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# QB-RL78G13

In-Circuit Emulator

User's Manual

Target Devices

RL78/G12, G13

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## 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 connection to the AC adapter, USB interface cable, or target system was in an unsatisfactory state
- If the cable of the AC adapter, the USB interface cable, the emulation 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 (As for handling, please see **2.3 Mounting and Connecting Connectors (When Using S Type Socket)** or **2.4 Mounting and Connecting Connectors (When Using T Type Socket)**).
- If a metal part of the power switch, cooling fan, or another such part comes in contact with an electrostatic charge.
- If the product is used or stored in an environment where an electrostatic or electrical noise is likely to occur.

## 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.**

# How to Use This Manual

<b>Readers</b>	This manual is intended for users who wish to perform debugging using the QB-RL78G13. The readers of this manual are assumed to be familiar with the device functions and usage, and to have knowledge of debuggers.
<b>Purpose</b>	This manual is intended to give users an understanding of the basic specifications and correct usage of the QB-RL78G13.
<b>Organization</b>	This manual is divided into the following sections. <ul style="list-style-type: none"><li>• General</li><li>• Setup procedure</li><li>• Settings at product shipment</li><li>• Cautions</li></ul>
<b>How to Read This Manual</b>	<p>It is assumed that the readers of this manual have general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers.</p> <p>This manual describes the basic setup procedures and how to set switches.</p> <p>To understand the overall functions and usages of the QB-RL78G13</p> <p>→ Read this manual in the order of the <b>CONTENTS</b>. The mark &lt;R&gt; shows major revised points. The revised points can be easily searched by copying an "&lt;R&gt;" 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-RL78G13</p> <p>→ See the user's manual of the debugger (supplied with the QB-RL78G13) to be used.</p>
<b>Conventions</b>	<p><b>Note:</b> Footnote for item marked with <b>Note</b> in the text</p> <p><b>Caution:</b> Information requiring particular attention</p> <p><b>Remark:</b> Supplementary information</p> <p>Numeric representation: Binary ... xxxx or xxxxB Decimal ... xxxx Hexadecimal ... xxxxH</p> <p>Prefix indicating power of 2 (address space, memory capacity): K (kilo): <math>2_{10} = 1,024</math> M (mega): <math>2_{20} = 1,024_2</math></p>

## 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. This includes the target program and the hardware provided by the user.
IECUBE™	Generic name for Renesas Electronics' high-performance / compact in-circuit emulator.

## Related Documents

Please use the following documents in conjunction 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-RL78G13 In-Circuit Emulator		This manual
RL78 Family User's Manual :Software		R01US0015E
CubeSuite+ Integrated Development Environment User's Manual	Start	R20UT0727E
	RL78 Design	R20UT0728E
	RL78,78K0R Cording	R20UT0729E
	RL78,78K0R Build	R20UT0730E
	RL78 Debug	R20UT0733E
	Analysis	R20UT0735E
	Message	R20UT0727E

**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-RL78G13 is an in-circuit emulator for emulating the RL78/G13. Hardware and software can be debugged efficiently in the development of systems in which the RL78/G13 is used. This manual describes basic setup procedures, hardware specifications, system specifications, and how to set switches.



