

LICE8L-HARD-1E

# **F<sup>2</sup>MC-8L Family Compact Emulator**

# **Hardware Manual**



# PREFACE

## ■ Manual Objectives

The Compact Emulator is the development support tool for development and evaluation of applications based on the F<sup>2</sup>MC-8L family.

The user to develop and evaluate applications based on the F<sup>2</sup>MC-8L family.

## ■ Manual Readers

This manual describes handling and connecting the Compact Emulator for engineers who will develop applications based on the F<sup>2</sup>MC-8L family using the Compact Emulator.

## ■ Composition of Manual

Read this manual before operating Compact Emulator.

This manual has four chapters.

### Chapter 1 Product Handling

This chapter describes the configuration and handling of the Compact Emulator emulation unit.

### Chapter 2 Product Description

This chapter describes the hardware configuration, the names of components, and specifications for the Compact Emulator unit.

### Chapter 3 Settings and Connections

This chapter describes various settings and connections of the Compact Emulator unit before power-on.

### Chapter 4 Hardware

This chapter the power-on/-off sequence for the Compact Emulator unit and the correspondence between the probe cable and evaluation MCU.

## How To Read This Manual

### ■ Page Construction

Each section in this manual is made up of one page or double-spread pages, so that you can look at the contents of the section without turning pages. Also, the summary under the title in each section will help you understand the section outline.

The construction of spread pages is shown below.

### ■ Spread Pages

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# CHAPTER 1 PRODUCT HANDLING

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This chapter describes the configuration and handling of the Compact Emulator unit.

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1.1 Checking Accessories

1.2 Options

1.3 Precautions in Use

## 1.1 Checking Accessories

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Before operating the Compact Emulator unit, check the accessories.

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### ■ Checking Accessories

Before operating the Compact emulation unit (hereafter called the emulation unit), check the following accessories.

- Compact Emulator unit ..... 1
- DIP-28P Probe Cable ..... 1
- F<sup>2</sup>MC - 8L Family Compact Emulator Hardware Manual ..... 1
- F<sup>2</sup>MC - 8L Family Compact Emulator, Emulator/Debugger  
MS-Windows Version Manual ..... 1



## 1.2 Options

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The Compact Emulator unit requires the following various options in Tables 1-1 and 1-2. The user should buy them separately as needed.

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### ■ Options

The Compact Emulator unit does not operate by itself. It requires an emulator debugger, probe cable, and evaluation MCU.

The user should buy the options in Table 1-1 separately as needed.

**Table 1-1 Options**

<b>Name</b>	<b>Model number</b>
Emulator debugger	—
Probe cable* <sup>1</sup>	MSE-2144-xxx
Evaluation MCU* <sup>2</sup>	MB89PVxxx
RS-232C cable (modem cable)* <sup>3</sup>	—

\*1: The model number varies with each package (see Table 1-2).

\*2: The F<sup>2</sup>MC-8L evaluation MCU must be capable of working with the user system.

\*3: Prepare separately the cable compatible to your personal computer.

**Table 1-2 Probe Cable**

<b>Name</b>	<b>Model number</b>
DIP-28 probe cable	MSE-2144-201
LCC-32A probe cable	MSE-2144-202
LCC-32B probe cable	MSE-2144-203

## 1.3 Precautions in Use

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Follow the precautions in using the Compact Emulator:

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### ■ Precautions in Use

Follow the precautions below in using the Compact Emulator:

- Turn off the power in connecting or disconnecting various cables.
- Disconnect cables with the case and connector held.
- To prevent electrostatic breakage, do not touch your fingers or any object to connecting pins such as cables.
- Do not block up vent holes.
- Set and use the emulator according to this manual.

### ■ Storage

Follow the precautions below in storing the Compact Emulator:

- Do not give any shock to the Compact Emulator.
- Keep the emulator free from direct sunlight, high temperature and humidity, and dew condensation.
- The Compact Emulator uses many electronic components and should never be stored for many hours in a place under electric or magnetic fields.

Table 1-3 indicate temperature and humidity in operation and storage.

**Table 1-3 Operating and Storage Environment**

	<b>Temperature</b>	<b>Humidity</b>
Operation	0 to 35°C	30 to 80% (no dew condensation)
Storage	-20 to 70°C	20 to 90% (no dew condensation)

# CHAPTER 2 PRODUCT DESCRIPTION

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This chapter describes the hardware configuration, the names of components, and specifications for the emulation unit.

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- 2.1 Hardware Configuration
- 2.2 External Views and Names of Components
- 2.3 Specifications for Compact Emulator Unit
- 2.4 Specifications for Probe Cable (DIP-28P)
- 2.5 Specifications for RS-232C

## 2.1 Hardware Configuration

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The Compact Emulator unit can be connected to the evaluation unit provided for each MCU, the probe cable, and the communication to build up the development support system compatible to the F<sup>2</sup>MC-8L family.

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### ■ System Configuration

The Compact Emulator unit can be connected to the evaluation unit provided for each MCU, the probe cable, and the communication to build up the development support system compatible to the F<sup>2</sup>MC-8L family.

When the host machine is connected to the emulation unit, the emulation unit will receive control from the host machine.

Figure 2.1 shows a hardware configuration.

