

User's Manual

IE-178134-NS-EM1

Emulation Board

Target Devices

μPD178024 Subseries

[MEMO]

Windows is either a registered trademark or a trademark of Microsoft Corporation in the United States and/or other countries.

PC/AT is a trademark of International Business Machines Corporation.

- **The information in this document is current as of August, 2002. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**

- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.

- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.

- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.

- NEC semiconductor products are classified into the following three quality grades:

"Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.

"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.

(Note)

(1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.

(2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4

Regional Information

Some information contained in this document may vary from country to country. Before using any NEC product in your application, please contact the NEC office in your country to obtain a list of authorized representatives and distributors. They will verify:

- Device availability
- Ordering information
- Product release schedule
- Availability of related technical literature
- Development environment specifications (for example, specifications for third-party tools and components, host computers, power plugs, AC supply voltages, and so forth)
- Network requirements

In addition, trademarks, registered trademarks, export restrictions, and other legal issues may also vary from country to country.

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

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

CHAPTER 1 GENERAL	11
1.1 System Configuration	12
1.2 Hardware Configuration	14
1.3 Basic Specifications	15
CHAPTER 2 PART NAMES	16
2.1 Parts of Main Unit	17
CHAPTER 3 INSTALLATION	18
3.1 Connection	19
3.2 Clock Settings	21
3.2.1 Overview of clock settings	21
3.2.2 System clock settings	23
3.3 External Trigger	28
3.4 Jumper Settings on IE-78K0-NS	29
3.5 Jumper Settings on IE-78K0-NS-A	29
3.6 Jumper Settings on IE-178134-NS-EM1	29
3.7 Switch Settings on IE-178134-NS-EM1	30
3.8 Setting of Low-Voltage Emulation	31
CHAPTER 4 DIFFERENCES BETWEEN TARGET DEVICES AND TARGET INTERFACE CIRCUITS	32
CHAPTER 5 RESTRICTIONS	35
APPENDIX A EMULATION PROBE PIN ASSIGNMENT TABLE	36
APPENDIX B NOTES ON DESIGNING TARGET SYSTEM	38

LIST OF FIGURES

Figure No.	Title	Page
1-1	System Configuration	12
1-2	Basic Hardware Configuration (When IE-78K0-NS Is Used)	14
1-3	Basic Hardware Configuration (When IE-78K0-NS-A Is Used)	14
2-1	IE-178134-NS-EM1 Part Names	17
2-2	178134 PROBE Board	17
3-1	Connection of Emulation Probe	20
3-2	External Circuits Used as System Clock Oscillator	21
3-3	When Using Clock That Is Already Mounted on Emulation Board	22
3-4	When Using User-Mounted Clock	22
3-5	When Using External Clock	23
3-6	Connections on Parts Board (When Using System Clock or User-Mounted Clock)	24
3-7	Crystal Oscillator (When Using System Clock or User-Mounted Clock)	26
3-8	Pin Alignment of Crystal Oscillator and Socket	26
3-9	External Trigger Input Position	28
3-10	IE-78K0-NS or IE-78K0-NS-A Main Board (G-780009 Board)	31
4-1	Equivalent Circuit 1 from Emulation Circuit	33
4-2	Equivalent Circuit 2 from Emulation Circuit	33
4-3	Equivalent Circuit 3 from Emulation Circuit	33
4-4	Equivalent Circuit 4 from Emulation Circuit	34
4-5	Equivalent Circuit 5 from Emulation Circuit	34
B-1	Distance Between In-Circuit Emulator and Conversion Adapter (When 80GC Is Used)	38
B-2	Connection Conditions of Target System (When NP-80GC-TQ Is Used)	39
B-3	Connection Conditions of Target System (When NP-H80GC-TQ Is Used)	39
B-4	Distance Between In-Circuit Emulator and Conversion Adapter (When 80GF Is Used)	40
B-5	Connection Conditions of Target System (When NP-80GF-TQ Is Used)	40

LIST OF TABLES

Table No.	Title	Page
1-1	Correspondence Between Emulation Probes and Conversion Socket/Conversion Adapters	13
1-2	Basic Specifications	15
3-1	System Clock Settings	23
3-2	Jumper Settings on IE-78K0-NS	29
3-3	Jumper Settings on G-780009 Board of IE-78K0-NS-A	29
3-4	Jumper Settings on G-78K0H Option Board of IE-78K0-NS-A	29
3-5	Jumper Settings on IE-178134-NS-EM1	29
3-6	Switch Settings on IE-178134-NS-EM1	30
3-7	Power Supply Voltage and Maximum Current Consumption	31
5-1	Initial Value of Port	35
A-1	NP-80GC, NP-80GC-TQ, NP-H80GC-TQ, NP-80GF, NP-80GF-TQ Pin Assignments	36
B-1	Distance Between IE System and Conversion Adapter	38

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.

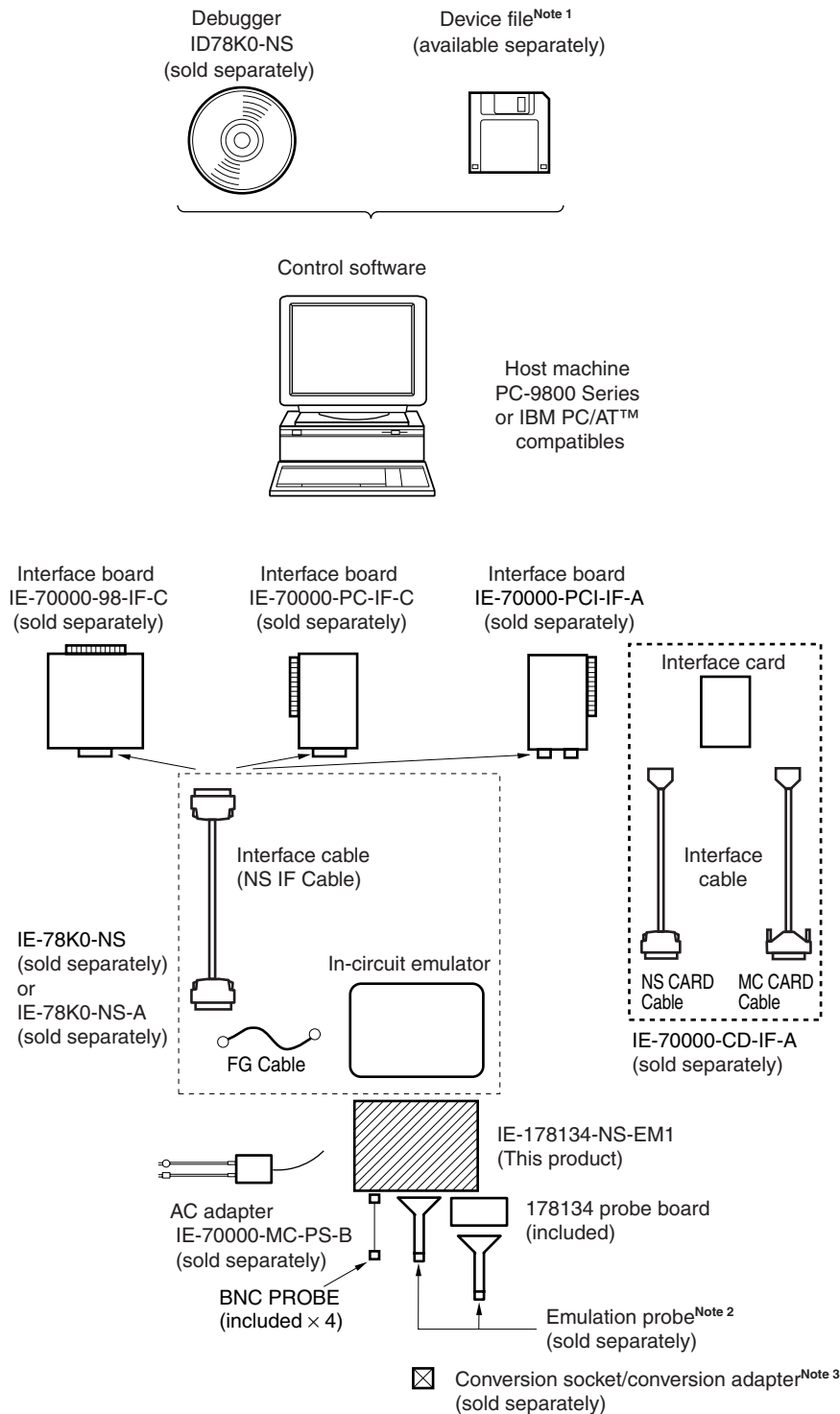
This chapter describes the IE-178134-NS-EM1's system configuration and basic specifications.

