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Preliminary User's Manual

IE-703008-MC-EM1

In-Circuit Emulator Option Board

V854™

Document No. U12420EJ1V0UM00 (1st edition)
Date Published July 1997 N

Phase-out/Discontinued

[MEMO]

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- Device availability
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- 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)
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Fax: 800-729-9288

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INTRODUCTION

READERS

This manual is intended for users who design and develop application systems using the V854.

PURPOSE

The purpose of this manual is to describe the proper operations of the IE-703008-MC-EM1 and its basic specifications.

ORGANIZATION

This manual is broadly divided into the following parts:

- Overview
- Nomenclature and function of each part
- Cautions

HOW TO READ THIS MANUAL

This manual assumes readers who have general knowledge of electric engineering, logic circuits, and microcomputers.

The IE-703008-MC-EM1 is used connecting to the IE-703002-MC, that is the in-circuit emulator for the V851™ and V852™. This manual explains the basic setup procedure and switch settings of the IE-703008-MC-EM1 and the IE-703002-MC when they are connected. For the names, functions, and the connection of parts, refer to the separate document **IE-703002-MC User's Manual**.

To learn about the basic specifications and operation methods

→ Read this manual in the order listed in **CONTENTS**.

To learn about the operation methods, command functions, etc., of the IE-703002-MC and IE-703008-MC-EM1

→ Read the user's manual of the debugger (optional) that is used.

LEGEND

Note	:	Describes items noted in text.
Caution	:	Describes points that require special attention.
Remark	:	Provides supplementary remarks to description in text.
Numeral representations	:	Binary ⋯ xxxx or xxxxB
		Decimal ⋯ xxxx
		Hexadecimal ⋯ 0×xxxx or xxxxH

Prefix representing the power of 2 (for address space, memory capacity):

K (kilo) : $2^{10} = 1024$

M (mega) : $2^{20} = 1024^2$

TERMINOLOGY

The meaning of terms used in this manual is 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.

RELATED DOCUMENTS

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

○ **Documents related to V854**

Document	Document Number
V854 User's Manual-Hardware	U11969E
μPD703008 Data Sheet	Planned
μPD70F3008 Data Sheet	Planned
μPD703008Y Data Sheet	Planned
μPD70F3008Y Data Sheet	Planned
V850 Family™ User's Manual-Architecture	U10243E
V850 Family Instruction List	U10229J[Note]

Note This document number is that of Japanese version.

○ **Documents related to development tools (user's manuals)**

Document		Document Number
IE-703002-MC (In-circuit emulator)		U11595E
IE-70000-MC-SV2 (Communication module)		U11781E
IE-70000-MC-IF (Communication module adopter)		U11601E
CA850 (C compiler package)	Operation UNIX™ based	U11013E
	Operation Windows™ based	U11068E
	C language	U11010E
	Assembly language	U10543E
RX850 (Real-time OS)	Basics	U11037E
	Technical	U11117E
	Nucleus installation	U11038E
	Debugger Windows-based	U11158E
AZ850 (System performance analyzer)	Operation	U11181E
ID850 (C source debugger)	Operation Windows-based	Planned
	Operation UNIX-based	Planned
	Installation UNIX-based	Planned

CONTENTS

List of Figures

List of Tables

[MEMO]

CHAPTER 1 OVERVIEW

The IE-703008-MC-EM1 is an optional board for the in-circuit emulator IE-703002-MC for the V851 and V852. By connecting the IE-703008-MC-EM1 and IE-703002-MC, hardware and software can be debugged efficiently in system development using the V854.

This manual describes the basic setup procedure and switch settings of the IE-703008-MC-EM1 and the IE-703002-MC when they are connected. For the names and functions of the parts of the IE-703002-MC, and for the connection of elements, refer to **IE-703002-MC User's Manual**.

1.1 Hardware Configuration

Optional hardware

IE-703002-MC (In-circuit emulator for V851 and V852)

Option board (IE-703008-MC-EM1)	The IE-703002-MC can be used as the in-circuit emulator for the V854 by adding this board.

Optional hardware

Extension probe (SC-144SD[Note])	General-purpose extension probe. Made by TOKYO ELETECH Corporation
PC interface board	This board is used to connect the IE-703002-MC to a personal computer. This board is inserted into the expansion slot of the personal computer.
Network module	The module is used when a workstation controls the IE-703002-MC via Ethernet™. It consists of a communication module (IE-70000-MC-SV2) and a dedicated adapter (IE-70000-MC-IF).
Power adapter	AC adapter dedicated to the IE-703002-MC

Note Contact: Daimaru Kogyo Co., Ltd. Tokyo Electronic Components Department (TEL 03-3820-7112)
Osaka Electronic Components Department (TEL 06-244-6672)

1.2 Features (When Connected to IE-703002-MC)

- Maximum operation frequency: 33 MHz (at 3.3-V operation)
- Extremely light in weight and compact
- Higher equivalence with target devices can be achieved by omitting buffers between signal cables.
- Following pins can be masked.
  $\overline{\text{RESET}}$, NMI, $\overline{\text{WAIT}}$, $\overline{\text{HLDRQ}}$
- Two methods of connection to target systems:
  - Pod tip direct connection (for information on the pod, refer to **IE-703002-MC User's Manual**)
  - Attach an extension probe (optional) to the pod tip for connection.
- Dimensions of the option board (IE-703008-MC-EM1) are as follows.

Parameter		Value
Power dissipation (Max. value at 3.3-V supply voltage)		0.35 W (at 33-MHz operation frequency)[Note]
Outer dimensions (Refer to **APPENDIX DIMENSIONS**)	Height	17 mm
	Width	172 mm
	Depth	96 mm
Weight		145 g