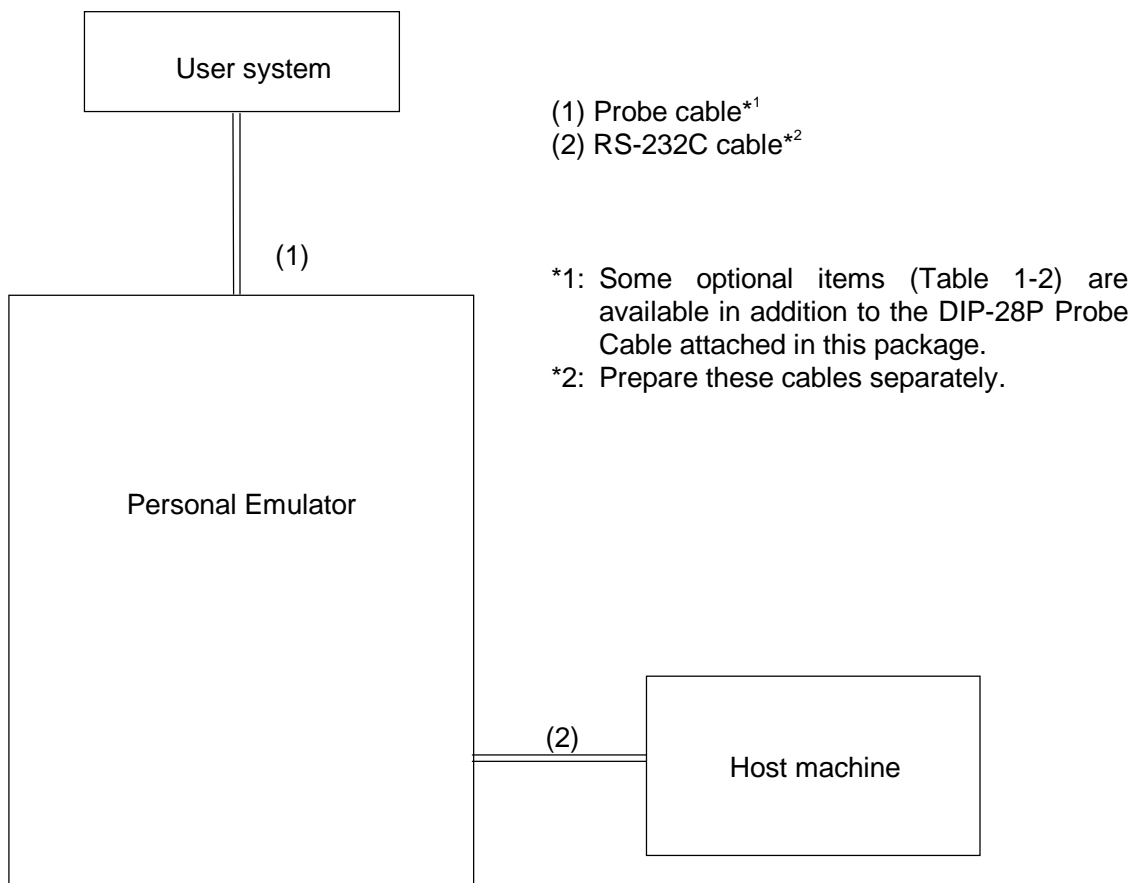
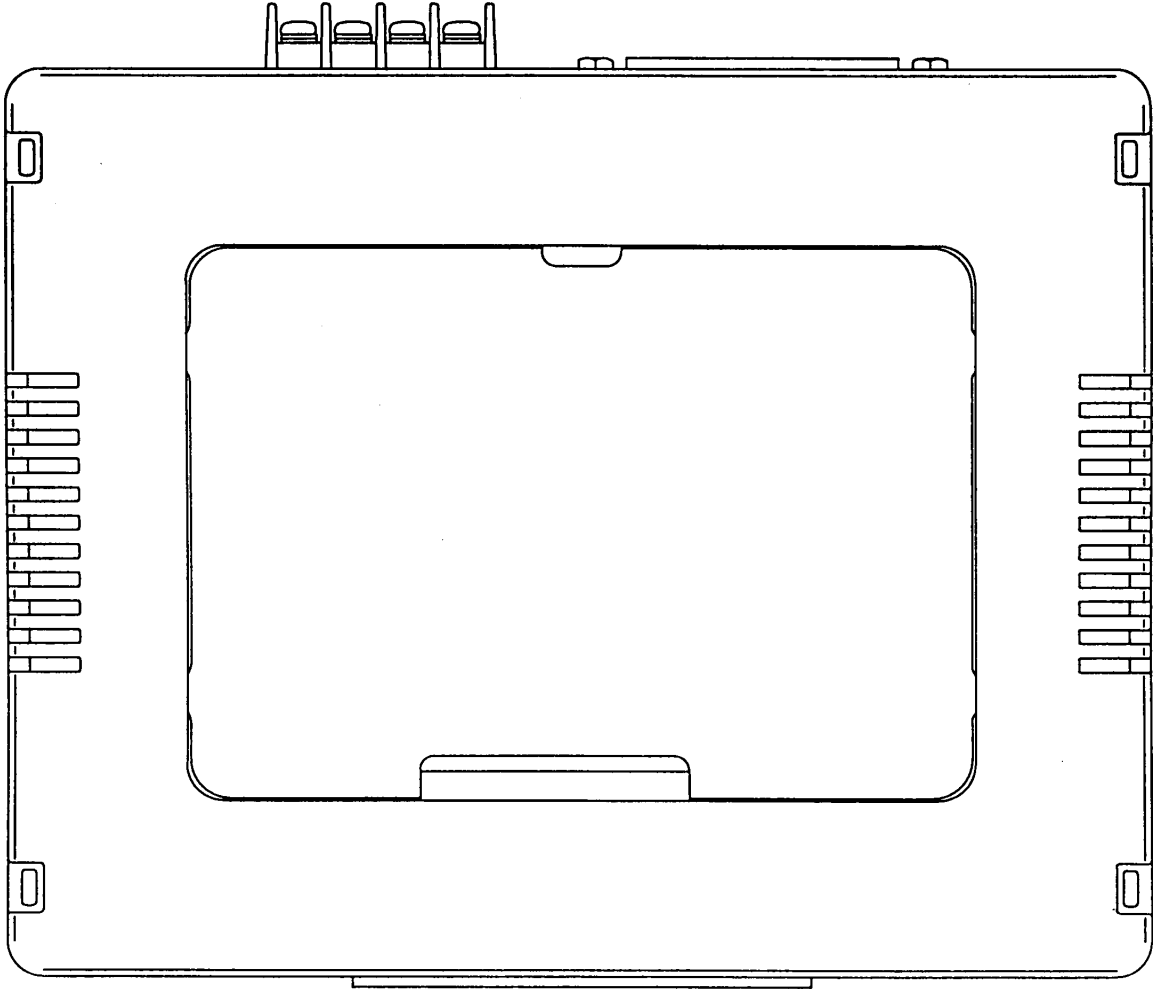


