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User's Manual

QB-V850EIX3

In-Circuit Emulator

Target Devices

V850E/IF3

V850E/IG3

Document No. U18651EJ2V0UM00 (2nd edition)

Date Published September 2007 NS

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- 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.^{Note}
- If excessive load is applied to the connectors or sockets.
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- If the product is used or stored in an environment where it may likely be exposed to electrostatic discharge or electrical noise

Note For handling, see **2.5 Mounting and Connecting Connectors (When Using S Type)**, **2.6 Mounting and Connecting Connectors (When Using T Type)** .

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- 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**.
- The AC adapter supplied with the product is exclusively for this product, so do not use it with other products.

INTRODUCTION

Readers	This manual is intended for users who wish to perform debugging using the QB-V850EIX3. 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-V850EIX3.	
Organization	This manual is divided into the following sections. <ul style="list-style-type: none">• General• Setup procedure• Settings at product shipment• Notes• Optional functions	
How to Read This Manual	<p>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.</p> <p>To understand the overall functions and usages of the QB-V850EIX3 →Read this manual in the order of the CONTENTS. The mark "<R>" shows major revised points. The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.</p> <p>To know the manipulations, command functions, and other software-related settings of the QB-V850EIX3 →See the user's manual of the debugger (supplied with the QB-V850EIX3) to be used.</p>	
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-V850EIX3 In-Circuit Emulator	This manual	
CA850 Ver. 3.00 C Compiler Package	Operation	U17293E
	C Language	U17291E
	Assembly Language	U17292E
	Link Directives	U17294E
ID850QB Ver. 3.40 Integrated Debugger	Operation	U18604E
SM+ System Simulator	Operation	U18010E
	User Open Interface	U17663E
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.

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CHAPTER 1 GENERAL

The QB-V850EIX3 is an in-circuit emulator for emulating the target device shown below.

Hardware and software can be debugged efficiently in the development of systems in which the target device is used. This manual describes basic setup procedures, hardware specifications, system specifications, and how to set switches.

Target device : V850E/IF3, V850E/IG3

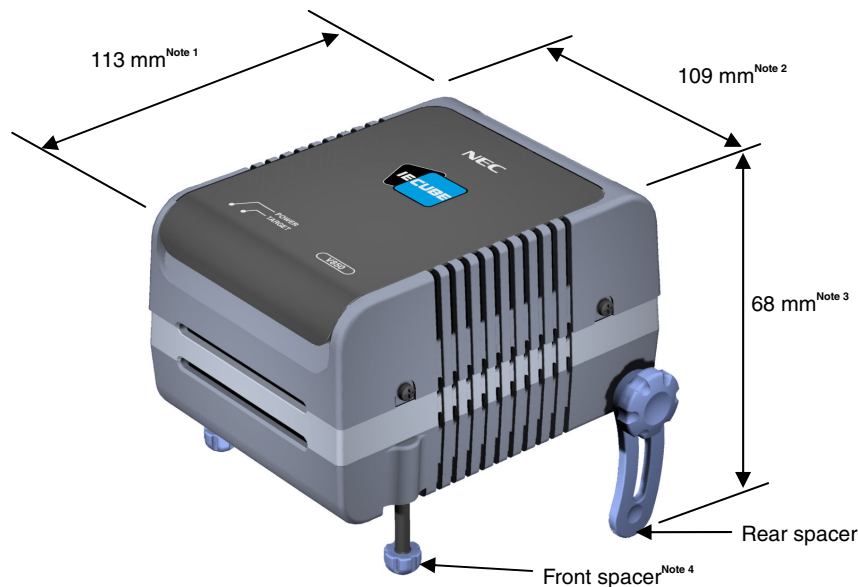
1.1 Hardware Specifications

Table 1-1. QB-V850EIX3 Hardware Specifications

Parameter		Specification
Target system interface voltage		$V_{DDX} = EV_{DD} = 3.5$ to 5.5 V ^{Note} (X = 0, 1) $AV_{DDX} = 4.0$ to 5.5 V (X = 0, 1, 2) $V_{SS} = EV_{SS} = AV_{SS} = 0$ V
Maximum operating frequency		64 MHz
Operating temperature range		0 to 40°C (No condensation)
Storage temperature range		-15 to +60°C (No condensation)
External dimensions		See figure below
Power consumption	AC adapter	15 V, 1 A
	Target system power supply	Same level or lower than target device (Except STOP mode)
Weight		About 500 g
Host interface		USB interface (1.1, 2.0)

Note Since the POC function detects voltages of 3.7 ± 0.2 V, the CPU does not start operation when the voltage exceeds 3.5 V. The CPU starts operation after reset to the POC function is released.

