department (TEL: +81-3-3820-7112)

Osaka Electronics Department (TEL: +81-6-6244-6672)

Table 1-1 shows the correspondence between the emulation probes and conversion sockets/conversion adapters that are sold separately.

Table 1-1. Correspondence Between Emulation Probes and Conversion Socket/Conversion Adapters

Package	Emulation Probe	Conversion Socket/Conversion Adapter
80-pin plastic QFP (GC type)	NP-80GC (probe length: 200 mm)	EV-9200GC-80
	NP-80GC-TQ (probe length: 200 mm) NP-H80GC-TQ (probe length: 400 mm)	TGC-080SBP
80-pin plastic QFP (GF type)	NP-80GF (probe length: 200 mm)	EV-9200G-80
	NP-80GF-TQ (probe length: 200 mm)	TGF-080RAP

1.2 Hardware Configuration

Figures 1-2 and 1-3 show the IE-178134-NS-EM1's position in the basic hardware configuration.

Figure 1-2. Basic Hardware Configuration (When IE-78K0-NS Is Used)
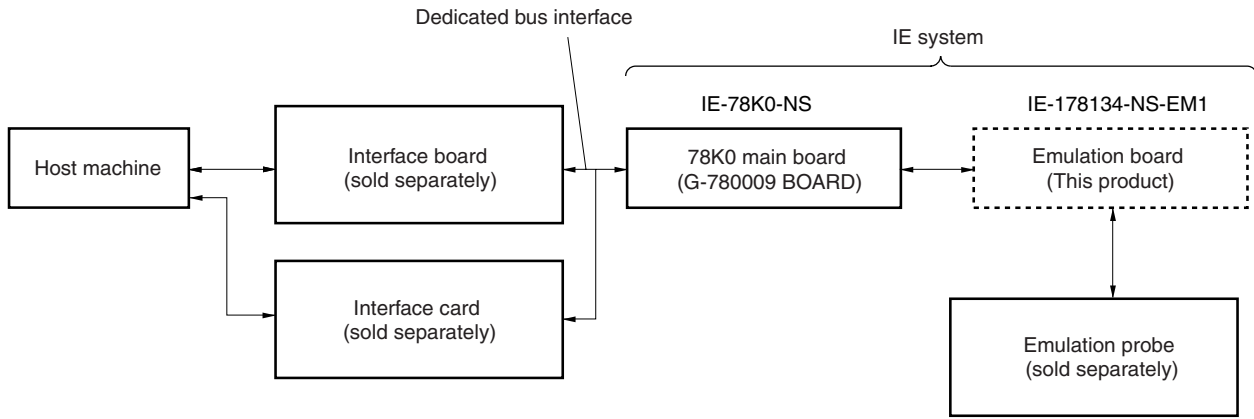
Figure 1-3. Basic Hardware Configuration (When IE-78K0-NS-A Is Used)
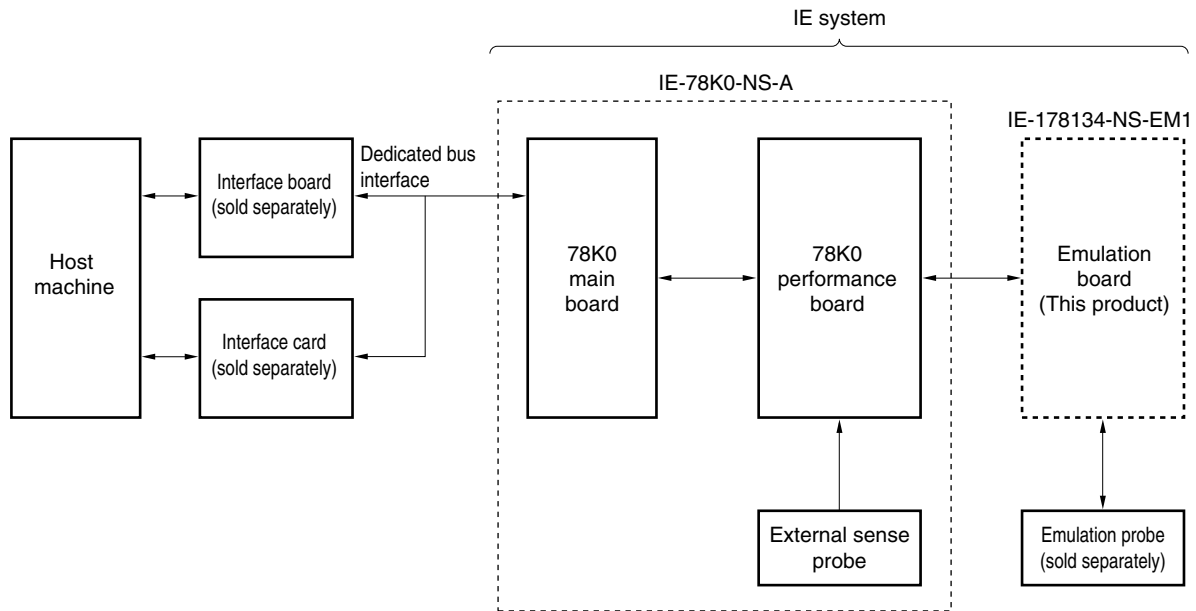
1.3   Basic Specifications

The IE-178134-NS-EM1's basic specifications are listed in Table 1-2.

Table 1-2. Basic Specifications

Parameter	Description
Target device	μPD178024 Subseries
System clock	4.5 MHz
Clock supply	External: Input via an emulation probe from the target system Internal: Mounted on emulation board (4.5 MHz), or mounted on the board by the user
Low-voltage support	V_{DD} = 3.5 to 5.5 V (same as target device)

CHAPTER 2 PART NAMES

This chapter introduces the parts of the IE-178134-NS-EM1 main unit.

The packing box contains the emulation board (IE-178134-NS-EM1).

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

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

2.1 Parts of Main Unit

Figure 2-1. IE-178134-NS-EM1 Part Names
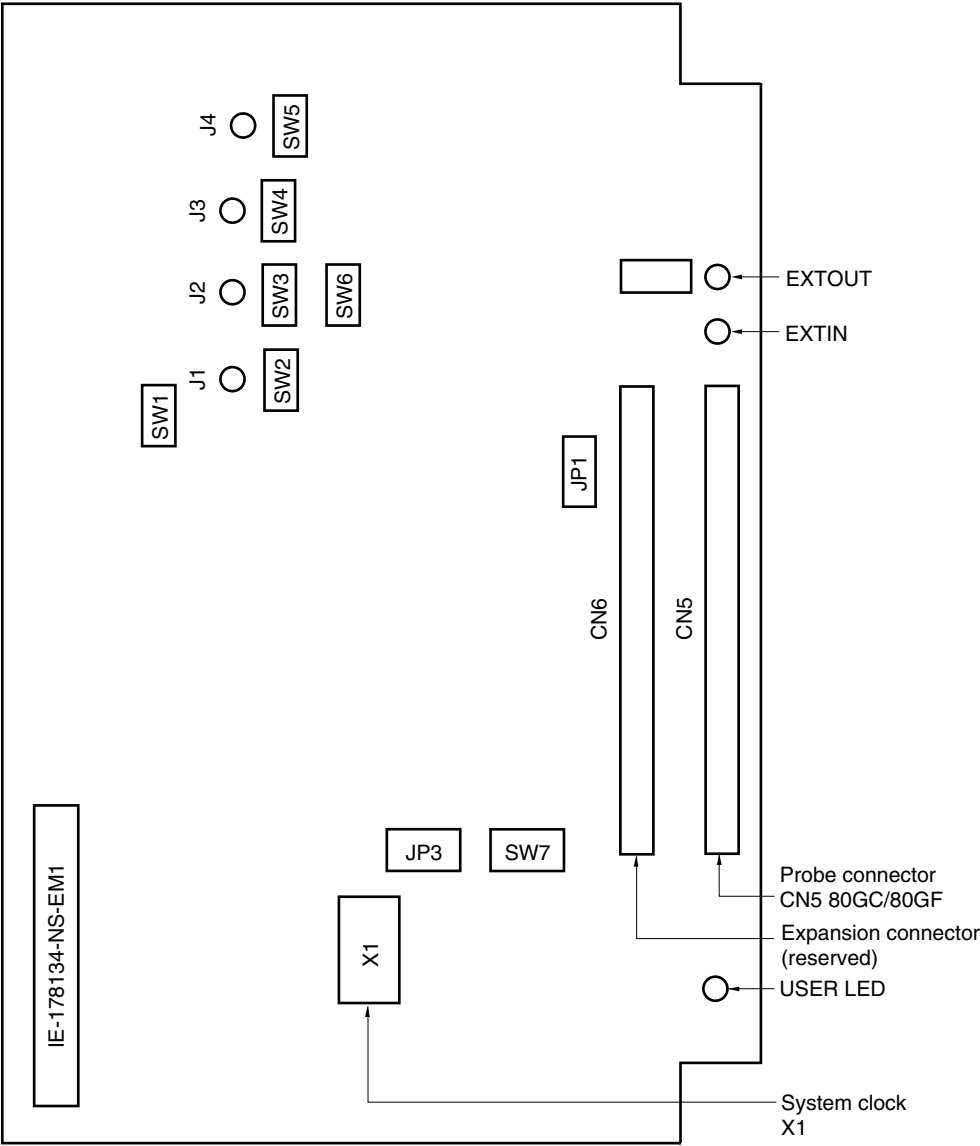
Figure 2-2. 178134 PROBE Board
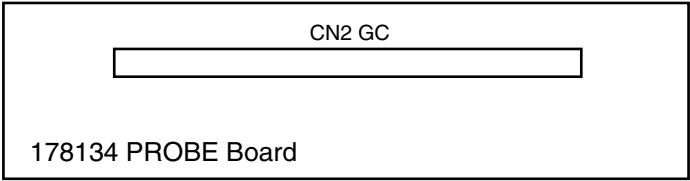
CHAPTER 3 INSTALLATION