- Target device
 - μ PD178024 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.

μ SxxxxDF178024: μ PD178024 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)	TGC-080SBP
	NP-H80GC-TQ (probe length: 400 mm)	
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)

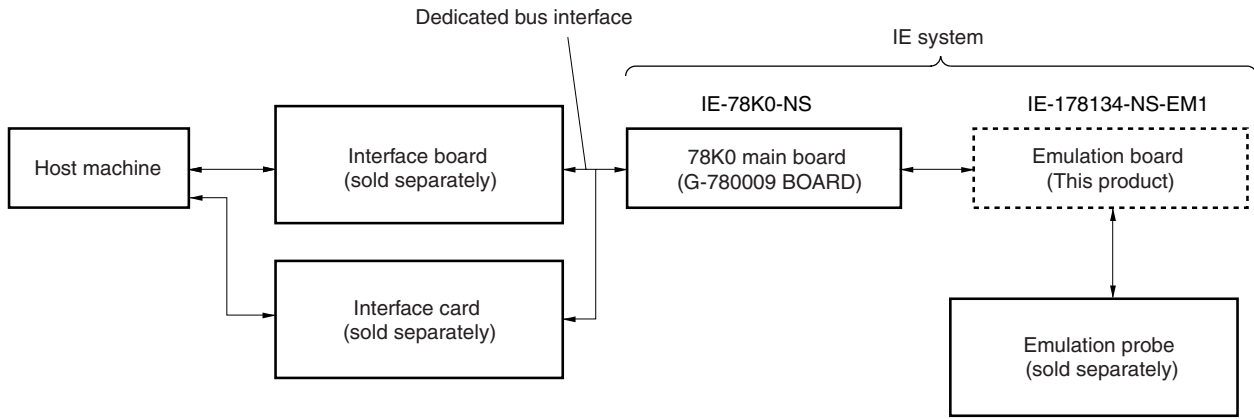
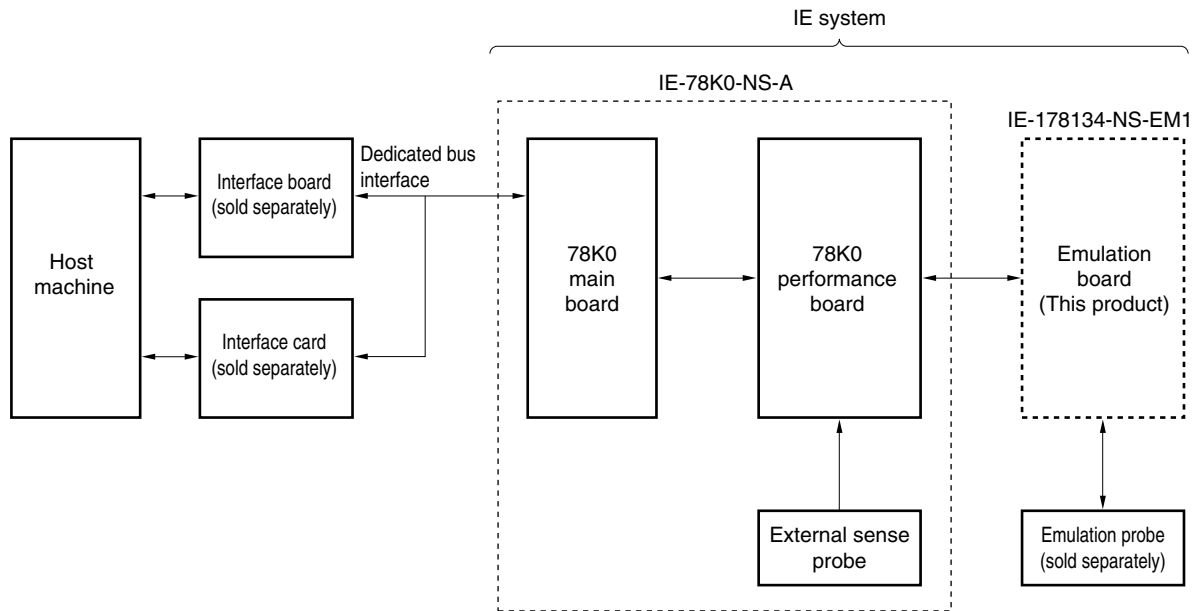


Figure 1-3. Basic Hardware Configuration (When IE-78K0-NS-A Is Used)



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	μ PD178024 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

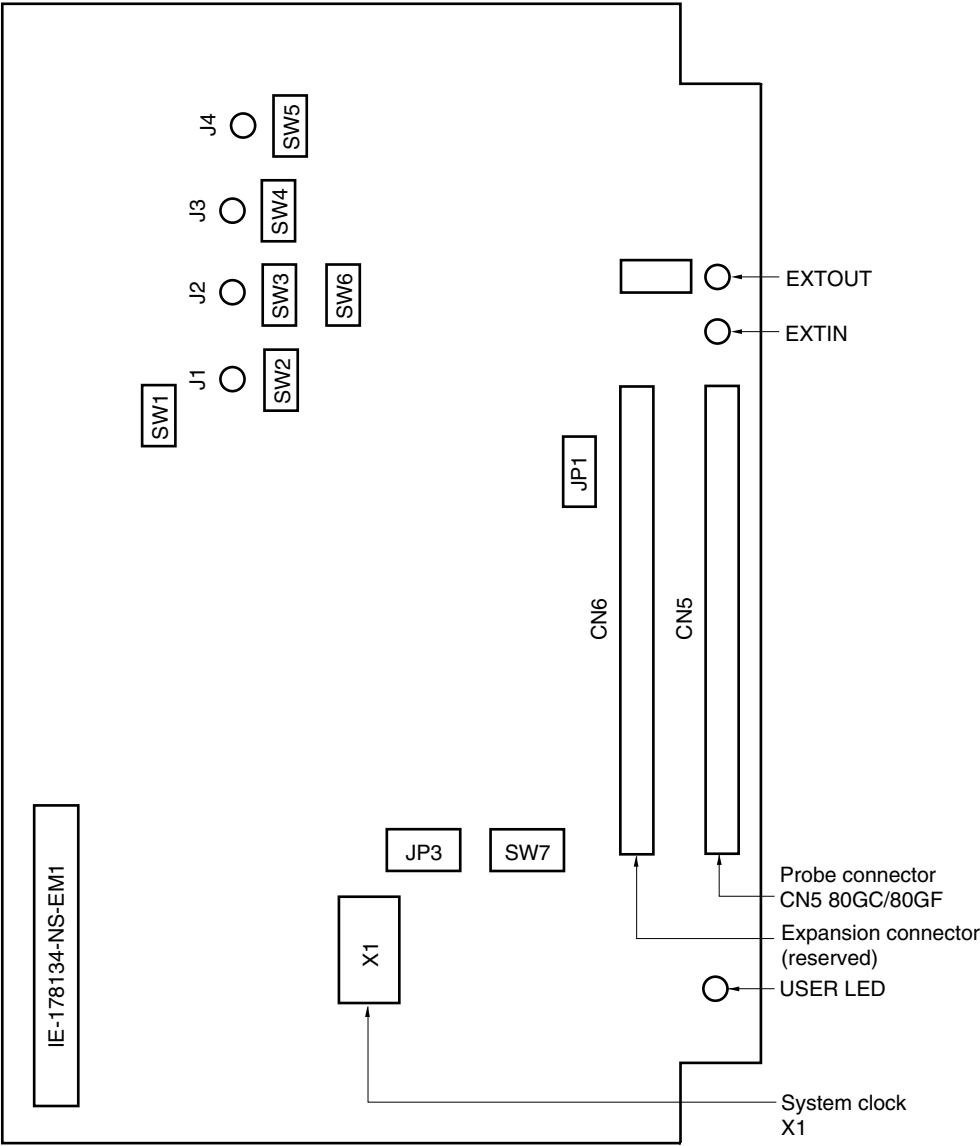
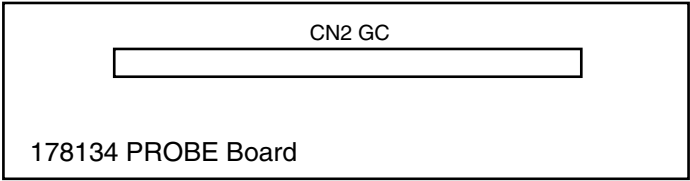