Figure 1-1. External Dimensions



- Notes**
- 1** Does not include projection of power switch
 - 2** Includes projection of screw that fixes rear spacer
 - 3** Dimension when rear spacer is made shortest (98 mm when longest)
 - 4** Front spacer can vary from 20 mm (longest) to 5 mm (shortest)

1.2 System Specifications

This section shows the QB-V850EIX3 system specifications. For the usage of the debugging function, refer to **ID850QB Ver. 3.40 Operation User's Manual (U18604E)**.

Table 1-2. QB-V850EIX3 System Specifications

Parameter		Specification
Emulation memory capacity	Internal ROM	1 MB max.
	Internal RAM	60 KB max.
	External memory	16 MB max. (optional) (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	50 MHz
	Measurement objects	Beginning through end of program execution Start event through end event (7 sections)
	Maximum measurement time	Approximately 195 hours (When using measurement-dedicated clock divided by 32)
	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)
Coverage function		Detection of execution or pass (optional)
	Measured range	Internal ROM space + arbitrary 1 MB space
Other functions		Mapping function, event function, register manipulation function, memory manipulation function

Caution Depending on the debugger, some functions are not supported.

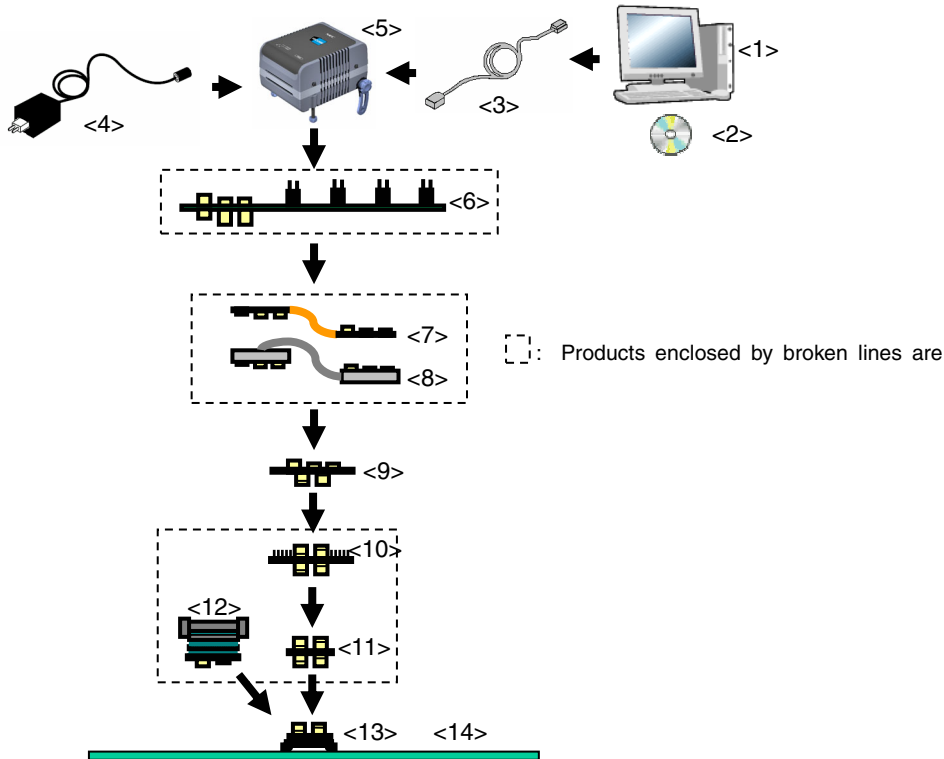
1.3 System Configuration

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

This section shows each system configuration when using the QB-V850EIX3 connected to a PC (a computer equipped with a USB port). 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: | Computer equipped with a USB port |
