CUSTOMER NOTIFICATION

SUD-DT-04-0047

January 30, 2004

Koji Nishibayashi, Senior System Integrator
Microcomputer Group
2nd Solutions Division
Solutions Operations Unit
NEC Electronics Corporation

CP(K), O

QB-V850ESSX2

(IECUBE for V850ES/SG2, V850ES/SJ2)

Preliminary User's Manual

Target Device:

V850ES/SG2

V850ES/SJ2

V850 Series, V850ES/SG2, V850ES/SJ2, and IECUBE are trademarks of NEC Electronics Corporation.
Windows is either a trademark or a registered trademark of Microsoft Corporation in the United States and/or other countries.
PC/AT is a trademark of International Business Machines Corporation.

INTRODUCTION

Target Readers This manual is intended for users who design and develop application systems using the V850ES/SG2 or V850ES/SJ2.

Purpose The purpose of this manual is to describe the proper operation of the QB-V850ESSX2, and its basic specifications.

Organization This manual is broadly divided into the following parts.

- Overview
- Setup procedure
- Cautions

How to Read This Manual

It is assumed that the reader of this manual has general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers. This manual explains the basic setup procedure, so read this document before using the QB-V850ESSX2.

To learn about the basic specifications and operation methods.

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

To learn about software settings such as operation methods and command functions.

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

Conventions

Note:	Footnote for item marked with **Note** in the text.	
Caution:	Information requiring particular attention.	
Remark:	Supplementary information.	
Numeral representation:	Binary	… xxxx or xxxxB
	Decimal	… xxxx
	Hexadecimal	… xxxxH

Units for representing powers of 2 (address space or memory space):

K (kilo): 2^{10} = 1,024

M (mega): 2^{20} = $1,024^2$

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

Term	Meaning
Target device	Refers to the device targeted for emulation.
Target system	Refers to the system targeted for debugging. This includes the target program and the hardware created by the user. In the narrow sense, it means hardware only.

Related Document When using this manual, refer to the following manuals.

The related documents indicated in this publication may include preliminary versions.

However, preliminary versions are not marked as such.

- Documents related to development tools (user's manuals)

Document Name		Document Number
QB-V850ESSX2		This manual
CA850 (Ver.2.50 or later) [C Compiler package]	Operation	U16053E
	C Language	U16054E
	PM plus	U16055E
	Assembly Language	U16042E
ID850QB (Ver.2.80) [Integrated debugger]	Operation Windows-Based	U16973E
SM plus (Ver.1.00) [System simulator]	Operation Windows-Based	U16906E
RX850 [Real-time OS]	Basics	U13430E
	Installation	U13410E
RX850 Pro [Real-time OS]	Fundamental	U13773E
	Installation	U13774E
RD850 [Task debugger]	Windows-Based	U13737E
RD850 Pro [Task debugger]	Windows-Based	U13916E
AZ850 [System performance analyzer]		U14410E

General cautions on handling this product

1. NEC Electronics' warranty does not cover the following cases:

- When the QB-V850ESSX2 is disassembled, reconstructed, or modified by the user
- When the QB-V850ESSX2 receives a heavy shock such as being dropped or falling down
- When the QB-V850ESSX2 is used with excessive voltage or is stored outside the guaranteed temperature range or guaranteed humidity range
- When power is applied while the AC adapter, USB interface cable, or target system is not connected securely
- When the AC adapter cable, USB interface cable, or extension probe is excessively twisted or stretched
- When an AC adapter other than the one supplied with the QB-V850ESSX2 is used
- When water is spilled on the QB-V850ESSX2

2. Cautions on safe use

- The QB-V850ESSX2 heats up (to approx. 50 to 60°C) when it operates for a long time. Take care not to receive injuries such as burns from a rise in the temperature.
- Be very careful to avoid electric shocks. There is risk of electric shock if the product is used as described in item 1 above.

CONTENTS

CHAPTER 1 OVERVIEW

The QB-V850ESSX2 (IECUBE) is an in-circuit emulator used to emulate the V850ES/SG2 and V850ES/SJ2. By using IECUBE, hardware and software can be debugged efficiently in system development using the V850ES/SG2 or V850ES/SJ2.

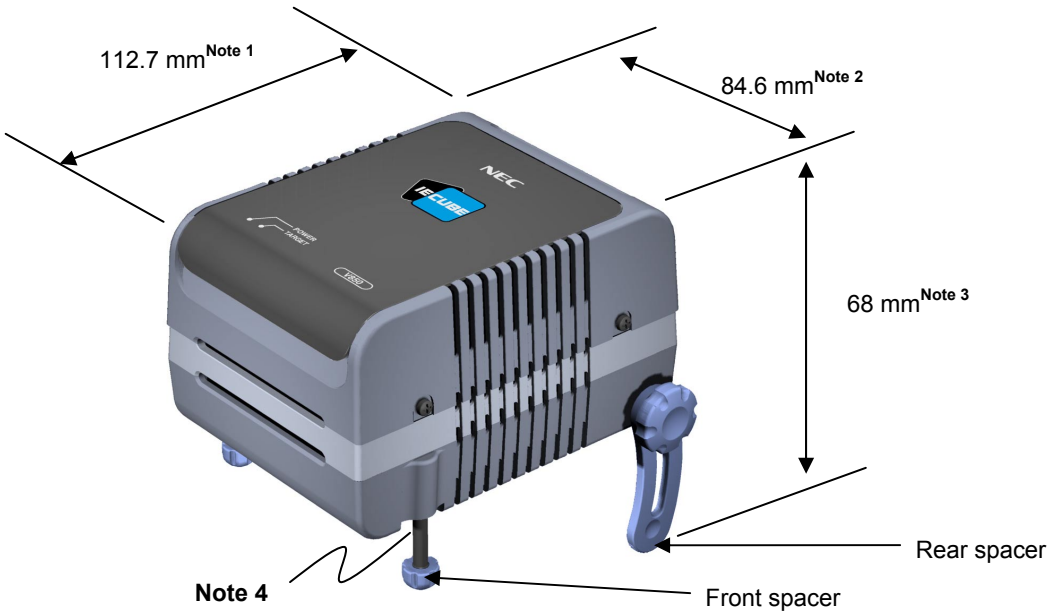
In this manual, the basic setup procedure, hardware specifications, system specifications, and switch settings are described.

This document describes the QB-V850ESSX2 as IECUBE.

1.1 Hardware Specifications

Table 1-1-1. QB-V850ESSX2 Hardware Specifications

Item		Specifications			
Target device		V850ES/SG2, V850ES/SJ2			
Target system interface voltage (unit: V)		$BV_{DD} \leq V_{DD} = EV_{DD} = AV_{REF0} = AV_{REF1}$ $V_{SS} = EV_{SS} = BV_{SS} = AV_{SS} = 0$ V			
		V_{DD}	EV_{DD}	BV_{DD}	AV_{REF0}, V_{REF1}
	When A/D converter or D/A converter is used	3.0 to 3.6	3.0 to 3.6	2.7 to 3.6	3.0 to 3.6
	When neither A/D converter nor D/A converter is used	2.85 to 3.6	2.85 to 3.6	2.7 to 3.6	2.85 to 3.6
Maximum operating frequency		20 MHz			
Operating temperature range		0 to 40°C (without condensation)			
Storage temperature range		−15 to 60°C (without condensation)			
Package dimensions		See below.			
Power consumption	AC adapter for IECUBE	15 V, 1 A			
	Target system power supply	Lower than that of target device			
Weight		382 g			
Host interface		USB interface (1.1 and 2.0)			



Notes 1. Not including projection of power supply switch.

2. Including projection of screw for fixing rear spacer

3. Shortest dimension for the rear spacer (98 mm max.)

4. The front spacer dimension is variable between 20 mm (max.) and 5 mm (min.)

1.2 System Specifications

The system specifications of the QB-V850ESSX2 are shown below.

Table 1-2-1. QB-V850ESSX2 System Specifications

Item		Specifications
Emulation memory capacity	Internal ROM	1 MB max.
	Internal RAM	60 KB max.
	External memory	Optional (under development)
Program execution function	Real-time execution function	Go, Start From Here, Go & Go, Come Here, Restart, Return Out
	Non-real-time execution function	Step In, Next Over, Slow Motion
Break function	Hardware break	Execution: 10 points Access: 6 points
	Software break	2000 points
	Fail-safe break	Non-map, I/O illegal, write protect
	Other	Trace full break, Manual Break, Timer Over Flow Break
Trace function	Trace data type	Branch source PC, branch destination PC, all PCs, all execution data, access data, access address, R/W status, time stamp, DMA point (start/end)
	Trace mode	Speed Priority, Trace Priority
	Trace event	Delay trigger, section, qualify
	Memory capacity	256 frames
Real-time RAM monitor function		256 bytes × 8 points
Time measurement function	Measurement clock	Measurement-dedicated clock or CPU clock
	Measurement target	Program execution start to end Start event to end event
	Maximum measurement time	About 195 hours (when measurement-dedicated clock is used)
	Minimum resolution	20 ns
	Number of timers used for measurement	8
	Measurement result	Execution time (execution start to end) Max., min., Average, pass count (between events)
	Other	Timer overflow break function (1 point)
Coverage function		Optional (under development)
Other functions		Mapping function, event function, register manipulation function, memory manipulation function

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

1.3 System Configuration

The system configuration when connecting the QB-V850ESSX to a PC (PC-9800 series or PC/AT compatible) is shown below. Connection is possible without optional products.

Connectors <6> to <12> vary depending on the target device to be emulated.

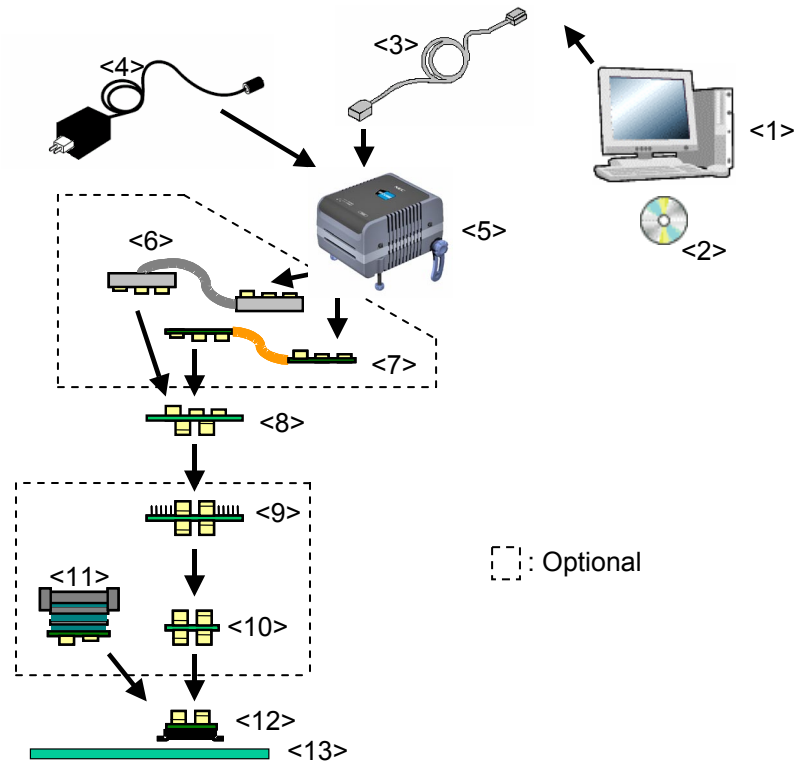


Figure 1-3-1. System Configuration

<1> Host machine: PC-9821 series or IBM PC/AT compatible machine can be used

<2> ID850QB Disk, Accessory Disk[Note 1]: Includes debugger, USB driver, manual, etc.

<3> USB interface cable: Cable used to connect the host machine and the QB-V850ESSX2

<4> AC adapter: Voltages from 100 to 240 V can be used by exchanging the AC plug

<5> QB-V850ESSX2: This product

<6> Extension probe (coaxial type) (optional)

<7> Extension probe (flexible type) (optional)

<8> Exchange adapter: Adapter used to convert pins

<9> Check pin adapter (optional): Adapter used for monitoring waveforms using an oscilloscope[Note 2]

<10> Spacer adapter (optional): Adapter used to adjust the height[Note 2]

<11> Mounting adapter (optional): Adapter used to mount the target device in the socket

<12> Target connector: Connector used to solder the emulator on the target system

<13> Target system

Notes 1. Download the device from the NEC Electronics web site.

URL: http://www.necel.com/micro/ods/jpn/index.html

2. <9> and <10> can also be used in the reverse position.

Table 1-3-1. List of Probes and Connectors for Each Target Device

No.	Name	Target Device to Be Emulated		
		V850ES/SG2 (100-pin GC)	V850ES/SG2 (100-pin GF)	V850ES/SJ2 (144-pin GJ)
<6>	Extension probe (coaxial type)	QB-144-EP-01S (sold separately)		
<7>	Extension probe (flexible type)	QB-144-EP-02S (sold separately)		
<8>	Exchange adapter	QB-100GC-EA-01S (sold separately)Note	QB-100GF-EA-01S (sold separately)Note	QB-144GJ-EA-01S (sold separately)Note
<9>	Check pin adapter	QB-100-CA-01S (sold separately)		QB-144-CA-01S (sold separately)
<10>	Spacer adapter	QB-100-SA-01S (sold separately)		QB-144-SA-01S (sold separately)
<11>	Mounting adapter	QB-100GC-MA-01S (sold separately)	QB-100GF-MA-01S (sold separately)	QB-144GJ-MA-01S (sold separately)
<12>	Target connector	QB-100GC-TC-01S (sold separately)Note	QB-100GF-TC-01S (sold separately)Note	QB-144GJ-TC-01S (sold separately)Note

Note The accessories included with this product are as shown below.

