

**NEC**

**User's Manual**

# **IE-703102-MC-EM1, IE-703102-MC-EM1-A**

**In-circuit Emulator Optional Board**

---

**Target device  
V850E/MS1™**

Document No. U13876EJ1V0UM00 (1st edition)  
Date Published December 1998 N CP(K)

© NEC Corporation 1998  
Printed in Japan

[MEMO]

**V850E/MS1 is a trademark of NEC Corporation.**

**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.**

**Ethernet is a trademark of Xerox Corporation.**

**UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.**

**The information in this document is subject to change without notice.**

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or of others.

# 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 Electronics (Germany) GmbH**

Duesseldorf, Germany  
Tel: 0211-65 03 02  
Fax: 0211-65 03 490

## **NEC Electronics (UK) Ltd.**

Milton Keynes, UK  
Tel: 01908-691-133  
Fax: 01908-670-290

## **NEC Electronics Italiana s.r.l.**

Milano, Italy  
Tel: 02-66 75 41  
Fax: 02-66 75 42 99

## **NEC Electronics (Germany) GmbH**

Benelux Office  
Eindhoven, The Netherlands  
Tel: 040-2445845  
Fax: 040-2444580

## **NEC Electronics (France) S.A.**

Velizy-Villacoublay, France  
Tel: 01-30-67 58 00  
Fax: 01-30-67 58 99

## **NEC Electronics (France) S.A.**

Spain Office  
Madrid, Spain  
Tel: 01-504-2787  
Fax: 01-504-2860

## **NEC Electronics (Germany) GmbH**

Scandinavia Office  
Taebby, Sweden  
Tel: 08-63 80 820  
Fax: 08-63 80 388

## **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 Singapore Pte. Ltd.**

United Square, Singapore 1130  
Tel: 65-253-8311  
Fax: 65-250-3583

## **NEC Electronics Taiwan Ltd.**

Taipei, Taiwan  
Tel: 02-2719-2377  
Fax: 02-2719-5951

## **NEC do Brasil S.A.**

Electron Devices Division  
Rodovia Presidente Dutra, Km 214  
07210-902-Guarulhos-SP Brasil  
Tel: 55-11-6465-6810  
Fax: 55-11-6465-6829

# INTRODUCTION

- Readers** This manual is intended for users who design and develop application systems using the V850E/MS1™.
- Purpose** The purpose of this manual is to describe the proper operation of the IE-703102-MC-EM1 and IE-703102-MC-EM1-A, and their basic specifications.
- Organization** This manual is broadly divided into the following parts.
- Overview
  - Name and function of components
  - Cautions

**How to Read This Manual** It is assumed that the reader of this manual has general knowledge of electrical engineering, logic circuits, and microcontrollers.

The IE-703102-MC-EM1 and IE-703102-MC-EM1-A are used connected to the IE-703102-MC in-circuit emulator. This manual explains the basic setup procedure and switch settings of the IE-703102-MC-EM1 and IE-703102-MC-EM1-A. For the names and functions, and the connection of parts, refer to the **IE-703102-MC User's Manual**, which is a separate volume.

To understand the basic specifications and operation methods broadly  
→ Read this manual in the order listed in **CONTENTS**.

To know the operation methods and command functions of the IE-703102-MC, IE-703102-MC-EM1, and IE-703102-MC-EM1-A  
→ Read the user's manual of the debugger (separate volume) that is used.

- Conventions**
- Note:** Footnote for item marked with **Note** in the text
- Caution:** Information requiring particular attention
- Remark:** Supplementary information
- Numeral representations:** Binary ... xxxx or xxxxB  
Decimal ... xxxx  
Hexadecimal ... xxxxH
- Prefixes representing the powers of 2 (address space, memory capacity):**  
K (kilo):  $2^{10} = 1024$   
M (mega):  $2^{20} = 1024^2$

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

Target device	Device that is emulated.
Target system	The system (user-built system) to be debugged. This includes the target program and user-configured hardware.

**Product Names** Unless otherwise specified, the IE-703102-MC-EM1 is treated as the representative model in this manual. When using the IE-703102-MC-EM1-A, read IE-703102-MC-EM1 as IE-703102-MC-EM1-A. For functional differences between IE-703102-MC-EM1 and IE-703102-MC-EM1-A, refer to **CHAPTER 1 OVERVIEW**.

**Related Documents** The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

○ **Documents related to V850E/MS1**

Document Name	Document Number
V850E/MS1 User's Manual-Hardware	U12688E
V850E/xxx User's Manual-Architecture	U12197E
μPD703100-40, 703101-33, 703102-33 Data Sheet	To be prepared
μPD703100-A40, 703101-A33, 703102-A33 Data Sheet	To be prepared
μPD70F3102-33 Data Sheet	U13844E
μPD70F3102-A33 Data Sheet	U13845E

○ **Documents related to development tools (User's Manual)**

Product Name	Document Number	
IE-703102-MC (In-circuit emulator)	U13875E	
IE-703102-MC-EM1, IE-703102-MC-EM1-A (In-circuit emulator optional board)	This manual	
CA850 (C Compiler package)	Operation UNIX™ based	U12839E
	Operation Windows™ based	U12827E
	C language	U12840E
	Assembly Language	U10543E
ID850 (Integrated debugger)	Operation Windows based	U13716E
RX850 (Real-time OS)	Basics	U13430E
	Technical	U13431E
	Installation	U13410E
RX850 Pro (Real-time OS)	Fundamental	Under preparation
	Technical	U13772E
	Installation	U13774E
RD850 (Task debugger) <sup>Note</sup>	U11158E	
RD850 (Ver. 3.0) (Task debugger)	U13737E	
AZ850 (System performance analyzer) Operation	U11181E	

**Note** Supports ID850 (Ver. 1.31 only)

## CONTENTS

<b>CHAPTER 1 OVERVIEW .....</b>	<b>11</b>
<b>1.1 Hardware Configuration .....</b>	<b>12</b>
<b>1.2 Features (When Connected to IE-703102-MC).....</b>	<b>13</b>
<b>1.3 Function Specifications (When Connected to IE-703102-MC).....</b>	<b>14</b>
<b>1.4 System Configuration .....</b>	<b>15</b>
<b>1.5 Contents in Carton .....</b>	<b>16</b>
<b>1.6 Connection between IE-703102-MC and IE-703102-MC-EM1 .....</b>	<b>17</b>
<b>CHAPTER 2 NAME AND FUNCTION OF COMPONENTS.....</b>	<b>19</b>
<b>2.1 Component Name and Function of IE-703102-MC-EM1 .....</b>	<b>19</b>
<b>2.2 Clock Settings.....</b>	<b>21</b>
<b>2.3 MODE Pin Setting.....</b>	<b>22</b>
2.3.1 MODE pin setting when emulator is used as stand-alone unit .....	22
2.3.2 MODE pin setting when emulator is used connected to target system .....	22
<b>2.4 Power Supply Settings .....</b>	<b>23</b>
2.4.1 JP2 setting when the emulator operates as a stand-alone unit and target system power is off....	23
2.4.2 JP2 setting when power of the target system is on .....	23
<b>CHAPTER 3 FACTORY SETTINGS .....</b>	<b>25</b>
<b>CHAPTER 4 CAUTIONS.....</b>	<b>27</b>
<b>4.1 V<sub>DD</sub> and HV<sub>DD</sub> of Target System .....</b>	<b>27</b>
<b>4.2 X1 Signal .....</b>	<b>27</b>
<b>4.3 Pin Termination .....</b>	<b>28</b>
<b>4.4 Internal RAM and ROM .....</b>	<b>29</b>
<b>4.5 Port 4 to 6, A, and B .....</b>	<b>30</b>
<b>4.6 Bus Interface Pin .....</b>	<b>31</b>
<b>4.7 Emulation Memory Operation Timing Difference.....</b>	<b>33</b>
<b>APPENDIX A DIMENSIONS .....</b>	<b>35</b>
<b>APPENDIX B EXAMPLE OF USE OF CONNECTOR FOR TARGET CONNECTION.....</b>	<b>41</b>
<b>APPENDIX C CONNECTORS FOR TARGET CONNECTION.....</b>	<b>43</b>
<b>C.1 Use.....</b>	<b>43</b>
<b>C.2 Cautions on Handling Connectors .....</b>	<b>45</b>
<b>APPENDIX D MOUNTING OF PLASTIC SPACER.....</b>	<b>47</b>

## LIST OF FIGURES

Figure No.	Title	Page
1-1.	System Configuration .....	15
1-2.	Contents in Carton.....	16
1-3.	Connection between IE-703102-MC and IE-703102-MC-EM1.....	17
2-1.	IE-703102-MC-EM1.....	19
2-2.	Power Supply Settings (When the Emulator Operates as a Stand-Alone Unit and Target System Power is Off) .....	23
2-3.	Power Supply Setting (When Power of the Target System is On).....	23
4-1.	Schematic Diagram of Power Supply Flow.....	27
4-2.	Diagram of X1 Signal Flow .....	28
4-3.	Circuit Diagram of CKSEL Pin .....	28
4-4.	Circuit Diagram of Port 4 to 6, A, and B .....	30
C-1.	Mounting of NQPACK144SD.....	43
C-2.	Mounting Device.....	44
C-3.	NQPACK100SD and Device Pin .....	44
D-1.	Mounting Method of Plastic Spacer.....	47



## LIST OF TABLES

Table No.	Title	Page
2-1.	Clock Setting (When the Emulator is Used as a Stand-Alone Unit) .....	21
2-2.	Clock Setting (When the Emulator is Used in Target System Connection).....	21
2-3.	MODE Pin Setting when Emulator is Used as Stand-Alone Unit .....	22
2-4.	MODE Pin Setting when Emulator is Used Connected to Target System.....	22
4-1.	Memory Capacity Limitation List .....	29
4-2.	Bus Interface Pin Operation List.....	31

[MEMO]

## CHAPTER 1 OVERVIEW

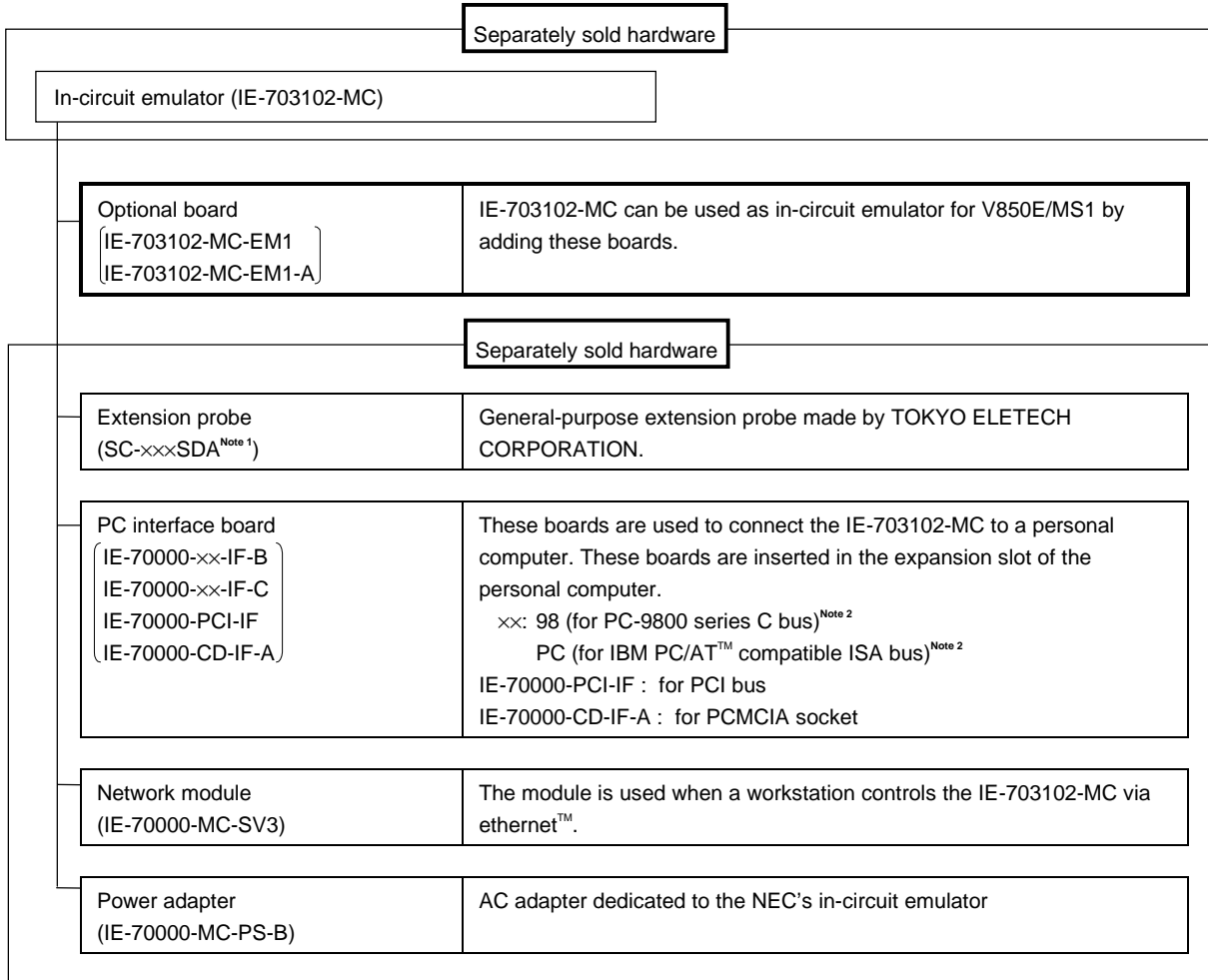
The IE-703102-MC-EM1 is an optional board for the in-circuit emulator IE-703102-MC. By connecting the IE-703102-MC-EM1 to IE-703102-MC, hardware and software can be debugged efficiently in system development using the V850E/MS1.