Note 10.35 W when the IE-703002-MC and the IE-703008-MC-EM1 are connected

1.3 Function Specifications (When Connected to IE-703002-MC)

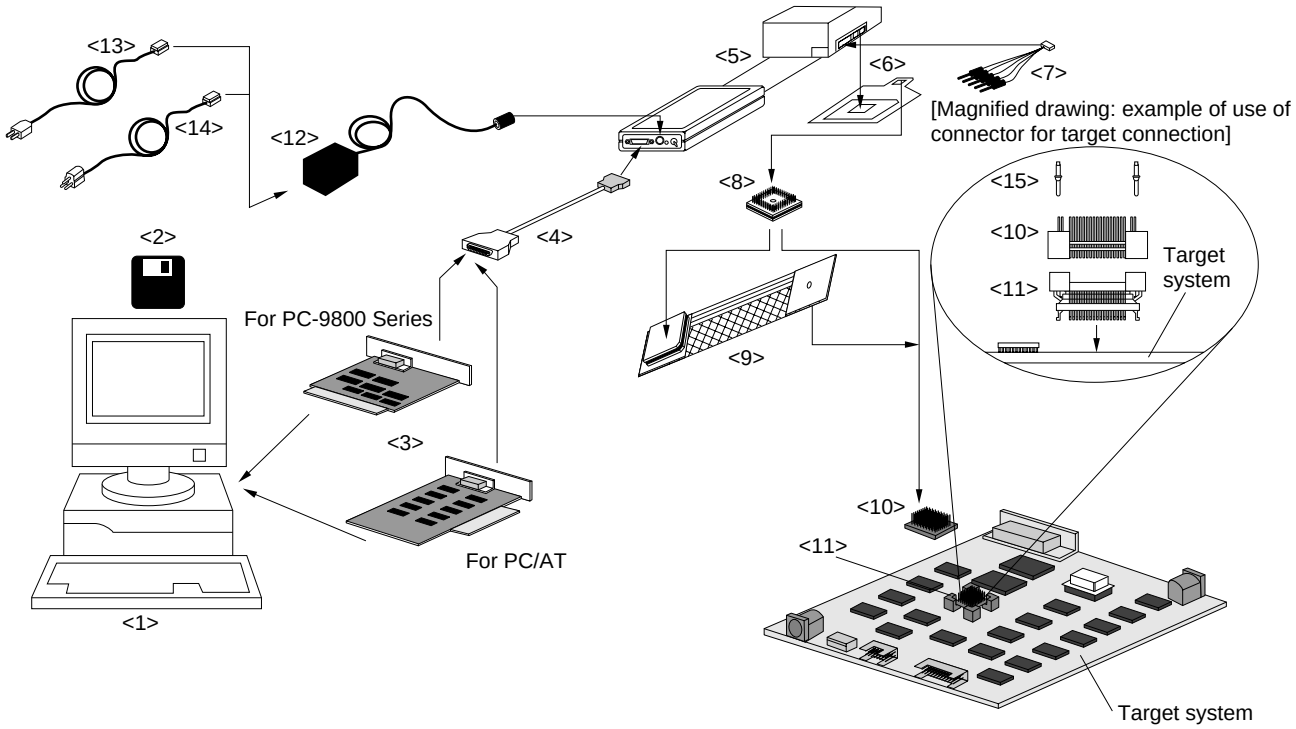
Parameter			Capacity
Emulation memory capacity	Internal ROM		128 Kbytes
	External memory	In ROM-less mode	2 Mbytes
		When using iROM	1 Mbyte
Execution/pass detection coverage memory capacity	Internal ROM		128 Kbytes
	External memory	In ROM-less mode	2 Mbytes
		When using iROM	1 Mbyte
Memory access detection coverage memory capacity (external memory)			1 Mbyte
Coverage memory capacity for branching entry number counting	Internal ROM		128 Kbytes
	External memory	In ROM-less mode	2 Mbytes
		When using iROM	1 Mbyte

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-703008-MC-EM1 to the IE-703002-MC and a personal computer (PC-9800 Series or PC/AT™ (or compatible machine)) is shown below.

Figure 1-1. System Configuration



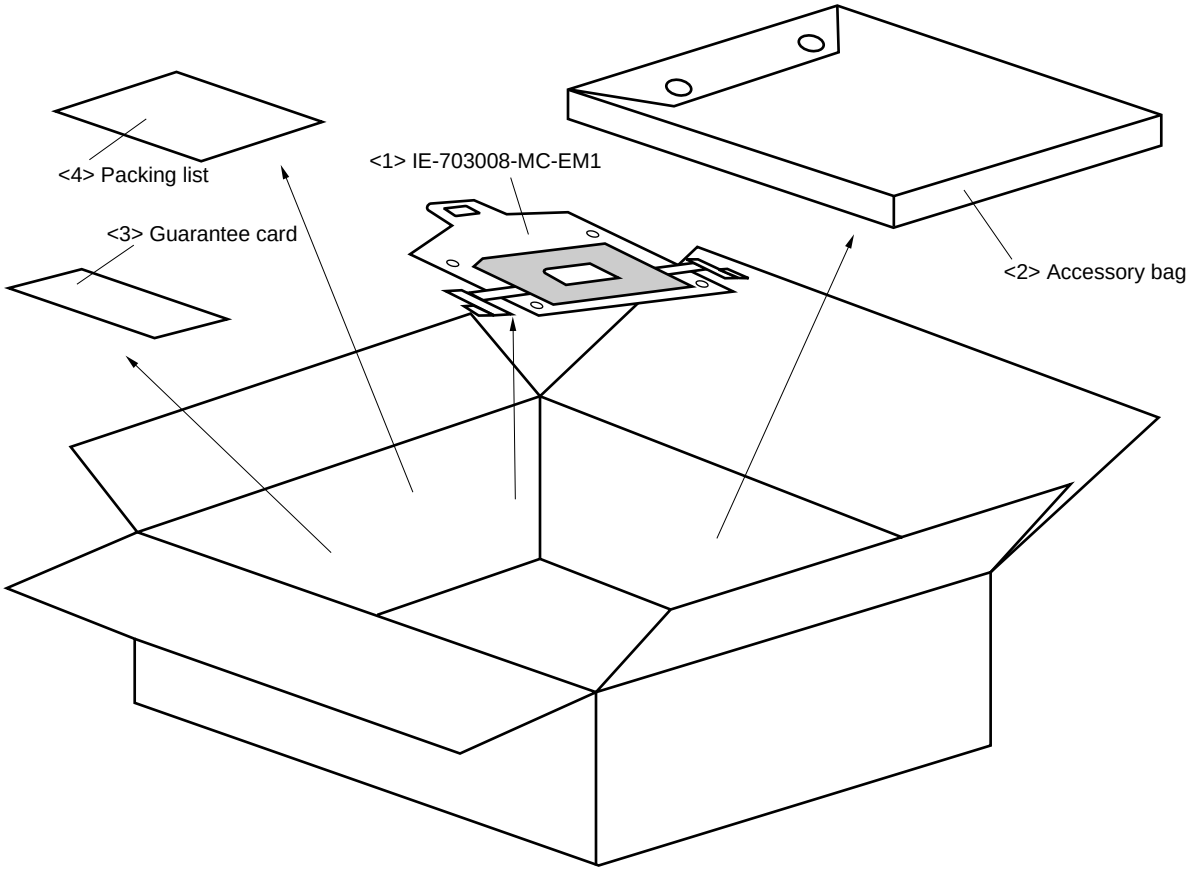
Remark

<1> Personal computer (PC-9800 Series or PC/AT)
<2> Debugger (optional)
<3> PC interface board (IE-70000-98-IF-B, IE-70000-PC-IF-B: optional)
<4> PC interface cable (included with IE-703002-MC)
<5> IE-703002-MC (in-circuit emulator)
<6> IE-703008-MC-EM1 (option board)
<7> External logic probe (included with IE-703002-MC)
<8> Socket for target connection (for protection) (YQSOCKET144SDN: optional)
<9> Extension probe (SC-144SD: optional)
<10> Connector for emulator connection (YQPACK144SD: included)
<11> Connector for target connection (NQPACK144SD: included)
<12> Power adapter (IE-70000-MC-PS-B: optional)
<13> 100-V AC power cable (attachment of optional IE-70000-MC-PS-B)
<14> 220-V AC power cable (attachment of optional IE-70000-MC-PS-B)
<15> Guide screw (YQGUIDE: optional)

1.5 Contents in Carton

The carton of the IE-703008-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, please contact an NEC sales representative or NEC dealer.