Figure 2-2. 178134 PROBE Board



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

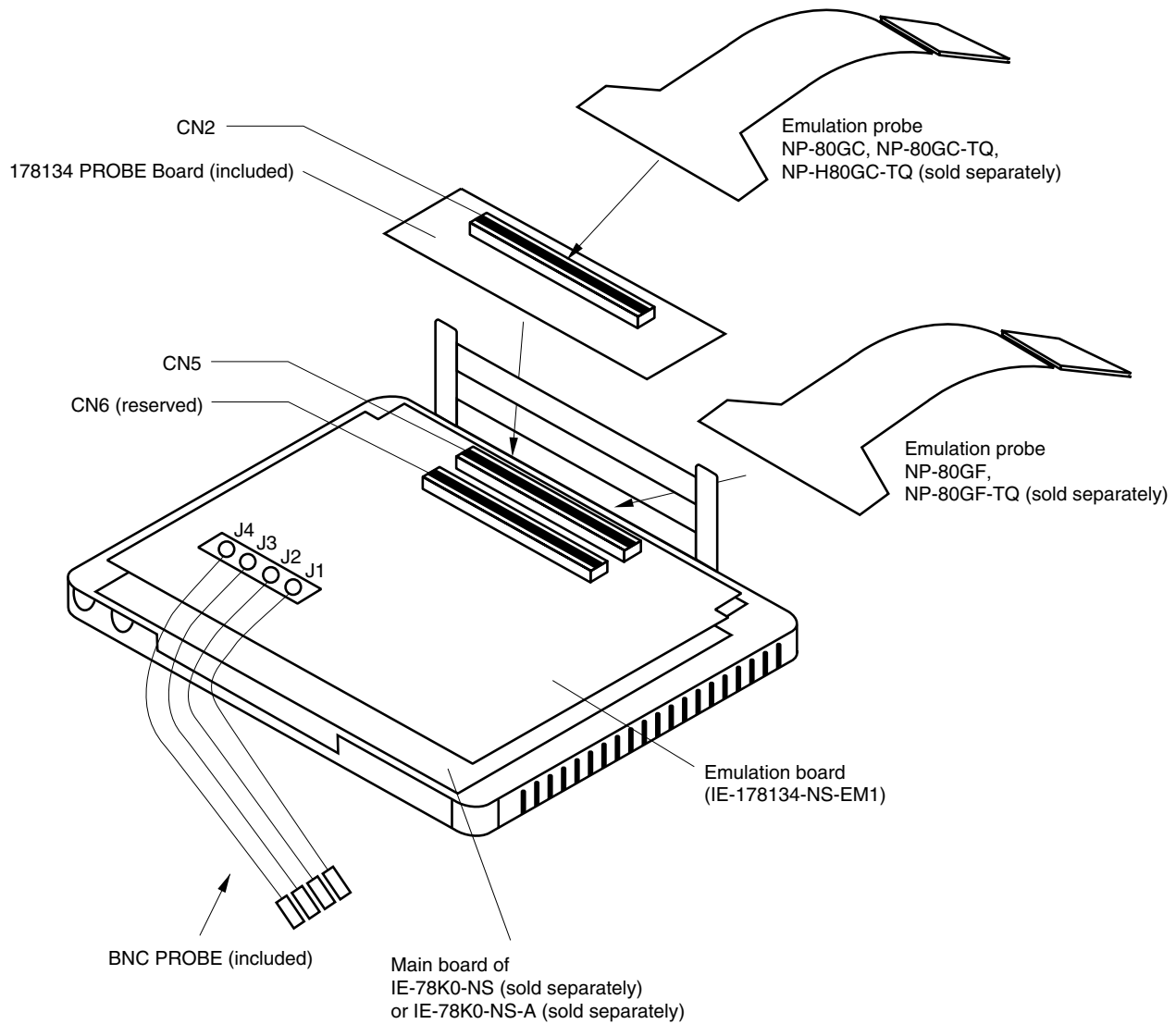
J4: AMIFC

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



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

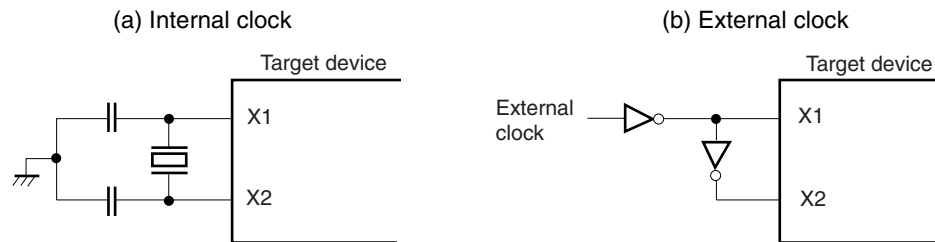
If the target system includes an internal clock, select either **(1) Clock that is already mounted on emulation board** or **(2) Clock that is mounted by user**. For an internal clock, the target device is connected to a resonator and the target device's internal oscillator is used. An example of the 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.