Fig. 2.1 Hardware Configuration

## 2.2 External Views and Names of Components

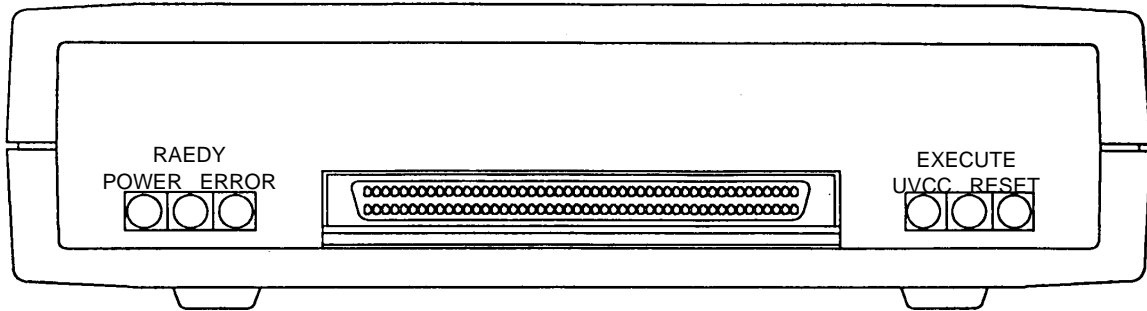
Figures 2.2 and 2.3 show the external views and the names of components of the Compact Emulator unit.

### ■ External Views and Names of Components



Probe Cable Connector 1: Connector to DIP28-P Probe Cable connected (beneath upper cover)

**Figure 2.2 Top View of Compact Emulator**

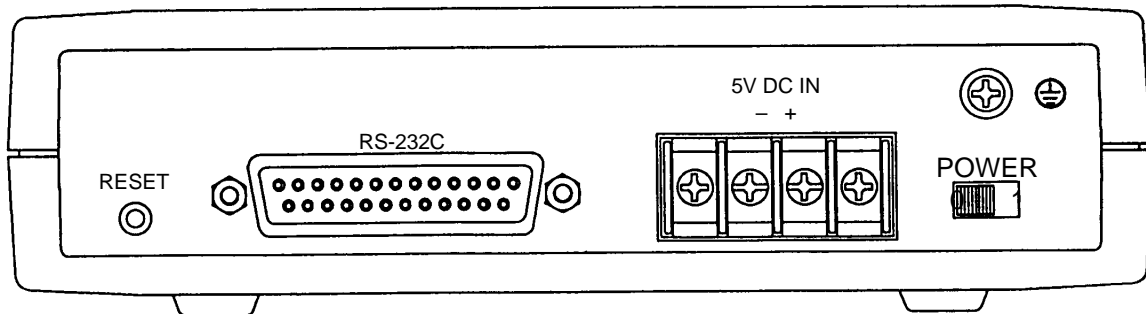


(1) Condition LEDs

- POWER: Indicates the Vcc condition of the Compact Emulator unit.
- ERROR: Indicates hardware error when lit
- READY: Indicates emulator ready to communicate when LED lit
- UVCC : Indicates the Vcc condition of the evaluation MCU. This LED goes on when Vcc supplied from the user system is 2.7 to 5.5 V.
- EXEC : Indicates that the MCU is in operation.
- RESET: Indicates that the MCU is in the reset state.

(2) Probe cable connectors 2: These connectors are used for connection of optional probe cables (for the appropriate model, see Section 1.2).

**Fig. 2.3 Front View of Compact Emulator**



- (1) Reset Switch: Switch to reset system
- (2) RS-232C Connector: Connector for RS-232C cable
- (3) 5V DC Power Supply Terminal: Connector for 5-V DC power supply cable
- (4) Power Switch: Power-on switch

**Fig. 2.4 Rear View of Compact Emulator**

## 2.3 Specifications for Compact Emulator Unit

Table 2-3 gives the general specifications for the Compact Emulator unit.

### ■ General Specifications for Compact Emulator Unit

Table 2-3 General Specifications for Compact Emulator Unit

Parameter	Specifications	
Name	F <sup>2</sup> MC-8L family Compact Emulator unit	
Power supply	Main unit Power supply* <sup>1</sup>	Voltage: +5 V ±5% Current consumption: 1 A
	Evaluation MCU Power supply* <sup>2</sup>	Voltage: +2.7 V to +5.5 V Current consumption: 100 mA max.
Operating frequency* <sup>3</sup>	1 kHz to 16 MHz* <sup>4</sup>	
Operating temperature	0 to 35°C	
Operating humidity	30 to 80% (no dew condensation)	
Frame dimensions	158 mm (W) × 126 mm (D) × 38 mm (H)* <sup>5</sup>	
Weight	400 g	

\*1: The power supply unit for the Compact Emulator is not included in this package.

\*2: The power to the evaluation MCU is supplied from the user system.

\*3: The operating frequency indicates a machine clock of the evaluation MCU.

\*4: The upper operating frequency varies depending of the target evaluation MCU and operating voltage.

\*5: Projections are excluded.

## 2.4 Specifications for DIP-28P Probe Cable

Table 2-4 indicates the components of the probe cable (DIP-28P), Table 2-5 gives general specifications for the probe cable, and Figure 2.5 shows the dimensional drawing of the probe cable.

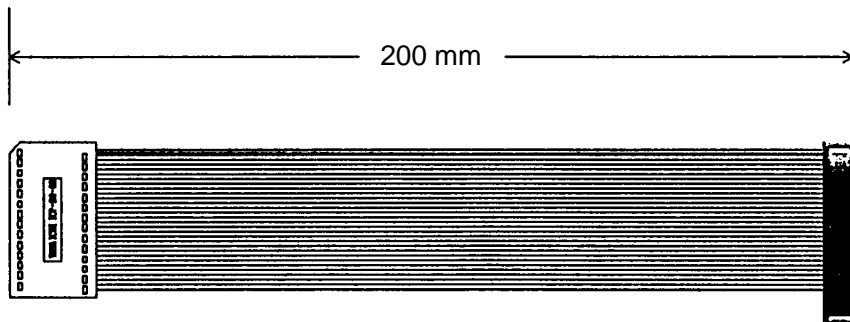
### ■ Specifications for probe cable

**Table 2-4 Components of DIP-28P Probe Cable**

Description	Remarks
Connector: FCN-747J034-AU/B × 1	
Header: FCP-28-03#1 × 1	
IC socket: IC26-2806-G24 × 1	