Figure 1-2. Contents in Carton

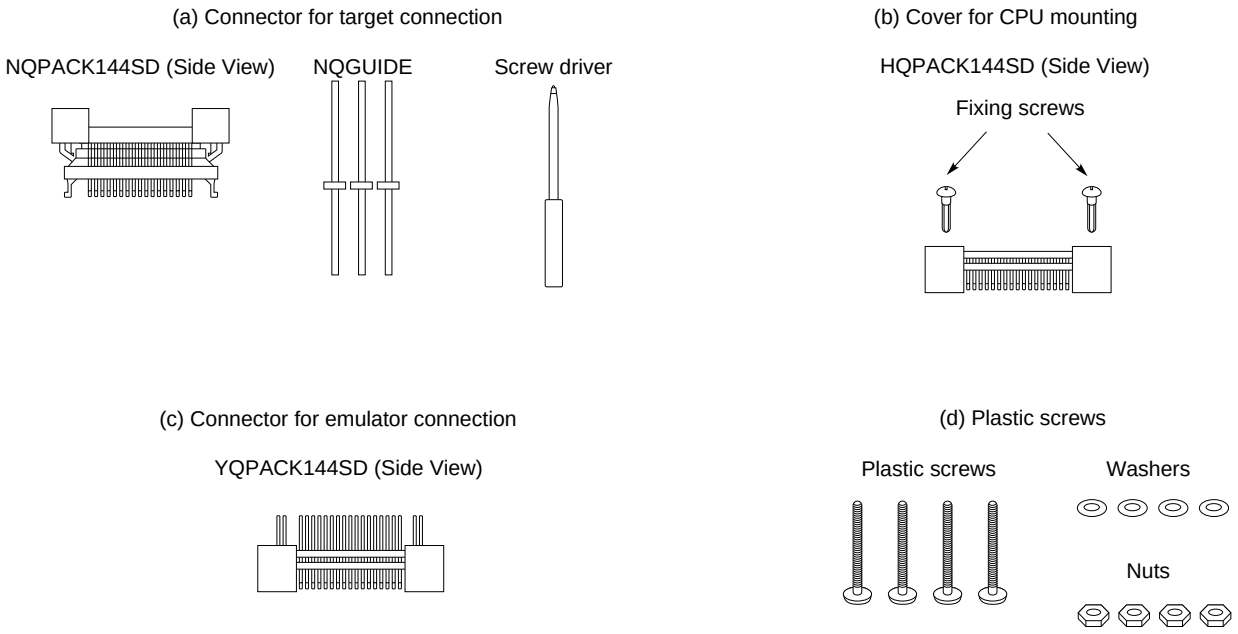


<1> IE-703008-MC-EM1 × 1 pc.
<2> Accessory bag × 1 pc.
<3> Guarantee card × 1 pc.
<4> Packing list × 1 sheet

Check that the accessory bag contains this manual, an accessory list, and the following accessories.

(a) Connector for target connection (NQPACK144SD) × 1 pc.
(including NQGUIDE 3 pcs., screw driver × 1 pc.)
(b) Cover for CPU mounting (HQPACK144SD) × 1 pc.
(including fixing screw × 4 pcs.)
(c) Connector for emulator connection (YQPACK144SD) × 1 pc.
(d) Plastic screw × 4 pcs.
(including nut and washer × 4 sets)

Figure 1-3. Accessories



Caution NQPACK144SD, HQPACK144SD, and YQPACK144SD are assumed products for program development and evaluation for laboratory use.

1.6 Connection between IE-703002-MC and IE-703008-MC-EM1

The procedure for connecting the IE-703002-MC and IE-703008-MC-EM1 is described below.

Caution During connection, be careful not to break or bend connector pins.

<1> Remove the pod cover (upper and lower) of the IE-703002-MC.
<2> Set the PGA socket lever of the IE-703008-MC-EM1 to the OPEN position as shown in Figure 1-4 (b).
<3> Connect the IE-703003-MC-EM1 to the PGA socket at the back of the pod (refer to Figure 1-4 (c)). When connecting, position the IE-703002-MC and IE-703008-MC-EM1 so that they are horizontal.
<4> Set the PGA socket lever of the IE-703008-MC-EM1 to the CLOSE position as shown in Figure 1-4 (b).
<5> Set the jumpers (JP1 to JP4) and switches (SW1 and SW2) of the pod. Open JP1 (remove the jumper contact and attach the removed jumper contact to one of the jumper pins to avoid losing them). Set JP2, and SW1 and SW2 depending on the use. Short the second and third pins of JP4.
<6> Fix the IE-703008-MC-EM1 between the pod covers (upper and lower) with the plastic screws.
<7> Secure the pod cover (upper) end with nylon rivets.

Figure 1-4. Connection between IE-703002-MC and IE-703008-MC-EM1 (1/2)