**IE-703102-MC-EM1** is an optional board when **HV<sub>DD</sub> = 5 V**

**IE-703102-MC-EM1-A** is an optional board when **HV<sub>DD</sub> = 3.3 V**

In this manual, the basic setup sequences and switch settings of the IE-703102-MC-EM1 when connecting it to the IE-703102-MC are described. For the names and functions of the parts of the IE-703102-MC, and for the connection of elements, refer to the **IE-703102-MC User's Manual (U13875E)** which is a separate volume.

## 1.1 Hardware Configuration



- Notes**
1. For further information, contact Daimaru Kogyo Co., Ltd.  
Tokyo Electronic Components Division (TEL +81-3-3820-7112)  
Osaka Electronic Components Division (TEL +81-6-244-6672)
  2. These interface boards cannot be used for the PC98-NX series.

## 1.2 Features (When Connected to IE-703102-MC)

- Maximum operation frequency: 40 MHz ( $HV_{DD} = 3.3\text{ V}$  or  $5.0\text{ V}$  operation)
- Extremely lightweight and compact
- Higher equivalence with target device can be achieved by omitting buffer between signal cables.
- Following pins can be masked.  
RESET, NMI,  $\overline{WAIT}$ ,  $\overline{HLDRQ}$
- Two methods of connection to target system:
  - Direct connection of the IE-703102-MC-EM1
  - Attach an extension probe (sold separately) to the connection tab of the IE-703102-MC-EM1.
- Dimensions of the IE-703102-MC-EM1 are as follows.

Parameter		Value
Power dissipation		0.4 W (at 40-MHz operation frequency) <sup>Note</sup>
External dimensions (Refer to <b>APPENDIX A DIMENSIONS</b> )	Height	15 mm
	Length	207 mm
	Width	96 mm
Weight		170 g

**Note** The power dissipation is 11.4 W when IE-703102-MC + IE-703102-MC-EM1.

## 1.3 Function Specifications (When Connected to IE-703102-MC)

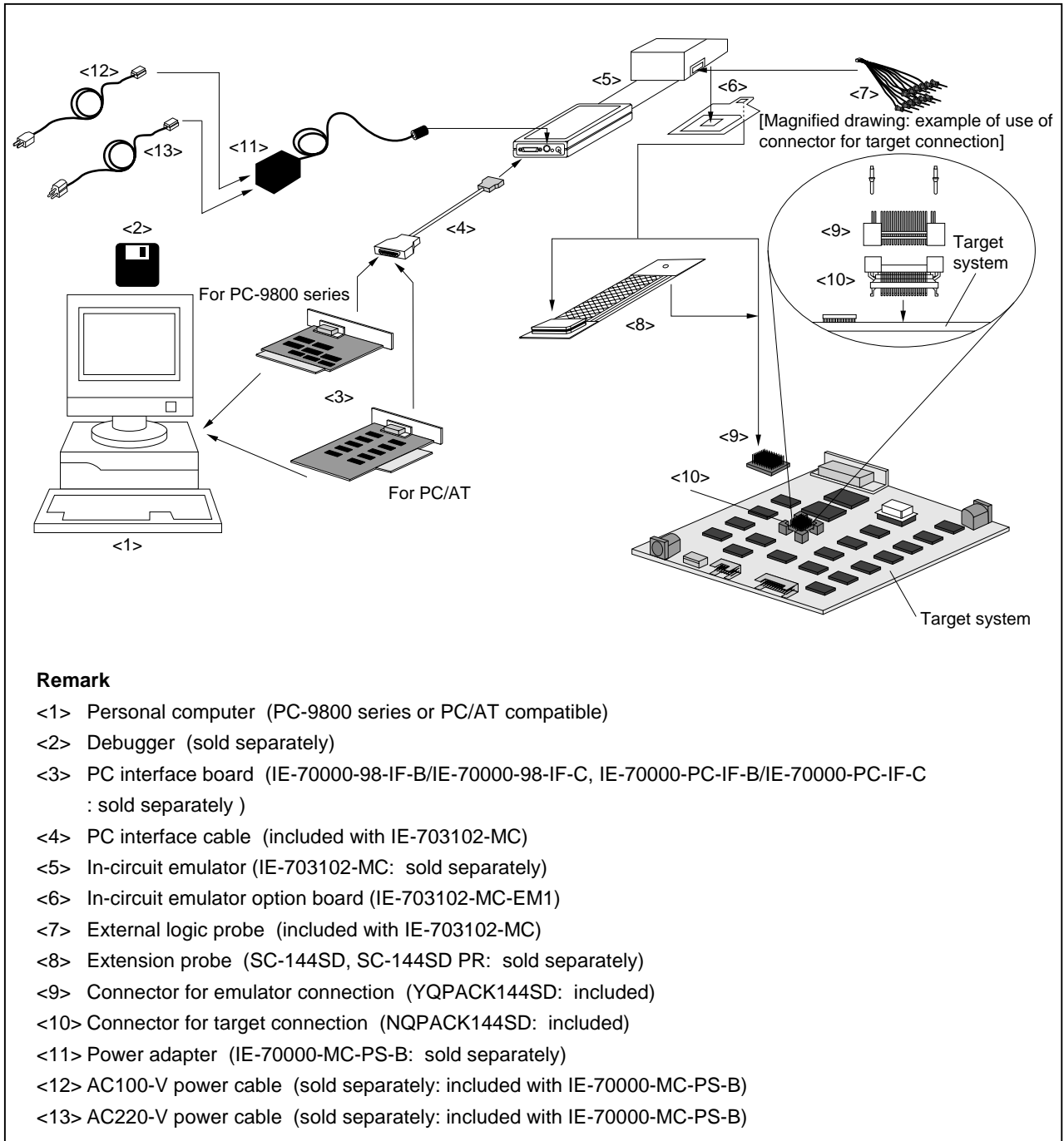
Parameter		Specification	
Emulation memory capacity	Internal ROM	128 Kbytes	
	External memory	2 Mbytes	
Execution/pass detection Coverage memory capacity	Internal ROM	128 Kbytes	
	External memory	In ROM-less mode	2 Mbytes
		When using iROM	1 Mbyte
Memory access detection Coverage memory capacity	External memory	1 Mbyte	
Trace memory capacity		168 bits × 32 Kframes	
Time measurement function		Can be measured with time tag and timers (3 lines)	
External logic probe		8-bit external trace is possible	
		Event setting for trace/break is possible	
Break function		Event break	
		Step execution break	
		Forced break	
		Fail safe break <ul style="list-style-type: none"> <li>• Illegal access to peripheral I/O</li> <li>• Access to guard space</li> <li>• Write to the ROM space</li> </ul>	

**Caution** Some of the functions may not be supported depending on the debugger used.

## 1.4 System Configuration

The system configuration when connecting the IE-703102-MC-EM1 to the IE-703102-MC, which is then connected to a personal computer (PC-9800 series or PC/AT compatible) is shown below.

Figure 1-1. System Configuration



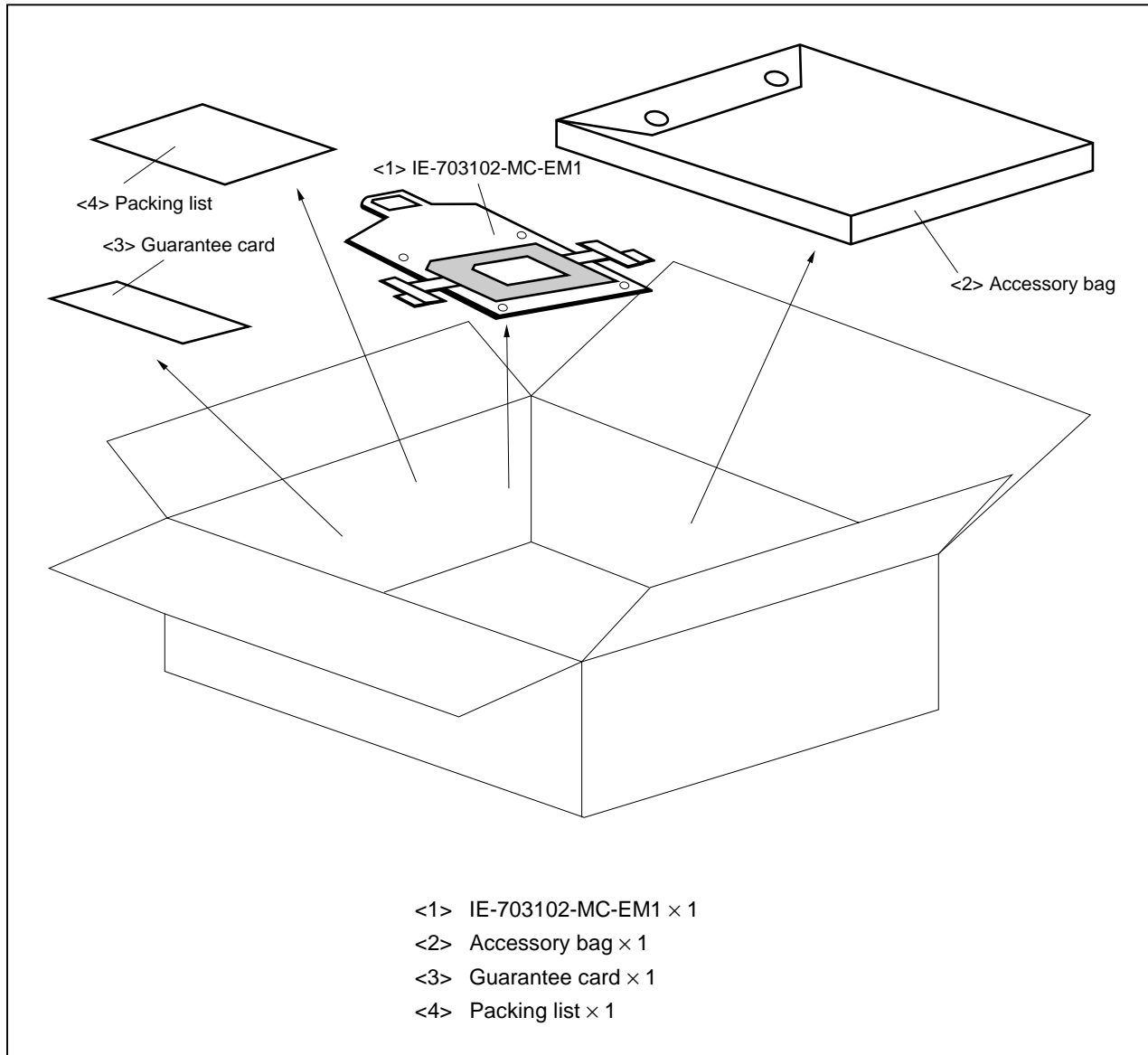
### Remark

- <1> Personal computer (PC-9800 series or PC/AT compatible)
- <2> Debugger (sold separately)
- <3> PC interface board (IE-70000-98-IF-B/IE-70000-98-IF-C, IE-70000-PC-IF-B/IE-70000-PC-IF-C : sold separately )
- <4> PC interface cable (included with IE-703102-MC)
- <5> In-circuit emulator (IE-703102-MC: sold separately)
- <6> In-circuit emulator option board (IE-703102-MC-EM1)
- <7> External logic probe (included with IE-703102-MC)
- <8> Extension probe (SC-144SD, SC-144SD PR: sold separately)
- <9> Connector for emulator connection (YQPACK144SD: included)
- <10> Connector for target connection (NQPACK144SD: included)
- <11> Power adapter (IE-70000-MC-PS-B: sold separately)
- <12> AC100-V power cable (sold separately: included with IE-70000-MC-PS-B)
- <13> AC220-V power cable (sold separately: included with IE-70000-MC-PS-B)

## 1.5 Contents in Carton

The carton of the IE-703102-MC-EM1 contains a main unit, guarantee card, packing list, and accessory bag. Make sure that the accessory bag contains this manual and connector accessories. In case of missing or damaged contents, contact an NEC sales representative or an NEC distributor.

Figure 1-2. Contents in Carton



Make sure that the accessory bag contains this manual and an accessory list (1 sheet).



## 1.6 Connection between IE-703102-MC and IE-703102-MC-EM1

The procedure for connecting the IE-703102-MC and IE-703102-MC-EM1 is described below.