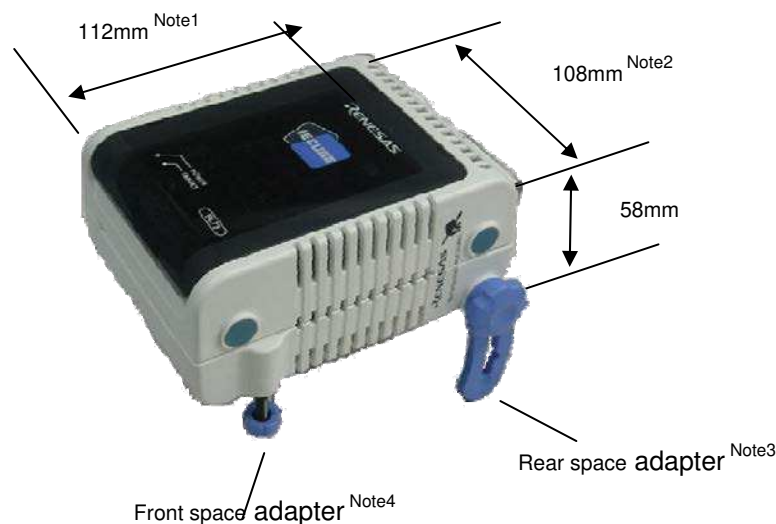
### 1.1 Hardware Specifications

Table 1-1. QB-RL78G13 Hardware Specifications

Parameter			Specification	
Target device			RL78/G12	RL78/G13
Operating voltage			1.8~5.5V	1.6 to 5.5V
Operating frequency	Main system clock <sup>Note1</sup>	High-speed system clock	2.7 V ≤ V <sub>DD</sub> ≤ 5.5 V : 1 to 20 MHz	2.7 V ≤ V <sub>DD</sub> ≤ 5.5 V : 1 to 20 MHz
			1.8 V ≤ V <sub>DD</sub> ≤ 2.7 V : 1 to 8 MHz	1.8 V ≤ V <sub>DD</sub> ≤ 2.7 V : 1 to 8 MHz
		-	1.6 V ≤ V <sub>DD</sub> ≤ 2.7 V : 1 to 4 MHz	
	High-speed on-chip oscillator clock	1.8 V ≤ V <sub>DD</sub> ≤ 5.5V : 1 to 24 MHz	1.6 V ≤ V <sub>DD</sub> ≤ 5.5V : 1 to 32 MHz	
	Low-speed system clock <sup>Note1</sup>	1.8 V ≤ V <sub>DD</sub> ≤ 5.5 V : 15 kHz	1.6 V ≤ V <sub>DD</sub> ≤ 5.5 V : 15 kHz	
Subsystem clock <sup>Note2</sup>			-	1.6 V ≤ V <sub>DD</sub> ≤ 5.5 V : 32.768 kHz
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	Target system power supply		Voltage: 1.8 to 5.5 V Current: approx. 250 mA MAX.	Voltage: 1.6 to 5.5 V Current: approx. 250 mA MAX
Weight			Approx. 400 g	
Host interface			USB interface (1.1, 2.0)	

**Note1** Errors are within ±0.05%. However, this does not apply to errors of the oscillator or clock system on the target board.

**Note2** Errors are within ±0.005%. However, this does not apply to errors of the oscillator or clock system on the target board.



- Notes 1.** Does not include projection of power switch
- 2.** Includes projection of screw that fixes rear space adapter
- 3.** Rear space adapter can adjust the height from 30 mm (longest) to 0 mm (shortest)
- 4.** Front space adapter can adjust the height from 20 mm (longest) to 5 mm (shortest)

### 1.2 Names and Functions of Hardware

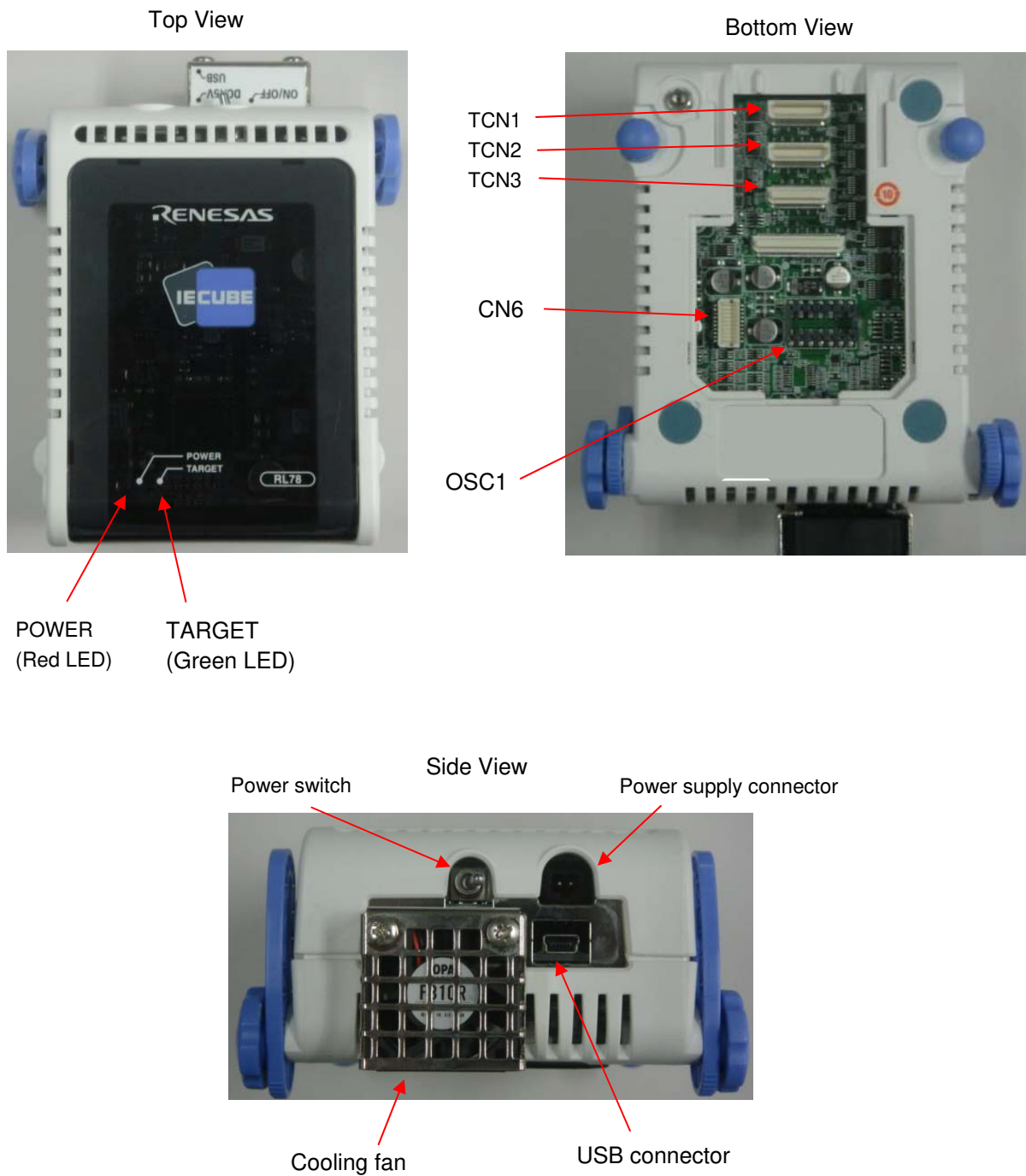


Figure 1-1. Names of Parts of QB-RL78G13

## (1) TCN1, TCN2, TCN3

These are connectors for connecting a check pin adapter or emulation probe.

