



M306V7T-RPD-E

Emulation Pod for M306V7

User's Manual

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\\SUPPORT\Product-name\SUPPORT.TXT

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Preface

The M306V7T-RPD-E is an emulation pod for M306V7 of 16-bit MCUs. It is used with a PC4701 emulator.

This user's manual mainly describes specifications of the M306V7T-RPD-E emulation pod and how to setup it. For details on the following products, which are used with M306V7T-RPD-E, refer to each product's user's manual or online manual.

- Emulator: PC4701 User's Manual
- Emulator debugger: M3T-PD30 User's Manual

All the components of this product are shown in "Table 2.1 Package components" (page 20) of this user's manual. If there is any question or doubt about this product, contact your local distributor.

To use the product properly

Precautions for Safety



- In both this 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.
- The icons' graphic images and meanings are given in "Chapter 1. Precautions for Safety". Be sure to read this chapter before using the product.

When using outside Japan



- When using in Europe, the United States, or Canada, be sure to use both the emulator and the emulation pod which meet local standards. EMI standards are not met when this product is used with the PC4700H or PC4700L emulator.

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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, host machine and emulator debugger.

Emulator main unit (Hereafter PC4701)

This means a generic name for emulators for M16C, 7700, 740 Families. For details on specific models of PC4701, visit the Renesas Tools Homepage at <http://www.renesas.com/en/tools>

Emulation pod

This means M306V7T-RPD-E (this product). This emulation pod is for M306V7.

Host machine

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

Emulator debugger

This means a software tool M3T-PD30 to control the emulator from the host machine through an interface.

Firmware

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

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 rising/falling edge of the signal entered from the external trace cable. The former break function is called data 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.

Evaluation MCU

This means the microcomputer mounted on the emulation pod which is operated in the specific mode for tools.

Target MCU

This means the microcomputer you are going to debug.

Target system

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

*

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

Chapter 1. Precautions for Safety

This chapter describes precautions for using this product safely and properly. For precautions for the emulator main unit and the emulator debugger, refer to each user's manual included with your product.

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Chapter 1. Precautions for Safety

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.

1.1 Safety Symbols and Meanings



WARNING

If the requirements shown in the "WARNING" sentences are ignored, the equipment may cause serious personal injury or death.



CAUTION

If the requirements shown in the "CAUTION" sentences are ignored, the equipment may malfunction.

IMPORTANT

It means important information on using this product.

In addition to the three 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.**

The following pages describe the symbols "WARNING", "CAUTION", and "IMPORTANT".

WARNING

Warning for Installation:



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

Warnings for Use Environment:



- The emulation pod is air-cooled with the ventilation slot. Therefore, do not block the ventilation slot. When heated to high temperatures, the emulation pod may not work properly.
- 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

Caution to Be Taken for Modifying This Product:



- Do not disassemble or modify this product. Disassembling or modifying this product can cause damage. Disassembling and modifying the product will void your warranty.

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 pull the emulation pod main unit by the flexible cable (FLX120-RPD) for connecting to the emulator main unit or the flexible cable (FLX64, FLX100, FLX160 or M3T-FLX160C) for connecting the target system. The cable may cause a break.
- Flexible cable (FLX120-RPD) for connecting to the emulator main unit and the flexible cable (FLX64, FLX100, FLX160 or M3T-FLX160C) for connecting the target system are different from earlier models. The slits make them more flexible. However, excessive flexing or force may break conductors.
- 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.

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 system 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.

IMPORTANT

Notes on Downloading Firmware:

- Before using this product for the first time, it is necessary to download the dedicated firmware (control software for the emulation pod built into the PC4701). Please note that, to do this, it is necessary to start up the PC4701 in maintenance mode. For firmware download procedures, see "4.3 Downloading Firmware" (page 44). 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.
- Except when a target status error occurs, if the self-check is not complete successfully, there may be trouble with the product. In such case, contact your sales representative. However, perform the self-check in the below setup.

- | | |
|--------------------------------------|---------------------------|
| (1) Target system: | Not connected |
| (2) Emulation pod internal switches: | At their factory settings |

Note on Quitting the Emulator Debugger:

- To restart the emulator debugger after it ends, always shut power to the emulator module off once and then on again.

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.

Notes on Target System:

- The emulator's pin V_{CC} is connected to the target system in order to monitor target system voltage. For this reason, the emulator cannot supply power to the target system. Therefore, provide the target system with a separate power supply from that of the emulator.
- The voltage of the target system should be within the range of the MCU specification.
- Do not change the voltage of the target 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 target system are all connected correctly. Next, turn on the power to each equipment following the procedure below.
 - (1) Turn ON/OFF the target 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 that target status LED (POWER) is ON.
 - Is the reset released? Check that target status LED (RESET) is OFF.For details, refer to "Chapter 4. Usage" (page 41).

Note on RESET* Input:

- The RESET* input from the target system 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 RDY* Input:

- Be sure to input "L" to pin RDY* of the target system during the user program executing (only while the RUN status LED on the PC4701's front panel is lit). Inputting "L" to pin RDY* during the user program stopping may cause a malfunction of the emulator.

Notes on HOLD* Input:

- Be sure to input "L" to the HOLD* pin of the target system during the user program executing (only while the RUN status LED on the PC4701's front panel is lit). Inputting "L" to the HOLD* pin during the user program stopping may cause a malfunction of the emulator.
- When inputting "L" to the HOLD* pin to run into the HOLD state, P00 to P52 will be in the HOLD state delaying by 2.5 cycles than the actual MCU (for details, see Table 5.4 and Figure 5.6).

Notes on Interruption:

- Even when the target program is not being executed (while the target program is stopped or during runtime debugging), the evaluation MCU keeps running so as to control the emulation pod. Therefore, note that timers and other components do not stop running even though the target program is not being executed.
- If a maskable interrupt request is generated when the target program is not being executed (while the target program is stopped or during runtime debugging), the request is not accepted because the emulator disables all interrupts. If an interrupt request is generated when the target program is not being executed, but the target program enables that interrupt, it will be accepted immediately after program execution starts.

Note on Clock Supply to the MCU:

- Clock can be supplied to the evaluation MCU in one of the following two ways. This is determined by emulator debugger clock selection.
 - (1) When Internal is selected:

The 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 "target system clock status" and "user program execution status".
 - (2) When External is selected:

Clock supply to the evaluation MCU depends on oscillation status (oscillate/off) of the target system.

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.

IMPORTANT

Notes on Stack Area:

- With this product, a maximum 8 bytes of the user stack is consumed.
- If the user 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 work area. Using areas like this is a cause of user program crashes and destabilized emulator control. Therefore, ensure the +8 bytes maximum capacity used by the user program as the user stack area.

Note on Setting the Work Area:

- To use this product, it is necessary to set the work area in the internal reserved area of the MCU. However, do not set it in the last 10 bytes of the internal reserved area. And be sure to set the internal reserved area to INTERNAL (set the work area by the INIT window of emulator debugger M3T-PD30).

For M306V7, set to the address 2000h. The emulator uses 10 bytes area of 02000h to 02009h.

Notes on Software Breaks and Hardware Breaks:

- Software breaks generate BRK interrupts by substituting the proper instruction to the BRK instruction. 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 reverse assemble mode, "BRK" instruction is displayed. For this reason, the BRK instruction cannot be used.
- 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 Accessing Address 00000h:

- When a maskable interrupt is generated, the interrupt data (interrupt No. and interrupt request level) stored in address 00000h is read out. Also, the interrupt request bit is cleared when address 00000h is read out. Consequently, when the address 00000h readout instruction is executed or when address 00000h 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 is generated excluding the interrupt, the yellow LED lights up to alarm. When this LED lights, there is a possibility of wrong access to address 00000h, therefore check the program. This LED is turned off by the reset switch of the emulator main unit.

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

- Do not perform the following debugging operations with the single step interrupt vector area (addresses FFFECh - FFEFh).
 - (1) Step execution of instructions that access the single step interrupt vector area
 - (2) Program execution using instructions that access the single step interrupt vector area when a software breakpoint is set in those instructions

IMPORTANT

Note on Stop and Wait Modes:

- Do not perform step execution at addresses in the stop or wait mode. It may cause communication errors.

Notes on MAP References and Settings:

- For details on referencing and setting MAP information, see user's manual of emulator debugger M3T-PD30.

According to MAP setting, "MAP = INT" and "MAP = EXT" are as follows:

(1) MAP = INT

The emulation memory inside this product becomes effective.

Set this at MCU internal ROM debugging and MCU internal RAM debugging.

(2) MAP = EXT

The emulation memory inside this product is not used.

Set this where the MCU internal resource (SFR) or resources on the target system are used.

- Be sure to set the SFR area to EXT (external section).
- When setting 0FFFCh to 0FFFFh to EXT:

This product uses the 4 byte area 0FFFCh through 0FFFFh as the stack area. If this 4 byte memory cannot be read or written to, reset cannot be properly effected. As a result, you need to alter the map settings if the condition given below is met.

- (1) With the system which shifts from the single-chip mode to memory expansion (or microprocessor) mode, using the 4 byte area of 0FFFCh to 0FFFFh set to EXT.
- (2) With the system which starts up in microprocessor mode, using the 4 byte area of 0FFFCh to 0FFFFh set to EXT and there is not enough memory to read or write.

The procedures to alter the MAP settings when the conditions (1) or (2) above are met.

- (1) Set the 4 byte area of 0FFFCh to 0FFFFh to INT.
- (2) Execute the RESET command by use of emulator debugger M3T-PD30.
- (3) Set the stack pointer.

