CUSTOMER NOTIFICATION

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CP(K),O

Preliminary User's Manual

QB-V850ESFJ3

In-Circuit Emulator

Target Devices

V850ES/FE3
V850ES/FF3
V850ES/FG3
V850ES/FJ3

[MEMO]

General Precautions for Handling This Product

1. Circumstances not covered by product guarantee
   - If the product was disassembled, altered, or repaired by the customer
   - If it was dropped, broken, or given another strong shock
   - Use at overvoltage, use outside guaranteed temperature range, storing outside guaranteed temperature range
   - If power was turned on while the AC adapter, USB interface cable, or connection to the target system was in an unsatisfactory state
   - If the cable of the AC adapter, the USB interface cable, the extension probe, or the like was bent or pulled excessively
   - If an AC adapter other than the supplied product was used
   - If the product got wet
   - If this product is connected to the target system when there is a potential difference between the GND of this product and GND of the target system.
   - If the connectors or cables are plugged/unplugged while this product is in the power-on state.
   - If excessive load is applied to the connectors or sockets.[Note]
   - If a metal part of the power switch, cooling fan, or another such part comes in contact with an electrostatic charge

Note For details on handling, refer to **2.5 Mounting and Connecting Connectors (When Using S Type)** or **2.6 Mounting and Connecting Connectors (When Using T Type)**.

2. Safety precautions
   - If used for a long time, the product may become hot (50°C to 60°C). Be careful of low temperature burns and other dangers due to the product becoming hot.
   - Be careful of electrical shock. There is a danger of electrical shock if the product is used as described above in **1 Circumstances not covered by product guarantee**.

INTRODUCTION

Readers

This manual is intended for users who wish to perform debugging using the QB-V850ESFJ3. The readers of this manual are assumed to be familiar with the device functions and usage, and to have knowledge of debuggers.

Purpose

This manual is intended to give users an understanding of the basic specifications and correct usage of the QB-V850ESFJ3.

Organization

This manual is divided into the following sections.

- General
- Setup procedure
- Settings at product shipment
- Cautions
- Notes on target system design
- Optional functions

How to Read This Manual

It is assumed that the readers of this manual have general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers.
This manual describes the basic setup procedures and how to set switches.

To understand the overall functions and usages of the QB-V850ESFJ3
→ Read this manual according to the **CONTENTS**.

To know the manipulations, command functions, and other software-related settings of the QB-V850ESFJ3
→ See the user's manual of the debugger (supplied with the QB-V850ESFJ3) to be used.

Conventions

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

Prefix indicating power of 2 (address space, memory capacity):
K (kilo): 2^{10} = 1,024
M (mega): 2^{20} = $1,024^2$

Terminology

The meanings of the terms used in this manual are described in the table below.

Term	Meaning
Target device	This is the device to be emulated.
Target system	This is the system to be debugged (system provided by the user). This includes the target program and the hardware provided by the user.
IECUBE®	Generic name for NEC Electronics' high-performance, compact in-circuit emulator.

Related Documents

Please use the following documents in combination with this manual.
The related documents listed below 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-V850ESFJ3 In-Circuit Emulator		This document
CA850 Ver. 3.00 C Compiler Package	Operation	U17293E
	C Language	U17291E
	Assembly Language	U17292E
	Link Directives	U17294E
ID850QB Ver. 3.10 Integrated Debugger	Operation	U17435E
SM+ System Simulator	Operation	U17246E
	User Open Interface	U17247E
RX850 Ver. 3.20 Real-Time OS	Basics	U13430E
	Installation	U17419E
	Technical	U13431E
	Task Debugger	U17420E
RX850 Pro Ver. 3.20 Real-Time OS	Basics	U13773E
	Installation	U17421E
	Technical	U13772E
	Task Debugger	U17422E
AZ850 Ver. 3.30 System Performance Analyzer		U17423E
PM+ Ver. 6.00 Project Manager		U17178E

Caution The related documents listed above are subject to change without notice. Be sure to use the latest version of each document for designing, etc.

CONTENTS

CHAPTER 1 GENERAL

The QB-V850ESFJ3 is an in-circuit emulator for emulating the V850ES/FE3, V850ES/FF3, V850ES/FG3, or V850ES/FJ3.

Hardware and software can be debugged efficiently in the development of systems in which the V850ES/FE3, V850ES/FF3, V850ES/FG3, or V850ES/FJ3 is used. This manual descries basic setup procedures, hardware specifications, system specifications, and how to set switches.

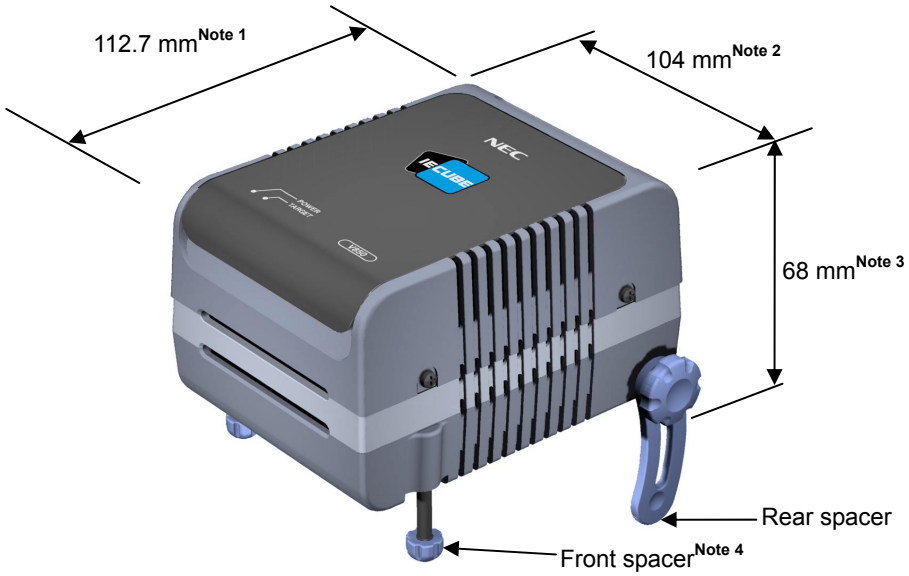
1.1 Hardware Specifications

Table 1-1. QB-V850ESFJ3 Hardware Specifications

Parameter		Specification
Target device		V850ES/FE3, V850ES/FF3, V850ES/FG3, V850ES/FJ3
Target system interface voltage[Note]		V_{DD} = EV_{DD} = BV_{DD}, AV_{REF0} V_{SS} = EV_{SS} = BV_{SS} = AV_{SS} = 0 V
	V_{DD} = EV_{DD} = BV_{DD}	3.5 to 5.5 V
	AV_{REF0}	4.0 to 5.5 V
Maximum operating frequency		48 MHz
Operating temperature range		0 to 40°C (No condensation)
Storage temperature range		–15 to 60°C (No condensation)
External dimensions		See **Figure 1-1**.
Power consumption	AC adapter	15 V, 1 A
	Target system power supply	Same level or lower than target device (except for the case in standby mode)
Weight		382 g
Host interface		USB interface (1.1, 2.0)

Note BV_{DD} and BV_{SS} are not available in the V850ES/FE3 and V850ES/FF3.

Figure 1-1. External Dimensions



Notes 1. Does not include projection of power switch

2. Includes projection of screw that fixes rear spacer

3. Front spacer can vary from 30 mm (longest) to 0 mm (shortest).

4. Front spacer can vary from 20 mm (longest) to 5 mm (shortest).

1.2 System Specifications

This section shows the QB-V850ESFJ3 system specifications.

Table 1-2. QB-V850ESFJ3 System Specifications (When IS850QB Is Used)

Parameter		Specification
Emulation memory capacity	Internal ROM	1 MB max.
	Internal RAM	60 KB max.
	External memory	16 MB max. (optional[Note]) (mapping possible in 1 MB units)
Program execution functions	Real-time execution function	Go, Start from Here, Go & Go, Come Here, Restart, Return Out
	Non-real-time execution function	Step In, Next Over, Slowmotion
Break functions	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, forced break, timer overflow break
Trace functions	Trace data types	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 modes	Real-time trace, Complete trace
	Trace events	Delay trigger, section, qualify
	Memory capacity	256K frames
Real-time RAM monitoring function		256 bytes × 8 points
Time measurement functions	Measurement clock	Measurement-dedicated clock or CPU clock
	Measurement objects	Beginning through end of program execution Start event through end event
	Maximum measurement time	Approximately 195 hours (When using measurement-dedicated clock)
	Minimum resolution	20 ns
	Number of timers for measurement	8
	Measurement results	Execution time (Start through end of execution) Maximum, minimum, average, pass count (between events)
	Other	Timer overflow break function (1 point)
TimeMachine™ function (optional[Note])		Consult a GHS tool distributor.
Coverage function (optional[Note 1])		Detection of execution or pass
	Measured range	Internal ROM space + arbitrary 1 MB space
Other functions		Mapping function, event function, register manipulation function, memory manipulation function

Note See **CHAPTER 6 OPTIONAL FUNCTIONS**.

Caution Some functions are not supported depending on the debugger.

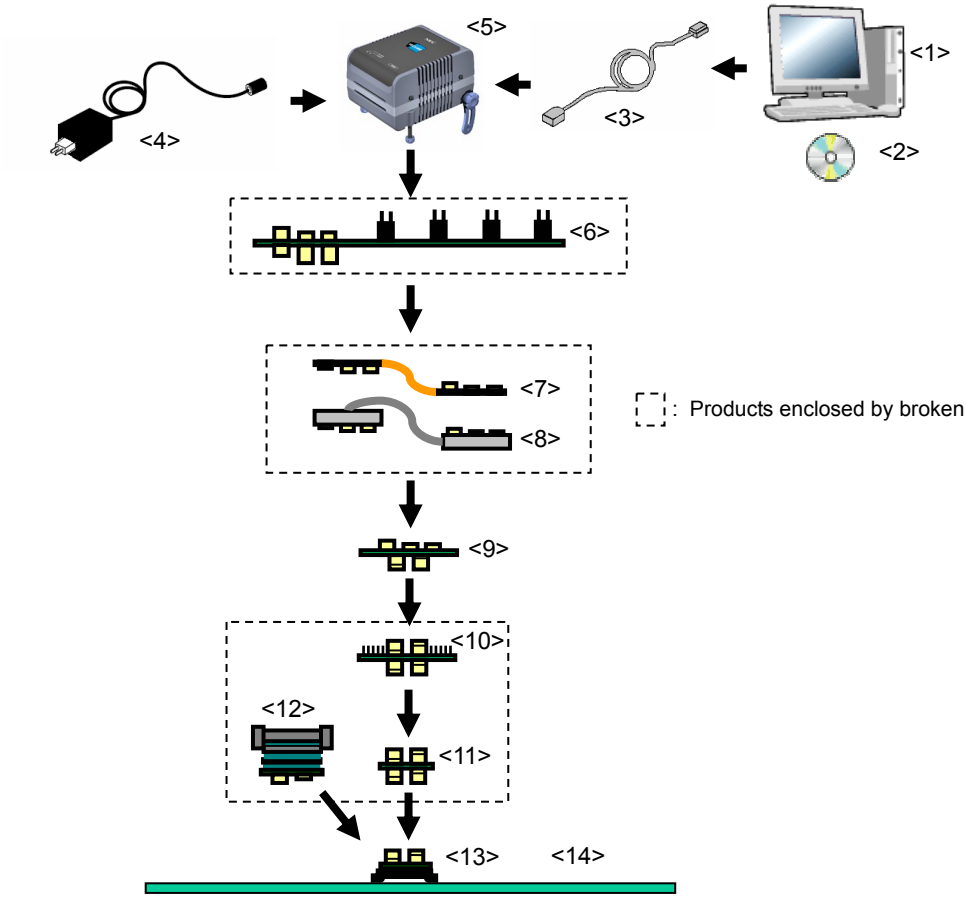
1.3 System Configuration

There are two configuration types: S Type and T Type.

This section shows each system configuration when using the QB-V850ESFJ3 connected to a PC (PC-9821 series or PC/AT™ compatible). Connection is possible even without optional products.

Connectors <9> to <13> differ depending on the target device to be emulated.