## (2) OSC1

This is a socket for mounting the oscillator.

## (3) CN6

This is a connector for the shipment inspection. It is not something that the user will need.

## (4) POWER (Red LED)

This is an LED that shows whether the power supply of the QB-RL78G13 is switched on.

LED State	QB-RL78G13 State
Lit	Power switch ON
Not lit	Power switch OFF or AC adapter not connected to QB-RL78G13
Blinking	Internal error occurred (Contact an Renesas Electronics sales representative or distributor)

## (5) TARGET (Green LED)

This is an LED that shows whether 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

## (6) Power switch

This is the power switch of the QB-RL78G13.

It is OFF at shipment.

## (7) Cooling fan

This is the cooling fan of the QB-RL78G13.

It works when the power supply of the QB-RL78G13 is switched on.

### 1.3 System Specifications

This section shows the QB-RL78G13 system specifications.

Table 1-2. QB-RL78G13 System Specifications

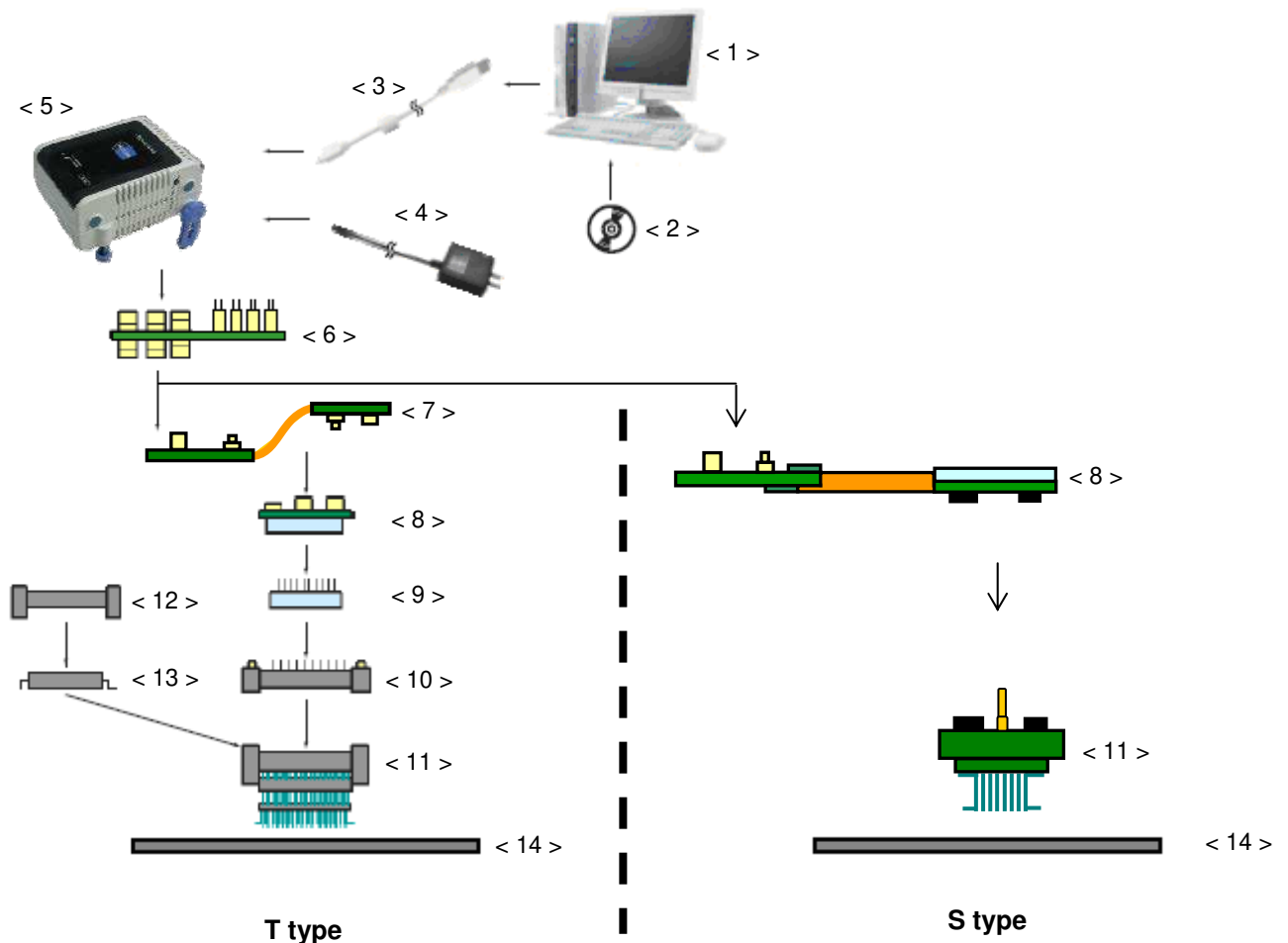
Parameter		Specification
Emulation memory capacity	Internal ROM	512 KB (MAX.)
	Internal RAM	61.75 KB (MAX.)
Program execution functions	Real-time execution function	Go, Start from Here, Come Here, Restart, Return Out, Ignore break points and Go
	Non-real-time execution function	Step In, Next Over, Slowmotion, Go & Go
Memory manipulation		Available (initialize, copy, compare)
Register manipulation		Available (general-purpose registers, control registers, SFRs)
Disassemble function		Available
Local variable view		Local variables
Watch data view		Local variables, global variables, or else
Stack trace view		Available
Break functions	Event break	Execution: 8 points Access: 8 points
	Software break	2000 points
	Pre-execution break	4 points
	Fail-safe break	Non-map, write protect, SFR illegal access, stack overflow, or else
	Other	Forcible break, trace full break, trace delay break, timeout break, timer overflow break
Trace functions	Trace data types	Program address, program data, access address, access data, status, time tag
	Trace modes	Unconditional trace, section trace, qualify trace, delay trigger trace
	Trace functions	Non-stop, full stop, full break, delay trigger stop, delay trigger break
	Memory capacity	128K frames
Real-time RAM monitoring function		All internal RAM spaces
Time measurement functions	Measurement clock	120 MHz
	Measurement objects	Start through end of program execution Start event through end event
	Maximum measurement time	Approx. 40 hours and 43 minutes
	Minimum resolution	8ns
	Number of timers for measurement	Start through end of program execution: 1 Start event through end event: 2
	Measurement results	Execution time (start through end of execution) Maximum, minimum, average, total, pass count (between events)
	Other	Timer overflow break function, timeout break function
Other functions		Command functions set in the console, mapping function, event function, coverage function, snapshot function, DMM function, power-off emulation function, pin mask function, flash self programming emulation function