**Caution** Connect carefully so as not to break or bend connector pins.

- <1> Remove the pod cover (upper and lower) of the IE-703102-MC.
- <2> Set the PGA socket lever of the IE-703102-MC-EM1 to the OPEN position as shown in Figure 1-3 (b).
- <3> Connect the IE-703102-MC-EM1 to the PGA socket at the back of the pod (refer to **Figure 1-3 (c)**). When connecting, position the IE-703102-MC and IE-703102-MC-EM1 so that they are horizontal.
- Spacers can be connected to fix the pod. (refer to **APPENDIX D MOUNTING OF PLASTIC SPACER**)
- <4> Set the PGA socket lever of the IE-703102-MC-EM1 to the CLOSE position as shown in Figure 1-3 (b).
- <5> Fix the IE-703102-MC-EM1 between the pod covers (upper and lower) with nylon rivets.
- <6> Secure the pod cover (upper) end with nylon rivets.

**Figure 1-3. Connection between IE-703102-MC and IE-703102-MC-EM1 (1/2)**

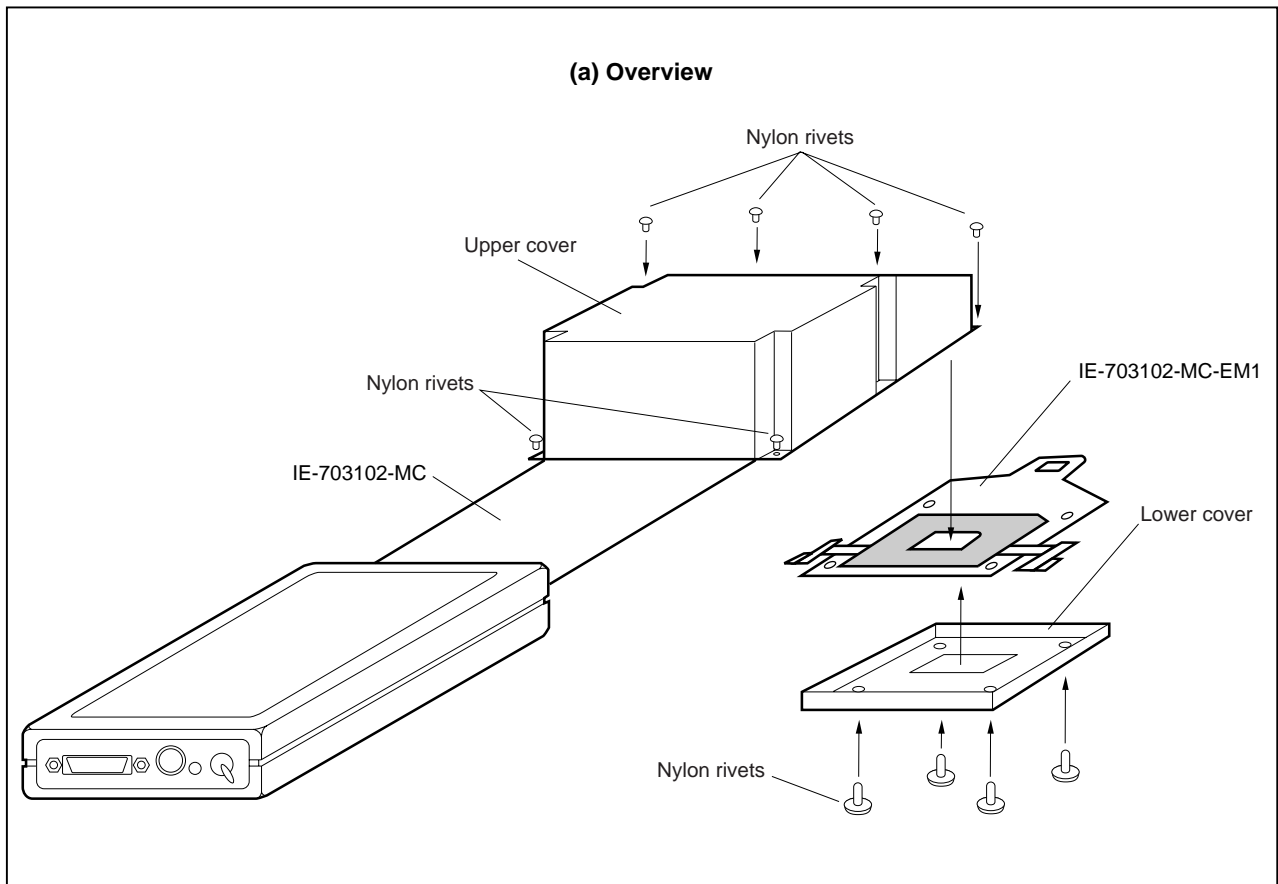
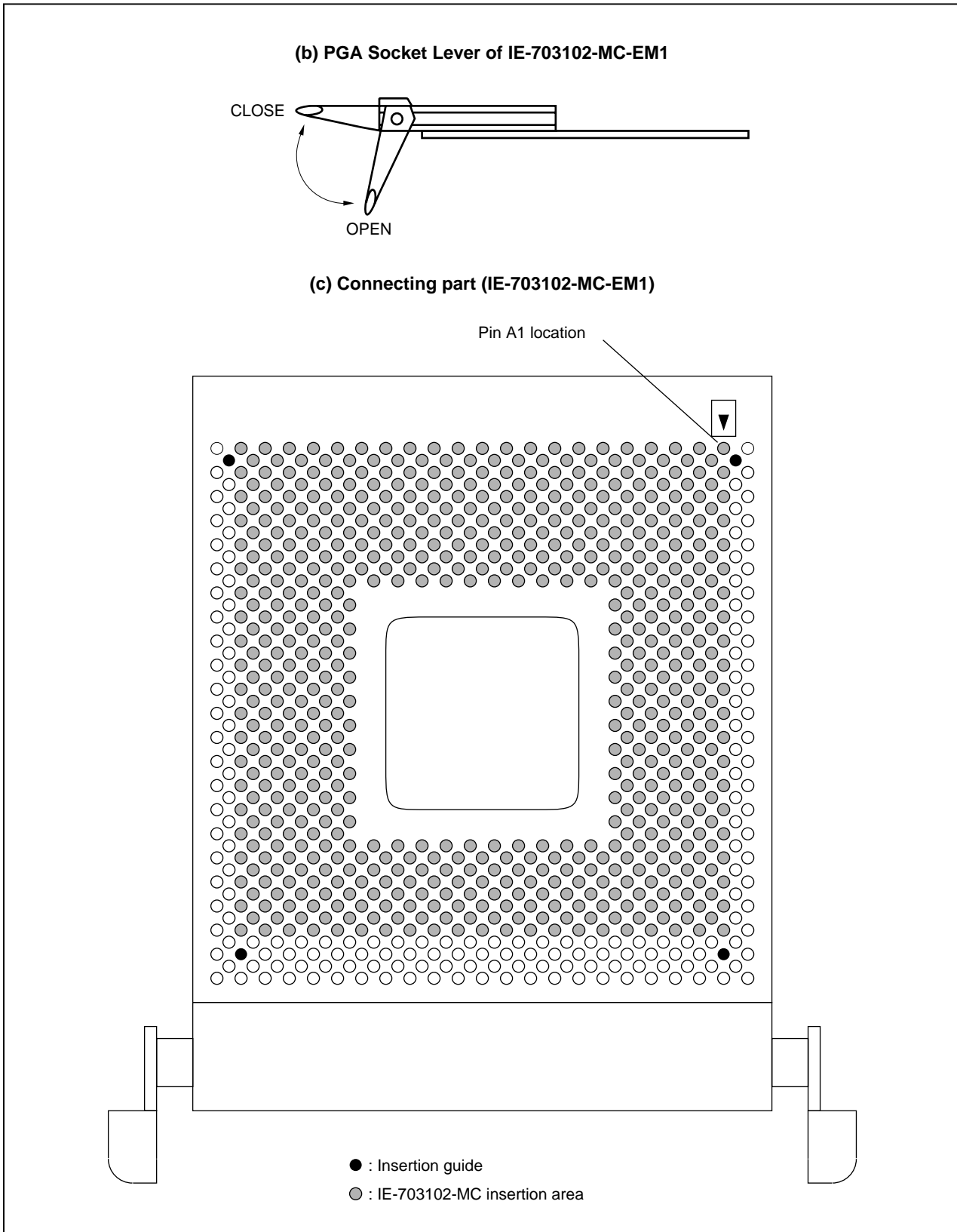


Figure 1-3. Connection between IE-703102-MC and IE-703102-MC-EM1 (2/2)

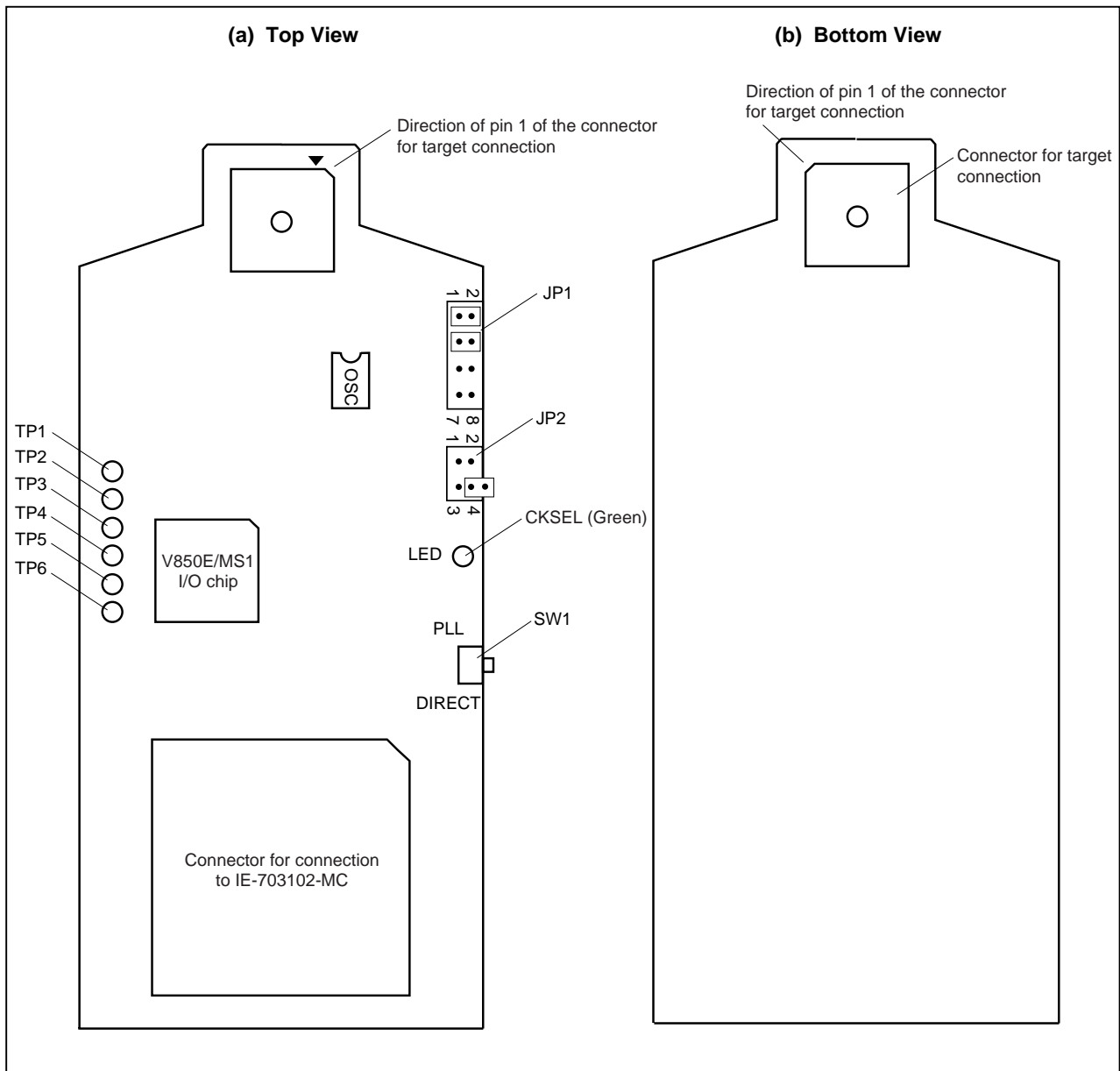


## CHAPTER 2 NAME AND FUNCTION OF COMPONENTS

This chapter describes the names, functions, and switch settings of components comprising the IE-703102-MC-EM1. For the details of the pod, jumper, and switch positions, etc., refer to the **IE-703102-MC User's Manual**.

### 2.1 Component Name and Function of IE-703102-MC-EM1

Figure 2-1. IE-703102-MC-EM1



**(1) Test pin (TP1 to TP6)**

To leave the DMA cycle or refresh cycle in the tracer, or break these cycles, connect these pins to the external logic probe.

- TP1: GND
- TP2: REFRQ
- TP3: DMAAK0
- TP4: DMAAK1
- TP5: DMAAK2
- TP6: DMAAK3

**(2) SW1**

This is a switch for clock mode switching (for details, refer to **2.2 Clock Settings**).

**(3) JP1**

This is a switch jumper for the clock supply source (for details, refer to **2.2 Clock Settings**).

**(4) JP2**

This is a switch jumper for the power supply (for details, refer to **2.4 Power Supply Settings**).