- When QB-V850ESSX2-ZZZ is ordered:

  The exchange adapter and target connector are not included.

- When QB-V850ESSX2-S100GC is ordered:

  The QB-100GC-EA-01S and QB-100GC-TC-01S are included.

- When QB-V850ESSX2-S100GF is ordered:

  The QB-100GF-EA-01S and QB-100GF-TC-01S are included.

- When QB-V850ESSX2-S144GJ is ordered:

  The QB-144GJ-EA-01S and QB-144GJ-TC-01S are included.

1.4 Packing Contents

The packing box of the QB-V850ESSX2 contains the following. Make sure that these items are included.

♦ Items included with QB-V850ESSX2-ZZZ

(1) QB-V850ESSX2

(2) AC adapter

(3) USB interface cable

(4) ID850QB Disk (CD-ROM)

(5) Accessory Disk (CD-ROM)

(6) IECUBE setup manual (Japanese/English)

(7) User registration card/software agreement

(8) PG-FPL (Flashpro Lite)

(9) Probe holder

(10) Parts board (for clock)

♦ Items included with QB-V850ESSX2-S144GJ

(1) to (10)

(11) Exchange adapter QB-144GJ-EA-01S

(12) Target connector QB-144GJ-TC-01S

♦ Items included with QB-V850ESSX2-S100GC

(1) to (10)

(11) Exchange adapter QB-100GC-EA-01S

(12) Target connector QB-100GC-TC-01S

♦ Items included with QB-V850ESSX2-S100GF

(1) to (10)

(11) Exchange adapter QB-100GF-EA-01S

(12) Target connector QB-100GF-TC-01S

CHAPTER 2 SETUP PROCEDURE

This chapter describes the procedure for setting up the QB-V850ESSX2.

Perform setup using the following procedure.

See **2.1 Names and Functions of Hardware** for the positions of jumpers and clocks.

Clock settings

A 5 MHz resonator is mounted at shipment.

There is no need to change the setting when a 5 MHz resonator can be used without problem.

See **2.2 Removing Acrylic Board** and **2.3 Clock Settings** when changing the resonator.

↓

Target device setting

It is assumed that the IECUBE target device is the V850ES/SG2 at shipment.

There is no need to change the setting when emulating the V850ES/SG2.

See **2.2 Removing Acrylic Board** and **2.4 Target Device Settings** when using as the V850ES/SJ2.

↓

Software setup

See **2.5 Software Setup**.

↓

Mounting and connecting connectors

See **2.6 Mounting and Connecting Connectors**.

↓

Connecting IECUBE to target system

See **2.7 Connecting IECUBE to target system**.

- When extension probe (QB-144-EP-01S) is used: See **2.7.1**.
- When extension probe (QB-144-EP-01S) is not used: See **2.7.2**.

↓

Connecting USB interface cable and AC adapter

See **2.8 Connecting USB Interface Cable and AC Adapter**.

↓

Power application/shutdown

See **2.9 Power application/shutdown**.

2.1 Names and Functions of Hardware

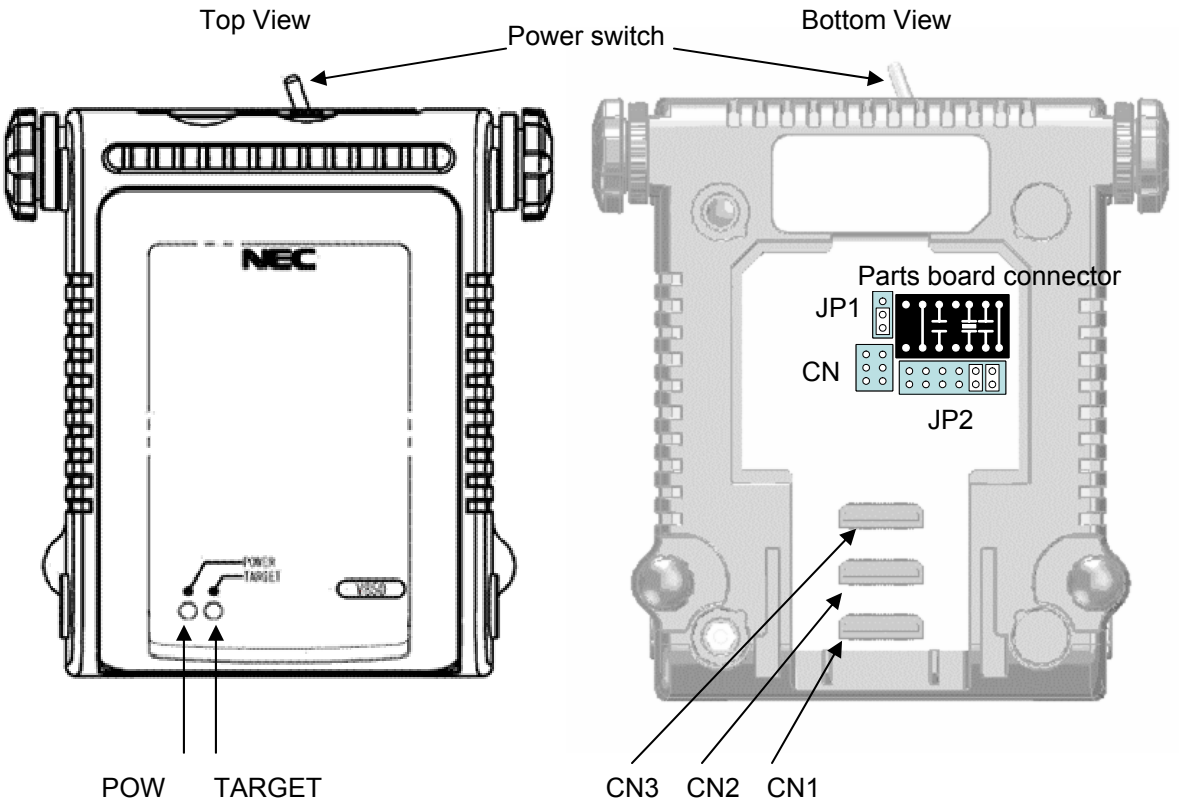


Figure 2-1-1. Names and Functions in QB-V850ESSX2

(1) CN1, CN2, CN3

These are connectors used to connect the exchange adapter or extension probe.

(2) Parts board connector (for clock)

This is a parts board used for mounting the resonator.

A 5 MHz resonator and capacitors, etc., that configure an oscillator circuit are mounted at shipment.

(See **2.3 Clock Settings** for details.)

(3) JP1

This is a jumper whose setting should be changed in accordance with the target device used.

It is 2-3 shorted at shipment.

(See **2.4 Target Device Settings** for details.)

(4) JP2

This is a jumper used to set the clock.

It is 1-2 open and 3-4 shorted at shipment. Other settings are prohibited.

(See **2.3 Clock Settings** for details.)

(5) CN8

This is a jumper used for shipment inspection. It is left open at shipment. Other settings are prohibited.

(6) POWER (red LED)

This is an LED that indicates whether or not the power to IECUBE is on.

LED Status	IECUBE Status
Lit	The power supply is on.
Extinguished	The power supply is off, or the AC adapter is not connected to IECUBE.
Blinking	An error has occurred internally. (Contact an NEC Electronics sales representative or distributor.)

(7) TARGET (green LED)

This is an LED that indicates whether or not the power to the target system is on.

LED Status	Target System Status
Lit	The power supply to the target system is on.
Extinguished	The power supply to the target system is off, or the target system is not connected.

(8) Power supply switch

This is a power switch for IECUBE. This switch is turned off at shipment.

2.2 Removing Acrylic Board

Remove the acrylic board on the bottom surface of IECUBE before changing the settings of jumpers or clocks.

The acrylic board can be removed by pulling it up.

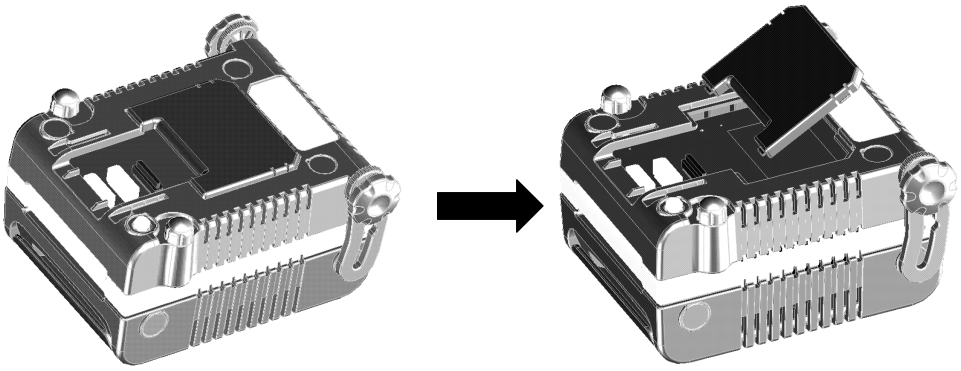


Figure 2-2-1. Removing Acrylic Board

2.3 Clock Settings

2.3.1 Overview of clock settings

Two methods are available for setting the clock.

See **2.3.2 How to set clock** for details.

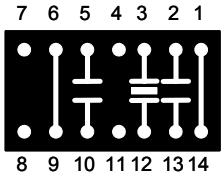
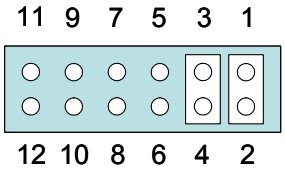
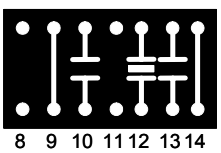
(1) Use the 5 MHz resonator mounted on IECUBE as the internal clock.

(2) Mount another resonator on IECUBE and use it as the internal clock.

2.3.2 How to set clock

A list of hardware settings for when the clock is set is shown in Table 2-3-1.

Table 2-3-1. List of Hardware Settings When Clock Is Set

Clock to Be Used	Parts Board	JP2 Setting
Use the 5 MHz resonator mounted on IECUBE as the internal clock	 Use the factory setting.	 Use the factory setting.
Mount another resonator on IECUBE and use it as the internal clock. The frequency of the resonator that can be used is the same as that of the target device.	 Mount the resonator on the parts board.	

* Settings other than above are prohibited.

2.3.3 How to change resonator

(1) Remove the parts board using a precision driver before changing the resonator.

Be careful not to damage IECUBE. An example of the removal procedure is shown below.

<1> Insert the driver at the pin-7 position on the parts board and raise the board by using leverage.

<2> Insert the driver at the pin-14 position on the parts board and raise the board using leverage.

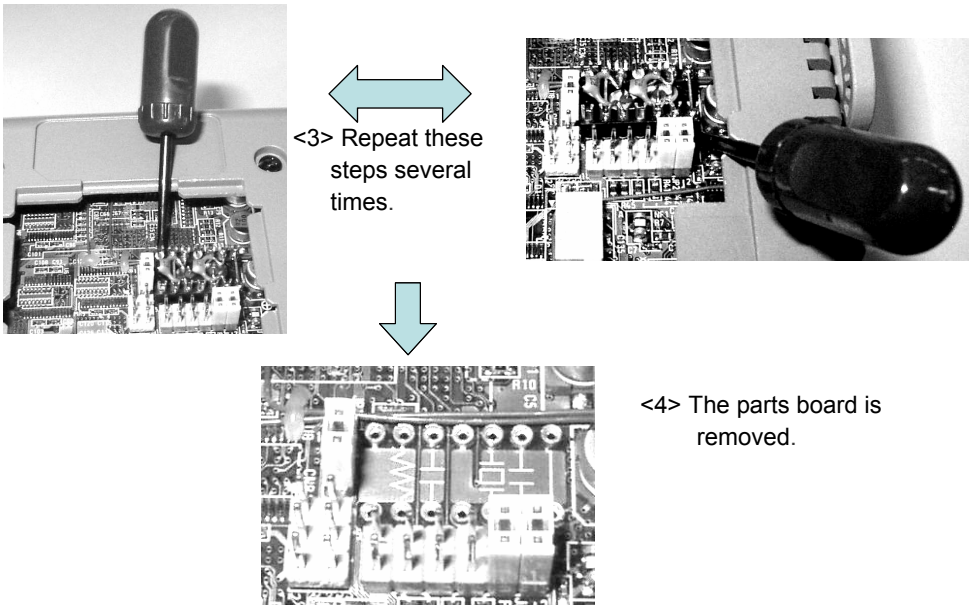


Figure 2-3-1. Example of Parts Board Removal Procedure

(2) Solder-mount the resonator and capacitor on the parts board supplied with IECUBE as follows.

Pin 1-14: Must be shorted.
Pin 2-13: Mount the capacitor.
Pin 3-12: Mount the resonator.
Pin 4-11: Leave open.
Pin 5-10: Mount the capacitor.
Pin 6-9: Must be shorted.
Pin 7-8: Leave open.

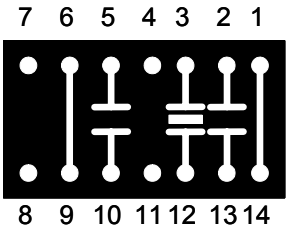


Figure 2-3-2. Parts Board Setting

(3) Insert parts board in the IECUBE.