### 1.4 System Configuration

This section shows the system configuration when using the QB-RL78G13 connected to a PC (Windows™ PC, PC/AT™ compatible). Connection is possible even without optional products.

Figure 1-2. System Configuration



- |                                  |  |
|----------------------------------|--|
| <1> Host machine                 | : Windows PC, IBM PC/AT compatible can be used                 |
| <2> Accessory Disk               | : Manual, etc.   |
| <3> USB interface cable          | : Cable connecting QB-RL78G13 to host machine                  |
| <4> AC adapter                   | : AC adapters classified by region                             |
| <5> QB-RL78G13                   | : This product   |
| <6> Check pin adapter (optional) | : Adapter used for monitoring waveforms with oscilloscope      |
| <7> Emulation probe              | : High-characteristic FPC type emulation probe                 |
| <8> Exchange adapter             | : Adapter that performs pin conversion                         |
| <9> Space adapter (optional)     | : Adapter used for height adjustment                           |
| <10> YQ connector                | : Connector that connects exchange adapter to target connector |
| <11> Target connector            | : Connector soldered to target system                          |
| <12> Mount adapter (optional)    | : Adapter used for mounting target device into socket          |
| <13> Device                      | : Target device  |
| <14> Target system               |  |

- Remarks 1.** Refer to **1.6 Package Contents** for the purchase forms of the above products.
2. As for handling of connectors, refer to **2.3 Mounting and Connecting Connectors (When Using S Type Socket)** or **2.4 Mounting and Connecting Connectors (When Using T Type Socket)**.
  3. The part number of <4> differs depending on the region of use. See **Table 1-5 Part Numbers of AC Adapter for IECUBE Classified by Region** for the part numbers. The IECUBE requires an AC adapter that must be purchased separately.
  4. See **Table 1-4 Common Probe and Adapter** for the part numbers of <6> and <7>.
  5. The combination of <8>, <9>, <10>, <11>, and <12> varies depending on the emulation device. See **Table 1-3 Adapters and Connectors for Each Target Device** for the combinations.
  6. To determine the T Type socket or the S Type socket, check for "T" or "S" at the end of the socket product name.  
Example:  
QB-64FB-EA-01T -> T Type  
QB-48NA-EA-02S -> S Type
  7. Even with the T Type socket, there may not be a space adapter/YQ connector/mount adapter. In this case, the device cannot be mounted in the socket.  
Check **Table 1-3 Adapters and Connectors for Each Target Device**.

## 1.5 System Configuration for Each Target Device

The following table lists the system configuration for each target device of the QB-RL78G13.

The adapter and connector for each device, and common probe and adapter are sold separately. An exchange adapter, a YQ connector, a target connector, and an emulation probe are included, depending on the order product name. For details, refer to **1.6 Package Contents**.