(a) Overview

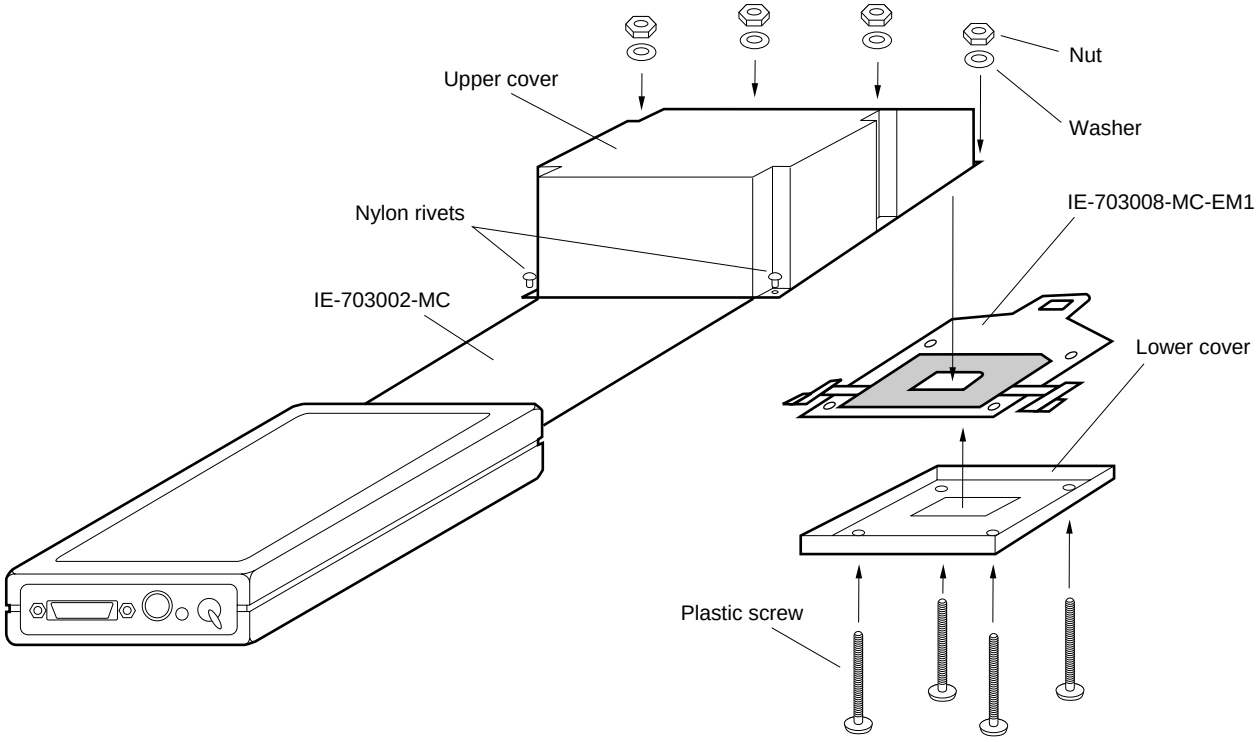
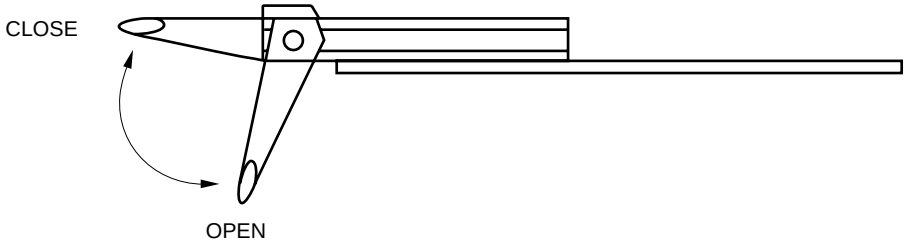
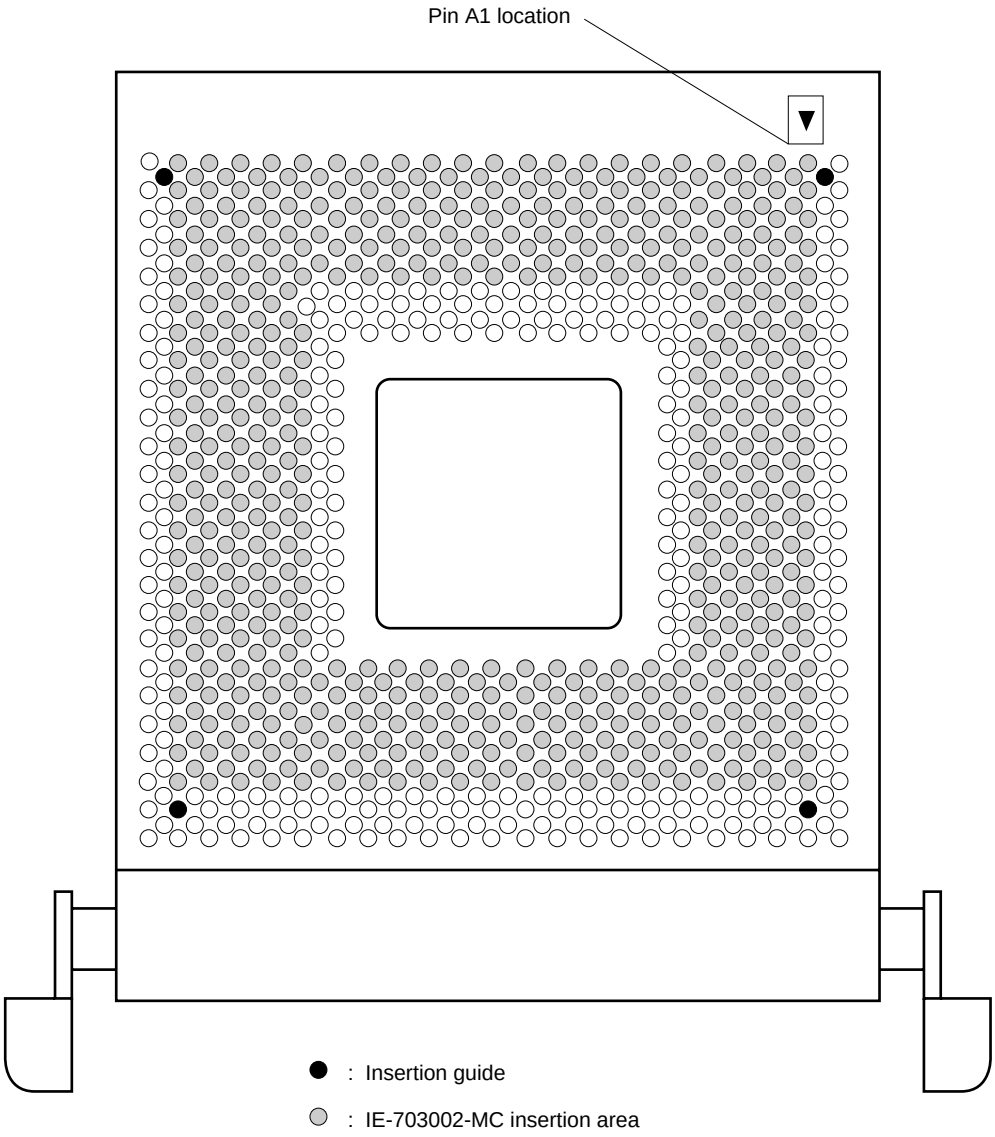


Figure 1-4. Connection between IE-703002-MC and IE-703008-MC-EM1 (2/2)

(b) PGA Socket Lever of IE-703008-MC-EM1



(c) Connecting part (IE-703008-MC-EM1)



Phase-out/Discontinued

[MEMO]