**(5) LED (CKSEL: Green)**

LED Status	When Used as a Stand-Alone Unit	When Used in Target System Connection
ON	SW1 = DIRECT	The CKSEL signal from the target system is high
OFF	SW1 = PLL	The CKSEL signal from the target system is low

**(6) Connector for IE-703102-MC connection**

This is a connector for connecting the IE-703102-MC.

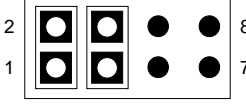
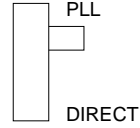
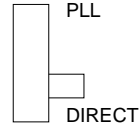
**(7) Connector for target connection**

This is a connector for connecting the target system or the extension probe.

## 2.2 Clock Settings

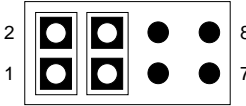
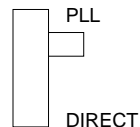
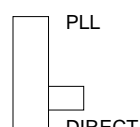
This section describes the clock settings. For JP1 and SW1, refer to Figure 2-1.

**Table 2-1. Clock Setting (When the Emulator is Used as a Stand-Alone Unit)**

Clock Supply Source Setting		Clock Mode Setting	
Clock Supply Method		JP1 Setting <sup>Note</sup>	SW1 Setting (CKSEL Setting)
Internal clock	PLL mode		
	Direct mode		

**Note** Setting any other state is prohibited.

**Table 2-2. Clock Setting (When the Emulator is Used in Target System Connection)**

Clock Supply Source Setting		Clock Mode Setting		
Clock Supply Method		JP1 Setting <sup>Note 1</sup>	SW1 Setting (CKSEL Setting)	CKSEL Setting of Target System
Internal clock/target clock <sup>Note 2</sup>	PLL mode			Low level
	Direct mode			High level

**Notes 1.** Setting any other state is prohibited.

**2.** Switching the internal clock and target clock is done with the debugger.

## 2.3 MODE Pin Setting

The emulator operation mode can be changed with the MODE pin setting.

### 2.3.1 MODE pin setting when emulator is used as stand-alone unit

When the emulator is used as a stand-alone unit, MODE0 and MODE1 in the emulator are set as follows.

The setting cannot be changed.

**Table 2-3. MODE Pin Setting when Emulator is Used as Stand-Alone Unit**

Emulator Operation	Settings Inside Emulator	
	MODE0	MODE1
Single-chip mode 0	Low-level input	High-level input

### 2.3.2 MODE pin setting when emulator is used connected to target system

When the emulator is connected to a target system, set the MODE pins of the target system as follows based on the emulator operations.

The MODE2 and MODE3 signals in the target system are not used in the emulator.

**Table 2-4. MODE Pin Setting when Emulator is Used Connected to Target System**

Emulator Operation	Target System Setting	
	MODE0	MODE1
ROM-less mode 0	Low-level input	Low-level input
ROM-less mode 1	High-level input	Low-level input
Single-chip mode 0	Low-level input	High-level input
Single-chip mode 1	High-level input	High-level input

## 2.4 Power Supply Settings

Using the JP2 setting, the IE-703102-MC-EM1 can switch between operation using the emulator as a stand-alone unit (using the power of the emulator) and operation using the emulator connected to the target system (using the power of the target system).

### 2.4.1 JP2 setting when the emulator operates as a stand-alone unit and target system power is off

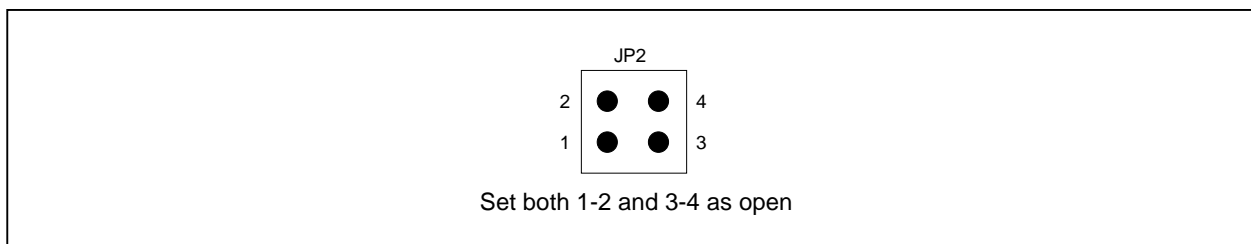
The IE-703102-MS-EM1 operates using the emulator's power supply when the emulator operates as a stand-alone unit and target system power is off. Depending on the product, the condition of the power is as follows.

- IE-703102-MC-EM1 :  $V_{DD} = 3.3\text{ V}$ ,  $HV_{DD} = 5.0\text{ V}$
- IE-703102-MC-EM1-A :  $V_{DD} = 3.3\text{ V}$ ,  $HV_{DD} = 3.3\text{ V}$

Figure 2-2 shows the JP2 setting.

**Caution** If the JP2 setting is incorrect, the emulator may be damaged.

**Figure 2-2. Power Supply Settings (When the Emulator Operates as a Stand-Alone Unit and Target System Power is Off)**

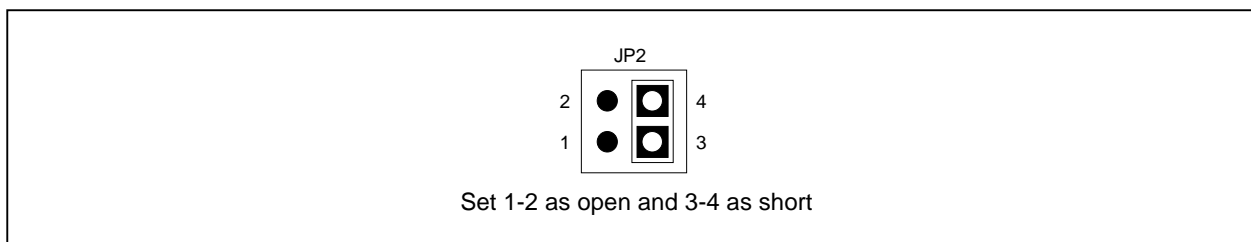


### 2.4.2 JP2 setting when power of the target system is on

The IE-703102-MC-EM1 operates using the target system's power supply when the power of the target system is on. Figure 2-3 shows the JP2 setting.

**Caution** If the JP2 setting is incorrect, the emulator may be damaged.

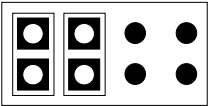
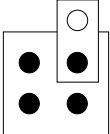
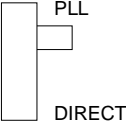
**Figure 2-3. Power Supply Setting (When Power of the Target System is On)**



[MEMO]



### CHAPTER 3 FACTORY SETTINGS

Item	Setting	Remark
JP1		All settings other than those set in the factory are prohibited.
JP2		Setting that supplies the IE-703102-MC-EM1 with the power of the emulator (when the emulator operates as a stand-alone unit and target system power is off).
SW1		Set to PLL mode.
Crystal oscillator	8.000-MHz crystal oscillator is mounted.	If SW1 is set to the factory setting, the CPU operates at 40 MHz.

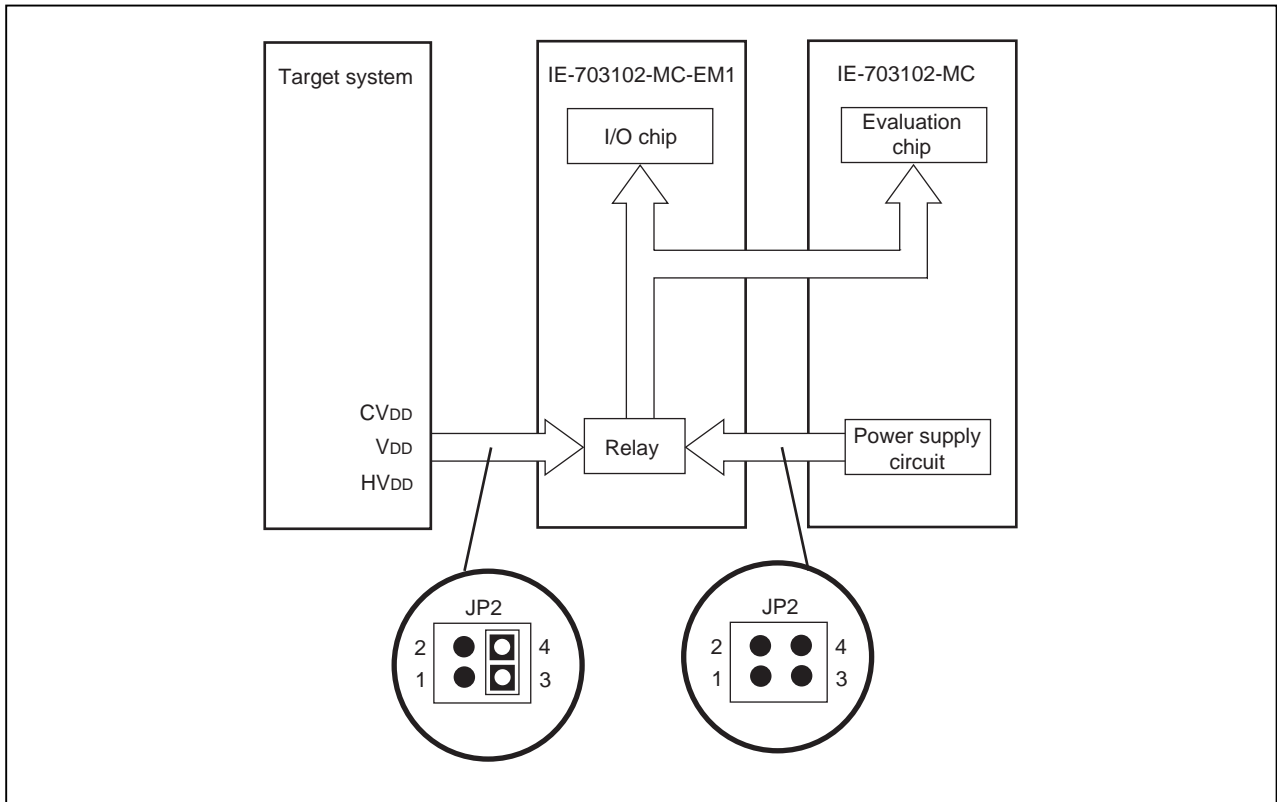
[MEMO]

## CHAPTER 4 CAUTIONS

### 4.1 V<sub>DD</sub> and HV<sub>DD</sub> of Target System

- (1) V<sub>DD</sub> and HV<sub>DD</sub> in the target system are used to operate the circuit in the emulator.
- (2) When JP2 is set as 1-2 : open and 3-4 : short, the evaluation chip in the emulator operates on V<sub>DD</sub> and HV<sub>DD</sub> from the target system.
- (3) When JP2 is set as 1-2 : open and 3-4 : open, the emulator recognizes the target system power is off and operates with the 3.3 V power supply.

Figure 4-1. Schematic Diagram of Power Supply Flow

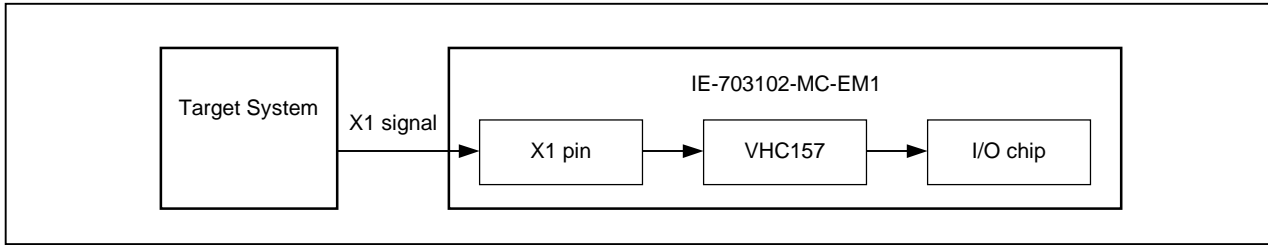


### 4.2 X1 Signal

The input signal (X1 signal) from the target system is delayed (for  $t_{pLH} = t_{pHL} = 13.2$  ns (MAX.)) because it passes through VHC157 before it is input to the I/O chip of the emulator.

In addition, the DC characteristics change. The input voltage becomes  $V_{IH} = 2.31$  V (MIN.) and  $V_{IL} = 0.99$  V (MAX.). The input current becomes  $I_{IN} = \pm 1.0$   $\mu$ A (MAX.).

Figure 4-2. Diagram of X1 Signal Flow



### 4.3 Pin Termination

#### (1) MODE0 to MODE3 pins

When the emulator operates as a stand-alone unit, the operation mode of the emulator is single-chip mode 0. The MODE0 to MODE3 pins are connected as follows.