(Example)

RESET:

FCLR I

LDC #4000H, SP

--> Set the stack pointer

(Stop the program after executing this instruction)

- (4) Set the 4 byte area 0FFFCh through 0FFFFh to EXT.

IMPORTANT

Note on Differences between Actual MCU and Emulator:

- Operations of the emulator differs from those of mask 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) Data values of MCU's internal resources at power-on

(3) Internal memories (ROM and RAM) capacities etc.

With this emulator system, "INT" (emulation memory enabled) is the default setting for mapping areas other than the SFR area (addresses 000h - 3FFh). For this reason, the emulation memory can be read and written into areas other than the SFR, internal RAM and internal ROM.

(4) Characteristics of ports P00 to P57

Ports P00 to P57 are connected via emulation circuits. The device used for the port emulation circuit is IC8 (M60081L-0142FP).

(5) Oscillator circuit

- Make note that in the oscillator circuit 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 target system. It is same for sub-clock oscillators (X_{CIN} and X_{COUT}).
- For notes on when using the oscillator circuit on the target system, refer to "3.7 (1) Using the Oscillator Circuit on the Target System" (page 31).

(6) HOLD* control

When inputting "L" to pin HOLD* to run into the HOLD state, P00 to P52 will be in the HOLD state delaying by 2.5 cycles than the actual MCU (see Table 5.4 on page 55 and Figure 5.6 on page 56).

(7) A-D converter function

As a flexible cable and other devices are used between the evaluation MCU and the target system, some characteristics are slightly different from those of the actual MCU.

(8) DBC, single-step and BRK instruction interrupt vector table addresses

As the emulator uses the DBC, single-step and BRK instruction interrupt vector table addresses, when data is read out from these addresses, the data are different from expected values (see Table 1.1).

Table 1.1 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

IMPORTANT

(9) Output of the actual MCU and this product

Table 1.2 Differences of outputs between the actual MCU and this product (when executing program)

| Access area | Signal | Actual MCU | This product | * for difference |
|------------------------------|-----------------|---|---|------------------|
| SFR area (MAP = EXT) | Address BHE* | Outputs | Outputs | |
| | Data | Outputs (floating during read cycle) | Outputs (floating during read cycle) | |
| | RD* WR* | Outputs ("L" during write cycle, "L" during read cycle) | Outputs ("L" at write cycle, "L" at read cycle) | |
| | CS* | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |
| | ALE | Does not output (fixed to "L" output) | Outputs | * |
| Internal RAM Internal ROM | Address BHE* | Retains previous status | Outputs | * |
| | Data | Floating | Floating | |
| | RD* WR* | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |
| | CS* | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |
| | ALE | Does not output (fixed to "L" output) | Outputs | * |
| External area | Address BHE* | Outputs | Outputs | |
| | Data | Outputs (inputs external data during read cycle) | Outputs (inputs external data during read cycle) | |
| | RD* WR* | Outputs ("L" during write cycle, "L" during read cycle) | Outputs ("L" during write cycle, "L" during read cycle) | |
| | CS* | Outputs | Outputs | |
| | ALE | Outputs | Outputs | |

Table 1.3 Differences of outputs between the actual MCU and this product (when stopping program)

| Access area | Signal | Actual MCU | This product | * for difference |
|-------------|-----------------|------------|--|------------------|
| | Address BHE* | | Outputs | |
| | Data | | Floating | |
| | RD* WR* | | Outputs RD* only (WR* is fixed to "H" output) | |
| | CS* | | Outputs | |
| | ALE | | Outputs | |

IMPORTANT

Table 1.4 Differences of outputs between the actual MCU and this product (in stop mode)

| Access area | Signal | Actual MCU | This product | * for difference |
|-------------|--------------|--|--|------------------|
| | Address BHE* | Retains previous status | Retains previous status | |
| | Data | Retains previous status | Floating | * |
| | RD* WR* | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |
| | CS* | Retains previous status | Retains previous status | |
| | ALE | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |

Table 1.5 Differences of outputs between the actual MCU and this product (in wait mode)

| Access area | Signal | Actual MCU | This product | * for difference |
|-------------|--------------|--|--|------------------|
| | Address BHE* | Retains previous status | Retains previous status | |
| | Data | Retains previous status | Floating | * |
| | RD* WR* | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |
| | CS* | Retains previous status | Retains previous status | |
| | ALE | Does not output (fixed to "H" output) | Does not output (fixed to "H" output) | |

Notes 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.
- If the reset circuit of the target system has a watchdog timer, disable it when using the emulator.

Note on DMA Transfer:

- With this product, the program is stopped with a loop program to a specific address. Therefore, if a DMA request is generated by a timer or other source while the program is stopped, DMA transfer is executed. However, make note that DMA transfer while the program is stopped may not be performed correctly. Also note that the below registers have been changed to generate DMA transfer as explained here even when the program is stopped.

DMA0 transfer counter register TCR0
DMA1 transfer counter register TCR1

IMPORTANT

Note on Software Reset:

- Do not use a software reset.

Note on Reading MCU's Internal Resources:

- When the registers that are listed in Table 1.6 are read with an emulator, those results will be the following (the data in the MCU are not effected).

(1) Results of real-time trace

The data values of the cycles read are not displayed correctly.

(2) Real-time RAM monitor

The data values read are not displayed correctly.

Table 1.6 Registers and symbols not displayed normally

| Register | Symbol |
|-------------------------------|----------------|
| DMA source pointers 0, 1 | SAR0, SAR1 |
| DMA destination pointers 0, 1 | DAR0, DAR1 |
| DMA transfer counters 0, 1 | TCR0, TCR1 |
| DMA control registers 0, 1 | DM0CON, DM1CON |

Notes on Address Match Interrupt:

- To debug address-match interrupts, set a software break or hardware break at the top address of the address-match interrupt process.
- Do not set a hardware break within 4 instructions before an address at which an address-match interrupt occurs. If you do set a hardware break in this range, the program will 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 Protect Register:

- Make note that the protect is not canceled when protect register (PRC2), which enables writing in the port P9 direction register and the SI/O3, 4 control register, is changed with the below procedure.
 - (1) Step execution of the "instruction for setting ("1") PRC2"
 - (2) Setting the break point from the "instruction for setting ("1") PRC2" to when the "setting the register for the protect"
 - (3) Setting "("1") PRC2" from the dump window or script window

Note on Pullup Control Register:

- Ports P00 to P57 are not pulled up by the pullup control register.

When pulling up the ports P00 to P57, apply a resistance to the inside of the emulator. How to apply it, refer to "3.4 Removing the Pullup Register" (page 26).

Note: Ports P60 to P107 are pulled up by the pullup control register.

Note: Pullup control register can read and write from P00 to P107 properly.

MEMO

Chapter 2. Preparation

This chapter describes the package components, the system configuration and the preparation for using this product for the first time.

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Chapter 2. Preparation

2.1 Package Components

The M306V7T-RPD-E package consists of the following items. When unpacking, check to see if your M306V7T-RPD-E contains all of these items.

Table 2.1 Package components

| Item | Quantity |
|---|----------|
| M306V7T-RPD-E emulation pod main unit | 1 |
| FLX120-RPD flexible cable for connecting PC4701 | 1 |
| M3T-FLX-100LCC pitch converter board for connecting target system | 1 |
| OSC-3 16 MHz oscillator circuit board for main clock (premounted) | 1 |
| OSC-2 oscillator circuit board (bare board) | 1 |
| Resistor arrays for pulling up ports P00 to P57 (51 kΩ) | 12 |
| IC61-1004-051 100-pin LCC socket | 1 |
| Hardware tool user registration FAX sheet (English) | 1 |
| Hardware tool user registration FAX sheet (Japanese) | 1 |
| M306V7T-RPD-E user's manual (this manual) | 1 |
| M306V7T-RPD-E user's manual (Japanese) | 1 |

* Please keep the M306V7T-RPD-E'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 any of these items are missing or found faulty, please contact your local distributor.

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

* For purchasing the IC61-1004-051 or for technical information, contact Yamaichi Electronics Co., Ltd.

2.2 Other Tool Products Required for Development

To bring forward programs development on the M306V7, the products listed below are necessary in addition to those contained package above. Get them separately.

Table 2.2 Other tool products

| | |
|--------------------|---|
| Emulator main unit | PC4701 |
| Emulator debugger | M3T-PD30 |
| Converter board | 100-pin 0.65-mm-pitch QFP (100P6S-A) M3T-DUMMY100S M3T-DIRECT100S M3T-FLX-100NRB Required according to the foot pattern of the target system (see "3.9 Connecting the Target System" on page 36) |

* To purchase these products, contact your local distributor.