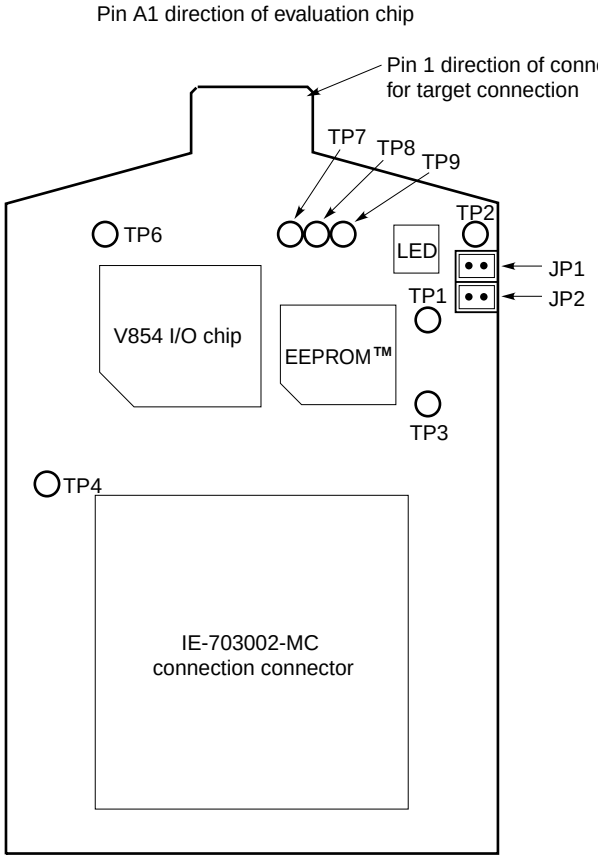
CHAPTER 2 NOMENCLATURE AND FUNCTION OF EACH PART

This chapter explains the nomenclature and function of each part of the IE-703008-MC-EM1 and how to set the switches.

For details about the positions of the pod, jumpers, and switches, refer to **IE-703002-MC User's Manual**.

2.1 Nomenclature and Function of Each Part of the IE-703008-MC-EM1

Figure 2-1. IE-703008-MC-EM1 (Top View)



(1) Test pin

Used for analog testing when emulator is used alone.

- TP1 … V_{DD}
- TP2 … BV_{DD}
- TP3 … 5V
- TP4 … GND
- TP6 … P70 (Analog port)
- TP7 … AV_{REF}
- TP8 … AV_{SS}
- TP9 … AV_{DD}

(2) JP1

Always use shorted

(3) JP2

Changes settings of the CKSEL, PLLSEL, RESET, MODE1, and MODE0 pins.

Short: Setting when target system is connected. (all target pins valid)

Open: Setting when emulator is used alone. (all target pin settings invalid)

(4) LED

LED of V_{PP}

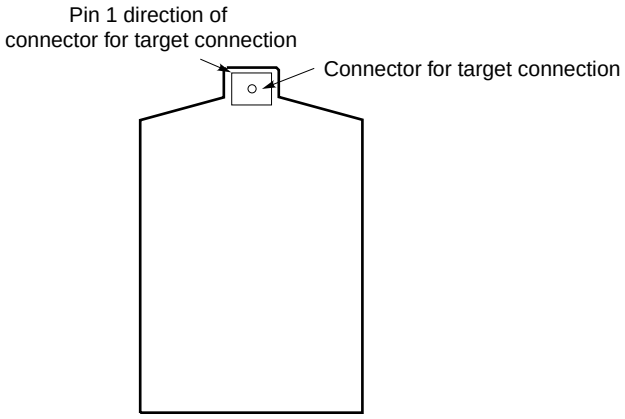
ON: On (voltage is applied to V_{PP})

OFF: Off (voltage is not applied to V_{PP})

(5) IE-703002-MC connection connector

Connector connected to the IE-703002-MC main unit.

Figure 2-2. IE-703008-MC-EM1 (Bottom View)



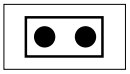
(6) Connector for target connection

Connector used to connect target system or extension probe

2.1.1 Setting at shipping (IE-703008-MC-EM1)

Table 2-1 shows the jumper setting of the IE-703008-MC-EM1 at shipping.

Table 2-1. Jumper Setting at Shipping (IE-703008-MC-EM1)

	Settings	
JP1	 Shorted	Always shorted
JP2		Settings of the CKSEL, PLLSEL, RESET, MODE0, and MODE1 of the target system are valid

2.2 Clock Setting

The following two tables show the clock setting. For the switch positions of the IE-703002-MC, refer to **IE-703002-MC User's Manual**. For the jumper positions of the IE-703008-MC-EM1, refer to Figure 2-1.

Table 2-2. Clock Setting (when emulator is used alone)

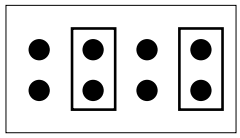
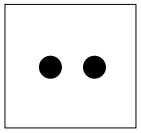
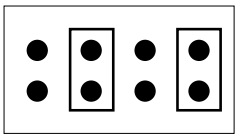
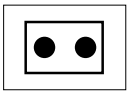
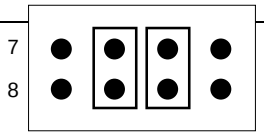
Clock Supply Source Setting				Clock Mode Setting		
Clock Supply Method			IE-703002-MC setting (pod)	IE-703002-MC setting (pod)		IE-703008-MC-EM1 setting
			JP2 setting	SW1 setting (PLLSEL setting)	SW2 setting (CKSEL setting)	JP2 setting
Internal clock	PLL mode	Input clock × 5		ON	OFF	
		Input clock × 1		OFF	OFF	
	Direct mode (input clock × 1/2)			don't care	ON	Open

Table 2-3. Clock Setting (when target system is connected)

Clock Supply Source Setting				Clock Mode Setting				
Clock Supply Method			IE-703002-MC setting (pod)	IE-703002-MC setting (pod)				IE-703008-MC-EM1 setting
			JP2 setting	PLLSEL setting		CKSEL setting		JP2 setting
				SW1	Target	SW2	Target	
Internal clock	PLL mode	Input clock × 5		ON	H	OFF	L	
		Input clock × 1		OFF	L	OFF	L	Shorted
	Direct mode (input clock × 1/2)			don't care	don't care	ON	H	
Target clock	PLL mode	Input clock × 5		ON	H	OFF	L	
		Input clock × 1		OFF	L	OFF	L	
	Direct mode (input clock × 1/2)			don't care	don't care	ON	H	

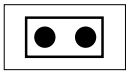
2.3 MODE Pin Setting

By setting the MODE pins, CLKOUT output enable/disable can be set.

2.3.1 Setting when target system is connected

When a target system is connected, the operation of the IE-703008-MC-EM1 becomes as follows according to the MODE pin setting of the target system (basically same mode to the V854).