This chapter describes methods for connecting the IE-178134-NS-EM1 to the IE-78K0-NS or IE-78K0-NS-A, emulation probe, etc. Mode setting methods are also described.

Caution Before connecting or disconnecting the IE-178134-NS-EM1 to or from the target system or changing the switch settings, turn off the IE system and target system.

3.1 Connection

(1) Connection with IE-78K0-NS or IE-78K0-NS-A main unit

See the **IE-78K0-NS User's Manual (U13731E)** for a description of how to connect the IE-178134-NS-EM1 to the IE-78K0-NS.

For how to connect the IE-178134-NS-EM1 to the IE-78K0-NS-A, refer to the **IE-78K0-NS-A User's Manual (U14889E)**.

(2) Connection with emulation probe

For how to connect the emulation probe to the IE-178134-NS-EM1, refer to the **IE-78K0-NS User's Manual (U13731E)** or **IE-78K0-NS-A User's Manual (U14889E)**.

When connecting emulation probe NP-80GF or NP-80GF-TQ, connect it to CN5.

When connecting emulation probe NP-80GC, NP-80GC-TQ, or NP-H80GC-TQ, connect it to CN2 on the 178134 PROBE Board.

(3) Connection with 178134 PROBE Board

Connect CN5 of the IE-178134-NS-EM1 and CN1 of the 178134 PROBE Board, aligning pin 1 on both connectors.

(4) Connection with BNC PROBE

Connect the supplied BNC PROBE to the J1 to J4 connectors on the IE-178134-NS-EM1.

The signals corresponding to J1 to J4 are as follows.
Connect the BNC PROBE to these connectors to amplify the input from the target system.

> J1: VCOL
> J2: VCOH
> J3: FMIFC
> J4: AMIFC

Cautions 1. Use of incorrect connection methods may damage the IE system.
Be sure to read the emulation probe's user's manual for a detailed description of the correct connection method.
2. Do not use CN6, which is exclusively used for expansion.

Figure 3-1. Connection of Emulation Probe

CN2

178134 PROBE Board (included)

Emulation probe
NP-80GC, NP-80GC-TQ,
NP-H80GC-TQ (sold separately)

CN5

CN6 (reserved)

Emulation probe
NP-80GF,
NP-80GF-TQ (sold separately)

J4 J3 J2 J1

Emulation board
(IE-178134-NS-EM1)

BNC PROBE (included)

Main board of
IE-78K0-NS (sold separately)
or IE-78K0-NS-A (sold separately)
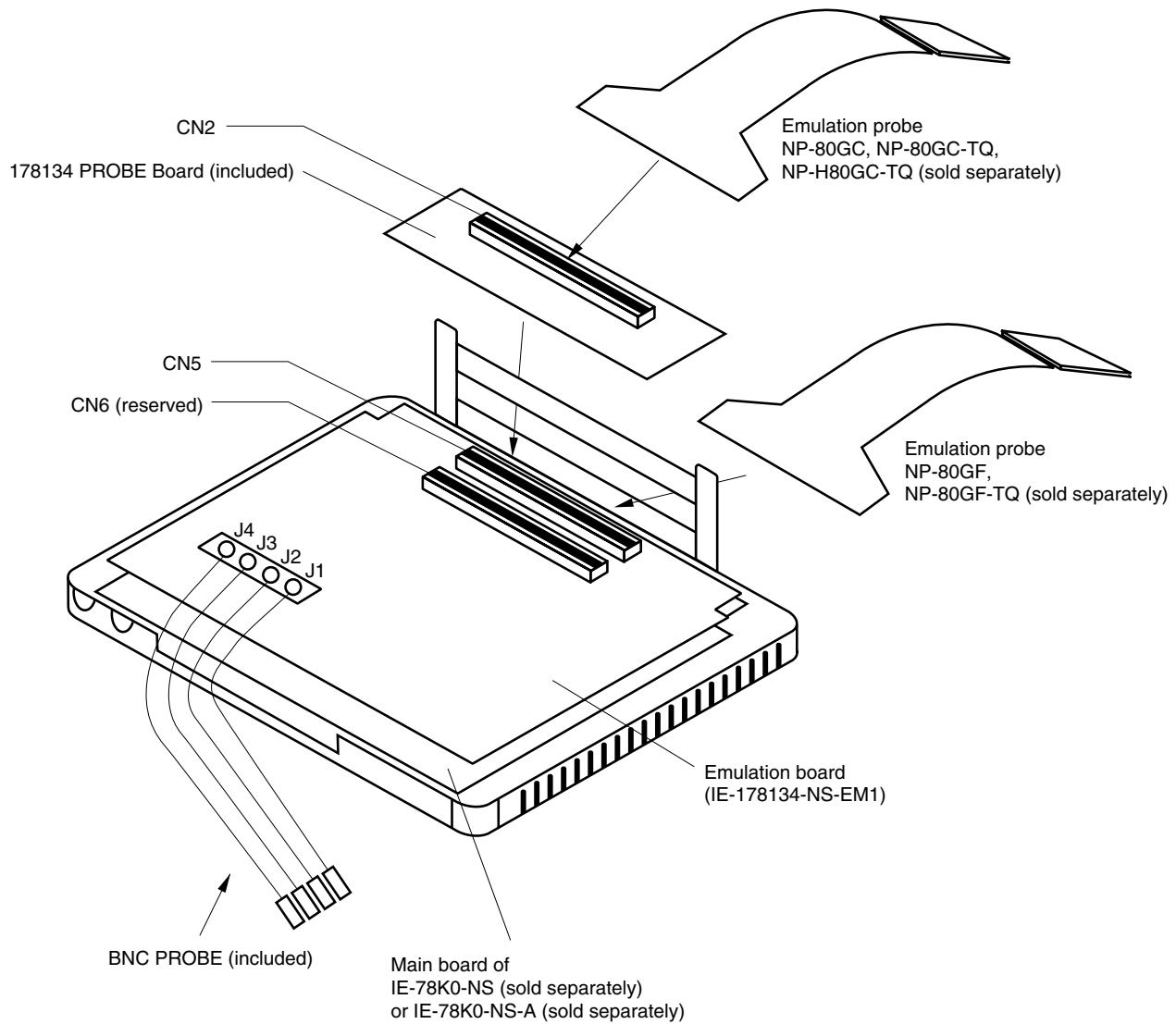
3.2 Clock Settings

3.2.1 Overview of clock settings

The system clock to be used during debugging can be selected from (1) to (3) below.

(1) Clock that is already mounted on emulation board
(2) Clock that is mounted by user
(3) External clock

If the target system includes an internal clock, select either **(1) Clock that is already mounted on emulation board** or **(2) Clock that is mounted by user**. For an internal clock, the target device is connected to a resonator and the target device's internal oscillator is used. An example of the external circuit is shown in part (a) of Figure 3-2. During emulation, the resonator that is mounted on the target system is not used. Instead, it uses the clock that is mounted on the emulation board which is installed for the IE-78K0-NS or IE-78K0-NS-A.

If the target system includes an external clock, select **(3) External clock**.

For an external clock, a clock signal is supplied from outside of the target device and the target device's internal oscillator is not used. An example of the external circuit is shown in part (b) of Figure 3-2.