Figure 1-2. System Configuration (S Type)



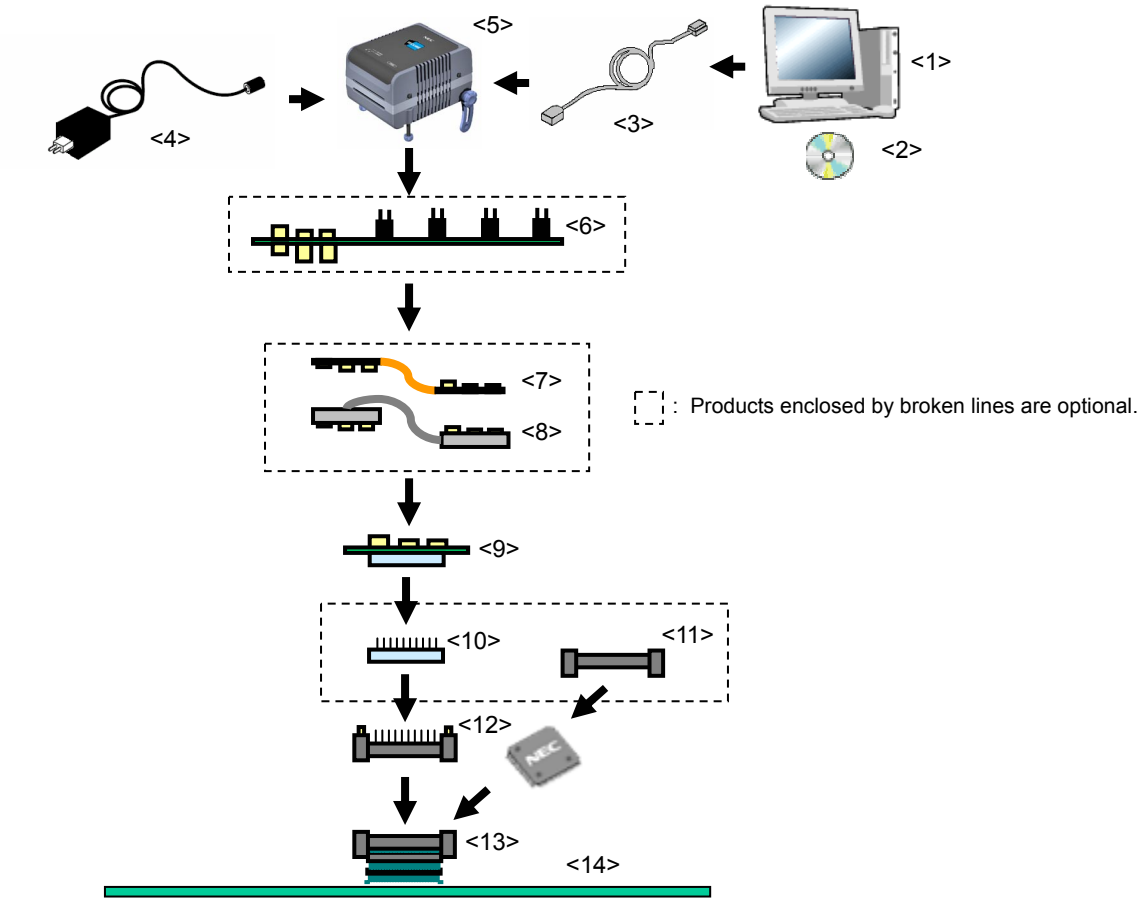
<1> Host machine: PC-9821 series, IBM PC/AT compatible can be used
<2> ID850QB Disk/Accessory Disk[Note 1]: Debugger, USB drivers, manual, etc.
<3> USB interface cable: Cable used for connecting QB-V850ESFJ3 to host machine
<4> AC adapter: Can support 100 to 240 V by replacing AC plug
<5> QB-V850ESFJ3: This product
<6> Check pin adapter (optional)[Note 2]: Adapter used for monitoring waveforms with oscilloscope
<7> Extension probe flexible type (under development) (optional)
<8> Extension probe coaxial type (optional)
<9> Exchange adapter: Adapter that performs pin conversion
<10> Check pin adapter (optional)[Note 3]: Adapter used for monitoring waveforms with oscilloscope
<11> Space adapter (optional): Adapter used for height adjustment
<12> Mount adapter (optional): Adapter used for mounting target device
<13> Target connector: Connector to be soldered to target system
<14> Target system

Notes 1. Download the device file from the NEC Electronics website.
URL: http://www.necel.com/micro/index_e.html

2. For the use of this product, refer to **[Related Information]** on the following webpage.
URL: http://www.necel.com/micro/english/iecube/index.html

3. If both <10> and <11> are used, connection sequence of <10> and <11> may be reversed. In addition, <8> is required when using <10>.

Figure 1-3. System Configuration (T Type)



<1> Host machine: PC-9821 series, IBM PC/AT compatible can be used
<2> ID850QB Disk/Accessory Disk[Note 1]: Debugger, USB drivers, manual, etc.
<3> USB interface cable: Cable used for connecting QB-V850ESFJ3 to host machine
<4> AC adapter: Can support 100 to 240 V by replacing AC plug
<5> QB-V850ESFJ3: This product
<6> Check pin adapter (optional)[Note 2]: Adapter used for monitoring waveforms with oscilloscope
<7> Extension probe flexible type (under development) (optional)
<8> Extension probe coaxial type (optional)
<9> Exchange adapter: Adapter that performs pin conversion
<10> Space adapter (optional): Adapter used for height adjustment
<11> Mount adapter (optional): Adapter used for mounting target device
<12> YQ connector: Connector used for connecting emulator
<13> Target connector: Connector to be soldered to target system
<14> Target system

Notes 1. Download the device file from the NEC Electronics website.
URL: http://www.necel.com/micro/index_e.html
2. For the use of this product, refer to **[Related Information]** on the following webpage.
URL: http://www.necel.com/micro/english/iecube/index.html

Table 1-3. List of Probe/Connector for Each Target Device (S Type)

No.	Name	Target Device to Be Emulated			
		V850ES/FE3 (64-Pin GB)	V850ES/FF3 (80-Pin GK)	V850ES/FG3 (100-Pin GC)	V850ES/FJ3 (144-Pin GJ)
<6>	Check pin adapter	QB-144-CA-01 (sold separately)			
<7>	Extension probe (flexible type)	Under development (sold separately)			
<8>	Extension probe (coaxial type)	QB-144-EP-01S (sold separately)			
<9>	Exchange adapter	QB-64GB-EA-01S (sold separately)Note	QB-80GK-EA-02S (sold separately)Note	QB-100GC-EA-01S (sold separately)Note	QB-144GJ-EA-03S (sold separately)Note
<10>	Check pin adapter	QB-64-CA-01S (sold separately)Note	QB-80-CA-01S (sold separately)Note	QB-100-CA-01S (sold separately)Note	QB-144-CA-01S (sold separately)Note
<11>	Space adapter	QB-64-SA-01S (sold separately)Note	QB-80-SA-01S (sold separately)Note	QB-100-SA-01S (sold separately)Note	QB-144-SA-01S (sold separately)Note
<12>	Mount adapter	QB-64GB-MA-01S (sold separately)Note	QB-80GK-MA-01S (sold separately)Note	QB-100GC-MA-01S (sold separately)Note	QB-144GJ-MA-01S (sold separately)Note
<13>	Target connector	QB-64GB-TC-01S (sold separately)Note	QB-80GK-TC-01S (sold separately)Note	QB-100GC-TC-01S (sold separately)Note	QB-144GJ-TC-01S (sold separately)Note

(See **Note** on the next page.)

Table 1-4. List of Probe/Connector for Each Target Device (T Type)

No.	Name	Target Device to Be Emulated			
		V850ES/FE3 (64-Pin GB)	V850ES/FF3 (80-Pin GK)	V850ES/FG3 (100-Pin GC)	V850ES/FJ3 (144-Pin GJ)
<6>	Check pin adapter	QB-144-CA-01 (sold separately)			
<7>	Extension probe (flexible type)	QB-144-EP-01S (sold separately)			
<8>	Extension probe (coaxial type)	Under development (sold separately)			
<9>	Exchange adapter	QB-64GB-EA-02T (sold separately)Note	QB-80GK-EA-02T (sold separately)Note	QB-100GC-EA-01T (sold separately)Note	QB-144GJ-EA-03T (sold separately)Note
<10>	Space adapter	QB-64-YS-01T (sold separately)Note	QB-80-YS-01T (sold separately)Note	QB-100-YS-01T (sold separately)Note	QB-144-YS-01T (sold separately)Note
<11>	Mount adapter	QB-64GB-HS-01T (sold separately)Note	QB-80GK-HQ-01T (sold separately)Note	QB-100GC-HQ-01T (sold separately)Note	QB-144GJ-HQ-01T (sold separately)Note
<12>	YQ connector	QB-64GB-YQ-01T (sold separately)Note	QB-80GK-YQ-01T (sold separately)Note	QB-100GC-YQ-01T (sold separately)Note	QB-144GJ-YQ-01T (sold separately)Note
<13>	Target connector	QB-64GB-NQ-01T (sold separately)Note	QB-80GK-NQ-01T (sold separately)Note	QB-100GC-NQ-01T (sold separately)Note	QB-144GJ-NQ-01T (sold separately)Note

(See **Note** on the next page.)

Note These accessories are supplied according to the part number ordered.

- If QB-V850ESFJ3-ZZZ is ordered
  The exchange adapter and target connector are not supplied.
- If QB-V850ESFJ3-S64GB is ordered
  The QB-64GB-EA-01S and QB-64GB-TC-01S are supplied.
- If QB-V850ESFJ3-T64GB is ordered
  The QB-64GB-EA-02T, QB-64GB-YQ-01T, and QB-64GB-NQ-01T are supplied.
- If QB-V850ESFJ3-S80GK is ordered
  The QB-80GK-EA-02S and QB-80GK-TC-01S are supplied.
- If QB-V850ESFJ3-T80GK is ordered
  The QB-80GK-EA-02T, QB-80GK-YQ-01T, and QB-80GK-NQ-01T are supplied.
- If QB-V850ESFJ3-S100GC is ordered
  The QB-100GC-EA-01S and QB-100GC-TC-01S are supplied.
- If QB-V850ESFJ3-T100GC is ordered
  The QB-100GC-EA-01T, QB-100GC-YQ-01T, and QB-100GC-NQ-01T are supplied.
- If QB-V850ESFJ3-S144GJ is ordered
  The QB-144GJ-EA-03S and QB-144GJ-TC-01S are supplied.
- If QB-V850ESFJ3-T144GJ is ordered
  The QB-144GJ-EA-03T, QB-144GJ-YQ-01T, and QB-144GJ-NQ-01T are supplied.

Remark For notes on target system design and package drawings, refer to **[Related Information]** on the following webpage.

URL: http://www.necel.com/micro/english/iecube/index.html

1.4 Package Contents

The following items have been placed in the QB-V850ESFJ3 packing box. Please check the contents.

Products supplied with QB-V850ESFJ3-ZZZ

<1>: QB-V850ESFJ3
<2>: AC adapter
<3>: USB interface cable
<4>: ID850QB Disk (CD-ROM)
<5>: Accessory Disk (CD-ROM)
<6>: IECUBE Setup Manual (J/E)
<7>: User registration (Guarantee card and software contract in one)
<8>: PG-FPL (Flash Pro Lite)
<9>: Probe holder
<10>: Parts board (for clock)

Products supplied with QB-V850ESFJ3-S64GB
(Order with which S-type connectors for the V850ES/FE3 are included)

<1> to <10>
<11>: Exchange adapter QB-64GB-EA-01S
<12>: Target connector QB-64GB-TC-01S

Products supplied with QB-V850ESFJ3-T64GB
(Order with which T-type connectors for the V850ES/FE3 are included)

<1> to <10>
<11>: Exchange adapter QB-64GB-EA-02T
<12>: Target connector QB-64GB-NQ-01T
<13>: YQ connector QB-64GB-YQ-01T

Products supplied with QB-V850ESFJ3-S80GK
(Order with which S-type connectors for the V850ES/FF3 are included)

<1> to <10>
<11>: Exchange adapter QB-80GK-EA-02S
<12>: Target connector QB-80GK-TC-01S

Products supplied with QB-V850ESFJ3-T80GK
(Order with which T-type connectors for the V850ES/FF3 are included)

<1> to <10>
<11>: Exchange adapter QB-80GK-EA-02T
<12>: Target connector QB-80GK-NQ-01T
<13>: YQ connector QB-80GK-YQ-01T

Products supplied with QB-V850ESFJ3-S100GC

(Order with which S-type connectors for the V850ES/FG3 are included)

<1> to <10>

<11>: Exchange adapter QB-100GC-EA-01S

<12>: Target connector QB-100GC-TC-01S

Products supplied with QB-V850ESFJ3-T100GC

(Order with which T-type connectors for the V850ES/FG3 are included)

<1> to <10>

<11>: Exchange adapter QB-100GC-EA-01T

<12>: Target connector QB-100GC-NQ-01T

<13>: YQ connector QB-100GC-YQ-01T

Products supplied with QB-V850ESFJ3-S144GJ

(Order with which S-type connectors for the V850ES/FJ3 are included)

<1> to <10>

<11>: Exchange adapter QB-144GJ-EA-03S

<12>: Target connector QB-144GJ-TC-01S

Products supplied with QB-V850ESFJ3-T144GJ

(Order with which T-type connectors for the V850ES/FJ3 are included)

<1> to <10>

<11>: Exchange adapter QB-144GJ-EA-03T

<12>: Target connector QB-144GJ-NQ-01T

<13>: YQ connector QB-144GJ-YQ-01T

CHAPTER 2 SETUP PROCEDURE

This chapter explains the QB-V850ESFJ3 setup procedure.