2.3 Name of Each Part

(1) System Configuration

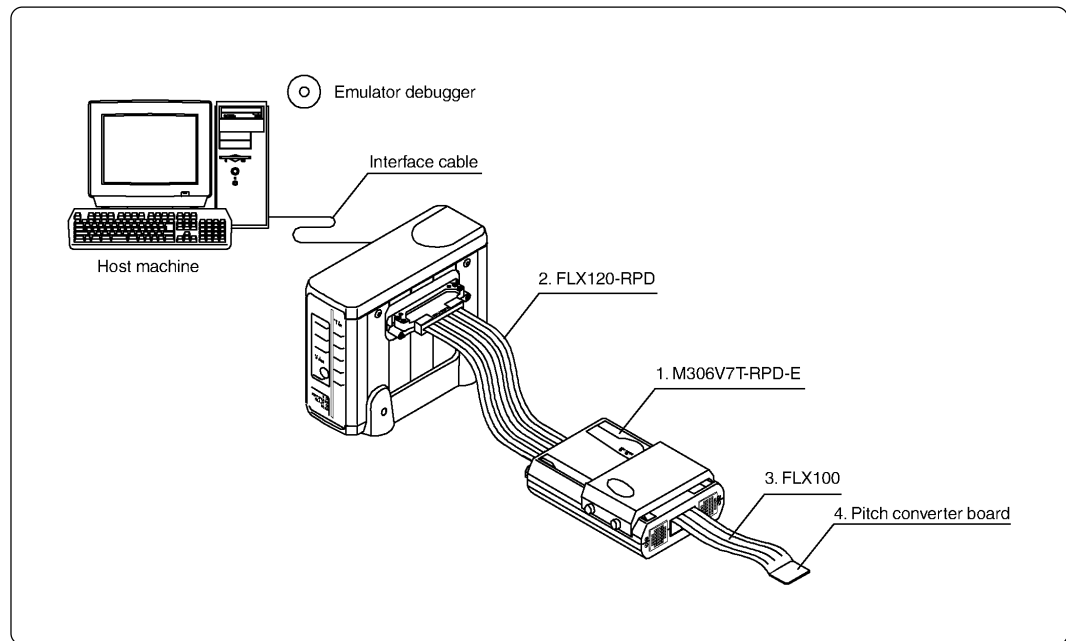


Figure 2.1 System configuration

(1) to (4) in Figure 2.1 are included with this product package.

(1) Emulation pod M306V7T-RPD-E

This emulation pod contains an evaluation MCU, emulation memory and circuit to feature the debug functions.

(2) Flexible cable FLX120-RPD

This is a 120-pin flexible cable for connecting the PC4701 emulator and the emulation pod.

(3) Flexible cable FLX100

This is a 100-pin flexible cable for connecting the emulation pod and the target system.

(4) Pitch converter board

This is a pitch converter board for connecting to the target system. For details, refer to "3.9 Connecting the Target System" (page 36).

2.4 When Using the Emulator for the First Time

If you have purchased this emulation pod newly, it is necessary to download the firmware. The download procedure is given in Figure 2.2.

Before attempting to download the firmware, check the emulator debugger is installed and the emulator is connected to the host machine. For more information, see each user's manual of the emulator debugger and the PC4701.

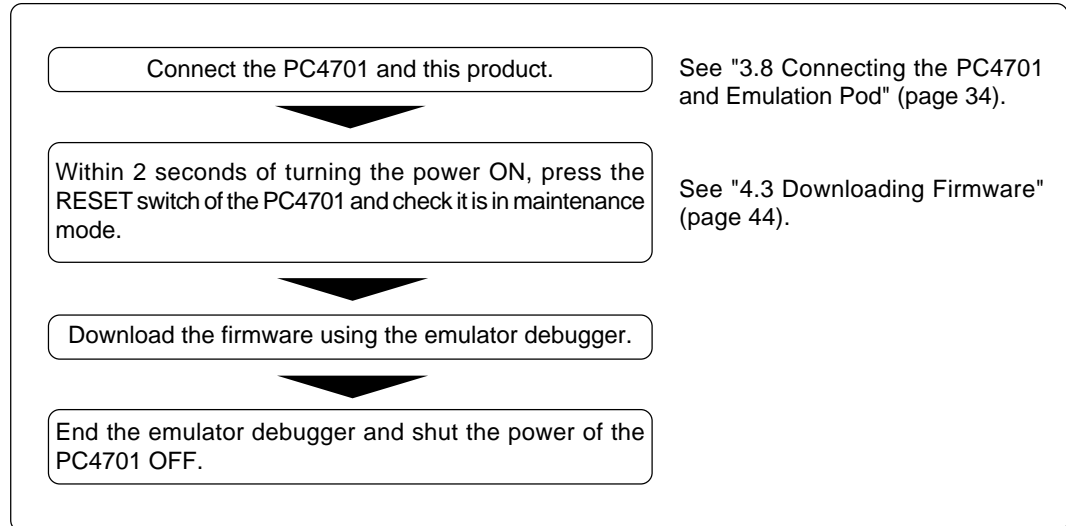


Figure 2.2 Firmware download procedure when the emulator is used for the first time

To make sure the emulation pod works properly, run the self-check. For self-check procedures, see "4.4 Self-check" (page 45).

Chapter 3. Setting Up

This chapter describes switch settings required for using this product and how to connect this product to the PC4701 and the target system.

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| (4) Connecting to a 100-pin 0.65-mm-pitch Foot Pattern (Part 3) | 40 |

Chapter 3. Setting Up

To use this emulation pod with your target system, it is necessary to set as follows. Set the following after removing the upper cover.

- Change the oscillation frequency.
- Set pins X_{CIN}/X_{COUT} for the target system.
- Inserting/pulling out the evaluation MCU.
- Replacing the parts of the MCU peripheral circuit.
- Remove a pullup resistor.

3.1 Opening the Upper Cover

The procedure of removing the upper cover is shown below.

- (1) Remove the two screws of both sides of this product and lift off the metal cover (see Figure 3.1).
- (2) Set the jumper switches.
- (3) Replace the metal cover and secure the two screws.

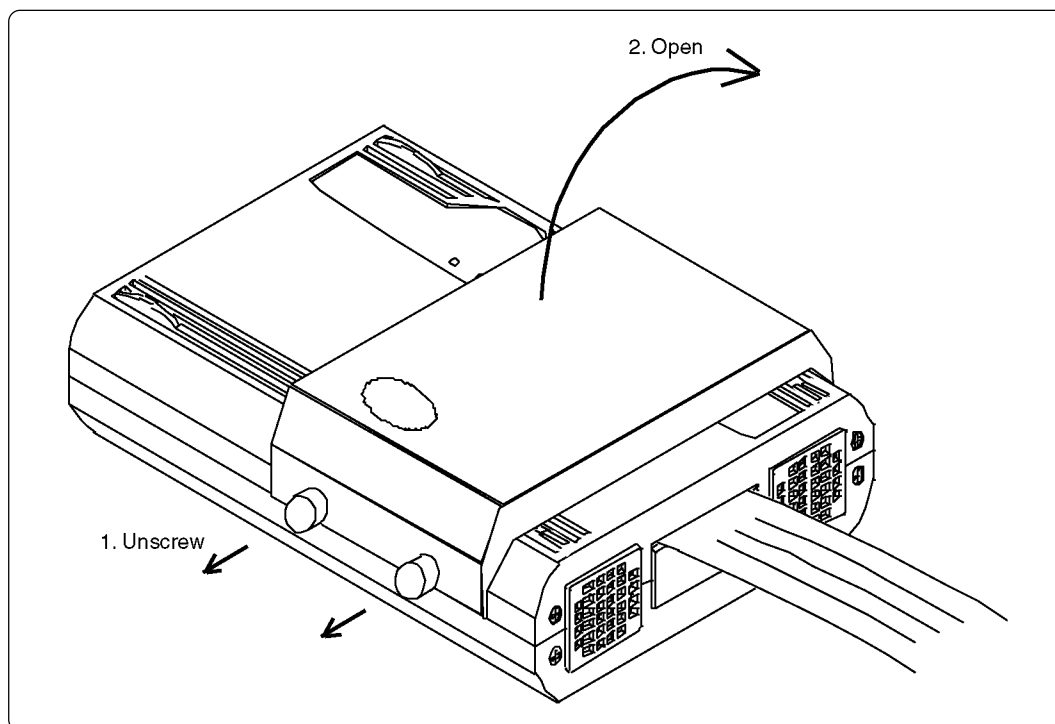


Figure 3.1 Opening the upper cover

CAUTION

When Opening the Upper Cover:

- Always shut OFF power when opening the upper cover or setting the switches.
- Do not touch the connector pins of the PC4701 and the target MCU connector pins. Static electricity may damage the internal circuits.

3.2 Each Setting

Figure 3.2 shows the position of each setting.

- (a) Changing the MCU
- (b) Changing the pullup resistor
- (c) Setting the switches
- (d) Replacing the MCU peripheral circuits
- (e) Replacing the oscillator circuit board

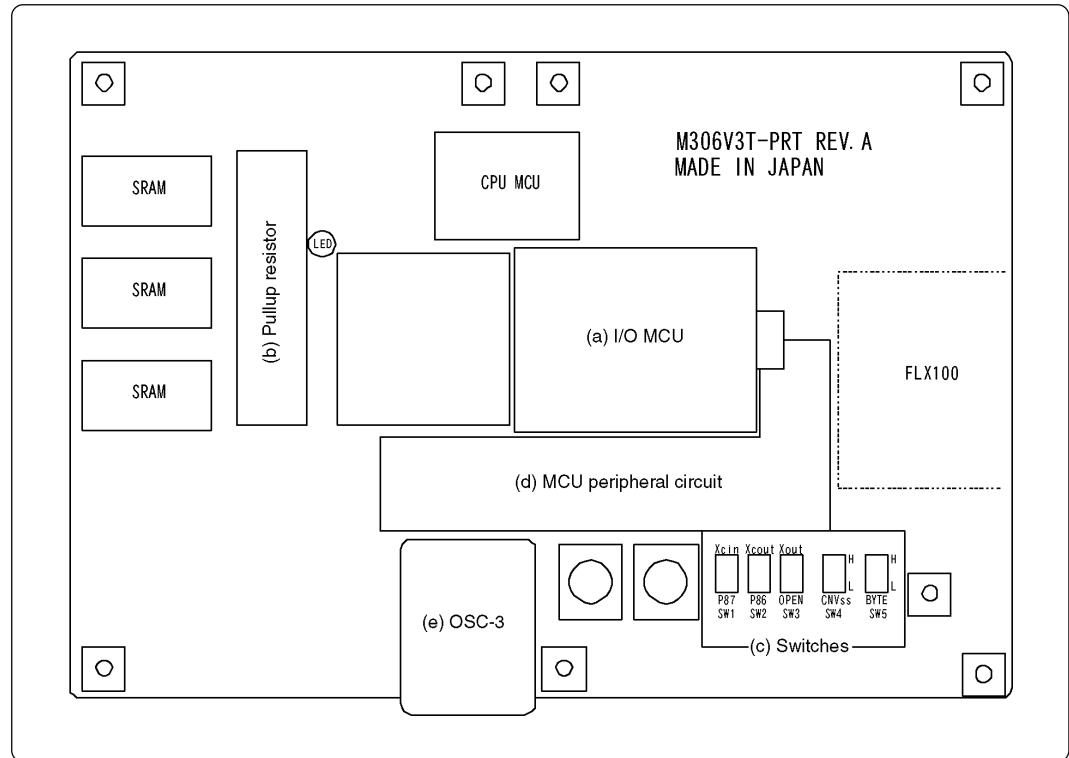


Figure 3.2 Each setting

3.3 Inserting and Removing the Evaluation MCU

It is necessary to inserting and removing the evaluation MCU to write to the internal OSD ROM by the serial programmer. Mount the MCU to the proper position as shown in Figure 3.3.