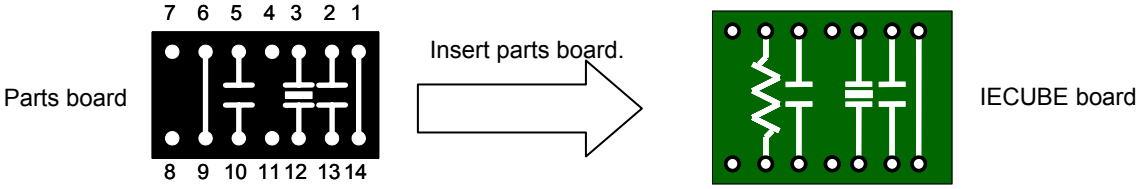


Figure 2-3-3. Inserting Parts Board in IECUBE

2.4 Target Device Settings

The JP1 setting varies depending on the target device. Settings other than below are prohibited.

When emulating V850ES/SG2: 2-3 shorted (factory setting)

When emulating V850ES/SJ2: 1-2 shorted

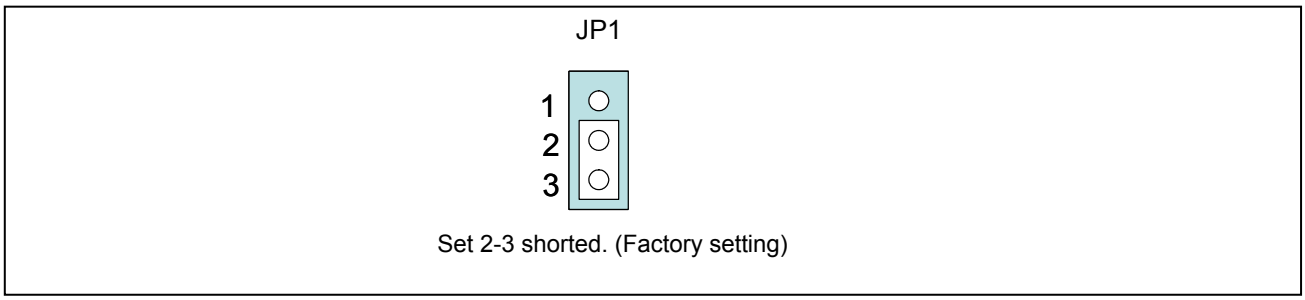


Figure 2-4-1. JP1 Setting When Using V850ES/SG2

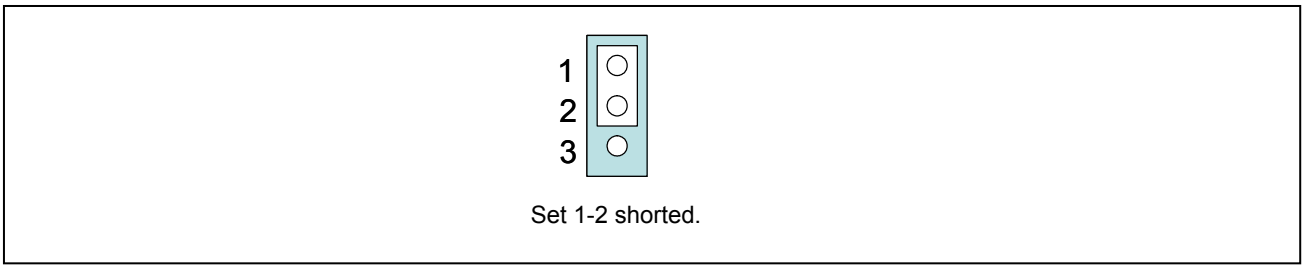


Figure 2-4-2. JP1 Setting When Using V850ES/SJ2

2.5 Software Setup

2.5.1 When ID850QB debugger is used

See the document “ID850QB Operating Precautions” attached to the ID850QB debugger for details.

2.5.2 When a debugger other than ID850QB (such as Multi) is used

See the user’s manual of the debugger to be used and the IECUBE Setup Manual.

2.6 Mounting and Connecting Connectors

This section explains how to connect IECUBE and the target system.

Be sure to turn off the power supply to IECUBE and the target system before connection.

The following symbols are used in this section.

TC: Target connector

EA: Exchange adapter

MA: Mounting adapter

CA: Check pin adapter

SA: Spacer adapter

2.6.1 Mounting target connector (TC) on target system

(1) Apply cream solder to the foot pattern for mounting the IC on the target system.

(2) TC has a cylindrical projection in the center of the underside (Figure 2-6-1). Apply a two-component hardening type epoxy adhesive agent (a type that hardens in 15 to 30 minutes) sparingly to the underside of the projection to temporarily secure the connector at the specified location on the target system. Make sure that the position of pin 1 of the connector (where the corner is cut) matches the position of pin 1 on the target board.

(3) TC mounting conditions

(a) To mount TC by reflow: 245°C × 20 seconds max. (heating)

(b) To mount TC by manual soldering: 320°C × 5 seconds max. (per pin)

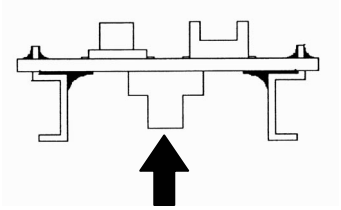


Figure 2-6-1. TC Projection Diagram

(4) Note on flux splashing

The flux splashing that takes place while the connector is being mounted often results in defective conduction. Be sure to cover the upper part of the connector with aluminum foil. **Do not clean the flux because the structure of the connector easily allows cleaner to enter.**

2.6.2 Inserting exchange adapter (EA) in TC

(1) Insert EA, MA, CA, or SA in target connector (TC) so that the position of pin 1 (where the corner is cut) on each board matches.

(a) When TC is inserted or removed, hold TC with your fingers so that no excessive force is applied to the connector.

(b) Remove or insert the adapter in the correct direction. (Figure 2-6-2)

Use a bamboo spit or similar object as a tool to remove the connector. Insert the tool between TC and EA and remove TC in the correction direction as shown in Figure 2-6-2. If force is applied to the connector in the wrong direction, the connector will be damaged.

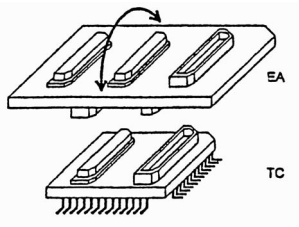


Figure 2-6-2. How to Insert/Remove EA and TC

2.6.3 General cautions on using TC, EA, MA, CA, and SA

(1) Causes of faulty contact of connector

(a) If flux gets inside TC when it is mounted

Thoroughly clean the flux with a solvent such as alcohol. Cleaning must be performed at least 5 to 6 times. If conduction is still not stable, repeat cleaning.

(b) If waste gets inside the connector

If waste, such as threads, gets inside the connector, defective conduction occurs. Remove any waste with a brush.

(c) Cautions on using CA and SA

When CA and SA are inserted, a very small amount of delay and capacitance occur in the signal propagation. Thoroughly evaluate these points after CA and SA are connected to the target system.

(2) Note on inserting or removing connector

(a) Be sure to hold the lower (mating) connector or board with your fingers when inserting or removing the connector.

(b) Be sure to insert or remove the connector in the correct direction (so that the positions match).

If the connector is inserted in a position that does not match the board direction, the connector may be damaged.

(c) When disconnecting the connector, use a thin bamboo or wooded stick as a leverage to protect the socket from being damaged. Do not remove the connector all at once, but do so little by little, shifting the leverage from one place to another.

If only a metallic object such as a screwdriver is available as a leverage, wrap its tip in a soft cloth.

2.7 Connecting IECUBE to Target System

2.7.1 Connection without using extension probe (QB-144-EP-01S)

IECUBE can be connected to the target system without using the extension probe.

When connecting IECUBE and the target system, adjust the height of IECUBE using the rear spacer so that no stress is applied to the exchange adapter and target connector.

In addition, take care to maintain insulation with the target system.

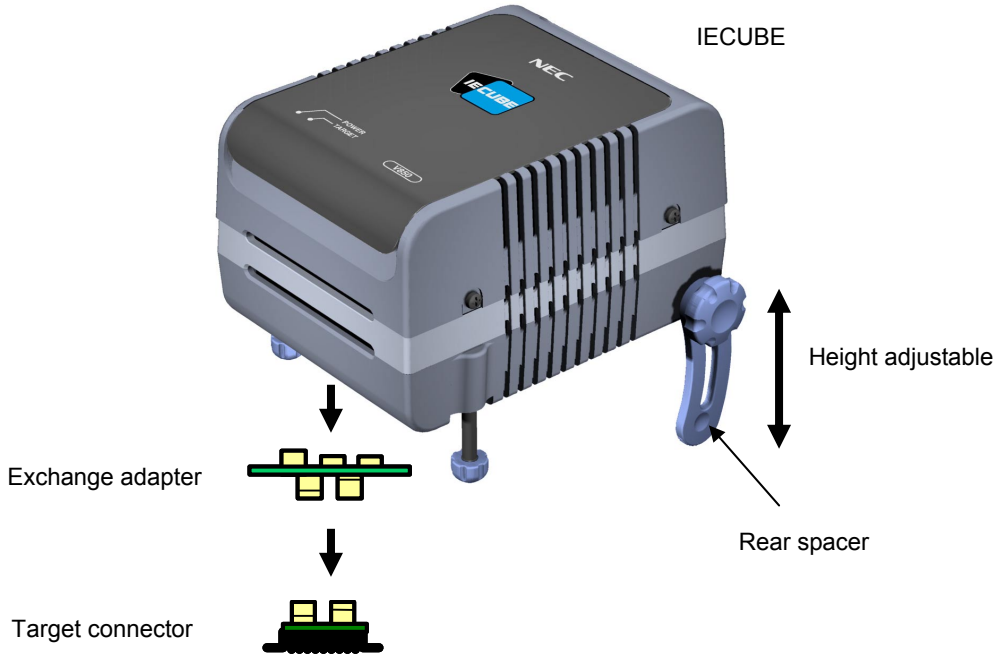


Figure 2-7-1. Connection Without Using Extension Probe

2.7.2 Connection using extension probe (QB-144-EP-01S)

When using the extension probe (QB-144-EP-01S), connect IECUBE and the target system using the following procedure.

(1) Connecting probe holder

Use the probe holder (included with IECUBE) for connecting the extension probe to IECUBE. How to connect is shown below.

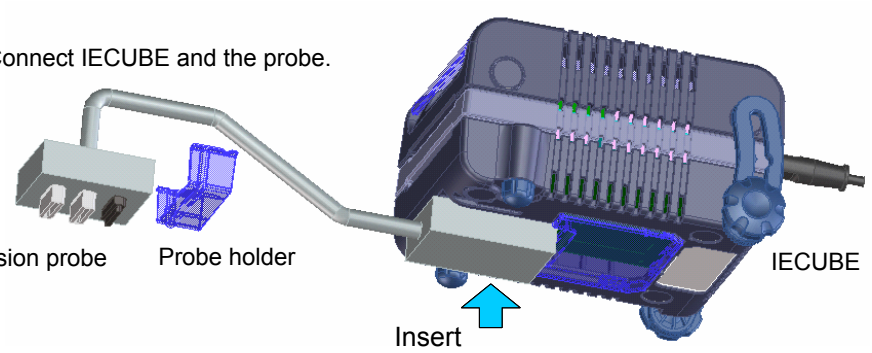


Figure 2-7-2. How to Use Probe Holder

(2) Connecting extension probe GND lines

The extension probe has three GND lines. Connect these lines to IECUBE and the target system using the following procedure.

<1> Fix a GND line of the extension probe to the nut on the bottom surface of IECUBE using a #0 or #1 precision cross-headed screwdriver. (Connection of **A** and **B** in Figure 2-7-3)

<2> Insert the connector on the top surface of the extension probe in the connector at the bottom opening of IECUBE from the lower side. Take care with the direction. (Connection of **C** and IECUBE in Figure 2-7-3)

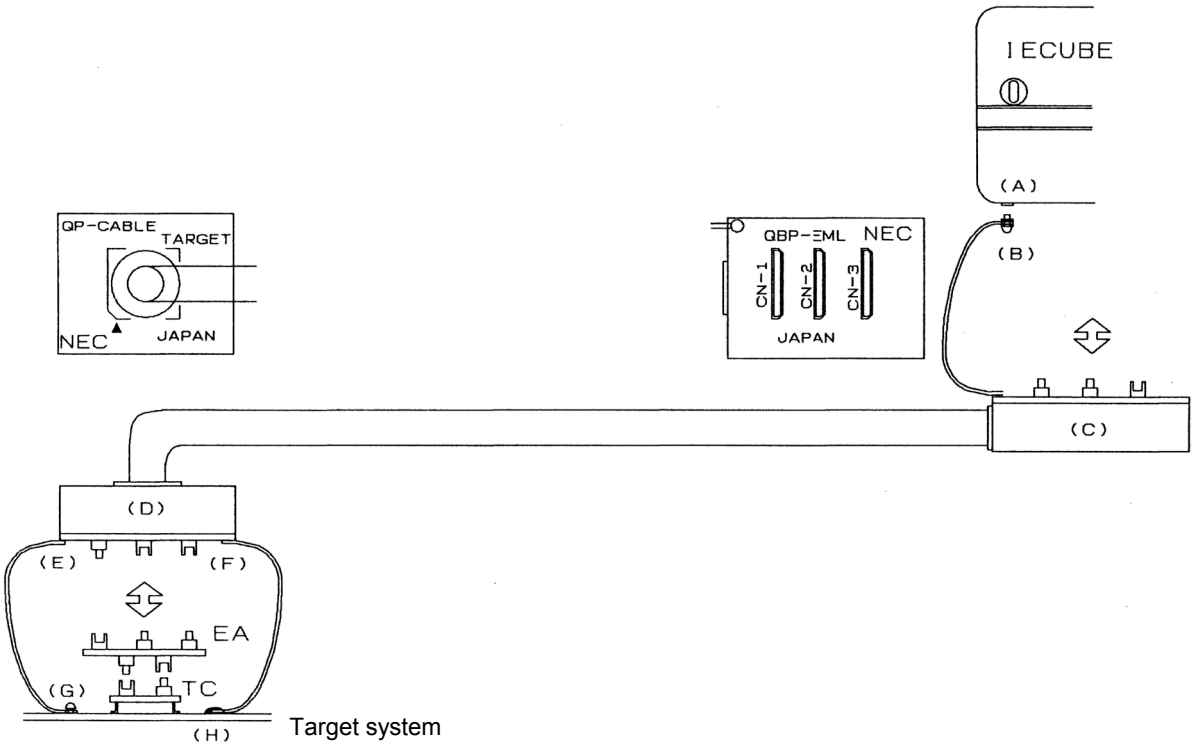


Figure 2-7-3. Connection of GND Lines

<3> Connect the exchange adapter and extension probe to the target connector.

