

**User's Manual**

**NEC**

# **IE-789136-NS-EM1**

**Emulation Board**

---

## **Target Devices**

<b>μPD789104A Subseries</b>	<b>μPD789114A Subseries</b>
<b>μPD789124A Subseries</b>	<b>μPD789134A Subseries</b>
<b>μPD78F9116B</b>	<b>μPD78F9136B</b>

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## Major Revisions in This Edition

Pages	Description
Throughout	<ul style="list-style-type: none"> <li>• Deletion of NP-28CT from supported emulation probes</li> <li>• Addition of IE-78K0S-NS-A as supported in-circuit emulator</li> <li>• Addition of NP-H36GS and NP-30MC as supported emulation probe</li> <li>• Addition of YQGUIDE as fixing screw</li> <li>• Addition of YSPACK30BK and NSPACK30BK as supported conversion adapter</li> </ul>
pp.12, 13	<p><b>Figure 1-1 System Configuration</b></p> <ul style="list-style-type: none"> <li>• Change of supply medium for debugger ID78K0S-NS to CD-ROM</li> <li>• Change of <b>Notes 1 to 3</b>.</li> </ul>
p.15	Modification of a part of <b>Table 1-1 Basic Specifications</b>
pp.20 to 22	<p><b>3.2.1 Overview of clock settings</b></p> <ul style="list-style-type: none"> <li>• Change from “internal clock” to “clock oscillator”</li> <li>• Addition of V<sub>SS</sub> pin in <b>(a) Clock oscillator</b> in <b>Figure 3-2 External Circuits Used as System Clock Oscillator</b></li> <li>• Change from “resonator” to “clock oscillator or external clock” on target system in <b>Figure 3-3 When Using Clock That Is Already Mounted on Emulation Board</b> and <b>Figure 3-4 When Using User-Mounted Clock</b></li> <li>• Change from “clock generator” to “external clock” in <b>Figure 3-5 When Using External Clock</b></li> </ul>
p.29 in 1st edition	Deletion of <b>3.4 Low-Voltage Emulation Setting</b> .
p.28	Addition of <b>3.4 Setting Power Supply Voltage of Target Interface</b>
p.30	<p><b>3.6 Switch and Jumper Settings</b></p> <ul style="list-style-type: none"> <li>• Addition of <b>(2) Switch and jumper settings on IE-78K0S-NS-A</b></li> </ul>
p.36	Addition of <b>APPENDIX B CAUTIONS ON DESIGNING TARGET SYSTEM</b>

The mark ★ shows major revised points.

## INTRODUCTION

### Product Overview

The IE-789136-NS-EM1 is designed to be used with the IE-78K0S-NS or IE-78K0S-NS-A to debug the following target devices that belong to the 78K/0S Series of 8-bit single-chip microcontrollers.

- $\mu$ PD789104A Subseries:  $\mu$ PD789101A, 789102A, 789104A
- $\mu$ PD789114A Subseries:  $\mu$ PD789111A, 789112A, 789114A
- $\mu$ PD789124A Subseries:  $\mu$ PD789121A, 789122A, 789124A
- $\mu$ PD789134A Subseries:  $\mu$ PD789131A, 789132A, 789134A
- $\mu$ PD78F9116B
- $\mu$ PD78F9136B

### Target Readers

This manual is intended for engineers who will use the IE-789136-NS-EM1 with the IE-78K0S-NS or IE-78K0S-NS-A 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-789136-NS-EM1, refer to not only this manual (supplied with the IE-789136-NS-EM1) but also the manual that is supplied with the IE-78K0S-NS or IE-78K0S-NS-A.

IE-78K0S-NS  
User's Manual

- Basic specifications
- System configuration
- External interface functions

IE-789136-NS-EM1  
User's Manual

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

IE-78K0S-NS-A  
User's Manual

- Basic specifications
- System configuration
- External interface functions

### Purpose

This manual is intended to give users an understanding of the various debugging functions that can be performed when using the IE-789136-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 the device to be emulated (real chip).
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-78K0S-NS or IE-78K0S-NS-A and the IE-789136-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-78K0S-NS	U13549E
IE-78K0S-NS-A	U15207E
IE-789136-NS-EM1	This manual
ID78K Series Integrated Debugger Ver. 2.30 or Later Operation (Windows™ Based)	U15185E
μPD789104A, 789114A, 789124A, 789134A Subseries	U14643E

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

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## CHAPTER 1 GENERAL

The IE-789136-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 78K/0S Series of 8-bit single-chip microcontrollers.

This chapter describes the IE-789136-NS-EM1's system configuration and basic specifications.

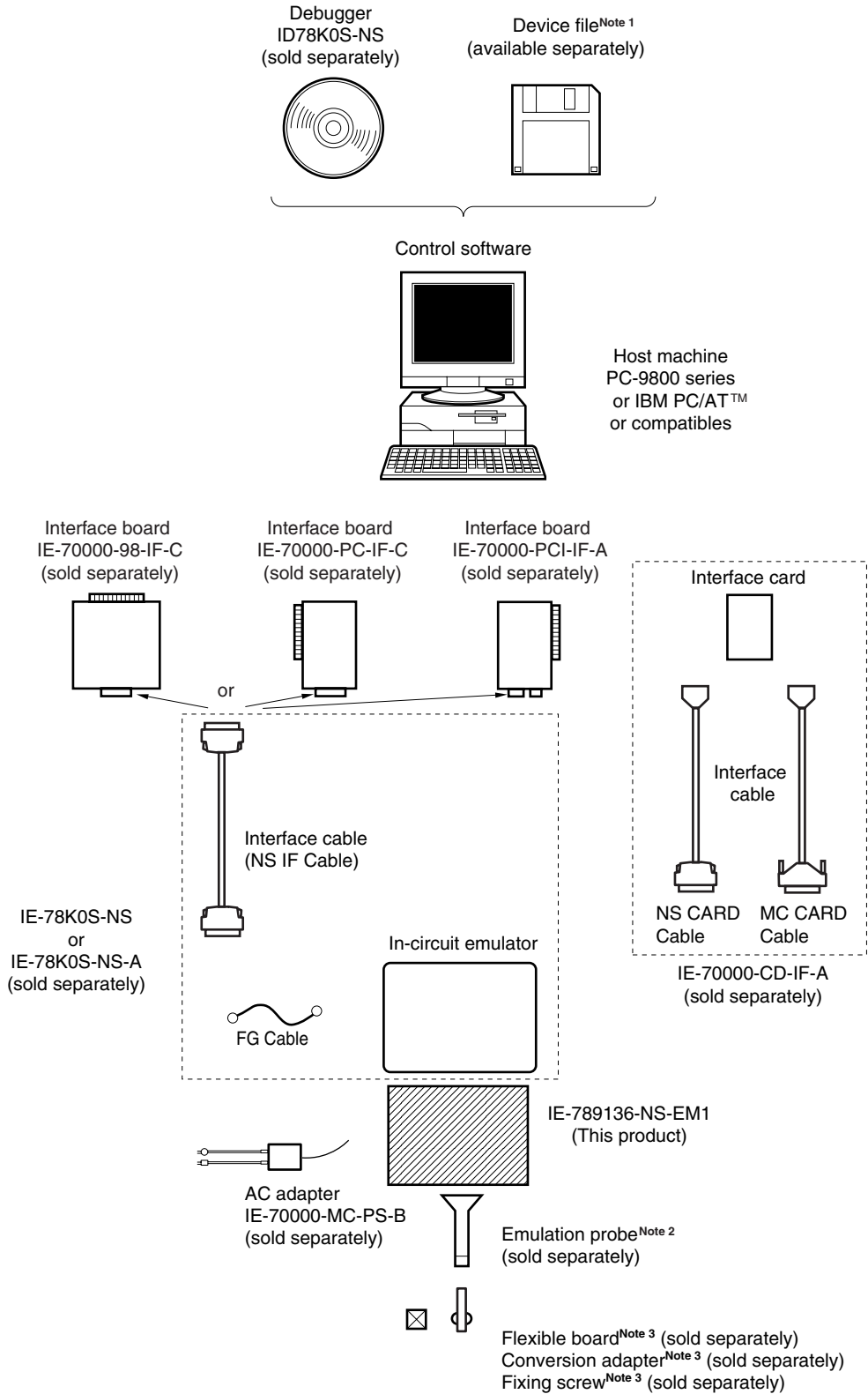
- Target device
  - $\mu$ PD789104A Subseries
  - $\mu$ PD789114A Subseries
  - $\mu$ PD789124A Subseries
  - $\mu$ PD789134A Subseries
  - $\mu$ PD78F9116B
  - $\mu$ PD78F9136B

## 1.1 System Configuration

Figure 1-1 illustrates the IE-789136-NS-EM1's system configuration.

★

**Figure 1-1. System Configuration**



**Notes** 1. The device file is as follows, in accordance with the subseries.

$\mu$ SxxxxDF789134:  $\mu$ PD789104A, 789114A, 789124A, 789134A Subseries,  $\mu$ PD78F9116B, 78F9136B

The device file can be downloaded from the NEC Electron Devices Web site (URL: <http://www.ic.nec.jp/micro>).