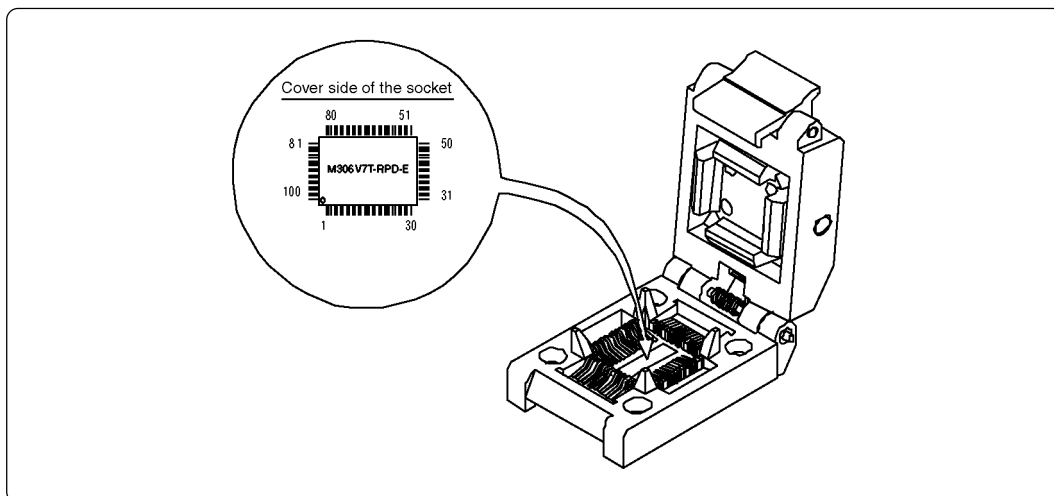


Figure 3.3 Position to mount the MCU

CAUTION

When Inserting and Removing the Evaluation MCU:

- Always shut OFF power inserting and removing the evaluation MCU. Otherwise, the internal circuit may cause a break.
- When mounting the evaluation MCU, insert it to the proper position. Otherwise, it may cause an unrepairable damage to the emulation pod.
- Do not use the evaluation MCU included with this product for other purposes.

3.4 Removing the Pullup Resistor

In this product, pullup control for ports P00 to P57 is impossible with the program (pullup control register read/write are possible). Mounting a pullup resistor inside this product allows pullup control. Mount the resistor array supplied with this product to the port for which pullup control is required (this array is factory installed before shipment). For the mounting location, refer to Figure 3.4 below.

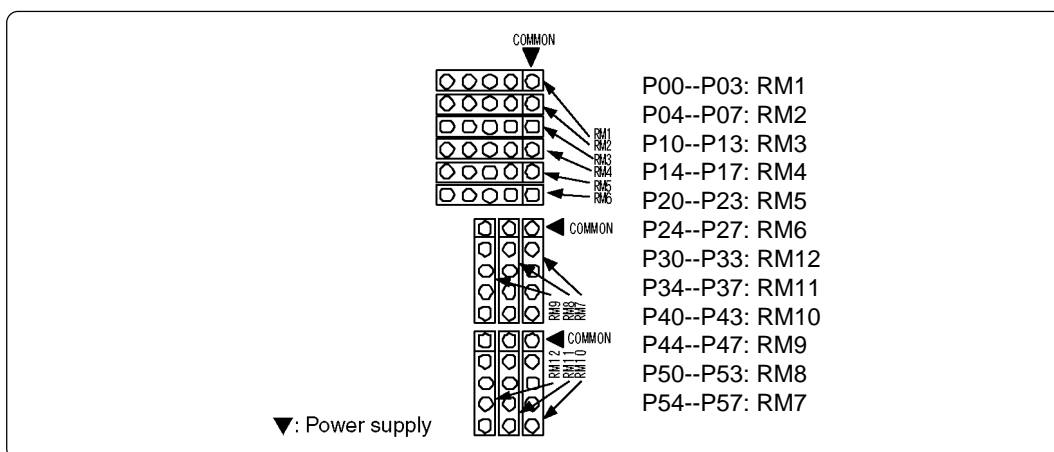


Figure 3.4 Position for mounting the pullup resistor

3.5 Setting Switches

Tables 3.1 and 3.2 list how to set the switches of the M306V7T-RPD-E.

Table 3.1 Switch settings of the M306V7T-RPD-E (1/2)






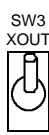
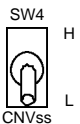
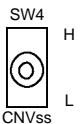
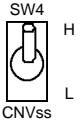
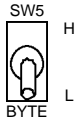

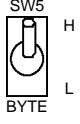
| Signal | Switch | Setting | Description |
|---|--------|--|--|
| P87/X _{CIN} P86/X _{COUT} | SW1 | Factory-setting  | Connects pin P87/X _{CIN} of the MCU to the target system (uses pin P87/X _{CIN} as Port P87). |
| | |  | Connects pin P87/X _{CIN} of the MCU to the sub-clock oscillator (32.768 kHz). |
| | SW2 | Factory-setting  | Connects pin P86/X _{COUT} of the MCU to the target system (uses pin P86/X _{COUT} as Port P86). |
| | |  | Connects pin P86/X _{COUT} of the MCU to the target system (uses pin P86/X _{COUT} as X _{COUT}). |
| X _{OUT} | SW3 | Factory-setting  | Pin X _{OUT} of the MCU is unconnected. |
| | |  | Connects pin X _{OUT} of the MCU to the target system. |

Table 3.2 Switch settings of the M306V7T-RPD-E (2/2)

| Signal | Switch | Setting | Description |
|-------------------|--------|--|---|
| CNV _{ss} | SW4 | Factory-setting  | Pulls down pin CNV _{ss} with a resistance of 33 kΩ. Choose this setting when using the emulation pod without the target system in single-chip mode or memory expansion mode. |
| | |  | Connects pin CNV _{ss} to the target system. Choose this setting when using the emulation pod with the target system. |
| | |  | Pulls up pin CNV _{ss} with a resistance of 33 kΩ. Choose this setting when using the emulation pod without the target system in single-chip mode or memory expansion mode. |
| BYTE | SW5 | Factory-setting  | Pulls down pin BYTE with a resistance of 33 kΩ. Choose this setting when using the emulation pod without the target system in 16-bit bus mode. |
| | |  | Connects pin BYTE to the target system. Choose this setting when using the emulation pod with the target system. |
| | |  | Pulls up pin BYTE with a resistance of 33 kΩ. Choose this setting when using the emulation pod without the target system in 8-bit bus mode. |

IMPORTANT

Note on Switch Settings:

- Switches of pins CNV_{ss} and BYTE are used for debugging operation without connecting the target system. When the target system is not connected, set both of them to the middle positions.

3.6 Changing Parts for MCU Peripheral Circuit

The MCU peripheral circuit parts can be changed with the socket mounted. The parts layout and connection are shown in Figure 3.5.