<4> Connect two GND lines of the extension probe on the target system side to the GND block of the target system. If the pin or screw is fixed on the GND block of the target system, remove the transparent pin cover at the top of the GND line and fix the Y-branch pin of the GND line to the target system (**G** in Figure 2-7-3). In the same manner, if the GND pad on the target system is exposed, fix the Y-branch pin to the pad on the target system by soldering (**H** in Figure 2-7-3). (Recommended iron temperature: 300°C)

<5> If there is only one GND connector on the target system, connect one side and cut off the other GND lines using nippers, or leave it as is without removing the pin cover.

<6> The length of the GND line shank (insulation block) is approximately 60 mm. Therefore, as shown in Figure 2-7-4, at least one connectable GND is necessary within a radius of approximately 60 mm from the three locations on the extension probe at which the target system is connected. The GND lines on the emulation probe are soldered at the position of **J** and **K** in Figure 2-7-4. When soldering the GND line at the position of **L**, remove a GND line soldered at J or K and solder it at **L**.

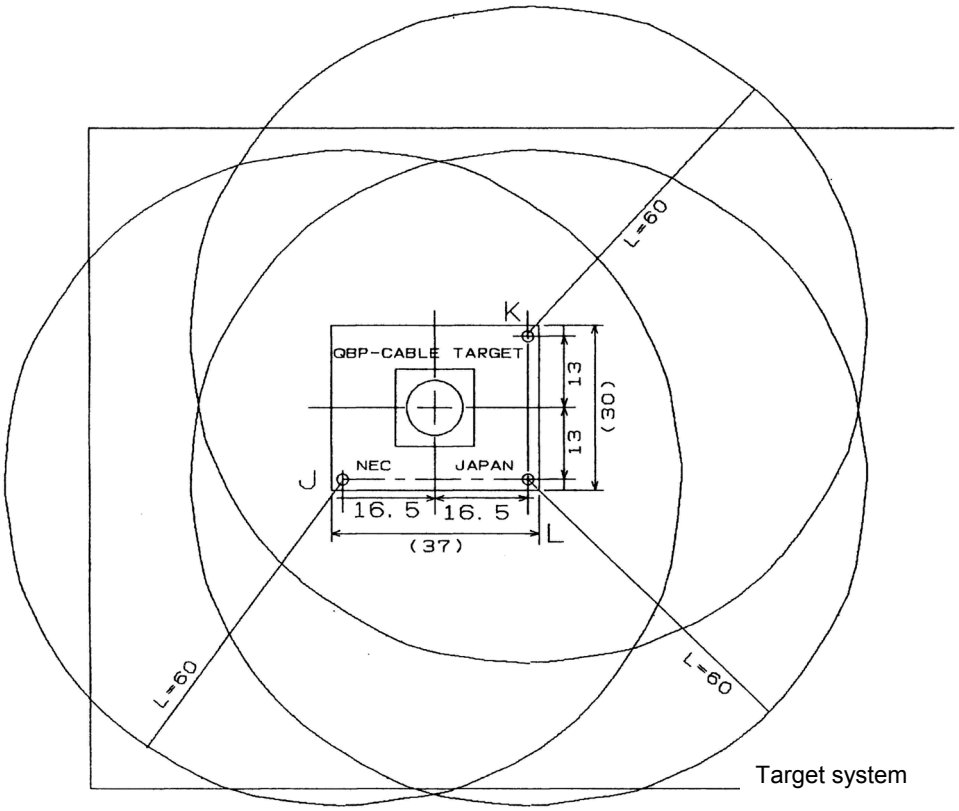


Figure 2-7-4. Location at Which GND Line Can Be Connected

(3) Maintaining insulation

When IECUBE and the target system are connected using the extension probe, adjust the height of IECUBE using the front spacer and rear spacer in order to maintain insulation with the target system.

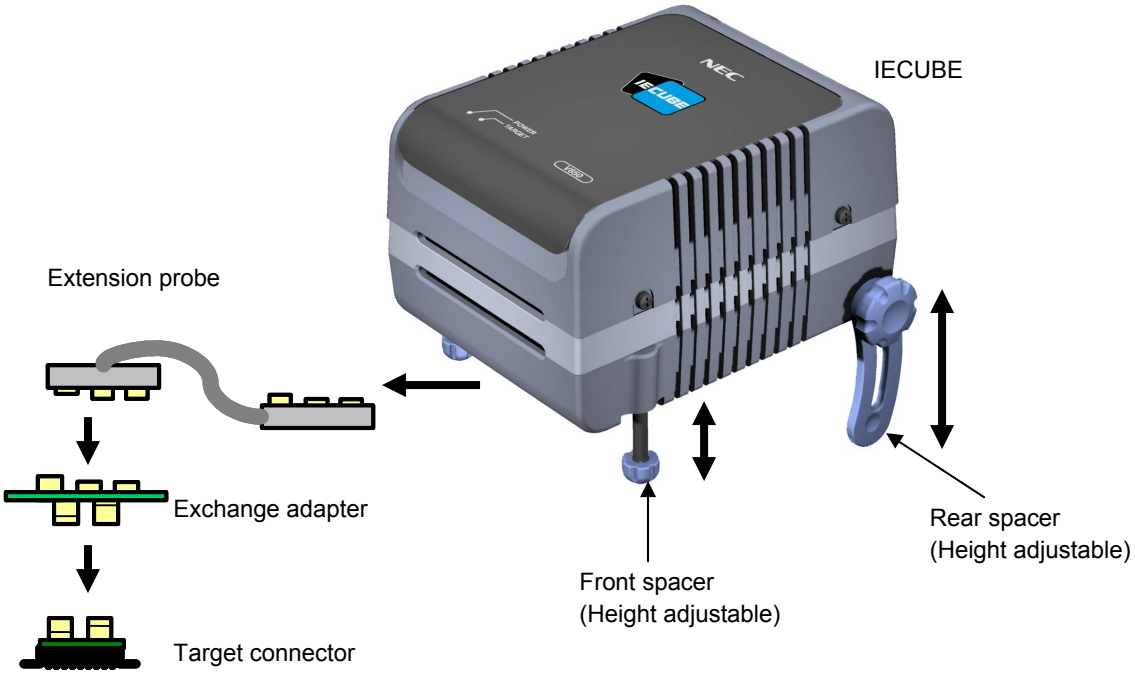


Figure 2-7-5. Connection When Using Extension Probe

(4) Cautions on using extension probe

Note the following points when using the extension probe.

- Be careful so that stress from the extension probe is not applied to the target connector. Hold the exchange adapter with your fingers when removing it so that no stress is applied to the target connector.
- Be sure to connect the GND line of the extension probe to IECUBE and the target system; otherwise the impedance of the cable becomes unstable, which may cause degradation of the signal transmission characteristics or distortion of the output waveform with respect to the input waveform.
- If the external bus interface is used when the extension probe is used, increase the data wait by one. (Increase the value set to the DWC register by one.)

2.8 Connecting USB Interface Cable and AC Adapter

Connect the computer and IECUBE using the USB interface cable supplied with IECUBE.

Insert the power supply connector on the rear side of IECUBE and insert the AC adapter plug supplied with IECUBE in the outlet. See **Figure 2-8-1** for the connector position of IECUBE.

The AC adapter can support voltages from 100 V to 240 V by exchanging the AC plug. A 100 V AC plug is mounted at shipment. To use IECUBE with 220 V or 240 V, exchange the AC plug for one that supports 220 V or 240 V (both included with IECUBE).

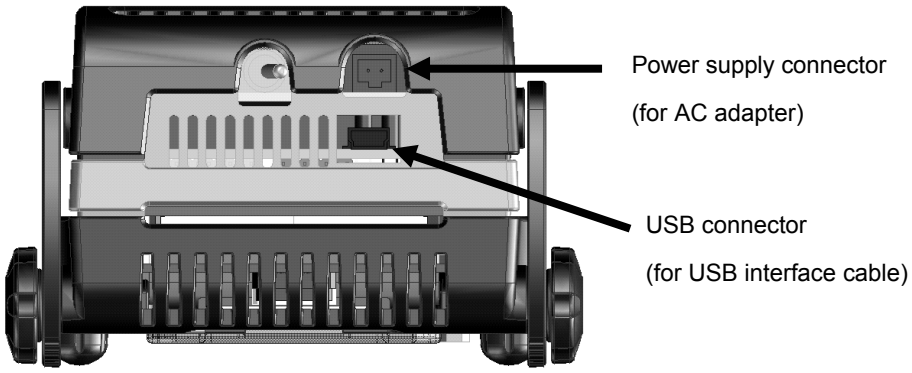


Figure 2-8-1. Connector Position

2.9 Power Application/Shutdown

Be sure follow the sequence shown below when activating or terminating the emulator; **otherwise the target system or IECUBE may be damaged**.

- When activating the emulator:

  Apply power to IECUBE → Apply power to the target system[Note] → Activates the debugger

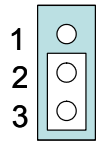
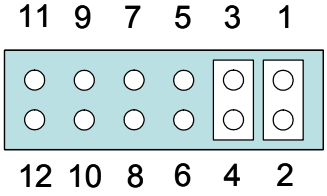
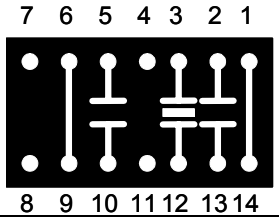
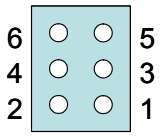
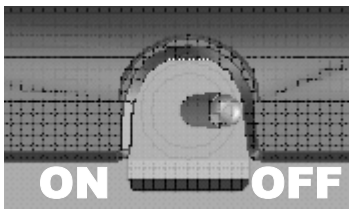
- When terminating the emulator:

  Terminate the debugger → Shut down power to the target system→ Shut down power to IECUBE

Note This step is not required when the target system is not connected.

CHAPTER 3 LIST OF FACTORY SETTINGS

Table 3-1-1. List of Factory Settings

Item	Settings	Remark
JP1		This switch is set to 2-3 shorted (when the target device is the V850ES/SG2). When the target device is the V850ES/SJ2, change the setting to 1-2 shorted. See **2.5 Target Device Settings** for details.
JP2		This switch is set to 1-2 shorted and 3-4 shorted. Do not change this setting. See **2.4 Clock Settings** for details.
Parts board		A 5 MHz resonator is mounted at the 3-12 pins. A 27 pF capacitor is mounted at the 2-13 pins and 5-10 pins. The frequency can be changed by configuring an oscillator on the parts board supplied with IECUBE. See **2.4 Clock Settings** for details.
CN8		All pins are left open. Do not change this setting.
Power supply switch		This switch is turned off at shipment.

CHAPTER 4 CAUTIONS

This chapter explains cautions on using the QB-V850ESSX2.

4.1 Caution on ROM Correction Function

The ROM correction function cannot be emulated. Evaluate this function using the target device.

4.2 Caution on Flash Self-Programming Function

The flash self-programming function cannot be emulated. Evaluate this function using the on-chip debug emulator or target device.

4.3 Caution on Non Map Break

If a program fetch is performed on the area that is not used by the program (unused area) in the emulator, normally a Non Map Break occurs. However, Non Map Breaks do not occur in the top 16 bytes of space in unused areas. (See **Figure 4-3-1**.)

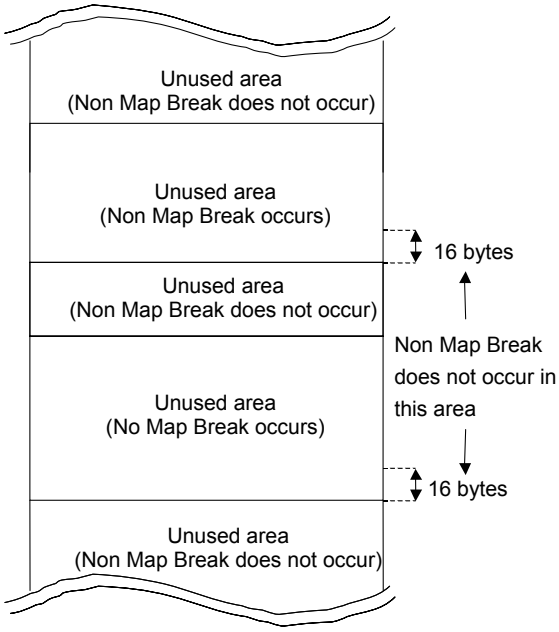


Figure 4-3-1. Break at Program Fetch from Unused Area

4.4 Caution on DBTRAP Instruction

The DBTRAP instruction cannot be used.

4.5 PSC Register Access

The debugger hangs up if a software break is set at the NOP instruction immediately after the PSC register is accessed.