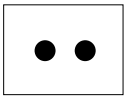
Table 2-4. MODE Pin Setting (when target system is connected)

Emulator Operation	Target System Setting		JP2 Setting
	MODE1	MODE0	
CLKOUT output enable with ROM-less mode 1	L	L	 Shorted
CLKOUT output enable with ROM-less mode 2	L	H	
CLKOUT output disable with single-chip mode 1	H	L	
CLKOUT output enable with single-chip mode 2	H	H	

2.3.2 Setting when emulator is used alone

When the emulator is used alone, the MODE1 and MODE0 settings inside the IE-703008-MC-EM1 are as follows (they cannot be changed).

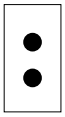
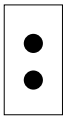
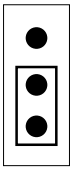
Table 2-5. MODE Pin Setting (when emulator is used alone)

Emulator Operation	Setting into Emulator			JP2 Setting
	MODE1	MODE0	CLKOUT, control signal	
CLKOUT output enable with single-chip mode	H	H	Output setting	 Open

2.4 JP1, JP3, JP4 Setting

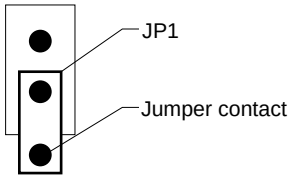
When the IE-703002-MC is used as the in-circuit emulator for the V854, set the jumpers (JP1, JP3, JP4) as follows. For the jumper positions of the IE-703002-MC, refer to **IE-703002-MC User's Manual**.

Table 2-6. JP1, JP3, JP4 Setting

Jumper	Setting		
JP1 Notes 1, 2	Open		Access illegal access detection ROM for V854 (ROM on option board)
JP3 Notes 1, 3	Open		Setting when used with operating voltage range of the IE-703008-MC-EM1 between 2 to 3.6 V
JP4 Note 3	2 to 3 shorted		Setting when power voltage of the target system is 2 V or higher and lower than 4.5 V (since the operating voltage of V854 is 2 to 3.6 V, retain this setting)

Notes 1. Differs from factory-set status

2. Keep the removed jumper contact attached to one pin of JP1 as shown in the drawing below.



3. By setting JP3 and JP4, the IE-703002-MC operates in the same voltage as the target system when the power supply of the target system is ON.
When the power supply of the target system is OFF, or the IE-703008-MC-EM1 is operated alone, always operates at 3.3 V.

CHAPTER 3 CAUTIONS

3.1 Internal RAM and ROM

Because the internal RAM (iRAM) and internal ROM (iROM) capacity of the IE-703002-MC are set in steps, the memory capacity is different from that of the target device. If an access is performed to addresses that exceed the target device capacity, the memory of the IE-703002-MC is accessed. Memory capacities are as follows.

Table 3-1. Memory Capacity Limitation List

(a) iRAM capacity (Unit: byte)

Target device	IE-703002-MC
1 K	1 K
2 K	2 K
3 K	3 K
4 K (V854)	4 K
5 K to 6 K	6 K
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

(b) iROM emulation memory capacity (Unit: byte)

Target device	IE-703002-MC (Emulation memory)
1 K to 32 K	32 K
33 K to 64 K	64 K
65 K to 128 K (V854)	128 K
129 K to 256 K	256 K
257 K to 512 K	512 K
513 K to 1024 K	512 K

Remark The IE-703002-MC incorporates 512 Kbytes of iROM emulation memory.

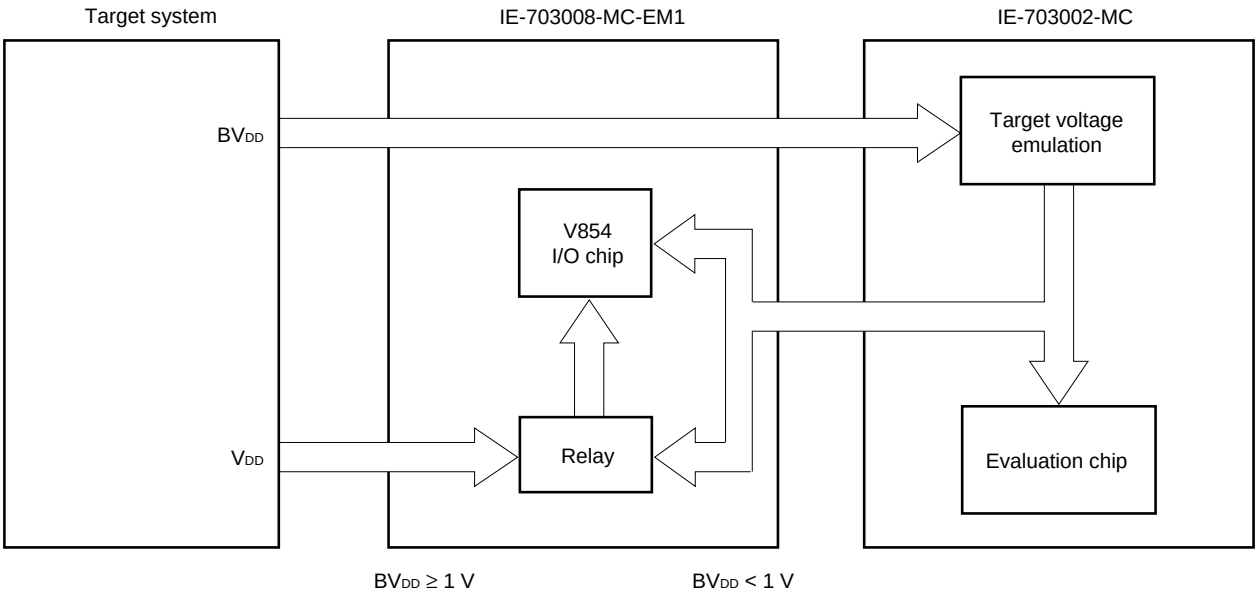
3.2 Target System V_{DD} and BV_{DD}

BV_{DD} of the target system does not connect to BV_{DD} of the evaluation chip of the IE-703002-MC. The IE-703002-MC uses the BV_{DD} (pins No. 1, 36) of the system for the following purposes:

- Power ON/OFF detection of target system
- Power supply voltage emulation of target voltage

When the supply voltage of the target system is 1 V or more, the target system supplies the supply voltage to the evaluation chip of the IE-703002-MC (the consumption current is equal to that of the μPD70F3008). When the supply voltage of the target system is less than 1 V, the IE-703002-MC judges the power supply is OFF and operates at 3.3 V.

