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M301N2T-PRB

User's Manual

Pod probe for M16C/1N Group

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Preface

The M301N2T-PRB is a pod probe for the M16C/1N Group of Renesas 16-bit MCUs. The M301N2T-PRB is used by connecting to a PC4701 emulator main unit (excluding the PC4701L and PC4700L) and the M30100T3-RPD-E emulation pod main unit.

This user's manual mainly describes specifications of the M301N2T-PRB pod probe and how to setup it. For details information about the emulator main unit, emulation pod main unit and emulator debugger, which are used with the M301N2T-PRB, refer to each product's user's manual or online manual.

All the components of this product are shown in "1.1 Package components" (page 12). If there is any question or doubt about this product, contact your local distributor.

The related manuals for using this product are listed below. You can download the latest manuals from the Renesas Tools homepage (<http://www.renesas.com/en/tools>).

Related manuals

Item	Manual
Emulator main unit	PC4701U User's Manual
	PC4701M User's Manual
	PC4701HS User's Manual
Emulation pod main unit	M30100T3-RPD-E User's Manual
Emulator debugger	M3T-PD30 User's Manual
	M16C PC4701 Emulator Software User's Manual
C compiler	NC30 User's Manual
	C compiler package for R8C/Tiny, M16C/60, 30, Tiny, 20 and 10 Series Compiler User's Manual
Assembler	AS30 User's Manual
	C compiler package for R8C/Tiny, M16C/60, 30, Tiny, 20 and 10 Series Assembler User's Manual

Important

Before using this product, be sure to read this user's manual carefully.

Keep this user's manual, and refer to this when you have questions about this product.

Emulator:

The emulator in this document refers to the following products that are manufactured by Renesas Technology Corp.:

- (1) PC4701 main unit
- (2) Emulation pod
- (3) Pod probe
- (4) Package converter board for connecting the user system

The emulator herein does not include the customer's user system and host machine.

Purpose of use of the emulator:

This emulator is a device to support the development of a system that uses the M16C Family M16C/10 Series M16C/1N Group of Renesas 16-bit single-chip MCUs. It provides support for system development in both software and hardware.

Be sure to use this emulator correctly according to said purpose of use. Please avoid using this emulator for other than its intended purpose of use.

For those who use this emulator:

This emulator can only be used by those who have carefully read the user's manual and know how to use it.

Use of this emulator requires the basic knowledge of electric circuits, logical circuits, and MCUs.

When using the emulator:

- (1) This product is a development supporting unit for use in your program development and evaluation stages. In mass-producing your program you have finished developing, be sure to make a judgment on your own risk that it can be put to practical use by performing integration test, evaluation, or some experiment else.
- (2) In no event shall Renesas Solutions Corp. be liable for any consequence arising from the use of this product.
- (3) Renesas Solutions Corp. strives to renovate or provide a workaround for product malfunction at some charge or without charge. However, this does not necessarily mean that Renesas Solutions Corp. guarantees the renovation or the provision under any circumstances.
- (4) This product has been developed by assuming its use for program development and evaluation in laboratories. Therefore, it does not fall under the application of Electrical Appliance and Material Safety Law and protection against electromagnetic interference when used in Japan.
- (5) Renesas Solutions Corp. cannot predict all possible situations or possible cases of misuse where a potential danger exists. Therefore, the warnings written in this user's manual and the warning labels attached to this emulator do not necessarily cover all of such possible situations or cases. Please be sure to use this emulator correctly and safely on your own responsibility.
- (6) This product is not qualified under UL or other safety standards and IEC or other industry standards. This fact must be taken into account when taking this product from Japan to some other country.

Usage restrictions:

This emulator has been developed as a means of supporting system development by users. Therefore, do not use it as a device used for equipment-embedded applications. Also, do not use it for developing the systems or equipment used for the following purposes either:

- (1) Transportation and vehicular
- (2) Medical (equipment where human life is concerned)
- (3) Aerospace
- (4) Nuclear power control
- (5) Undersea repeater

If you are considering the use of this emulator for one of the above purposes, please be sure to consult your local distributor.

About product changes:

We are constantly making efforts to improve the design and performance of this emulator. Therefore, the specification or design of this emulator or its user's manual may be changed without prior notice.

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About diagrams:

The diagrams in this user's manual may not all represent exactly the actual object.

Precautions for Safety

Definitions of Signal Words

In both the user's manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.

This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read this chapter before using this product.



This symbol represents a warning about safety. It is used to arouse caution about a potential danger that will possibly inflict an injury on persons. To avoid a possible injury or death, please be sure to observe the safety message that follows this symbol.



DANGER indicates an imminently dangerous situation that will cause death or heavy wound unless it is avoided. However, there are no instances of such danger for the product presented in this user's manual.



WARNING indicates a potentially dangerous situation that will cause death or heavy wound unless it is avoided.



CAUTION indicates a potentially dangerous situation that will cause a slight injury or a medium-degree injury unless it is avoided.

CAUTION

CAUTION with no safety warning symbols attached indicates a potentially dangerous situation that will cause property damage unless it is avoided.

IMPORTANT

This is used in operation procedures or explanatory descriptions to convey exceptional conditions or cautions to the user.

In addition to the five above, the following are also used as appropriate.

△ means WARNING or CAUTION.

Example:



CAUTION AGAINST AN ELECTRIC SHOCK

⊘ means PROHIBITION.

Example:



DISASSEMBLY PROHIBITED

● means A FORCIBLE ACTION.

Example:



UNPLUG THE POWER CABLE FROM THE RECEPTACLE.

⚠ WARNING

Warnings for AC Power Supply:



- If the attached AC power cable does not fit the receptacle, do not alter the AC power cable and do not plug it forcibly. Failure to comply may cause electric shock and/or fire.

- Use an AC power cable which complies with the safety standard of the country.
- Do not touch the plug of the AC power cable when your hands are wet. This may cause electric shock.
- This product is connected signal ground with frame ground. If your developing product is transformless (not having isolation transformer of AC power), this may cause electric shock. Also, this may give an unreparable damage to this product and your developing one.
While developing, connect AC power of the product to commercial power through isolation transformer in order to avoid these dangers.

- If other equipment is connected to the same branch circuit, care should be taken not to overload the circuit.



- When installing this equipment, insure that a reliable ground connection is maintained.



- If you smell a strange odor, hear an unusual sound, or see smoke coming from this product, then disconnect power immediately by unplugging the AC power cable from the outlet.

Do not use this as it is because of the danger of electric shock and/or fire. In this case, contact your local distributor.

- Before setting up this emulator and connecting it to other devices, turn off power or remove a power cable to prevent injury or product damage.

Warnings to Be Taken for This Product:



- Do not disassemble or modify this product. Personal injury due to electric shock may occur if this product is disassembled and modified. Disassembling and modifying the product will void your warranty.

- Make sure nothing falls into the cooling fan on the top panel, especially liquids, metal objects, or anything combustible.

Warning for Installation:



- Do not set this product in water or areas of high humidity. Make sure that the product does not get wet. Spilling water or some other liquid into the product may cause unreparable damage.

Warning for Use Environment:



- This equipment is to be used in an environment with a maximum ambient temperature of 35°C. Care should be taken that this temperature is not exceeded.

 **CAUTION****Cautions to Be Taken for Turning On the Power:**

- Turn ON the power of the emulator and user system as simultaneously as possible. Turn OFF the power of the emulator and user system as simultaneously as possible.
- Do not leave either the emulator or user system powered on, because of leakage current the internal circuits may be damaged.
- When turning ON the power again after shutting OFF the power, wait about 10 seconds.

Cautions to Be Taken for Handling This Product:

- Use caution when handling the main unit. Be careful not to apply a mechanical shock.
- Do not touch the connector pins of the emulator main unit and the target MCU connector pins. Static electricity may damage the internal circuits.
- Do not use inch-size screws for this equipment. The screws used in this equipment are all ISO (meter-size) type screws. When replacing screws, use same type screws as equipped before.

Caution to Be Taken for System Malfunctions:

- If the emulator malfunctions because of interference like external noise, do the following to remedy the trouble.
 - (1) Press the RESET switch on the emulator PC4701 front panel.
 - (2) If normal operation is not restored after step (1), shut OFF power to the emulator once and then reactivate it.

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Terminology

Some specific words used in this user's manual are defined as follows:

Emulator system

This means an emulator system built around the PC4701 emulator. The PC4701 emulator system is configured with an emulator main unit, emulation pod, pod probe, host machine and emulator debugger.

Emulator main unit (Hereafter PC4701)

This means a generic name for emulators for M16C, 7700, 740 Families. Take note of the fact that the M301N2T-PRB (this product) does not support the PC4701L and PC4700L emulators. For details on specific models of PC4701, visit the Renesas Tools Homepage at <http://www.renesas.com/en/tools>.

Emulation pod

This means M30100T3-RPD-E for the M16C/10 Series. It is used with the emulator main unit PC4701.

Pod probe M301N2T-PRB

This means pod probe M301N2T-PRB (this product) for the M16C/1N Group MCUs.

Emulator debugger

This means a software tool to control the emulator from the emulation pod through an interface.

For the emulator system including this product, the emulator debugger M3T-PD30 Ver. 8.20 Release1 or the M16C PC4701 Emulator Debugger included with the M16C R8C Debugger Package is available.

Firmware

Program that analyzes contents of communication with the emulator debugger and controls the emulator hardware. This program is installed in the flash memory in the emulator main unit. This program is downloadable from the emulator debugger to upgrade the firmware or to support other MCUs.

Host machine

This means a personal computer used to control the emulator main unit and emulation pod.

Software break

A software break is a function to break the program before the system executes an instruction at the specified address. The instruction at the preset address will not be executed.

Hardware break

A hardware break is a function to break the program when the system detects a write/read of data to/from memory or a leading/trailing edge of the signal entered from the external trace cable. The former break function is called address break; and the latter break function is called trigger break. While the instruction at the address where the software break is set is not executed, a hardware break is performed after the specified instruction is executed.

Target MCU

This means the MCU you are going to debug.

User system

This means a user's application system using the microcomputer to be debugged.

User program

This means the program you are going to debug.

Evaluation MCU

This means the MCU mounted on this product which is operated in the specific mode for tools.

*

In this user's manual, this symbol is used to show active Low. (e.g. RESET*: Reset signal).

1. Outline

This chapter describes the package components, the system configuration, the specifications of the emulator functions and the operating environment.

1.1 Package Components

The M301N2T-PRB package consists of the following items. When unpacking it, check to see if your M301N2T-PRB contains all of these items.

Table 1.1 Package components

Item	Quantity
M301N2T-PRB pod probe	1
Repair request sheet (English)	1
Repair request sheet (Japanese)	1
M301N2T-PRB User's Manual (This manual)	1
M301N2T-PRB User's Manual (Japanese)	1

* Please keep the M301N2T-PRB's packing box and cushion material in your place for reuse at a later time when sending your product for repair or other purposes. Always use these packing box and cushion material when transporting this product.

* If there is any question or doubt about the packaged product, contact your local distributor.

1.2 Other Tool Products Required for Development

To bring forward programs development on the M16C/1N Group MCUs, the products listed below are necessary in addition to those contained package above. Get them separately.

Table 1.2 Other tool products required for development

Product	Product name	Notes
Emulator main unit	PC4701(excluding PC4700L and PC4701L)	Required
Emulation pod main unit	M30100T3-RPD-E	Required
Emulator debugger	M3T-PD30 Ver. 8.20 Release1 or the M16C PC4701 Emulator Debugger included with the M16C R8C Debugger Package	Required
Converter board	M30102T-PTC	Required

* To purchase these products, contact your local distributor.

1.3 System Configuration

1.3.1 System Configuration

Figure 1.1 shows a configuration of the PC4701 system.