2. The emulation probes are as follows, in accordance with the package.

NP-36GS: For 30-pin plastic shrink SOP (GS type)

NP-H36GS: Long type for 30-pin plastic shrink SOP (GS type)

NP-30MC: For 30-pin plastic SSOP (MC type)

3. The flexible board, conversion adapter, and fixing screw are as follows.

NGS-30: 30-pin plastic shrink SOP (GS type)

YSPACK30BK: For 30-pin plastic SSOP (MC type)

NSPACK30BK: For 30-pin plastic SSOP (MC type)

YQGUIDE: Fixing screw for YSPACK30BK and NSPACK30BK

The NP-36GS, NP-H36GS, NGS-30, and NP-30MC are products of Naito Densei Machida Mfg. Co., Ltd.

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

The YSPACK30BK, NSPACK30BK, and YQGUIDE are products of TOKYO ELETECH CORPORATION.

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

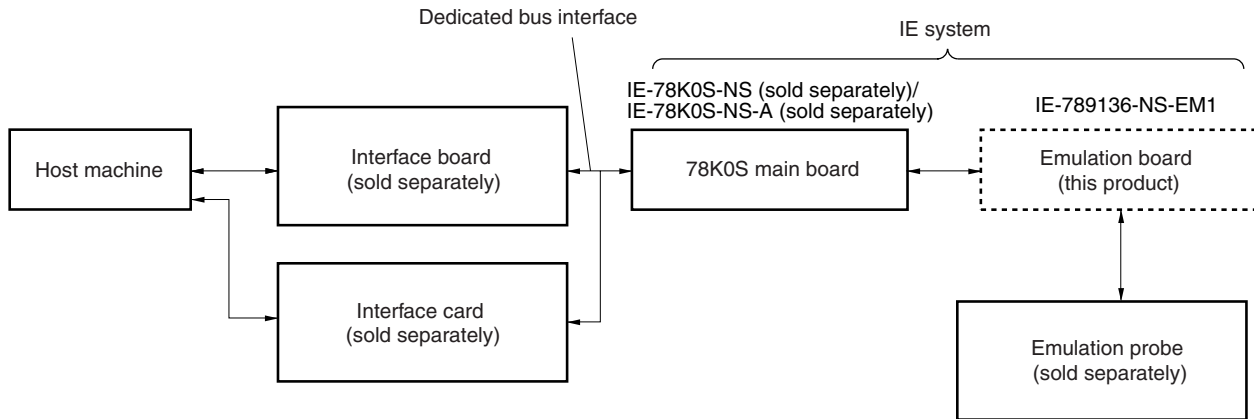
Tokyo Electronics Department (TEL: +81-3-3820-7112)

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

## 1.2 Hardware Configuration

Figure 1-2 shows the IE-789136-NS-EM1's position in the basic hardware configuration.

**Figure 1-2. Basic Hardware Configuration**



### 1.3 Basic Specifications

The IE-789136-NS-EM1's basic specifications are listed in Table 1-1.

**Table 1-1. Basic Specifications**

Parameter	Description
Target device	$\mu$ PD789136 Subseries
System clock	1.0 to 10.0 MHz
Clock supply	External: Clock input from the target system via an emulation probe Internal: Clock mounted on emulation board (5.0 MHz), or clock mounted on the parts board by the user
Target interface	$V_{DD} = 1.8$ to $5.5$ V (same as target device) The IE-789136-NS-EM1 operates on the internal power supply (5 V) when not connected to the target system.

## CHAPTER 2 PART NAMES

This chapter introduces the parts of the IE-789136-NS-EM1 main unit.

The packing box contains the emulation board (IE-789136-NS-EM1), packing list, user's manual, and guarantee card.

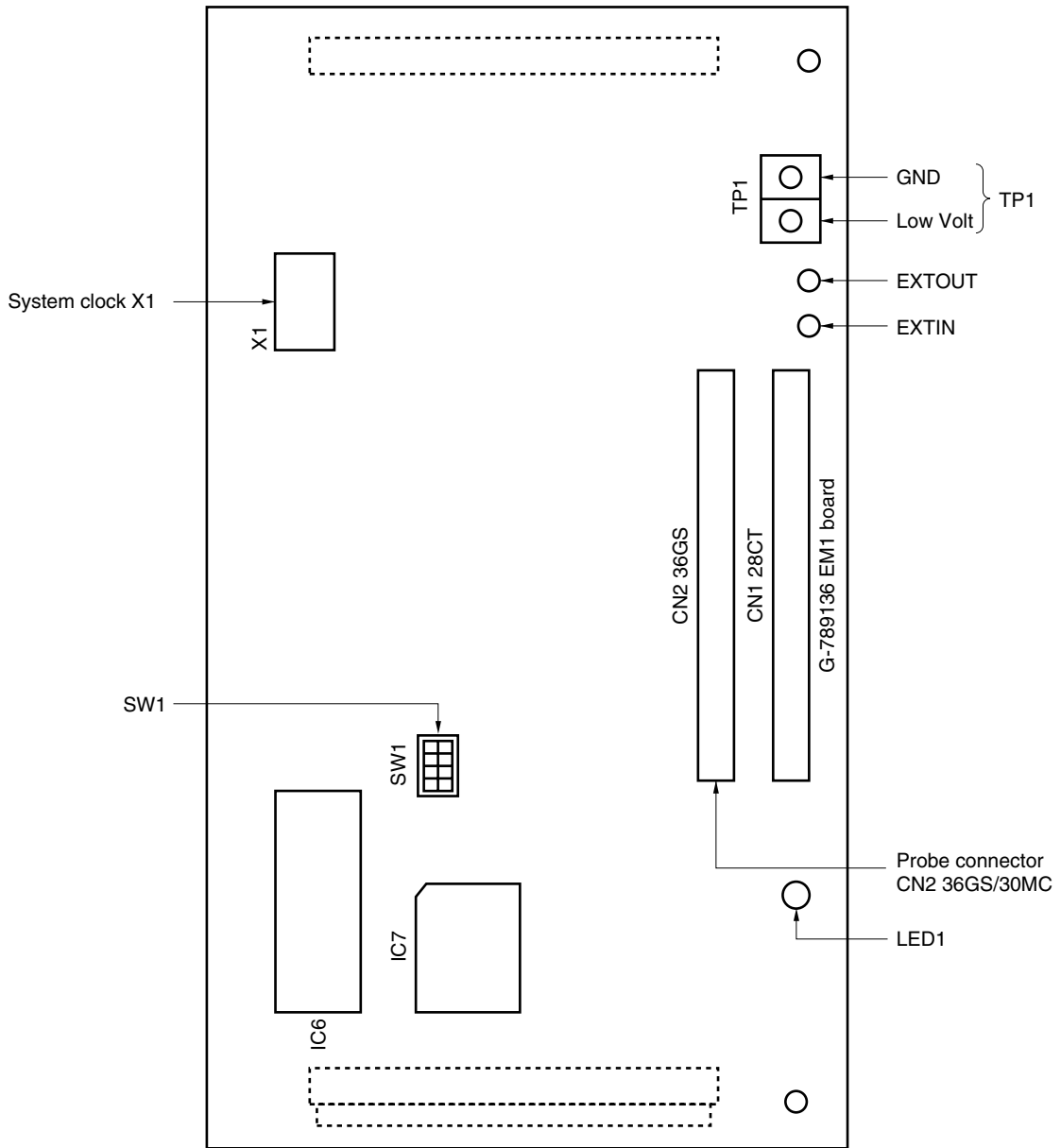
If there are any missing or damaged items, please contact an NEC sales representative.

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



2.1 Parts of Main Unit

Figure 2-1. IE-789136-NS-EM1 Part Names



## CHAPTER 3 INSTALLATION

This chapter describes methods for connecting the IE-789136-NS-EM1 to the IE-78K0S-NS or IE-78K0S-NS-A, 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 Connection

#### (1) Connection with IE-78K0S-NS or IE-78K0S-NS-A main unit

See the **IE-78K0S-NS User's Manual (U13549E)**<sup>Note</sup> for a description of how to connect the IE-789136-NS-EM1 to the IE-78K0S-NS.

**Note** When using the IE-78K0S-NS-A, refer to the **IE-78K0S-NS-A User's Manual (U15207E)**.

#### (2) Connection with emulation probe

See the **IE-78K0S-NS User's Manual (U13549E)**<sup>Note</sup> for a description of how to connect an emulation probe to the IE-789136-NS-EM1.