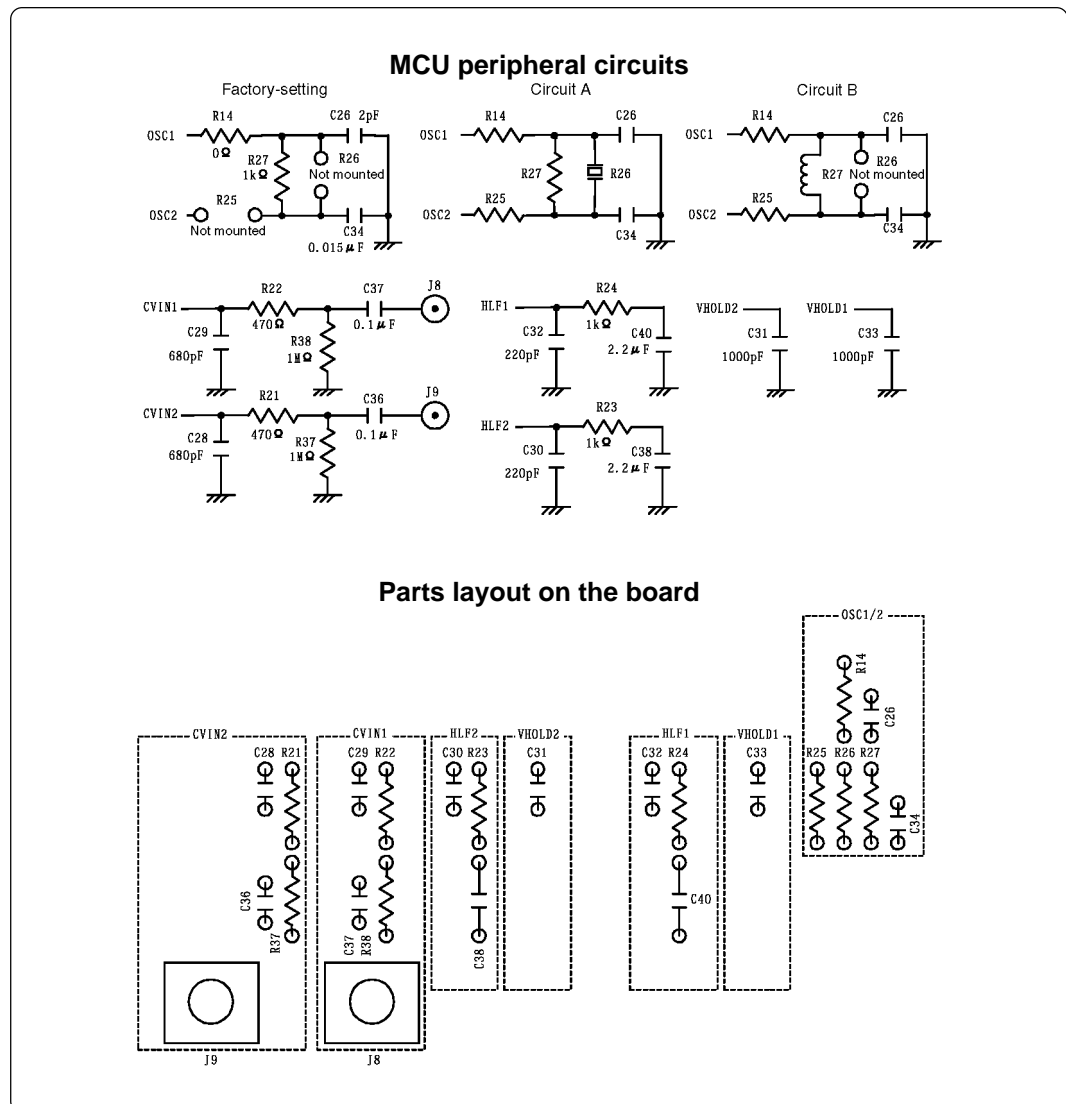


Figure 3.5 Parts layout of MCU peripheral circuits

CAUTION

When Changing the Parts:

- Before changing the parts of peripheral circuit inside the emulation pod, be sure to turn the power OFF; otherwise, the internal circuit may be destructed.
- Insert and remove the parts slowly into and from the socket vertically to the printed circuit board.
- When changing the parts, take the greatest possible care so that no injury is caused to the human body and no damage is caused to the printed circuit board and parts.

3.7 Selecting Clock Supply

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 target system. Table 3.3 lists the factory-settings of each clock supply.

Table 3.3 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 MHz) | Internal | Yes |
| | Target system | External | - |
| X _{CIN} -X _{COU} T | Internal oscillator circuit of emulation pod (32.768 kHz) | Internal | - |
| | Target system | External | Yes |

IMPORTANT

Notes 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 X_{CIN}-X_{COU}T pins, it is necessary to set the switches. For details, refer to "3.5 Setting Switches" (page 27).

(1) Using the Oscillator Circuit on the Target System

When turning on the power supply, the internal clock of emulation pod is selected to supply the clock to the MCU. To use the external clock on the target system, change the clock in the Init dialog box when starting up the emulator debugger or the CLK command on the script window (for details, refer to the user's manual of the emulator debugger).

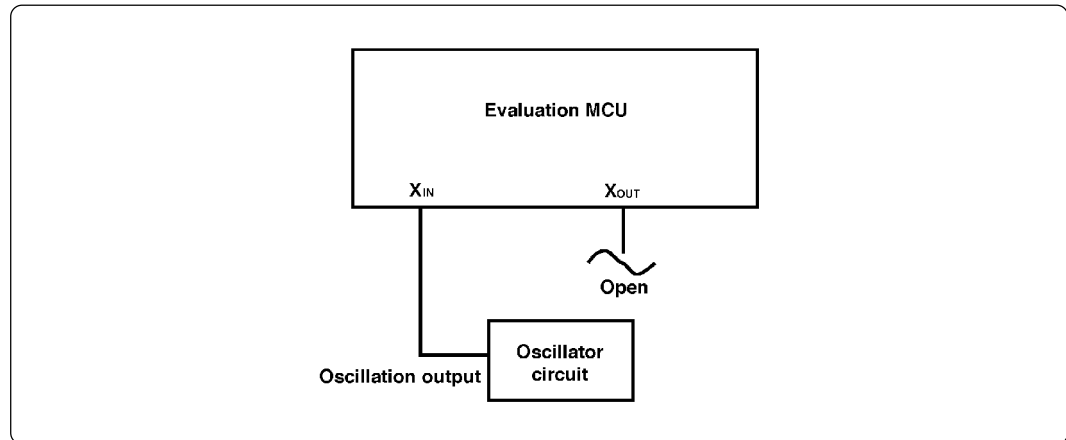


Figure 3.6 External oscillator circuit

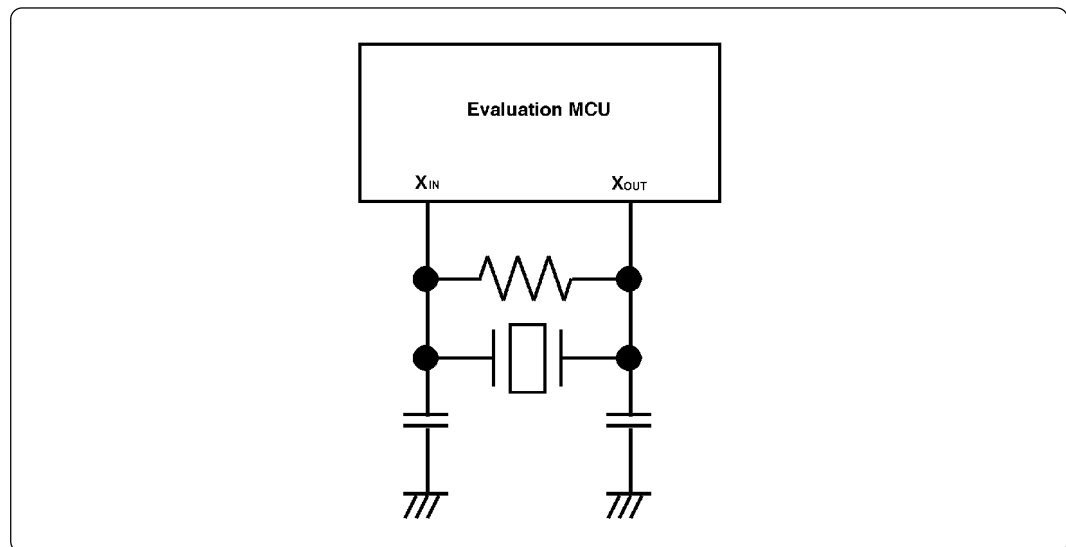


Figure 3.7 Circuit in which oscillation does not occur (same for X_{CIN} - X_{COUT})

IMPORTANT

Notes on External Clock:

- To operate the emulation pod with an external clock, construct the oscillator circuit as shown in Figure 3.6 in the target 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.
- Make note that in the oscillator circuit shown in Figure 3.7 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 target system. It is same for sub-clock oscillator circuits (X_{CIN} and X_{COUT}).

(2) Changing the Internal Oscillator Circuit of the Emulation Pod

An oscillator circuit board for 16 MHz (OSC-3) is mounted on this product. To use the emulation pod at a frequency other than 16 MHz, build the desired oscillator circuit on the included OSC-2 oscillator circuit board (bare board) and replace the board installed in the emulation pod when shipped from the factory.

Figure 3.8 shows an external view of the OSC-2 oscillator circuit board (bare board) and where connector pins are located. Figure 3.9 shows the circuitry of the OSC-2 oscillator circuit board (bare board). Use the number of oscillator circuits recommended by the oscillator manufacturer.

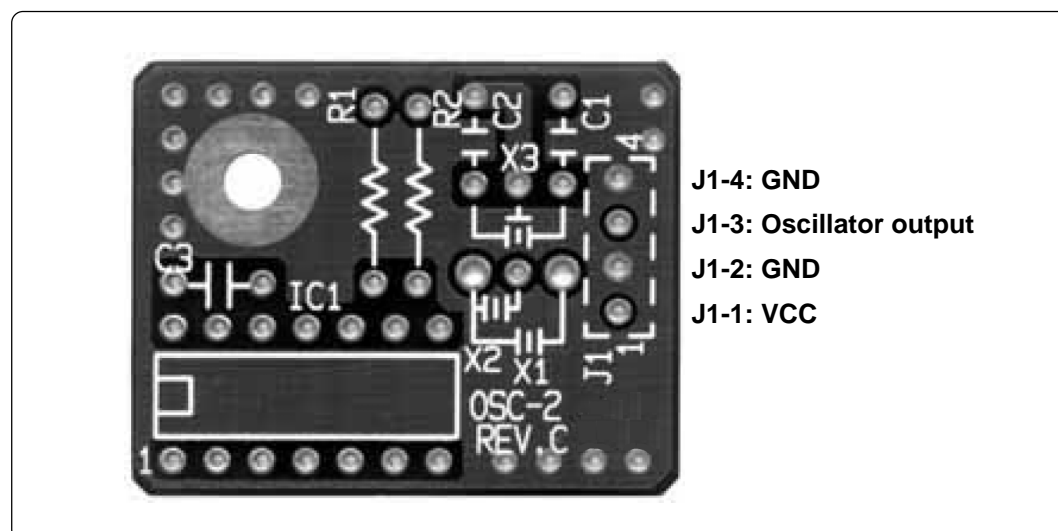


Figure 3.8 External view of the oscillator board (OSC-2) and connector pin assignment