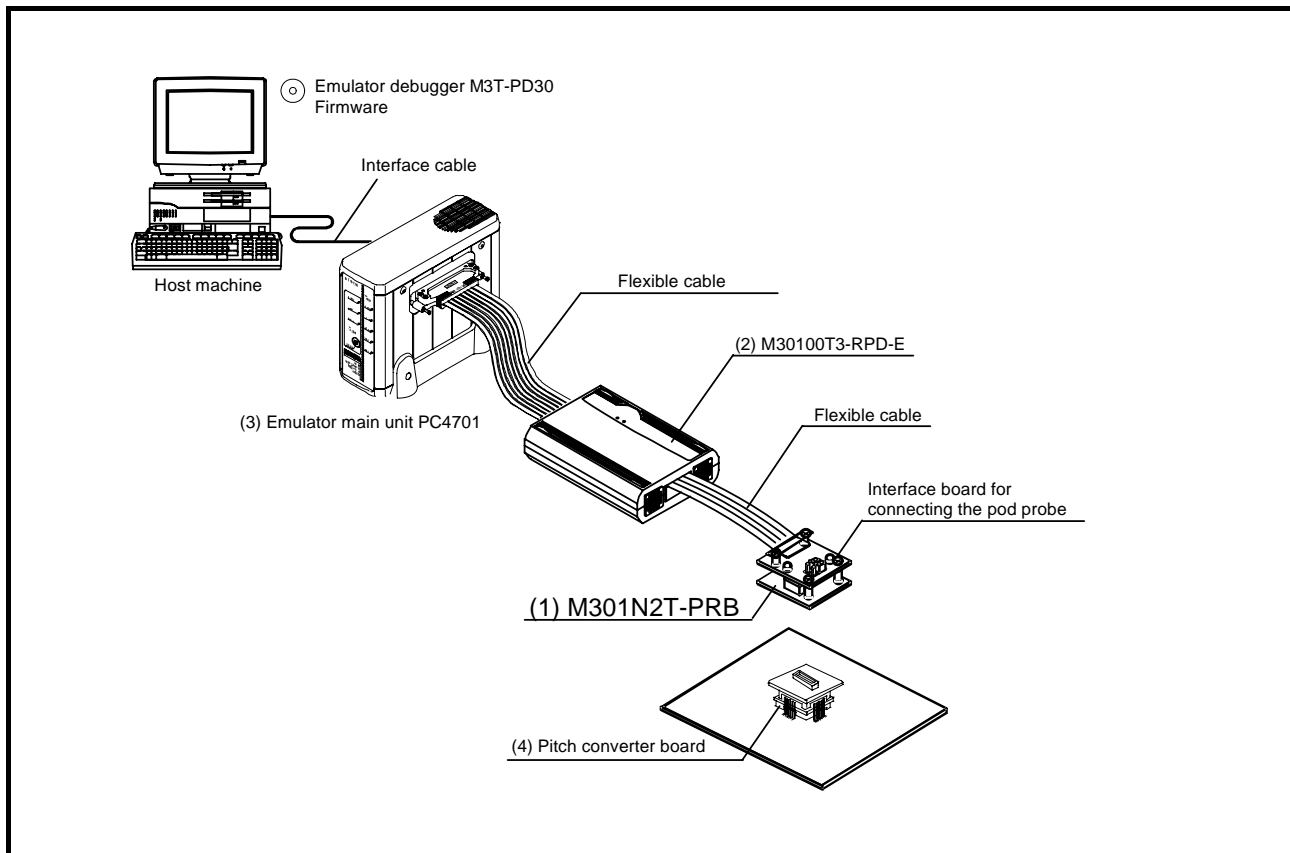


Figure 1.1 System configuration

- (1) Pod probe M301N2T-PRB (this product)
This pod probe is for the M16C/1N Group MCUs. The evaluation MCU M301N2RGP is mounted on it.
- (2) Emulation pod M30100T3-RPD-E (separately available)
This emulation pod is for the M16C/10 Series MCUs.
- (3) Emulator main unit PC4701 (separately available)
This is a PC4701 series emulator main unit, excluding PC4701L and PC4700L.
- (4) Pitch converter board (separately available)
This is a pitch converter board for connecting to the user system. For details, refer to “2.5 Connecting the User System” (page 23).

1.3.2 Names and Functions of the PC4701 Front Panel LEDs

Figure 1.2 shows the names of the LEDs on the front panel of the emulator.

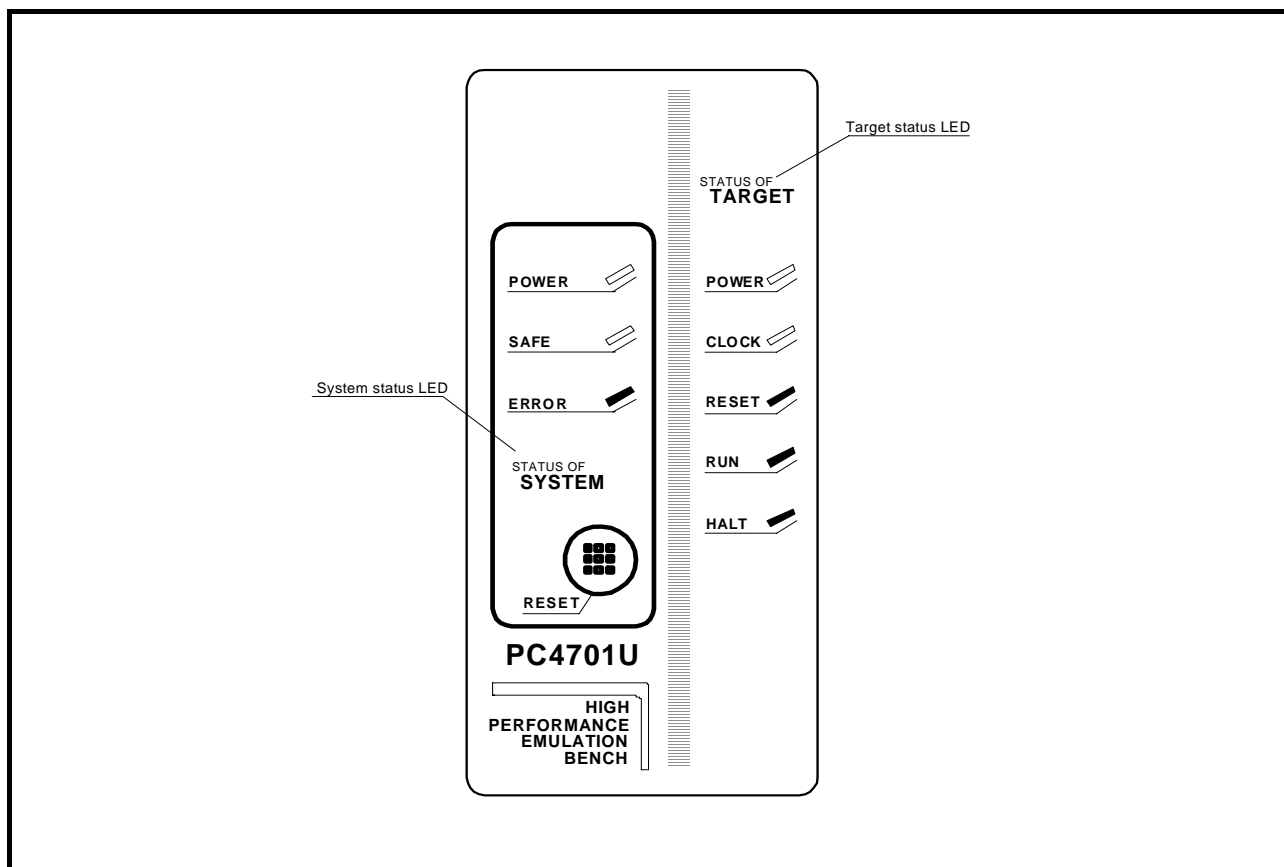


Figure 1.2 Names of the LEDs on the front panel of the PC4701

(1) System Status LEDs

The system status LEDs indicate the emulator PC4701's power supply, firmware operating status, etc. Table 1.3 lists the definition of each system status LED.

Table 1.3 Definitions of the system status LEDs

Name	Status	Meaning
POWER	ON	Emulator system power supply is turned ON.
	OFF	Emulator system power supply is turned OFF.
SAFE	ON	Emulator system is operating normally.
	Flashing	Special mode (maintenance mode) for downloading firmware. The emulator system does not operate except for downloading firmware and the self-check.
	OFF	Emulator system is not operating normally.
ERROR	ON	Emulator is not operating normally.
	Flashing	Downloading firmware.
	ON	Emulator is operating normally.

(2) Target Status LEDs

The target status LEDs indicate the target MCU's operating status and power supply. Table 1.4 lists the definition of each target status LED.

Table 1.4 Definitions of the target status LEDs

Name	Status	Meaning
POWER	ON	Power is supplied to the target MCU.
	OFF	Power is not supplied to the target MCU.
CLOCK	ON	Target MCU clock is supplied.
	OFF	Target MCU clock is not supplied.
RESET	ON	Target MCU is being reset, or reset signal of the user system is held low.
	OFF	Target MCU is not being reset.
RUN	ON	User program is being executed.
	OFF	User program has been halted.
HALT	ON	Target MCU internal clock is not oscillating.
	OFF	Target MCU internal clock is oscillating.

IMPORTANT

Caution for Target Status POWER LED:

- If your MCU has two or more power supply terminals (VCC), you need to supply power to all the terminals.

1.4 Specifications

Tables 1.5 lists the specifications of the M301N2T-PRB.

Table 1.5 M301N2T-PRB specification

Item		Description
Applicable MCU		M16C/1N Group
Evaluation MCU		M301N2RGP (1 piece)
Usable MCU mode		Single-chip mode
Applicable power supply		4.2--5.5V
Operating frequency	4.2--5.5V	16MHz, 0 wait
Clock supply	X _{IN} -X _{OUT}	Internal oscillator circuit board (OSC-3) Switchable to external oscillator input
	X _{CIN} -X _{COU} T	Internal oscillator circuit (fixed 32.768kHz) Switchable to external oscillator input
Basic debugging functions		<ul style="list-style-type: none"> - Download - Software break (max. 64 points) - Program execution/stop (allows free-run execution supporting software breaks) - Memory reference/setting (reference/setting C-variables, run-time execution) - Register reference/setting - Disassemble display - C-level debugging, etc.
Real-time trace function		<ul style="list-style-type: none"> - 32K-cycle bus information recordable (Bus, external trigger, time stamp) - 5 trace modes supported (Break/Before/About/After/Full) - Can be recorded ON/OFF by events
Real-time RAM monitor function		<ul style="list-style-type: none"> - 1,024 bytes - Data/last access result
Hardware break function		6 points (Bus detection, interrupt, external trigger signal)
Execution time measurement function		Time between program start and stop Maximum/minimum/average execution time and pass count of specified four zones. Count clock: Equal to MCU Clock or 16 MHz
C0 coverage		256KB
Event output		Break x1, Event x6
External trigger input		TTL level x8
Host machine interface		Dedicated parallel (PC4701HS) LPT parallel (PC4701M/PC4701U) Serial (PC4701HS/PC4701M) USB (PC4701U) LAN (PC4701HS/PC4701U)
Power supply to emulator		AC100V--120V, AC200--240V (50/60Hz)
Connection to user system (see "2.5 Connecting the User System" on page 23)		Converter board for connecting a 48-pin 0.5-mm-pitch (48P6Q): M30102T-PTC (not included)

1.5. Operating Environment

Be sure to use this emulator with the operating environmental of the emulator and host machine listed in Tables 1.6 and 1.7.

Table 1.6 Operating environmental conditions

Item	Description
Operating temperature	5 to 35°C (no dew)
Storage temperature	-10 to 60°C (no dew)

Table 1.7 Operating environment of the host machine

Item	Description
Host machine	IBM PC/AT compatibles
OS	Windows 98 Windows 2000 Windows Me Windows XP
CPU	Pentium III 600 MHz or more recommended
Memory	128 MB or more recommended
Pointing device such as mouse	Mouse or any other pointing device usable with the above OS that can be connected to the main body of the host machine.

* Windows and Window NT are either registered trademarks or trademarks of Microsoft Corporation in the United states and other countries.

2. Setup

This chapter describes the preparation for using this product, the procedure for starting up the emulator and how to change settings.

2.1 Selecting Clock Supply

2.1.1 Clock Supply to the MCU

There are two ways to supply a clock to the MCU, using the oscillator circuit of the emulation pod or using the oscillator circuit on the user system. Table 2.1 lists the factory-settings of each clock supply when you install the emulator debugger.

Table 2.1 Clock Supply to the MCU

Clock	Description	Display of emulator debugger	Default setting
X _{IN} -X _{OUT}	Internal oscillator circuit of emulation pod (OSC-3: 16.0 MHz or OSC-2)	Internal	Yes
	User system	External	-
X _{CIN} -X _{COU} T	Internal oscillator circuit of emulation pod (32.768 kHz)	Internal	-
	User system	External	Yes

IMPORTANT

Note on Changing the Clock Supply:

- The clock supply can be set in the Init dialog box when starting up the emulator debugger or inputting CLK command on the script window.
- For pins X_{CIN}-X_{COU}T, it is necessary to set the switches in the M30100T3-RPD-E. For details, refer to "2.2 Switch Settings" (page 20)

2.1.2 Using the Internal Oscillator Circuit Board

An oscillator circuit board for 16.0 MHz (OSC-3) is pre-mounted on the emulation pod M30100T3-RPD-E. Also the oscillator circuit board (OSC-2) is attached to change the oscillation frequency. When you use an internal oscillator circuit as a main clock, "Internal" can be set by the emulator debugger. For details on replacing the oscillator circuit board, refer to the M30100T3-RPD-E user's manual.