| <2> ID850QB Disk/Accessory Disk ^{Note 1} : | Debugger, USB drivers, manual, etc. |
| <3> USB interface cable: | Cable used for connecting QB-V850EIX3 to host machine |
| <4> AC adapter: | Can support 100 to 240 V by replacing AC plug |
| <5> QB-V850EIX3: | This product |
| <6> Check pin adapter (optional): | Adapter used for monitoring waveforms with oscilloscope |
| <7> Extension probe flexible type (optional) | |
| <8> Extension probe coaxial type (optional) | |
| <9> Exchange adapter: | Adapter that performs pin conversion |
| <10> Check pin adapter (optional): | Adapter used for monitoring waveforms with oscilloscope ^{Note 2} |
| <11> Space adapter (optional): | Adapter used for height adjustment ^{Note 2} |
| <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.

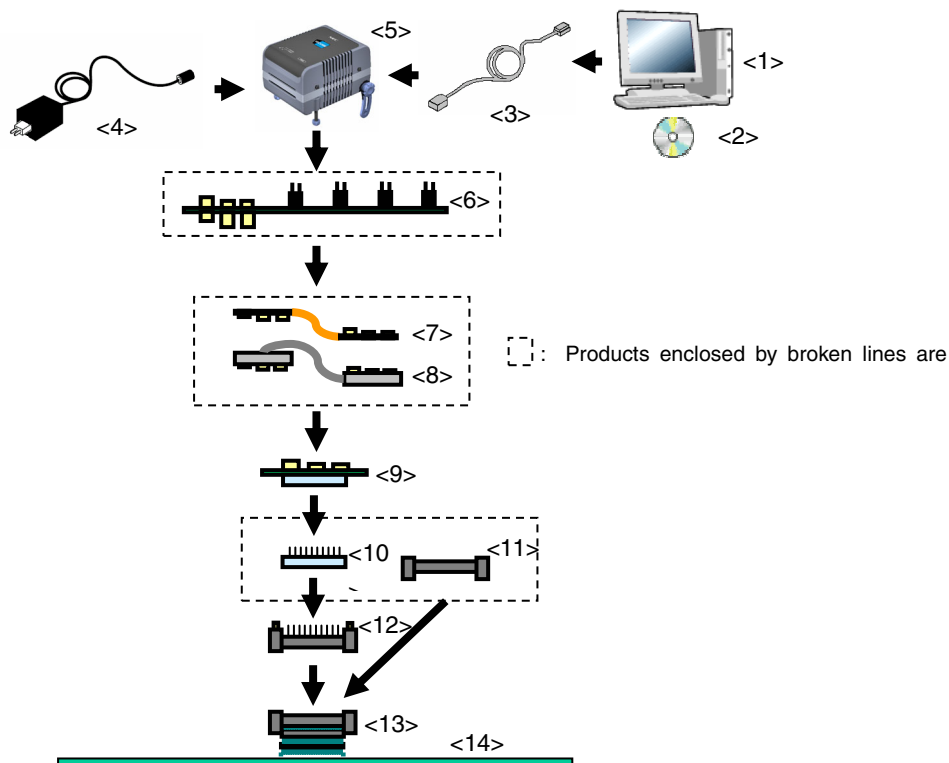
http://www.necel.com/micro/index_e.html

2. If both <10> and <11> are used, connection sequence of <10> and <11> may be reversed.

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

http://www.necel.com/micro/index_e.html

Figure 1-3. System Configuration (T Type)



<1> Host machine:	Computer equipped with a USB port
<2> ID850QB Disk/Accessory Disk ^{Note} :	Debugger, USB drivers, manual, etc.
<3> USB interface cable:	Cable used for connecting QB-V850EIX3 to host machine
<4> AC adapter:	Can support 100 to 240 V by replacing AC plug
<5> QB-V850EIX3:	This product
<6> Check pin adapter (optional):	Adapter used for monitoring waveforms with oscilloscope
<7> Extension probe flexible type (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	