Setup can be completed by performing installation/setup in the order in which it appears in this chapter.

Perform setup along the lines of the following procedure.

See **2.1 Names and Functions of Hardware** for jumper and clock board positions.

Main clock settings

At shipment, a 6 MHz resonator is mounted.

If the 6 MHz resonator is used as is, the setting does not have to be changed.

If the clock must be changed, see **2.2 Removal of Acrylic Board** and **2.3 Clock Settings**.

↓

Sub clock settings

At shipment, the QB-V850ESFJ3's 32.768 kHz resonator is selected.

If modification is necessary, see **2.3.4 Overview of subclock settings**.

↓

Software settings

See **2.4 Software Settings**.

↓

Mounting and connecting connectors

When using the S Type, see **2.5 Mounting and Connecting Connectors (When Using S Type)**.

When using the T Type, see **2.6 Mounting and Connecting Connectors (When Using T Type)**.

↓

Connecting QB-V850ESFJ3 to target system

See **2.7 Connecting QB-V850ESFJ3 to Target System**.

- When not using the extension probe (QB-144-EP-01S): see **2.7.1**.
- When using the extension probe (QB-144-EP-01S): see **2.7.2**.

↓

Connecting USB interface cable and AC adapter

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

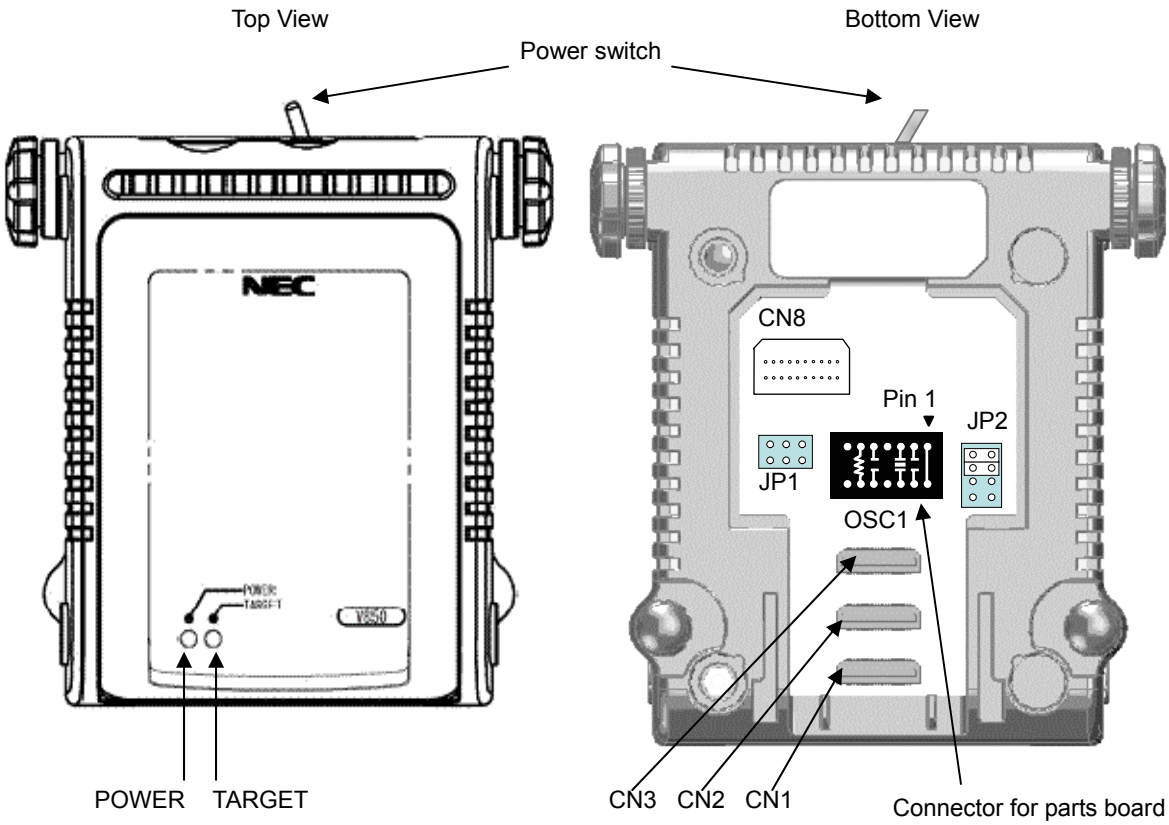
↓

Switching power on and off

See **2.9 Switching Power On and Off**

2.1 Names and Functions of Hardware

Figure 2-1. Names of Parts of QB-V850ESFJ3



(1) CN1, CN2, CN3

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

(2) Parts board connector (for clock)

This parts board is used to mount the resonator.

(For details, refer to **2.3 Clock Settings**.)

(3) JP1

This jumper is used for delivery inspection.

All the pins of this jumper are open at shipment. Other settings are prohibited.

(4) JP2

This jumper is used to set the subclock.

1 and 2 are shorted, and 3 and 4 are shorted at shipment.

(For details, refer to **2.3 Clock Settings**.)

(5) CN8

This jumper is used for delivery inspection.

All the pins of this jumper are open at shipment. Other settings are prohibited.

(6) POWER (Red LED)

This is an LED that shows whether or not the power supply of the QB-V850ESFJ3 is switched on.

LED State	QB-V850ESFJ3 State
Lit	Power switch ON
Not lit	Power switch OFF or AC adapter not connected to QB-V850ESFJ3
Blinking	Internal error occurred (Contact an NEC Electronics sales representative or distributor)

(7) TARGET (Green LED)

This is an LED that shows whether or not the power supply of the target system is switched on.

LED State	Target System State
Lit	Target system power supply ON
Not lit	Target system power supply OFF or target system not connected

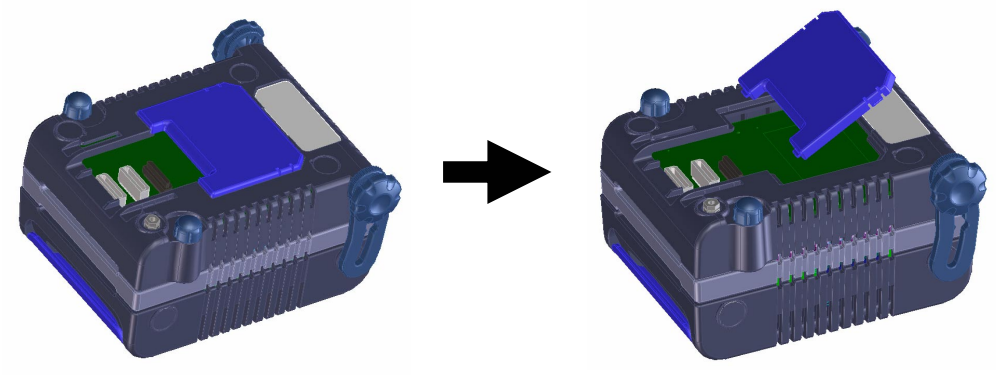
(8) Power switch

This is the power switch of the QB-V850ESFJ3. It is OFF at shipment.

2.2 Removal of Acrylic Board

To change the jumper or clock setting, the acrylic board on the bottom of the QB-V850ESFJ3 must be removed. The acrylic board can be removed by lifting it up.

Figure 2-2. Acrylic Board Removal Method



2.3 Clock Settings

2.3.1 Overview of main clock settings

The following types of main clock settings are available.

For details, see **2.3.2 Main clock settings**.

(1) Using a clock generated from a 6 MHz resonator mounted in the QB-V850ESFJ3 as an internal clock.

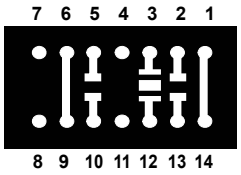
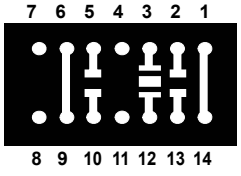
(2) Using a clock generated from a resonator other than the 6 MHz resonator mounted in the QB-V850ESFJ3 as an internal clock.

Oscillation with the resonator on the target system is not supported. Therefore, the in-circuit emulator cannot emulate the oscillation operation of the clock on the target system.

2.3.2 Main clock settings

The following shows the hardware settings when setting the main clock.

Table 2-1. Hardware Settings for Each Main Clock Setting

Type of Clock Used	Parts Board (OSC1)
(1) The clock generated from the 6 MHz resonator mounted in the QB-V850ESFJ3 is used as the internal clock.	 Used in setting at shipment.
(2) The clock generated from a resonator other than the 6 MHz resonator is mounted in the QB-V850ESFJ3 for an internal clock (resonator frequency that can be used is the same as that of the target device)	 Mounted on parts board supplied

Caution Settings other than above are prohibited.

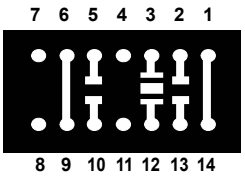
2.3.3 Cautions on changing oscillator

(1) Remove the parts board in OSC1 before changing the resonator.
To remove the parts board, use a high-precision screwdriver. An example of removing the parts board are shown below.
<1> Insert the screwdriver at the position of pin 7 on the parts board and slightly push up the parts board.
<2> Insert the screwdriver at the position of pin 14 on the parts board and slightly push up the parts board.
<3> Repeat <1> and <2>.
Exercise care not to damage the QB-QB-V850ESFJ3.

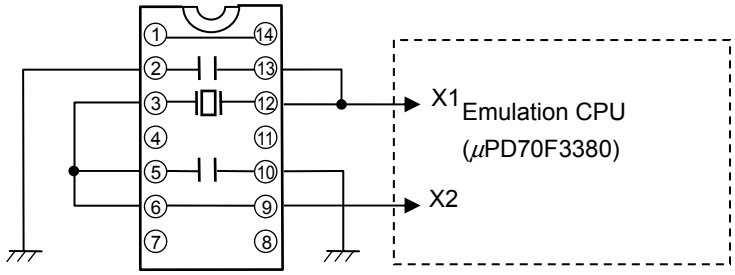
(2) Solder a resonator and a capacitor to the parts board supplied with the QB-V850ESSX2.
The setting is as follows.

Pins 1 and 14: Short these pins.
Pins 2 and 13: Connect a capacitor.
Pins 3 and 12: Connect a resonator.
Pins 4 and 11: Leave these pins open.
Pins 5 and 10: Connect a capacitor.
Pins 6 and 9: Short these pins.
Pins 7 and 8: Leave these pins open.

Figure 2-3. Parts Board Settings and Peripheral Circuit



Parts board settings



Peripheral circuit

(3) Insert the parts board into the QB-V850ESFJ3. Pay attention to the pin position.
(See **Figure 2-1**.)

2.3.4 Overview of subclock settings

The following types of subclock settings are available.
For details, see **2.3.5 Subclock settings**.

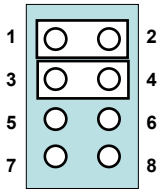
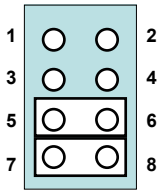
(1) Using the 32.768 kHz resonator mounted in the QB-V850ESFJ3.
(2) Using the 15 kHz (Typ.) RC oscillator configured on the QB-V850ESFJ3.

Oscillation with the resonator on the target system is not supported. Therefore, the in-circuit emulator cannot emulate the oscillation operation of the clock on the target system.

2.3.5 Subclock settings

The following shows the hardware settings when setting the subclock.

Table 2-2. Hardware Settings for Each Subclock Setting

Type of Clock Used	JP2
The clock generated from a 32.768 MHz resonator mounted in the QB-V850ESFJ3 is used. 1-2 shorted, 3-4 shorted	 (Factory setting)
The clock generated from the RC oscillator configured in the QB-V850ESFJ3 is used. 5-6 shorted, 7-8 shorted	

Caution Settings other than above are prohibited.

2.4 Software Settings

2.4.1 When using ID850QB as debugger

For details, refer to the **V850 Series Integrated Debugger ID850QB Operating Precautions** supplied with the debugger (ID850QB).

2.4.2 When using a debugger other than ID850QB (MULTI, etc.)

Refer to the user's manual of the debugger used and the **V850 IECUBE Setup Manual** (supplied).

2.5 Mounting and Connecting Connectors (When Using S Type)

This section describes the methods for connecting the QB-V850ESFJ3 to the target system when using the S Type.

Make connections with both the QB-V850ESFJ3 and target system powered off.

The following abbreviations are used in this section.