**Remark** For the package drawings of the connector, adapter, and probe, refer to the following URL.

[http://www.renesas.com/products/tools/emulation\\_debugging/incircuit\\_emulators/iecube/rl78/index.jsp](http://www.renesas.com/products/tools/emulation_debugging/incircuit_emulators/iecube/rl78/index.jsp)

Table 1-3. Adapters and Connectors for Each Target Device

Target Device	Package	Exchange Adaptor	Space Adaptor	YQ Connector	Target Connector	Mount Adaptor
RL78/G13	20SP	QB-20SP-EA-01T	—	—	QB-20SP-NQ-01T	—
	24NA	QB-24NA-EA-01S	—	—	QB-24NA-TC-01S	—
	25LA	QB-25LA-EA-01T	—	—	QB-25LA -NQ-01T	—
	30SP	QB-30SP-EA-01T	QB-30SP-YS-01T	QB-30SP-YQ-01T	QB-30SP-NQ-01T	QB-30SP-HQ-01T
	32NA	QB-32NA-EA-02S	—	—	QB-32NA-TC-01S	—
	36LA	QB-36LA-EA-01T	—	—	QB-36LA-NQ-01T	—
	40NA	QB-40NA-EA-01S	—	—	QB-40NA-TC-01S	—
	44FP	QB-44FP-EA-01T	QB-44FP -YS-01T	QB-44FP -YQ-01T	QB-44FP -NQ-01T	QB-44FP -HQ-01T
	48FB	QB-48FB-EA-01T	QB-48FB -YS-01T	QB-48FB -YQ-01T	QB-48FB -NQ-01T	QB-48FB -HQ-01T
	48NA	QB-48NA-EA-01S	—	—	QB-48NA-TC-01S	—
	52FA	QB-52FA-EA-01T	QB-52FA -YS-01T	QB-52FA -YQ-01T	QB-52FA -NQ-01T	QB-52FA -HQ-01T
	64FA	QB-64FA -EA-01T	QB-64FA -YS-01T	QB-64FA -YQ-01T	QB-64FA -NQ-01T	QB-64FA-HQ-01T
	64FB	QB-64FB-EA-01T	QB-64FB -YS-01T	QB-64FB -YQ-01T	QB-64FB -NQ-01T	QB-64FB -HQ-01T
	64BG	QB-64BG-EA-01T	—	—	QB-64BG-NQ-01T	—
	80FA	QB-80FA-EA-01T	QB-80FA-YS-01T	QB-80FA-YQ-01T	QB-80FA-NQ-01T	QB-80FA-HQ-01T
	80FB	QB-80FB-EA-01T	QB-80FB-YS-01T	QB-80FB-YQ-01T	QB-80FB-NQ-01T	QB-80FB-HQ-01T
	100FA	QB-100FA-EA-01T	QB-100FA-YS-01T	QB-100FA-YQ-01T	QB-100FA-NQ-01T	QB-100FA-HQ-01T
100FB	QB-100FB-EA-01T	QB-100FB-YS-01T	QB-100FB-YQ-01T	QB-100FB-NQ-01T	QB-100FB-HQ-01T	
128FB	QB-128FB-EA-01T	QB-128FB-YS-01T	QB-128FB-YQ-01T	QB-128FB-NQ-01T	QB-128FB-HQ-01T	
RL78/G12	20SP	QB-20SP-EA-04T	QB-20SP-YS-01T	QB-20SP-YQ-01T	QB-20SPNQ-01T	QB-20SP-HQ-01T
	24NA	QB-24NA-EA-02S	—	—	QB-24NA-TC-01S	—
	30SP	QB-30SP-EA-01T	QB-30SP-YS-01T	QB-30SP-YQ-01T	QB-30SP-NQ-01T	QB-30SP-HQ-01T

Table 1-4. Common Probe and Adapter

Name	Part Number	Target Device
Check pin adapter	QB-144-CA-01	RL78/G12,G13
Emulation probe	QB-80-EP-01T	Under 80pin of RL78/G13, RL78/G12
	QB-144-EP-02S	Over 100pin of RL78/G13

## 1.6 Package Contents

The included products are described for each order product name.

Products supplied with QB-RL78G13-ZZZ

- 1: QB-RL78G13
- 2: USB interface cable (2 meters)
- 3: Online user registration card (warranty card and software contract in one)
- 4: Accessory Disk (CD-ROM)
- 5: Packing list

Products supplied with QB-RL78G13-T20SP

- 1 to 5
- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-20SP-EA-01T
- 8: Target connector QB-20SP-NQ-01T

Products supplied with QB-RL78G13-T20SP04

- 1 to 5
- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-20SP-EA-04T
- 8: Target connector QB-20SP-NQ-01T

Products supplied with QB-RL78G13-T24NA

- 1 to 5
- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-24NA-EA-01S
- 8: Target connector QB-24NA-TC-01S

Products supplied with QB-RL78G13-S24NA02

- 1 to 5
- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-24NA-EA-02S
- 8: Target connector QB-24NA-TC-01S

Products supplied with QB-RL78G13-T25LA

- 1 to 5
- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-25LA-EA-01T
- 8: Target connector QB-25LA-NQ-01T

Products supplied with QB-RL78G13-T30SP

- 1 to 5
- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-30SP-EA-01T
- 8: YQ connector QB-30SP-YQ-01T
- 9: Target connector QB-30SP-NQ-01T



## Products supplied with QB-RL78G13-S32NA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-32NA-EA-02S
- 8: Target connector QB-32NA-TC-01S

## Products supplied with QB-RL78G13-T36LA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-36LA-EA-01T
- 8: Target connector QB-36LA-NQ-01T

## Products supplied with QB-RL78G13- S40NA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-40NA-EA-01S
- 8: Target connector QB-40NA-TC-01S

## Products supplied with QB-RL78G13-T44FP

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-44FP-EA-01T
- 8: YQ connector QB-44FP-YQ-01T
- 9: Target connector QB-44FP-NQ-01T