**Table 2-5 General Specifications for DIP-28P Probe Cable**

Parameter		Value
Rated current		1 A DC
Temperature	Operation	-10 to +60°C
	Storage	-10 to +60°C
Weight		150 g



**Fig. 2.5 Dimensional Drawing of DIP-28P Probe Cable**



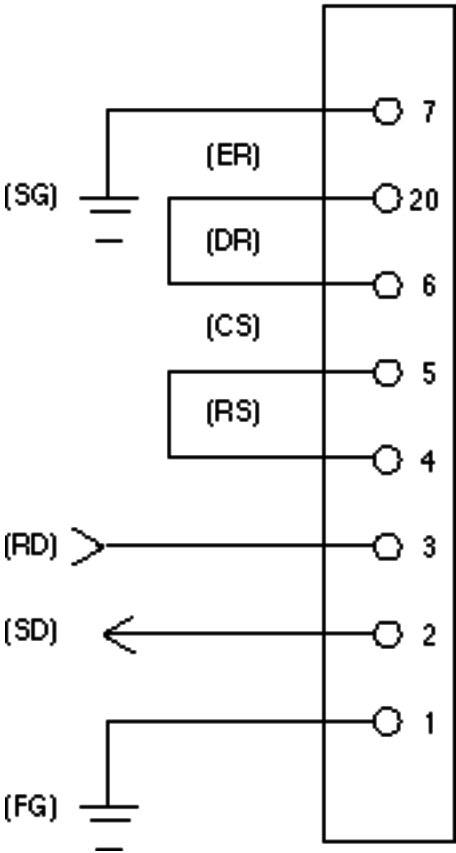
## 2.5 Specifications for RS-232C

The Compact Emulator has one RS-232C line. Table 2-6 gives the specifications for RS-232C and Figure 2.6 shows a circuit diagram of the RS-232C connector.

### ■ Specifications for RS-232C

Table 2-6 Specifications for RS-232C

Parameter	Value
Signal definition	DCE (same as modem)
Baud rate	9600, 19200 [bps]
Data bit length	8 bits
Parity bit	Non
Stop bit length	1 bit
X control	Off



\*: The Compact Emulator uses only signal lines shown in left figure.

Fig. 2.6 Circuit Diagram of RS-232C Connector

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## CHAPTER 3 SETTINGS AND CONNECTIONS

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This chapter describes various settings and connections of the emulation unit before power on. For the names of components, see **2.2 EXTERNAL VIEWS AND NAMES OF COMPONENTS**.

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- 3.1 Connecting the Probe Cable
- 3.2 Connection with User System
- 3.3 Connection with Personal Computer
- 3.4 Connection with Power Supply

### 3.1 Connecting Probe Cable

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Connect the probe cable to Compact Emulator according to Figure 3.1 and 3.2.

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#### ■ Connecting Probe Cable

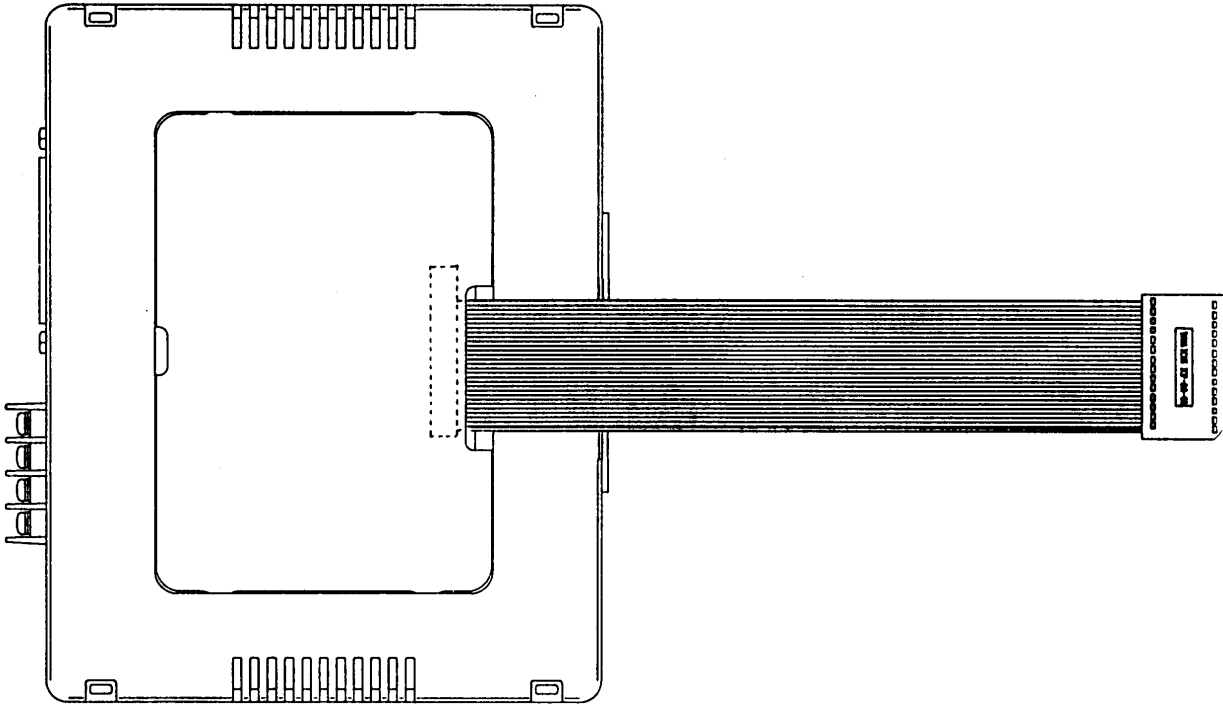
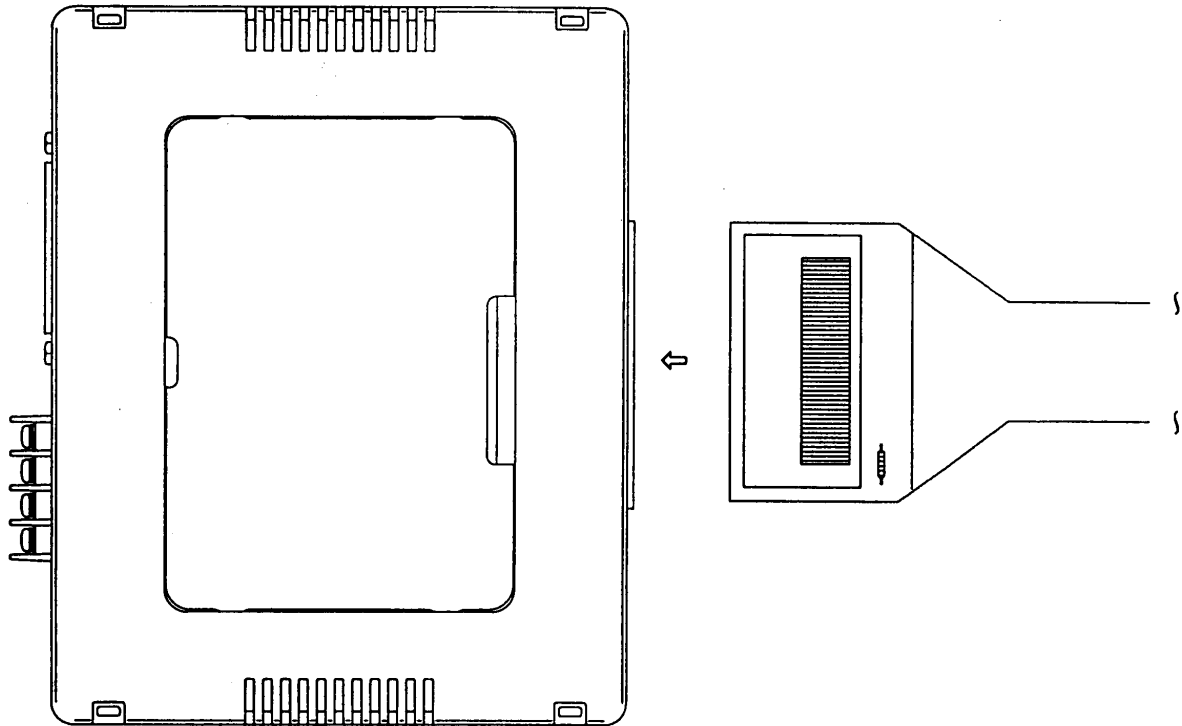