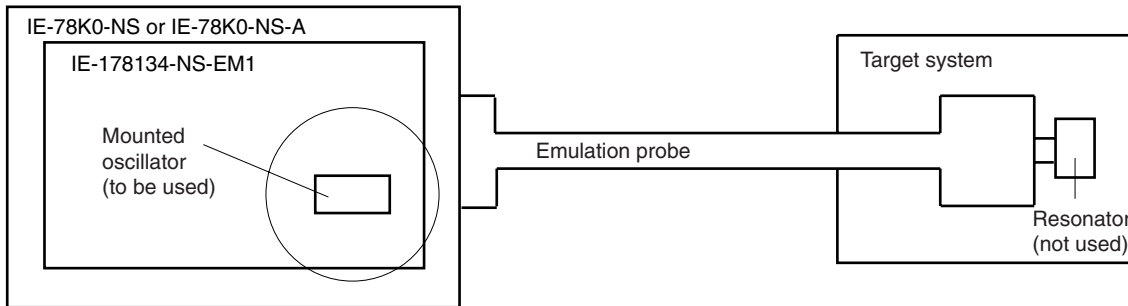
Figure 3-2. External Circuits Used as System Clock Oscillator



(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

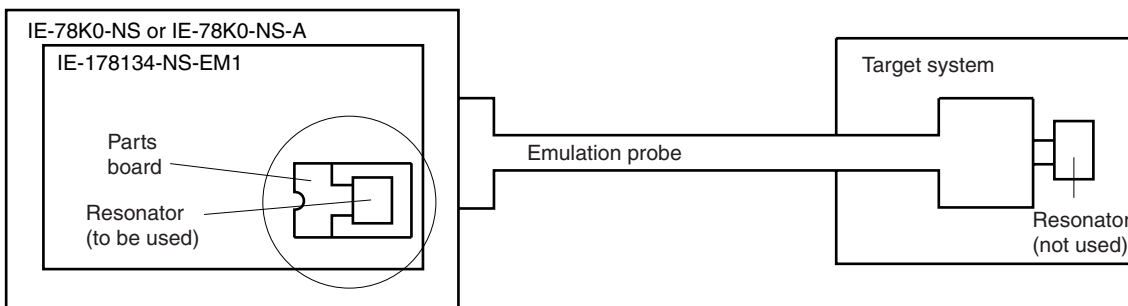


Remark The clock that is supplied by the IE-178134-NS-EM1's oscillator (encircled in the figure) is used.

(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.

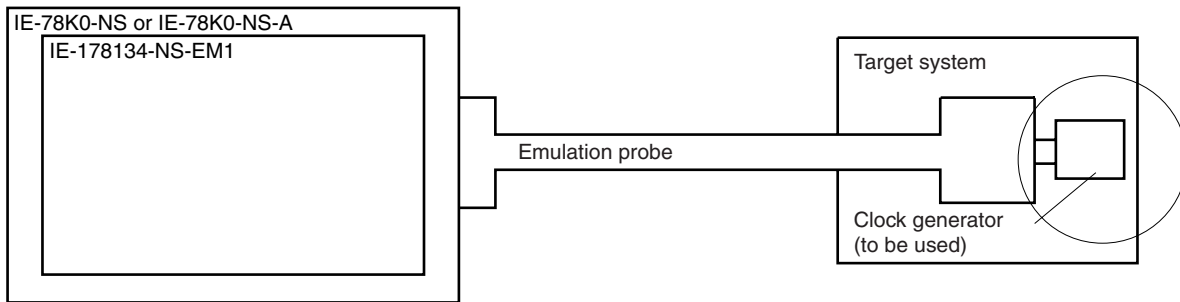
Figure 3-4. When Using User-Mounted Clock



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

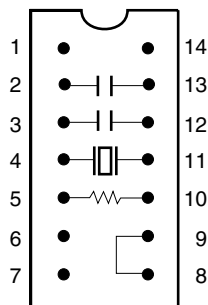
- Parts board
- Ceramic resonator or crystal resonator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Solder kit

<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).

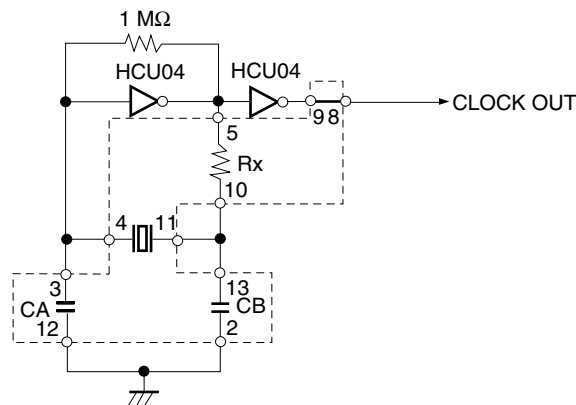
Figure 3-6. Connections on Parts Board (When Using System Clock or User-Mounted Clock)

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

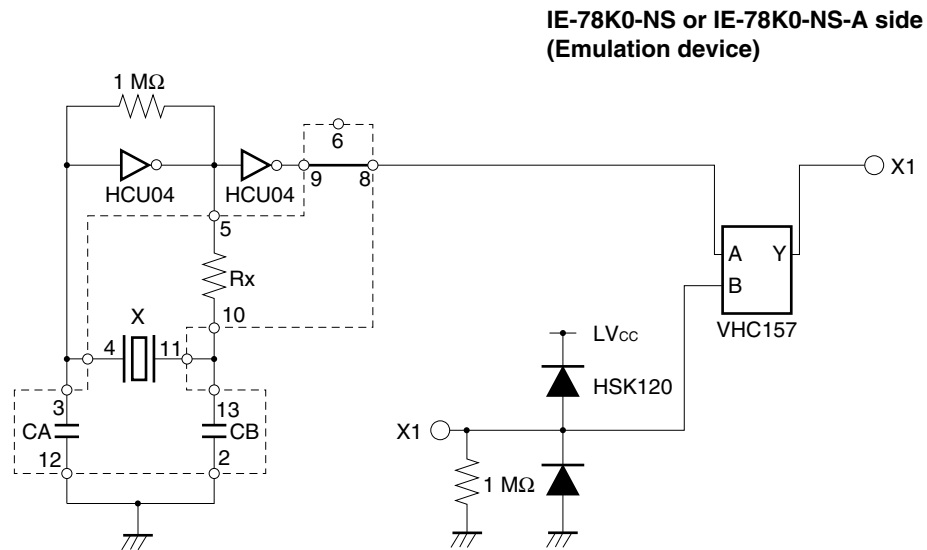
Circuit diagram



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.

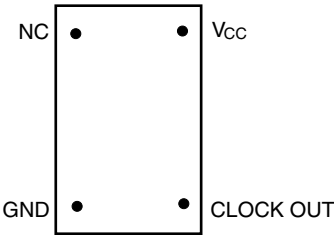


Remark The sections enclosed in broken lines indicate parts that are attached to the parts board.

(b) When using a crystal oscillator

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

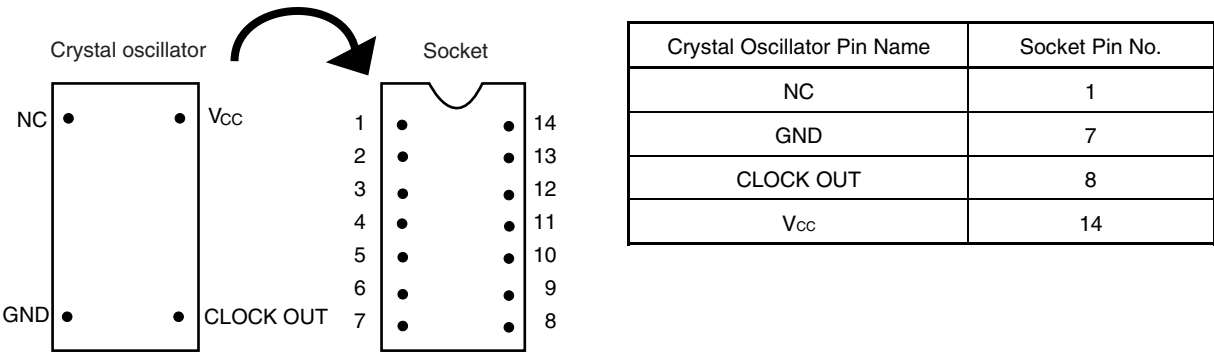
Figure 3-7. Crystal Oscillator (When Using System Clock or User-Mounted Clock)