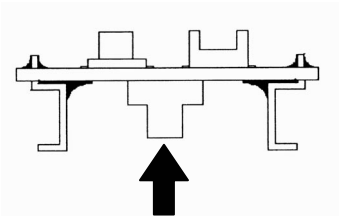
- TC: Target connector
- EA: Exchange adapter
- MA: Mount adapter
- CA: Check pin adapter
- SA: Space adapter

2.5.1 Mounting TC onto target system

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

(2) A circular projection is at the center of the bottom side of the TC (refer to **Figure 2-4**). Sparingly apply two-component epoxy adhesive (type that hardens in 15 to 30 minutes is recommended) to temporarily secure the connector at the specified position on the target system. At this time, match the position of pin 1 (position where a corner is cut) with the position of pin 1 from the target system.

Figure 2-4. TC Projection



(3) Soldering condition of TC

(a) Reflow soldering

At 245°C for a maximum of 20 seconds (main heating)

(b) Manual soldering

At 320°C for a maximum of 5 seconds (per pin)

(4) Precautions on flux splatter

If the solder flux splatters when the connector is soldered, faulty contact may occur. Be sure to cover the upper part of the connector with aluminum foil. Do not clean the connector because the flux solvent may remain inside the connector.

2.5.2 Inserting EA into TC

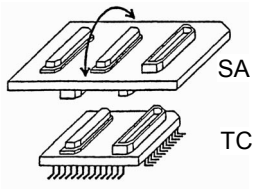
Match the pin 1 position of the EA, MA, CA, or SA to the pin 1 position of the TC and insert it (corner cuts match in both).

(a) When inserting or removing, hold down the TC with your fingers so that there is no force on the TC.

(b) When inserting or removing, be careful of the direction of wiggling (refer to **Figure 2-5**).

As a tool when removing, insert some kind of thin non-conductive material such as a wooden stick in between the TC and EA and wiggle it in the direction shown in **Figure 2-5** while slowly removing. Be careful since the connector will be damaged if this is done in the wrong direction.

Figure 2-5. Inserting and Removing



2.5.3 Precautions for handling TC, EA, MA, CA, and SA

(1) Cause of faulty contact of connector

(a) If flux gets inside the connector when the TC is soldered

It is easy for flux to get inside of the connector. Clean the connector several times with a solvent such as alcohol if flux gets inside.

If conduction is still unstable, repeat cleaning.

(b) If dust gets inside the connector

Faulty contact occurs if dust such as a thread gets inside the connector. Remove dust with a brush.

(c) Cautions on using the CA or SA

When the CA or SA is used, a fractional delay time of signal propagation and a little capacitance are generated as a result of inserting the adapter. Make a thorough evaluation by connecting the target system.

(2) Cautions on inserting and removing the connector

(a) When inserting or removing the connector, be sure to hold down the lower (mating) connector or board with your fingers.

(b) Before inserting a connector, make sure that the connectors are correctly positioned.

If the connector is inserted incorrectly positioned, it may be damaged.

(c) When removing a connector, insert some kind of thin non-conductive material such as a wooden stick beneath the connector to protect the board from being damaged. Do not remove the connector all at once. Remove it slowly.

If only a metallic object such as a screwdriver is available, wind a soft cloth around its tip.

(3) Cautions for CA (QB-80-CA-01S) for V850ES/FF3

The silk print for the check pin is based on the pin layout of the 80-pin GC package. When using the CA for the V850ES/FF3 (80-pin GK package), read the silk print as shown in Table 2-3.

Table 2-3. Pin Layout for QB-80-CA-01S V850ES/FF3

Position of Silk Print	Pin Layout	Position of Silk Print	Pin Layout
1	10	41	50
2	9	42	49
3	8	43	48
4	7	44	47
5	6	45	46
6	1	46	41
7	2	47	42
8	3	48	43
9	5	49	45
10	4	50	44
11	16	51	56
12	17	52	57
13	18	53	58
14	19	54	59
15	20	55	60
16	15	56	55
17	14	57	54
18	13	58	53
19	12	59	52
20	11	60	51
21	21	61	61
22	22	62	62
23	23	63	63
24	24	64	64
25	25	65	65
26	26	66	66
27	27	67	67
28	28	68	68
29	29	69	69
30	30	70	70
31	31	71	71
32	32	72	72
33	33	73	73
34	34	74	74
35	35	75	75
36	36	76	76
37	37	77	77
38	38	78	78
39	39	79	79
40	40	80	80

(4) Check pin adapter QB-xxx-CA-01S

When using the check pin adapter QB-xxx-CA-01S, the separately available extension probe QB-144-EP-01S must be connected.

(5) Check pin adapter QB-144-CA-01

The check pin adapter QB-144-CA-01 is an optional product for IECUBE, and can be used to measure the waveform between IECUBE and the target system.

Since the pins on the QB-144-CA-01 do not correspond to the pin layout in each device, the pin header cover must be mounted according to the device to be used.

For mounting methods of the pin header cover, refer to **[Related Information]** on the following webpage.

URL: http://www.necel.com/micro/english/iecube/index.html

2.5.4 Precautions for mounting IC using MA

(1) Confirm that there is no weld flash in the resin (sealant part) of the IC. If there is weld flash, remove it using a knife or the like.

(2) Confirm that there is no weld flash breaking or bending of IC leads. In particular, confirm the planarity of IC leads. If there is abnormality in the planarity, correct that portion.

(3) Viewing the contact pins on the bottom of the MA (IC mounting part) from the top, if there are foreign bodies on them, remove them using a brush or the like.

After confirming (1) to (3), fit the IC to the bottom of the MA. Also fit the top (cover) of the MA.

(4) Put the supplied M2 × 6 mm screws in the four accessory holes on the top (cover) of the MA and fasten the screws in opposite corners. At that time, use either the dedicated screwdriver that is supplied or a torque driver to fasten them equally in turn with a tightening torque of 0.054 Nm (MAX.). Since the contact is poor if tightening is too great, once you have lightly fastened the screws on the top of the MA, tighten them again.

(5) Depending on the use environment, when starting up a device that has been left for a long time, starting it may be difficult. In this case, loosen the screws slightly and then retighten them.

(6) If startup still is difficult after (5) above, check (1) to (3) again.

(7) Tightening the screws on the top of the MA too much may give rise to cracks in the molded part of the MA (plastic part) and bend the mold into a bowed shape, making contact poor.

(8) After soldering the MA, do not perform cleaning by flux immersion or vapor.

2.6 Mounting and Connecting Connectors (When Using T Type)

This section describes the methods for connecting the QB-V850ESFJ3 to the target system when using the T Type.

Make connections with both the QB-V850ESFJ3 and target system powered off.

The following abbreviations are used in this section.

- TC: Target connector
- YQ: YQ connector
- EA: Exchange adapter
- MA: Mount adapter
- CA: Check pin adapter
- SA: Space adapter

2.6.1 Mounting TC onto target system

(1) Thinly apply a two-component epoxy adhesive (hardening time at least 30 minutes) to the ends of the four projections on the base of the TC and adhere the TC to the user board (clean the surface of the user board using alcohol or the like). If alignment of user board pads to TC leads is difficult, align them as in (2).

(2) Align by inserting the guide pins for alignment for the TC (NQGUIDE) through the pin holes on the top of the TC. Accessory holes are ϕ1.0 mm non-through holes in two or three places.
(For hole positions, see the particular TC drawing.)

(3) Solder after fitting the MA to the TC. This is to prevent troubles such as flux or solder splatter and adhering to the TC contact pins when soldering.

- Soldering conditions — Solder reflow: At 240°C for a maximum of 20 seconds
  Manual soldering: At 240°C for a maximum of 10 seconds (per pin)

Caution Do not perform cleaning by flux immersion or vapor.

(4) Remove the guide pins.

2.6.2 Connecting YQ on TC

(1) After confirming that there are no broken or bent YQ contact pins, fit the YQ in the TC and fasten the screw. If repeatedly inserting and removing, be sure to inspect the YQ pins before fitting. If pins are bent, correct them using something thin and flat such as the edge of a knife.

(2) Accessory holes are needed in prescribed positions in four places in the board for connecting the YQ. Fasten the YQ to the TC on the user board using the supplied M2 $\times$ 10 mm screws. The thickness of a board corresponding to these screws is 1.0 to 2.0 mm. Fasten the screws equally in the four corners using a #0 or #1 Phillips precision screwdriver or torque driver. The tightening torque of the screws is 0.054 Nm (MAX.). Too great tightening causes bad connections.
Screws for fitting to the TC (M2 $\times$ 10 mm/4) are included with the YQ.

2.6.3 Inserting EA into YQ

Match the pin 1 position of the YQ or SA (corner cuts match in both) to the pin 1 position of the EA and insert it.

- When inserting or removing, press on the TC, YQ, and SA with a finger so that there is no force on the TC.
- When inserting or removing, be careful of the direction of wiggling.

As a tool when removing, insert some kind of thin non-conductive material such as a wooden stick between the YQ (SA) and EA and wiggle it while slowly removing. Be careful since the connector will be damaged if this is done in the wrong direction.

2.6.4 Precautions for handling TC, YQ, SA, and CA

(1) When taking the TC from the box, press down on the body and take out the sponge first.

(2) Since the pins of the YQ are thin and easily bent, be careful. When inserting it in the TC, confirm that there are no bent pins.

(3) When screwing a YQ soldered to a board to the TC, fasten the screws in four places in turn using a #0 or #1 Phillips precision screwdriver or torque driver after tentatively tightening them. Fix the torque at 0.054 Nm (MAX.). If just one place is overtightened, it may cause poor contact. Moreover, a board being connected to the YQ must have accessory holes in prescribed positions (4 places: ϕ2.3 mm or ϕ3.3 mm). The ϕ3.8 mm or ϕ4.3 mm that is the screw head size is an area where wiring is prohibited.

(4) In YQ and SA removal, since there is a danger of YQ pins being bent or broken when prying and wiggling, remove them gradually using a flatbladed screwdriver from four directions. Moreover, to connect and use the YQ and SA, screw the YQ to the TC according to the YQGUIDE (sold separately) using a 2.3 mm flatbladed screwdriver and then connect it to the SA. Fix the torque at 0.054 Nm (MAX.). If even one place is overtightened, it may cause poor contact.

(5) For the TC, YQ, and SA, since there is a danger that cleaning fluid on the structure will remain in the connector, do not perform cleaning.

(6) TC, IC, and YQ cannot be used in combination.

(7) An TC/YQ system cannot be used in an environment of vibrations or shocks.

(8) It is assumed that this product will be used in system development and evaluation. Moreover, when used in Japan, Electrical Appliance and Material Control Law and electromagnetic disturbance countermeasures have not been applied.

(9) Since there are rare cases of shape change if the box is left for a long time in a place where it is 50°C or higher, for safekeeping, store it in a place where it is no higher than 40°C and direct sunlight does not hit it.

(10) For details about handling the TC, YQ, and SA, see the NQPACK series technical materials at the website of Tokyo Eletech Corporation.
Tokyo Eletech Corporation website: http://www.tetc.co.jp/

(11) Check pin adapter QB-144-CA-01
The check pin adapter QB-144-CA-01 is an optional product for IECUBE, and can be used to measure the waveform between IECUBE and the target system.
Since the pins on the QB-144-CA-01 do not correspond to the pin layout in each device, the pin header cover must be mounted according to the device to be used.
For mounting methods of the pin header cover, refer to **[Related Information]** on the following webpage.
URL: http://www.necel.com/micro/english/iecube/index.html

2.6.5 Precautions for mounting IC using TC and MA

(1) Confirm that there is no weld flash in the resin (sealant part) of the IC. If there is weld flash, remove it using a knife or the like.

(2) Confirm that there is no weld flash breaking or bending of IC leads. In particular, confirm the planarity of IC leads. If there is abnormality in the planarity, correct that portion.

(3) Viewing the TC contact pins from the top, if there are foreign bodies on them, remove them using a brush or the like.

After confirming (1) to (3), fit the IC to the TC. Also fit the MA.

(4) Put the supplied M2 × 6 mm screws in the four accessory holes of the MA and fasten the screws in opposite corners. At that time, use either the dedicated screwdriver that is supplied or a torque driver to fasten them equally in turn with a tightening torque of 0.054 Nm (MAX.). Since the contact is poor if tightening is too great, once you have lightly fastened the MA screws, tighten them again.

(5) Depending on the use environment, when starting up a device that has been left for a long time, starting it may be difficult. In this case, loosen the screws slightly and then retighten them.

(6) If startup still is difficult after (5) above, check (1) to (3) again.

(7) Tightening the screws of the MA too much may give rise to cracks in the molded part of the MA (plastic part) and bend the mold into a bowed shape, making contact poor.

(8) After soldering the TC, do not perform cleaning by flux immersion or vapor.