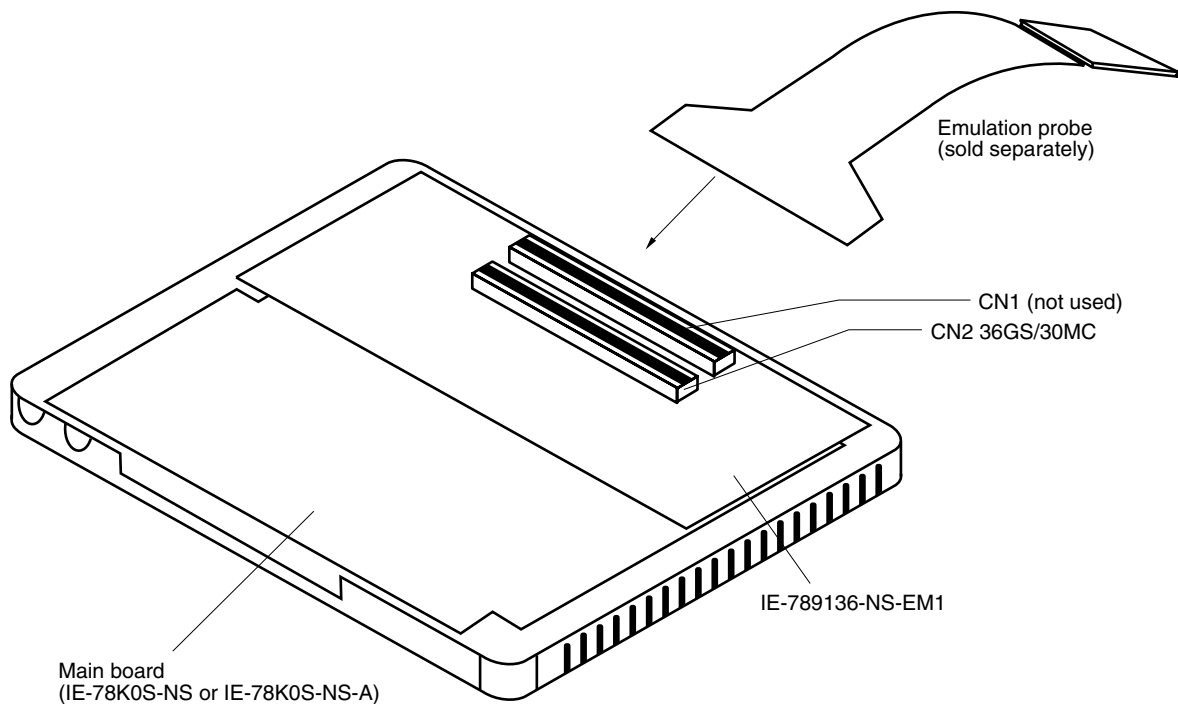
On this board, connect an emulation probe to CN2.

**Note** When using the IE-78K0S-NS-A, refer to the **IE-78K0S-NS-A User's Manual (U15207E)**.

**Caution** Incorrect connection may damage the IE system.

Be sure to read the emulation probe's user's manual for a detailed description of the connection method.

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.

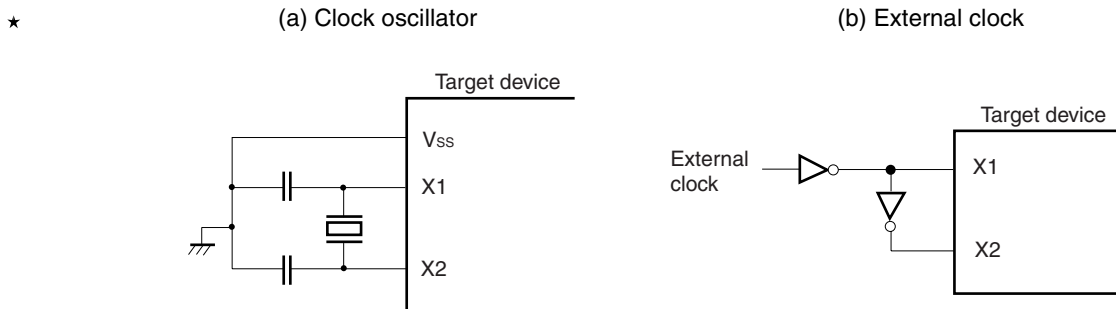
- (1) Clock that is already mounted on emulation board
- (2) Clock that is mounted by user
- (3) Pulse input from target system

★ If the target system includes a clock oscillator, select either **(1) Clock that is already mounted on emulation board** or **(2) Clock that is mounted by user**. For a clock oscillator, a resonator is connected to the target device 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 oscillator that is mounted on the target system is not used. Instead, the clock that is mounted on the emulation board that is installed for the IE-78K0S-NS or IE-78K0S-NS-A is used.

If the target system includes an external clock, select **(3) Pulse input from target system**. 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

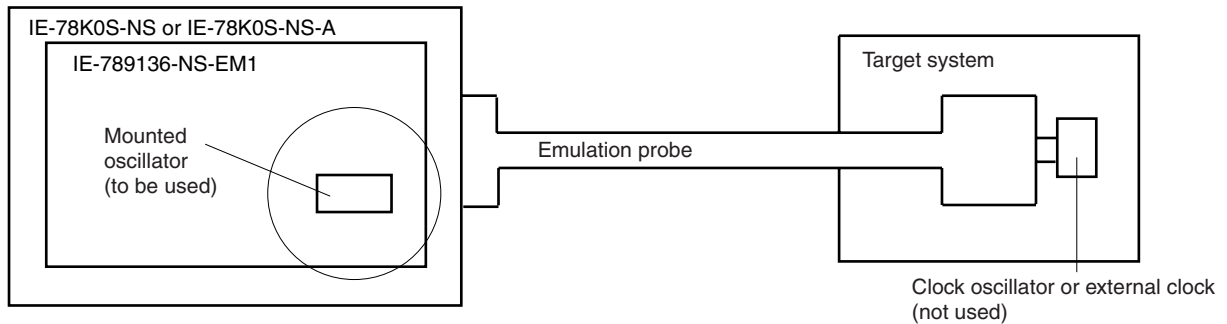


(1) **Clock that is already mounted on emulation board**

A crystal oscillator (X1) is already mounted on the emulation board. Its frequency is 5.0 MHz.

★

**Figure 3-3. When Using Clock That Is Already Mounted on Emulation Board**



**Remark** The clock that is supplied by the IE-789136-NS-EM1's oscillator (encircled in the figure) is used.

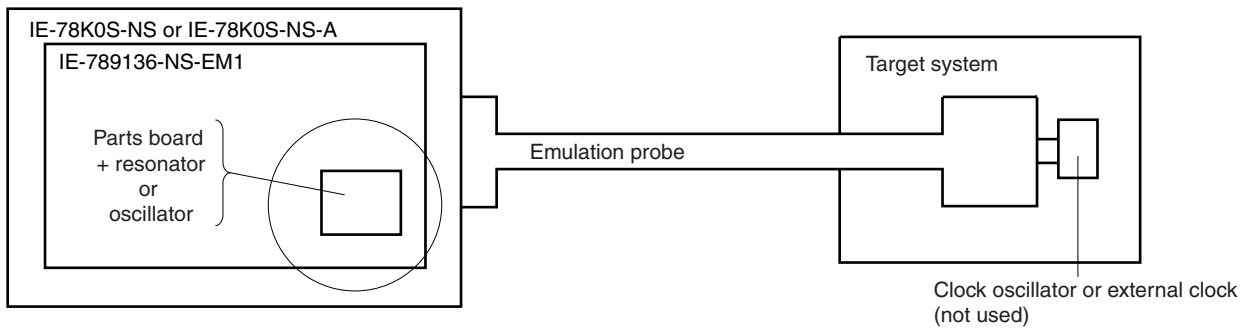
(2) **Clock that is mounted by user**

The user is able to mount any clock supported by the set specifications on the IE-789136-NS-EM1.

Remove the crystal oscillator (X1) that is already mounted on the emulation board, and mount either the parts board on which the resonator to be used is mounted or an oscillator. This method is useful when using a different frequency from that of the premounted clock.

★

**Figure 3-4. When Using User-Mounted Clock**



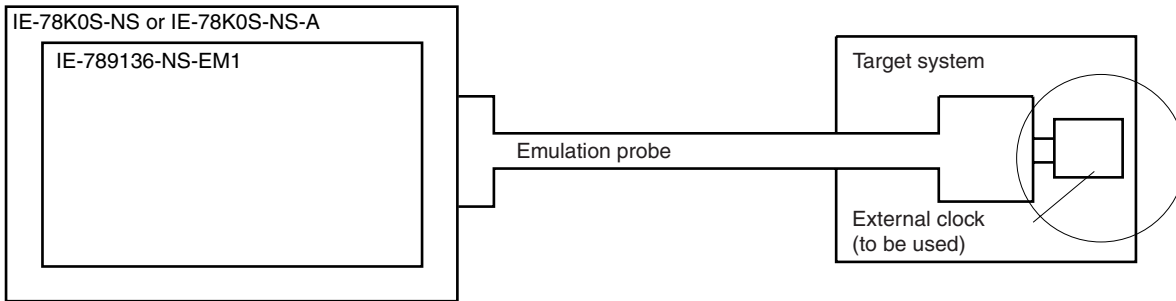
**Remark** The clock that is supplied by the parts board with a resonator or oscillator on the IE-789136-NS-EM1 (encircled in the figure) is used.