- MODE0: Connected to  $V_{SS}$  via a resistor (33 k $\Omega$ ). (Pull-down)
- MODE1: Connected to  $V_{DD}$  via a resistor (5.1 k $\Omega$ ). (Pull-up)
- MODE2: Unconnected
- MODE3: Unconnected

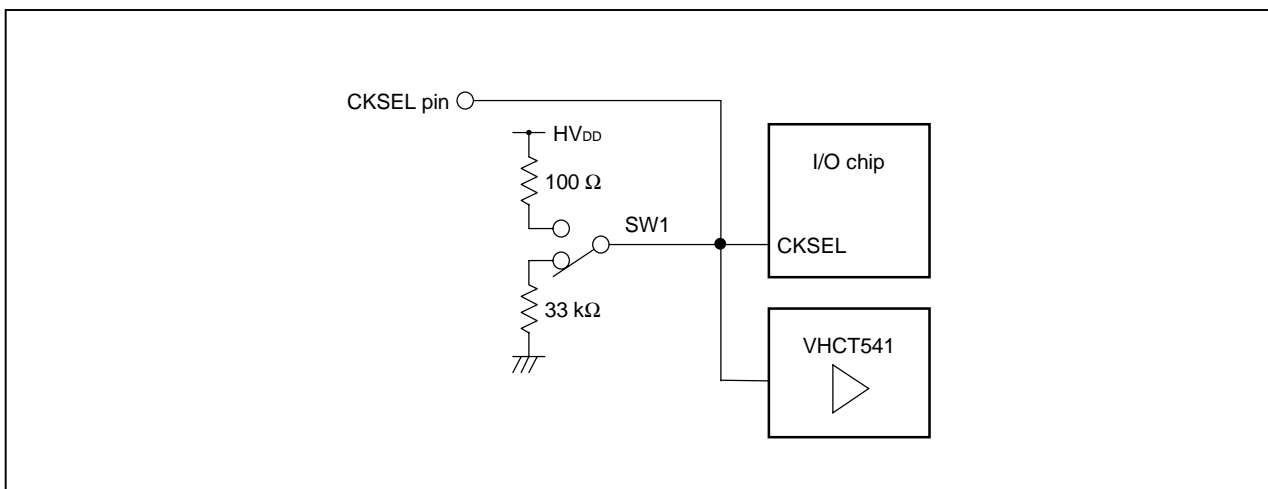
#### (2) $\overline{\text{RESET}}$ pin

This pin is connected to  $V_{DD}$  via a resistor (5.1 k $\Omega$ ). (Pull-up)

#### (3) CKSEL pin

Pull-up/pull-down switching is possible with SW1.

Figure 4-3. Circuit Diagram of CKSEL Pin



#### 4.4 Internal RAM and ROM

Because the internal RAM (iRAM) and internal ROM (iROM) capacities of the emulator are set in steps, the memory capacity is different from that of the target device. If access is performed to addresses that exceed the target device capacity, the memory of the emulator is accessed. Memory capacities are as follows.

**Table 4-1. Memory Capacity Limitation List**

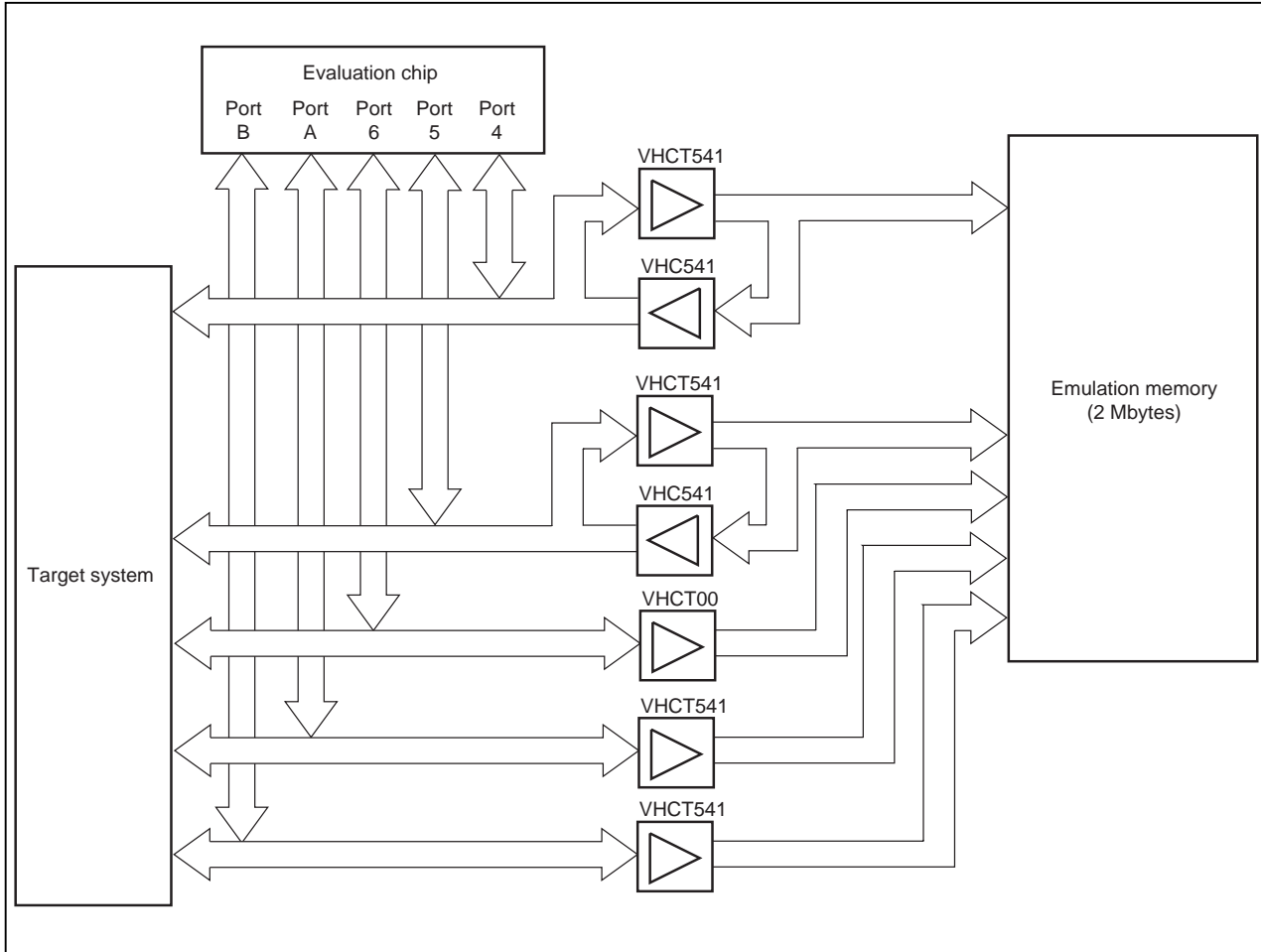
(a) iRAM capacity (Unit: byte)		(b) iROM capacity (Unit: byte)	
Target Device	Emulator	Target Device	Emulator (Emulation Memory)
1 K	1 K	1 K to 32 K	32 K
2 K	2 K	33 K to 64 K	64 K
3 K	3 K	65 K to 128 K(V850E/MS1)	128 K
4 K (V850E/MS1)	4 K	129 K to 256 K	256 K
5 K to 6 K	6 K	257 K to 512 K	512 K <sup>Note</sup>
7 K to 8 K	8 K		
9 K to 10 K	10 K		
11 K to 12 K	12 K		
13 K to 16 K	16 K		
17 K to 20 K	20 K		
21 K to 24 K	24 K		
25 K to 28 K	28 K		
29 K to 36 K	36 K		
37 K to 44 K	44 K		
45 K to 52 K	52 K		
53 K to 60 K	60 K		

**Note** The emulator is mounted iROM emulation memory of 512 Kbytes.

4.5 Port 4 to 6, A, and B

Ports 4 to 6, A, and B are connected to VHCT541, VHC541, and VHCT00, respectively.

Figure 4-4. Circuit Diagram of Port 4 to 6, A, and B



## 4.6 Bus Interface Pin

There are the following differences between the emulator and the target device in the operation of the pins for bus interface.

**Table 4-2. Bus Interface Pin Operation List (1/3)**  
**(a) During break**

Pin Name	Waiting for Emulator Command	Internal Memory					External Memory			
		Internal ROM	Internal RAM		Internal Peripheral I/O		Emulation RAM		Target System	
		R	R	W	R	W	R	W	R	W
A0 to A23	<b>Note</b>	<b>Note</b>					<b>Note</b>		<b>Note</b>	
D0 to D15	Hi-Z	Hi-Z					<b>Note</b>		<b>Note</b>	
$\overline{WE}$	H	H					H		<b>Note</b>	
$\overline{OE}$	H	H					H		<b>Note</b>	
$\overline{RD}$	H	H					H		<b>Note</b>	
$\overline{ADV/BCYST}$	<b>Note</b>	H					<b>Note</b>		<b>Note</b>	
$\overline{UWR/UCAS}$	H	H					H		<b>Note</b>	
$\overline{LWR/LCAS}$	H	H					H		<b>Note</b>	
$\overline{IORD}$	H	H					H		<b>Note</b>	
$\overline{IOWR}$	H	H					H		<b>Note</b>	
$\overline{CS0}$ to $\overline{CS7}$	H	H					H		<b>Note</b>	
$\overline{RAS0}$ to $\overline{RAS7}$	H	H					H		<b>Note</b>	
$\overline{REFRQ}$	H	H					H		<b>Note</b>	
$\overline{WAIT}$	Invalid	<b>Note</b>					Maskable			
$\overline{HLDRQ}$	Maskable	Maskable					Maskable			
$\overline{HLDAK}$	<b>Note</b>	<b>Note</b>					<b>Note</b>			

**Note** Performs the same operation as the cycle that is generated by the target device program execution.

- Remarks**
1. R : Read  
W : Write
  2. H : High-level output  
Hi-Z: High-impedance

**Table 4-2. Bus Interface Pin Operation List (2/3)**  
**(b) During user program execution**

Pin Name	Internal Memory							External Memory					
	Internal ROM		Internal RAM			Internal Peripheral I/O		Emulation RAM			Target System		
	F	R	F	R	W	R	W	F	R	W	F	R	W
A0 to A23	<b>Note</b>							<b>Note</b>			<b>Note</b>		
D0 to D15	Hi-Z							<b>Note</b>			<b>Note</b>		
$\overline{WE}$	H							H			<b>Note</b>		
$\overline{OE}$	H							H			<b>Note</b>		
$\overline{RD}$	H							H			<b>Note</b>		
$\overline{ADV/BCYST}$	H							<b>Note</b>			<b>Note</b>		
$\overline{UWR/UCAS}$	H							H			<b>Note</b>		
$\overline{LWR/LCAS}$	H							H			<b>Note</b>		
$\overline{IROD}$	H							H			<b>Note</b>		
$\overline{IOWR}$	H							H			<b>Note</b>		
$\overline{CS0}$ to $\overline{CS7}$	H							H			<b>Note</b>		
$\overline{RAS0}$ to $\overline{RAS7}$	H							H			<b>Note</b>		
$\overline{REFRQ}$	H							H			<b>Note</b>		
$\overline{WAIT}$	<b>Note</b>							Maskable					
$\overline{HLDRQ}$	Maskable							Maskable					
$\overline{HLDK}$	<b>Note</b>							<b>Note</b>					

**Note** Performs the same operation as the cycle that is generated by the target device program execution.

- Remarks 1.** F : Fetch  
R : Read  
W : Write  
**2.** H : High-level output  
Hi-Z : High-impedance



**Table 4-2. Bus Interface Pin Operation List (3/3)**  
**(c) Refresh cycle**

Pin Name	Operation
A0 to A23	<b>Note</b>
D0 to D15	<b>Note</b>
$\overline{\text{WE}}$	<b>Note</b>
$\overline{\text{OE}}$	<b>Note</b>
$\overline{\text{RD}}$	<b>Note</b>
$\overline{\text{ADV/BCYST}}$	<b>Note</b>
$\overline{\text{UWR/UCAS}}$	<b>Note</b>
$\overline{\text{LWR/LCAS}}$	<b>Note</b>
$\overline{\text{IORD}}$	<b>Note</b>
$\overline{\text{IOWR}}$	<b>Note</b>
$\overline{\text{CS0}}$ to $\overline{\text{CS7}}$	<b>Note</b>
$\overline{\text{RAS0}}$ to $\overline{\text{RAS7}}$	<b>Note</b>
$\overline{\text{REFRQ}}$	<b>Note</b>
$\overline{\text{WAIT}}$	Maskable
$\overline{\text{HLDRQ}}$	Maskable
$\overline{\text{HLDAK}}$	<b>Note</b>