2.7 Connecting QB-V850ESFJ3 to Target System

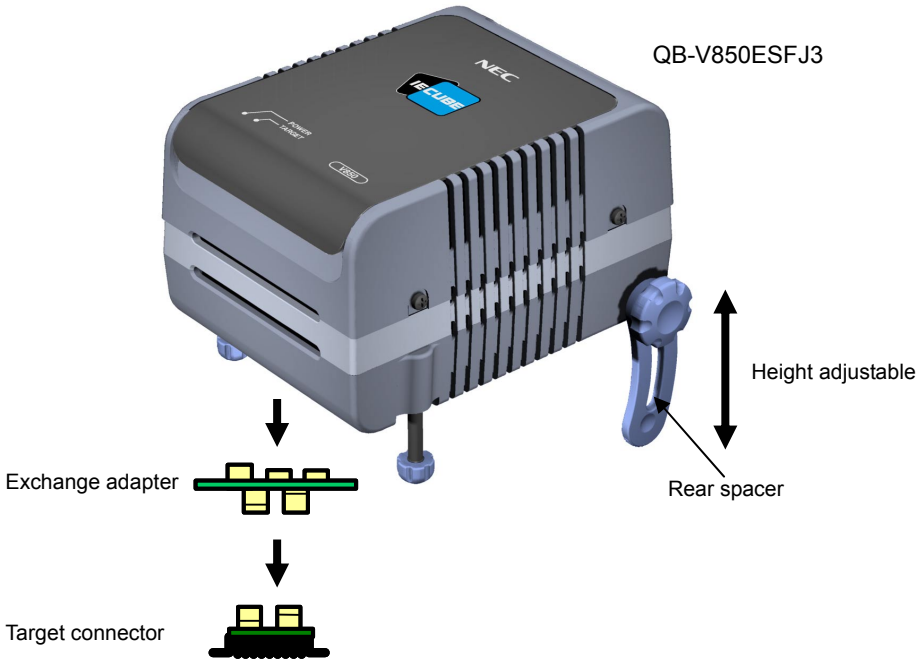
2.7.1 When not using extension probe (QB-144-EP-01S)

The QB-V850ESFJ3 can be connected to the target system without using an extension probe.

Adjust the height by using the spacer at the rear part of the QB-V850ESFJ3, so that no stress is applied to the exchange adapter, the target connector, and other connectors.

Sufficiently insulate the target system.

Figure 2-6. Connection Without Extension Probe



Remark The connector shown in the above figure is the connector used with the S Type. When used with the T Type, read this connector as that of the T Type.

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

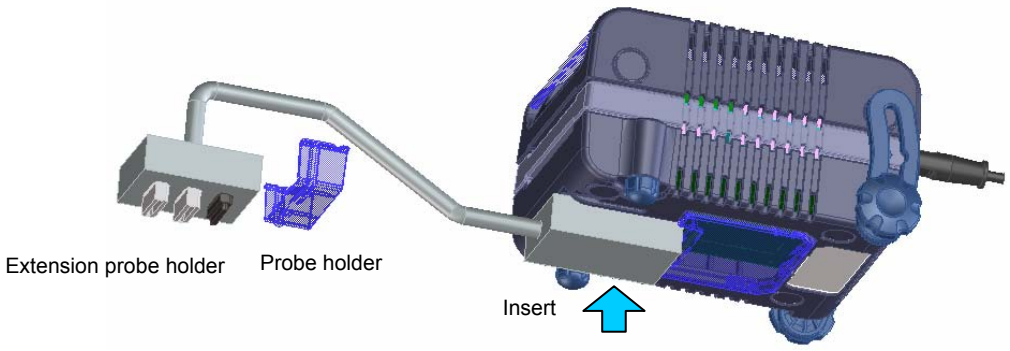
When using the extension probe (QB-144-EP-01S), connect the QB-V850ESFJ3 to the target system using the following procedure.

(1) Connecting probe holder

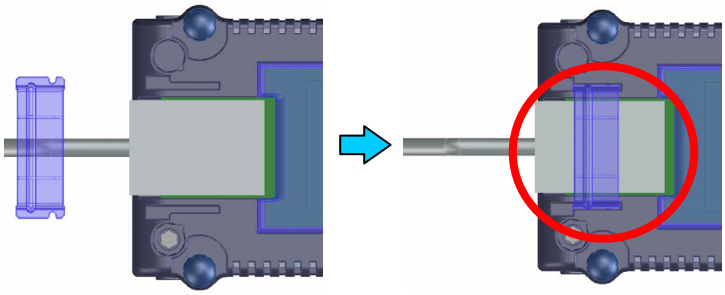
Use the probe holder (supplied with the QB-V850ESFJ3) to connect the extension probe to the QB-V850ESFJ3, as shown below.

Figure 2-7. Using Probe Holder

<1> Connect the QB-V850ESFJ3 to the probe.



<2> Insert the probe holder into the QB-V850ESFJ3.



Insert the probe holder into the QB-V850ESFJ3 until you hear a click (note the direction).

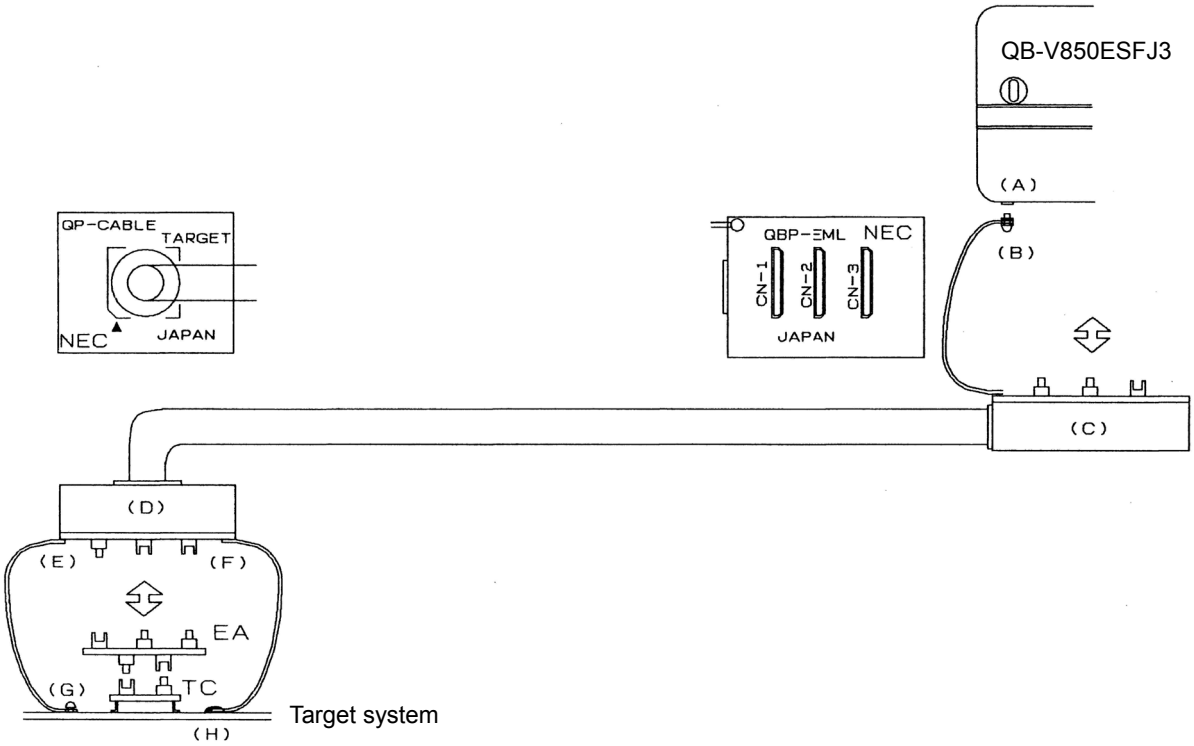
(2) Connection of extension probe GND wire

There are three GND wires in the extension probe. Connect them to the QB-V850ESFJ3 and target system.

<1> Fasten the GND wire on the QB-V850ESFJ3 side of the extension probe to the nut on the bottom of the QB-V850ESFJ3 using a #0 or #1 Phillips precision screwdriver (connection of B to A in **Figure 2-8**).

<2> Next insert the connector on the top of the extension probe into the connector at the opening on the bottom of the QB-V850ESFJ3 from below being careful of the insertion direction (connection of C in **Figure 2-8** to QB-V850ESFJ3).

Figure 2-8. GND Wire



Remark The connector shown in the above figure is the connector used with the S Type. When used with the T Type, read this connector as that of the T Type.

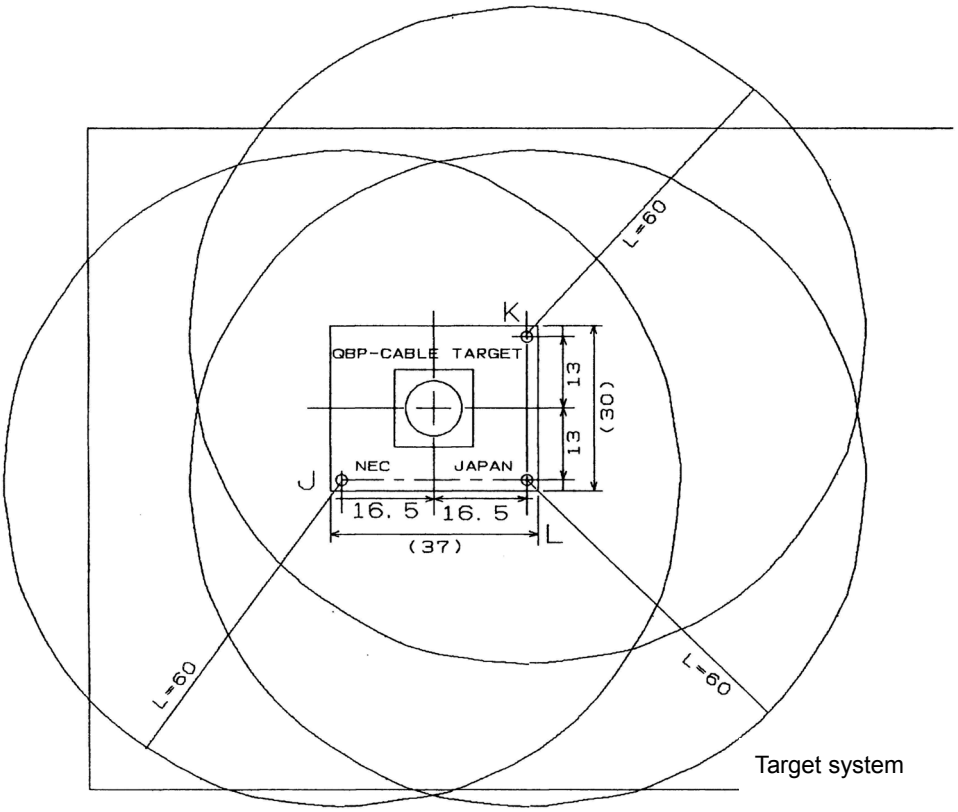
<3> Connect two GND wires on the target system side of the extension probe to the target system GND.

<4> If a pin or screw is fastened to the target system GND, remove the transparent terminal cover on the end of the GND wire and fasten the Y type pin of the GND wire to the target system (G in **Figure 2-8**). If the GND on the target system is an exposed pad, likewise fasten the Y type pin to the pad on the target system by soldering (H in **Figure 2-8**) (recommended soldering iron temperature setting: 300°C).

<5> If the target system has only one GND, connect only one of the GND wires of the extension probe. Cut off the other GND wires with a nipper or leave it as is without removing the pin cover.

<6> Since the length of the GND wire below the head (insulated part) is approximately 60 mm, there must be at least a GND to which it can be connected to within the range of the three approximately 60 mm radius sections of the target system for connecting the extension probe, as shown in **Figure 2-9**. The GND wire of the extension probe is soldered to positions J and K in **Figure 2-9**. To connect it to position L, remove the wire soldered to J or K and then solder it to L.