**(3) Pulse input from target system**

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 external clock (encircled in the figure) is used.

**3.2.2 System clock settings**

**Table 3-1. System Clock Settings**

Frequency of System Clock		IE-789136-NS-EM1	CPU Clock Source Selection (ID)
		X1 Socket	
When using clock that is already mounted on emulation board	5.0 MHz	Oscillator used	Internal
When using clock mounted by user	Other than 5.0 MHz	Oscillator assembled by user	
When pulse is input from target system			Oscillator not used

**Caution** When a pulse is input from the target system, open the configuration dialog box when starting the integrated debugger (ID78K0S-NS) and select “External” in the area (Clock) for selecting the CPU’s clock source (this selects the user clock).

**Remark** The IE-789136-NS-EM1 is shipped, the settings for “when using clock that is already mounted on emulation board” are preset.

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

When the IE-789136-NS-EM1 is shipped, a 5.0 MHz crystal oscillator is already mounted in the IE-789136-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 (ID78K0S-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**

The settings described under either (a) or (b) are required, depending on the type of clock to be used. When starting the integrated debugger (ID78K0S-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**

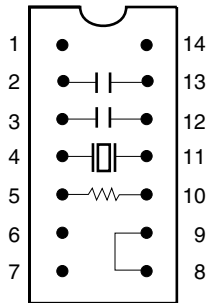
- Items to be prepared
  - Parts board
  - Ceramic resonator or crystal resonator
  - Resistor Rx
- Capacitor CA
- Capacitor CB
- Solder kit

<Steps>

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

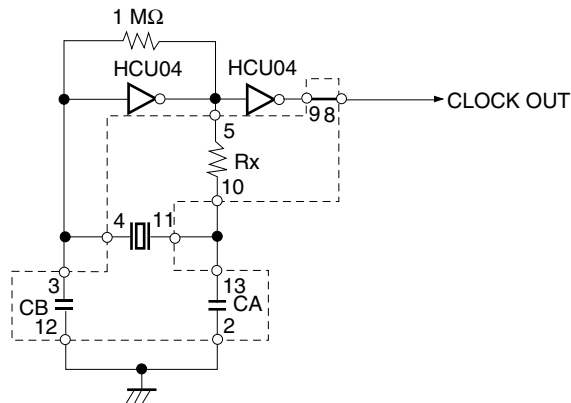
**Figure 3-6. Connections on Parts Board (When Using User-Mounted Clock)**

Parts board (X1)



Pin No.	Connection
2-13	Capacitor CA
3-12	Capacitor CB
4-11	Ceramic resonator or crystal resonator
5-10	Resistor Rx
8-9	Shorted

Circuit diagram

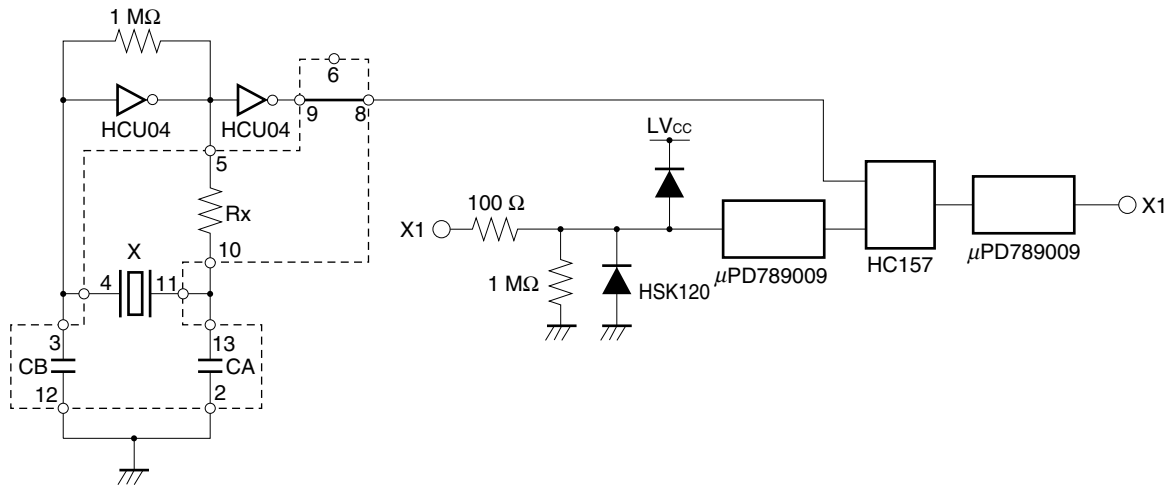


**Remark** The sections enclosed in broken lines indicate parts that are attached to the parts board.

- <2> Prepare the IE-789136-NS-EM1.
- <3> Remove the crystal oscillator that is mounted in the IE-789136-NS-EM1's X1 socket.
- <4> Connect the parts board (from <1> above) to the X1 socket 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 is wired as shown in Figure 3-6 above.
- <6> Install the IE-789136-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.

**IE-78K0S-NS or IE-78K0S-NS-A side  
(Emulation device)**



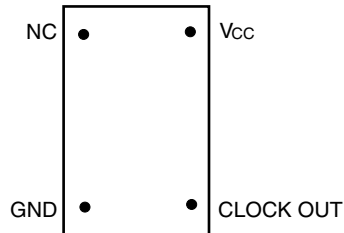
**Remark** The sections enclosed in broken lines indicate parts that are attached to the parts board.



(b) When using a crystal oscillator

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

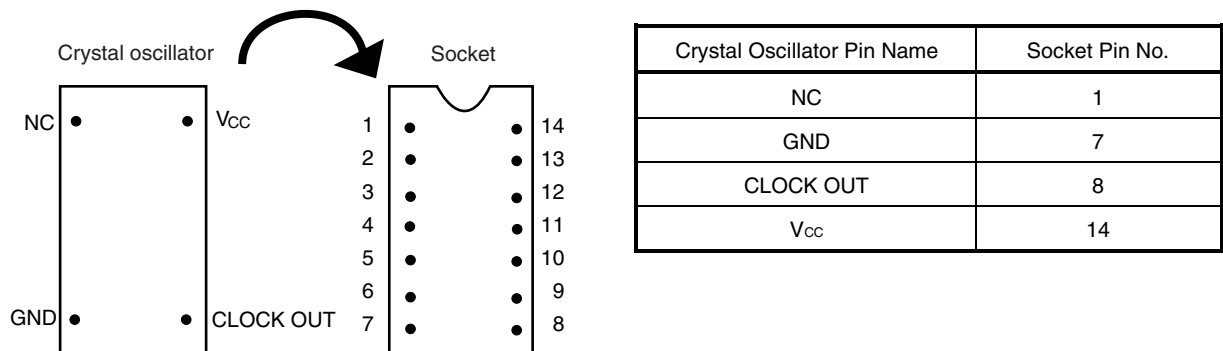
**Figure 3-7. Crystal Oscillator (When Using User-Mounted Clock)**



<Steps>

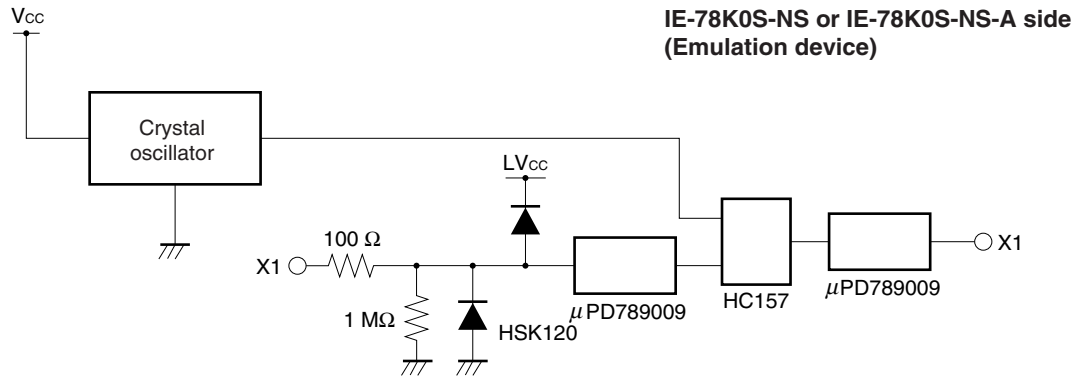
- <1> Prepare the IE-789136-NS-EM1.
- <2> Remove the crystal oscillator that is mounted in the IE-789136-NS-EM1's X1 socket.
- <3> Mount a crystal oscillator in the X1 socket from which the crystal oscillator was removed in <2> above. Insert the crystal oscillator pin into the socket aligning the pins as shown in the figure below.

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



- <4> Install the IE-789136-NS-EM1 in the IE-78K0S-NS or IE-78K0S-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 pulse is input from target system**

No hardware settings are required for this situation.

When starting the integrated debugger (ID78K0S-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 Mask Option Setting

By setting the DIP switch (SW1) in the IE-789136-NS-EM1, the 33 kΩ pull-up resistor can be connected to P50 to P53 by mask option.