**Note** Performs the same operation as the cycle that is generated by the target device program execution.

#### 4.7 Emulation Memory Operation Timing Difference

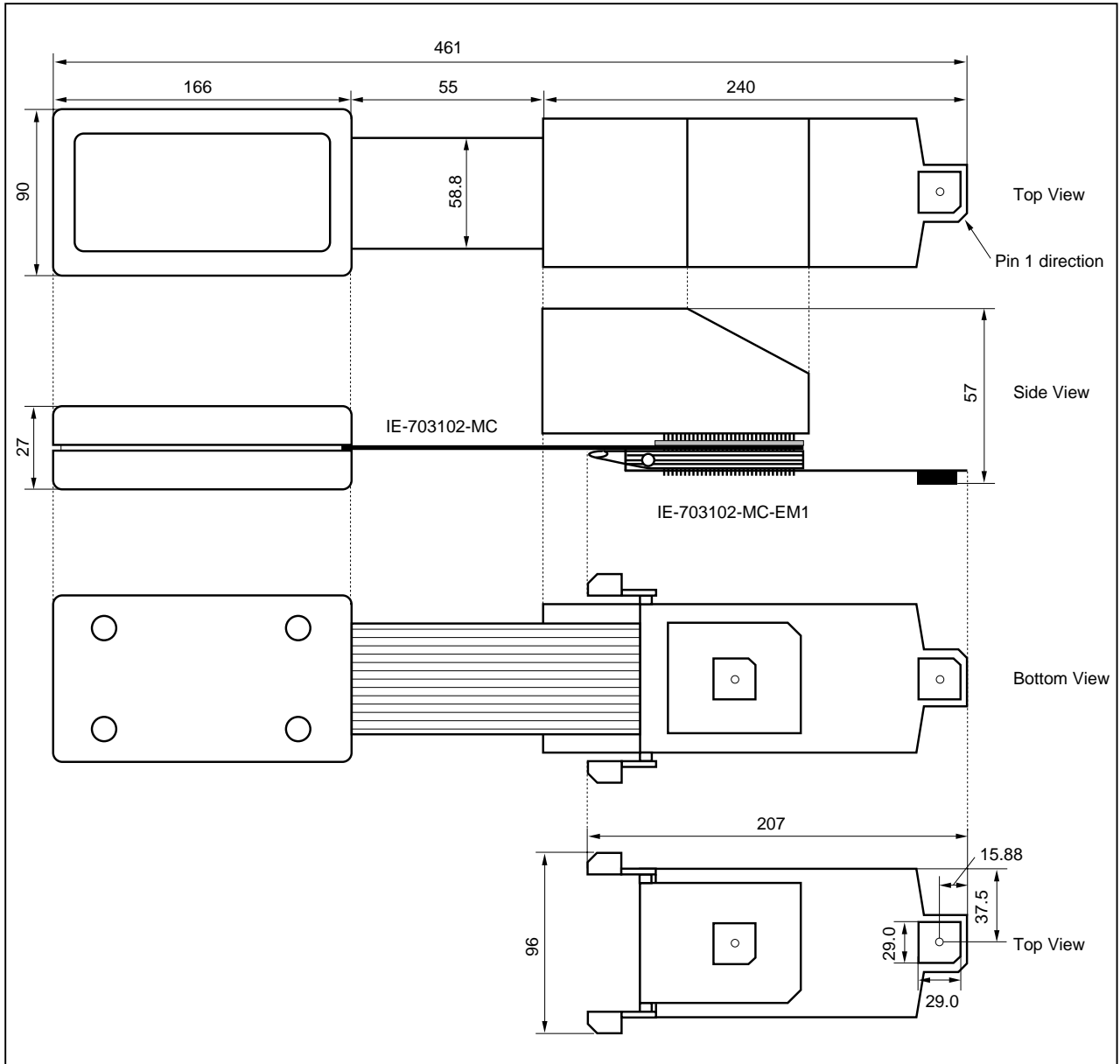
When the area of the DRAM, synchronous flash memory, or page ROM in the target system has been allocated to the emulation memory, the operation timing is the SRAM access timing.

When measuring the performance by using the emulation memory, adjust the setting so that the wait set matches the memory access timing that is actually used.

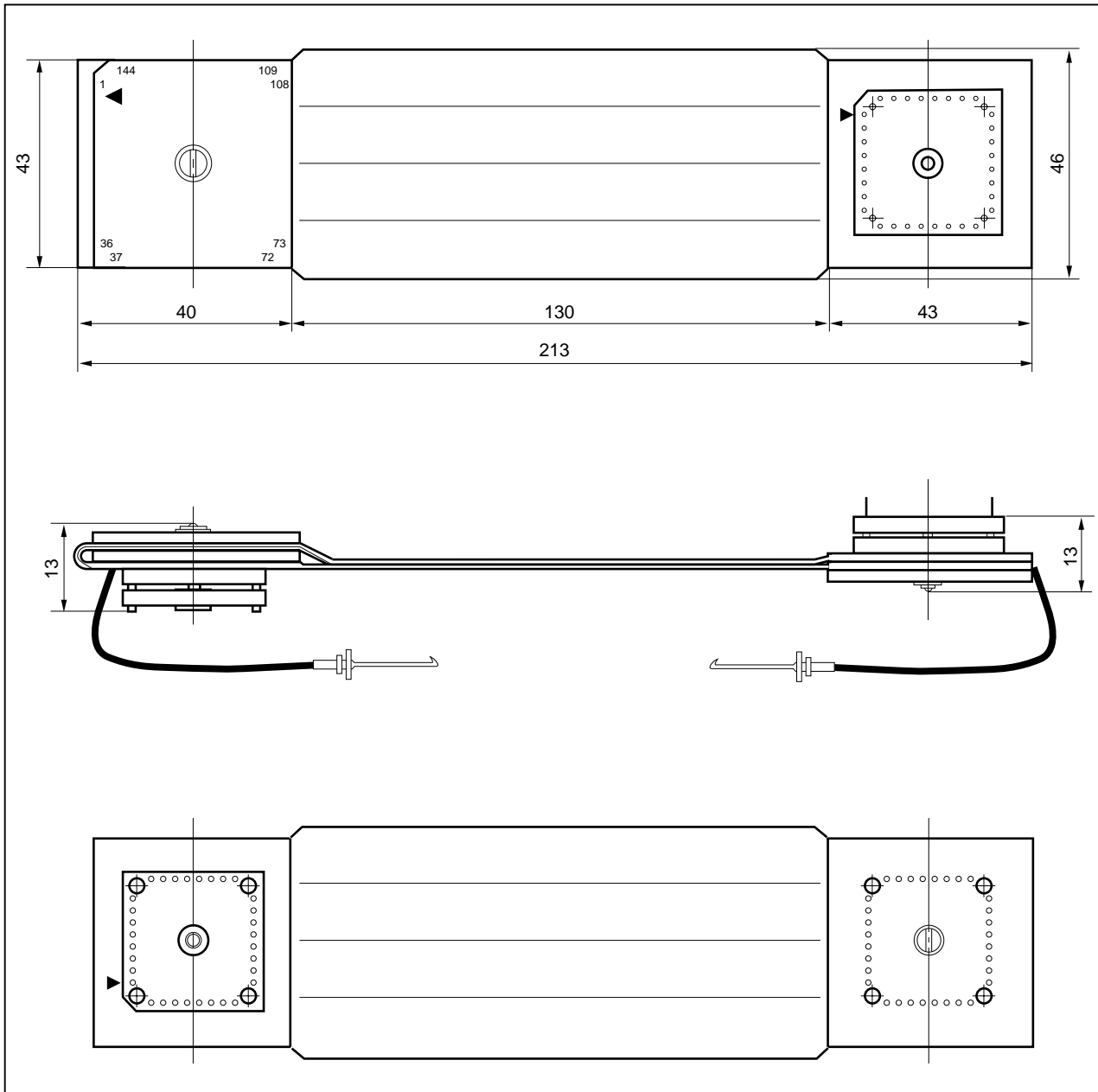
[MEMO]

# APPENDIX A DIMENSIONS

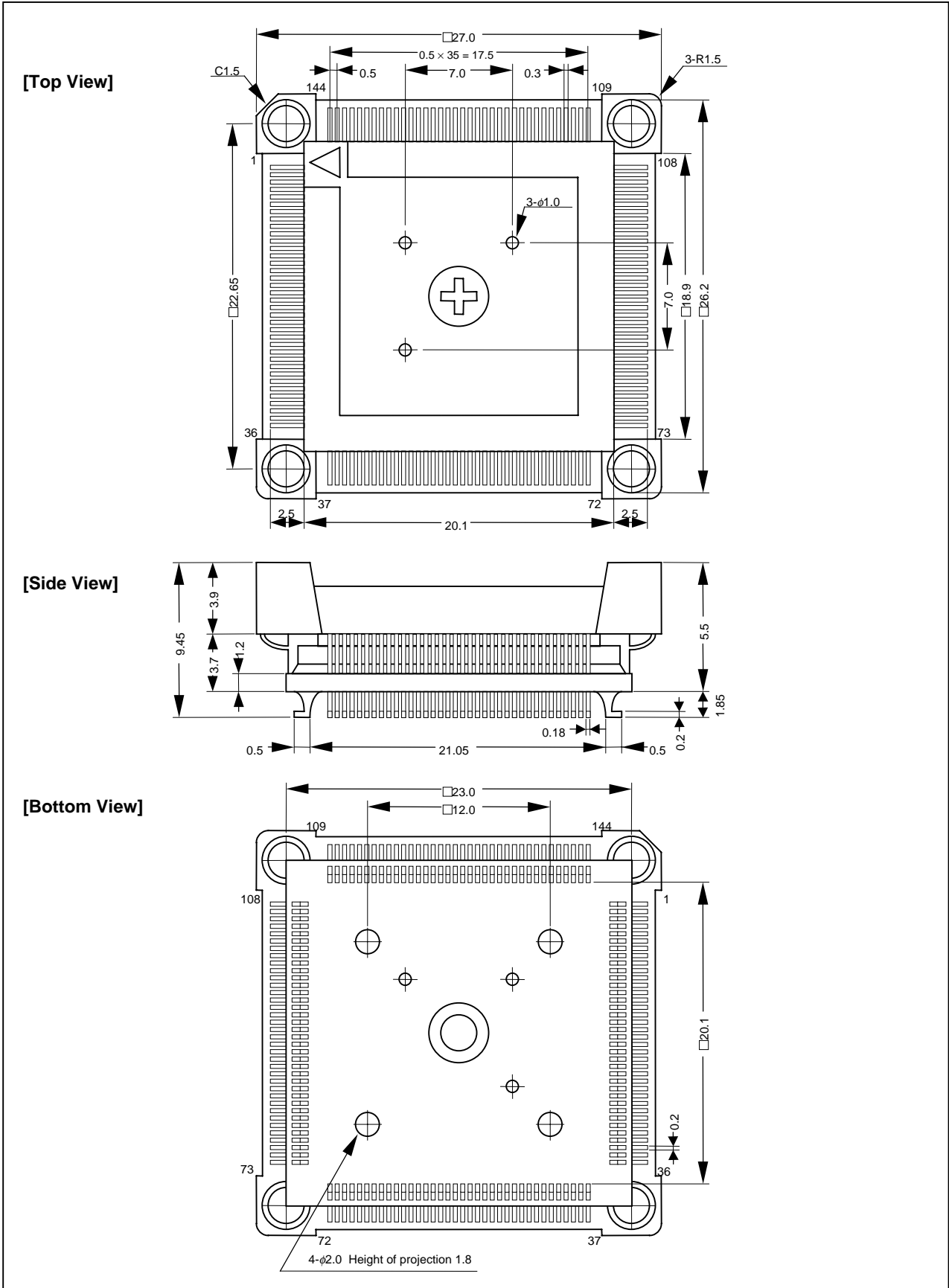
(1) IE-703102-MC + IE-703102-MC-EM1 (Unit: mm)



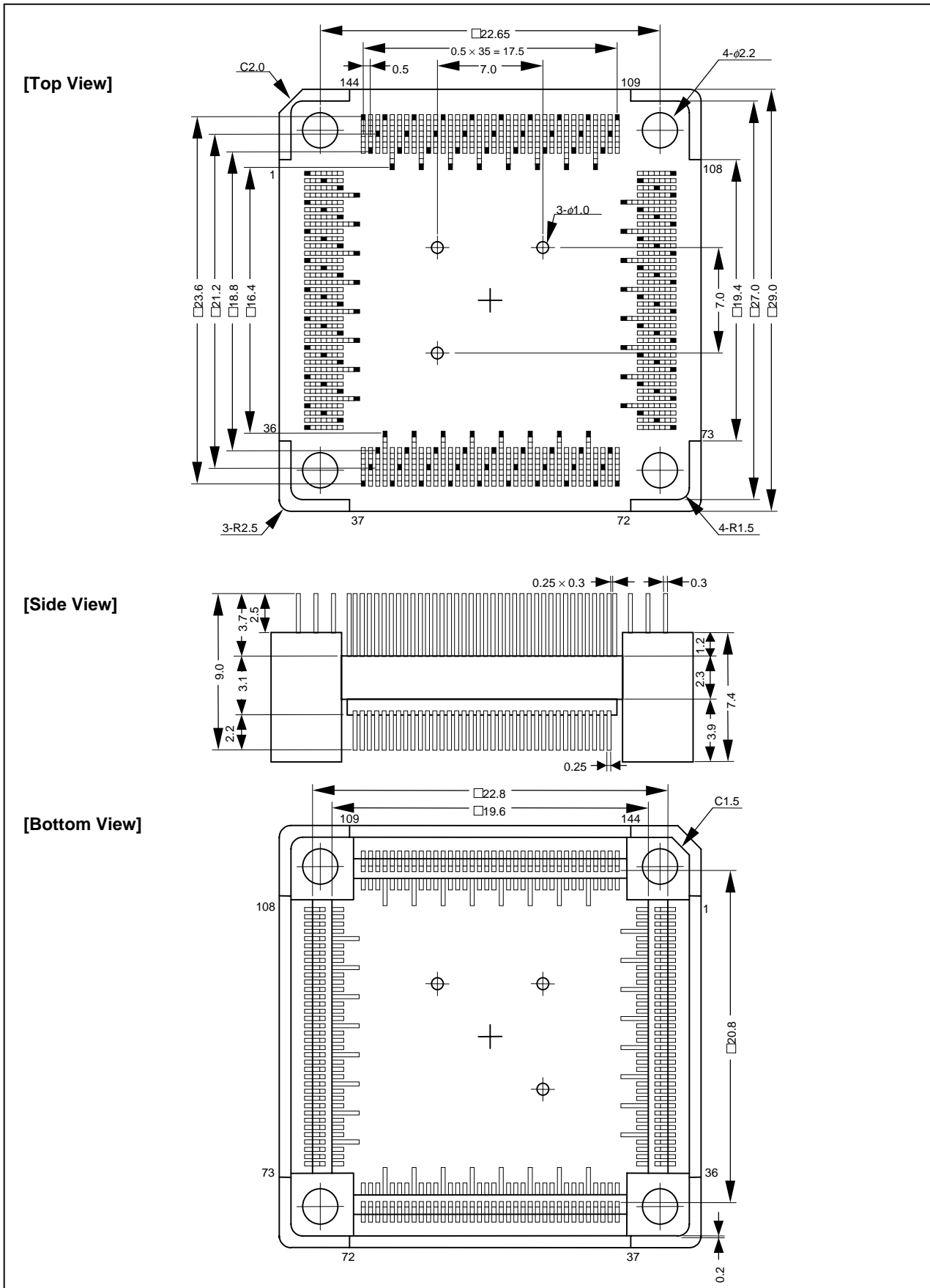
(2) SC-144SD (Unit: mm)