Caution **The IE system will be hung-up if the system clock is not supplied normally. Moreover, be sure to input a rectangular wave as the clock from the target. There is no need to supply a clock to X2 pin.**

Figure 3-2. External Circuits Used as System Clock Oscillator

(a) Internal clock

(b) External clock
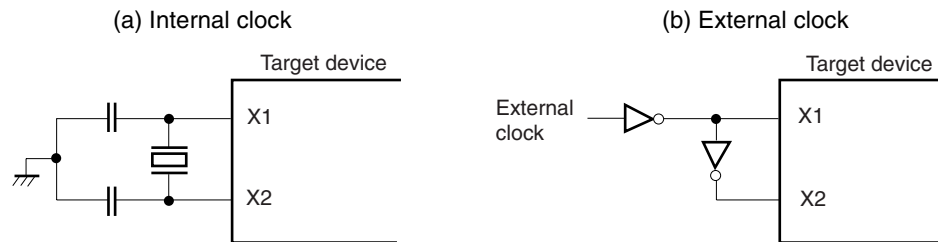
(1) Clock that is already mounted on emulation board

A crystal oscillator is already mounted on the emulation board. Its frequency is 4.5 MHz.

Figure 3-3. When Using Clock That Is Already Mounted on Emulation Board
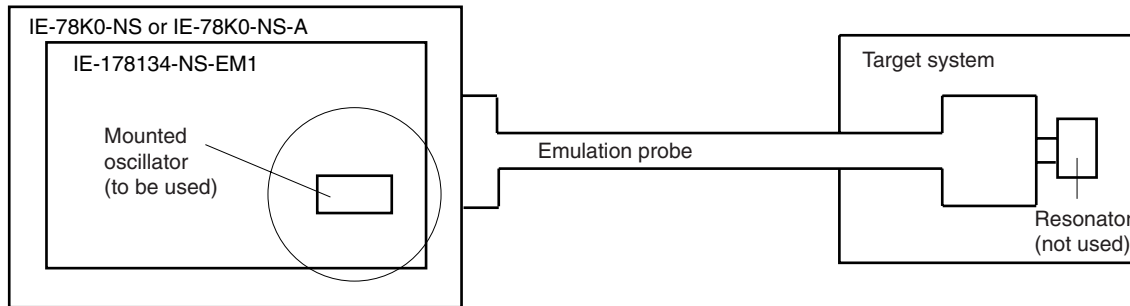
Remark The clock that is supplied by the IE-178134-NS-EM1's oscillator (encircled in the figure) is used.

(2) Clock that is mounted by user

The user is able to mount any clock supported by the set specifications on the IE-178134-NS-EM1. First mount the resonator on the parts board, then attach the parts board to the IE-178134-NS-EM1. This method is useful when using a different frequency from that of the pre-mounted clock.

Figure 3-4. When Using User-Mounted Clock
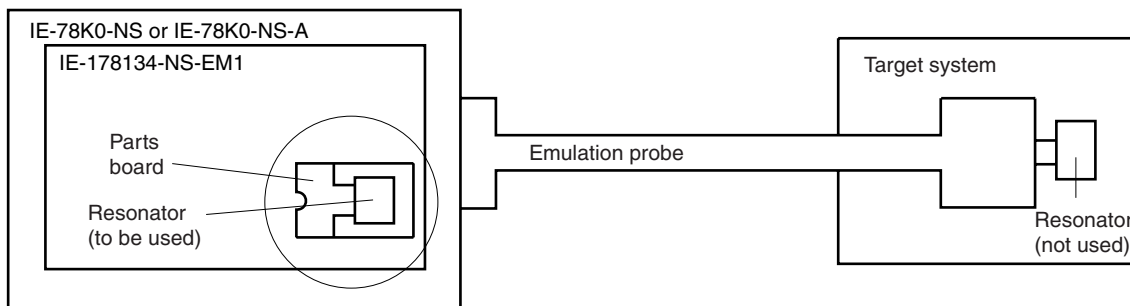
Remark The clock that is supplied by the IE-178134-NS-EM1's resonator (encircled in the figure) is used.

(3) External clock

An external clock connected to the target system can be used via an emulation probe.

Figure 3-5. When Using External Clock
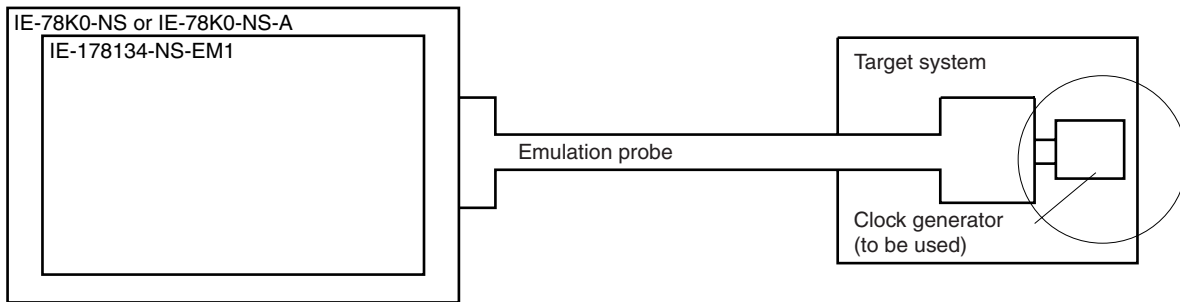
Remark The clock supplied by the target system's clock generator (encircled in the figure) is used.

3.2.2 System clock settings

Table 3-1. System Clock Settings

Frequency of System Clock		IE-178134-NS-EM1	CPU Clock Source Selection (ID)
		Parts Board (X1)	
When using clock that is already mounted on emulation board	4.5 MHz	Oscillator	Internal
When using clock mounted by user	Other than 4.5 MHz	Oscillator assembled by user	
When using external clock		Oscillator (not used)	External

Caution **When using an external clock, open the configuration dialog box when starting the integrated debugger (ID78K0-NS) and select "External" in the area (Clock) for selecting the CPU's clock source (this selects the user's clock).**

Remark The IE-178134-NS-EM1's factory settings are those listed above under "when using clock that is already mounted on emulation board".

(1) When using clock that is already mounted on emulation board

When the IE-178134-NS-EM1 is shipped, a 4.5 MHz crystal oscillator is already mounted in the IE-178134-NS-EM1's X1 socket. When using the factory-set mode settings, there is no need to make any other hardware settings.

When starting the integrated debugger (ID78K0-NS), open the configuration dialog box and select "Internal" in the area (Clock) for selecting the CPU's clock source (this selects the emulator's internal clock).

(2) When using clock mounted by user

Perform the settings described under either (a) or (b), in accordance with the type of clock to be used.

When starting the integrated debugger (ID78K0-NS), open the configuration dialog box and select "Internal" in the area (Clock) for selecting the CPU's clock source (this selects the emulator's internal clock).

(a) When using a ceramic resonator or crystal resonator

● Items to be prepared
  • Parts board
  • Ceramic resonator or crystal resonator
  • Resistor Rx

  • Capacitor CA
  • Capacitor CB
  • Solder kit

<Steps>

<1> Solder the target ceramic resonator or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequency) onto the supplied parts board (as shown below).

Figure 3-6. Connections on Parts Board (When Using System Clock or User-Mounted Clock)

Parts board (X1)
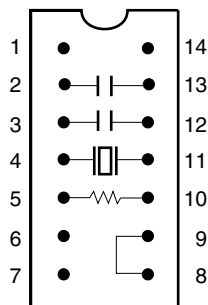
Pin No.	Connection
2-13	Capacitor CB
3-12	Capacitor CA
4-11	Ceramic resonator or crystal resonator
5-10	Resistor Rx
8-9	Short

Circuit diagram
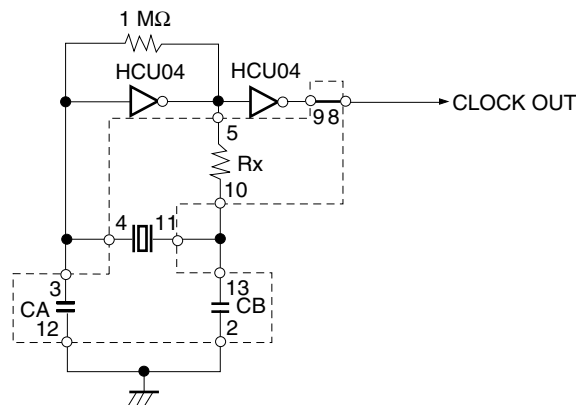
Remark The sections enclosed in broken lines indicate parts that are attached to the parts board.