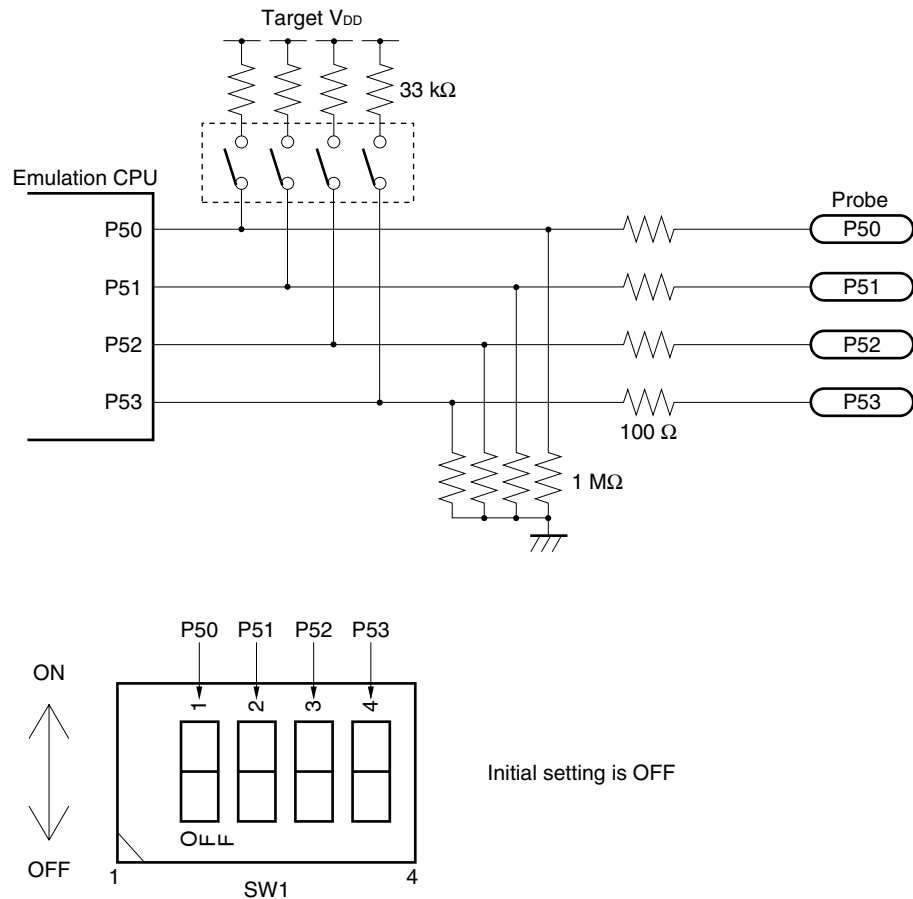
The DIP switch setting is as follows.

**Table 3-2. DIP Switch Setting**

	SW1			
	1	2	3	4
Destination pin	P50	P51	P52	P53

When the DIP switch is ON, the corresponding pin is pulled-up by the target V<sub>DD</sub> pin. When it is OFF, the corresponding pull-up resistor is disconnected. Set the DIP switch to OFF for ports that do not exist.

**Figure 3-9. Mask Option Setting**



### ★ 3.4 Setting Power Supply Voltage of Target Interface

In the IE system, emulation is possible with a voltage of the same level as the power supply voltage of the target system.

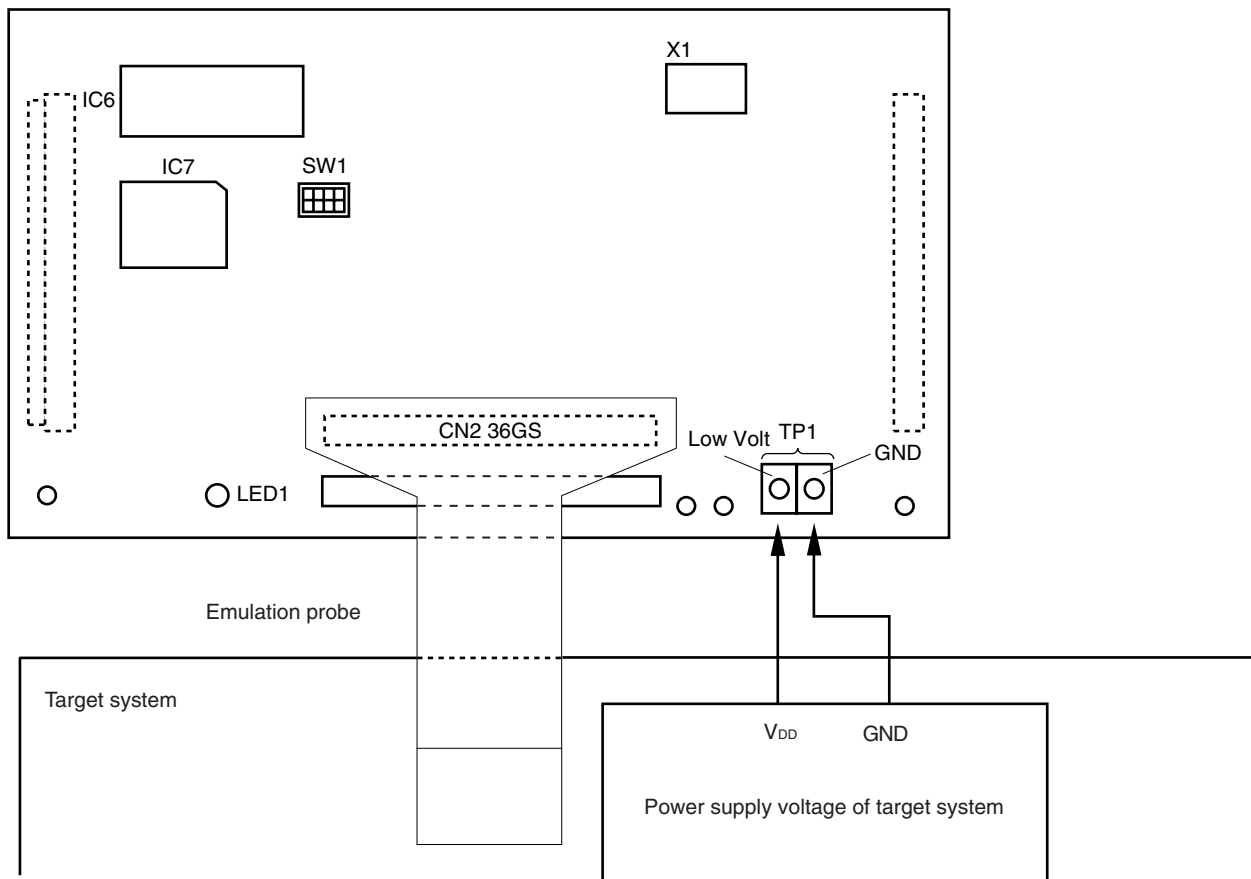
When the target system is not connected, the IE system automatically operates with the emulator's internal power supply (5 V).

When debugging with a voltage that is the same level as that of the target system, supply the same voltage as that of the target system to the TP1 terminal pin of the IE-789136-NS-EM1 (the same applies when the voltage is 5 V).

Set the target voltage to between 1.8 and 5.0 V.

- Maximum current consumption of TP1  
1.8 to 5.0 V: Approximately 100 mA

**Figure 3-10. Connection of TP1 and Power Supply Voltage of Target System**



**Caution** Connect TP1 on the board and the power supply voltage of the target system after turning off the power of the IE-78K0S-NS or IE-78K0S-NS-A.

**Remark** The  $V_{DD}$  pin of the target system is only used for controlling LED1 ( $TV_{CC}$ ), which monitors whether the power supply of the target system is connected in the IE-789136-NS-EM1.

### 3.5 External Trigger

To set up an external trigger, connect it to the IE-789136-NS-EM1's check pins EXTOUT and EXTIN as shown below.

See the **IE-78K0S-NS User's Manual (U13549E)** or **IE-78K0S-NS-A User's Manual (U15207E)** for pin characteristics, and the **ID78K Series Integrated Debugger Ver. 2.30 or Later Operation (Windows Based) (U15185E)** for the usage methods.