Example

```
mov 0x2,r1
st.b r1,prcmd
st.b r1,psc
nop          ← The debugger hangs up if a software break is set here.
nop          ← Setting a software break hereafter causes no problem.
```

Use a hardware break to set a break immediately after the PSC register is accessed.

4.6 Caution on DBPC, DBPSW, and ECR Registers

The DBPC, DBPSW, and ECR registers cannot be accessed during a break.

If written, the written value is discarded. If read, 0 is always read.

4.7 Caution on Trace Display Order

When trace mode is used to display the access history, the displayed order may be reversed in the following two cases.

- When a read instruction and write instruction are performed in succession
- When a bit manipulation instruction that performs read, modify, and write at once (such as SET, NOT, CLR) is executed

The trace result is displayed as write and read in that order in both cases.

4.8 Caution on Extension Probe

If the external bus interface is used when the extension probe is used, increase the data wait by one. (Increase the value set to the DWC register by one.)

4.9 Simultaneous Execution of Two Instructions When Hardware Break Is Set

Suppose that two instructions are executed simultaneously and the first instruction is called “instruction A”, and the following instruction is called “instruction B” in this description. The execution result of these instructions is as shown in Table 4-9-1 when a hardware break is set. As a result, the break may occur at a different location from the set address, or the set break may not occur.

To avoid this bug, set a software break instead.

Table 4-9-1. Location at Which Set Break Occurs

No.	Instruction A	Instruction B	Execution Result
<1>	A break before execution is set.	No break setting	A break occurs before execution of instruction A.
<2>	A break after execution is set.	No break setting	A break occurs after execution of instruction B.
<3>	No break setting	A break before execution is set.	A break occurs before execution of instruction A.
<4>	No break setting	A break after execution is set.	A break occurs after execution of instruction B.
<5>	A break before execution is set.	A break before execution is set.	A break occurs before execution of instruction A.
<6>	A break before execution is set.	A break after execution is set.	A break occurs before execution of instruction A and after execution of instruction B.
<7>	A break after execution is set.	A break before execution is set.	A break occurs before execution of instruction A and after execution of instruction B.
<8>	A break after execution is set.	A break after execution is set.	A break occurs after execution of instruction B.

[Combination of instructions for which two instructions are simultaneously executed]

- Conditions in which “mov + operation instruction” are executed as one instruction

If dst of mov and dst of the operation instruction are the same register, except when that register is r0, in the combination “mov src, dst” and the following instruction:

Format I	satsubr/satsub/satadd/mulh
	or/xor/and
	subr/sub/add
Format II	shr/sar/shl/mulh

* This combination of instructions is executed as one instruction only when the mov instruction is at the first position.

- Condition for parallel execution of instructions

(1) Combination of following instructions and br

Format I	nop/mov/not/sld
	satsubr/satsub/satadd/mulh
	or/xor/and/tst
	subr/sub/add/cmp
Format II	mov/satadd/add/cmp
	shr/sar/shl/mulh
Format IV	sld.b/sst.b/sld.h/sst.h/sld.w/sst.w

(2) Combination of following instructions (instructions that do not update flags) and bcc instruction except br

Format I	nop/mov/sld
	mulh/sxb/sxh/zxb/zxh
Format II	mov/mulh
Format IV	sld.b/sst.b/sld.h/sst.h/sld.w/sst.w

(3) Combination of following instructions and sld

Format I	nop/mov/not
	satsubr/satsub/satadd/mulh
	or/xor/and/tst
	subr/sub/add/cmp
Format II	mov/satadd/add/cmp
	shr/sar/shl/mulh

* In (1) to (3) above, parallel execution is performed only when br/bcc/sld instruction is at the second position of the above combination of instructions.

*** Formats I, II, and IV are the instruction formats shown in the V850E1 Architecture User’s Manual.**

In the following cases, parallel execution is not performed even in the above combination.

a) If the first instruction is the first instruction after branch to unaligned word

Example

```
0x1006    mov r10,r12
0x1008    sld.b 0x8[ep],r11
```

If a branch to address 0x1006 is executed, two instructions are not executed at the same time because the first instruction is a branch to an unaligned word (the LSB is neither 0, 4, 8, A, nor C).

b) If the second instruction is sld and if writing to the register of ep is not completed

Example

```
0x1004    mov r10,ep
0x1006    sld.b 0x8[ep],r11
```

In this case, the mov instruction at address 0x1004 writes the value of r10 to the ep register. When the sld.b instruction at address 0x10068 is executed, however, WB (writeback) of the mov instruction is not completed and therefore, the two instructions are not executed at the same time.

c) If the second instruction is bcc (conditional branch instruction) and flag hazard occurs
(if there is a possibility that the flag is updated immediate before or by the preceding instruction)

Example

```
0x1004    cmp r0,r10
0x1006    bn 0xf0
```

Because the S flag is changed by the cmp instruction at address 0x1004, the bn instruction that references the S flag and branches must wait for execution of the cmp instruction. Consequently, a flag hazard occurs when the bn instruction is executed, and two instructions are not executed at the same time.

d) If sld is used and the load buffer of both the instructions are in the WB wait status

Example

Suppose the following instructions are located in memory

```
0x1000    nop
0x1002    nop
0x1004 ld.w 0x3000[r10],r11
0x1008 ld.w 0x3004[r10],r12
0x100c mov r8,r9
0x100e sld.b 0x10[ep],r13
```

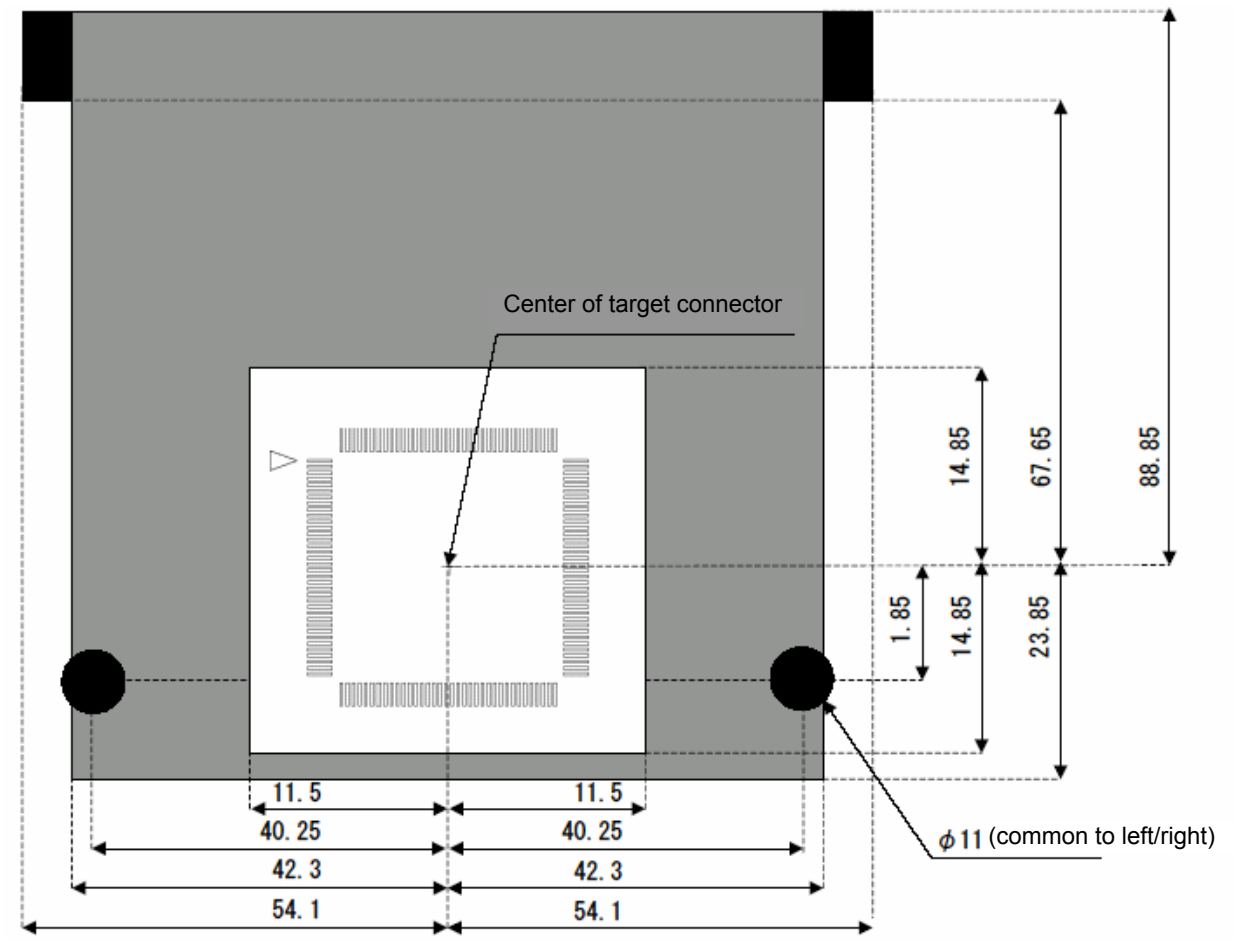
At this time, several wait state clocks are inserted if ld.w at addresses 0x1004 and 0x1008 accesses the external memory. When address 0x100e is executed, therefore, WB of the ld.w instruction at addresses 0x1004 and 0x1008 is not completed and “WB wait” status begins. Consequently, the two instructions at addresses 0x100c and 0x100e are not executed at the same time.

CHAPTER 5 NOTES ON TARGET SYSTEM DESIGN

This chapter explains notes on target system design, including areas in which parts should not be mounted on the target system and the area that has a height restriction on the mounting parts.

5.1 When Extension Probe Is Not Used

5.1.1 V850ES/SJ2



: Exchange adapter area; parts of up to 4.2 mm in height can be mounted[Note]

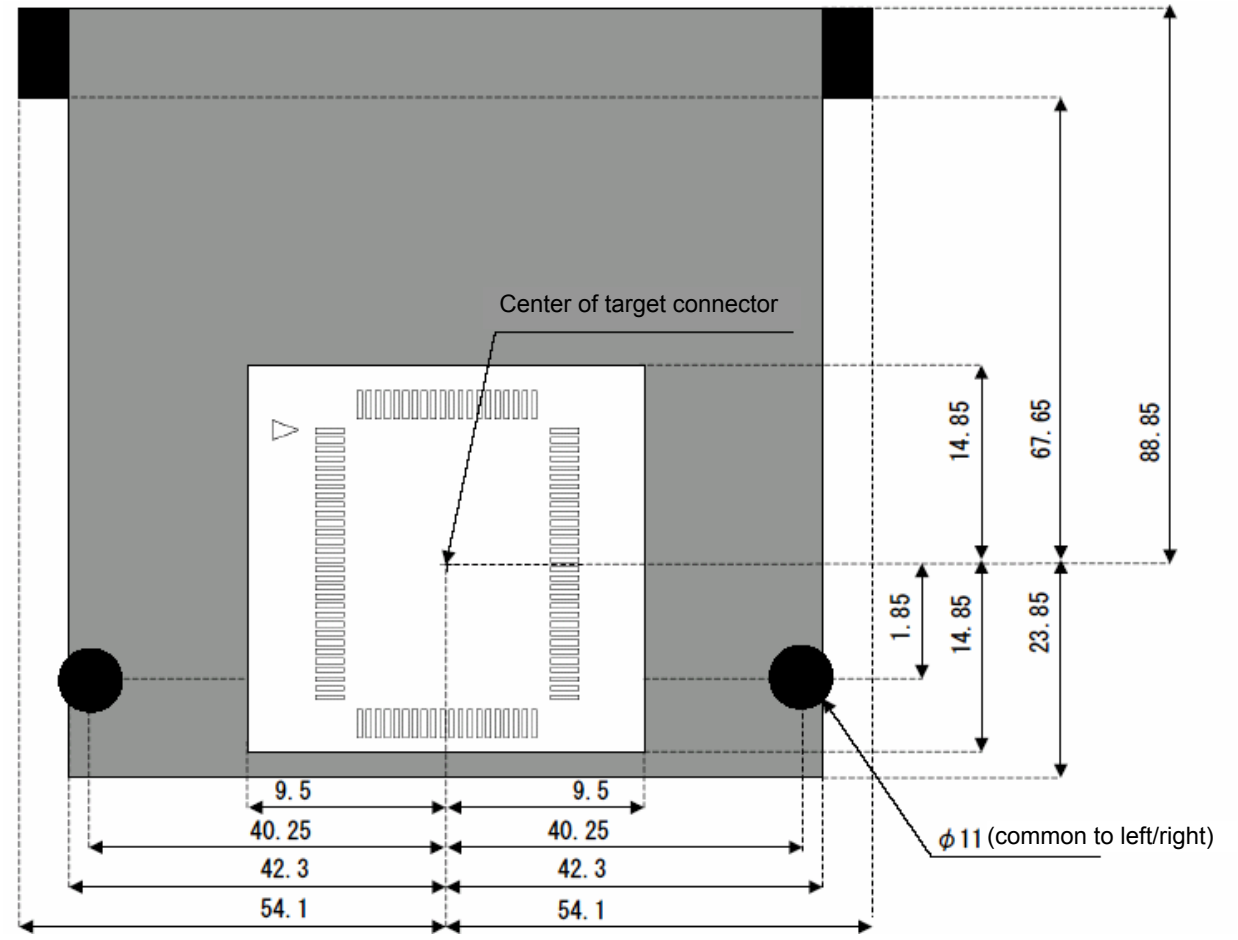
: IECUBE unit area; parts of up to 1 mm in height can be mounted[Note]