2.1.3 Using the Oscillator Circuit on the User System

To operate this product with an external clock, construct the oscillator circuit as shown in Figure 2.6 in the user system and input the oscillator output at 50% duty (within the operating range of the evaluation MCU) into pin X_{IN}. And pin X_{OUT} should be open. Choose "External" in the emulator debugger to use this clock.

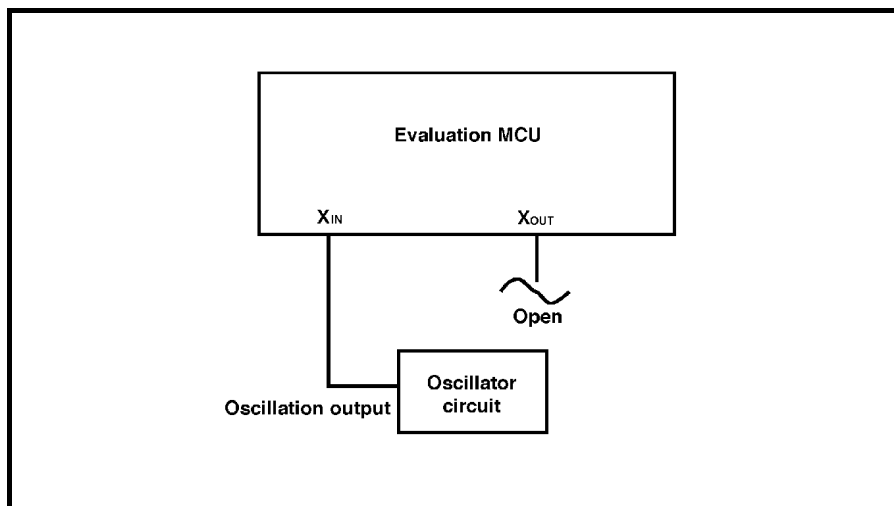


Figure 2.1 External oscillator circuit

Make note that in the oscillator circuit shown in Figure 2.2 where a resonator is connected between pins X_{IN} and X_{OUT} , oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the user system. It is same for sub-clock oscillator circuits (X_{CIN} and X_{COUT}).

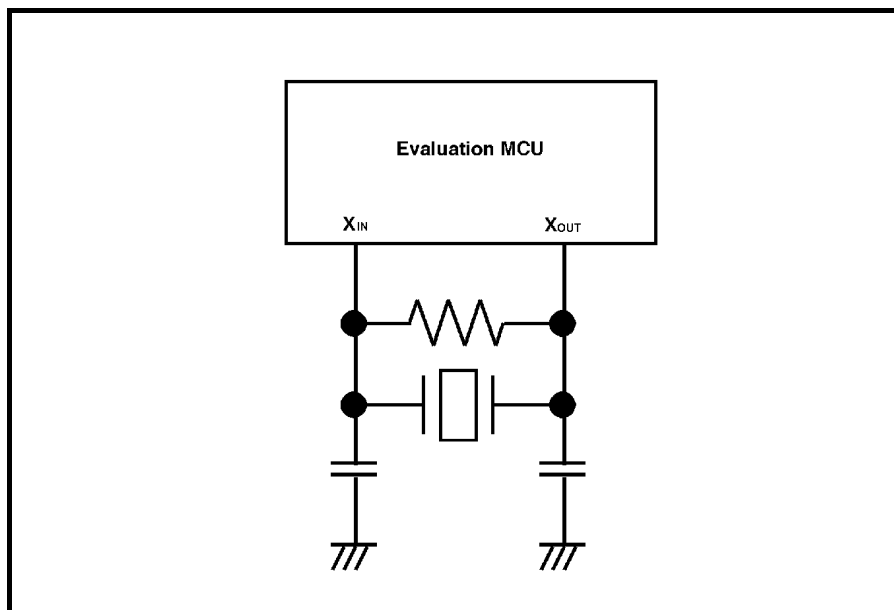


Figure 2.2 Circuit in which oscillation does not occur (same for X_{CIN} - X_{COUT})

2.2 Switch Settings

It is necessary to set the switches of the FLX64-PRB for debugging according to the user system. Figure 2.3 shows the positions of the switches of the FLX64-PRB, and Table 2.2 shows the switch settings.

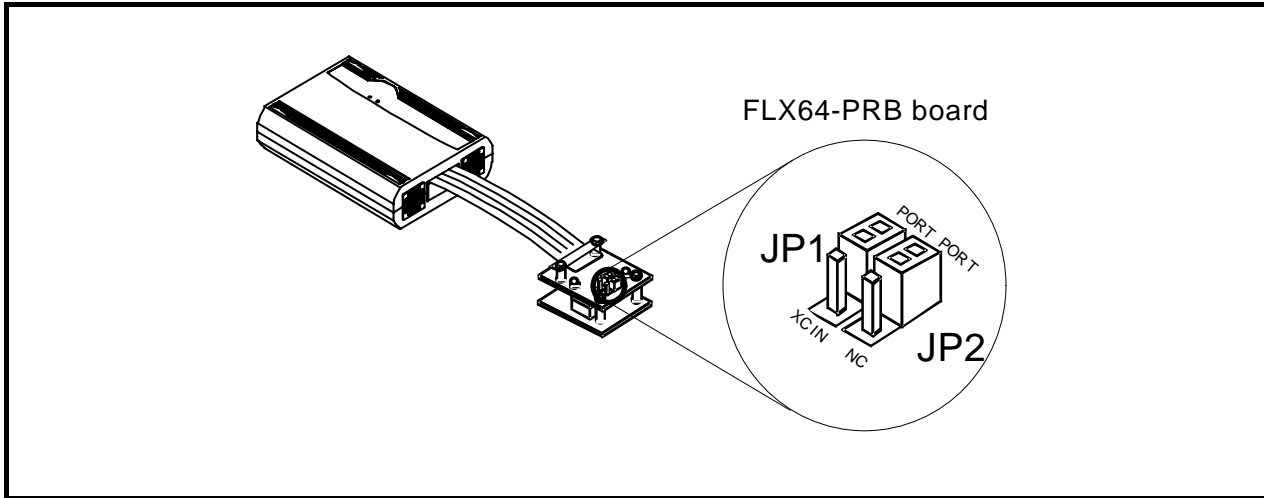






Figure 2.3 Positions of the switches and their factory-settings

Table 2.2 Switch settings of the FLX64-PRB

Signal	Switch	Switch	Setting of jumper switches	
FLX64-PRB	JP1	P47/X _{CIN}	PORT  XCIN When using the P47/X _{CIN} as a port (Factory-setting)	PORT  XCIN When using the P47/X _{CIN} as XCIN
	JP2	P46/X _{COU} T	PORT  NC When using the P46/X _{COU} T as a port (Factory-setting)	PORT  NC When not connecting the P46/X _{COU} T

⚠ CAUTION

Note on Switch Settings:



- Always shut OFF power before changing switch setting. Otherwise, internal circuit board may be damaged.

2.3 A/D and D/A Conversion Bypass Capacitors

This product has a foot pattern on the board for mounting a bypass capacitor for the A/D and D/A converter circuits. Mount a suitable bypass capacitor as occasion demands.

Figure 2.4 shows the position of the bypass capacitor.

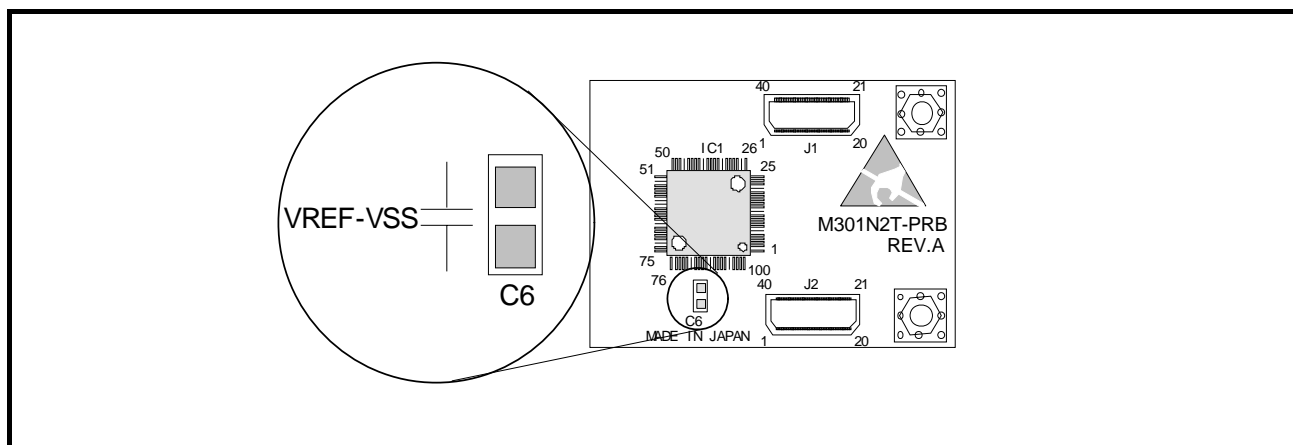


Figure 2.4 Foot patterns of bypass capacitors for A/D converter

IMPORTANT

Note on the A/D Converter Function:

- The characteristics of an A/D converter differ from those of an actual MCU because there are a pitch converter and other devices between the evaluation MCU and the user system. Make the final evaluation of the A/D converter with the actual MCU.

2.4 Connection the M30100T3-RPD-E

The emulation pod for the M16C/1N Group MCUs consists of the two products, the M30100T3-RPD-E emulation pod main unit and the M301N2T-PRB pod probe. Figures 2.5 and 2.6 show how to connect the M301N2T-PRB and how to remove it, respectively.