Fig. 3.1 Connection of DIP-28P Probe Cable (attached)

#### ■ Cautions

1. Turn off the power in connecting or disconnecting the cable; otherwise, causing a failure.
2. Disconnect the cable with the connector held; otherwise, causing disconnection.



**Fig. 3.2 Connecting Optional Probe Cable**

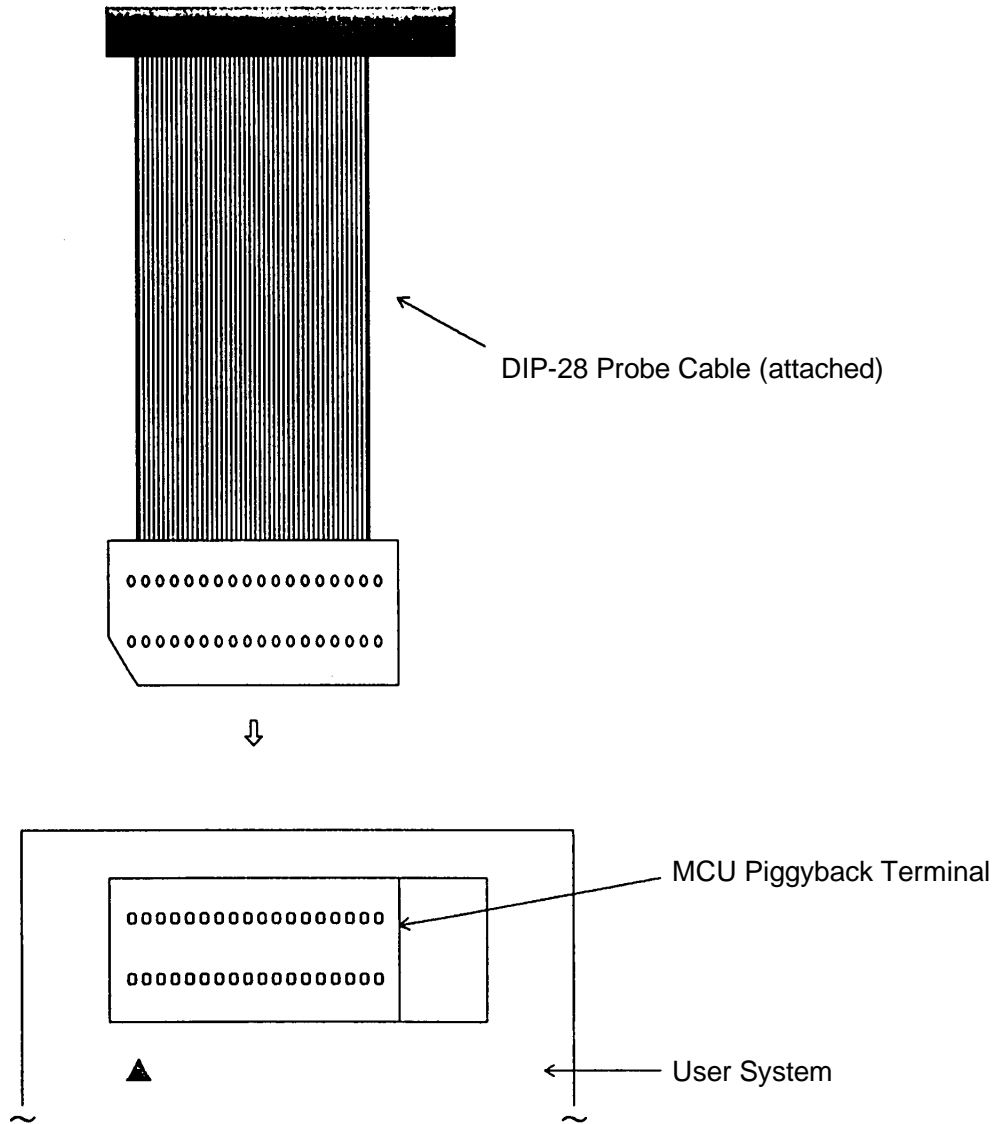
**■ Cautions**

1. Turn off the power in connecting or disconnecting the cable; otherwise, causing a failure.
2. Disconnect the cable with the connector held; otherwise, causing disconnection.