**(1) EXTOUT**

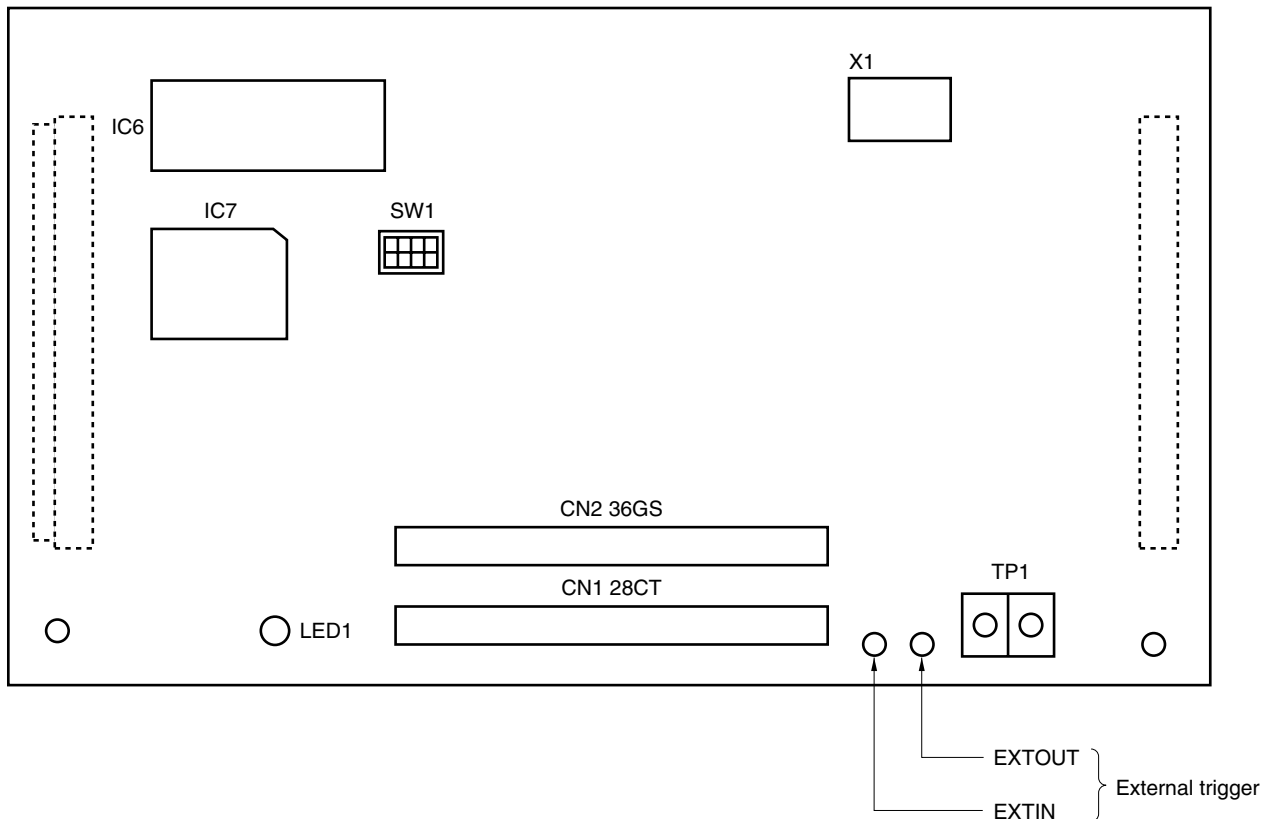
Outputs a low level from the EXTOUT pin on the IE-789136-NS-EM1 for 1.3  $\mu$ s upon the occurrence of a break event.

**Caution** Connect a pull-up resistor on the target system since this is an open-drain output.

**(2) EXTIN**

An event signal can be input from the EXTIN pin on the IE-789136-NS-EM1. Input a high-level pulse signal for 2 CPU operation clocks or more.

**Figure 3-11. External Trigger Input Position**



### 3.6 Switch and Jumper Settings

**(1) Switch and jumper settings on the IE-78K0S-NS**

When using the IE-789136-NS-EM1, set the switches and jumpers on the IE-78K0S-NS as shown in Table 3-3. For details of these switch and jumper settings, refer to the **IE-78K0S-NS User's Manual (U13549E)**.

**Table 3-3. Switch and Jumper Settings on IE-78K0S-NS**

	SW1	SW3	SW4	JP1	JP4
Setting	OFF	All switches ON	All switches ON	2 to 3 shorted	1 to 2 shorted

**Caution** If the jumpers and switches are set incorrectly, the board may be damaged.

**★ (2) Switch and jumper setting on IE-78K0S-NS-A**

When using the IE-789136-NS-EM1, set the switches and jumpers on the IE-78K0S-NS-A as shown in Table 3-4. For the position of the switches and jumpers, refer to the **IE-78K0S-NS-A User's Manual (U15207E)**.

**Table 3-4. Switch and Jumper Settings on IE-78K0S-NS-A**

	SW1	JP1	JP3
Setting	OFF	1-2	Shorted (fixed)

**Caution** If the jumpers and switches are set incorrectly, the board may be damaged.

**(3) Switch setting on the IE-789136-NS-EM1**

The initial setting of the switch on the IE-789136-NS-EM1 is as shown in Table 3-5. For details, refer to **3.2 Clock Settings**.

**Table 3-5. Initial Setting of Jumper on IE-789136-NS-EM1**

	SW1
Setting	All switches OFF

## 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-789136-NS-EM1's target interface circuit.

Although the target device is a CMOS circuit, the IE-789136-NS-EM1's target interface circuit consists of an emulation CPU, TTL, CMOS-IC, and other emulation circuits.

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 EVA chip and the peripheral EVA chip
- (2) Signals input from the target system via a gate
- (3) Analog signals
- (4) Other signals

The IE-789136-NS-EM1's circuit is used as follows for signals listed in (1) to (4) above.

### (1) Signals input to or output from the EVA chip and peripheral EVA chip

The following signals perform the same operations as in the  $\mu$ PD789104A, 789114A, 789124A, 789134A Subseries,  $\mu$ PD78F9116B, and 78F9136B. However, a 1 M $\Omega$  pull-down resistor and 100  $\Omega$  resistor are inserted in series.

- Signals related to port 0
- Signals related to port 1
- Signals related to port 2
- Signals related to port 5

### (2) Signals input from the target system via a gate

Since the following signals are input via a gate, their timing shows a delay compared to the  $\mu$ PD789104A, 789114A, 789124A, 789134A Subseries,  $\mu$ PD78F9116B, and 78F9136B.

- $\overline{\text{RESET}}$  signal
- Signals related to X1

**(3) Analog signals**

Because the following signals input/output analog-related signals, special processing is not performed in the IE-789136-NS-EM1.

- AV<sub>DD</sub> pin
- Signals related to port 6

**(4) Other signals**

- V<sub>DD</sub> pin

The emulation CPU operates on the internal power supply (5 V) of the IE-789136-NS-EM1 when not connected to the target system, and operates on the voltage supplied from the voltage supply pin (TP1) when connected to the target system.

The V<sub>DD</sub> pin of the target system is used only to control the LED (TV<sub>CC</sub>) that indicates whether the target system's power is on or off.

- V<sub>SS</sub> and AV<sub>SS</sub> pins

The V<sub>SS</sub> and AV<sub>SS</sub> pins are connected to GND in the IE-789136-NS-EM1.

- TEST/V<sub>PP</sub> pin

The TEST/V<sub>PP</sub> pin is not used in the IE-789136-NS-EM1.

- X2 pin

The X2 pin is not used in the IE-789136-NS-EM1.



Figure 4-1. Equivalent Circuit from Emulation Circuit (1/2)