(3) NQPACK144SD (Unit: mm)

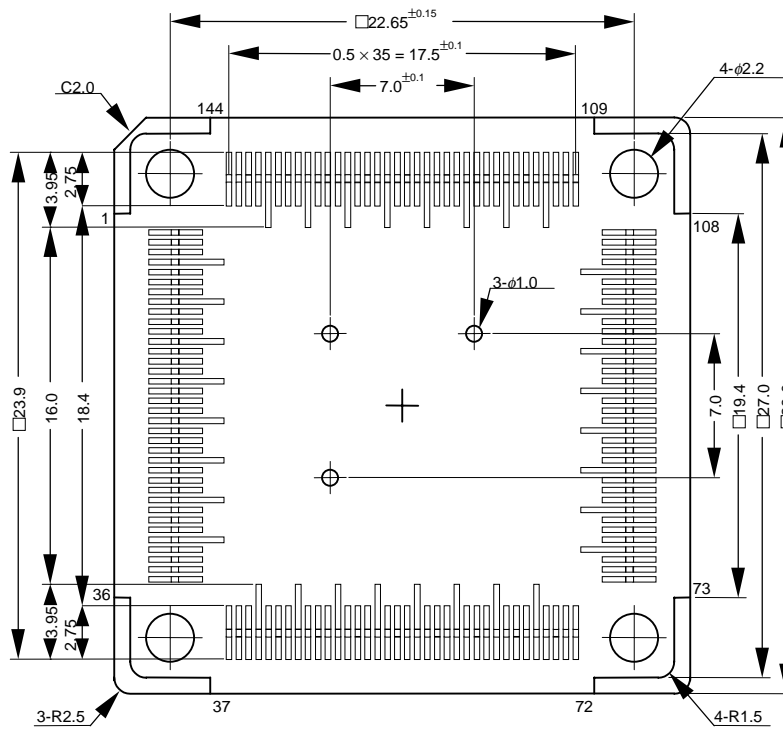


(4) YQPACK144SD (Unit: mm)

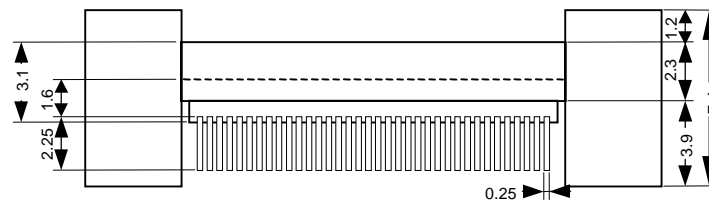


(5) HQPACK144SD (Unit: mm)

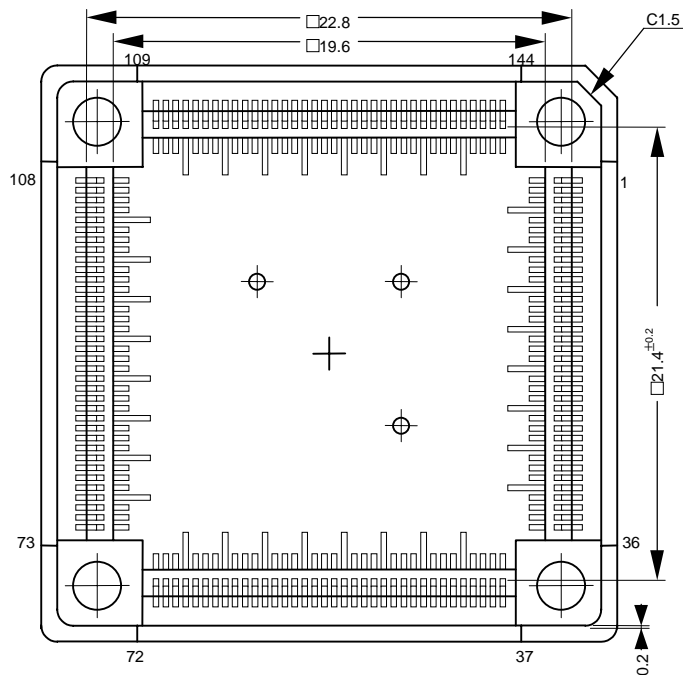
[Top View]



[Side View]



[Bottom View]

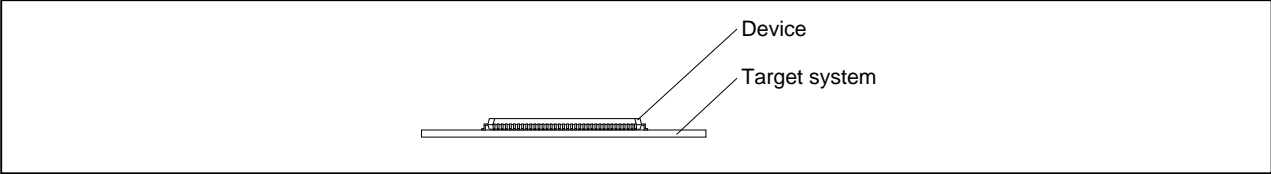


[MEMO]