## 3.2 Connecting User System

As shown in Figures 3.3 and 3.4, connect the probe cable header to the piggyback terminal of the MCU on the user system.

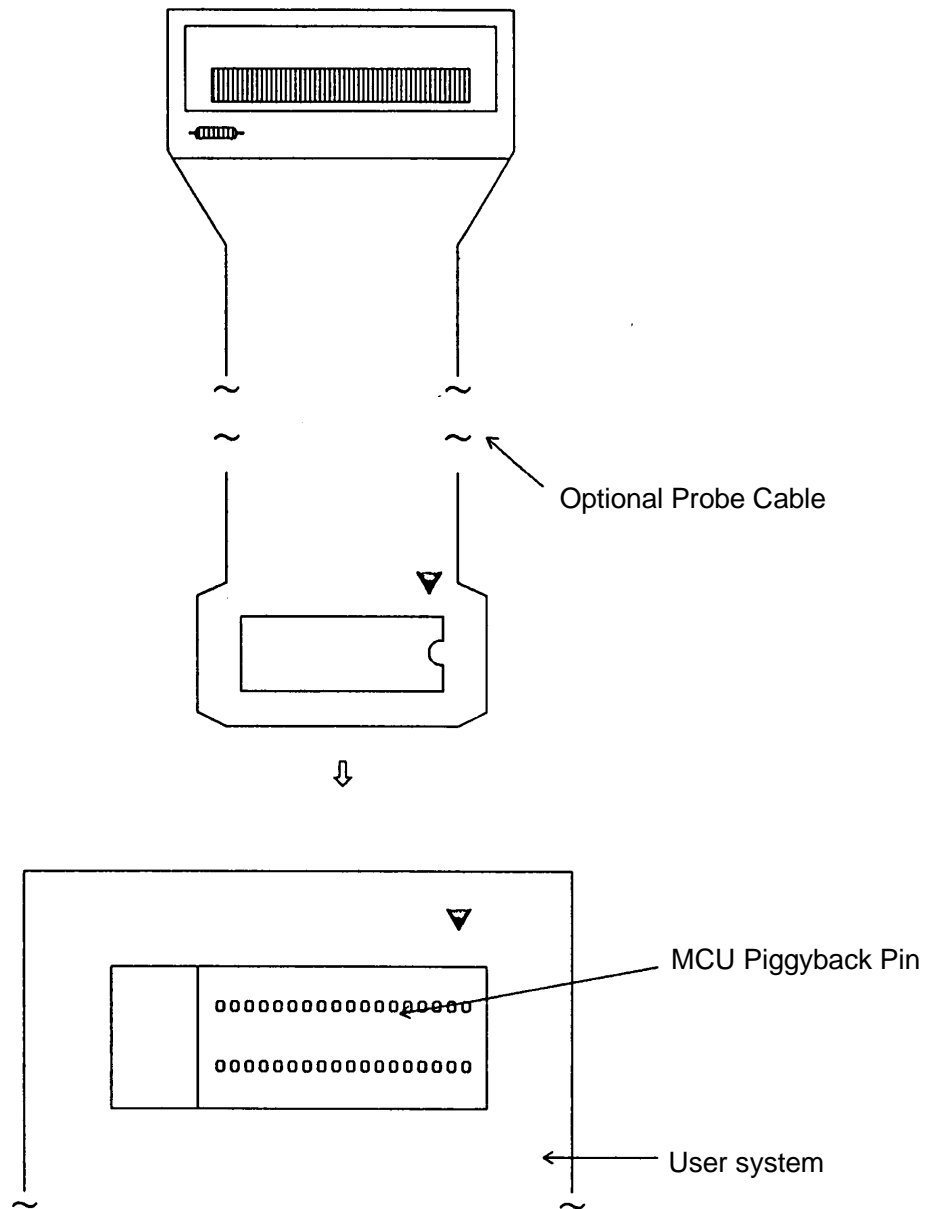
### ■ Connecting User System



**Fig. 3.3 Connecting DIP-28 Probe Cable (attached) to User System**

### ■ Cautions

1. Turn off the power in connecting or disconnecting the cable; otherwise, causing a failure.
2. Disconnect the cable with the connector held; otherwise, causing disconnection.



**Fig. 3.4 Connecting Optional Probe Cable to User System**

**■ Cautions**

1. Turn off the power in connecting or disconnecting the cable; otherwise, causing a failure.
2. Disconnect the cable with the case and connector held; otherwise, causing disconnection.
3. Ensure that the probe header is oriented correctly because the face side of the header is not the same as that of the attached probe cable.

### 3.3 Connection with Personal Computer

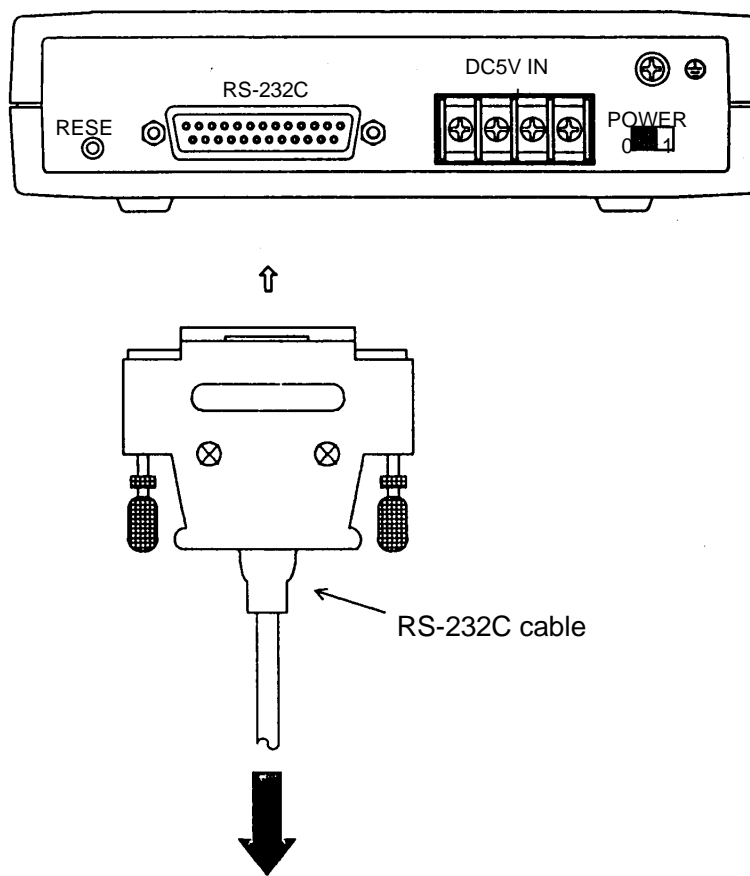
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Connect the personal computer and Compact Emulator unit with the RS-232C cables according to Figure 3.5.