Figure 3-1. Schematic Diagram of Power Supply

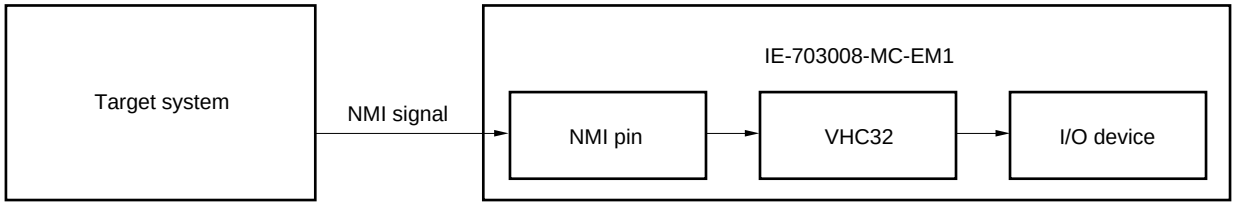


3.3 NMI Signal

The NMI signal from the target system is delayed because it passes through VHC32 before being input into the IE-703008-MC-EM1. ($t_{pLH} = t_{pHL}$ = 8 ns (TYP.))

Moreover, DC characteristics are changed to input voltage $V_{IH} = 0.7V_{DD}$ (MIN.), $V_{IL} = 0.3V_{DD}$ (MAX.), input current $I_{IN} = \pm 1.0\ \mu A$ (MAX.).

Figure 3-2. NMI Signal Flow Path

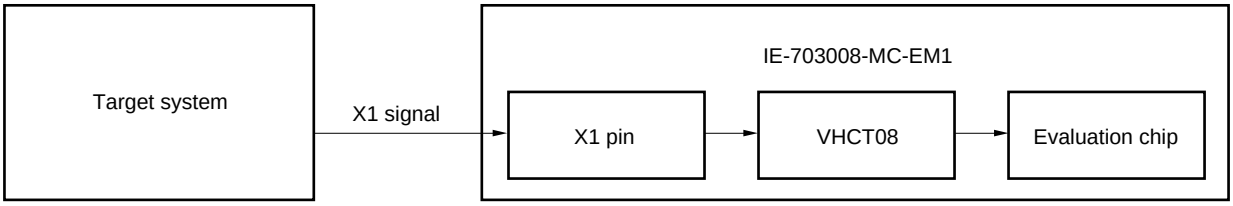


3.4 X1 Signal

The X1 signal from the target system is delayed because it passes through VHCT08 before being input into the evaluation chip of the IE-703008-MC-EM1. (t_{pLH} = 8 ns (MAX.), t_{pHL} = 9 ns (MAX.))

Moreover, DC characteristics are changed to input voltage V_{IH} = 2.0 V (MIN.), V_{IL} = 0.8 V (MAX.), input current I_{IN} = ±1.0 μA (MAX.).

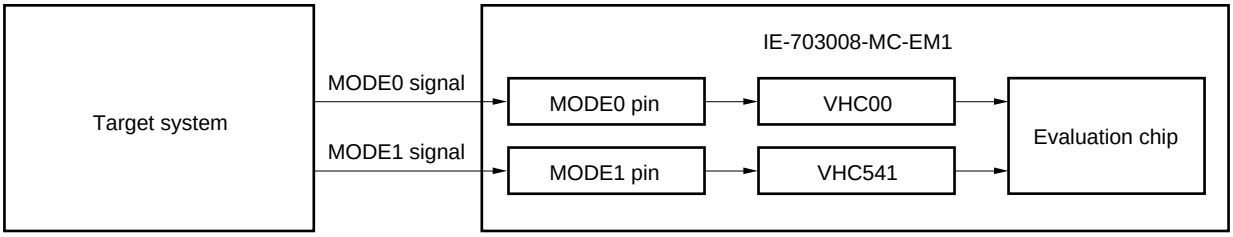
Figure 3-3. X1 Signal Flow Path



3.5 MODE Signal

The MODE0 signal from the target system passes through VHC00 before being input to the evaluation chip of the IE-703008-MC-EM1. Moreover, the MODE1 signal passes through VHC541. Therefore, DC characteristics are changed to input voltage V_{IH} = 2.1 V (MIN.), V_{IL} = 0.5 V (MAX.), input current I_{IN} = ±1.0 μA (MAX.).

Figure 3-4. MODE Signal Flow Path



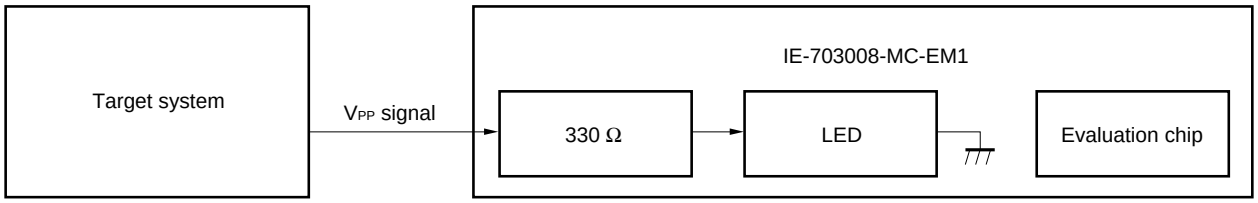
When the emulator is operated alone, the MODE0 pin is terminated by a resistor so that the single-chip mode 2 is selected.

- MODE0: 5.1 kΩ pull-up
- MODE1: 5.1 kΩ pull-up

3.6 V_{PP} Signal

The V_{PP} signal from the target system is connected to LEDs via a 330-Ω resistor inside the IE-703008-MC-EM1. The V_{PP} signal is not connected to the evaluation chip of the IE-703008-MC-EM1.