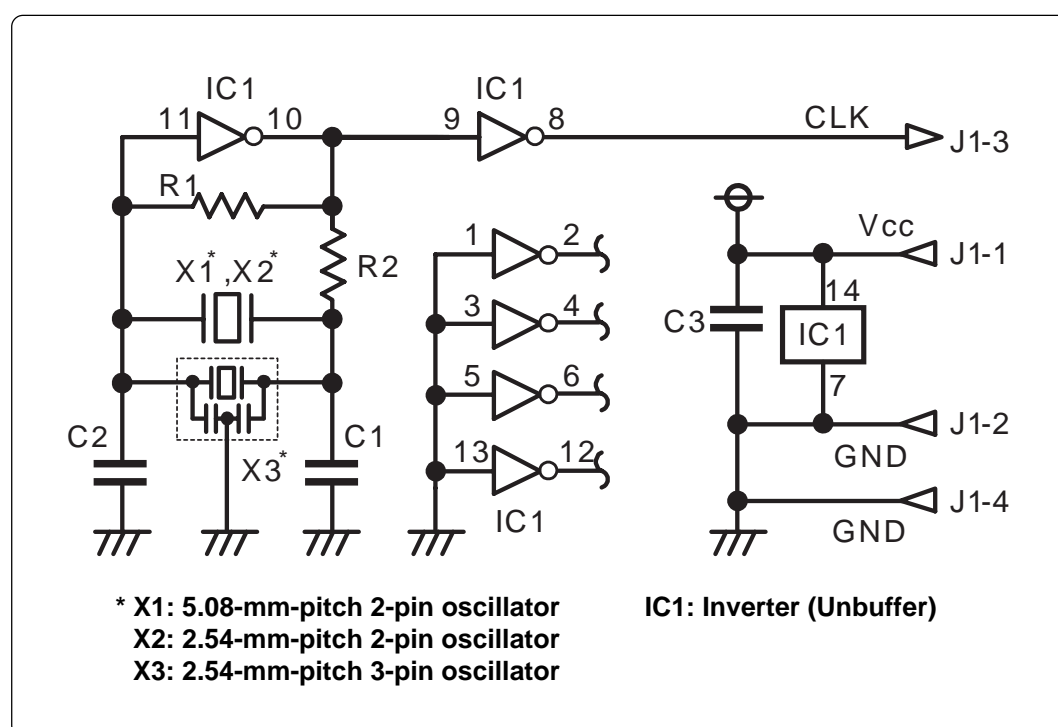


Figure 3.9 Circuit of the oscillator board (OSC-2)

(3) Replacing the Oscillator Circuit Boards

Figure 3.10 shows how to replace the oscillator circuit boards. For the position of the oscillator circuit board, see Figure 3.2.

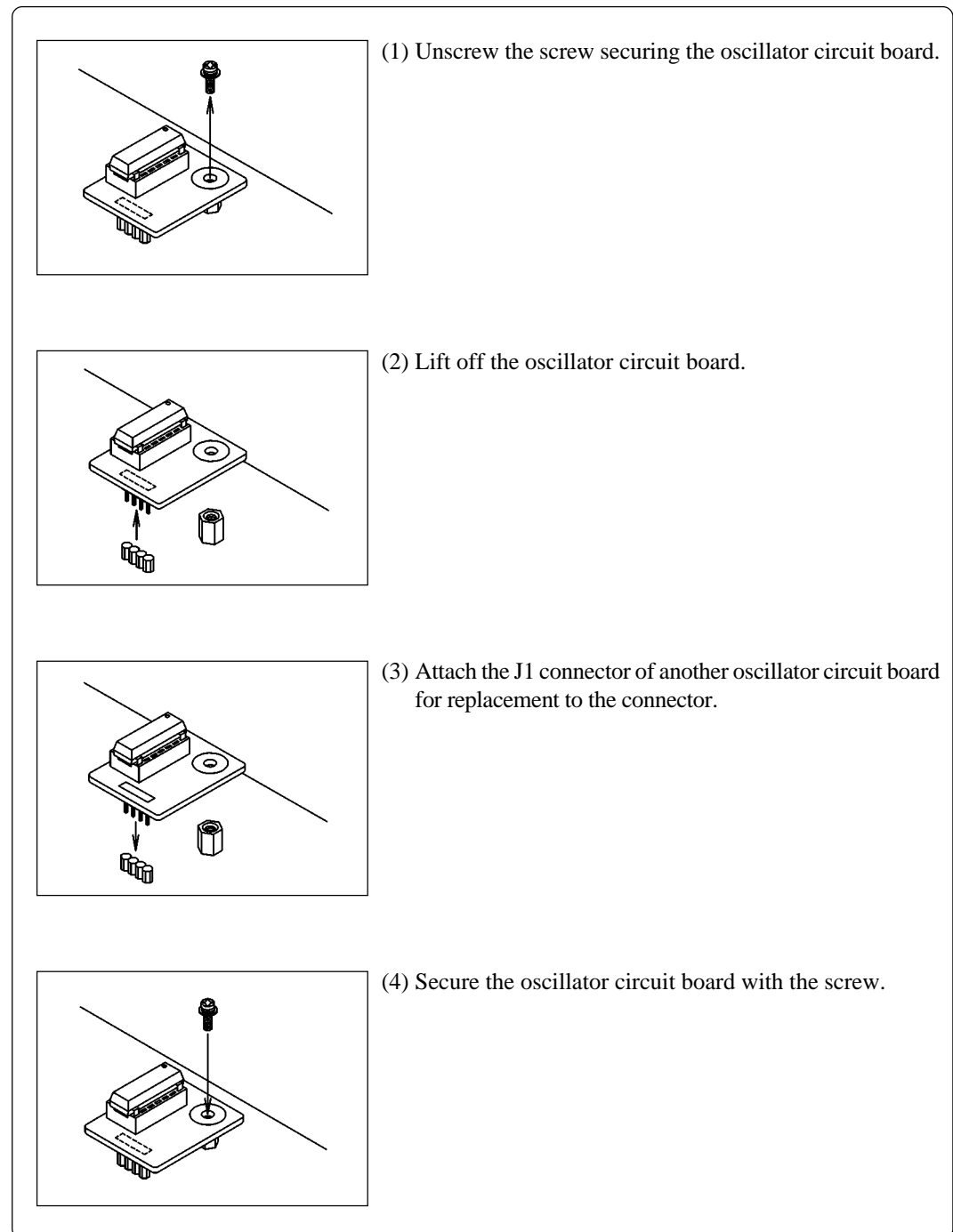


Figure 3.10 Replacing the oscillator circuit boards

3.8 Connecting the PC4701 and Emulation Pod

To connect the emulation pod to the PC4701, use the FLX120-RPD 120-pin flexible cable included with this product package. Connect the PC4701 side connector of the FLX120-RPD to the cable connector of the PC4701, then secure with screws the FLX120-RPD.

(1) Connecting the Cable to the PC4701

Figure 3.11 shows how to connect the PC4701 and FLX120-RPD

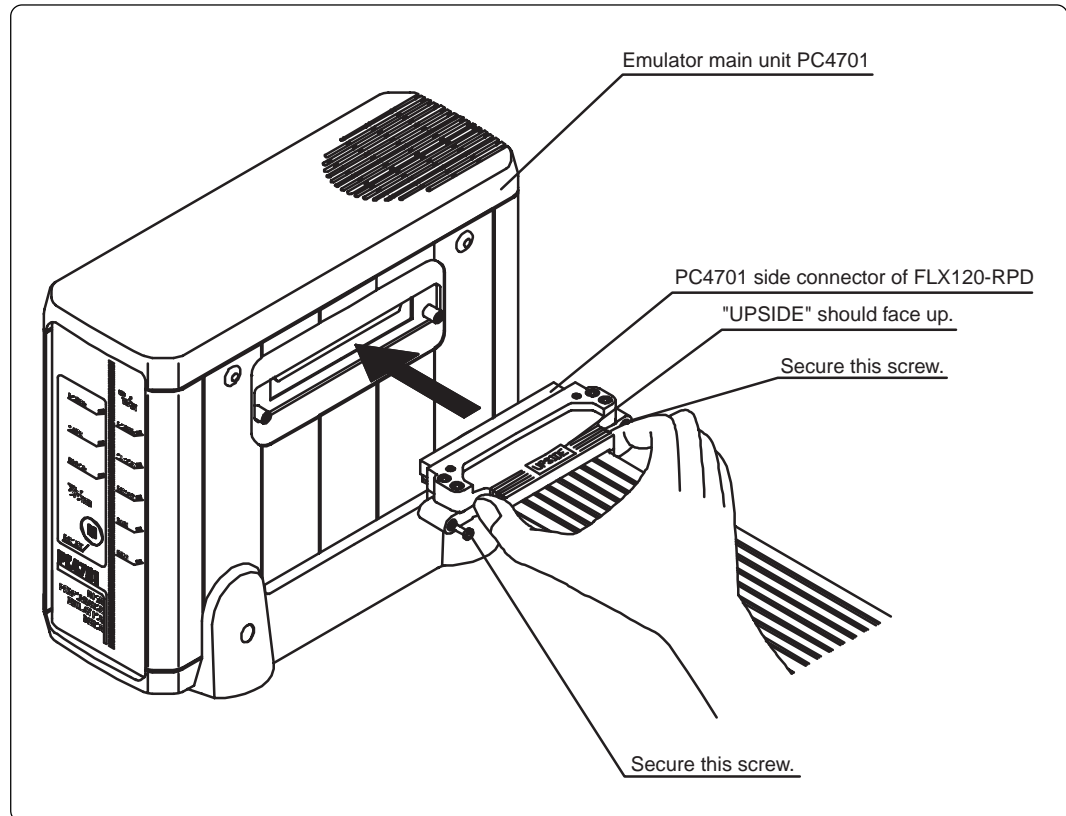


Figure 3.11 Connecting the PC4701 and FLX120-RPD

CAUTION

Notes on Connecting the Cable:

- To connect the FLX120-RPD, be sure to hold the both sides of the PC4701 side connector horizontally with the "UPSIDE" facing up.
- Always shut OFF power before connecting the FLX120-RPD. The power ON state could destroy internal circuits.