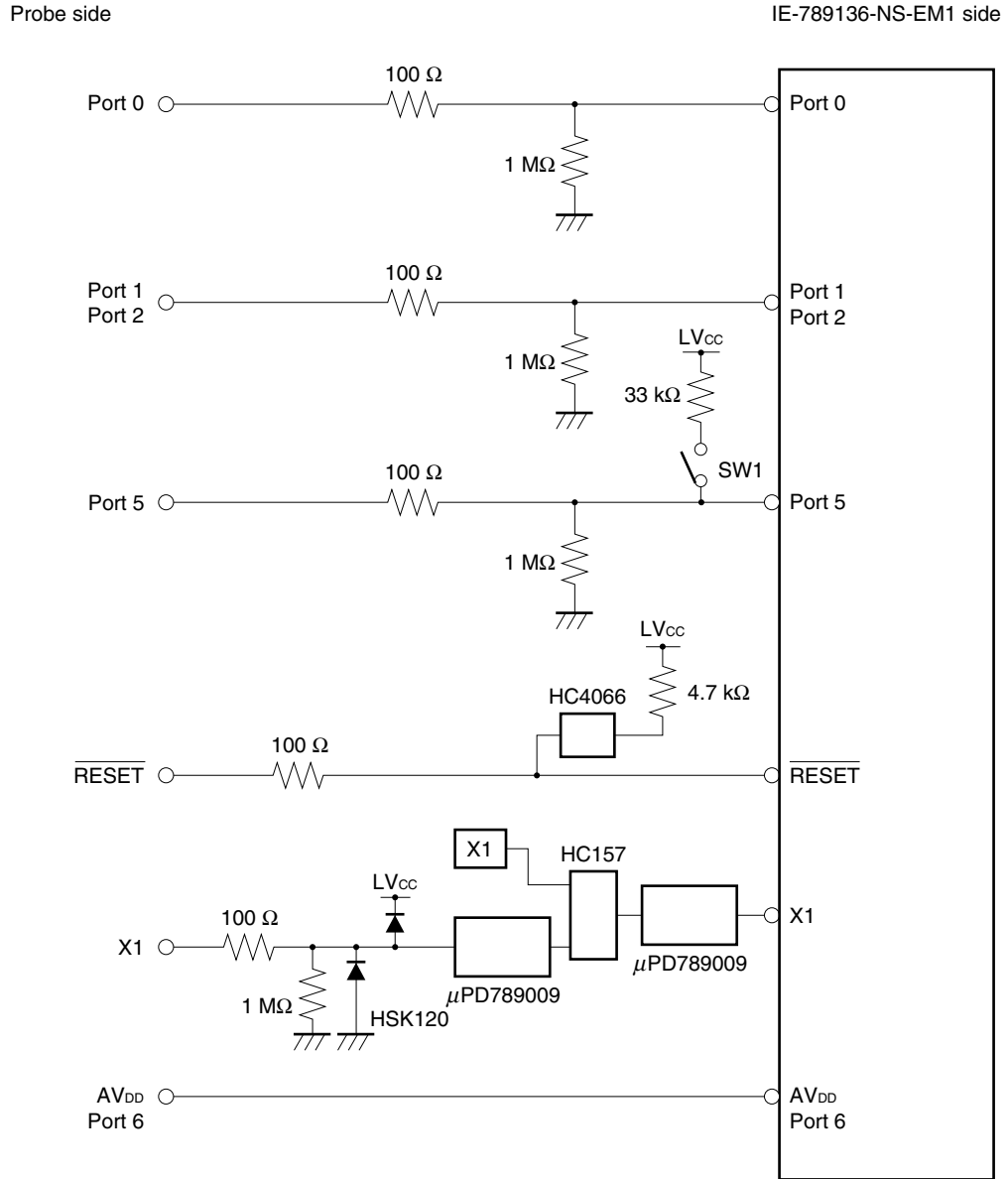
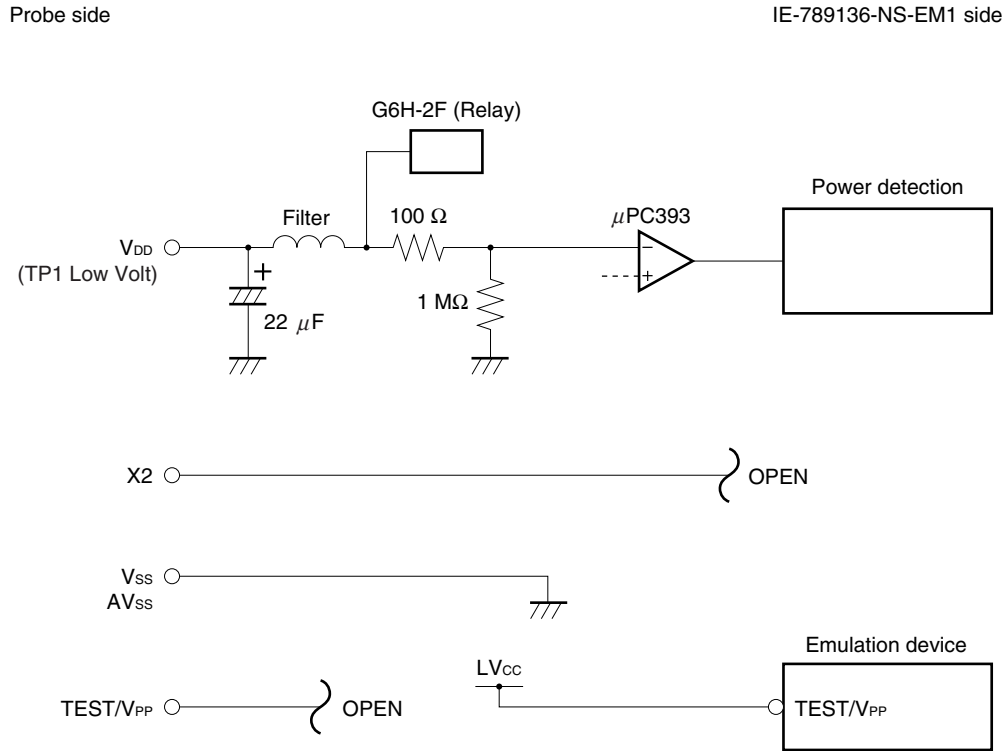


Figure 4-1. Equivalent Circuit from Emulation Circuit (2/2)



## APPENDIX A EMULATION PROBE PIN ASSIGNMENT TABLE

**Table A-1. NGS-30, NP-36GS, NP-H36GS, and NP-30MC Pin Assignments**

NGS-30 NP-30MC Emulation Device Side	NP-36GS NP-H36GS CN5 Pin No.	CN2 Pin No.	NGS-30 NP-30MC Emulation Device Side	NP-36GS NP-H36GS CN5 Pin No.	CN2 Pin No.
1	19	58	16	11	99
2	20	56	17	10	63
3	21	49	18	9	64
4	22	55	19	8	70
5	23	19	20	7	69
6	24	18	21	6	72
7	25	22	22	5	102
8	33	62	23	4	71
9	32	65	24	12	94
10	31	66	25	13	93
11	30	92	26	14	30
12	29	91	27	15	29
13	28	98	28	16	24
14	27	97	29	17	23
15	26	21	30	18	20

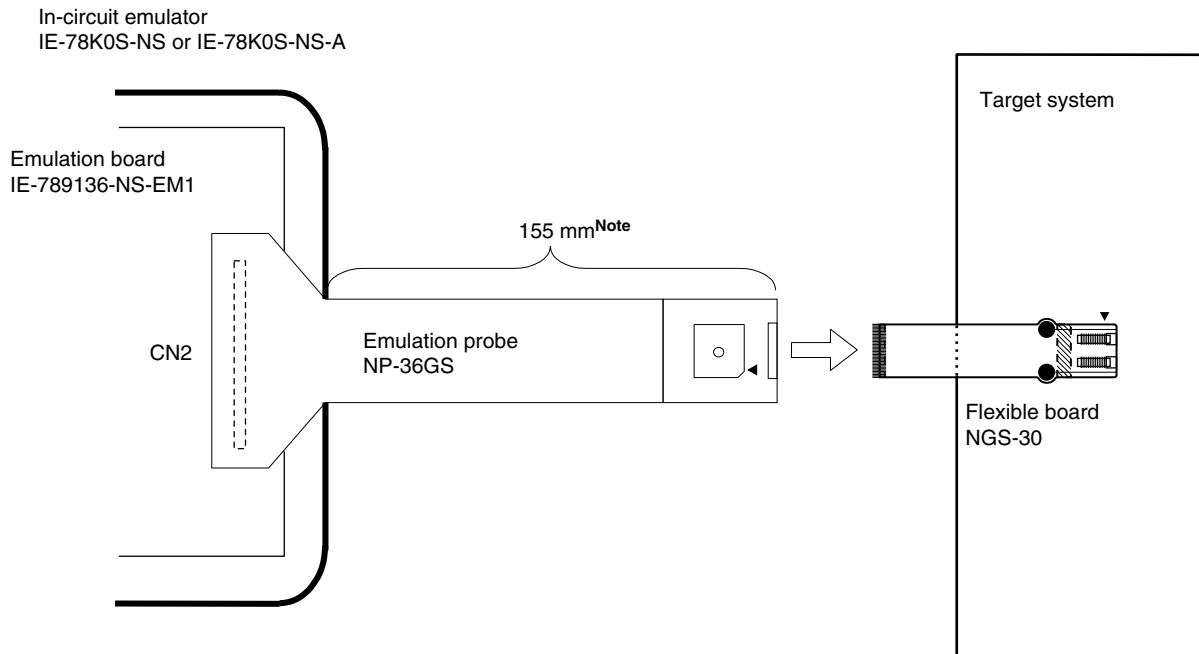
- Remarks**
1. The NGS-30, NP-36GS, NP-H36GS, and NP-30MC are products of Naito Densai Machida Mfg. Co., Ltd.
  2. The numbers in the “NGS-30 Emulation Device Side” column indicate the corresponding pin number on the target system side tip of the NGS-30 and NP-30MC.
  3. The numbers in the “NP-36GS, NP-H36GS CN5 Pin No.” column indicate the pin number of the NP-36GS and NP-H36GS connectors connected to the NGS-30 side.

★

## APPENDIX B CAUTIONS ON DESIGNING TARGET SYSTEM

Figures B-1 to B-4 show the conditions when connecting the emulation probe to the flexible board and the conversion adapter. Follow the configuration below and consider the shape of parts to be mounted on the target system when designing a system.