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

Remark For notes on target system design and package drawings, refer to **[Related Information]** on the following URL.
http://www.necel.com/micro/index_e.html

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

No.	Name	Target Device to Be Emulated		
		V850E/IF3 (80-Pin GC)	V850E/IG3 (100-Pin GC)	V850E/IG3 (100-Pin GF)
<6>	Check pin adapter	QB-144-CA-01 (sold separately)		
<7>	Extension probe (flexible type)	QB-144-EP-02S (sold separately)		
<8>	Extension probe (coaxial type)	QB-144-EP-01S (sold separately)		
<9>	Exchange adapter	QB-80GC-EA-03S (sold separately) ^{Note}	QB-100GC-EA-02S (sold separately) ^{Note}	QB-100GF-EA-03S (sold separately) ^{Note}
<10>	Check pin adapter	QB-80-CA-03S (sold separately)	QB-100-CA-01S (sold separately)	
<11>	Space adapter	QB-80-SA-01S (sold separately)	QB-100-SA-01S (sold separately)	
<12>	Mount adapter	QB-80GC-MA-01S (sold separately)	QB-100GC-MA-01S (sold separately)	QB-100GF-MA-03S (sold separately)
<13>	Target connector	QB-80GC-TC-01S (sold separately) ^{Note}	QB-100GC-TC-01S (sold separately) ^{Note}	QB-100GF-TC-01S (sold separately) ^{Note}

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

No.	Name	Target Device to Be Emulated		
		V850E/IF3 (80-Pin GC)	V850E/IG3 (100-Pin GC)	V850E/IG3 (100-Pin GF)
<6>	Check pin adapter	QB-144-CA-01 (sold separately)		
<7>	Extension probe (flexible type)	QB-144-EP-02S (sold separately)		
<8>	Extension probe (coaxial type)	QB-144-EP-01S (sold separately)		
<9>	Exchange adapter	QB-80GC-EA-07T (sold separately) ^{Note}	QB-100GC-EA-02T (sold separately) ^{Note}	QB-100GF-EA-02T (sold separately) ^{Note}
<10>	Space adapter	QB-80GC-YS-01T (sold separately)	QB-100GC-YS-01T (sold separately)	QB-100GF-YS-01T (sold separately)
<11>	Mount adapter	QB-80GC-HQ-01T (sold separately)	QB-100GC-HQ-01T (sold separately)	QB-100GF-HQ-03T (sold separately)
<12>	YQ connector	QB-80GC-YQ-01T (sold separately) ^{Note}	QB-100GC-YQ-01T (sold separately) ^{Note}	QB-100GF-YQ-01T (sold separately) ^{Note}
<13>	Target connector	QB-80GC-NQ-01T (sold separately) ^{Note}	QB-100GC-NQ-01T (sold separately) ^{Note}	QB-100GF-NQ-01T (sold separately) ^{Note}

Note These accessories are supplied depending on the part number ordered (Refer to 1.4 Package Contents).

1.4 Package Contents

The following items have been placed in the QB-V850EIX3 packing box. Please check the contents.

Products supplied with QB-V850EIX3-ZZZ

- 1: QB-V850EIX3
- 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: Simple flash memory programmer (PG-FPL or QB-MINI2)
- 9: Probe holder
- 10: Parts board (for clock)

Products supplied with QB-V850EIX3-S80GC

- 1 to 10
- 11: Exchange adapter QB-80GC-EA-03S
 - 12: Target connector QB-80GC-TC-01S

Products supplied with QB-V850EIX3-S100GC

- 1 to 10
- 11: Exchange adapter QB-100GC-EA-02S
 - 12: Target connector QB-100GC-TC-01S

Products supplied with QB-V850EIX3-S100GF

- 1 to 10
- 11: Exchange adapter QB-100GF-EA-03S
 - 12: Target connector QB-100GF-TC-01S

Products supplied with QB-V850EIX3-T80GC

- 1 to 10
- 11: Exchange adapter QB-80GC-EA-07T
 - 12: YQ connector QB-80GC -YQ-01T
 - 13: Target connector QB-80GC-NQ-01T