<2> Prepare the IE-178134-NS-EM1.

<3> Remove the crystal oscillator that is mounted in the IE-178134-NS-EM1's socket (the socket marked as X1).

<4> Connect the parts board (from <1> above) to the socket (X1) from which the crystal oscillator was removed. Check the pin 1 mark to make sure the board is mounted in the correct direction.

<5> Make sure that the parts board mounted in the X1 socket on the emulation board is wired as shown in Figure 3-6 above.

<6> Install the IE-178134-NS-EM1 in the IE-78K0-NS or IE-78K0-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.
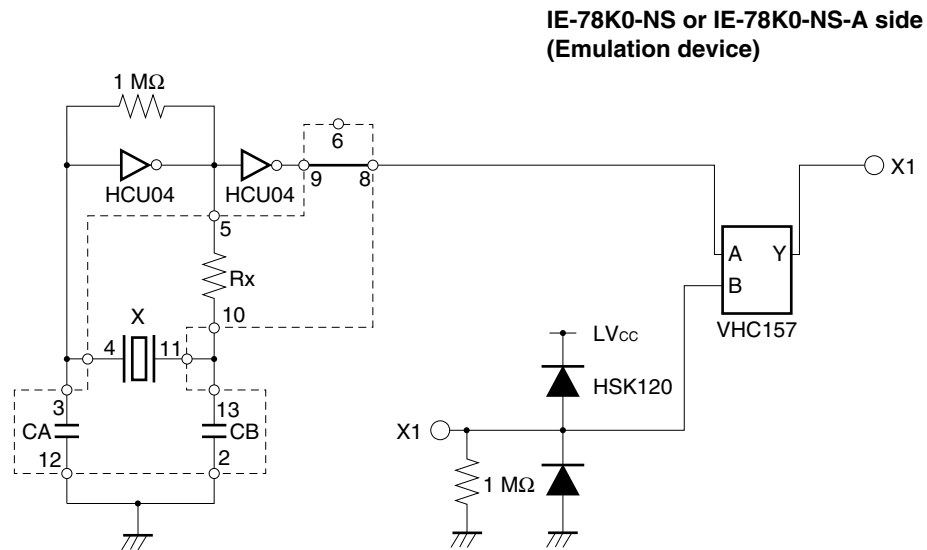
Remark The sections enclosed in broken lines indicate parts that are attached to the parts board.

(b) When using a crystal oscillator

- Items to be prepared
  - Crystal oscillator (see pinouts shown in Figure 3-7)

Figure 3-7. Crystal Oscillator (When Using System Clock or User-Mounted Clock)
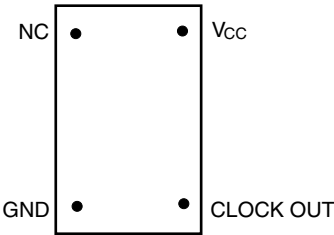
<Steps>
<1> Prepare the IE-178134-NS-EM1.
<2> Remove the crystal oscillator that is mounted in the IE-178134-NS-EM1's socket (the socket marked as X1).
<3> Connect the crystal oscillator to the socket (X1) from which the crystal oscillator was removed (in <2> above). Insert the crystal oscillator pin into the socket aligning the pins as shown in the figure below.

Figure 3-8. Pin Alignment of Crystal Oscillator and Socket

Crystal Oscillator Pin Name	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
Vcc	14
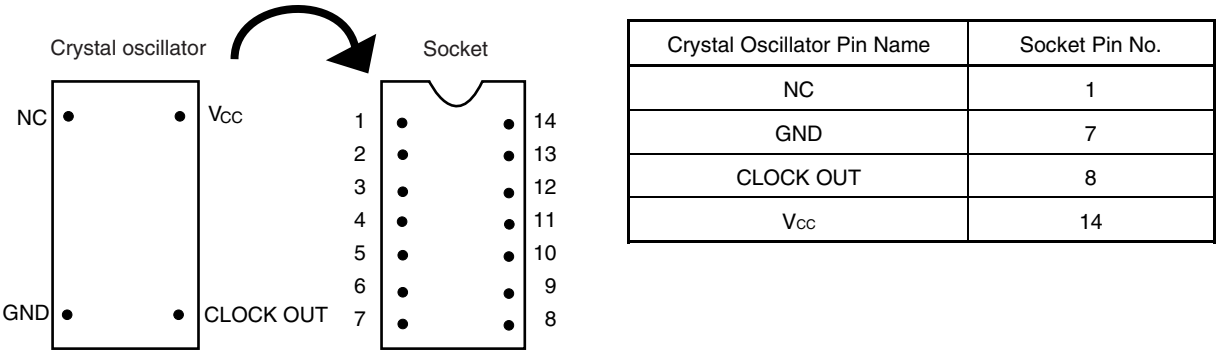
<4> Connect the IE-178134-NS-EM1 to the IE-78K0-NS or IE-78K0-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.
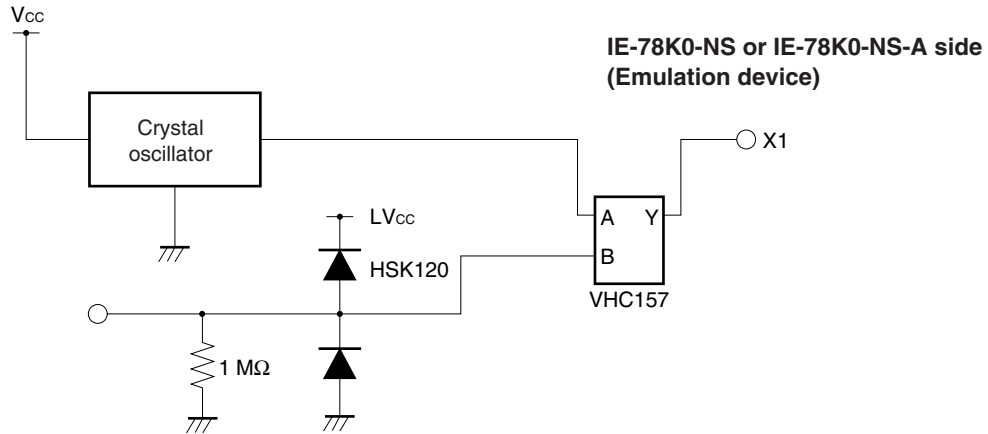
(3) When using external clock

No hardware settings are required for this situation.

When starting the integrated debugger (ID78K0-NS), open the configuration dialog box and select "External" in the area (Clock) for selecting the CPU's clock source (this selects the user's clock).

3.3 External Trigger

To set up an external trigger, connect the IE-178134-NS-EM1's check pins EXTOUT and EXTIN as shown below.

For the pin characteristics, refer to the **IE-78K0-NS User's Manual (U13731E)** or **IE-78K0-NS-A User's Manual (U14889E)**.

For usage methods, refer to the **ID78K Series Ver. 2.30 or Later Operation Windows Based User's Manual (15185E)**.