## Products supplied with QB-RL78G13-T48FB

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-48FB-EA-01T
- 8: YQ connector QB-48FB-YQ-01T
- 9: Target connector QB-48FB-NQ-01T

## Products supplied with QB-RL78G13-S48NA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-48NA-EA-01S
- 8: Target connector QB-48NA-TC-01S

## Products supplied with QB-RL78G13-T52FA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-52FA-EA-01T
- 8: YQ connector QB-52FA-YQ-01T
- 9: Target connector QB-52FA-NQ-01T

## Products supplied with QB-RL78G13-T64FA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-64FA-EA-01T
- 8: YQ connector QB-64FA-YQ-01T
- 9: Target connector QB-64FA-NQ-01T

## Products supplied with QB-RL78G13-T64FB

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-64FB-EA-01T
- 8: YQ connector QB-64FB-YQ-01T
- 9: Target connector QB-64FB-NQ-01T

## Products supplied with QB-RL78G13-T64BG

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-64BG-EA-01T
- 8: Target connector QB-64BG-NQ-01T

## Products supplied with QB-RL78G13-T80FA

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-80FA-EA-01T
- 8: YQ connector QB-80FA-YQ-01T
- 9: Target connector QB-80FA-NQ-01T

## Products supplied with QB-RL78G13-T80FB

1 to 5

- 6: Emulation probe QB-80-EP-01T
- 7: Exchange adapter QB-80FB-EA-01T
- 8: YQ connector QB-80FB-YQ-01T
- 9: Target connector QB-80FB-NQ-01T

## Products supplied with QB-RL78G13-T100FA

1 to 5

- 6: Emulation probe QB-144-EP-02S
- 7: Exchange adapter QB-100FA-EA-02T
- 8: YQ connector QB-100FA-YQ-01T
- 9: Target connector QB-100FA-NQ-01T

## Products supplied with QB-RL78G13-T100FB

1 to 5

- 6: Emulation probe QB-144-EP-02S
- 7: Exchange adapter QB-100FB-EA-01T
- 8: YQ connector QB-100FB-YQ-01T
- 9: Target connector QB-100FB-NQ-01T

Products supplied with QB-RL78G13-T128FB

1 to 5

- 6: Emulation probe QB-144-EP-02S
- 7: Exchange adapter QB-128FB-EA-01T
- 8: YQ connector QB-128FB-YQ-01T
- 9: Target connector QB-128FB-NQ-01T

## 1.7 AC Adapter for IECUBE

The specifications of the AC adapter for IECUBE differ depending on the region of use. Be sure to use an AC adapter corresponding to the region of use.

Table 1-5. Part Numbers of AC Adapter for IECUBE Classified by Region

Product	Destination (Region) <sup>Notes 1, 2</sup>	Part Number <sup>Note 3</sup>
AC adapter (sold separately)	Japan	QB-COMMON-PW-JP
	USA	QB-COMMON-PW-EA
	China	QB-COMMON-PW-CN
	Hong Kong	QB-COMMON-PW-HK
	South Korea	QB-COMMON-PW-KR
	Singapore	QB-COMMON-PW-SG
	Taiwan	QB-COMMON-PW-TW

**Notes 1.** Products are shipped only on order from each region.

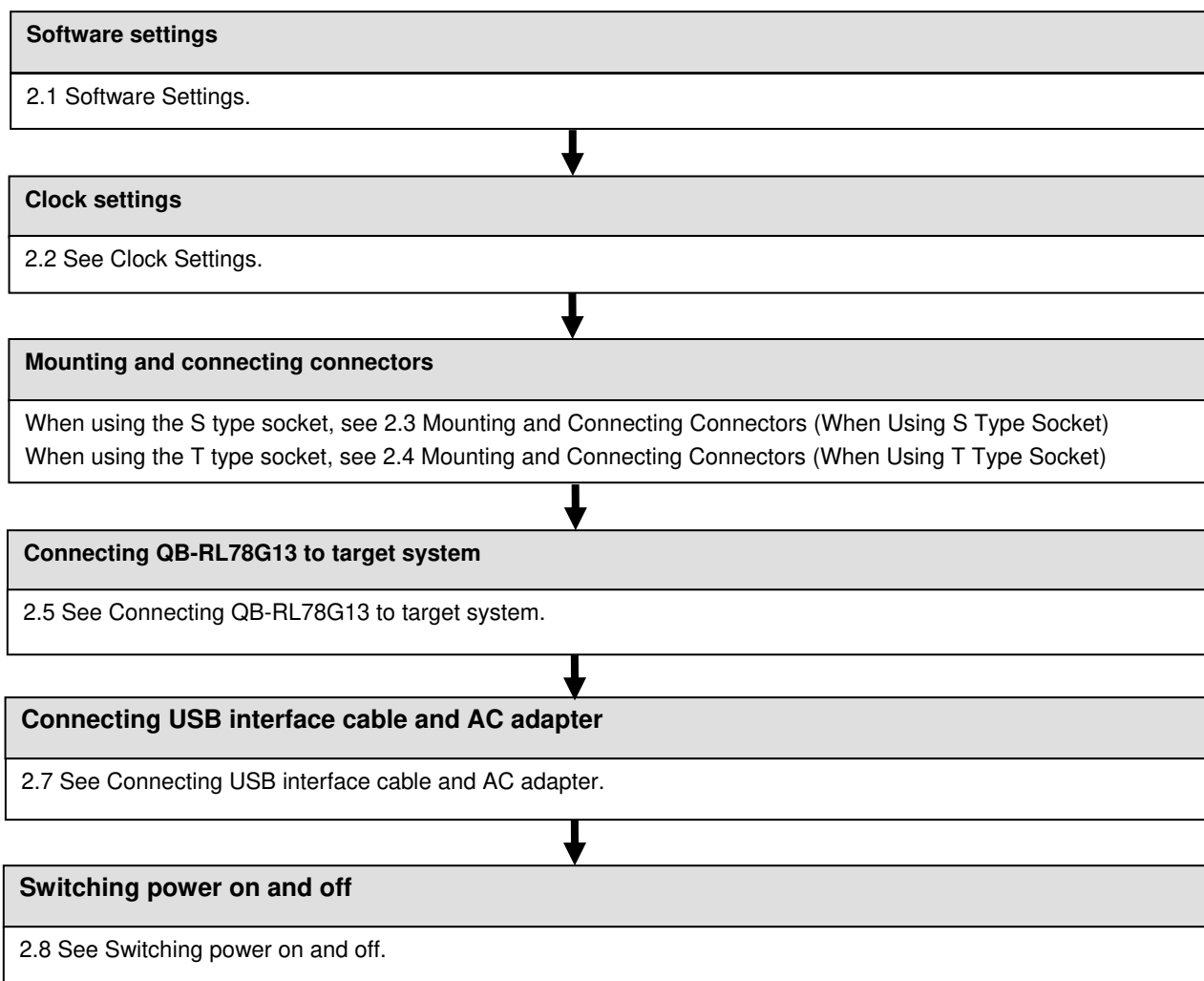
**2.** Contact a distributor or a Renesas Electronics sales representative for information on regions other than the above.