Products supplied with QB-V850EIX3-T100GC

- 1 to 10
- 11: Exchange adapter QB-100GC-EA-02T
 - 12: YQ connector QB-100GC-YQ-01T
 - 13: Target connector QB-100GC-NQ-01T

Products supplied with QB-V850EIX3-T100GF

- 1 to 10
- 11: Exchange adapter QB-100GF-EA-02T
 - 12: YQ connector QB-100GF-YQ-01T
 - 13: Target connector QB-100GF-NQ-01T

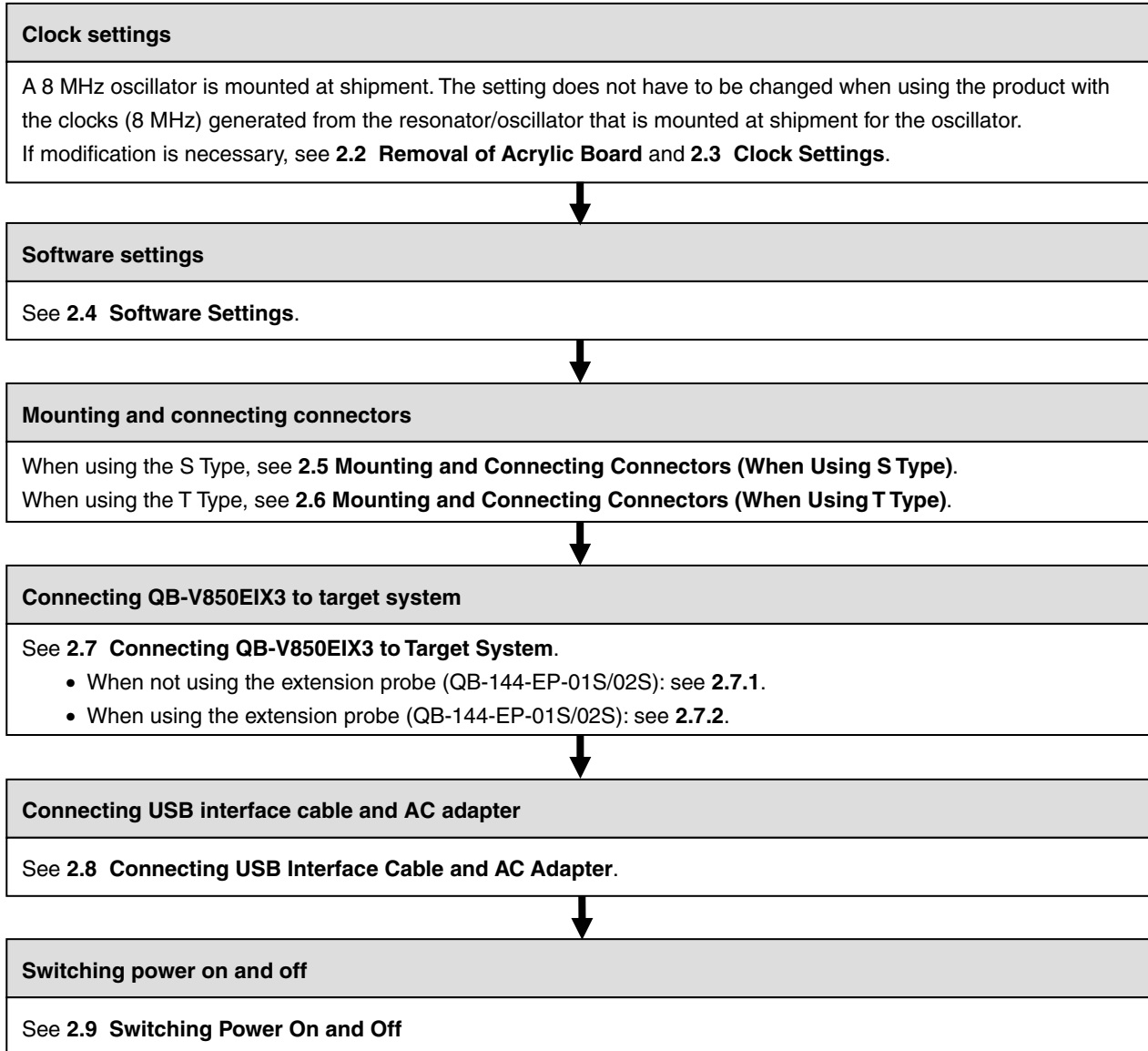
CHAPTER 2 SETUP PROCEDURE

This chapter explains the QB-V850EIX3 setup procedure.