Figure 3-9. External Trigger Input Position
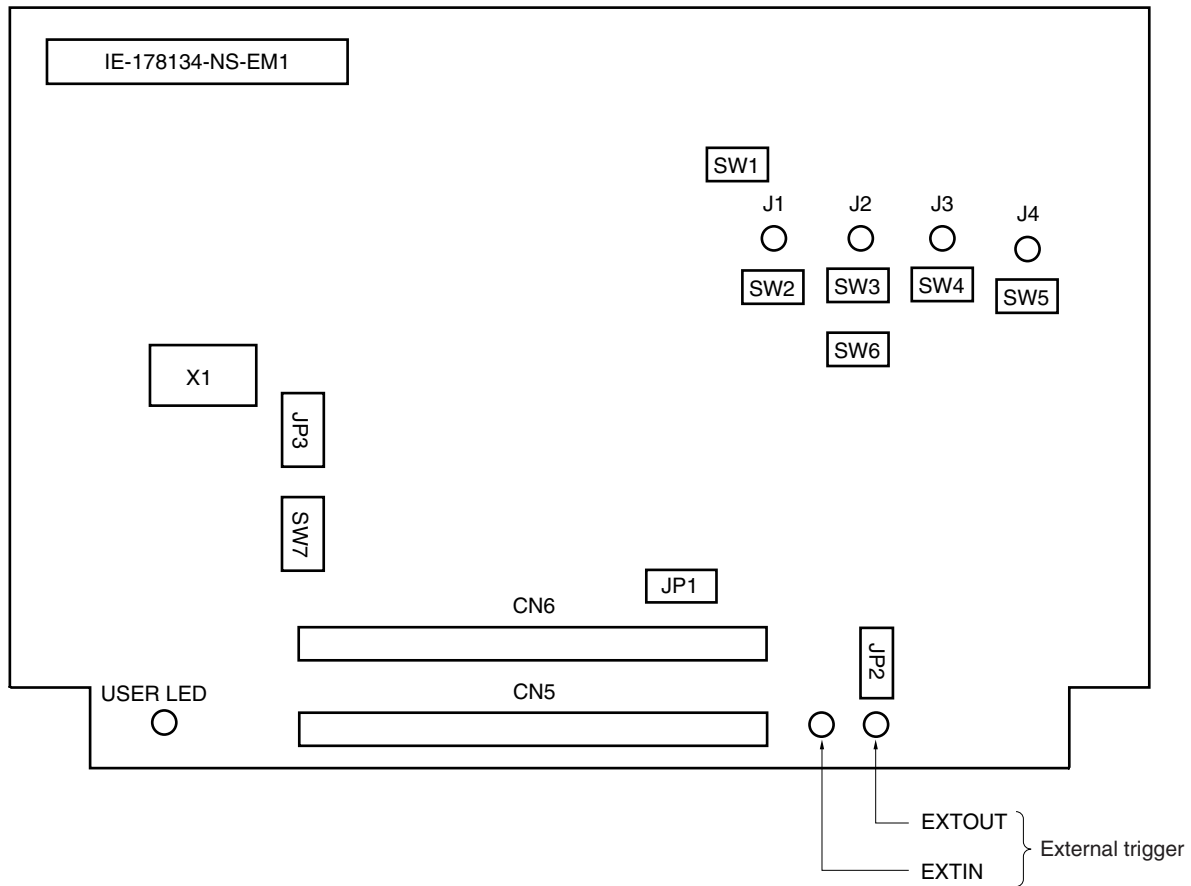
3.4 Jumper Settings on IE-78K0-NS

When using the IE-178134-NS-EM1, set the jumpers on the IE-78K0-NS as shown below. For details of these jumper settings, refer to the **IE-78K0-NS User's Manual (U13731E)**.

Caution   Incorrect jumper settings may damage the IE system.

★

Table 3-2. Jumper Settings on IE-78K0-NS

	JP2	JP3	JP4	JP6	JP7	JP8
Setting	2 and 3 shorted	1 and 2 shorted	1 and 2 shorted	5 and 6 shorted	1 and 2 shorted	1 and 2 shorted

3.5 Jumper Settings on IE-78K0-NS-A

When using the IE-178134-NS-EM1 with the IE-78K0-NS-A, set the jumpers on the IE-78K0-NS-A as follows. For the jumper locations, refer to the **IE-78K0-NS-A User's Manual (U14889E)**.

Caution   Incorrect jumper settings may damage the IE system.

Table 3-3. Jumper Settings on G-780009 Board of IE-78K0-NS-A

	JP2	JP3	JP4	JP6	JP7	JP8
Setting	2 and 3 shorted	1 and 2 shorted	1 and 2 shorted	5 and 6 shorted	1 and 2 shorted	1 and 2 shorted

Table 3-4. Jumper Settings on G-78K0H Option Board of IE-78K0-NS-A

	JP2
Setting	2 and 3 shorted

3.6 Jumper Settings on IE-178134-NS-EM1

Set the jumpers of the IE-178134-NS-EM1 as shown below.

Caution   Incorrect jumper settings may damage the IE system.

Table 3-5. Jumper Settings on IE-178134-NS-EM1

	JP1	JP2	JP3
Setting	1 and 2 shorted	2 and 3 shorted	1 and 2 shorted

3.7   Switch Settings on IE-178134-NS-EM1

Table 3-6 shows the switch settings on the IE-178134-NS-EM1.

Table 3-6. Switch Settings on IE-178134-NS-EM1

Switch	Signal Name	Setting	Description	Factory Setting
SW1	–	PORT side	Do not change (target device selection)	PORT side
SW2	VCOL	AMP side	Via the amplifier of the IE-178134-NS-EM1	AMP side
		NO AMP side	Not via the amplifier of the IE-178134-NS-EM1	
SW3	VCOH	AMP side	Via the amplifier of the IE-178134-NS-EM1	AMP side
		NO AMP side	Not via the amplifier of the IE-178134-NS-EM1	
SW4	FMIFC	AMP side	Via the amplifier of the IE-178134-NS-EM1	AMP side
		NO AMP side	Not via the amplifier of the IE-178134-NS-EM1	
SW5	AMIFC	AMP side	Via the amplifier of the IE-178134-NS-EM1	AMP side
		NO AMP side	Not via the amplifier of the IE-178134-NS-EM1	
SW6	–	124 side	Do not change (pin selection)	124 side
SW7	REGOSC, REGCPU	I side	The pin is connected on the IE-178134-NS-EM1[Note]. Normally use the IE system with SW7 set to the I side.	I side
		U side	The pin is connected on the target system.	

Note   Connected to GND via a capacitor (0.1 μF)

3.8 Setting of Low-Voltage Emulation

If the target system operates with a low voltage, supply the TP1 terminal pin on the main board (G-780009 Board) of the IE-78K0-NS or IE-78K0-NS-A with the same power supply voltage as that of the target system.

Set the power supply voltage of the target system to 3.5 V to 5 V.

Caution When emulating at 4.5 V or lower, start the IE system with 5 V and then lower the voltage for the target system.

Table 3-7. Power Supply Voltage and Maximum Current Consumption

Power Supply Voltage to TP1	Maximum Current Consumption of TP1
3.5 V to 5 V	300 mA

Figure 3-10. IE-78K0-NS or IE-78K0-NS-A Main Board (G-780009 Board)

TP1

V_{CC}

GND

Dedicated bus interface connector
(HOST-I/F)
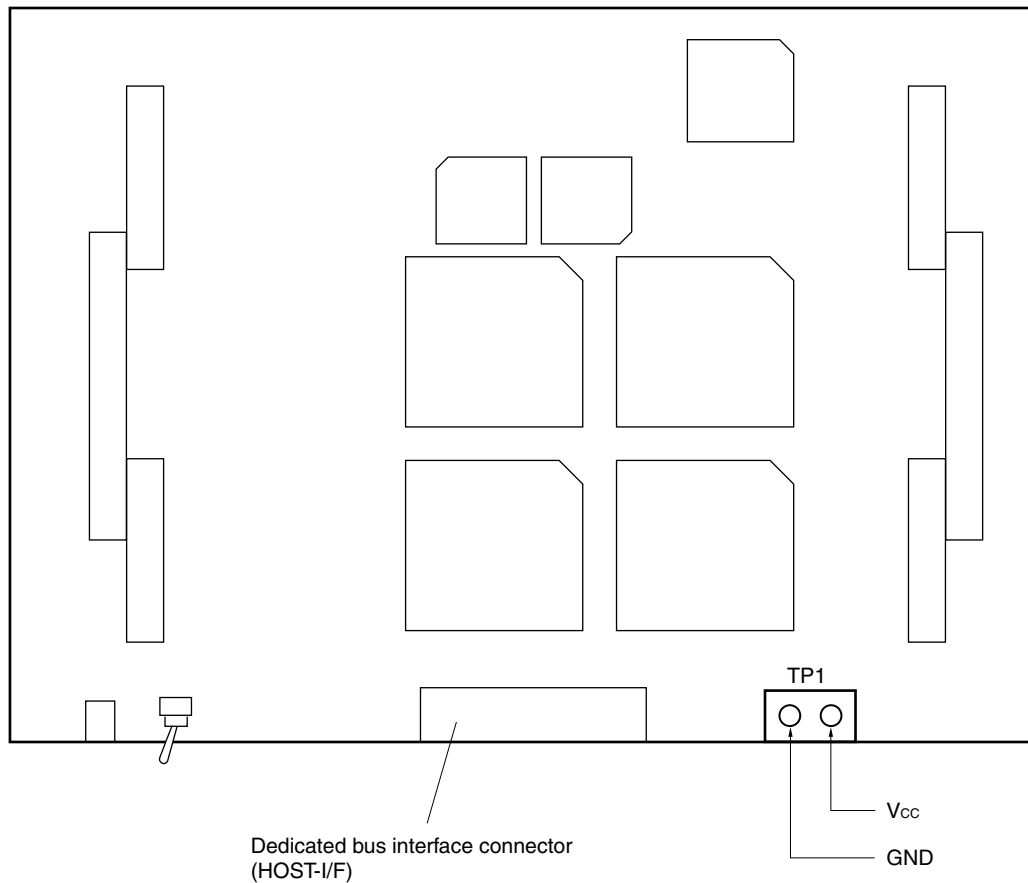
CHAPTER 4 DIFFERENCES BETWEEN TARGET DEVICES AND TARGET INTERFACE CIRCUITS

This chapter describes differences between the target device's signal lines and the signal lines of the IE-178134-NS-EM1's target interface circuit.