**3.** Only the AC adapter usable in each region can be ordered



## CHAPTER 2 SETUP PROCEDURE

This chapter explains the QB-RL78G13 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 1.2 Names and Functions of Hardware for clock positions.



## 2.1 Software Settings

Check the user's manual for the debugger that will be used.

## 2.2 Clock Settings

The IECUBE clock must be set to the clock used by the target device. For details about how to set the clock, check the user's manual for the debugger that will be used.

IECUBE clock settings for the clock used by the target device are shown below.

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.

Table 2-1. List of clock settings

Clock Used	Clock Supply
(1) High-speed system clock (X1 oscillator or External input)	(a) When the clock generated within the emulator is used
	(b) When the clock (a square wave) is supplied from the target system
	(c) When the oscillator (OSC1) mounted onto the emulator is used
(2) Internal high-speed oscillation clock	Uses the clock internally generated from the emulator
(3) Internal low-speed oscillation clock	Uses the clock internally generated from the emulator
(4) Subsystem clock (XT1 oscillator or External input)	(a) When the clock generated within the emulator is used
	(b) When the clock (a square wave) is supplied from the target system

## (1) High-speed system clock

The clock settings are listed below.

Table 2-2. Settings for High-Speed System Clock

Type of Clock to Be Used	OSC1
(a) When the clock generated within the emulator is used	–
(b) When the clock (a square wave) is supplied from the target system <b>Note</b>	–
(c) When the oscillator (OSC1) mounted onto the emulator is used	Oscillator mounted

**Note** This setting is not possible when TARGET LED is not lit.

**Remarks 1.** Settings other than the above are prohibited.

**2.** Selection of (a) or (b) is possible regardless of whether the oscillator is not mounted in the OSC1 socket.

## (a) When the clock generated within the emulator is used

This method uses the clock generated inside the emulator.

The oscillation frequency that will be used must be set in the debugger. For details about how to set the oscillation frequency, check the user's manual for the debugger that will be used.

## (b) When the clock (a square wave) is supplied from the target system

The clock input from the target system is then used.

To input a clock from the target system, input to the clock pin (X2) the square-wave signal with the same voltage potential as that of the target device supply voltage (VDD). Inputting the inverted signal to X1 is not necessary.

The selectable frequencies are same as those of the target device.

For debugger settings, check the user's manual for the debugger that will be used. Oscillation by a resonator in the target system is not supported.

## (c) When the oscillator (OSC1) mounted onto the emulator is used

Mount an oscillator in the OSC1 socket in the emulator and then select the "Clock socket" in the debugger.

The clock generated from the oscillator mounted on the emulator is used.

The selectable frequencies are same as those of the target device.

To modify the clock setting, the acrylic board on the bottom of the QB-RL78G13 must be removed.

The acrylic board can be removed by lifting it up.

For debugger settings, check the user's manual for the debugger that will be used.

Figure 2-1. Acrylic Board Removal Method



As an oscillator<sup>Note</sup> to be mounted in the OSC1 socket in the emulator, use the one that satisfies the following specifications.