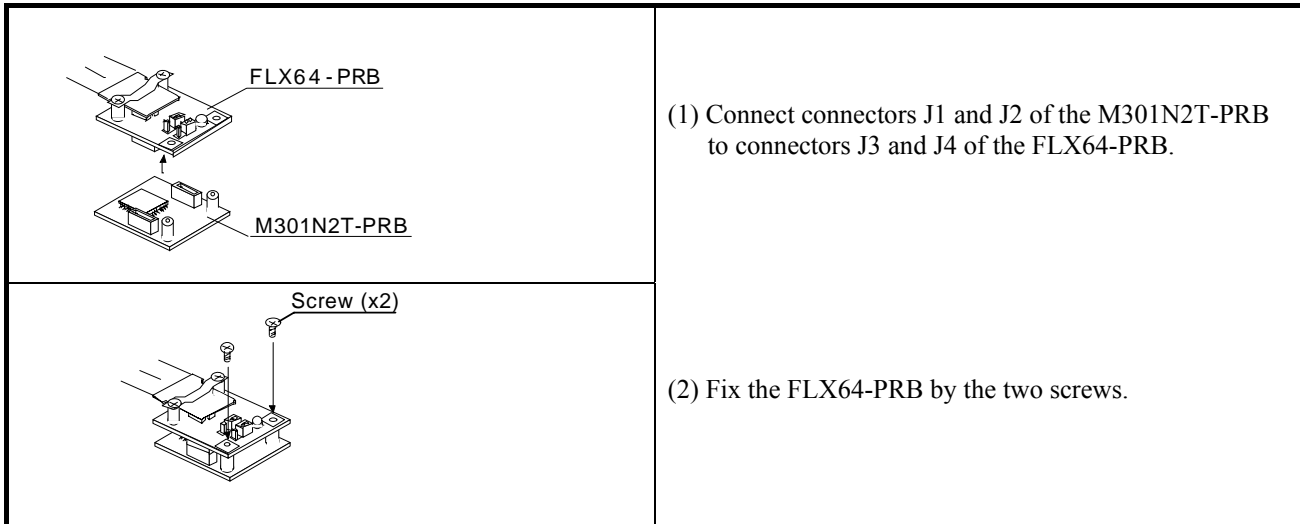


Figure 2.5 Connection the pod probe M301N2T-PRB

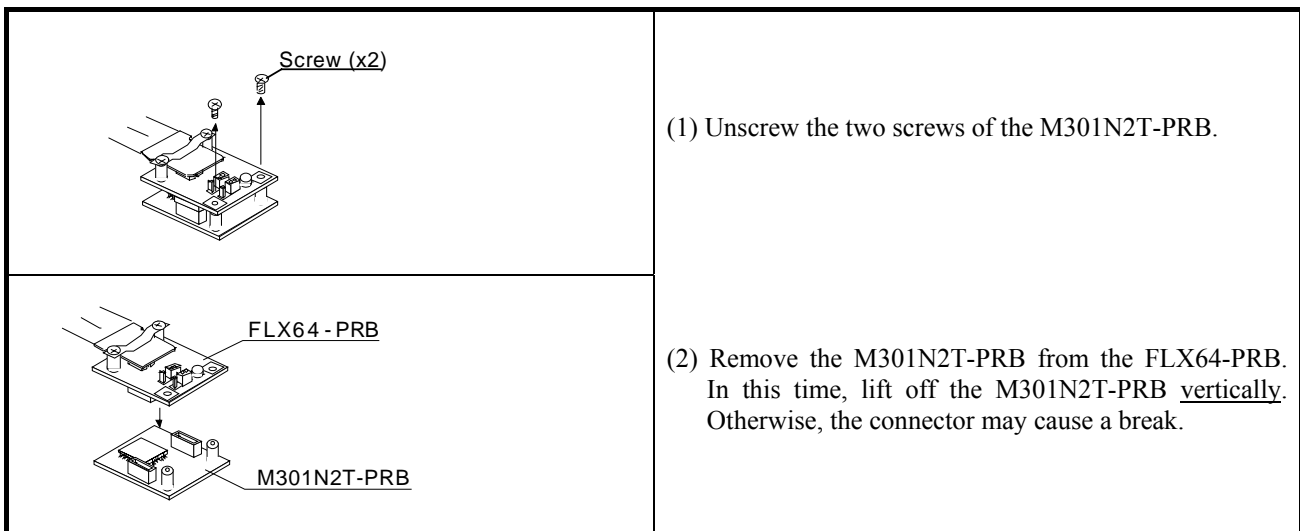


Figure 2.6 Removing the pod probe M301N2T-PRB

IMPORTANT

Notes on Connecting the Pod Probe:

- Be sure to turn off the power before making connections. Otherwise, the internal circuits may be damaged.
- The small connectors of the M301N2T-PRB (J1 to J3) and FLX64-PRB (J3 and J4) are guaranteed for only 50 insertion/removal iterations
- When removing the M301N2T-PRB from the FLX64-PRB, lift off the M301N2T-PRB vertically. Otherwise, the connector may cause a break.

2.5 Connecting the User System

Connect the emulation pod to the user system as shown in Figure 2.7.

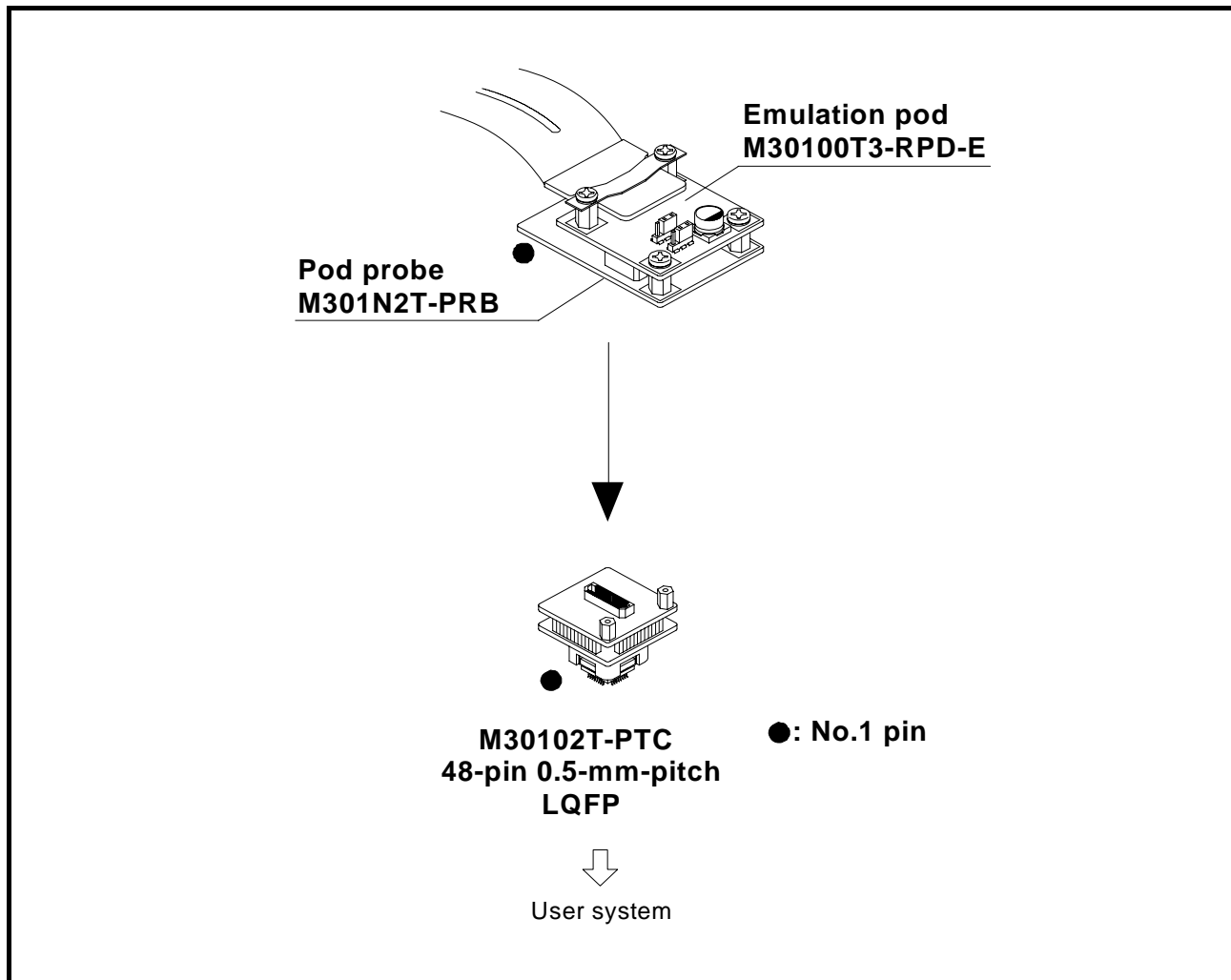


Figure 2.7 Connecting the user system

Figure 2.8 shows how to connect converter board M30102T-PTC for a 48-pin 0.5-mm-pitch package.

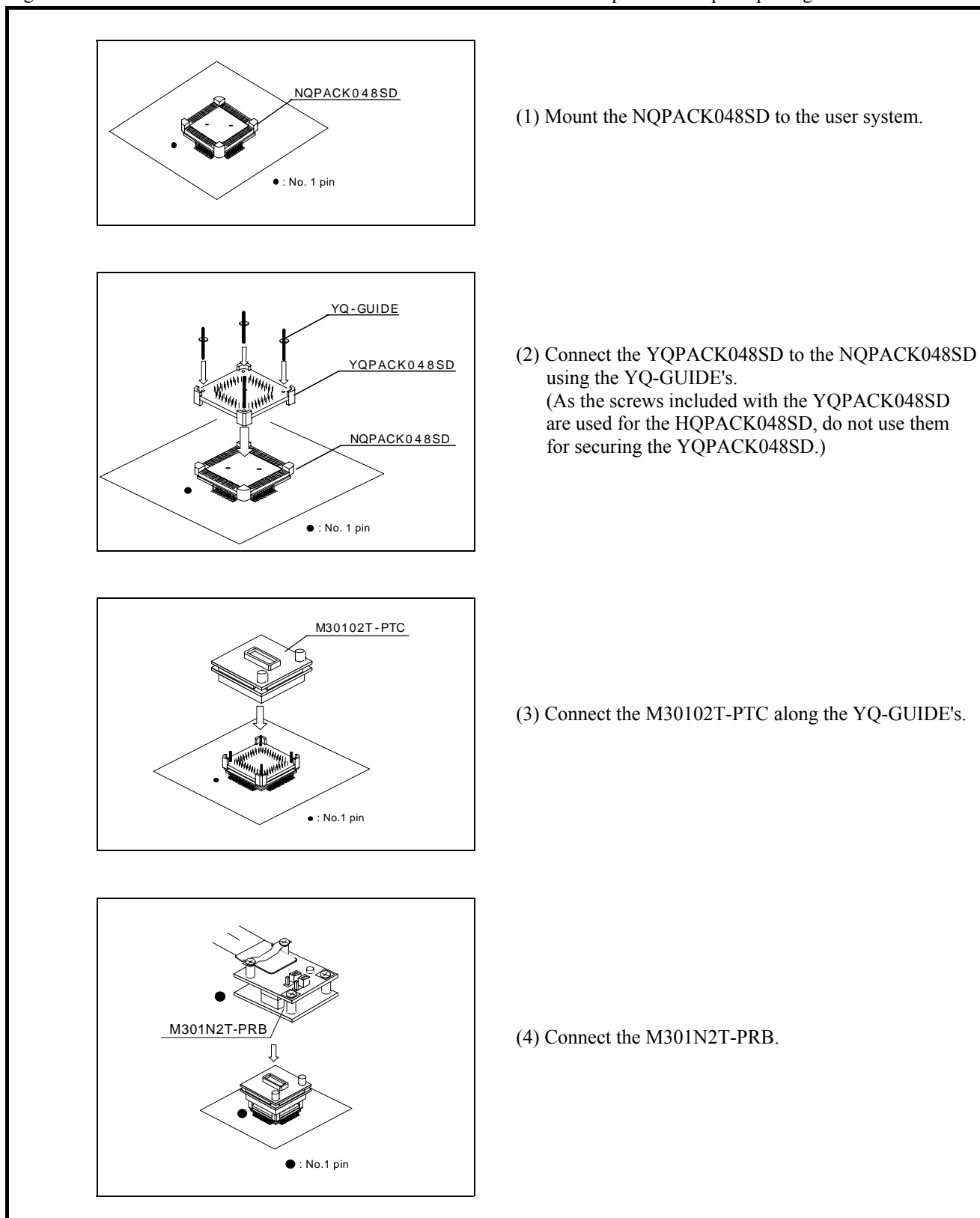


Figure 2.8 Connecting the converter board M30102T-PTC for a 48-pin 0.5-mm-pitch LQFP

⚠ CAUTION

Note on Connecting the User System:



- Take care not to mount the pitch converter board in a wrong direction. Otherwise, it may cause a fatal damage to the emulation pod.

3. Usage

This chapter describes the setting when you use this product for the first time and the workflow, from turning on the power of this product to starting up the emulator debugger.

3.1 When Using This Product for the First Time

3.1.1 Making an MCU File

It is necessary to make an MCU file to use this product with the emulator debugger. According to the MCU you use, change the contents of the MCU file. Make the MCU file following the description below using a text editor and store it in the "mcufiles" folder in the directory where the emulator debugger is installed.

The MCU file contains information such as, SFR area, internal RAM area, internal ROM area, firmware file name. The contents of the MCU file when using the M301N2F8FP (3KB RAM, 64KB ROM) are as follows:

(An example of a file name: M301N2T3.MCU)

0	:	SFR area	Start address
3FF	:		End address
400	:	Internal RAM	Start address
FFF	:		End address
F0000	:	Internal ROM	Start address
FFFFFF	:		End address
M30620P	:	Name of firmware (Do not change.)	
0	:	Expansion No.	(Do not change.)

Note:

When using the M30100T3-RPD-E, the 7th line of the MCU file always needs to be "M30620P".

3.1.2 Setting the Work Area

With this product, the emulator uses 54 bytes as a work area in emulation memory. Therefore, according to the memory mapping of the MCU you use, specify the work area addresses.

When using this product, set the work area address at 8000h.

The area used as a work area (54 bytes) is specified in the F/W and Work Area tab of the INIT dialog box of the emulator debugger. And set the work area as MAP=INT.

3.2 Turning On the Power

3.2.1 Checking Connections of the Emulator System

Before turning the power ON, check the connections of the PC4701, emulation pod, pod probe, converter board and user system.

3.2.2 Turning ON/OFF the Power

- (1) Turn on the power of the emulator and user system as simultaneously as possible.
- (2) Turn off the power of the emulator and user system as simultaneously as possible.
- (3) Do not leave either the emulator or user system powered on, because of leakage current the internal circuits may be damaged.
- (4) When turning on the power again after shutting off the power, wait about 10 seconds.