Note on Securing the Screws:

- After connecting the FLX120-RPD to the PC4701, be sure to secure the screws mounted in both sides of the connector.

(2) Connecting the Cable to the Emulation Pod

Figure 3.12 shows how to connect the FLX120-RPD and the emulation pod.

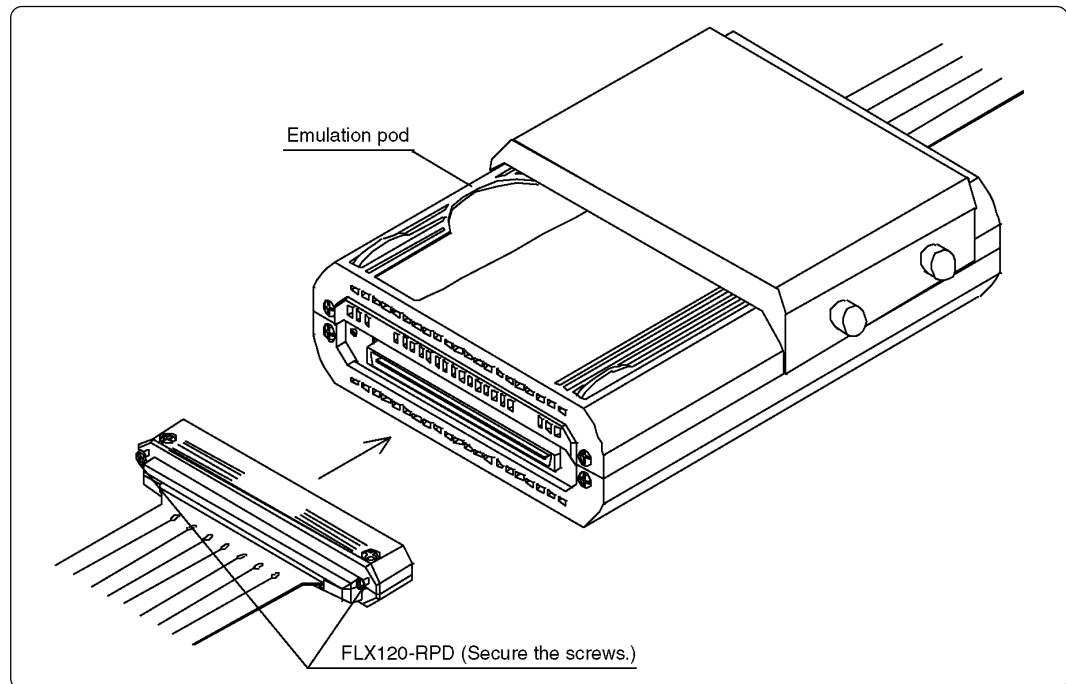


Figure 3.12 Connecting FLX120-RPD and emulation pod

CAUTION

Note on Connecting the Cable:

- Always shut OFF power before connecting the cable. The power ON state could destroy internal circuits.

Note on Securing the Screws:

- After connecting the cable to the emulation pod, be sure to secure the screws.

3.9 Connecting the Target System

There are four ways available to connect the emulation pod to target systems as shown in Figure 3.13.

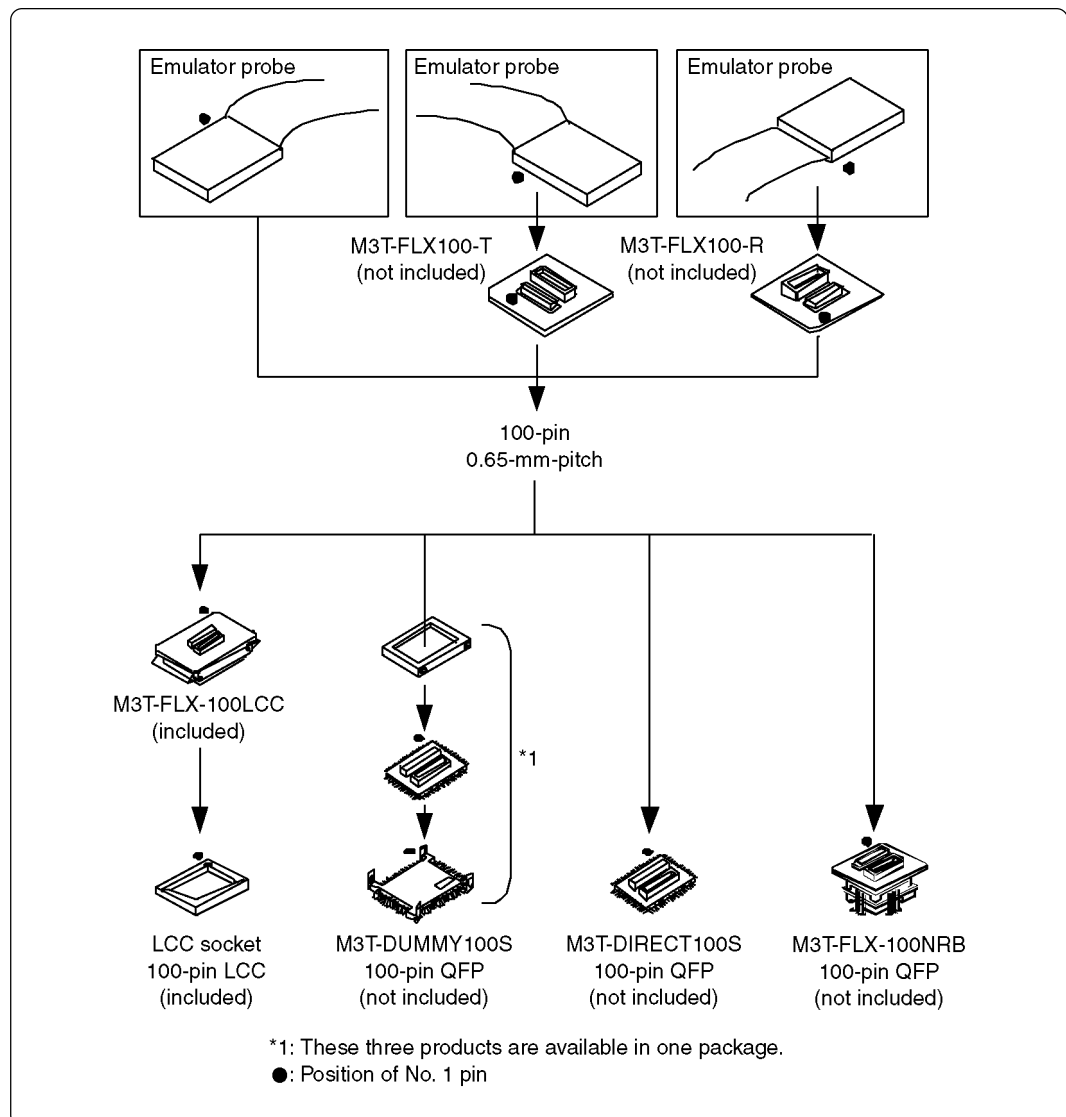


Figure 3.13 Connecting the emulation pod and target systems

CAUTION

Notes on Connecting the Target Systems:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.

(1) Connecting to the 100-pin LCC Socket

When connecting the emulation pod probe to the included 100-pin LCC socket (Yamaichi Electronics Co., Ltd.: IC61-1004-051 etc.) on the target system, following the procedure below.

- (1) Attach the FLX100 to the M3T-FLX-100LCC.
- (2) Attach the M3T-FLX-100LCC to the 100-pin LCC socket.