Although the target device is a CMOS circuit, the IE-178134-NS-EM1's target interface circuit consists of an emulation CPU, emulation gate array, TTL, CMOS-IC, and other components.

When the IE system is connected with the target system for debugging, the IE system performs emulation so as to operate as the actual target device would operate in the target system.

However, some minor differences exist since the operations are performed via the IE system's emulation.

(1) Signals input to or output from the emulation gate array (μPD7880)
(2) Signals input to or output from the emulation gate array (μPD7883)
(3) Signals input to or output from the emulation CPU (μPD78F124)
(4) Signals input to or output from the emulation CPU (μPD780009)
(5) Other signals

The IE system's circuit is used as follows for signals listed in (1) to (5) above.

(1) Signals input to or output from the emulation gate array (μPD7880)
Refer to **Figure 4-1 Equivalent Circuit 1 from Emulation Circuit**.
- P50 to P57
- P60 to P67

(2) Signals input to or output from the emulation gate array (μPD7883)
Refer to **Figure 4-2 Equivalent Circuit 2 from Emulation Circuit.**
- P40 to P47

(3) Signals input to or output from the emulation CPU (μPD78F124)
Refer to **Figure 4-3 Equivalent Circuit 3 from Emulation Circuit.**
- P00 to P06
- P10 to P15
- P30 to P37
- P70 to P77
- P120 to P125
- P130 to P132
- EO0, EO1
- REGCPU, REGOSC
- J1 to J4 (AMIFC, FMIFC, VCOL, VCOH)

(4) Signals input to or output from the emulation CPU (μPD780009)
Refer to **Figure 4-4 Equivalent Circuit 4 from Emulation Circuit.**
- X1
- $\overline{\text{RESET}}$

(5) Other signals

Refer to **Figure 4-5 Equivalent Circuit 5 from Emulation Circuit.**

- GND, GNDPORT
- V_{DD}
- $V_{DD}PORT$, $V_{DD}PLL$, GNDPLL
- IC/V_{PP}
- X2
- AMIFC, FMIFC, VCOL, VCOH

Figure 4-1. Equivalent Circuit 1 from Emulation Circuit

P50 to P57
P60 to P67 ○ ──────────────────────── μPD7880
Emulation gate array

Figure 4-2. Equivalent Circuit 2 from Emulation Circuit

P40 to P47 ○ ──────────────────────── μPD7883
Emulation gate array

Figure 4-3. Equivalent Circuit 3 from Emulation Circuit

P00 to P06
P10 to P15
P30 to P37 ○ ────────────────────────
P70 to P77
P120 to P125
P130 to P132
EO0, EO1

REGCPU, REGOSC ○ ──────────── SW7 ──── μPD178F124

0.1 μF ═══ Emulation CPU

J1 to J4 ◉ ── SW2 to SW5 ── μPC2711 ── SW6 ──

$\begin{pmatrix} VCOL, VCOH, \\ FMIFC, AMIFC \end{pmatrix}$

Figure 4-4. Equivalent Circuit 4 from Emulation Circuit

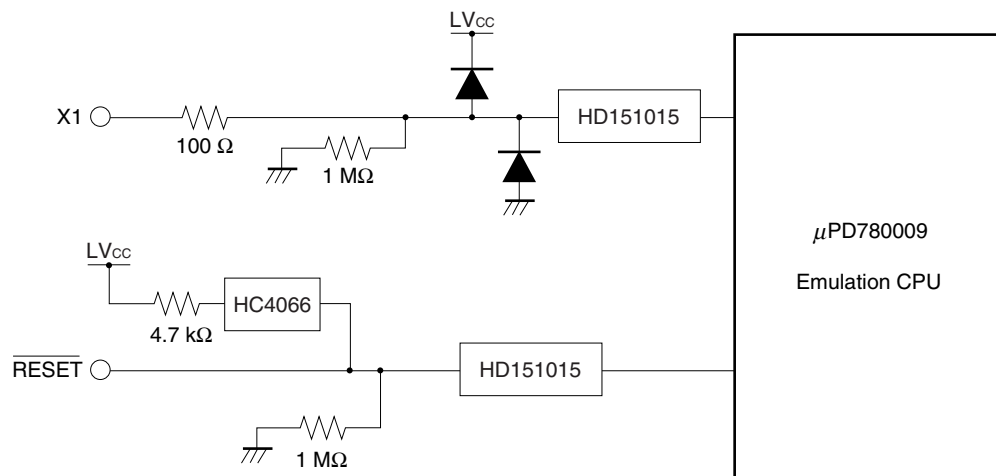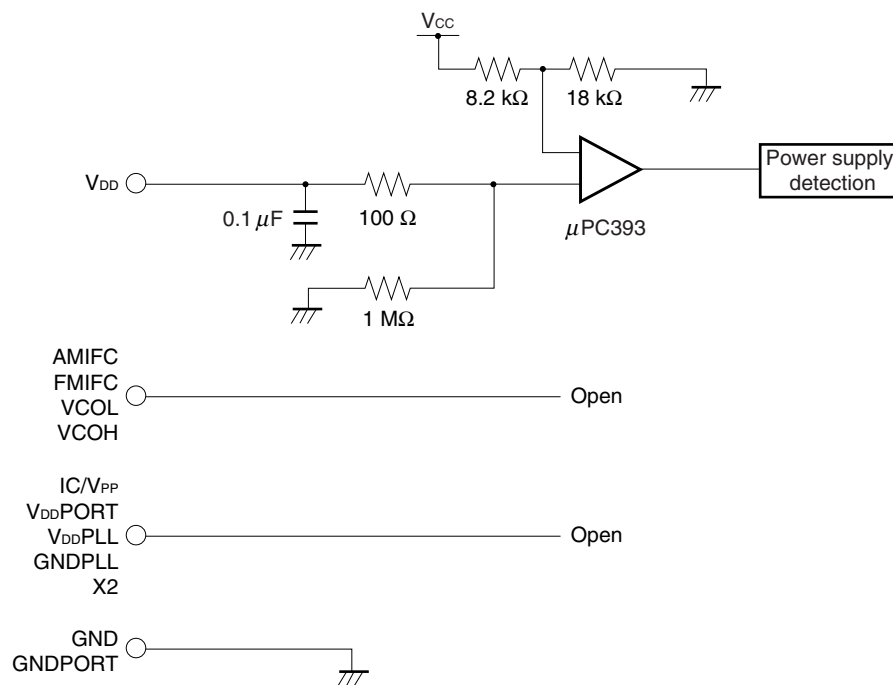**Figure 4-5. Equivalent Circuit 5 from Emulation Circuit**

CHAPTER 5   RESTRICTIONS

This chapter describes the restrictions of the IE-178134-NS-EM1.

- When the IE system is started without connecting the target board, the initial value of each port is undefined.

Table 5-1. Initial Value of Port

	Emulator	Target CPU
Initial value of port	Undefined	00H

APPENDIX A EMULATION PROBE PIN ASSIGNMENT TABLE

Table A-1. NP-80GC, NP-80GC-TQ, NP-H80GC-TQ, NP-80GF, NP-80GF-TQ Pin Assignments (1/2)

Emulation Probe	CN2 Pin No.	Emulation Probe	CN2 Pin No.
1	114	35	50
2	113	36	45
3	108	37	46
4	107	38	41
5	104	39	42
6	103	40	35
7	100	41	8
8	99	42	7
9	94	43	14
10	93	44	13
11	30	45	18
12	29	46	17
13	24	47	22
14	23	48	21
15	20	49	28
16	19	50	27
17	16	51	92
18	15	52	91
19	10	53	98
20	9	54	97
21	37	55	102
22	43	56	101
23	44	57	106
24	47	58	105
25	48	59	112
26	51	60	111
27	52	61	83
28	57	62	77
29	58	63	78
30	59	64	73
31	60	65	74
32	55	66	69
33	56	67	70
34	49	68	63

Remarks 1. NP-80GC, NP-80GC-TQ, NP-H80GC-TQ, NP-80GF, and NP-80GF-TQ are products of Naito Densei Machida Mfg. Co., Ltd.