IMPORTANT

Notes on Power Supply:

- The Vcc terminal of the emulator is connected to the user system to observe the voltage of the user system. Therefore design your system so that the user system is powered by an external power supply.
- The voltage of the user system should be within the MCU's specified range.
- Do not change the voltage of the user system after turning on the power.

3.2.3 LED Display When the Emulator Starts Up Normally

After the emulator starts up, check the status of the LEDs on the front panel to see whether emulation pod operation is enabled or not. Figure 3.1 shows front panel LED lighting status when the emulator is turned ON.

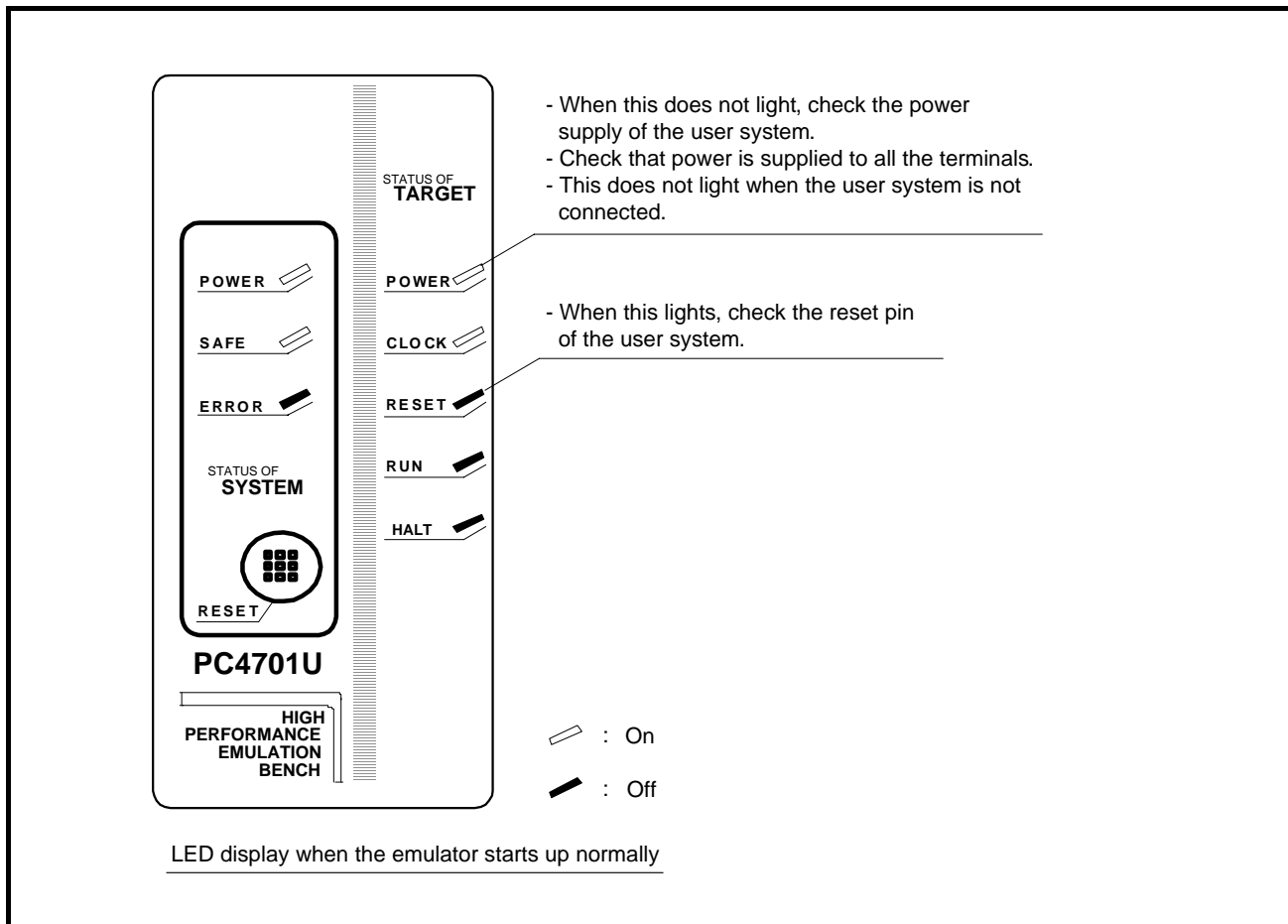


Figure 3.1 LED display when the power turned on

IMPORTANT

Note on the Target Status POWER LED:

- If the MCU has two or more Vcc terminals, the LED does not light unless power is supplied to all the terminals.

Note on the Target Status CLOCK LED:

- If the LED is not turned on, check the following.
 - (1) After powering on the PC4701 (before starting up the emulator debugger):
Make sure that the oscillator circuit board is properly installed in the PC4701 and it is oscillating normally.
 - (2) After the emulator debugger is started up (after the Init dialog box settings are complete):
Make sure that the oscillator selected in the Init dialog box is oscillating normally.

3.3 Downloading Firmware

3.3.1 When It is Necessary to Download Firmware

It is necessary to download the firmware in the cases listed below. Normally, the following are automatically detected when the emulator debugger is started up, and the firmware is downloaded.

- (1) When you use this product for the first time
- (2) When the emulator debugger or firmware has been upgraded
- (3) When you use this product with a PC4701 which was used with another emulation probe before

If you use this product for the first time or have accidentally failed to download the firmware, redownload the firmware in maintenance mode.

3.3.2 Downloading Firmware in Maintenance Mode

Download the firmware in maintenance mode as explained here following. **The user system must not be connected when downloading the firmware.**

Figure 3.2 shows LED display during firmware download.

- (1) Within 2 seconds of activating power to the emulator, press the system reset switch on the emulator front panel to switch the emulator to maintenance mode. Then the system status SAFE LED will start blinking.
- (2) Start up the emulator debugger. When the Init dialog box setup is complete, the dialog which urges to download the firmware will appear. Download the firmware following messages. Required time for downloading the firmware depends on the connection of the interface.

- USB and LPT interface: about 20 seconds
- Dedicated parallel interface about 30 seconds
- Serial interface about 5 minutes

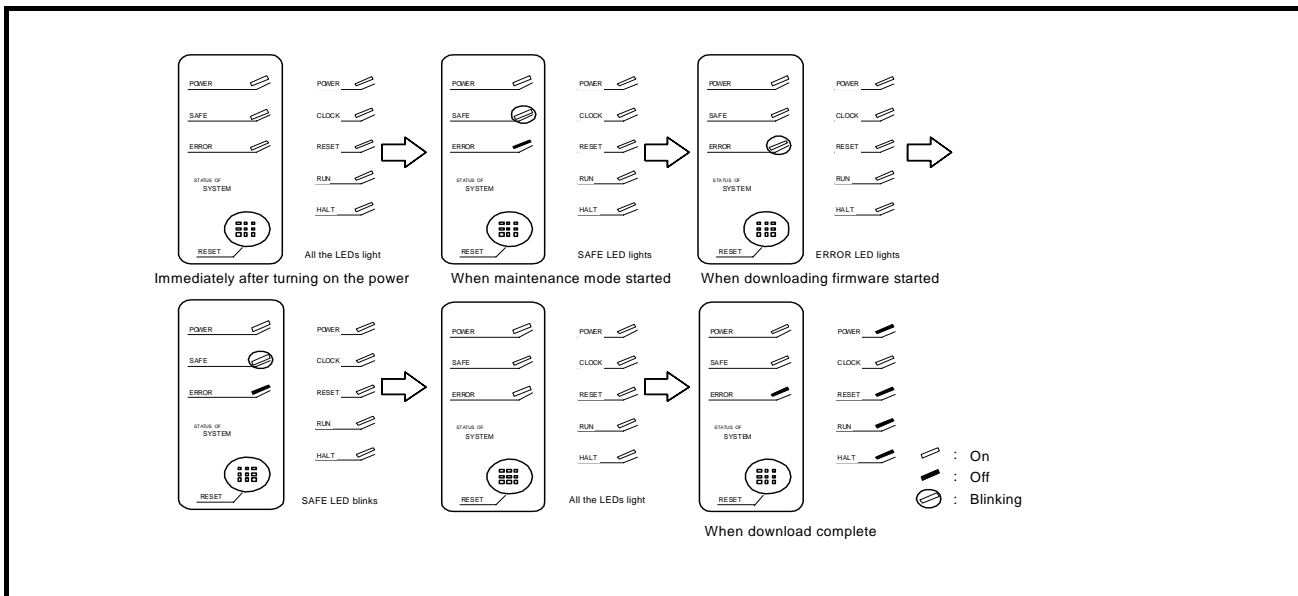


Figure 3.2 Downloading firmware in maintenance mode

IMPORTANT

Note on Downloading Firmware:

- Do not shut OFF power while the firmware is being downloaded. Doing so, the emulator will not start up properly. If power is shut OFF by mistake, redownload the firmware in maintenance mode.

3.4 Self-check

3.4.1 Self-check Procedure

To run the self-check of the emulator, do so as explained here below. While the self-check is in progress, the LEDs will change as shown in Figure 3.5.

- (1) If the user system is connected, disconnect it.
- (2) Set the switches in the emulation pod to the factory settings as shown in Figure 3.3.
- (3) Set the switches in the emulation pod FLX64-PRB to the factory settings as shown in Figure 3.4.
- (4) Within 2 seconds of activating power to the emulator, press the system reset switch on the emulator front panel.
- (5) Check the SAFE LED starts blinking and then press the system reset switch again.
- (6) The self-check will start. If the normal result is displayed in about 40 seconds, the self-check has terminated normally.

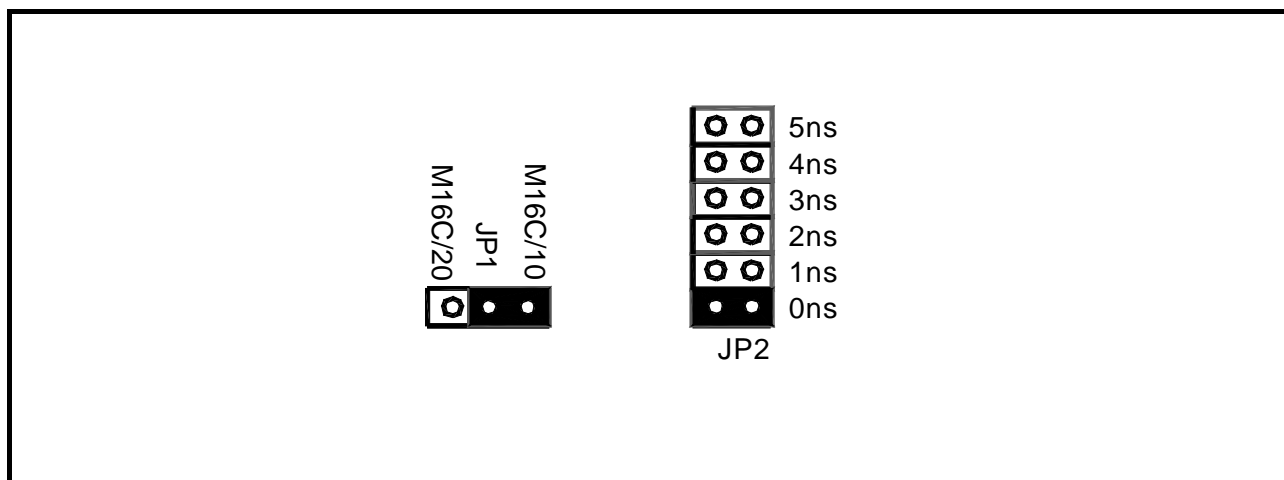


Figure 3.3 Switch settings of the M30100T3-RPD-E for the self-check (factory-settings)

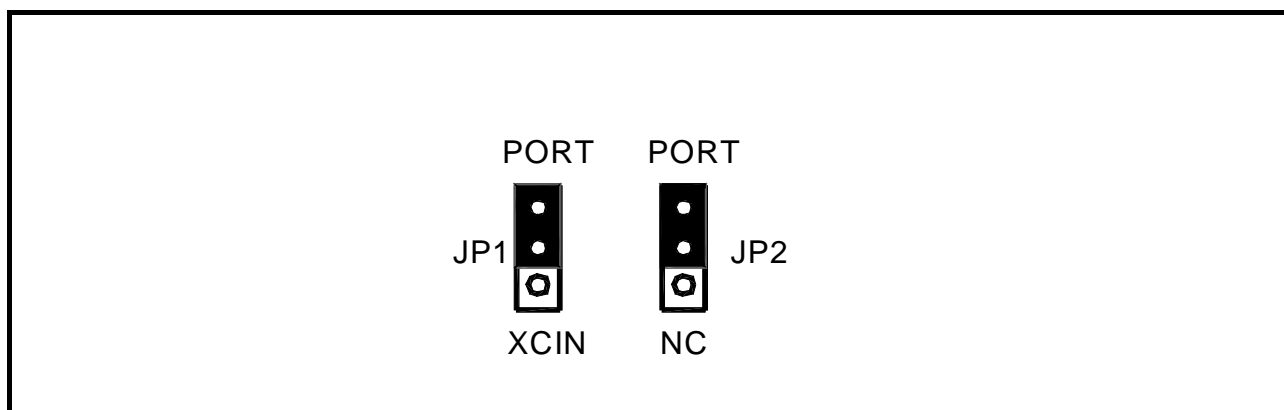


Figure 3.4 Switch settings the FLX64-PRB for the self-check (factory-settings)

3.4.2 If an Error is Detected in the Self-check

If the self-check does not result normally (system status error or target status error in Figure 3.5), check the following.