<Steps>

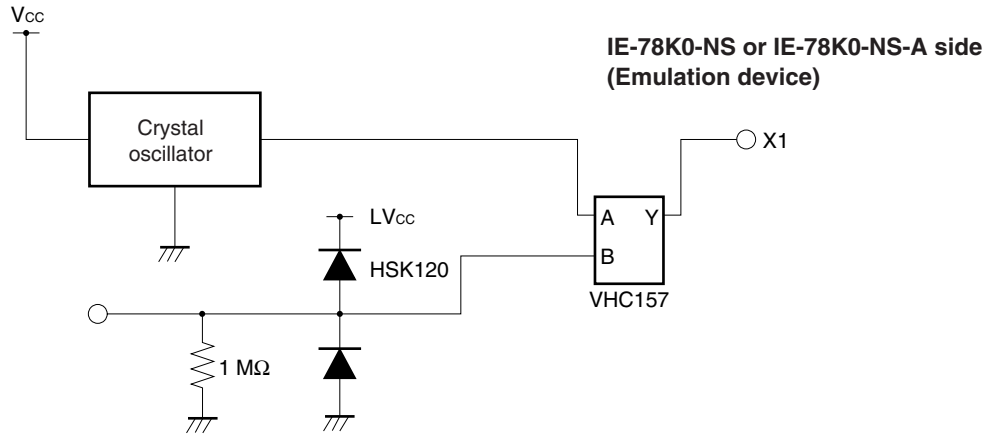
- <1> Prepare the IE-178134-NS-EM1.
- <2> Remove the crystal oscillator that is mounted in the IE-178134-NS-EM1's socket (the socket marked as X1).
- <3> Connect the crystal oscillator to the socket (X1) from which the crystal oscillator was removed (in <2> above). Insert the crystal oscillator pin into the socket aligning the pins as shown in the figure below.

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



- <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).

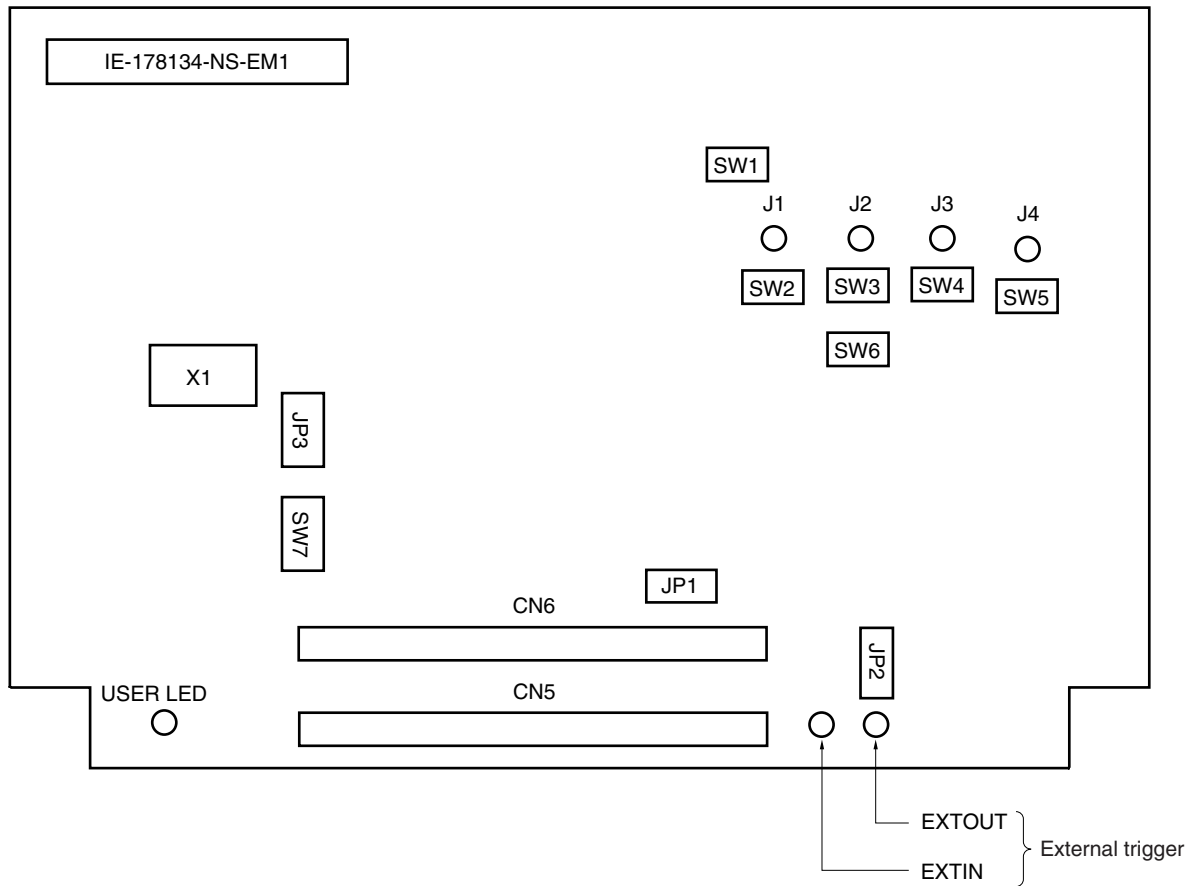
3.3 External Trigger

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 μ F)

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.

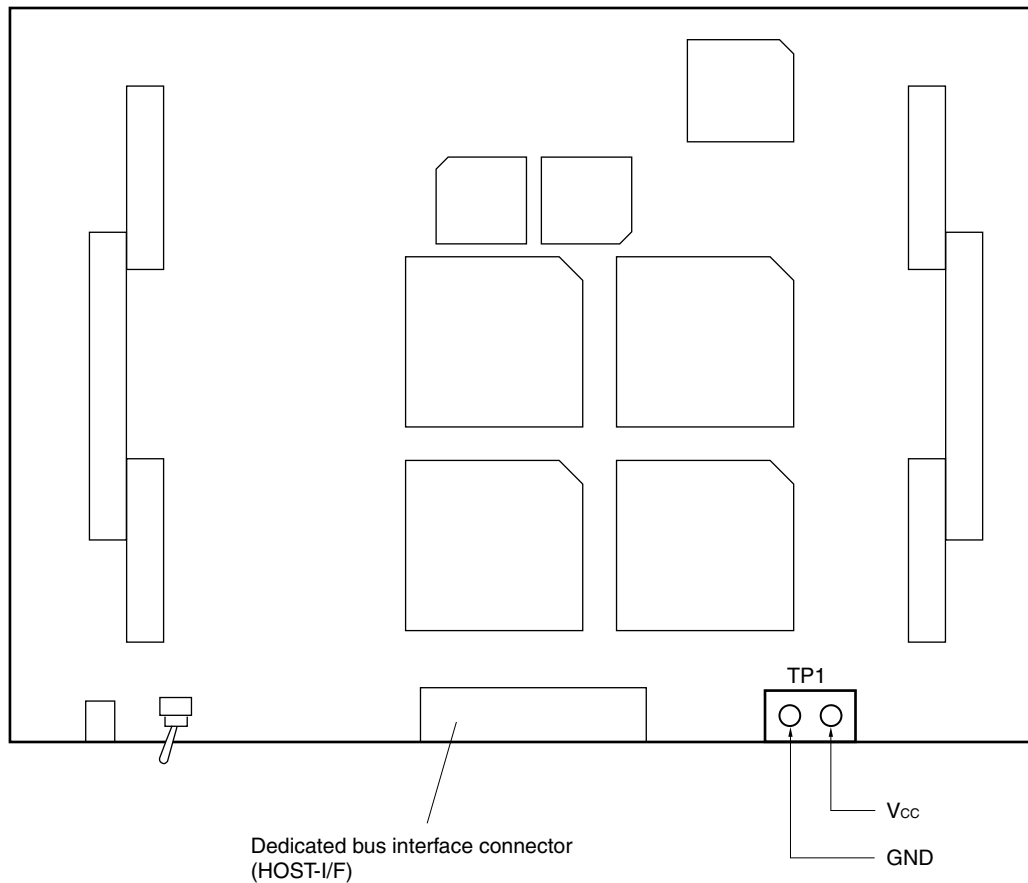
Set the power supply voltage of the target system to 3.5 V to 5 V.