: IECUBE spacer area; mounting parts prohibited

Note The height can be adjusted using the spacer adapter (can increase by 5.6 mm per unit)

Figure 5-1-1. V850ES/SJ2

5.1.2 V850ES/SG2 (100-pin GF package)



: Exchange adapter area; parts of up to 4.2 mm in height can be mounted[Note]

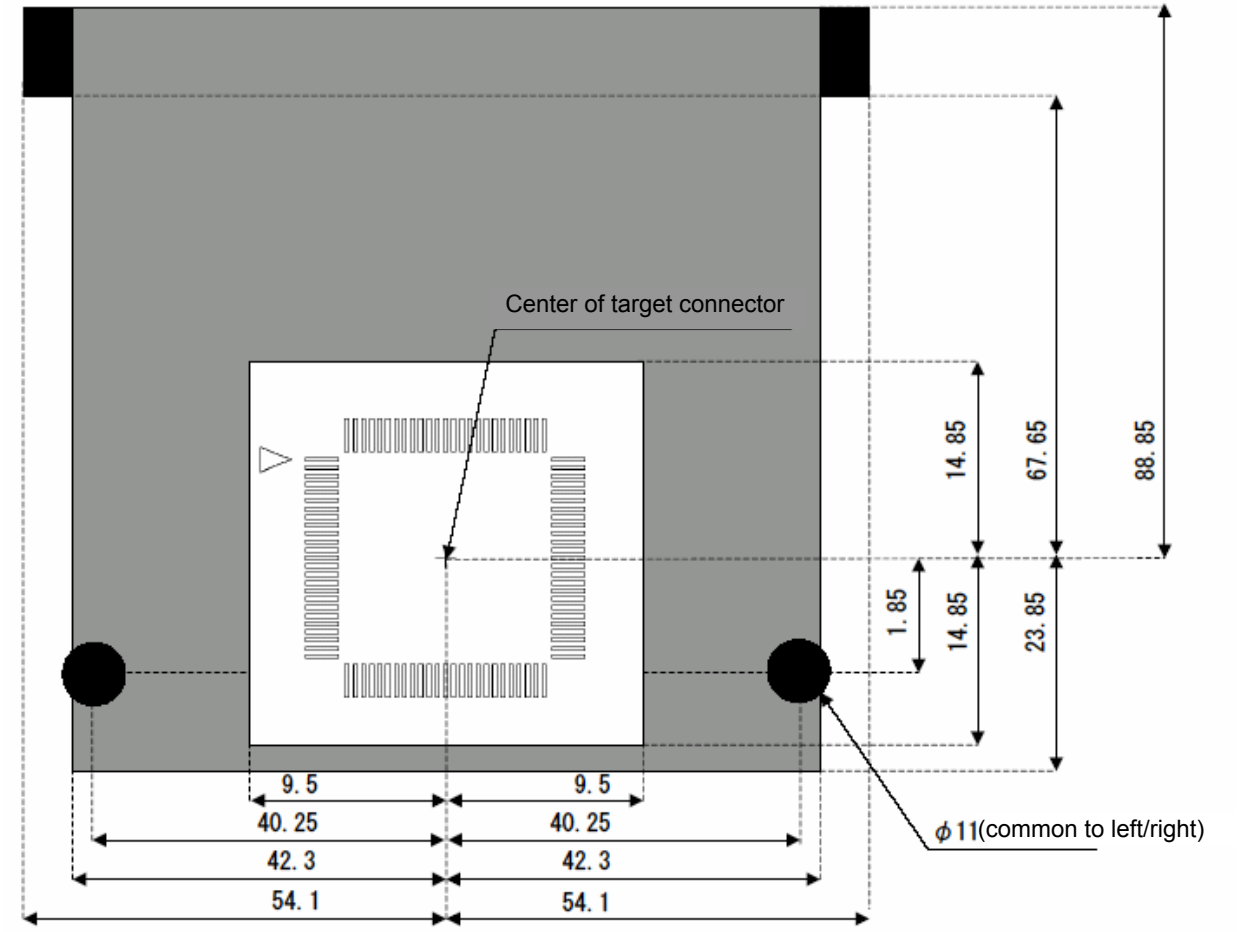
: IECUBE unit area; parts of up to 1 mm in height can be mounted[Note]

: IECUBE spacer area; mounting parts prohibited

Note The height can be adjusted using the spacer adapter (can increase by 5.6 mm per unit)

Figure 5-1-2. V850ES/SG2 (100-Pin GF Package)

5.1.3 V850ES/SG2 (100-pin GC package)



: Exchange adapter area; parts of up to 4.2 mm in height can be mounted[Note]

: IECUBE unit area; parts of up to 1 mm in height can be mounted[Note]

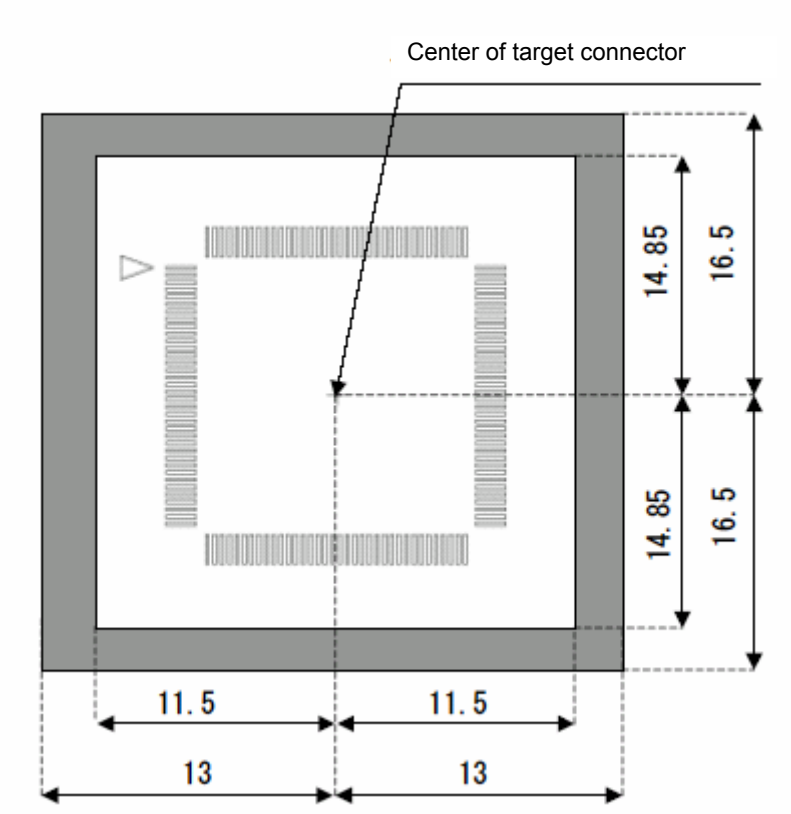
: IECUBE spacer area; mounting parts prohibited

Note The height can be adjusted using the spacer adapter (can increase by 5.6 mm per unit)

Figure 5-1-3. V850ES/SG2 (100-Pin GC Package)

5.2 When Extension Probe Is Used

5.2.1 V850ES/SJ2



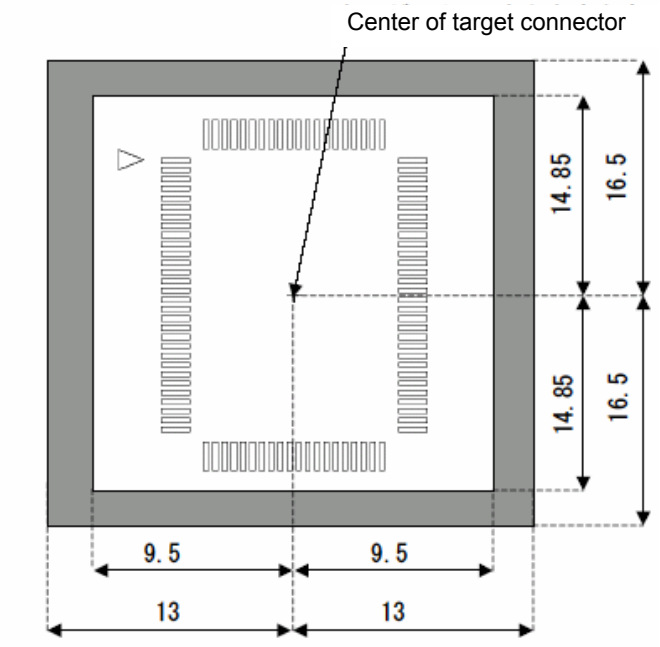
□ : Exchange adapter area; parts of up to 4.2 mm in height can be mounted[Note]

▒ : Extension probe top area; parts of up to 13.2 mm in height can be mounted[Note]

Note The height can be adjusted using the spacer adapter (can increase by 5.6 mm per unit)

Figure 5-2-1. V850ES/SJ2

5.2.2 V850ES/SG2 (100-pin GF package)



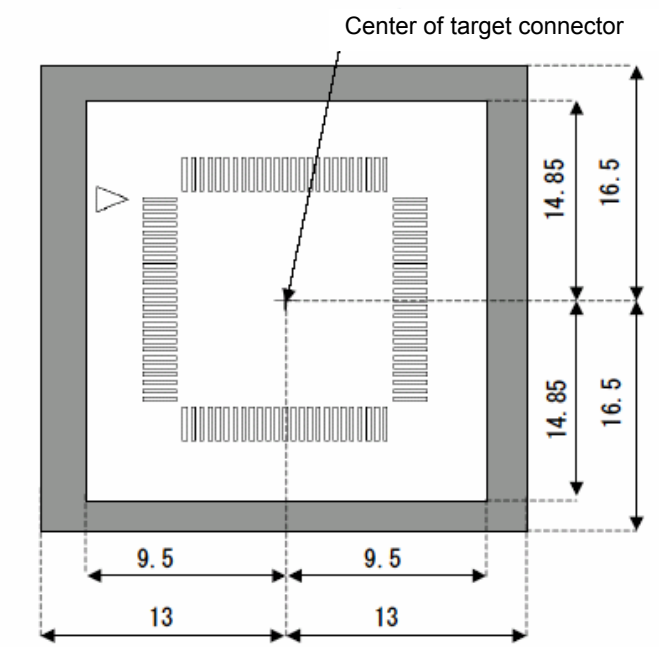
□ : Exchange adapter area; parts of up to 4.2 mm in height can be mounted[Note]

▒ : Extension probe connector area; parts of up to 13.2 mm in height can be mounted[Note]

Note The height can be adjusted using the spacer adapter (can increase by 5.6 mm per unit)

Figure 5-2-2. V850ES/SG2 (100-Pin GF Package)

5.2.3 V850ES/SG2 (100-pin GC package)



□ : Exchange adapter area; parts of up to 4.2 mm in height can be mounted[Note]

▒ : Extension probe connector area; parts of up to 13.2 mm in height can be mounted[Note]

Note The height can be adjusted using the spacer adapter (can increase by 5.6 mm per unit)

Figure 5-2-3. V850ES/SG2 (100-Pin GF Package)

CHAPTER 6 CONNECTOR PROBE PACKAGE DRAWINGS

6.1 Target Connector

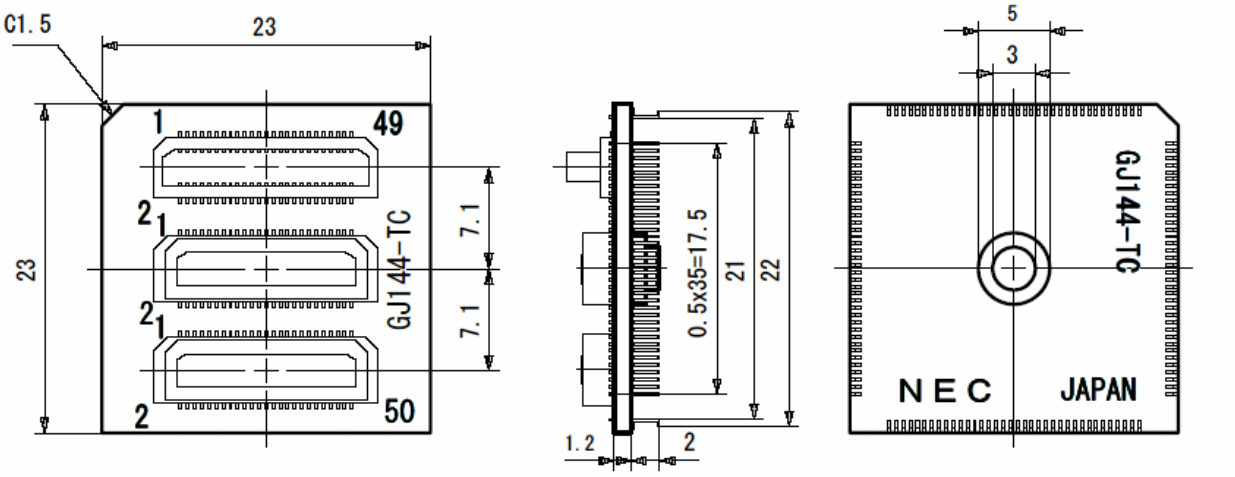


Figure 6-1-1. Target Connector for V850ES/SJ2

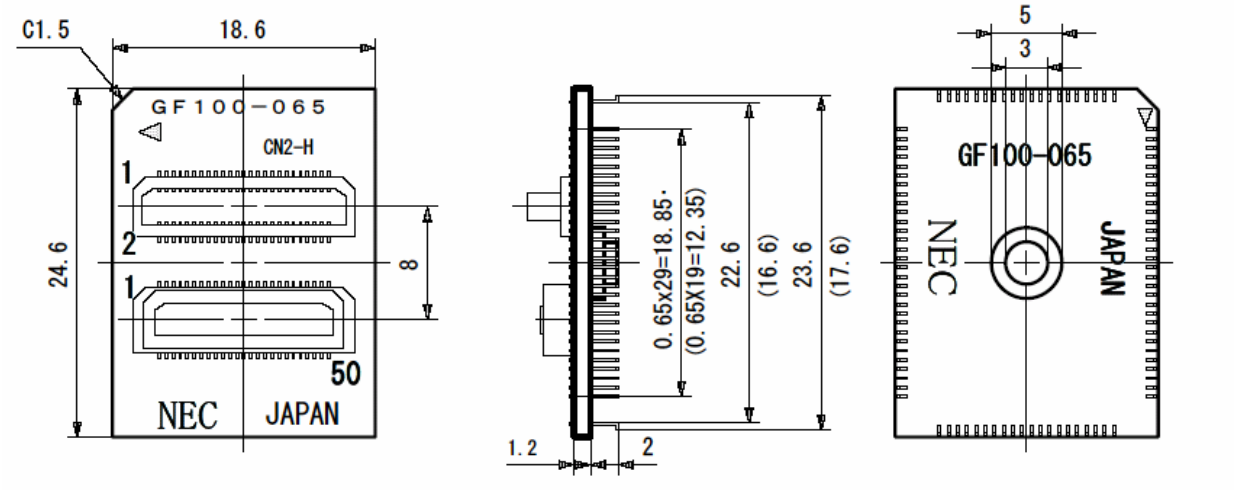


Figure 6-1-2. Target Connector for V850ES/SG2 (100-Pin GF Package)