- Whether the emulation pod and PC4701 are connected properly
- Whether the pod probe and emulation pod are connected properly
- Redownload the proper firmware
- Whether the switches in the M30100T3-RPD-E and FLX64-PRB are set to the factory settings (as shown in Figure 3.3 and Figure 3.4).

IMPORTANT

Note on Self-check:

- If the self-check does not result normally (excluding target status error), the emulation pod may be damaged. Then contact your local distributor.

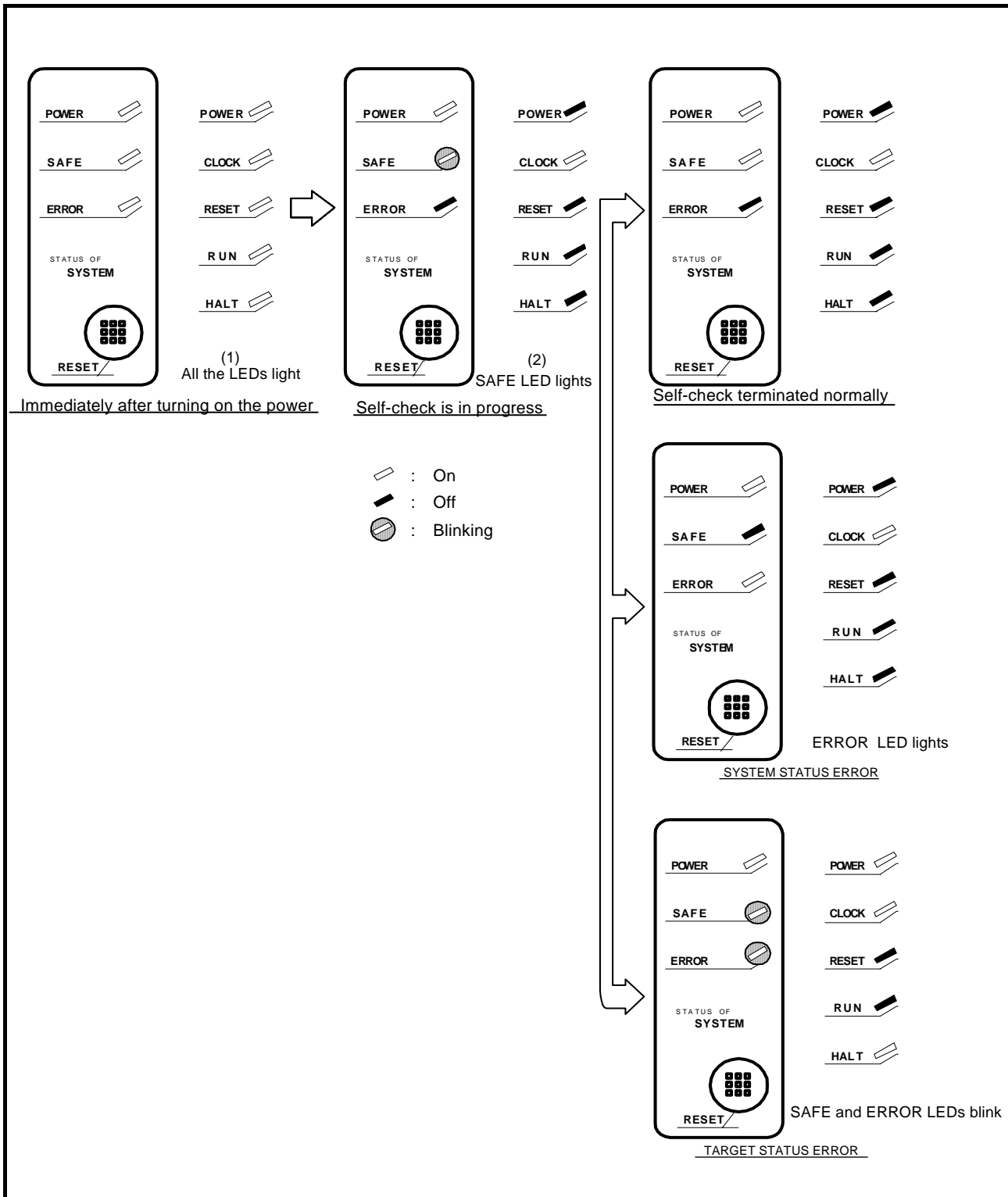


Figure 3.5 Self-check procedure

4. Hardware Specifications

This chapter describes specifications of this product.

4.1 Target MCU Specifications

Table 4.1 lists the specifications of target MCUs which can be debugged with this product.

Table 4.1 Specifications of target MCUs for the M301N2T-PRB

Item	Description
Applicable MCU	M16C/1N Group
Applicable MCU mode	Single-chip mode
Emulation Memory	1 MB
Max. operating frequency	16MHz (VCC2=4.2--5.5 V)
Operating voltage	VCC=4.2--5.5 V

4.2 Differences between the Actual MCU and Emulator

Differences between the actual MCU and emulator are shown below. When debugging the MCU using this product, be careful about the following precautions.

IMPORTANT

Note on Differences between the Actual MCU and Emulator:

- Operations of the emulator system differ from those of actual MCUs as listed below.
 - (1) Reset condition
Set the time for starting up (0.2 V_{CC} to 0.8 V_{CC}) 1 μs or less.
 - (2) Initial values of internal resource data of an MCU at power-on
 - (3) Internal memories (ROM and RAM) capacities etc.
With this emulator system, regardless of ROM and RAM of the MCU you use, all the areas other than the SFR area can be read and written into.
 - (4) Oscillator circuit
 - In the oscillator circuit where an oscillator is connected between pins X_{IN} and X_{OUT}, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the user system. It is same for the sub-clock oscillation circuit (pins X_{CIN} and X_{COU}T).
 - For notes on when using the oscillator circuit on the user system, refer to "2.1.3 Using the Oscillator Circuit on the User System" (page 18).
 - (5) A/D converter function
Because a flexible cable and other devices are used between the evaluation MCU and the user system, the A/D converter operates differently from that of the actual MCU.
 - (6) DBC, single-step and BRK instruction interrupt vector table addresses
Although data can be downloaded to the DBC, single-step, or BRK instruction interrupt vector table addresses, be aware that because the emulator system uses this area, the data read from this area may not be an expected value (see Table 4.2).

Table 4.2 Vector table addresses for the emulator

Factor of interruption	Vector table addresses	Data read
DBC*1	FFFF4h--FFFF7h	Indefinite
Single-step*1	FFFECh--FFFEFh	Indefinite
BRK instruction	FFFE4h--FFFE7h	Indefinite

*1 Interruption for the emulator only

- (7) Pin X_{OUT}
Pin X_{OUT} is not assigned to the evaluation MCU used by this product. For this reason, pin X_{OUT} of this product is open.
- (8) Pin IVCC
Pin IVCC of this product is open. The circuit for IVCC on this product is connected to pin IVCC on the evaluation MCU.
- (9) Timer X
When the device is to be operated in pulse period measurement mode, be sure to use timer C.
- (10) Timer Z
When operating in programmable wait one-shot generation mode, an invalid interrupt may be generated at the end of TZOUT waveform output. Please do not use programmable wait one-shot generation mode of timer Z.
- (11) Timer C
To measure the frequency of the on-chip oscillator, be sure to use timer Y.
- (12) INT1, 2, 3
 - To clear the INT input enable bit to 0, set the interrupt priority level to 0 before setting the INT input enable bit to 0.
 - To set the direction register for the corresponding port to 1, set the interrupt priority level to 0 before setting the direction register value to 1.

Note on NMI* Input:

- "L" level input from the user system to pin NMI* is accepted only while a user program is being executed (only while the RUN status LED on the PC4701's front panel is lit).

IMPORTANT

Note on RESET* Input:

- "L" level input from the user system to pin RESET* is accepted only while a user program is being executed (only while the RUN status LED on the PC4701's front panel is lit).

Notes on Maskable Interrupts:

- Even if a user program is not being executed (including when run-time debugging is being performed), the evaluation MCU keeps running so as to control the emulation pod. If a maskable interrupt is requested when the user program is not being executed (including when run-time debugging is being performed), the maskable interrupt request cannot be accepted, because the emulator disables interrupts. The interrupt request is accepted immediately after the user program execution is started.
- Take note that when the user program is not being executed (including when run-time debugging is being performed), a peripheral I/O interruption is not accepted.

Note on Final Evaluation:

- Be sure to evaluate your system with an evaluation MCU. Before starting mask production, evaluate your system and make final confirmation with a CS (Commercial Sample) version MCU.

4.3 External Dimensions

4.3.1 External Dimensions of the Pod Probe

Figure 4.1 shows external dimensions of the M301N2T-PRB.

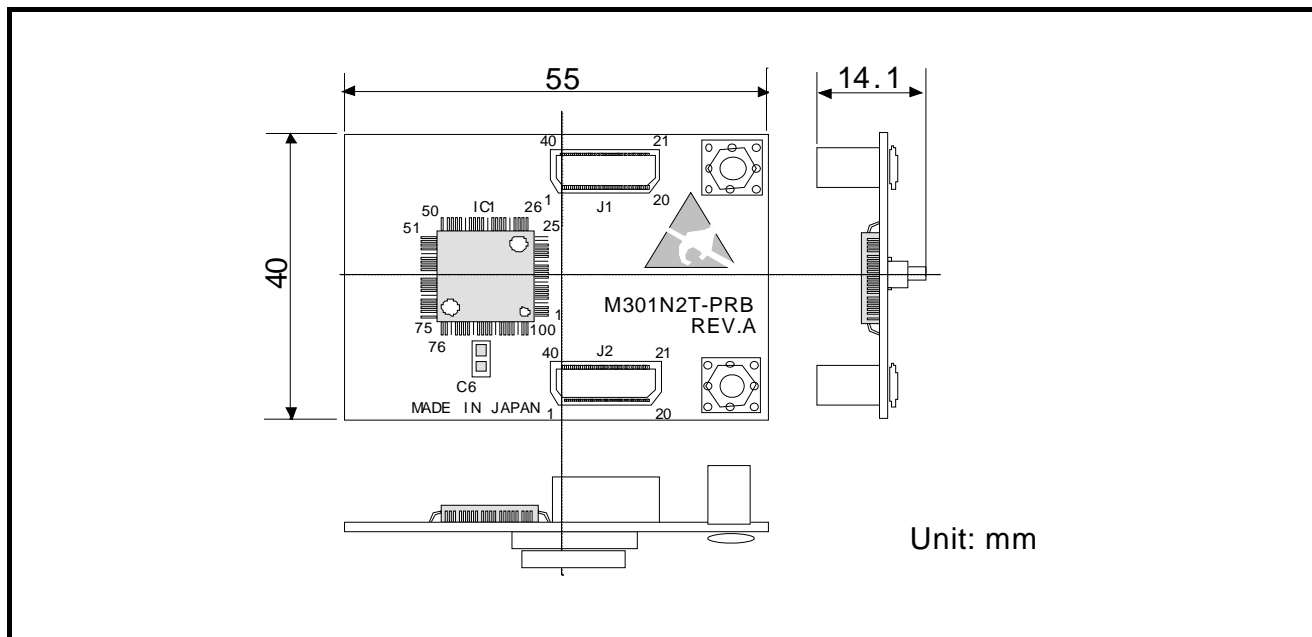


Figure 4.1 External dimensions of the M301N2T-PRB

4.3.2 External Dimensions of the Converter Board M30102T-PTC

Figure 4.2 shows the external dimensions and a sample foot pattern of the converter board M30102T-PTC for a 48-pin 0.5-mm-pitch LQFP.