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)



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 (μ PD7880)
- (2) Signals input to or output from the emulation gate array (μ PD7883)
- (3) Signals input to or output from the emulation CPU (μ PD78F124)
- (4) Signals input to or output from the emulation CPU (μ PD780009)
- (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 (μ PD7880)

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 (μ PD7883)

Refer to **Figure 4-2 Equivalent Circuit 2 from Emulation Circuit.**

- P40 to P47

(3) Signals input to or output from the emulation CPU (μ PD78F124)

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 (μ PD780009)

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



Figure 4-2. Equivalent Circuit 2 from Emulation Circuit



Figure 4-3. Equivalent Circuit 3 from Emulation Circuit

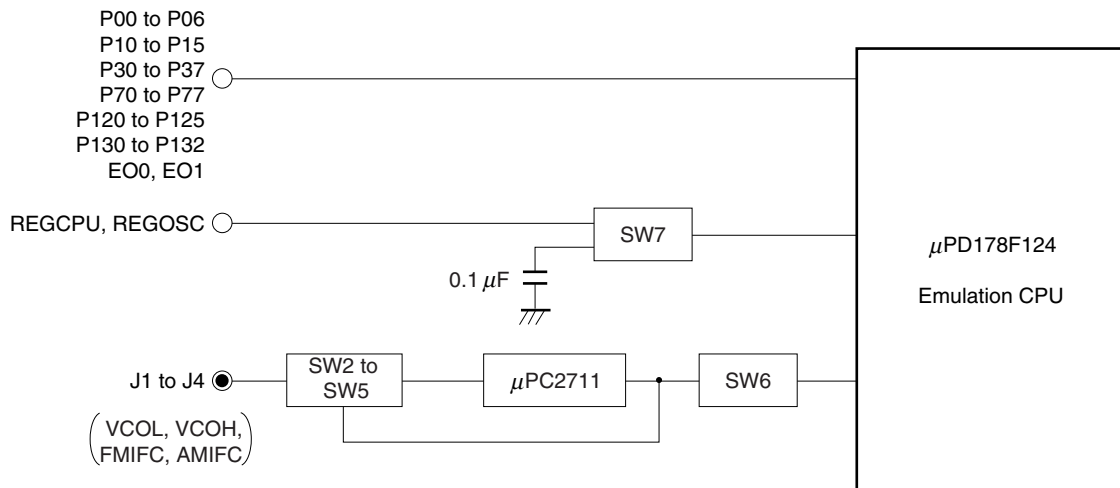


Figure 4-4. Equivalent Circuit 4 from Emulation Circuit

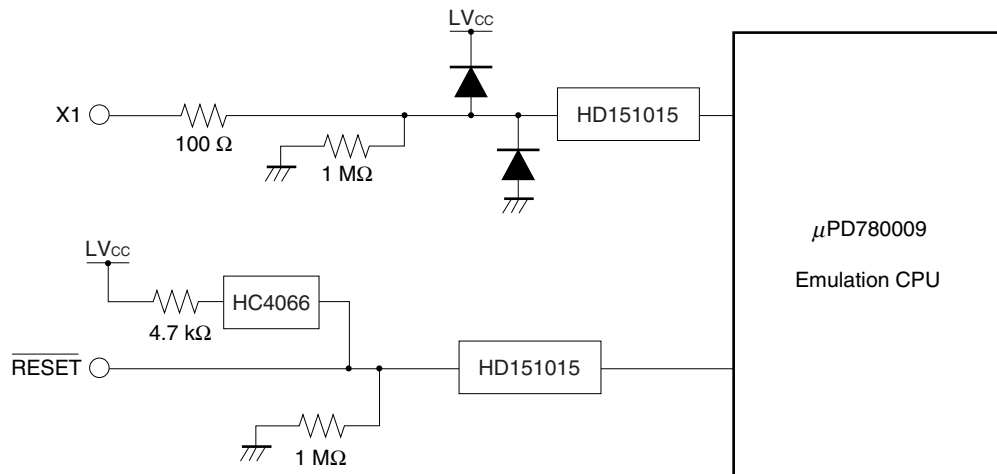
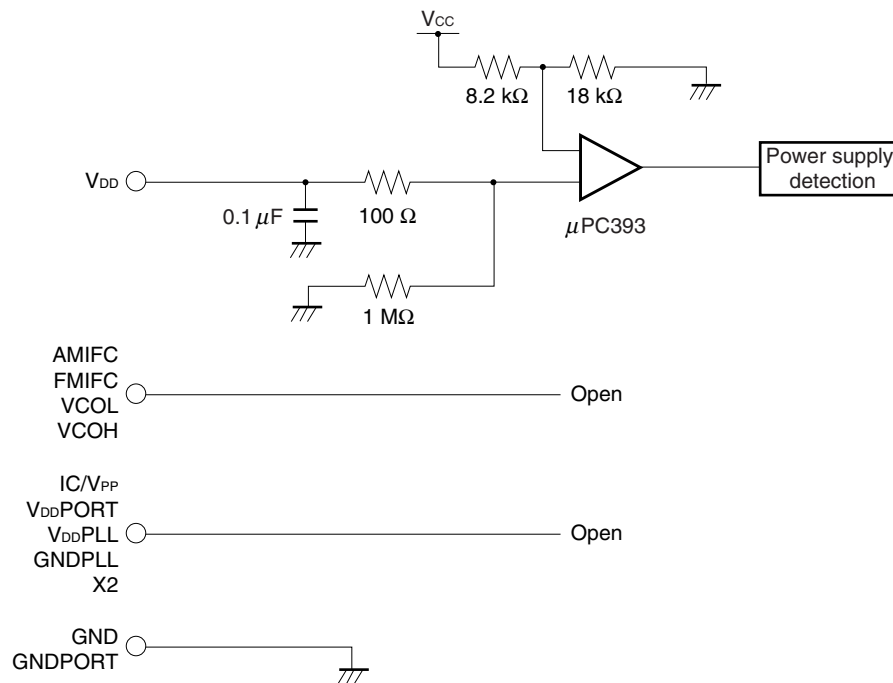


Figure 4-5. Equivalent Circuit 5 from Emulation Circuit



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 Densai 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