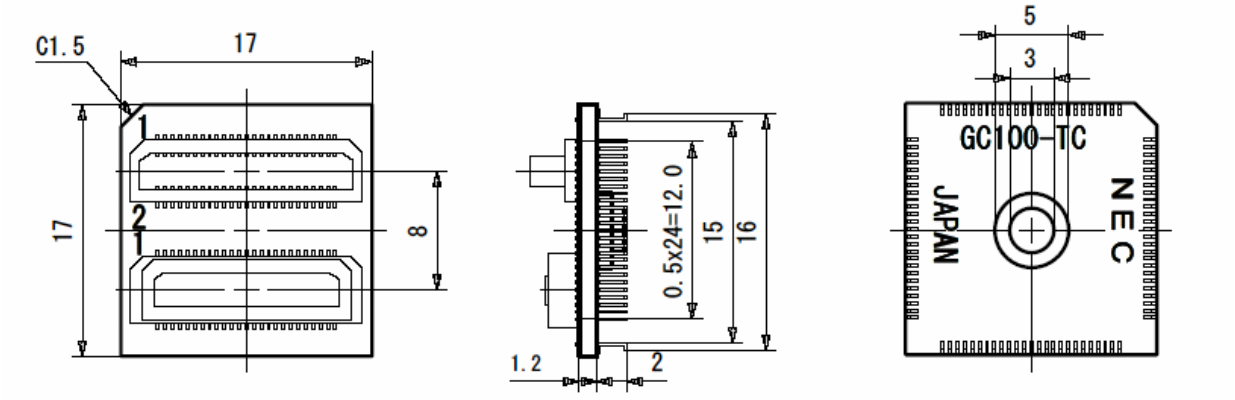


Figure 6-1-3. Target Connector for V850ES/SG2 (100-Pin GC Package)

6.2 Foot Patterns of Target Connectors

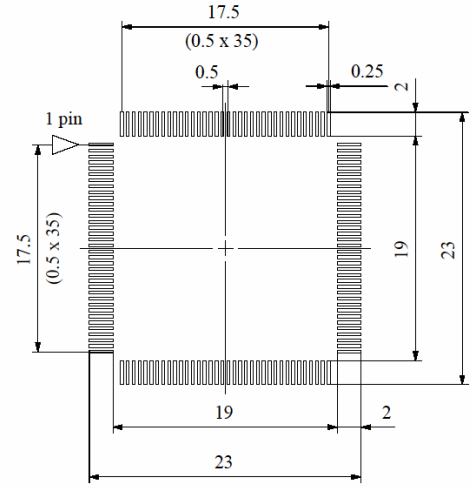


Figure 6-2-1. Foot Pattern of Target Connector for V850ES/SJ2

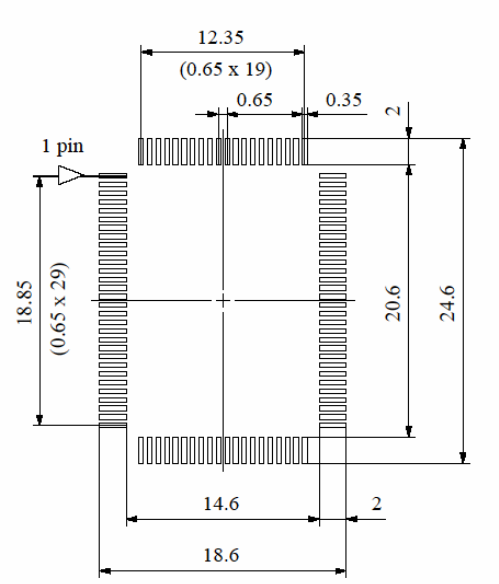


Figure 6-2-2. Foot Pattern of Target Connector for V850ES/SG2 (100-Pin GF Package)

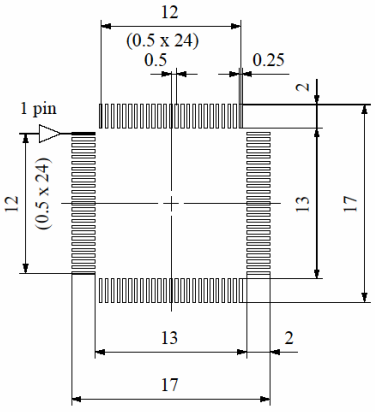


Figure 6-2-3. Foot Pattern of Target Connector for V850ES/SG2 (100-Pin GC Package)

6.3 Exchange Adapter

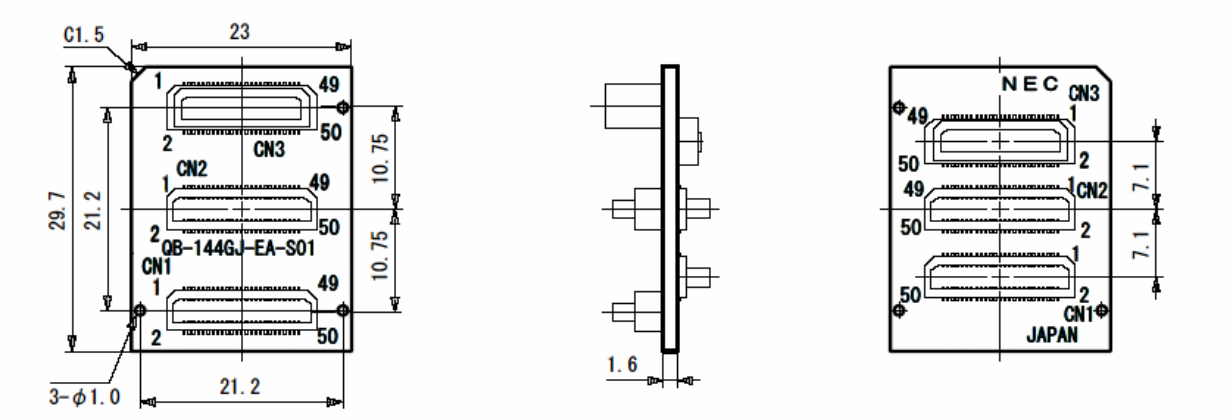


Figure 6-3-1. Exchange Adapter for V850ES/SJ2

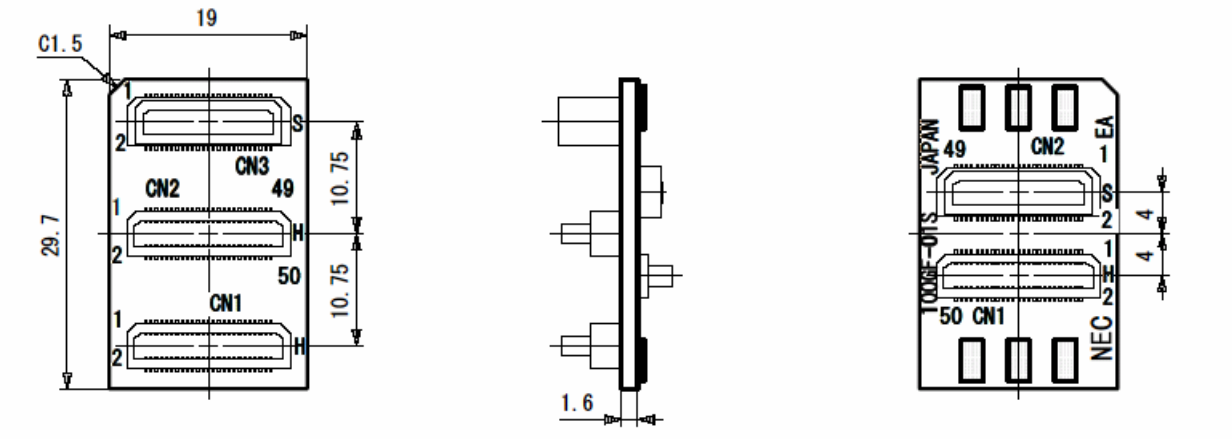


Figure 6-3-2. Exchange Adapter for V850ES/SG2 (100-Pin GF Package)

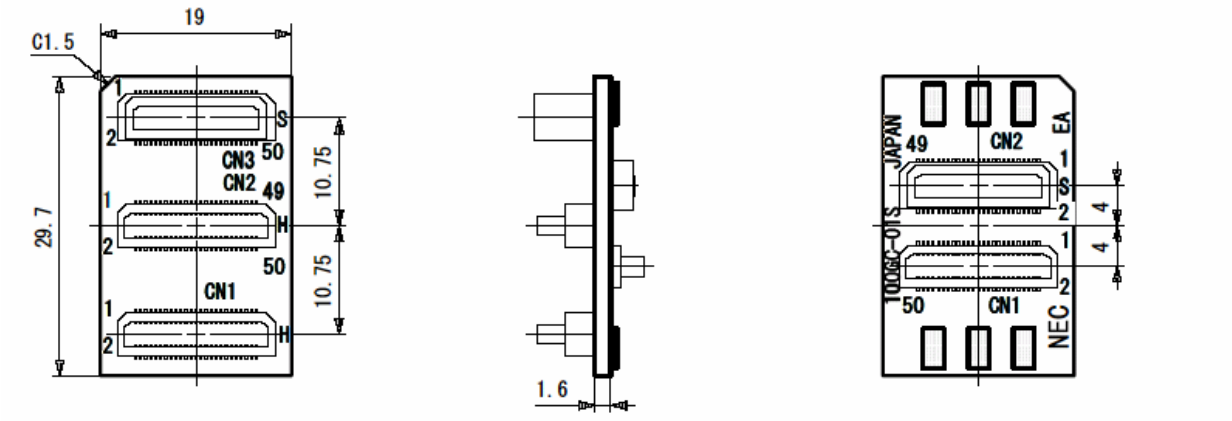


Figure 6-3-3. Exchange Adapter for V850ES/SG2 (100-Pin GC Package)

6.4 Mounting Adapter

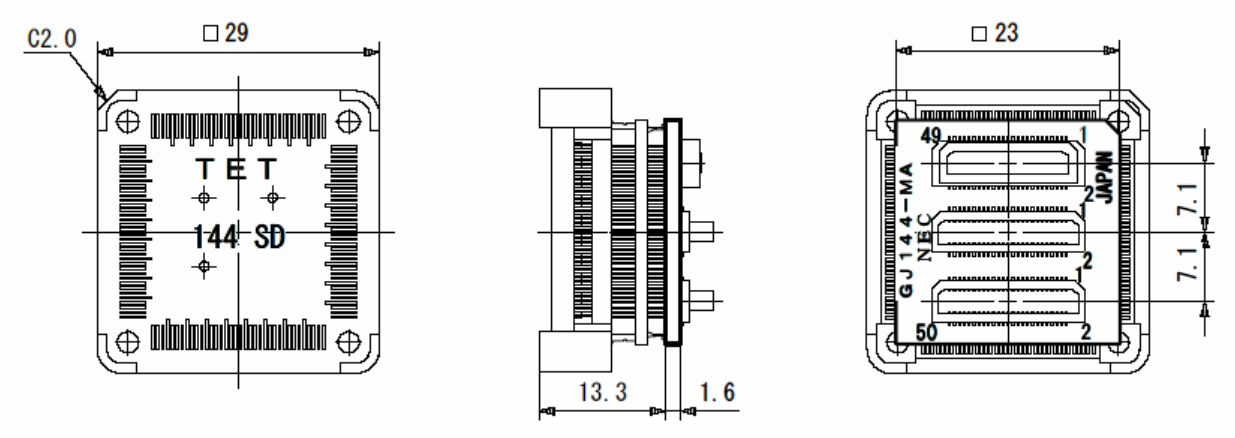


Figure 6-4-1. Mounting Adapter for V850ES/SJ2

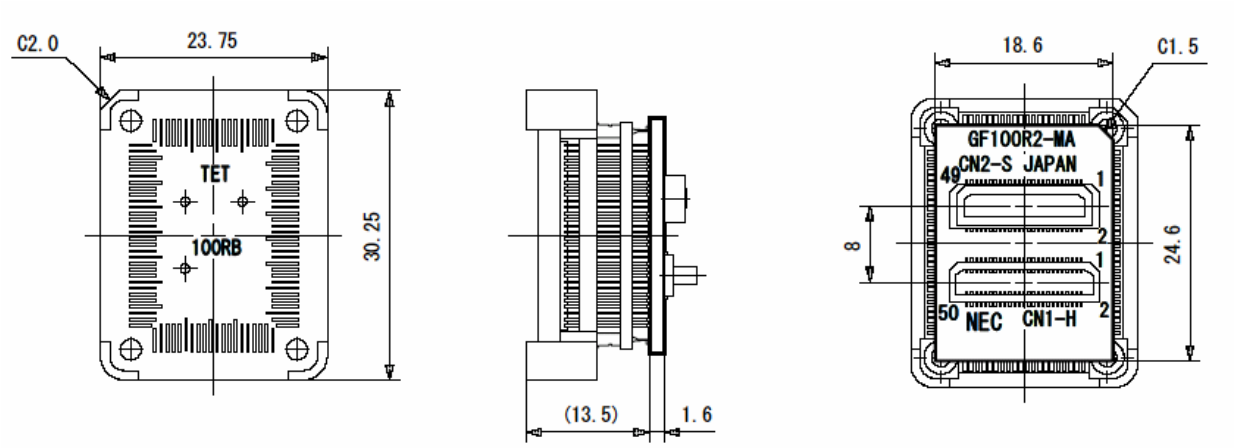


Figure 6-4-2. Mounting Adapter for V850ES/SG2 (100-Pin GF Package)