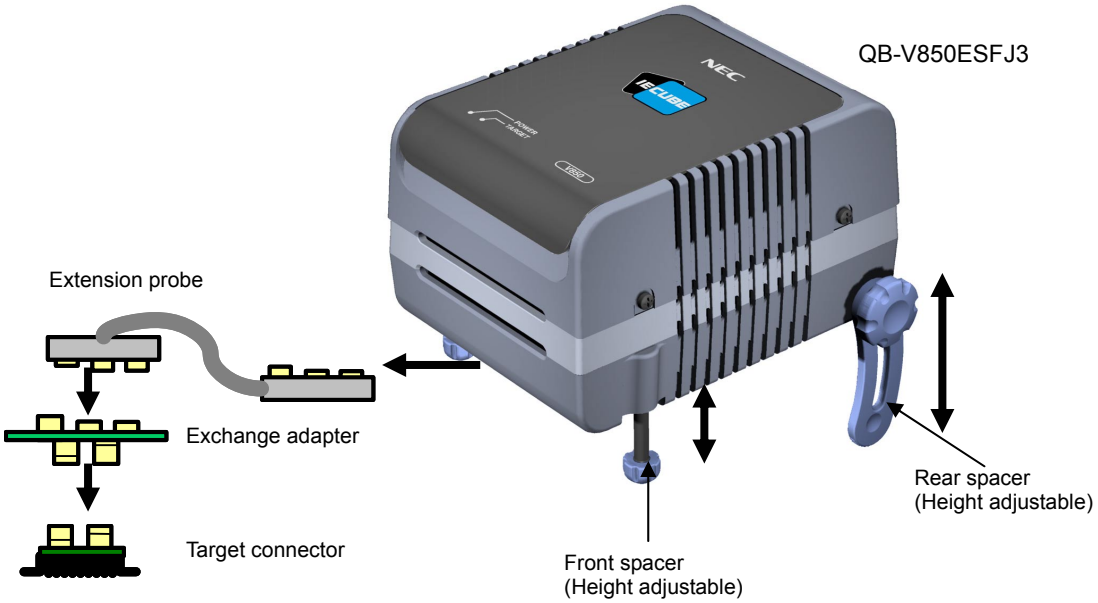
Figure 2-9. Where GND Wire Can Be Connected



(3) Ensuring isolation

When connecting the target system to the QB-V850ESFJ3 using an extension probe, adjust the height using the front spacer or rear spacer of the QB-V850ESFJ3 to ensure isolation from the target system.

Figure 2-10. Connection Using Emulation Probe



Remark The connector shown in the above figure is the connector used with the S Type. When used with the T Type, read this connector as that of the T Type.

(4) Cautions related to extension probe

The following cautions pertain to using the extension probe.

<1> Be careful that stress of the extension probe is not placed on the target connector. Moreover, when removing the extension probe, remove it slowly while holding down on the exchange adapter with a finger so that there is no stress on the target connector.

<2> Be sure to connect the GND wire of the extension probe to the QB-V850ESFJ3 and the target system. If not, the impedance of the cable becomes unstable, resulting in the lowering of signal transmission characteristics or distortion of the output waveform for an input waveform.

<3> When using the external bus interface with the extension probe, add a data wait state by increasing the set value of the DWC register by one.

2.8 Connecting USB Interface Cable and AC Adapter

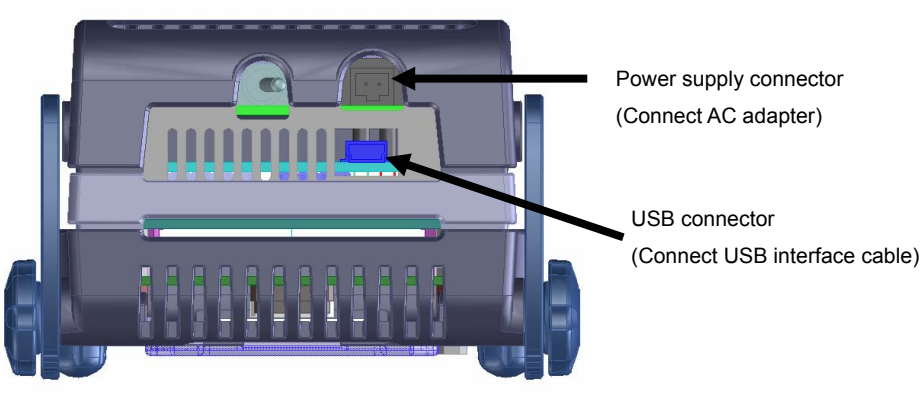
Plug the USB interface cable supplied with the QB-V850ESFJ3 into the USB connector of the host machine, and plug the other side into the USB connector on the rear of the QB-V850ESFJ3.

Plug the AC adapter supplied with the QB-V850ESFJ3 into a receptacle and plug the other side into the power supply connector on the rear of the QB-V850ESFJ3.

For QB-V850ESFJ3 connector positions, see **Figure 2-11**.

By replacing the AC plug, the AC adapter can support the voltage from 100 to 240 V. The AC plug for 100 V is attached when shipped. Replace it with the AC plug for 220 or 240 V (supplied with the QB-V850ESFJ3) when the AC adapter is used at 220 or 240 V.

Figure 2-11. Connector Positions



2.9 Switching Power On and Off

Be sure to switch the power on and off according to the following procedures.

- Switching power on

<1> QB-V850ESFJ3 power on

<2> Target system power on[Note]

<3> Debugger startup

- Switching power off

<1> Debugger termination

<2> Target system power off[Note]

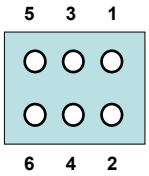
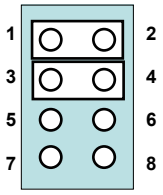
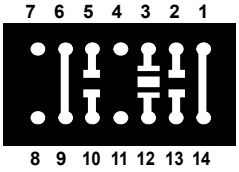
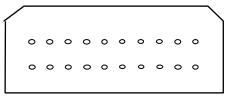
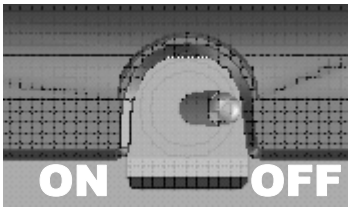
<3> QB-V850ESFJ3 power off

Note In the procedures, <2> is unnecessary if the target system is not connected.

Caution If the wrong sequence was used for the operation, the target system or QB-V850ESFJ3 may fail.

CHAPTER 3 SETTINGS AT PRODUCT SHIPMENT

Table 3-1. Settings at Shipment

Item	Setting	Remarks
JP1		All pins are left open. Do not change this setting.
JP2		1 and 2, and 3 and 4 are shorted. For details, refer to **2.3 Clock Settings**.
Parts board		A 6 MHz resonator is mounted between pins 3 and 12. The 27 pF capacitor is mounted between pins 2 and 13, and pins 5 and 10. The frequency can be changed by mounting the oscillator on the parts board supplied with IECUBE. For details, refer to **2.3 Clock Settings**.
CN8		All pins are left open. Do not change this setting.
Power switch		Set to OFF at shipment.

CHAPTER 4 CAUTIONS

This chapter explains the points to be noted when the QB-V850ESFJ3 is used.

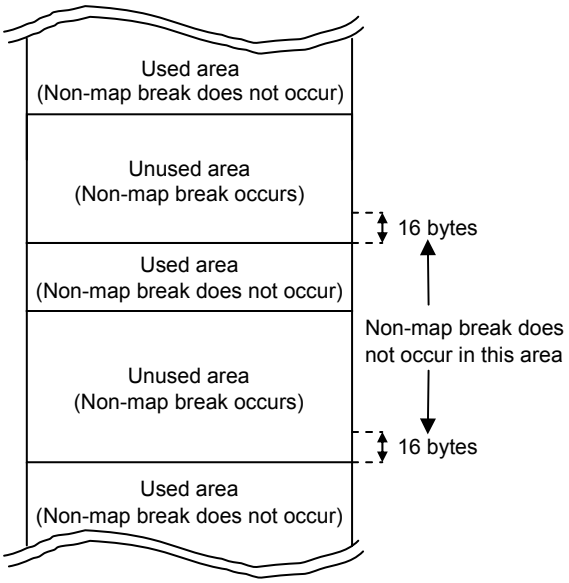
4.1 Cautions on Flash Self Programming Function

The flash self programming function cannot be emulated. To use this function, make an evaluation by using an on-chip debug emulator or the target device.

4.2 Cautions on Non-Map Break

If a program is fetched from an area not used by a program (unused area) with an emulator, a non-map break usually occurs. However, a non-map break does not occur in the first 16-byte space of each unused area (refer to **Figure 4-1**).

Figure 4-1. Break at Fetching Unused Area



4.3 Cautions on DBTRAP Instruction

The DBTRAP instruction cannot be used.

4.4 PSC Register Access

Data is written to the PSC register in the following sequence. If a software break is set to the NOP instruction immediately after the register has been accessed, the debugger hangs up.

Example:

```
mov 0x2,r1
st.b r1,prcmd
st.b r1,psc
nop        ← Debugger hangs up if a software break is set here.
nop        ← There is no problem if a software break is set here or later.
```

To set a break immediately after the PSC register has been written, use a hardware break.

4.5 Cautions on DBPC, DBPSW, and ECR Registers

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

If a value is written to any of these registers during a break, the written value is ignored.

If these registers are read, 0 is always read.

4.6 Cautions on Trace Display Sequence

When the trace mode that displays the access history is used, the display sequence may be reversed.

- If read and write instructions are successively executed
- If a bit manipulation instruction that executes read-modify-write is executed (such as SET, NOT, or CLR)

In both the cases, the trace results of write and read are displayed in that order.

4.7 Cautions on Extension Probe

When using the external bus interface with the extension probe, add a data wait state by increasing the set value of the DWC register by one.

4.8 Simultaneously Executing Two Instructions When Hardware Break Is Set

If a hardware break is set at the first or the next of two instructions that are executed at the same time, the following phenomena may occur.

- Break occurs at a place different from where it has been set.
- The set break does not occur.

To prevent these phenomena, set a software break.

The conditions under which two instructions are simultaneously executed are shown on the following pages.

[Combination of instructions for the occurrence of the simultaneous execution of two instructions]

- Condition where "mov + operation instruction" are executed as one instruction
  If dst of mov and dst of the operation instruction are the same register, except r0, in combination of "mov src, dst" and one of the following instructions:

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

Remark "mov + operation instruction" are executed as one instruction only when the mov instruction is the first instruction of the above combinations of instructions.

- Condition of parallel execution of instructions
  <1> Combination of one of the following instructions and br instruction

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 one of the following instructions (instructions that do not update flags) and bcc instruction except br instruction

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 one of the following instructions and sld instruction

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

Remark Of <1> to <3>, two instructions are simultaneously executed only when the second instruction of the above combinations of instructions is br/brcc/sld

Caution Formats I, II, and IV are the instruction formats described in the V850ES Architecture User's Manual (U15943E).

- Cases in which two instructions are not simultaneously executed

  In the following cases, two instructions are not simultaneously executed.

  (a) If the first instruction is the first instruction after execution branches to an address that is not word aligned.

  Example

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

  If a branch to address 0x1006 occurs, the two instructions are not executed simultaneously because the first instruction is not word aligned (because the lower 1 byte of the address is not 0, 4, 8, A, or C).

  (b) If the second instruction is sld and writing to the ep register is not completed.

  Example

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

  In this case, the value of r10 is written to the ep register by the mov instruction at address 0x1004. However, the two instructions are not executed simultaneously because WB (writeback) of the mov instruction is not completed when the sld.b instruction at address 0x1006 is executed.

  (c) If the second instruction is bcc (conditional branch instruction) and a flag hazard occurs (the instruction immediately before or the instruction before that instruction may update the flags).

  Example

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

  The bn instruction that references the S flag and branches must wait for execution of the cmp instruction at address 0x1004 because the S flag is changed by the cmp instruction. As a consequence, the bn instruction causes a flag hazard and the two instructions are not executed simultaneously.

  (d) If the second instruction is sld and both of the load buffers are in the WB wait status.