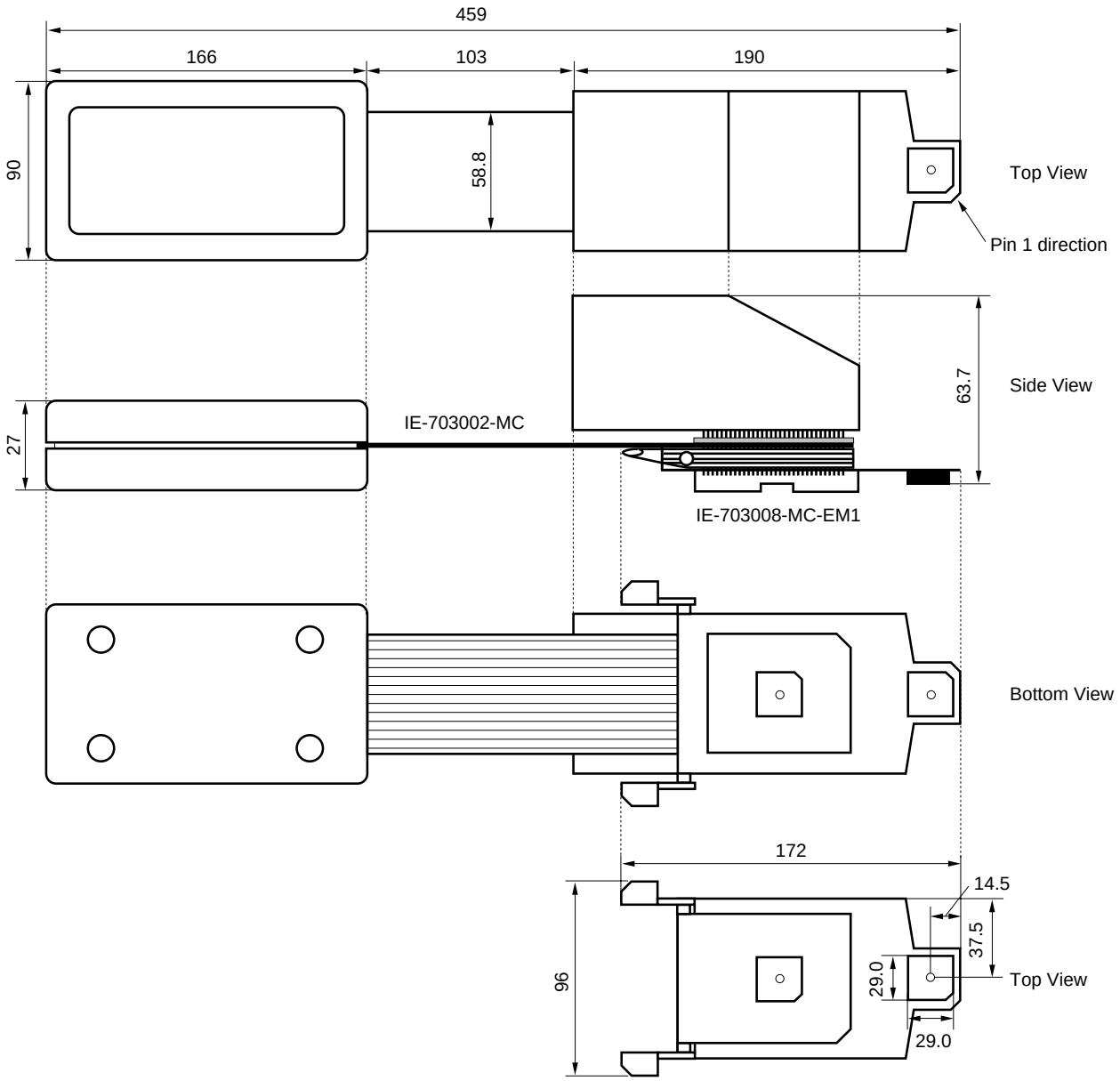
Figure 3-5. V_{PP} Signal Flow Path



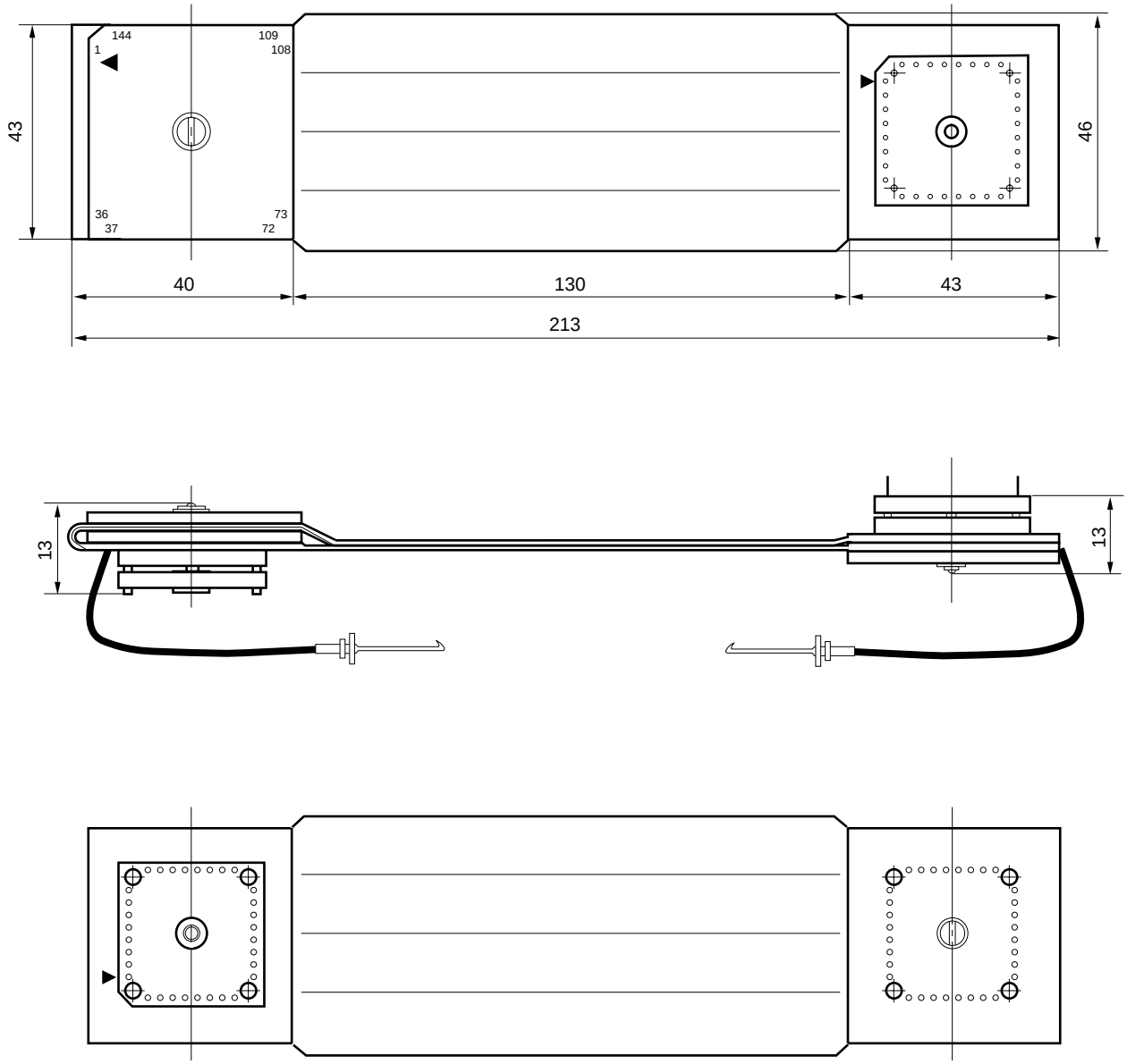
Phase-out/Discontinued

APPENDIX DIMENSIONS

IE-703002-MC + IE-703008-MC-EM1 (Unit: mm)



SC-144SD (Unit: mm)



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