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#### ■ Connection with Personal Computer

As shown in Figure 3.5, connect the Compact Emulator to your PC with a RS-232C cable.



To RS-232C connector for personal computer

**Fig. 3.5 Connection with Personal Computer**

#### ■ Cautions

1. Turn off the power in connecting or disconnecting the cable; otherwise, causing a failure.
2. Disconnect the cable with the connector held; otherwise, causing disconnection.



### 3.4 Connecting Power Supply

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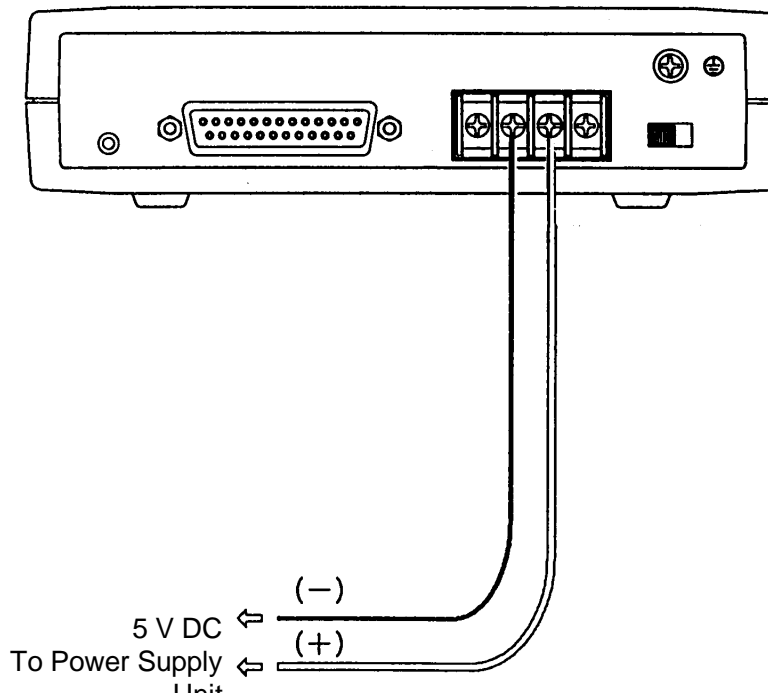
As shown in Figure 3.6, connect the power supply cable to the Compact Emulator.

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#### ■ Connecting Power Supply

As shown in Figure 3.6, connect the power supply cable to the Compact Emulator.

Note: The power cable and power supply unit is not included in this package.



**Fig. 3.6 Connecting Power Supply**

#### ■ Cautions

1. Turn off the power in connecting or disconnecting the cable; otherwise, causing a failure.

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# CHAPTER 4 DETAILS OF HARDWARE

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This chapter describes the details of hardware of Compact Emulator.

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## 4.1 Power-ON/OFF Sequence

## 4.1 Power-ON/OFF Sequence

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This section describes the power-ON/OFF sequence.

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### ■ Power-on/off Sequence

After the completion of all connections, turn on the power in the following sequence. To turn on the power, slide to the "I" position the power switch on the Compact Emulator (see **2.2 EXTERNAL VIEWS AND NAMES OF COMPONENTS**).

- Turn on the power to the Compact Emulator unit.
- Turn on the power to the user system.
- Activate the emulator debugger.

Follows the above sequence; otherwise, causing a failure in the Compact Emulator. Turn off the power in the reverse order of power-on.

### ■ Notes

1. After the power to the emulator is turned on, turn the power to the target (user system) from off to on.
2. The emulator cannot be used for evaluation on power sources such as power-on reset and current consumption.  
In this case, evaluation should be made with a signal Microcontroller chip such as the OTP Microcontroller and Microcontroller chip.

# APPENDIX

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This appendixes indicate the LED messages of Compact Emulator and specifications of optional probe cable.

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APPENDIX A LED Messages

APPENDIX B Specifications of Optional Probe Cable (Piggyback/Evaluation)

## APPENDIX A LED Messages

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The following messages are given when six LEDs at the front of the Compact Emulator go on.

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### ■ LED Messages

- Power LED (orange) [POWER]  
The power has been turned on.
- Ready LED (green) [READY]  
<On>  
The communication between the Compact Emulator and personal computer is enabled.  
<Blinking>  
The communication between the Compact Emulator and personal computer is in progress.
- Hardware error LED (red) [ERROR]  
A hardware error has occurred.
- User System Power LED (Green) [UVCC]
- Execution LED (Green) [Execute]  
<When lit>  
Indicates MCU busy  
<When flashing>  
Indicates MCU free
- Reset LED (Green) [Reset]  
Indicates system in reset status