    2. The numbers in the "Emulation probe" column indicate the corresponding pin number on the emulation probe tip.

    3. The CN2 pin numbers indicate the CN2 pin numbers of the 178134 PROBE Board.

Table A-1. NP-80GC, NP-80GC-TQ, NP-H80GC-TQ, NP-80GF, NP-80GF-TQ Pin Assignments (2/2)

Emulation Probe	CN2 Pin No.	Emulation Probe	CN2 Pin No.
69	64	75	72
70	61	76	75
71	62	77	76
72	65	78	79
73	66	79	80
74	71	80	85

Remarks 1. NP-80GC, NP-80GC-TQ, NP-H80GC-TQ, NP-80GF, and NP-80GF-TQ are products of Naito Densei Machida Mfg. Co., Ltd.

2. The numbers in the "Emulation probe" column indicate the corresponding pin number on the emulation probe tip.

3. The CN2 pin numbers indicate the CN2 pin numbers of the 178134 PROBE Board.
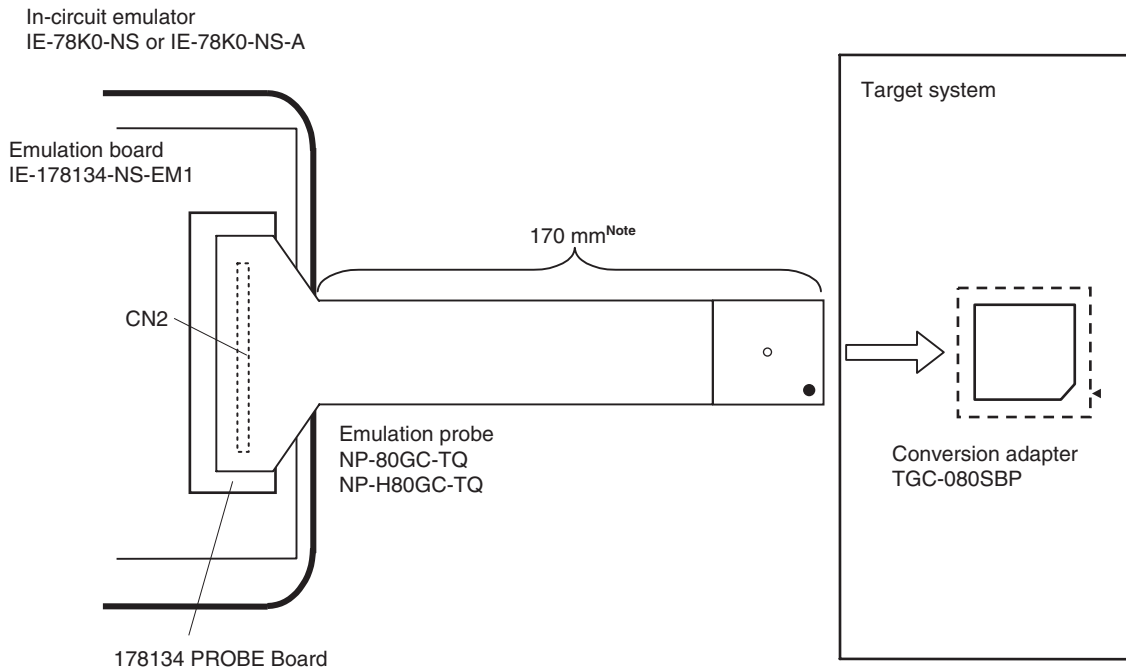
APPENDIX B NOTES ON DESIGNING TARGET SYSTEM

The following shows the conditions when connecting the emulation probe and conversion adapter. Consider the shape of the components to be mounted on the target system and follow the configurations below when designing the system.

Table B-1. Distance Between IE System and Conversion Adapter

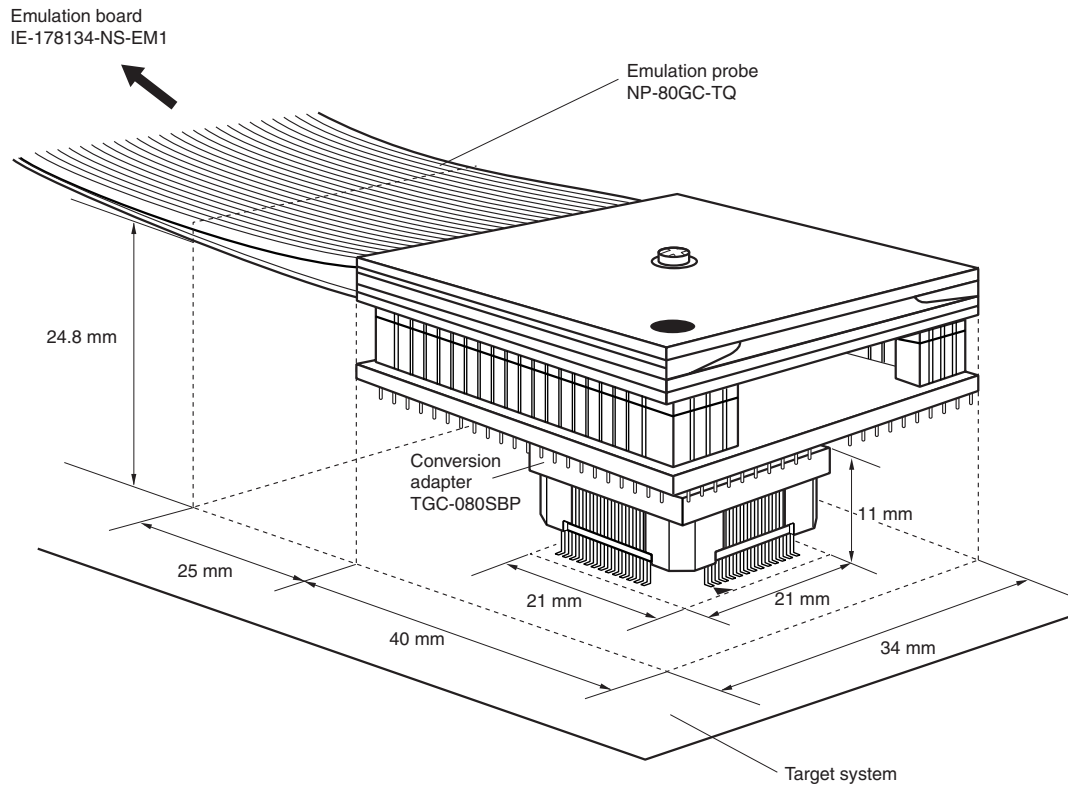| Emulation Probe	Conversion Adapter	Distance Between IE System and Conversion Adapter
NP-80GC-TQ	TGC-080SBP	170 mm
NP-H80GC-TQ		370 mm
NP-80GF-TQ	TGF-080RAP	170 mm

Remark NP-80GC-TQ, NP-H80GC-TQ, and NP-80GF-TQ are products of Naito Densei Machida Mfg. Co., Ltd. and TGC-080SBP and TGF-080RAP are products of TOKYO ELETECH CORPORATION.

Figure B-1. Distance Between In-Circuit Emulator and Conversion Adapter (When 80GC Is Used)

In-circuit emulator
IE-78K0-NS or IE-78K0-NS-A

Target system

Emulation board
IE-178134-NS-EM1

170 mm[Note]

CN2

Emulation probe
NP-80GC-TQ
NP-H80GC-TQ

Conversion adapter
TGC-080SBP

178134 PROBE Board

Note The above shows the distance when the NP-80GC-TQ is used. When the NP-H80GC-TQ is used, the distance is 370 mm.