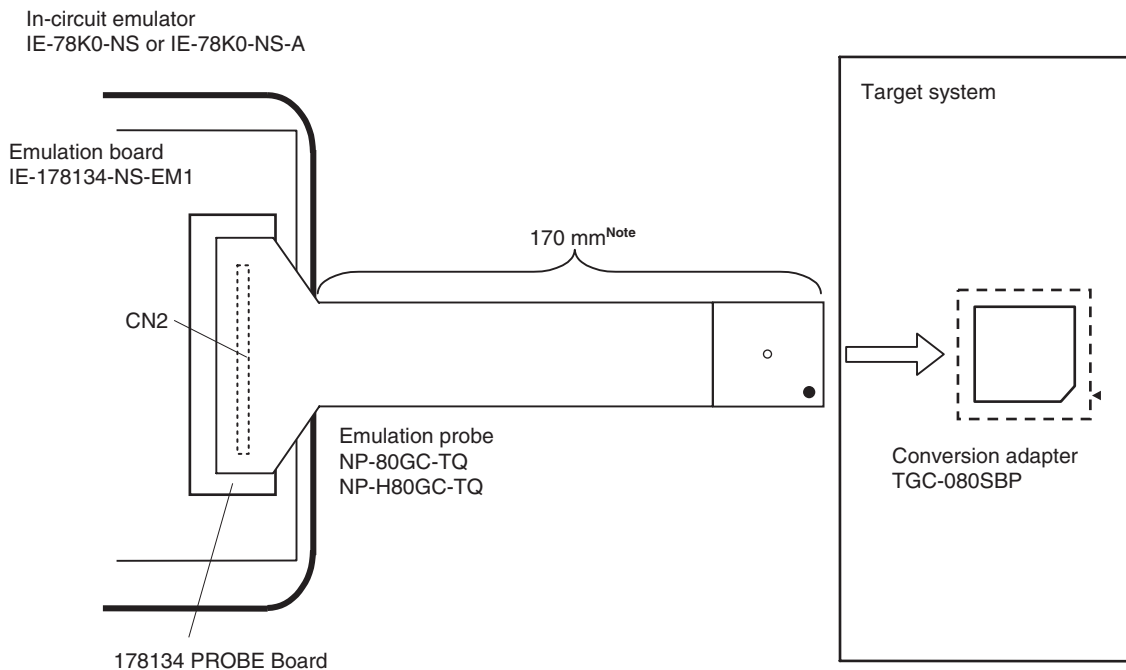
The following shows the conditions when connecting the emulation probe and conversion adapter. Consider the shape of the components to be mounted on the target system and follow the configurations below when designing the system.

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

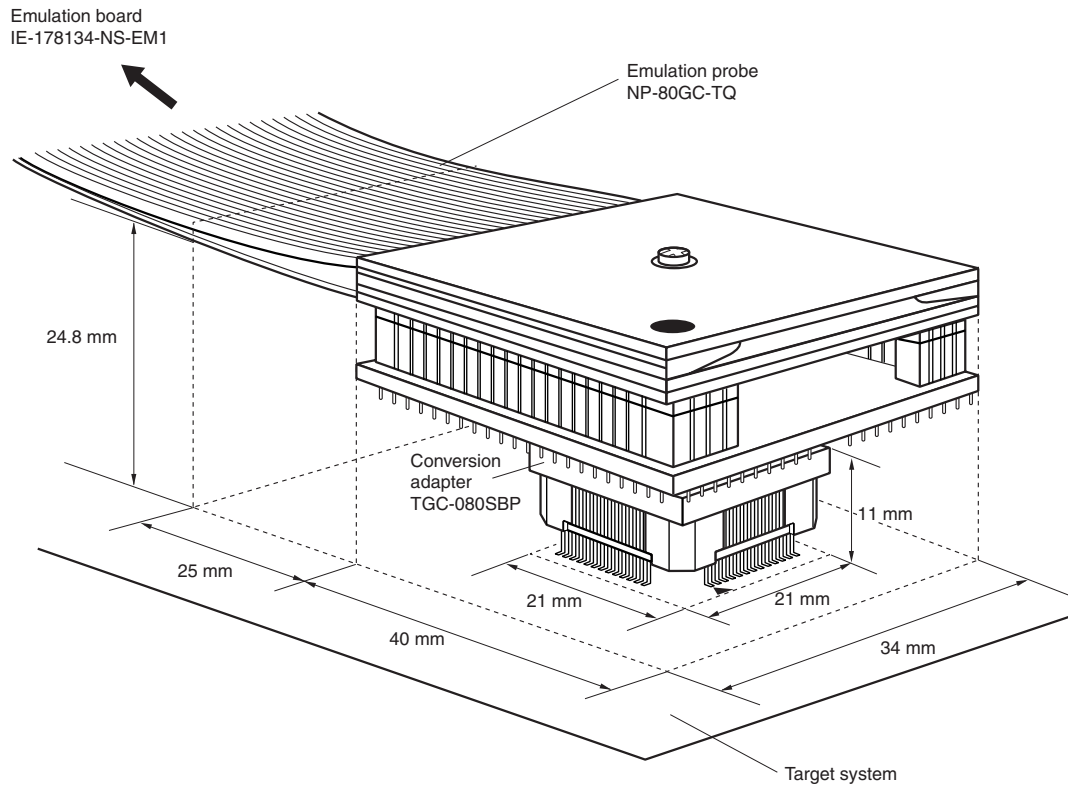
Remark NP-80GC-TQ, NP-H80GC-TQ, and NP-80GF-TQ are products of Naito Densei Machida Mfg. Co., Ltd. and TGC-080SBP and TGF-080RAP are products of TOKYO ELETECH CORPORATION.