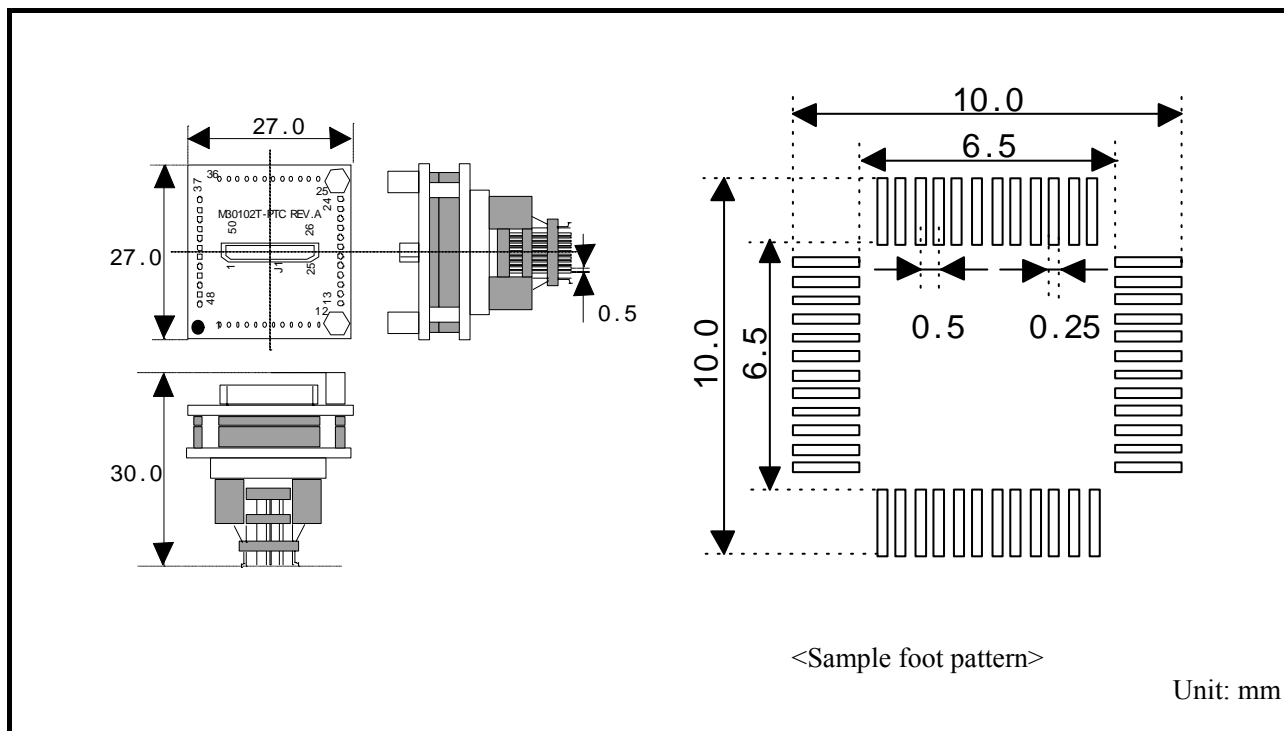


Figure 4.2 External dimensions of the converter board M30102T-PTC and a sample foot pattern

4.4 Notes on Using This Product

Notes on using this product are listed below. Be sure to read these notes before using this product.

IMPORTANT

Note on Malfunctions in the PC4701 System

- If the emulator malfunctions because of interference like external noise, do the following to remedy the trouble
 - (1) Press the RESET switch on the emulator front panel.
 - (2) If normal operation is not restored after step (1), shut OFF power to the emulator once and then reactivate it.

Notes on Downloading Firmware:

- Before using this product for the first time, it is necessary to download the dedicated firmware (control software built into the PC4701). Please note that, to do this, it is necessary to start up the emulator main unit in maintenance mode. For firmware download procedures, see "3.3 Downloading Firmware" (page 28). Once the firmware has been downloaded, the product can be used by simply turning on the power.
- Do not shut off the power while downloading the firmware. If this happens, the product will not start up properly. If power is shut off unexpectedly, redownload the firmware in maintenance mode.
- Be sure to disconnect the user system before downloading the firmware.

Notes on the Self-check:

- If the self-check does not result normally (excluding user system error), the emulation pod or pod probe may be damaged. Then contact your local distributor.
- Be sure to disconnect the user system before executing the self-check. For details on the self-check, see "3.4 Self-check" on page 29.

Note on Quitting the Emulator Debugger:

- To restart the emulator debugger after it ends, always shut power to the emulator off once and wait about 10 seconds, then turn on the power again.

Notes on Power Supply to the User System:

- The Vcc terminal of the emulator is connected to the user system to observe the voltage of the user system. Therefore design your system so that the user system is powered by an external power supply.
- The voltage of the user system should be within the MCU's specified range.
- Do not change the voltage of the user system after turning on the power.
- Before powering on your emulator system, check that the host machine, the emulator main unit, the converter board and user system are all connected correctly. Next, turn on the power to each equipment following the procedure below.
 - (1) Turn ON/OFF the user system and the PC4701 emulator as simultaneously as possible.
 - (2) When the PC4701 and emulator debugger start up, check the target status LEDs on the emulator main unit's front panel to see if this product is ready to operate.
 - Is the power supplied? Check target status LED (POWER) is ON.
 - Is the reset is released? Check target status LED (RESET) is OFF.
 For details, refer to "3. Usage" (page 25)

IMPORTANT

Note on Clock Supply to the MCU:

- A clock supplied to the evaluation MCU is selected by the Clock tab in the Init dialog box of the emulator debugger.
 - (1) When "Internal" is selected:
A clock generated by the oscillation circuit in the emulation pod is supplied to the evaluation MCU. The clock is continually supplied to the evaluation MCU regardless of a status of user system clock and a status of user program execution.
 - (2) When "External" is selected:
Clock supply to the evaluation MCU depends on oscillation state (oscillate/off) of the user system.
- The frequency of an oscillator circuit board in the M30100T3-RPD-E should be 2 MHz or more.
- You can input a square wave of frequency of 0 to 16 MHz to X_{IN} from the user system. To debug programs in a frequency of 2 MHz or less or without oscillation, set a clock to "EXT" and use X_{IN} from the user system.

Notes on Setting the Work Area When Starting Up the Emulator Debugger:

- With this product, the emulator uses 54 bytes as a work area in emulation memory. When using this product, set the work area address at 8000h.
For more details, see "3.1.2 Setting the Work Area" (page 25).
- Set the work area as MAP=INT.

Note on Stack Area:

- With this product, a maximum 7 bytes of the interrupt stack is consumed. Therefore, ensure the +7 bytes maximum capacity used by the user program as the interrupt stack area. If the interrupt stack does not have enough area, do not use areas which cannot be used as stack (SFR area, RAM area which stores data, or ROM area) as a work area. Using areas like this is a cause of user program crashes and destabilized emulator control.

Note on MAP References and Settings:

- When starting up the M30100T3-RPD-E, initial MAP settings are as follows. Do not change these settings.

00000h--003FFh:	“EXT”
00400h--FFFFFFh:	“INT” (emulation memory available)

Note on Operation When Not Executing the User Program:

- With this product, bit 7 of processor mode register 1 (wait bit PM17) is forcibly set to "1" (with wait) when the user program is not executed (e.g. when the program is stopped or when run-time debugging is being performed). However, when wait bit PM17 is referenced by the dump window etc. the value set during user program execution is displayed.

Note on Making an MCU File:

- To debug an MCU which has any other size of memory (SFR, ROM, RAM), be sure to make an MCU file for it. For details on making the MCU file, see "3.1.1 Making an MCU File" on page 25. For memory maps of each MCU, refer to the datasheet of the MCU.

IMPORTANT

Notes on Address-Match Interrupts:

- To debug address-match interrupts, set a software break or hardware break at the top address of the address-match interrupt process. If you set a software break or hardware break at an address where an address-match interrupt occurs, the program may run out of control.
- When an address at which an address-match interrupt occurs is executed in one-step mode, the program stops after executing the first instruction after returning from the address-match interrupt processing.

Note on BRK Instruction and BRK Interrupt:

- With this emulator system, a BRK interrupt by a BRK instruction is exclusively used for software break functions. Therefore, you can not use them for your program.

Notes on Software and Hardware Breaks:

- The software break generates BRK interrupts by substituting the proper instruction to the BRK instruction "00h". Therefore, when referencing the result of a trace in bus mode, "00h" is displayed for the instruction fetch address where a software break is set, and when referencing in disassemble mode, "BRK" instruction is displayed.
- It is not possible to use a software break and a hardware break at the same time. If doing so, it may not operate normally.
- In the area where the MAP setting is EXTERNAL, software breaks cannot be used.

Note on Stop and Wait Modes:

- Do not single step an instruction shifting to stop or wait mode. It may cause communication errors.

Note on Watchdog Function:

- The MCU's watchdog timer can be used only while programs are being executed. To use it otherwise, disable the watchdog timer.

Note on Protect Register (PRC2):

- Make note of the fact that the protect is not canceled when protect register (PRC2), which enables writing in the port P0 direction register, is changed with the below procedure.
 - (1) Step execution of the "instruction for setting ("1") PRC2"
 - (2) Execution from the instruction setting "1" to PRC2 where a software breakpoint is set
 - (3) Setting the break point from the "instruction for setting ("1") PRC2" to when the "setting the port P9 direction register and the SI/Oi control register"
 - (4) Setting ("1") PRC2 from the dump window or script window

Note on Accessing Addresses 00000h and 00001h:

- With the M16C/10 Series MCUs, when a maskable interrupt is generated, the interrupt data (interrupt number and interrupt request level) stored in addresses 00000h and 00001h are read out. Also, the interrupt request bit is cleared when address 00000h or 00001h is read out. Consequently, when the address 00000h readout instruction is executed or when address 00000h or 00001h is read out in the cause of a program runaway, a malfunction occurs in that the interrupt is not executed despite the interrupt request, because the request bit of the highest priority interrupt factor enabled is cleared. For this malfunction, when the reading out to the address 00000h or 00001h is generated excluding the interrupt, the WANING LED (yellow) lights up to alarm. When this LED lights, there is a possibility of wrong access, therefore check the program. This LED is turned off by the system reset switch of the emulator main unit.

IMPORTANT

Note on Instructions that Access the Single-step Interrupt Vector Area:

- Do not perform the below debugging operations with the single-step interrupt vector area (addresses FFFECh--FFFEFh).
 - (1) Step execution of instructions that access the single step interrupt vector area
 - (2) Program execution from the instruction accessing the single step interrupt vector area when a software breakpoint is set at the instruction

5. Troubleshooting

This chapter describes how to troubleshoot when this product does not work properly.

5.1 Flowchart to Remedy the Troubles

Figure 5.1 shows the flowchart to remedy troubles from when power to the emulator is activated until the emulator debugger starts up. **Check this while the user system is not connected.** For the latest FAQs visit the Renesas Tools Homepage.