★   **Figure B-2. Connection Conditions of Target System (When NP-80GC-TQ Is Used)**

Emulation board
IE-178134-NS-EM1

Emulation probe
NP-80GC-TQ

24.8 mm

Conversion
adapter
TGC-080SBP

11 mm

25 mm

21 mm

21 mm

40 mm

34 mm

Target system

★   **Figure B-3. Connection Conditions of Target System (When NP-H80GC-TQ Is Used)**

Emulation board
IE-178134-NS-EM1

Emulation probe
NP-H80GC-TQ

25.3 mm

Conversion
adapter
TGC-080SBP

11 mm

25 mm

21 mm

21 mm

42 mm
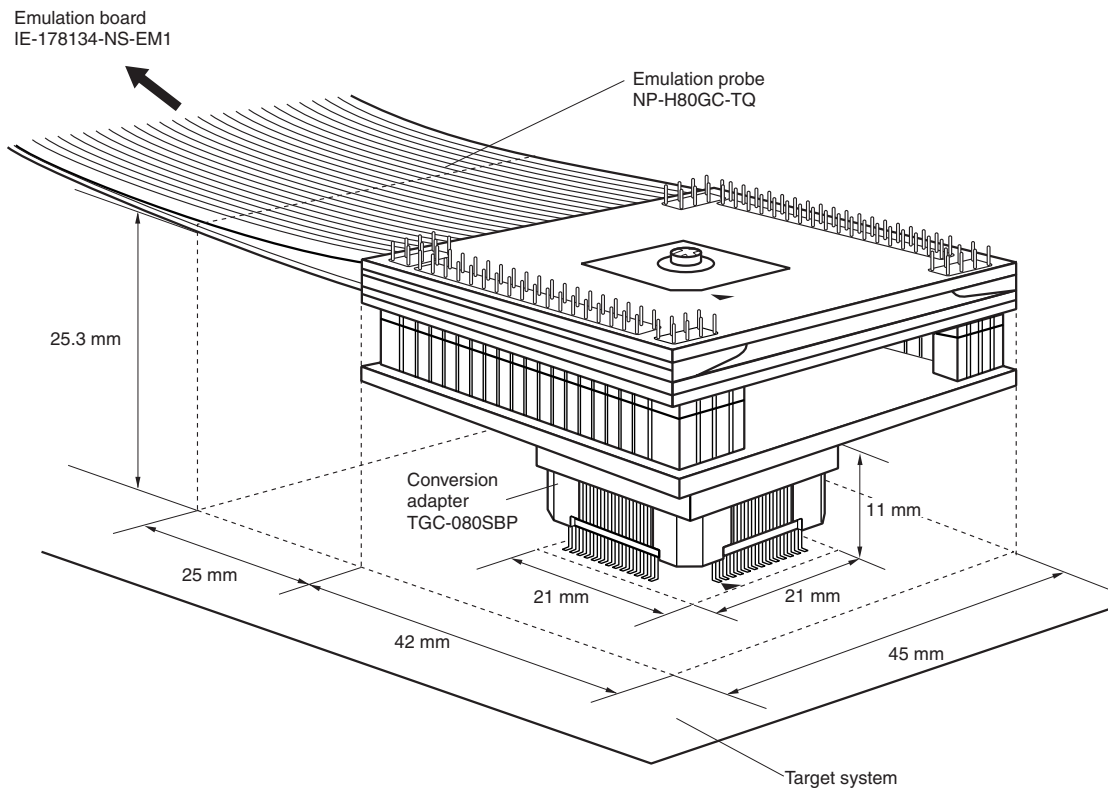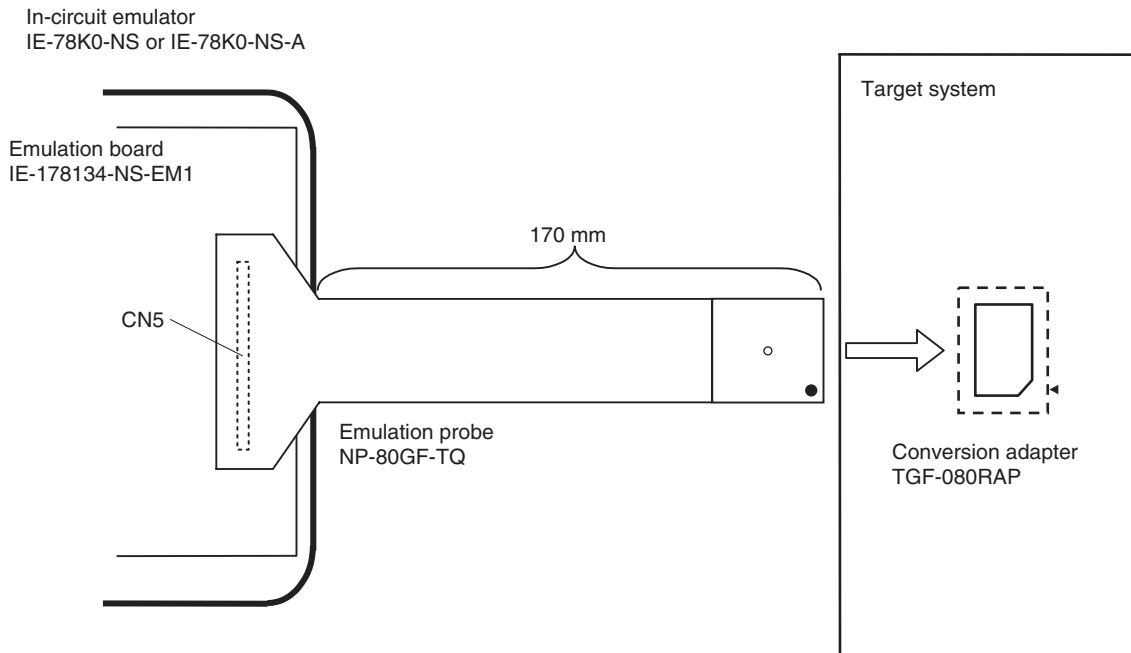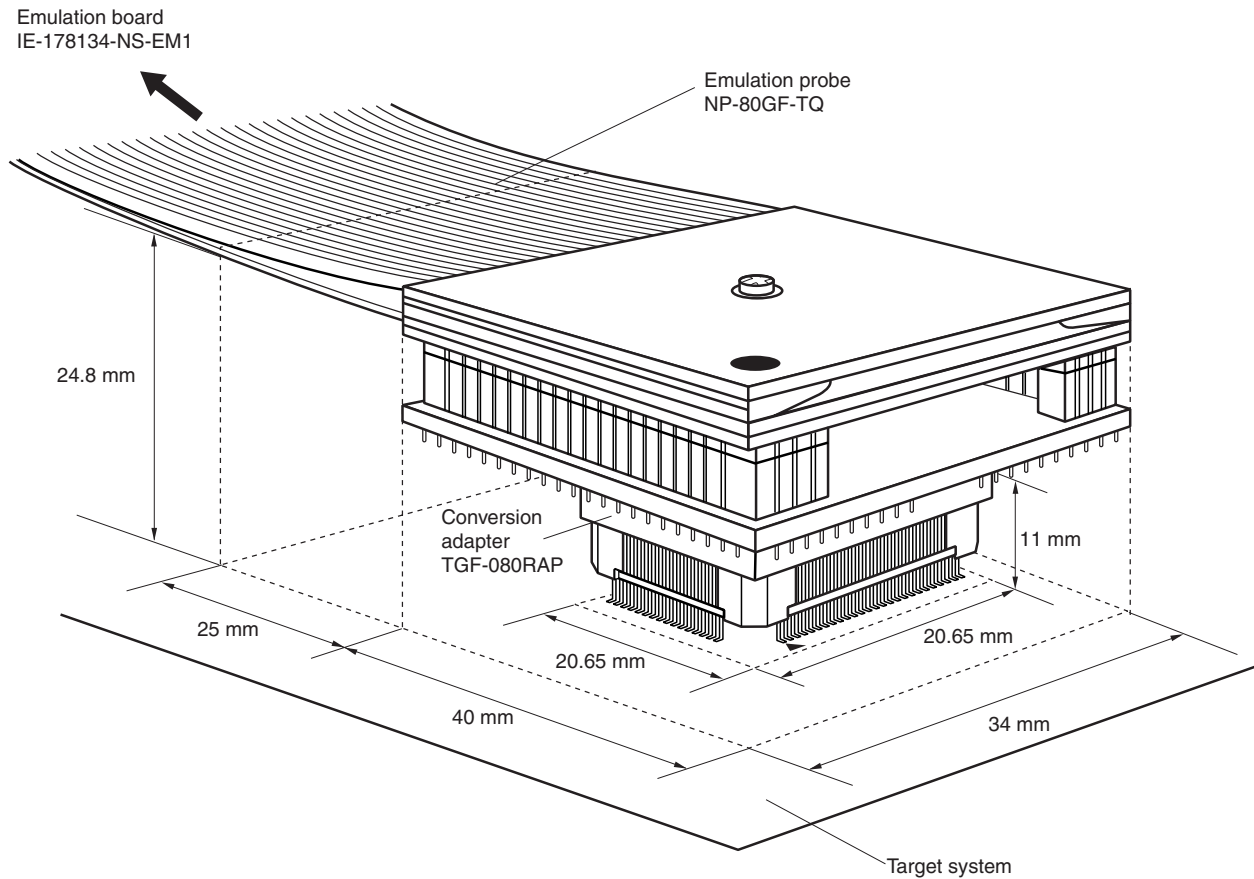
45 mm

Target system

Figure B-4. Distance Between In-Circuit Emulator and Conversion Adapter (When 80GF Is Used)

★   **Figure B-5. Connection Conditions of Target System (When NP-80GF-TQ Is Used)**

[MEMO]

[MEMO]

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