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

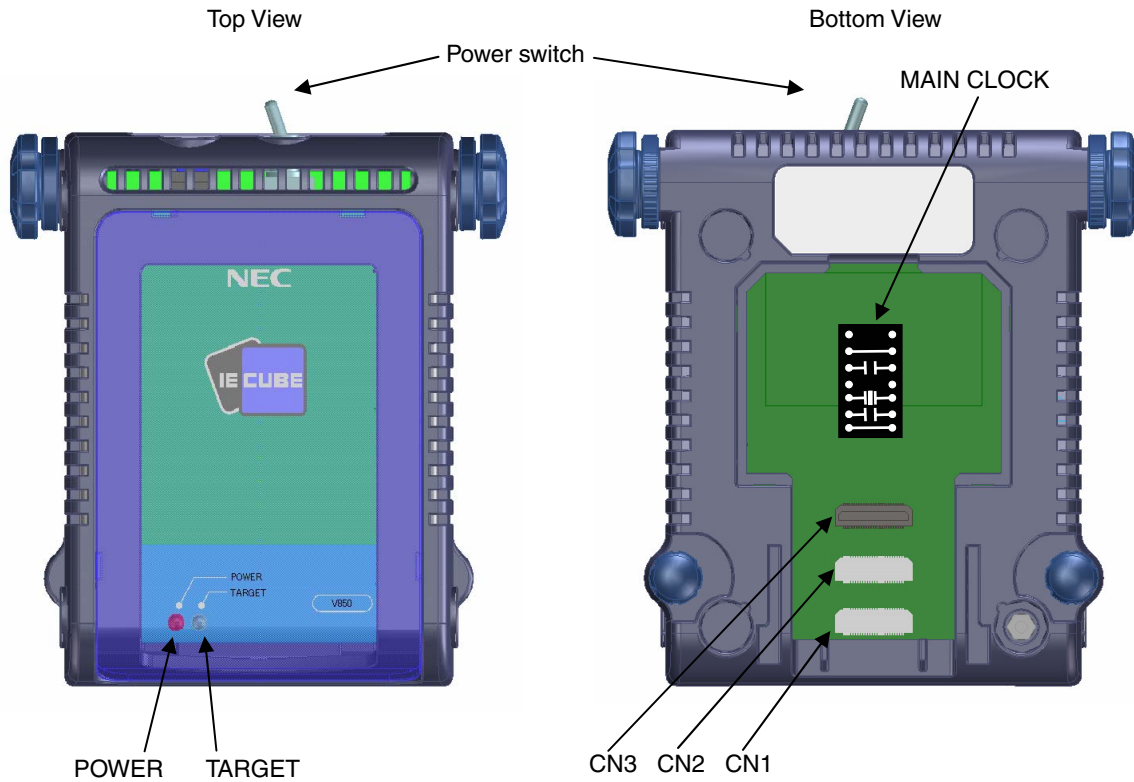
Perform setup along the lines of the following procedure.

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



2.1 Names and Functions of Hardware

Figure 2-1. Names of Parts of QB-V850EIX3



(1) CN1, CN2, CN3

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

(2) MAIN CLOCK (for clock)

This parts board is used to mount the resonator.

An oscillator with a 8 MHz resonator and a capacitor are mounted at shipment.

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

(3) POWER (Red LED)

This is an LED that shows whether or not the power supply of the QB-V850EIX3 is switched on.