### ■ Caution

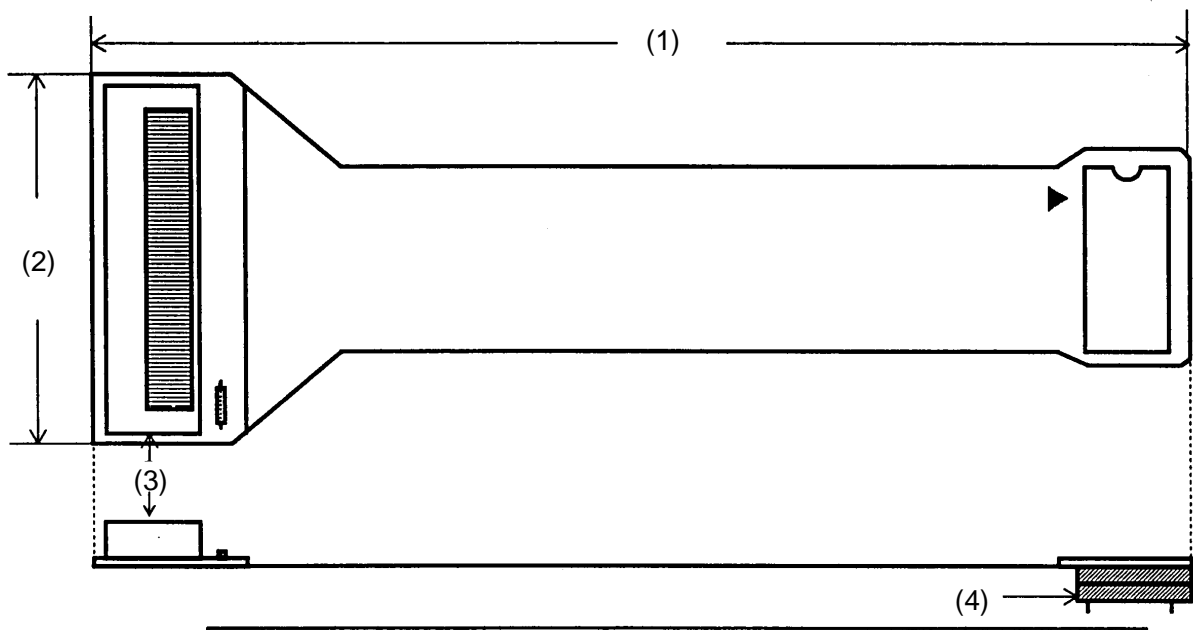
Repair is needed when the hardware error LED goes on.

## Appendix B Specifications of Optional Probe Cable (Piggyback/Evaluation)

Three types of probe cables are available for Piggyback/Evaluation: DIP-28 type, LCC-32 rectangular type, and LCC-32 square type. Figures B.1 and B.2 show the specifications of the probe cables for Piggyback/Evaluation.

### ■ Specifications of DIP-28 Type Probe Cable

Figure B.1 shows the specifications of the DIP-28 Type Probe Cable.

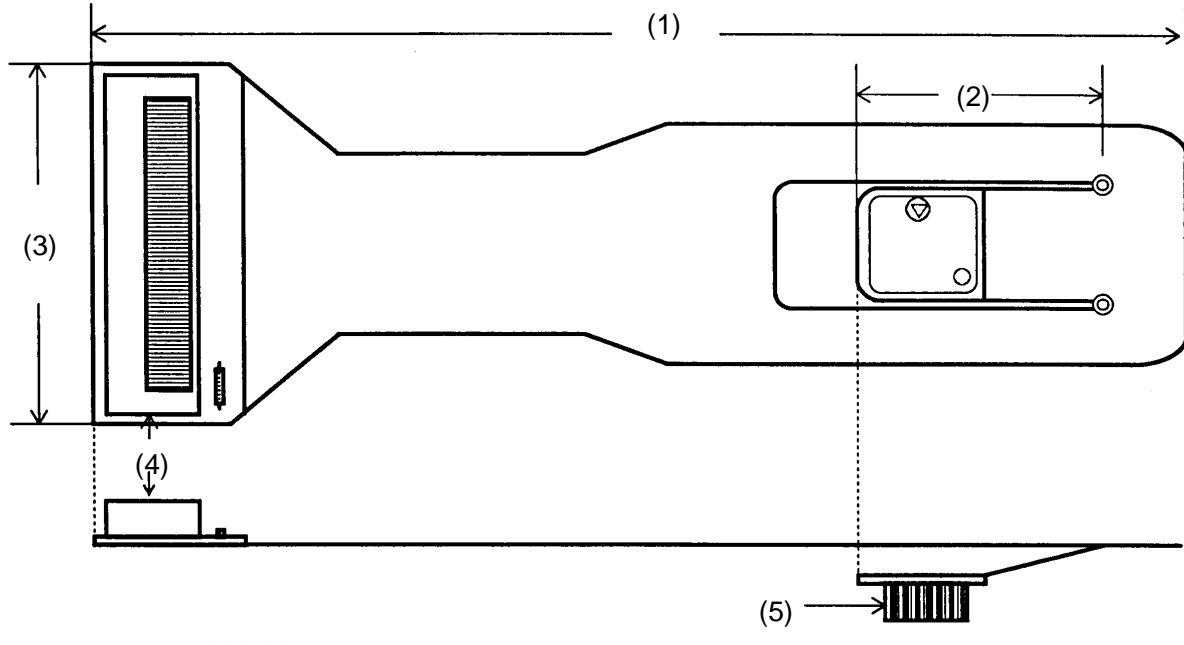


No.	Item	Description
—	Product Name	DIP-28 Type Probe Cable
—	Part Number	MSE-2144-201
(1)	Cable Length	250 mm (Flexible type)
(2)	Cable Width	70 mm
(3)	I/F Connector Type	FCN-235P096-G/0 (FUJITSU)
(4)	IC Header Type	IC26-2806-GG4 (YAMAICHI ELECTRIC)

Figure B.1 Specifications of DIP-28 Type Probe Cable

## ■ Specifications of LCC-32 Type Probe Cable

Figure B.2 shows the specifications of the LCC-32 Type Probe Cable.



No.	Item	Description
—	Product Name	LCC-32 Type A (B) Probe Cable
—	Part Number	LCC-32 Type A: MSE-2144-202 LCC-32 Type B: MSE-2144-203
(1)	Cable Length	250 mm (Flexible type)
(2)	Length of Folded Portion	60 mm
(3)	Cable Width	70 mm
(4)	I/F Connector Type	FCN-235P096-G/0 (FUJITSU)
(5)	I/F Header Type	LCC-32 Type A: HMBSTMF64-01T6 (Kyocera) LCC-32 Type B: HMBSTMF48-02T02 (Kyocera)

Fig. B.2 Specifications of LCC-32 Type Probe Cable