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



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)**



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

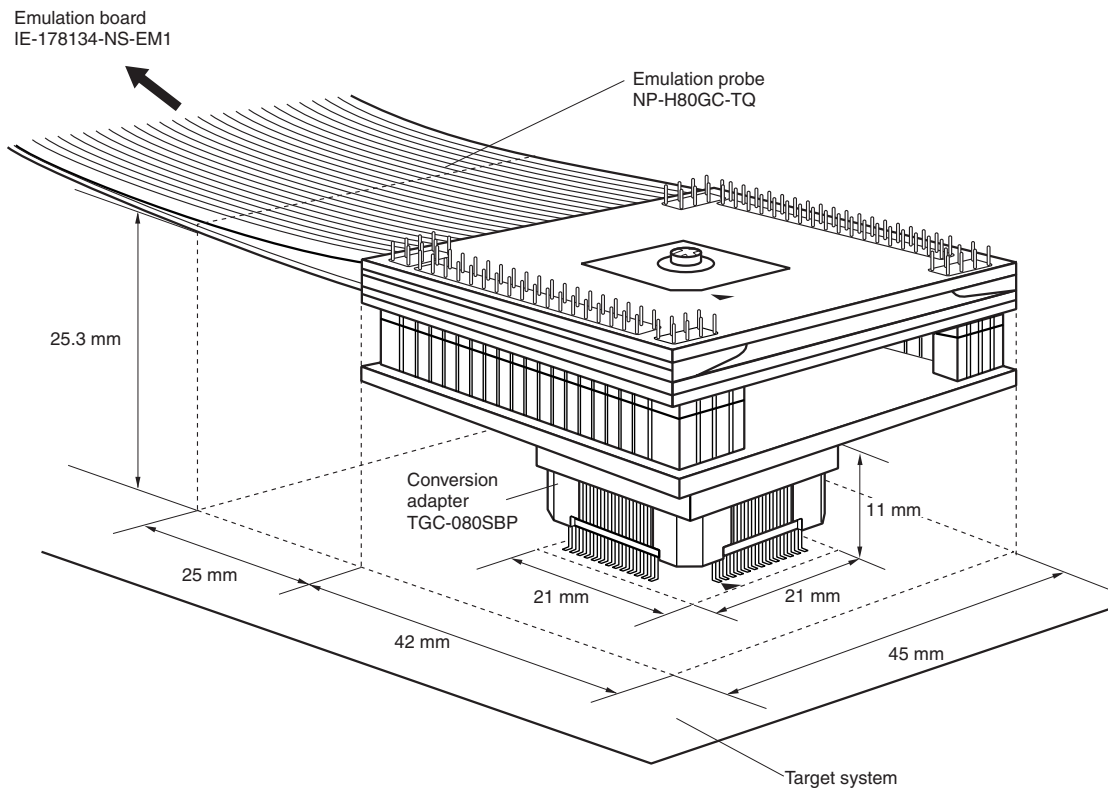
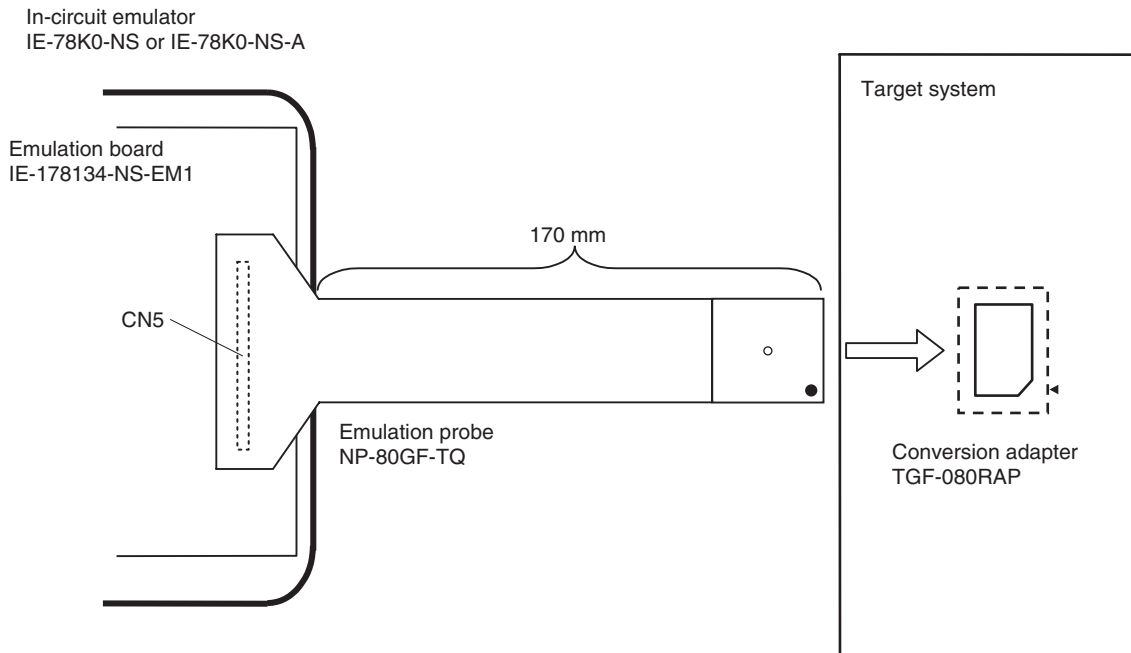
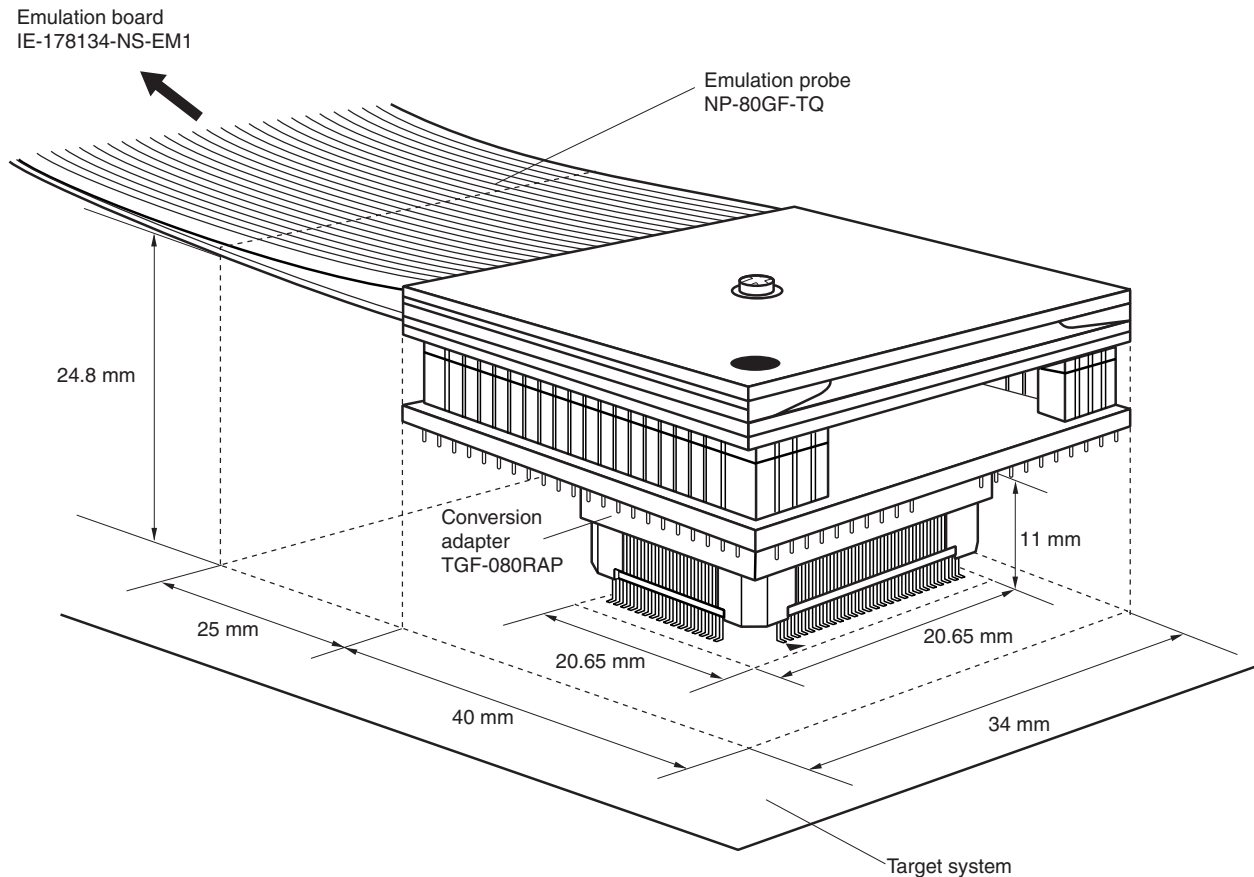


Figure B-4. Distance Between In-Circuit Emulator and Conversion Adapter (When 80GF Is Used)

★

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

[MEMO]

[MEMO]

Facsimile Message

From:

Name

Company

Tel.

FAX

Address

Although NEC has taken all possible steps to ensure that the documentation supplied to our customers is complete, bug free and up-to-date, we readily accept that errors may occur. Despite all the care and precautions we've taken, you may encounter problems in the documentation. Please complete this form whenever you'd like to report errors or suggest improvements to us.

Thank you for your kind support.

North America

NEC Electronics Inc.
Corporate Communications Dept.
Fax: +1-800-729-9288
+1-408-588-6130

Hong Kong, Philippines, Oceania

NEC Electronics Hong Kong Ltd.
Fax: +852-2886-9022/9044

Taiwan

NEC Electronics Taiwan Ltd.
Fax: +886-2-2719-5951

Europe

NEC Electronics (Europe) GmbH
Market Communication Dept.
Fax: +49-211-6503-274

Korea

NEC Electronics Hong Kong Ltd.
Seoul Branch
Fax: +82-2-528-4411

Asian Nations except Philippines

NEC Electronics Singapore Pte. Ltd.
Fax: +65-250-3583

South America

NEC do Brasil S.A.
Fax: +55-11-6462-6829

P.R. China

NEC Electronics Shanghai, Ltd.
Fax: +86-21-6841-1137

Japan

NEC Semiconductor Technical Hotline
Fax: +81- 44-435-9608

I would like to report the following error/make the following suggestion:

Document title: _____

Document number: _____ Page number: _____

If possible, please fax the referenced page or drawing.

Document Rating	Excellent	Good	Acceptable	Poor
Clarity	☐	☐	☐	☐
Technical Accuracy	☐	☐	☐	☐
Organization	☐	☐	☐	☐