LED State	QB-V850EIX3 State
Lit	Power switch ON
Not lit	Power switch OFF or AC adapter not connected to QB-V850EIX3
Blinking	Internal error occurred (Contact an NEC Electronics sales representative or distributor)

(4) 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

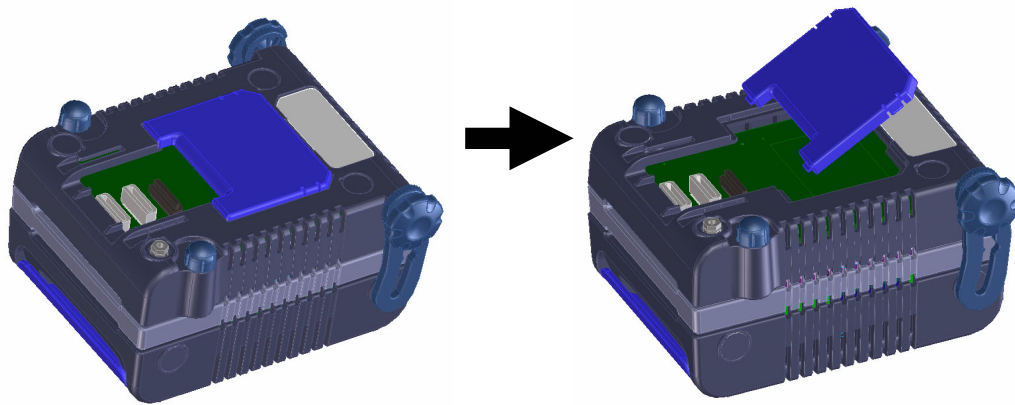
(5) Power switch

This is the power switch of the QB-V850EIX3.
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-V850EIX3 must be removed. The acrylic board can be removed by lifting it up.

Figure 2-2. Acrylic Board Removal Method



2.3 Clock Settings

The main clock is generated from the oscillator mounted in the QB-V850EIX3. It oscillates at 8 MHz with the factory setting. To change the oscillation clock frequency, perform settings with the following procedures.

Caution This product does not support clock input from the target system.

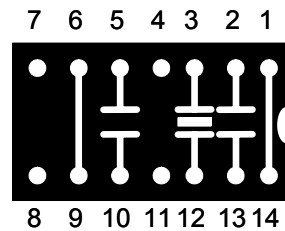
(1) Removing parts board on MAIN CLOCK socket

(2) Solder a resonator and a capacitor to the parts board supplied with the QB-V850EIX3.

The setting is as follows.

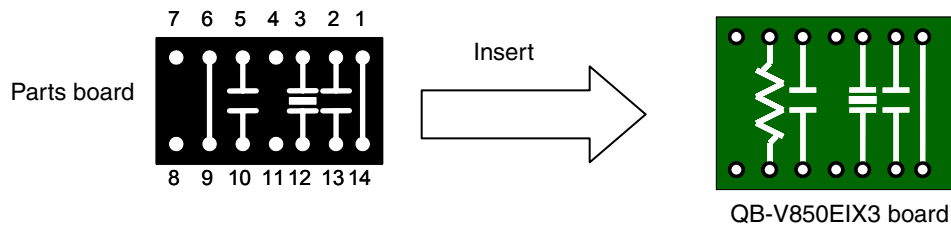
- Pins 1 and 14: Be sure to short these pins.
- Pins 2 and 13: Connect a capacitor.
- Pins 3 and 12: Connect a resonator.
- Pins 4 and 11: Leave open.
- Pins 5 and 10: Connect a capacitor.
- Pins 6 and 9: Be sure to short these pins.
- Pins 7 and 8: Be sure to leave open.

Figure 2-3. Setting Parts Board



(3) Insert the parts board into MAIN CLOCK socket of the QB-V850EIX3.

Figure 2-4. Inserting Parts Board



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 other than ID850QB (MULTI, etc.) as debugger

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-V850EIX3 to the target system when using the S Type. Make connections with both the QB-V850EIX3 and target system powered off.

The following abbreviations are used in this section.