  Example

  Suppose that the following instructions are located in the 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
  ```

  If ld.w at addresses 0x1004 and 0x1008 accesses the external memory, several clocks of wait states are inserted. If the instruction at address 0x100e is executed, then the load buffer is in the "WB wait" status because WB of the ld.w instructions at addresses 0x1004 and 0x1008 is not completed, and the two instructions at address 0x100c and 0x100e are not simultaneously executed.

4.9 Cautions on On-Chip Debug Function

The on-chip debug function cannot be emulated.

Use the on-chip debug function with an on-chip debug emulator and a target device with the flash memory.

4.10 Cautions on Standby Mode

The timings of setting and releasing standby mode in IECUBE differ from those in the target device.

The timing margin is within 1 clock for setting and 2 to 3 clocks for releasing.

4.11 Operation During Break

To stop the peripheral functions of the in-circuit emulator during a break, select the Break radio button in the Peripheral Break field in the Configuration dialog box of the debugger. The following functions can be stopped.

- Watch timer
- 16-bit timer/counter (TMP, TMQ, TMM)
- A/D converter

However, the count operation of watchdog timer 2 is stopped during a break regardless of the peripheral break settings.

4.12 Cautions on RAM Hold Voltage Flag

The RAM hold voltage flag (RAMF) is not set to 1 by a forcible reset by the debugger, a reset by POC/LVI, or a reset during accessing the RAM.

4.13 Cautions on Current Consumption

Current consumption cannot be emulated in IECUBE.

Since the internal clock supply is not stopped in a mode other than normal operating mode according to the specifications of the emulator, IECUBE consumes more current than is consumed by the target device.

4.14 Cautions on ROM Correction Function

The ROM correction function cannot be emulated. To use this function, make an evaluation by using the target device.

4.15 Cautions on Starting Debugger

When the debugger is started, the following warning or error may occur depending on the setting of the debugger and the status of the target system. This is because the status of the target system is not in accordance with the setting of the debugger. If a warning or error occurs, check the status of the target system or the setting of the debugger.

It is recommended that the conversion adapter be connected to the QB-V850ESFJ3 even when the target system is not connected. If the conversion adapter is not connected, the value of the input port may not be correctly read.

- ID850QB

Error No.	Error Message	"Target" Field of ID850QB Configuration Window		Target System Connection		Exchange Adapter		arget System Power ON/OFF	
		Connect	Not Connect	Connected	Not Connected	Used	Not Used	ON	OFF
Ff606	Check connection with the target and turn on power to the target.	√							√
Wf607	Check the connection of the conversion adapter.		√		√		√		√
Ff608	Disconnect the target.		√	√					√
Ff609	Turn off power to the target and disconnect the target.		√					√	

- MULTI

Error Message	"-tc" of 850eserv Start Option		Target System Connection		Exchange Adapter		Target System Power ON/OFF	
	With -tc	Without -tc	Connected	Not Connected	Used	Not Used	ON	OFF
Check the target power on. Or please delete "-tc" option.	√							√
Check the exchange adapter is connected.		√		√		√		√
Remove the target. Or please add "-tc" option and power on the target.		√	√					√
Power off and remove the target. Or please add "-tc" option.		√					√	

CHAPTER 5 NOTES ON TARGET SYSTEM DESIGN

For details on the notes on the target system design (areas on the target system in which components must not be mounted and where the height of the mounted components are restricted) and information on external dimensions of connectors and adapters, refer to **[Related Information]** on the following webpage.

URL: http://www.necel.com/micro/english/iecube/index.html

CHAPTER 6 OPTIONAL FUNCTIONS

The following functions can be added to QB-V850ESFJ3 control code C or later (cannot be added to products with control code A or B). This chapter explains the functional outline and specifications of the optional functions, and how to obtain them.

- Memory emulation function
- Coverage measurement function
- TimeMachine function

The support status of each optional function differs depending on the debugger used. The following table lists the support statuses as of November 2005. If you have any questions regarding the support status, consult an NEC Electronics sales representative or distributor.

Function	Support Status	
	ID850QB	MULTI
Memory emulation function	Supported in V2.90, V3.10 and later	Supported in 850eserv V2.233 and later and earlier than V3.000, as well as in 850eserv V3.233
Coverage measurement function	Supported in V2.90, V3.10 and later	Support under consideration
TimeMachine function	Not supported	Supported in 850eserv2 V1.000 and later

6.1 Memory Emulation Function

This section explains the functional outline of the memory emulation function and differences in specifications that occur after the addition of this function.

6.1.1 Functional outline

Using the memory emulation function, the QB-V850ESFJ3 can be substituted for the external memory on the target system, so that programs and data can be allocated to the QB-V850ESFJ3.

This function was designed for use in cases such as the following.

- Development of the target system is delayed, so program development for external spaces cannot be started.
  Through memory substitution, program development can be started in advance.
- Writing to the flash memory on the target system takes too much time and thus development is inefficient.
  Through memory substitution, the program development efficiency can be improved.

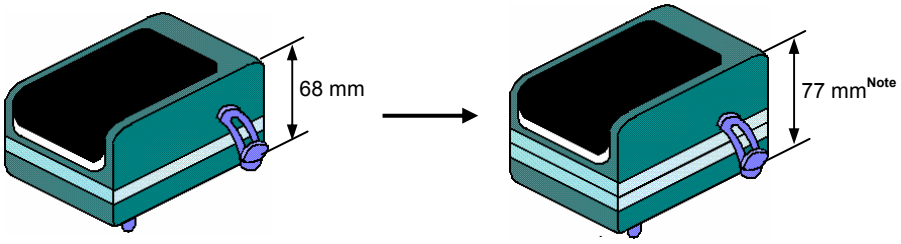
Refer to the user's manual for the debugger for details on use of the memory emulation function.

When using the memory emulation function, do not map the area used for memory emulation to the space where the data flash area is allocated.

6.1.2 Differences from hardware specifications

After addition of the memory emulation function, differences from the hardware specifications described in this manual are as follows.

- External dimensions
  The height increases by 9 mm.



Note When the rear spacer is adjusted to the lowest height (107 mm max.)

- Weight
  The weight increases by approximately 70 g.

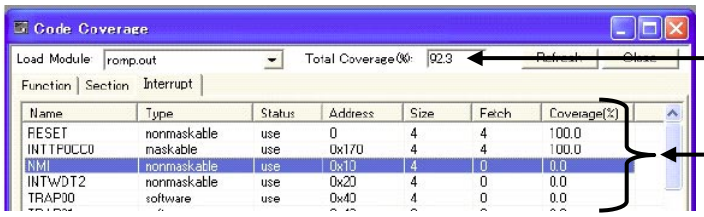
6.2 Coverage Measurement Function

This section explains the functional outline of the coverage measurement function and differences in specifications that occur after the addition of this function.

6.2.1 Functional outline

The coverage measurement function is used to measure the percentage of the executed code in a load module, section, or other such area. After the addition of this function, the Code Coverage window will be added and the Source and Assemble windows will be modified in the debugger ID850QB, as follows.

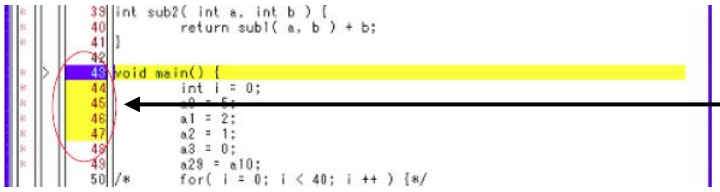
- Code Coverage window



Displays the coverage (%) of the executed code for total code in a load module.

Displays the coverage (%) of the executed code separately by functions, sections and vectors.

- Source window and Assemble window



The executed lines are highlighted.

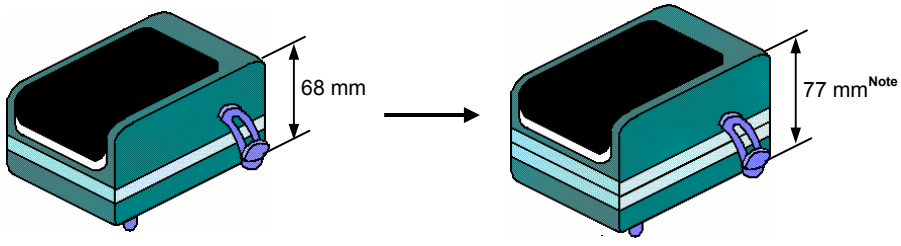
Refer to the user's manual for the debugger for details on use of the coverage measurement function.

6.2.2 Differences from hardware specifications