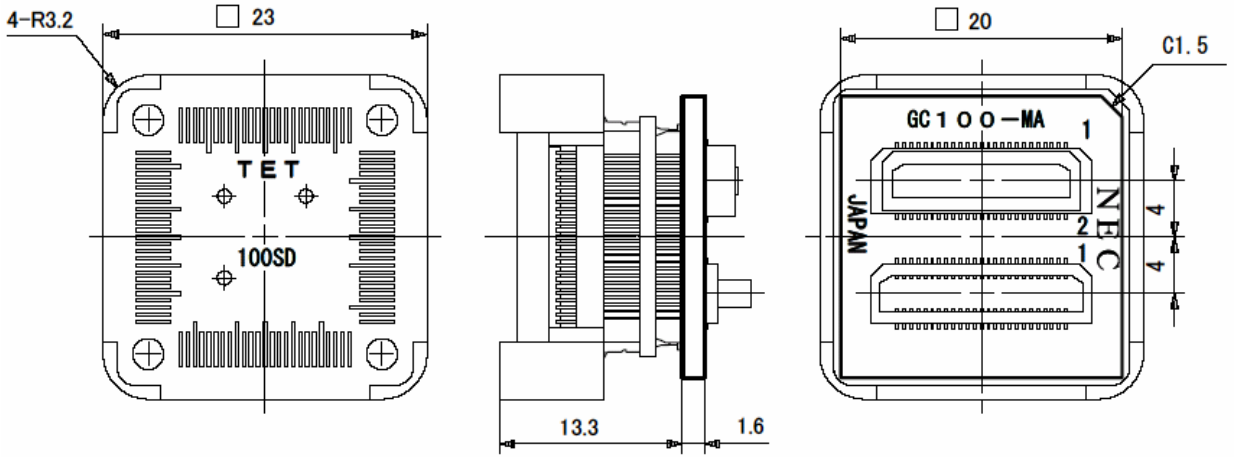


Figure 6-4-3. Mount Adapter for V850ES/SG2 (100-Pin GC Package)

6.5 Check Pin Adapter

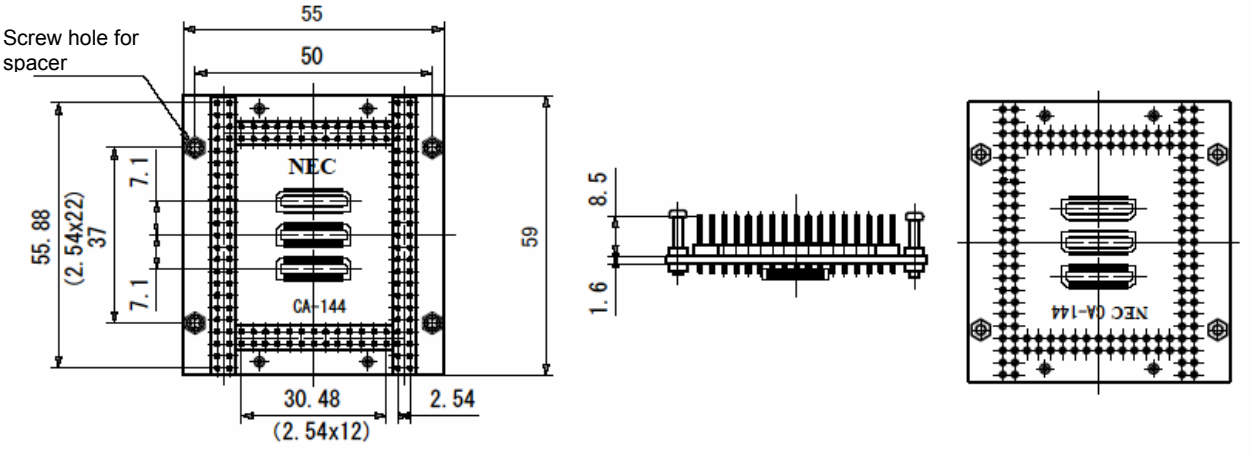


Figure 6-5-1. Check Pin Adapter for V850ES/SJ2

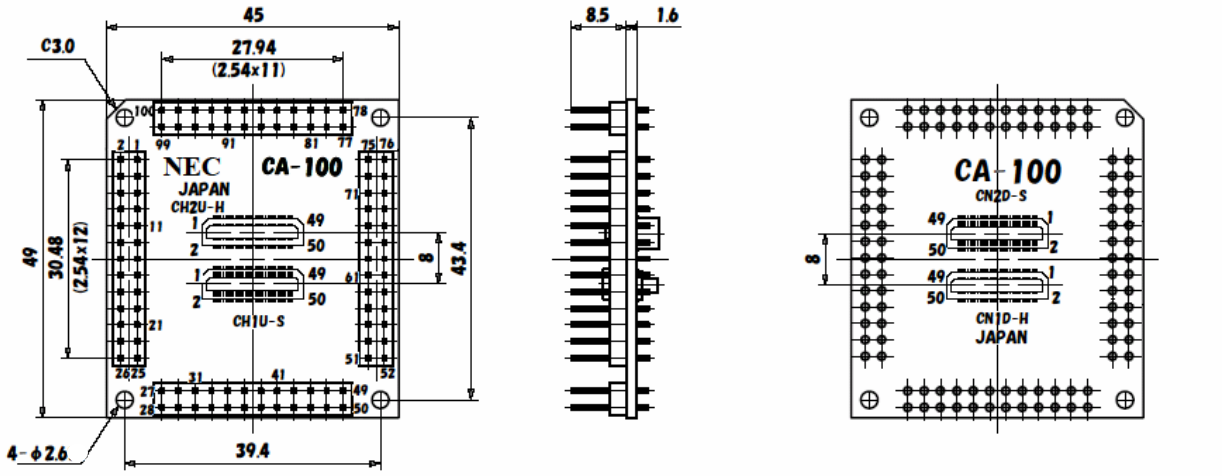


Figure 6-5-2. Check Pin Adapter for V850ES/SG2

6.6 Spacer Adapter

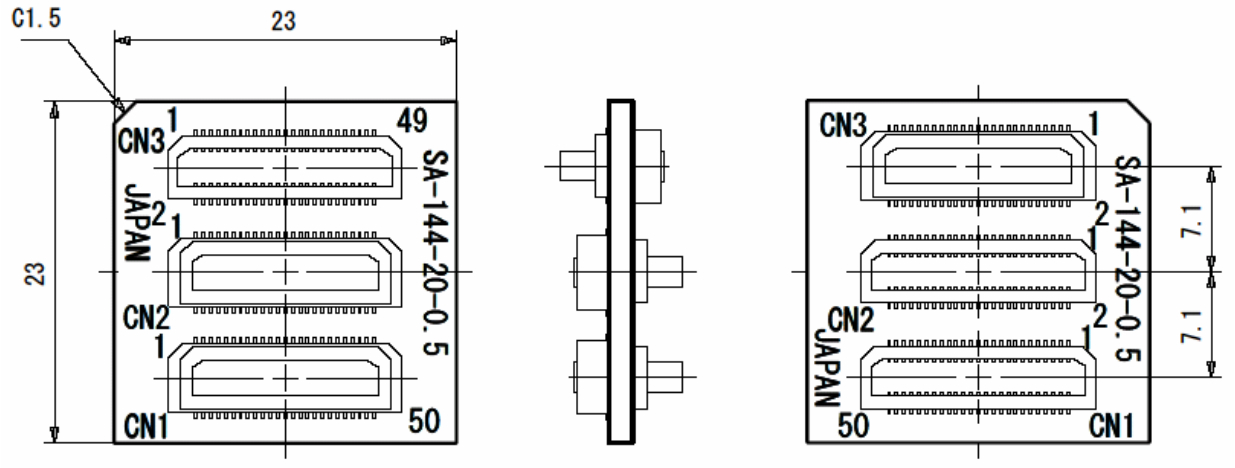


Figure 6-6-1. Spacer Adapter for V850ES/SJ2

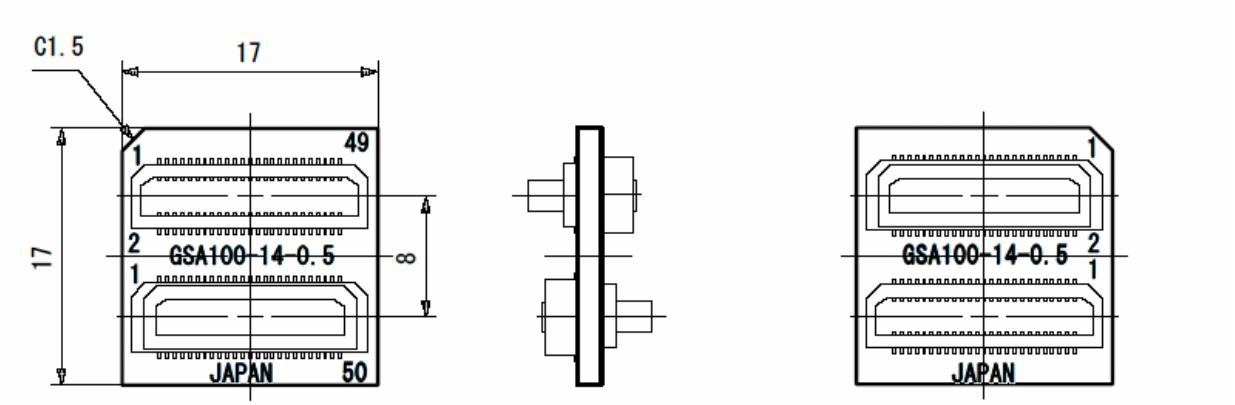


Figure 6-6-2. Spacer Adapter for V850ES/SG2

6.7 Extension Probe

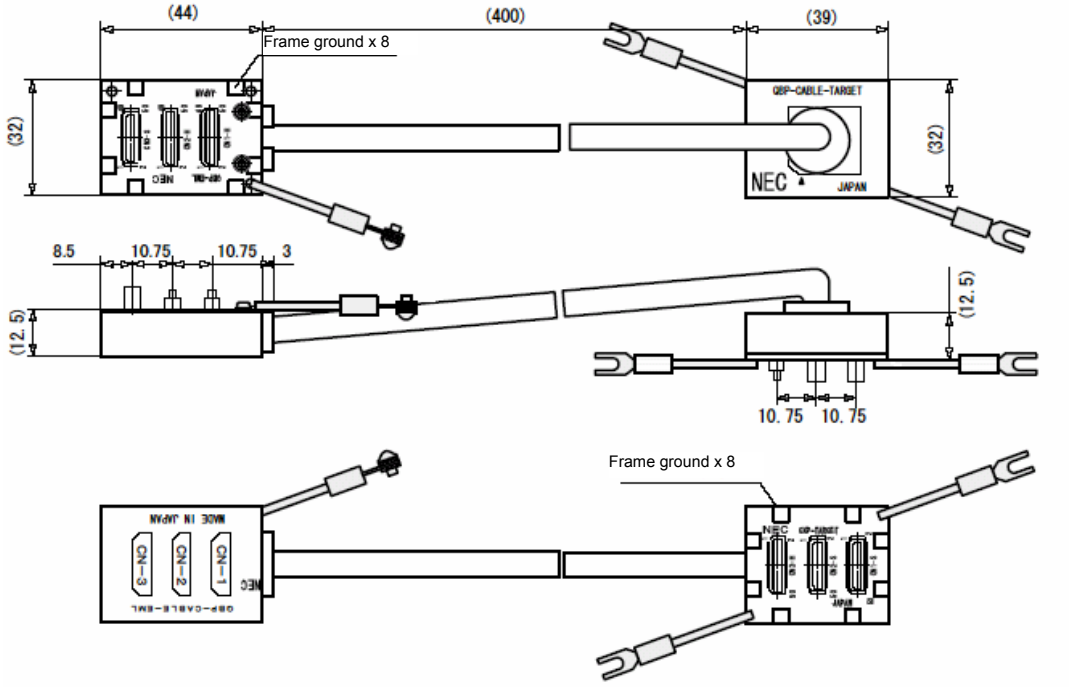


Figure 6-7-1. Extension Probe