<http://www.renesas.com/en/tools>

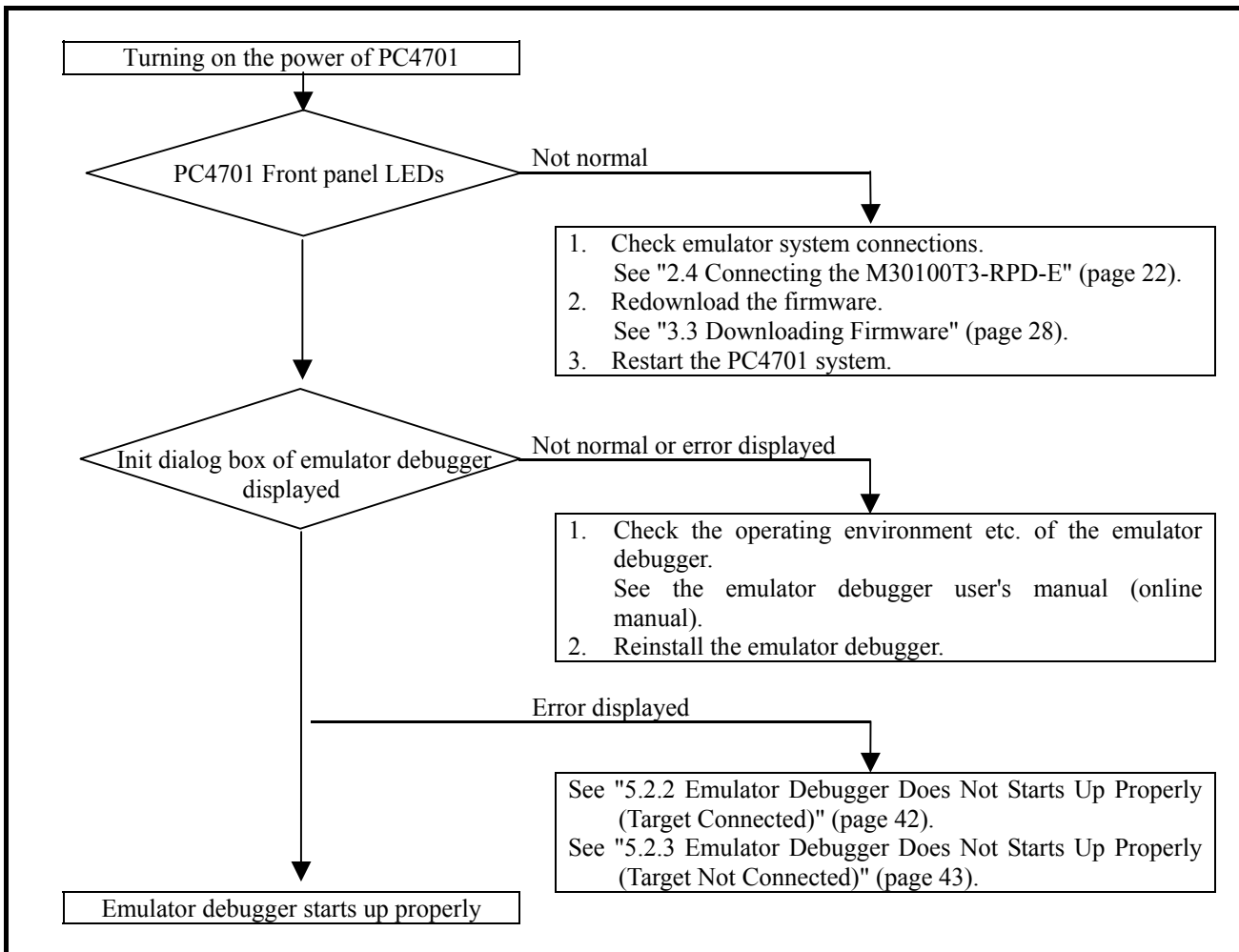


Figure 5.1 Flowchart to remedy troubles

5.2 When the Emulator Debugger Does Not Start Up Properly

5.2.1 When the LED Display of the PC4701 is Abnormal

Table 5.1 LED's abnormal display and its checkpoints

Error	Connection to the user system	Checkpoint
LEDs do not light up.	-	Check that the power cable is connected to the PC4701. <i>See the PC4701 user's manual</i>
All LEDs remain lit.	-	Check the connection between the PC4701 and this product. <i>See "2.4 Connecting the M30100T3-RPD-E" (page 22)</i> <i>See the M30100T3-RPD-E user's manual</i>
The "POWER" LED of "STATUS OF TARGET" does not light up.	Connected	Check that power (Vcc and GND) is properly supplied to the user system.
The "CLOCK" LED of "STATUS OF TARGET" does not light up.	Disconnected	(1) Check that both the main/sub clocks are not set to "External" in the emulator debugger. <i>See the CLK command of the emulator debugger</i> (2) Check the oscillator circuit board is mounted in the M30100T3-RPD-E and it is oscillating properly. <i>See the M30100T3-RPD-E user's manual</i>
	Connected	(1) When the clock supply is set to "External", check that the oscillation circuit on the user system is oscillating correctly. (2) Check the switches in the M30100T3-RPD-E are correctly set. <i>See "2.2 Switch settings" (page 20)</i>
The "RESET" LED of "STATUS OF TARGET" does not go out.	Connected	Check the reset pin of the user system is held high.

5.2.2 Emulator Debugger Does Not Starts Up Properly (Target Connected)

Table 5.2 Checkpoints of errors when starting up the emulator debugger (target connected)

Error	Checkpoint
ERROR 16005: Can't connect with the target.	(1) Check the connection between the PC4701 and host machine. <i>See the PC4701 User's Manual</i> (2) Check that the PC4701 is powered on. <i>See the PC4701 User's Manual</i> (3) Check that all switch settings on the rear of the PC4701 and interface cable settings of the emulator debugger match. <i>See the PC4701 User's Manual and the emulator debugger user's manual (online manual)</i>
ERROR 16211: The version of M3T-PD30 and the firmware on the target are not same.	(1) Check the connection between the PC4701 and the M30100T3-RPD-E. <i>See the M30100T3-RPD-E user's manual</i> (2) Download the proper firmware. <i>See "3.3 Downloading Firmware" (page 28)</i> (3) Choose the proper MCU file in the Init dialog box. <i>See the emulator debugger user's manual (online manual)</i> (4) Check that the descriptions in the MCU file are correct. <i>See "3.1.1 Making an MCU File" (page 25)</i>
ERROR 16215: Cannot communicate with the debugging monitor. Please execute RESET command.	(1) Check the connection between the PC4701 and the M30100T3-RPD-E. <i>See the M30100T3-RPD-E user's manual</i> (2) Check the connection between the M30100T3-RPD-E and this product. <i>See "2.4 Connecting the M30100T3-RPD-E" (page 22)</i> (3) Check that the reset pin of the user system is at "H" level. <i>See the MCU specifications.</i> (4) Check that the oscillator circuit of the emulation pod is oscillating properly. <i>See the M30100T3-RPD-E user's manual</i>
ERROR 16014: Communication ERROR. Can't accept data.	(1) Check that the oscillator circuit of the user system is oscillating properly. <i>See "2.1.3 Using the Oscillator Circuit on the User System " (page 18)</i> (2) Check that the PC4701 LEDs at startup show normal operation. <i>See "3.2.3 LED Display When the Emulator Starts Up Normally" (page 27).</i>
ERROR 16231: There was sent undefined data from the emulator.	Check that the emulator debugger has not been started up without shutting down the PC4701. <i>See "4.4 Notes on Using This Product: Note on Quitting the Emulator Debugger" (page 36).</i>

5.2.3 Emulator Debugger Does Not Starts Up Properly (Target Not Connected)

Table 5.3 Checkpoints of errors when starting up the emulator debugger (target not connected)

Error	Checkpoint
ERROR 16005: Can't connect with the target.	<ol style="list-style-type: none"> (1) Check the connection between the PC4701 and host machine. <i>See the PC4701 User's Manual</i> (2) Check that the PC4701 is powered on. <i>See the PC4701 User's Manual</i> (3) Check that all switch settings on the rear of the PC4701 and interface cable settings of the emulator debugger match. <i>See the PC4701 User's Manual and the emulator debugger user's manual (online manual)</i>
ERROR 16211: The version of M3T-PD30 and the firmware on the target are not same.	<ol style="list-style-type: none"> (1) Check the connection between the PC4701 and the M30100T3-RPD-E. <i>See the M30100T3-RPD-E user's manual</i> (2) Download the proper firmware. <i>See "3.3 Downloading Firmware" (page 28)</i> (3) Choose the proper MCU file in the Init dialog box. <i>See the emulator debugger user's manual (online manual).</i> (4) Check that the descriptions in the MCU file are correct. <i>See "3.1.1 Making an MCU File" (page 25)</i>
ERROR 16215: Cannot communicate with the debugging monitor. Please execute RESET command.	<ol style="list-style-type: none"> (1) Check the connection between the PC4701 and the M30100T3-RPD-E. <i>See the M30100T3-RPD-E user's manual</i> (2) Check the connection between the M30100T3-RPD-E and this product. <i>See "2.4 Connecting the M30100T3-RPD-E" (page 22)</i> (3) Check that the oscillator circuit of the emulation pod is oscillating properly. <i>See the M30100T3-RPD-E user's manual</i>
ERROR 16014: Communication ERROR. Can't accept data.	Check that the PC4701 LEDs at startup show normal operation. <i>See "3.2.3 LED Display When the Emulator Starts Up Normally" (page 27).</i>
ERROR 16231: There was sent undefined data from PC4700.	Check that the emulator debugger has not been started up without shutting down the PC4701. <i>See "4.4 Notes on Using This Product: Note on Quitting the Emulator Debugger" (page 36).</i>

5.3 How to Request for Support

After checking the items in "5 Troubleshooting", fill in the text file the installer of the emulator debugger generates in the following directory and email to your local distributor.

\\SUPPORT\product-name\SUPPORT.TXT

For prompt response, please specify the following information:

(1) Operating environment

- Operating voltage: _____ [V]
- Operating frequency: _____ [MHz]
- Operating mode: Single-chip, memory expansion, or microprocessor mode
- Clock supply to the MCU: Internal oscillator/External oscillator

(2) Condition

- The emulator debugger starts up/does not start up
- The error is detected/not detected in the self-check
- Frequency of errors: always/frequency (_____)

(3) Problem

6. Maintenance and Guarantee

This chapter describes how to maintenance, repair provisions and how to request for repair.

6.1 Maintenance

- (1) If dust or dirt collects on any equipment of your emulation system, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.
- (2) When you do not use this product for a long period, for safety purposes, disconnect the power cable from the power supply.

6.2 Guarantee

If your product becomes faulty within one year after its purchase while being used under good conditions by observing "IMPORTANT" and "Precautions for Safety" described in this user's manual, we will repair or replace your faulty product free of charge. Note, however, that if your product's fault is raised by any one of the following causes, we will repair it or replace it with new one with extra-charge:

- Misuse, abuse, or use under extraordinary conditions
- Unauthorized repair, remodeling, maintenance, and so on
- Inadequate user's system or misuse of it
- Fires, earthquakes, and other unexpected disasters

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

6.3 Repair Provisions

(1) Repair with extra-charge

The products elapsed more than one year after purchase can be repaired with extra-charge.

(2) Replacement with extra-charge

If your product's fault falls in any of the following categories, the fault will be corrected by replacing the entire product instead of repair, or you will be advised to purchase new one, depending on the severity of the fault.

- Faulty or broken mechanical portions
- Flaw, separation, or rust in coated or plated portions
- Flaw or cracks in plastic portions
- Faults or breakage caused by improper use or unauthorized repair or modification
- Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply
- Cracks in the printed circuit board or burnt-down patterns
- Wide range of faults that makes replacement less expensive than repair
- Unlocatable or unidentified faults

(3) Expiration of the repair period

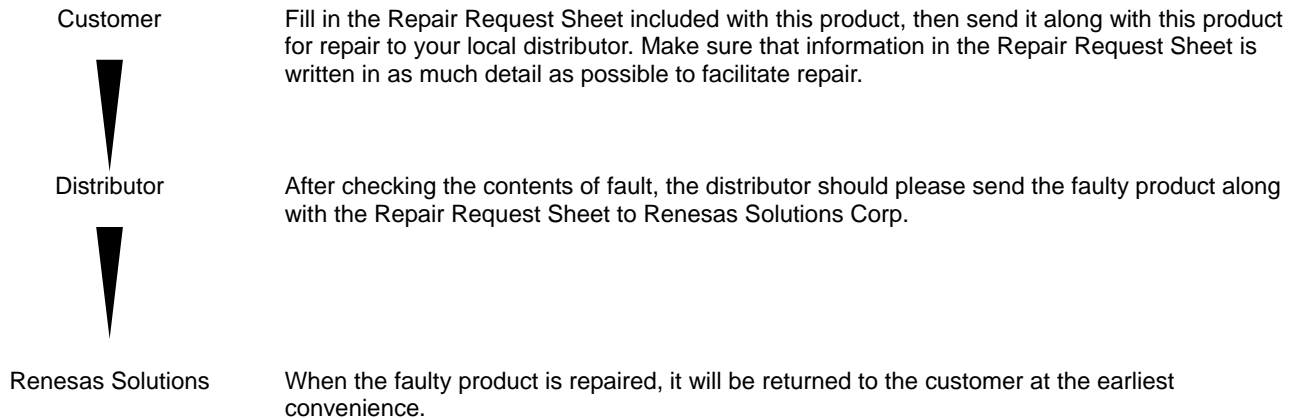
When a period of one year elapses after the model was dropped from production, repairing products of the model may become impossible.

(4) Transportation fees at sending your product for repair

Please send your product to us for repair at your expense.

6.4 How to Make Request for Repair

If your product is found faulty, follow the procedure below to send your product for repair.



CAUTION

Note on Transporting the Product:



- When sending your product for repair, use the packing box and cushion material supplied with this product when delivered to you and specify handling caution for it to be handled as precision equipment. If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with this product (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

Pod probe for M16C/1N Group
M301N2T-PRB User's Manual

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M301N2T-PRB
User's Manual



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