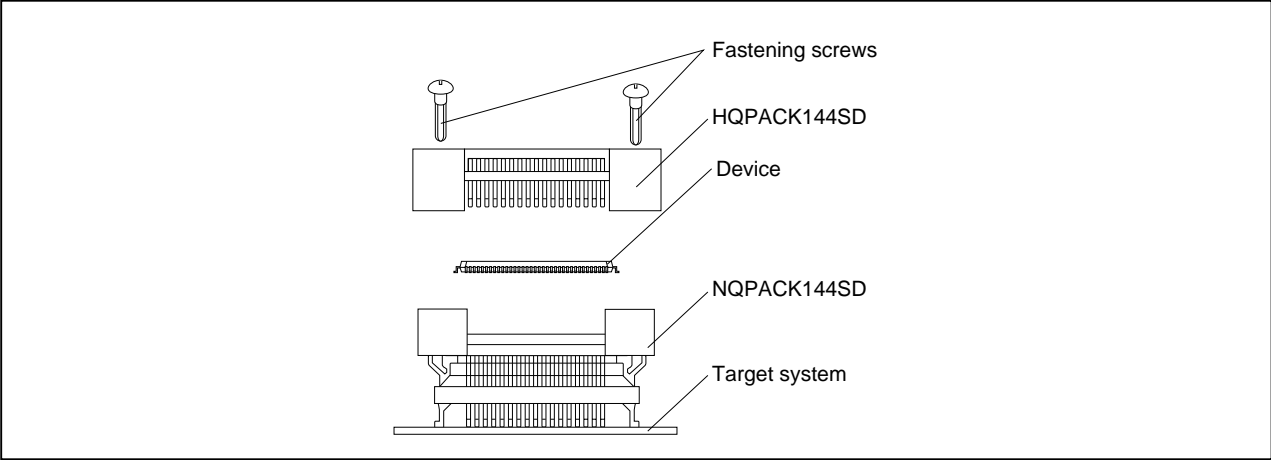


**APPENDIX B EXAMPLE OF USE OF CONNECTOR FOR TARGET CONNECTION**

**(1) When directly connecting device to target system (Connector for target connection is not used)**

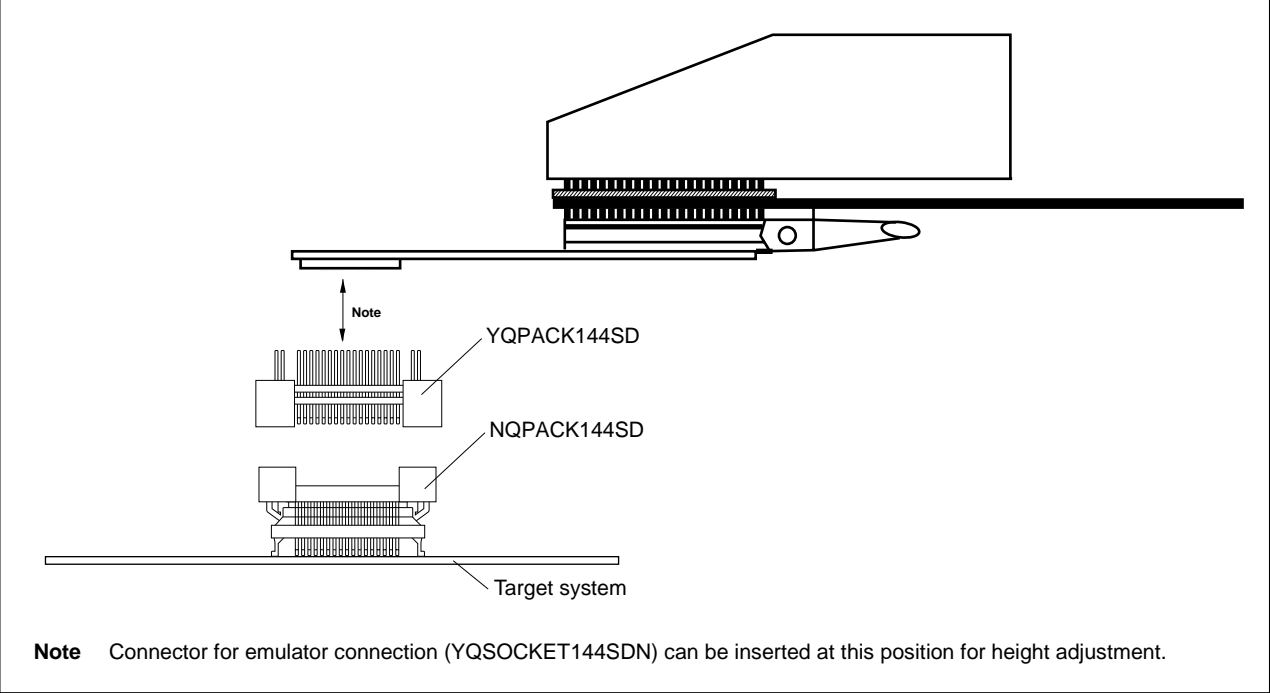


**(2) When equipping device by using connector for target connection**

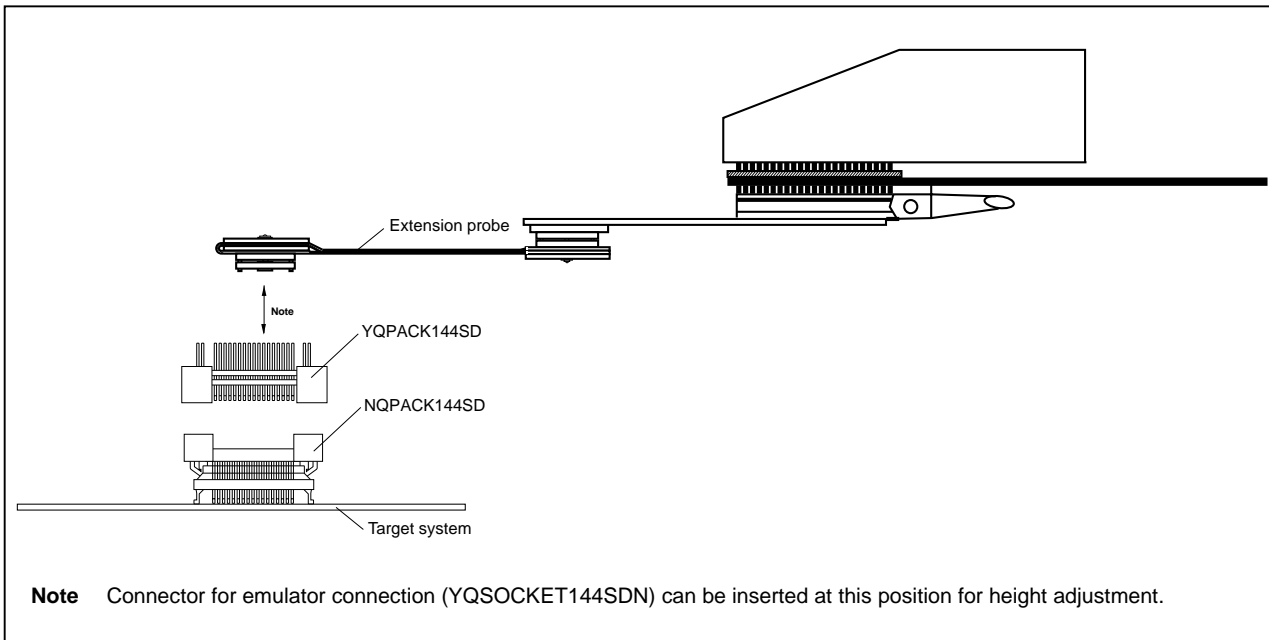


**(3) Connection between emulator and target system**

**(a) When extension probe is not used**



(b) Example of use of extension probe



## APPENDIX C CONNECTORS FOR TARGET CONNECTION

### C.1 Use

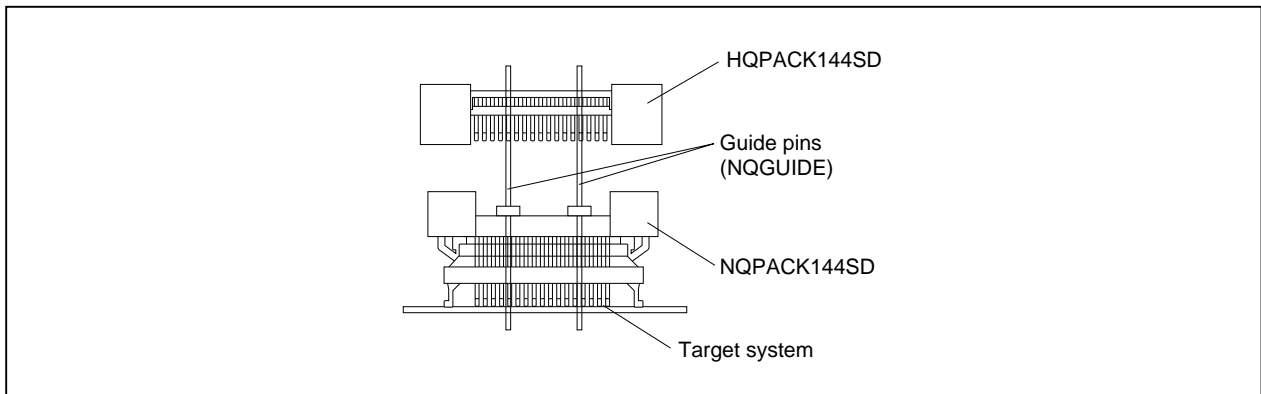
#### (1) When mounting NQPACK144SD to target system

- <1> Coat the tip of four projections (points) at the bottom of the NQPACK144SD with two-component type epoxy adhesive (cure time longer than 30 min.) and bond the NQPACK144SD to the target system. If not bonded properly, the pad of the printed circuit board may peel off when the emulator is removed from the target system. If the lead of the NQPACK144SD does not coincide with the pad of the target system easily, perform step <2> to adjust the position.
- <2> To adjust the position, insert the guide pins for position-adjustment (NQGUIDE) provided with NQPACK144SD into the pin holes at the upper side of NQPACK144SD (refer to **Figure C-1**). The diameter of a hole is  $\phi = 1.0$  mm. There are three non-through holes (refer to **APPENDIX A DIMENSIONS**).
- <3> After setting the HQPACK144SD, solder NQPACK144SD to the target system. By following this sequence, adherence of flux or solder spluttering to contact pins of the NQPACK144SD can be avoided.

Recommended soldering condition... Reflow : 240°C, 20 sec. max.  
Partial heating : 240°C, 10 sec. max. (per pin row)

- <4> Remove the guide pins.

**Figure C-1. Mounting of NQPACK144SD**



**Remark** NQPACK144SD: Connector for target connection  
HQPACK144SD: Cover for device installation

(2) When setting device

**Caution** Check for abnormal conditions such as resin burr or bent pins before setting a device to the NQPACK144SD. Moreover, check that the hold pins of the HQPACK144SD are not broken or bent before setting HQPACK144SD. If there are broken or bent pins, fix them with a thin, flat plate such as a blade.

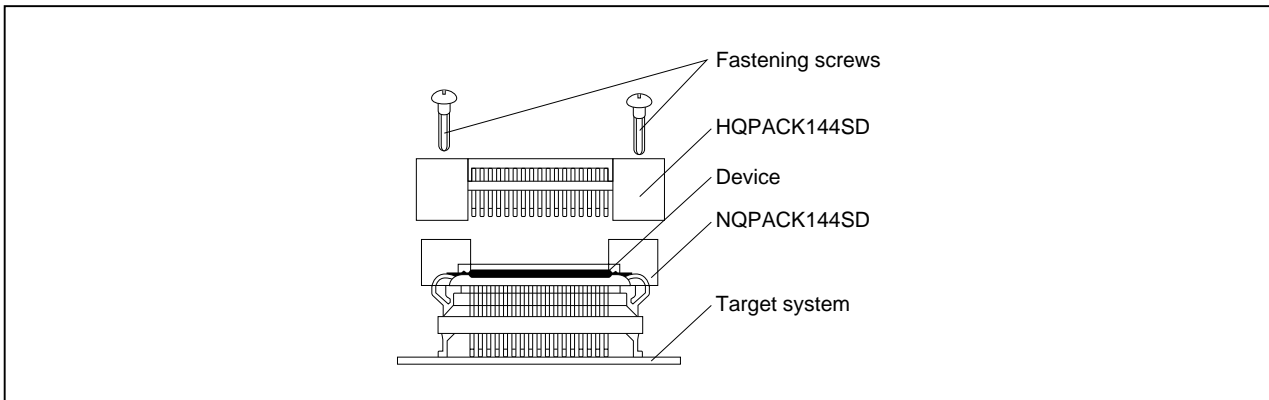
<1> Make sure that the NQPACK144SD is clean and the device pins are parallel (flat) before setting a device to the NQPACK144SD. Then, after mounting the NQPACK144SD to the target board, set the device and HQPACK144SD (refer to **Figure C-2**).

<2> Using the screws provided with the HQPACK144SD (four locations: M2 × 6 mm), secure the HQPACK144SD, device, and NQPACK144SD.

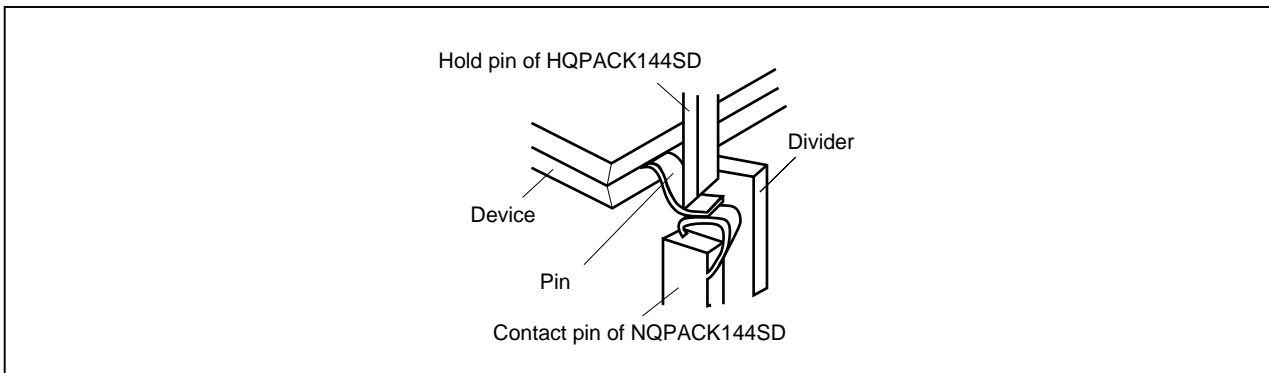
Tighten the screws in a crisscross pattern with the provided screwdriver or driver with torque gauge (avoid tightening strongly only one screw). Tighten the screws with 0.55 kg-f-cm (0.054 N-m) max. torque. Excessive tightening may diminish conductivity.

At this time, each pin is fixed inside the plastic wall dividers by the contact pin of the NQPACK144SD and the hold pin of the HQPACK144SD (refer to **Figure C-3**). Thus, pins cannot cause a short with pins of neighboring devices.

**Figure C-2. Mounting Device**



**Figure C-3. NQPACK100SD and Device Pin**



## C.2 Cautions on Handling Connectors

- (1) When taking connectors out of the case, remove the sponge while holding the main unit.
- (2) When soldering the NQPACK144SD to the target system, cover the HQPACK144SD to protect it against splashing flux.

Recommended soldering conditions... Reflow : 240°C, 20 sec. max.  
Partial heating : 240°C, 10 sec. max. (per pin row)

- (3) Check for abnormal conditions such as resin burr or bent pins before setting a device to the NQPACK144SD. Moreover, check that the hold pins of the HQPACK144SD are not broken or bent before setting HQPACK144SD. If there are broken or bent pins, fix them with a thin, flat plate such as a blade.
- (4) When securing the YQPACK144SD (connector for emulator connection) or HQPACK144SD to the NQPACK144SD with screws, tighten the four screws temporarily with the provided screwdriver or driver with torque gauge, then tighten the screws in a crisscross pattern (with 0.054 N·m max. torque).  
Excessive tightening of only one screw may diminish conductivity.  
If the conductivity is diminished after screw-tightening, stop tightening, remove the screws and check whether the NQPACK144SD is stained and make sure the device pins are parallel.
- (5) Device pins do not have high strength. Repeatedly connecting to the NQPACK144SD may cause pins to bend. When setting a device to the NQPACK144SD, check and adjust bent pins.

[MEMO]

## APPENDIX D MOUNTING OF PLASTIC SPACER

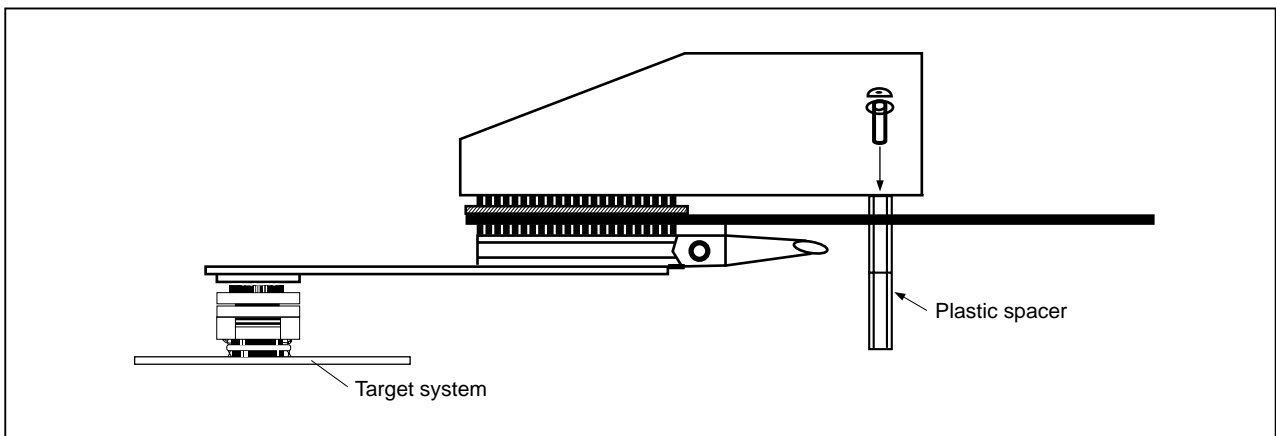
This chapter describes the mounting method for the plastic spacer supplied with the IE-703102-MC.

When using the emulator connected to the target system, mount the plastic spacer as shown in Figure D-1 to fix the pod horizontally.

### (1) Mounting IE-703102-MC to plastic spacer

- <1> Remove the nylon rivet from the rear part of the pod.
- <2> Tighten the plastic spacer with the supplied plastic screw.
- <3> To adjust the height, use a user spacer or stand.

Figure D-1. Mounting Method of Plastic Spacer



[MEMO]



## Facsimile Message

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.

From:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Company

\_\_\_\_\_  
Tel.

\_\_\_\_\_  
FAX

\_\_\_\_\_  
Address

*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

**Asian Nations except Philippines**

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

**Europe**

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

**Korea**

NEC Electronics Hong Kong Ltd.  
Seoul Branch  
Fax: 02-528-4411

**Japan**

NEC Semiconductor Technical Hotline  
Fax: 044-548-7900

**South America**

NEC do Brasil S.A.  
Fax: +55-11-6465-6829

**Taiwan**

NEC Electronics Taiwan Ltd.  
Fax: 02-2719-5951

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical Accuracy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>