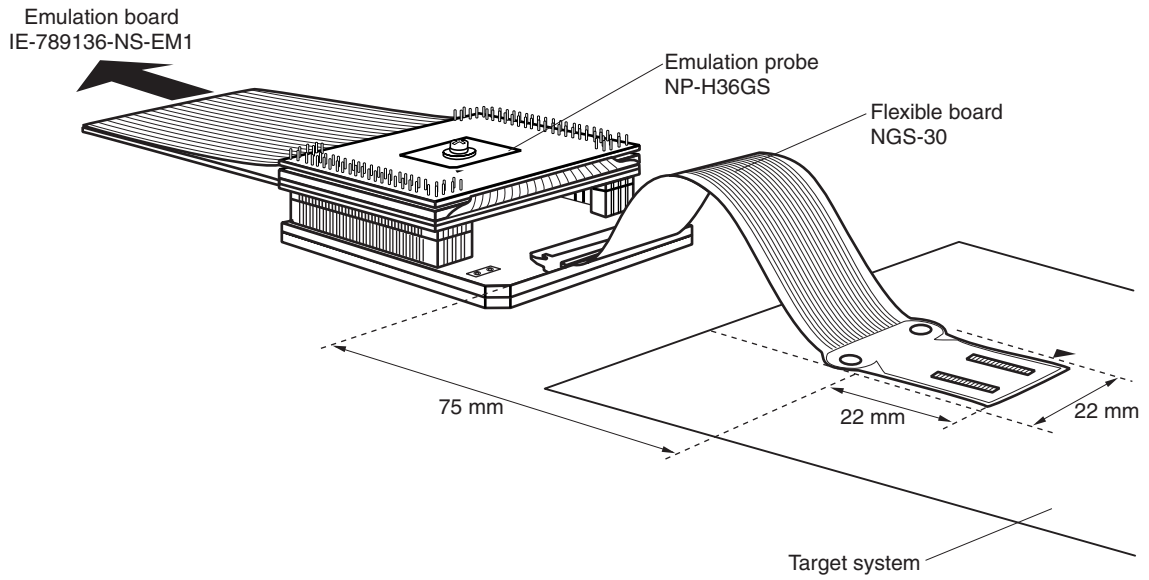
**Figure B-1. Distance Between In-Circuit Emulator and Flexible Board (NP-36GS)**



**Note** Distance when NP-36GS is used. When NP-H36GS is used, the distance is 355 mm.

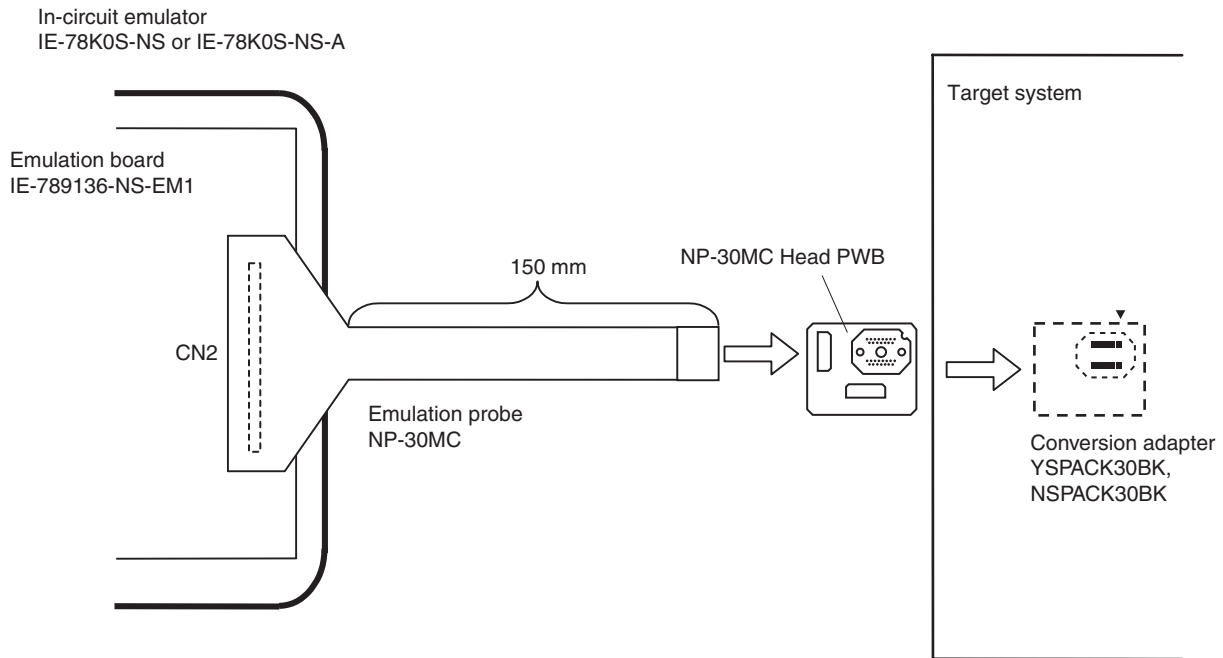
**Remark** NP-36GS, NP-H36GS, and NGS-30 are products of Naito Densai Machida Mfg. Co., Ltd.

Figure B-2. Connection Condition of Target System (NP-H36GS)



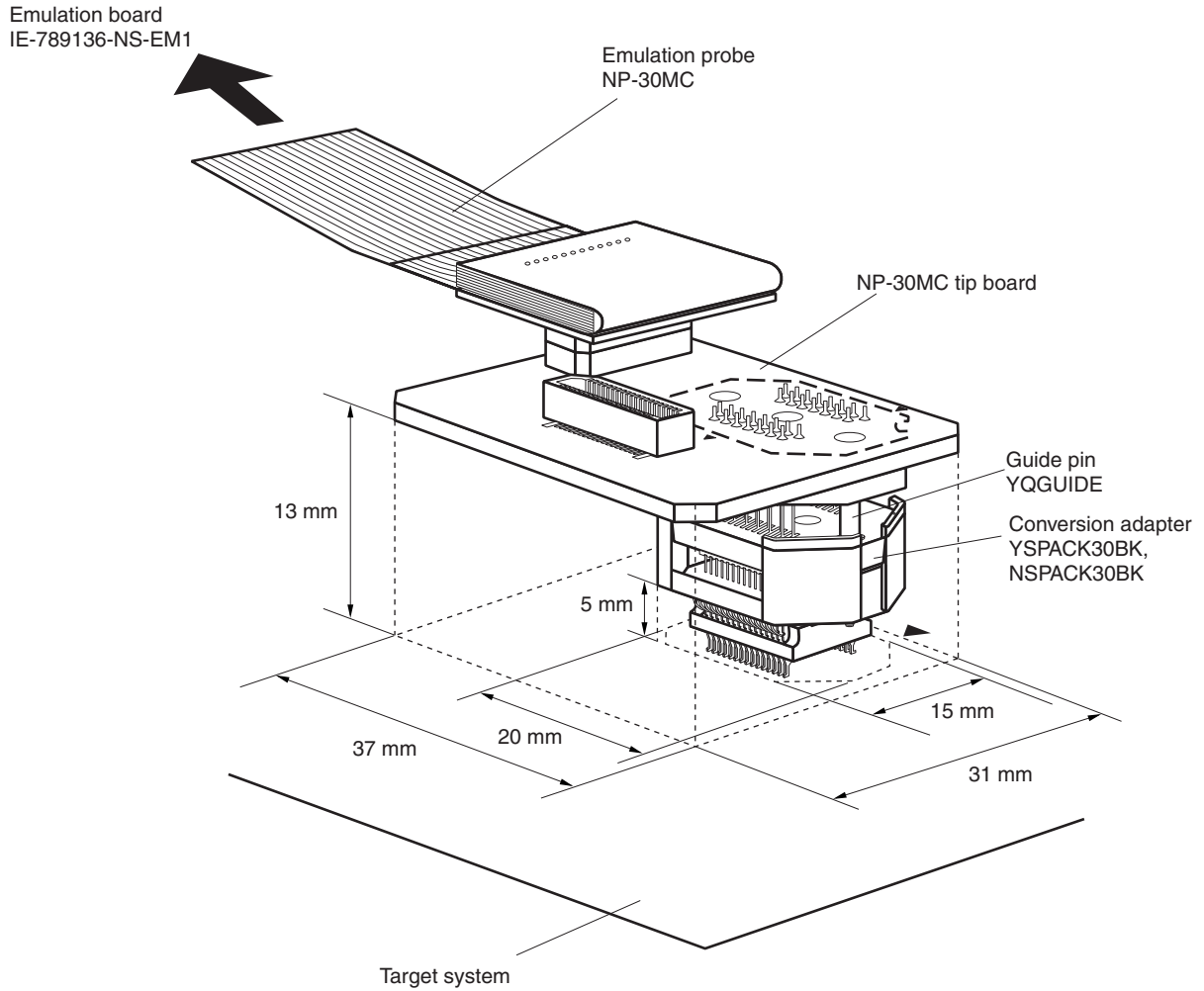
**Remark** NP-H36GS and NGS-30 are a products of Naito Densai Machida Mfg.Co., Ltd.

**Figure B-3. Distance Between In-Circuit Emulator and Conversion Adapter (NP-30MC)**



**Remark** NP-30MC is a product of Naito Densai Machida Mfg. Co., Ltd.  
YSPACK30BK and NSPACK30BK are products of TOKYO ELETECH CORPORATION.

Figure B-4. Connection Condition of Target System (NP-30MC)



**Remark** NP-30MC is a product of Naito Densai Machida Mfg. Co., Ltd.  
 YSPACK30BK, NSPACK30BK, and YQGUIDE are products of TOKYO ELETECH CORPORATION.

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