- Supply voltage: 5.0 V
- Output level: CMOS

**Note** An oscillator that uses a resonator cannot be used.

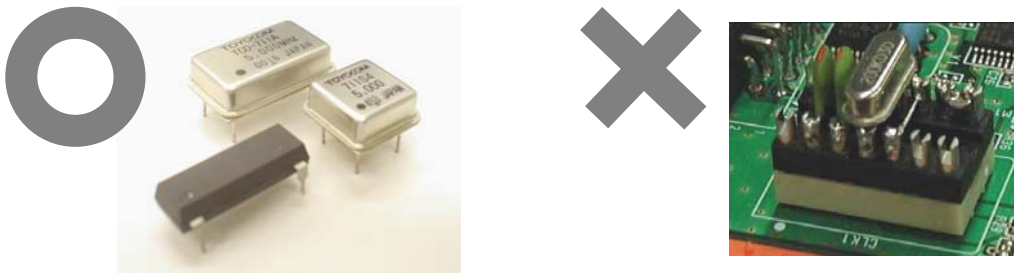
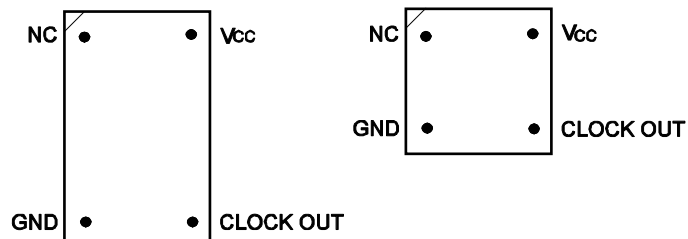
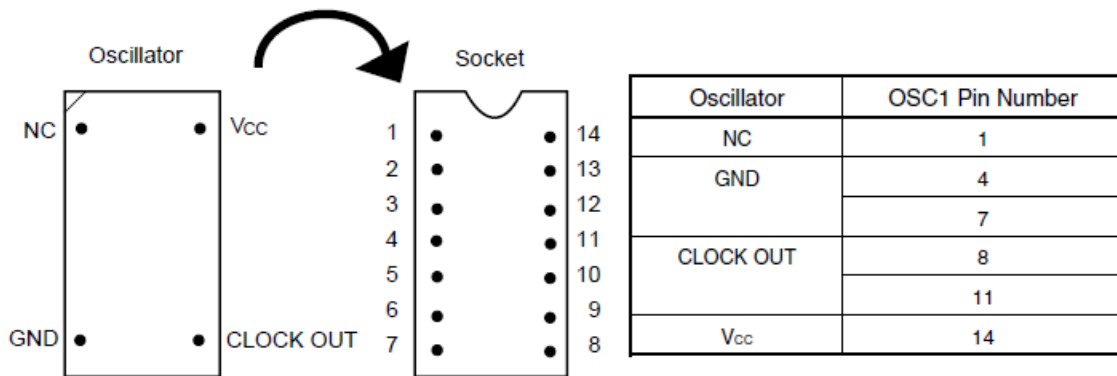


Figure 2-2. Oscillator Shape



Top View

Figure 2-3. Mapping of Oscillator to Socket



**Remark** Insert the oscillator into the socket, take care for the pin 1 position.

(2) Internal high-speed oscillation clock

This method uses the clock inside the emulator by configuring the use of the high-speed oscillation clock in the user program.

(3) Internal low-speed oscillation clock

This method uses the clock inside the emulator by configuring the use of the low-speed oscillation clock in the user program.

(4) Subsystem clock

The clock settings are listed below.

Table 2-3. Settings for Subsystem Clock

Type of Clock to Be Used
(a) When the clock generated within the emulator is used
(b) When the clock (a square wave) is supplied from the target system <sup>Note</sup>

(a) When the clock generated within the emulator is used

This method uses the clock inside the emulator by configuring the use of the subsystem clock in the user program. For debugger settings, check the user's manual for the debugger that will be used.

(b) When the clock (a square wave) is supplied from the target system

Select the "External" in the debugger. The clock input from the target system is then used.

Oscillation with the resonator on the target system is not supported. To input a clock from the target system, input to the clock pin (XT2) the square-wave signal with the same voltage potential as that of the target device supply voltage (V<sub>DD</sub>). Inputting the inverted signal to XT1 is not necessary.

The selectable frequencies are same as those of the target device.

## 2.3 Mounting and Connecting Connectors (When Using S Type Socket)

This section describes the methods of connecting the QB-RL78G13 and target system.

Make connections with both the QB-RL78G13 and target system powered OFF.

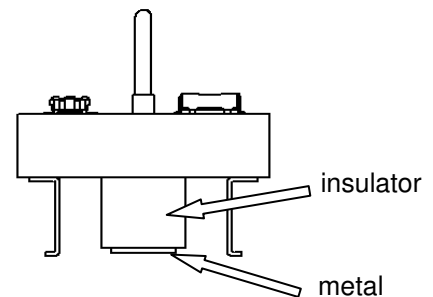
The following abbreviations are used in this section:

- TC: Target connector
- EA: Exchange adapter
- CA: Check pin adapter

### 2.3.1 Mounting TC to target system

- (1) Apply cream solder to the foot pattern of the target system for mounting an IC
- (2) There is a circular protrusion (Figure 2-4) in middle of the bottom of the TC. The center of this cylinder is a metallic component (metal plated) for the GND connection. In the same manner as the IC pad, the TC GND is connected to the target board GND by applying cream solder to the pad in the center of the recommended IC foot pattern and then reflow soldering.

Figure 2-4. TC protrusion



- (3) Soldering condition of TC
  - (a) Reflow soldering
    - At 235°C for a maximum of 10 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.