After addition of the coverage measurement function, differences from the hardware specifications described in this manual are as follows.

- External dimensions

  The height increases by 9 mm.



Note When the rear spacer is adjusted to the lowest height (107 mm max.)

- Weight

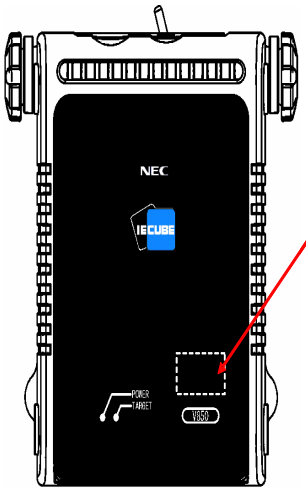
  The weight increases by approximately 70 g.

6.3 TimeMachine Function

This function is supported by the Green Hills Software (GHS) debugger. For details on the functional outline and specifications, consult a GHS tool distributor.

6.4 Changes to Top Side of Product Consequent to Addition of Optional Functions

After the addition of the optional functions, the following stickers will be attached to the top of the QB-V850ESFJ3. The addition of the optional functions can be confirmed through the presence of these stickers.



QB-V850ESFJ3 Top View

A sticker is attached to this position according to the function added, as follows.

- For the memory emulation function:

- For the coverage measuring function:

- For the TimeMachine function:

6.5 How to Add Optional Functions

To add the optional functions, the option board corresponding to each function, as listed in the following, must be mounted.

Function	Option Board Required for Adding Function
Memory emulation function	Emulation memory board
Coverage measurement function	Coverage memory board[Note 1]
TimeMachine function	SuperTrace™ probe board[Notes 1, 2]

Notes 1. Either the coverage memory board or the SuperTrace probe board can be added, but not both.

2. To use the TimeMachine function, the SuperTrace probe (Green Hills Software (GHS)) must be mounted in the QB-V850ESFJ3, in addition to the SuperTrace probe board.
For details on specifications and purchases, consult a GHS tool distributor.

The following two methods have been provided for mounting the option boards.

For more information on ordering, price and schedule, consult an NEC Electronics sales representative or distributor.

- New purchase

  By adding one of the following suffixes at the end of the ordering code, you can purchase the QB-V850ESFJ3 with the corresponding option board mounted.

  -M: Emulation memory board mounted
  -C: Coverage memory board mounted
  -S: SuperTrace probe board mounted
  -CM: Coverage memory board and emulation memory board mounted
  -SM: SuperTrace Probe board and emulation memory board mounted

  Part number examples: QB-V850ESFJ3-S100GC-M
  QB-V850ESFJ3-S144GJ-CM

- System upgrade

  Using this method, the option board can be mounted in your QB-V850ESFJ3.

APPENDIX A CHARACTERISTICS OF TARGET INTERFACE

The target interface (signals connecting the in-circuit emulator and target system) operate, in terms of function, as if an actual device were connected. The characteristics, however, may be different from those of the actual device. The target interface of the QB-V850ESFJ3 is one of the equivalent circuits shown below.

Figure A-1. Equivalent Circuit A

Figure A-2. Equivalent Circuit B

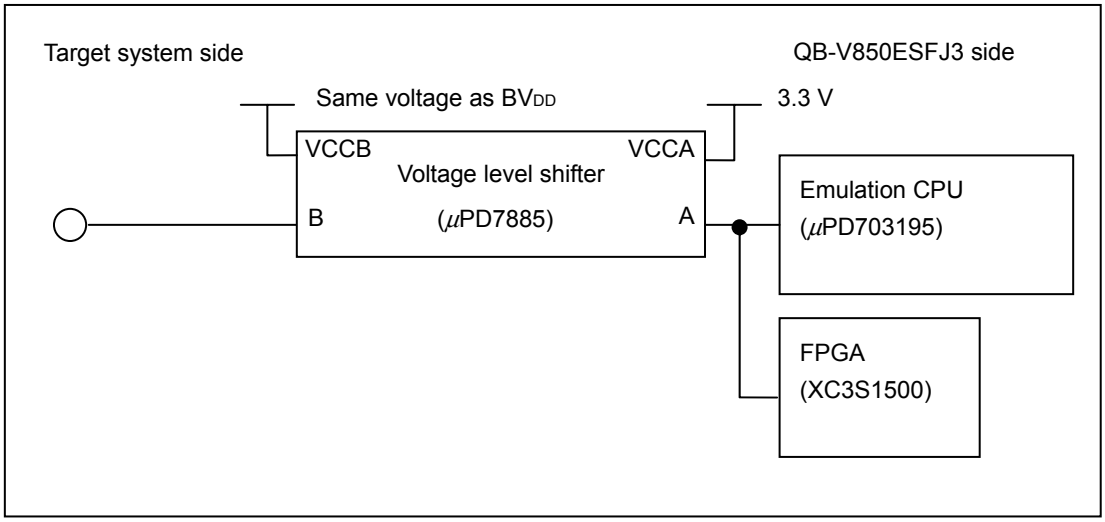


Figure A-3. Equivalent Circuit C

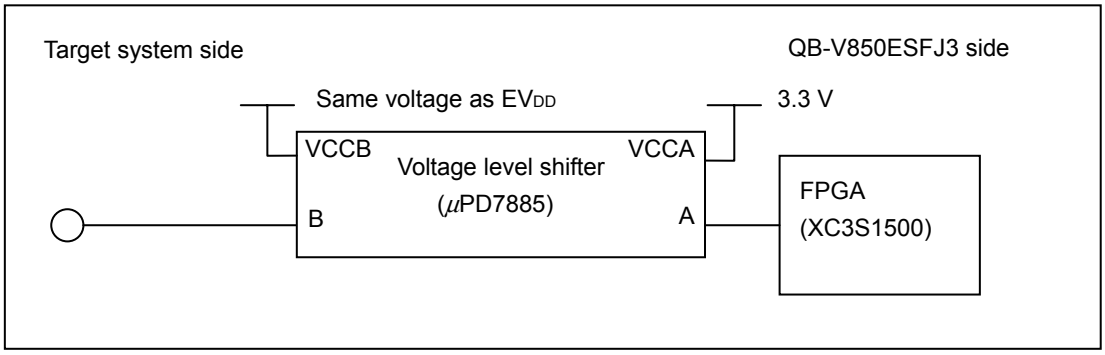


Figure A-4. Equivalent Circuit D

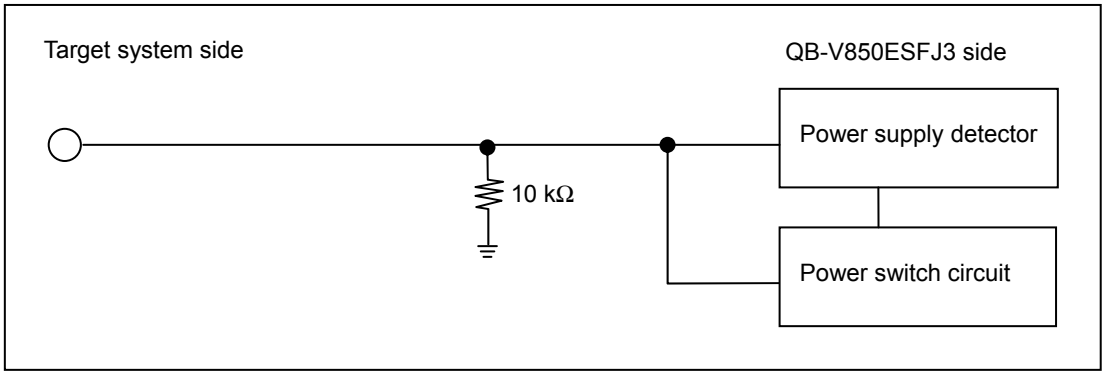


Figure A-5. Equivalent Circuit E

Figure A-6. Equivalent Circuit F

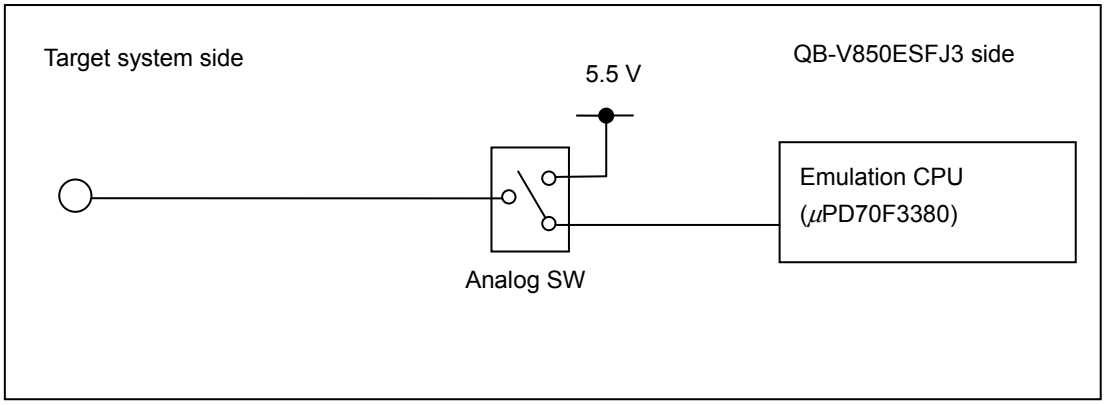


Figure A-7. Equivalent Circuit G

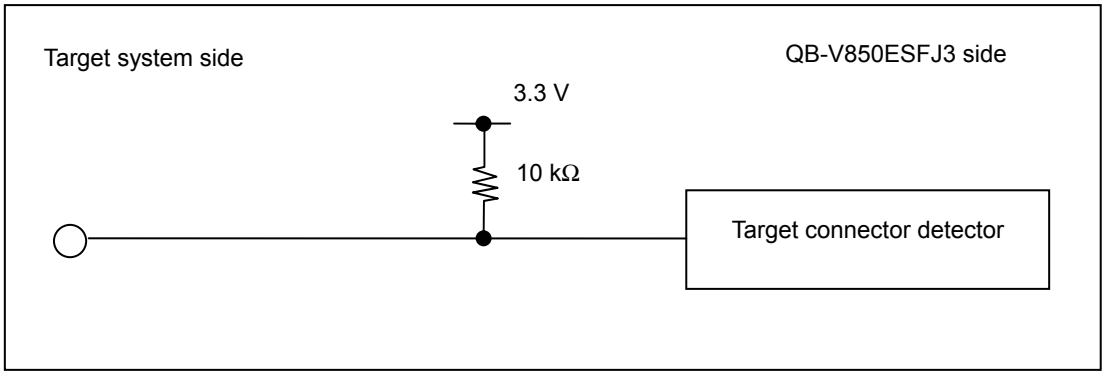


Figure A-8. Equivalent Circuit H

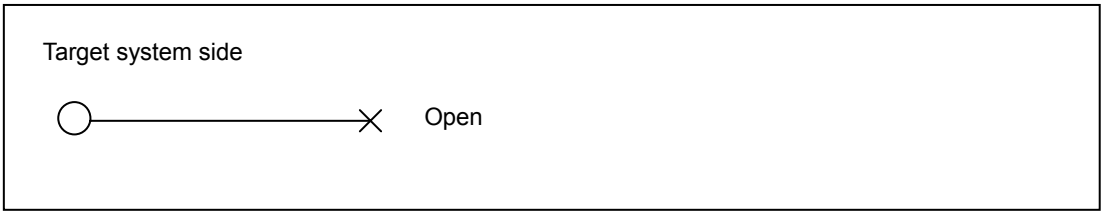


Figure A-9. Equivalent Circuit I

Table A-1. Target Interface Connection (1/4)

Pin No.				Target Device Pin Name (Name in V850ES/FJ3)	Equivalent Circuit Type
FJ3	FG3	FF3	FE3		
1	1	1	1	AVREF0	F
2	2	2	2	AVSS	I
3	3			P10/INTP9	A
4	4			P11/INTP10	A
5	5			EVDD	D
6	6	3	12	P00/TIP31/TOP31	A
7	7	4	13	P01/TIP30/TOP30	A
8	8	8	3	MODE/FLMD0	H
9	9	9	4	VDD	H
10	10	10	5	REGC	H
11	11	11	6	VSS	G
12	12	12	7	X1	H
13	13	13	8	X2	H
14	14	14	9	$\overline{\text{RESET}}$	C
15	15	15	10	XT1	H
16	16	16	11	XT2	H
17	17	5	14	P02/NMI	A
18	18	6	15	P03/INTP0/ADTRG	A
19	19	7	16	P04/INTP1	A
20	20	17	17	P05/INTP2/$\overline{\text{DRST}}$	A
21	21	18	18	P06/INTP3	A
22	22	19	19	P40/SIB0	A
23	23	20	20	P41/SOB0	A
24	24	21	21	P42/$\overline{\text{SCKB0}}$	A
25	25	22	22	P30/TXDA0	A
26	26	23	23	P31/RXDA0/INTP7	A
27	27	24	24	P32/ASCKA0/TIP00/TOP00/TOP01	A
28	28	25	25	P33/TIP01/TOP01/CTXD0	A
29	29	26	26	P34/TIP10/TOP10/CRXD0	A
30	30	27	27	P35/TIP11/TOP11	A
31	31			P36/CTXD1	A
32	32			P37/CRXD1	A
33	33	30	32	EVSS	I
34	34	31	33	EVDD	D
35	35	28		P38/TXDA2	A
36	36	29		P39/RXDA2/INTP8	A
37	37	32	28	P50/KR0/TIQ01/TOQ01	A
38	38	33	29	P51/KR1/TIQ02/TOQ02	A
39	39	34	30	P52/KR2/TIQ03/TOQ03/DDI	A
40	40	35	31	P53/KR3/TIQ00/TOQ00/DDO	A

Table A-1. Target Interface Connection (2/4)

Pin No.				Target Device Pin Name (Name in V850ES/FJ3)	Equivalent Circuit Type
FJ3	FG3	FF3	FE3		
41	41	36	34	P54/KR4/DCK	A
42	42	37	35	P55/KR5/DMS	A
43				P60/INTP11	A
44				P61/INTP12	A
45				P62/INTP13	A
46				P63	A
47				P64	A
48				P65/CTXD2	A
49				P66/CRXD2	A
50				P67/CTXD3	A
51				P68/CRXD3	A
52				P69	A
53				P610/TIQ20/TOQ20	A
54				P611/TIQ21/TOQ21	A
55				P612/TIQ22/TOQ22	A
56				P613/TIQ23/TOQ23	A
57				P614	A
58				P615	A
59				P80/RXDA3/INTP14	A
60				P81/TXDA3	A
61	43	38	36	P90/KR6/TXDA1	A
62	44	39	37	P91/KR7/RXDA1	A
63	45			P92/TIQ11/TOQ11	A
64	46			P93/TIQ12/TOQ12	A
65	47			P94/TIQ13/TOQ13	A
66	48			P95/TIQ10/TOQ10	A
67	49	40	38	P96/TIP21/TOP21	A
68	50	41	39	P97/SIB1/TIP20/TOP20	A
69	51	42	40	P98/SOB1	A
70	52	43	41	P99/$\overline{\text{SCKB1}}$	A
71	53			P910/SIB2	A
72	54			P911/SOB2	A
73	55			P912/$\overline{\text{SCKB2}}$	A
74	56	44	42	P913/INTP4/PCL	A
75	57	45	43	P914/INTP5	A
76	58	46	44	P915/INTP6	A
77				PCD0	B
78				PCD1	B
79				PCD2	B
80				PCD3	B

Table A-1. Target Interface Connection (3/4)

Pin No.				Target Device Pin Name (Name in V850ES/FJ3)	Equivalent Circuit Type
FJ3	FG3	FF3	FE3		
81	59	47		PCS0/$\overline{CS0}$	B
82	60	48		PCS1/$\overline{CS1}$	B
83				PCS2/$\overline{CS2}$	B
84				PCS3/$\overline{CS3}$	B
85	61	49	45	PCM0/$\overline{WAIT}$	B
86	62	50	46	PCM1/CLKOUT	B
87	63	51		PCM2/$\overline{HLDAK}$	B
88	64	52		PCM3/$\overline{HLDRQ}$	B
89				PCM4	B
90				PCM5	B
91				PCS4	B
92				PCS5	B
93				PCS6	B
94				PCS7	B
95	65	53		PCT0/$\overline{WR0}$	B
96	66	54		PCT1/$\overline{WR1}$	B
97				PCT2	B
98				PCT3	B
99	67	55		PCT4/$\overline{RD}$	B
100				PCT5	B
101	68	56		PCT6/ASTB	B
102				PCT7	B
103	69			BVSS	I
104	70			BVDD	D
105	71	57	47	PDL0/AD0	B
106	72	58	48	PDL1/AD1	B
107	73	59	49	PDL2/AD2	B
108	74	60	50	PDL3/AD3	B
109	75	61	51	PDL4/AD4	B
110	76	62	52	PDL5/AD5/FLMD1	B
111	77	63	53	PDL6/AD6	B
112	78	64	54	PDL7/AD7	B
113	79	65		PDL8/AD8	B
114	80	66		PDL9/AD9	B
115	81	67		PDL10/AD10	B
116	82	68		PDL11/AD11	B
117	83			PDL12/AD12	B
118	84			PDL13/AD13	B
119				PDL14/AD14	B
120				PDL15/AD15	B

Table A-1. Target Interface Connection (4/4)

Pin No.				Target Device Pin Name (Name in V850ES/FJ3)	Equivalent Circuit Type
FJ3	FG3	FF3	FE3		
121				P127/ANI23	A
122				P126/ANI22	A
123				P125/ANI21	A
124				P124/ANI20	A
125				P123/ANI19	A
126				P122/ANI18	A
127				P121/ANI17	A
128				P120/ANI16	A
129	85			P715/ANI15	A
130	86			P714/ANI14	A
131	87			P713/ANI13	A
132	88			P712/ANI12	A
133	89	69		P711/ANI11	A
134	90	70		P710/ANI10	A
135	91	71	55	P79/ANI9	A
136	92	72	56	P78/ANI8	A
137	93	73	57	P77/ANI7	A
138	94	74	58	P76/ANI6	A
139	95	75	59	P75/ANI5	A
140	96	76	60	P74/ANI4	A
141	97	77	61	P73/ANI3	A
142	98	78	62	P72/ANI2	A
143	99	79	63	P71/ANI1	A
144	100	80	64	P70/ANI0	A
				PDH0/A16	B
				PDH1/A17	B

APPENDIX B REVISION HISTORY

Document Number	Issued on	Description
ZUD-CD-05-0149	November 11, 2005	Newly created.