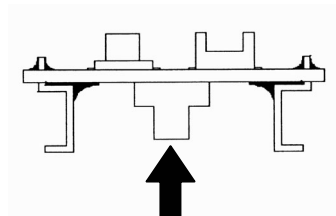
- TC: Target connector
- EA: Exchange adapter
- MA: Mount adapter
- CA: Check pin adapter
- SA: Space adapter

2.5.1 Mounting TC to 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 2-5**). Sparingly apply two-liquid hardening 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.
- (3) Soldering condition of TC
 - (a) Reflow soldering
 - At 245°C for a maximum of 20 seconds (main heating)
 - (b) Manual soldering
 - At 330°C for a maximum of 3 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.

Figure 2-5. TC Projection



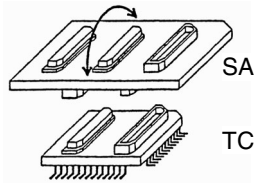
2.5.2 Inserting EA into TC

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 2-6**).
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 2-12 while slowly removing. Be careful since the connector will be damaged if this is done in the wrong direction.

Figure 2-6. 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) 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>
- (4) Check pin adapter (QB-xxx-CA-01S)
When using a check pin adapter (QB-xxx-CA-01S), connect a extension probe (QB-144-EP-01S/02S) (sold separately).

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-V850EIX3 to the target system when using the T Type. Make connections with both the QB-V850EIX3 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 in 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 $\phi 1.0$ 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.

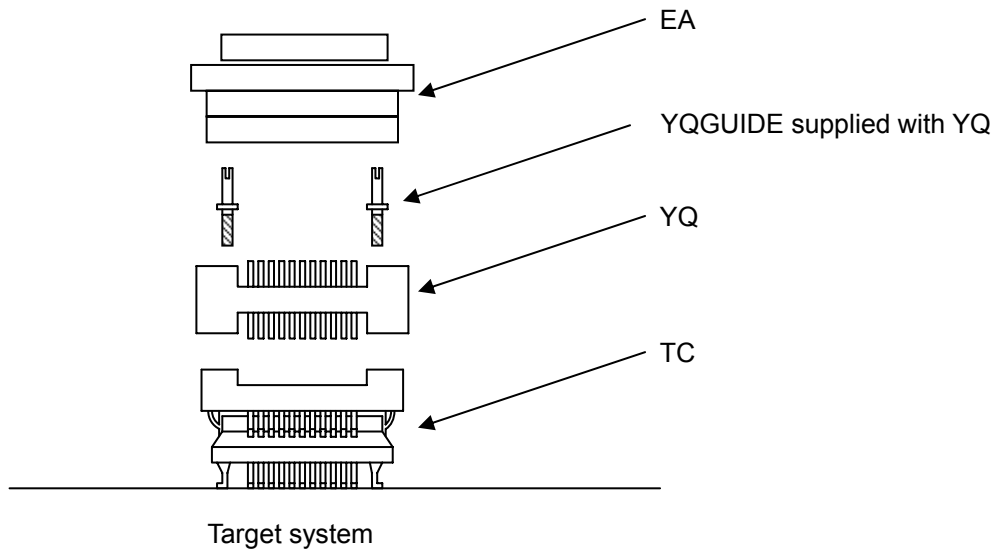
• Soldering conditions	Solder reflow	At 260°C for a maximum of 10 seconds
	Manual soldering	At 350°C for a maximum of 5 seconds (per pin)

Caution Do not perform cleaning by flux immersion or vapor.

- (4) Remove the guide pins.

2.6.2 Connecting YQ on TC

- <R> (1) After confirming that there are no broken or bent YQ contact pins, fit the YQ in the TC and fasten it using the supplied YQGUIDE (for the fastening method, see the next step, (2)). 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.
- <R> (2) Fasten YQ to the TC on the target system using the supplied YQGUIDE. Fasten the screws equally in the four corners using the supplied flat-blade screwdriver or a torque driver. The tightening torque of YQGUIDE is 0.054 Nm (MAX.). Too great tightening causes bad connections. Four screws for fitting to the MA (M2 x 10 mm / 4 units) are included with 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, and SA

- (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: $\phi 2.3$ mm or $\phi 3.3$ mm). The $\phi 3.8$ mm or $\phi 4.3$ 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 (included with the YQ) 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) 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.