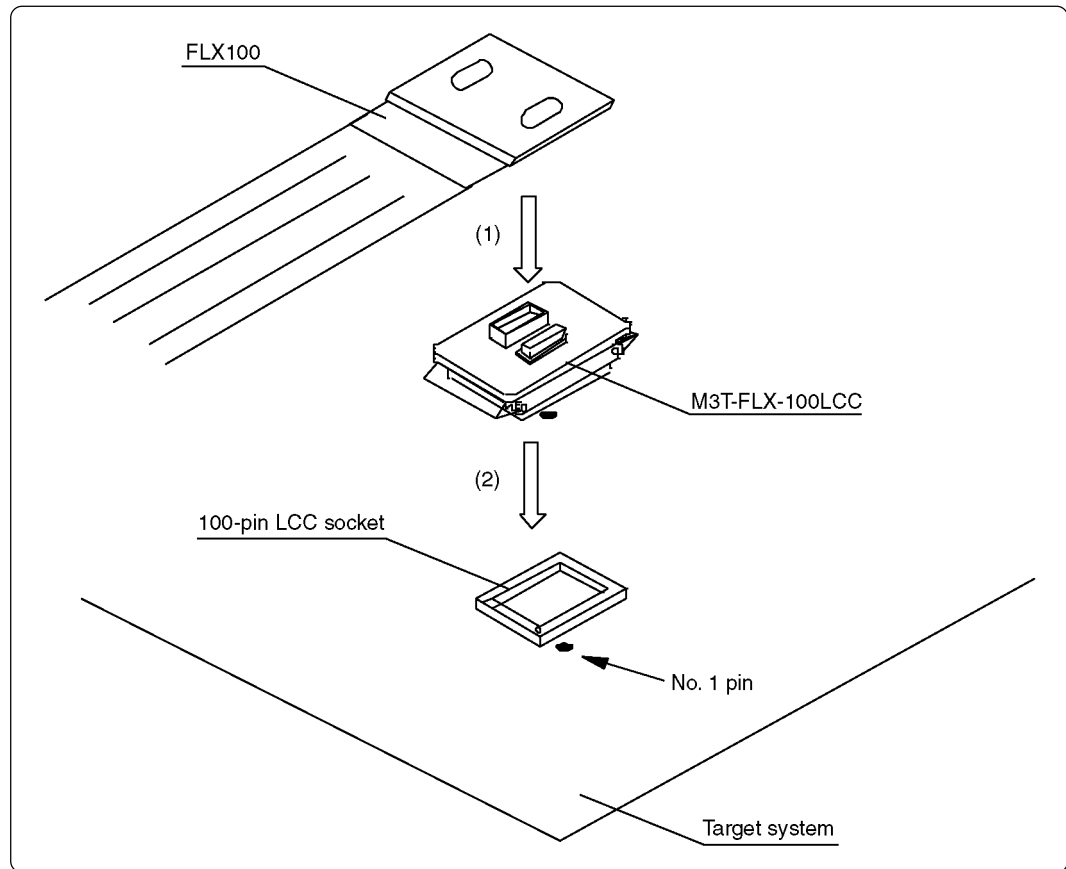


Figure 3.14 Connecting to the 100-pin LCC socket

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-FLX-100LCC are guaranteed for only 20 insertion/removal iterations.
- The included IC61-1004-51 is guaranteed for only 20 insertion/removal iterations.
- For purchasing the IC61-1004-51 or for technical information, contact Yamaichi Electronics Co., Ltd.

(2) Connecting to a 100-pin 0.65-mm-pitch Foot Pattern (Part 1)

Figure 3.15 shows how to connect the emulation pod probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-DUMMY100S (not included), and here following is its procedure. For details on the M3T-DUMMY100S, refer to its user's manual.

- (1) Attach the M3T-DUMMY100S to the target system.
- (2) Attach the FLX100 to the M3T-DUMMY100S.

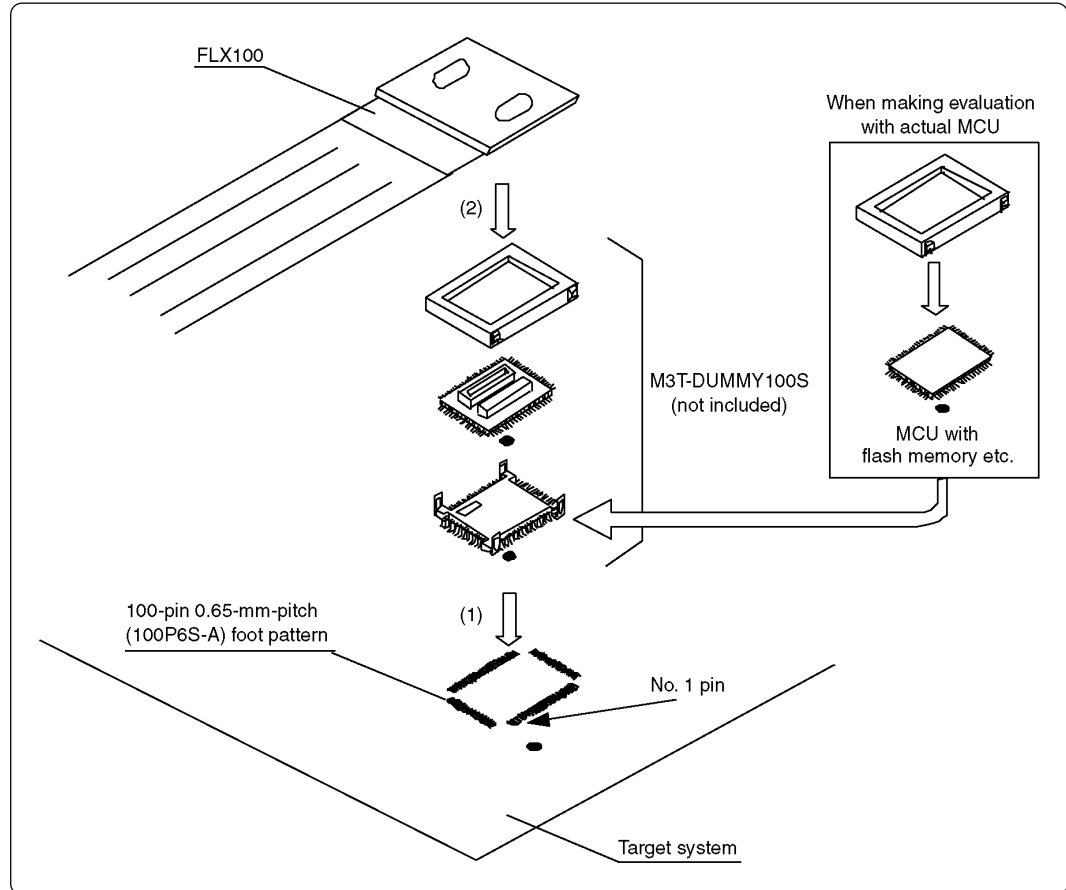


Figure 3.15 Connecting to a 100-pin 0.65-mm-pitch foot pattern (part 1)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-DUMMY100S are guaranteed for only 20 insertion/removal iterations.

(3) Connecting to a 100-pin 0.65-mm-pitch Foot Pattern (Part 2)

Figure 3.16 shows how to connect the emulation pod probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-DIRECT100S (not included), and here following is its procedure. For details on the M3T-DIRECT100S, refer to its user's manual.

- (1) Attach the M3T-DIRECT100S to the target system.
- (2) Attach the FLX100 to the M3T-DIRECT100S.

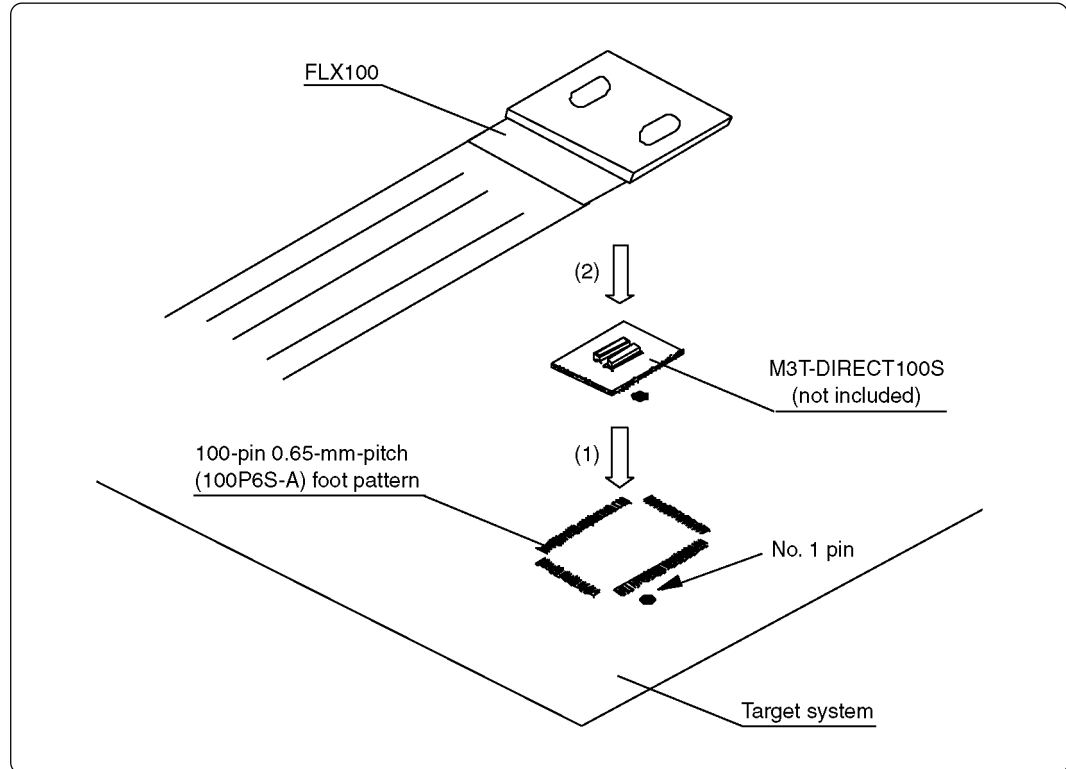


Figure 3.16 Connecting to a 100-pin 0.65-mm-pitch foot pattern (part 2)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-DIRECT100S are guaranteed for only 20 insertion/removal iterations.

(4) Connecting to a 100-pin 0.65-mm-pitch Foot Pattern (Part 3)

Figure 3.17 shows how to connect the emulation pod probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-FLX-100NRB (not included), and here following is its procedure. For details on the M3T-FLX-100NRB, refer to its user's manual.

- (1) Attach the M3T-FLX-100NRB to the target system.
For details on how to attach the M3T-FLX-100NRB to the target system, see its user's manual.
- (2) Attach the FLX100 to the M3T-FLX-100NRB.

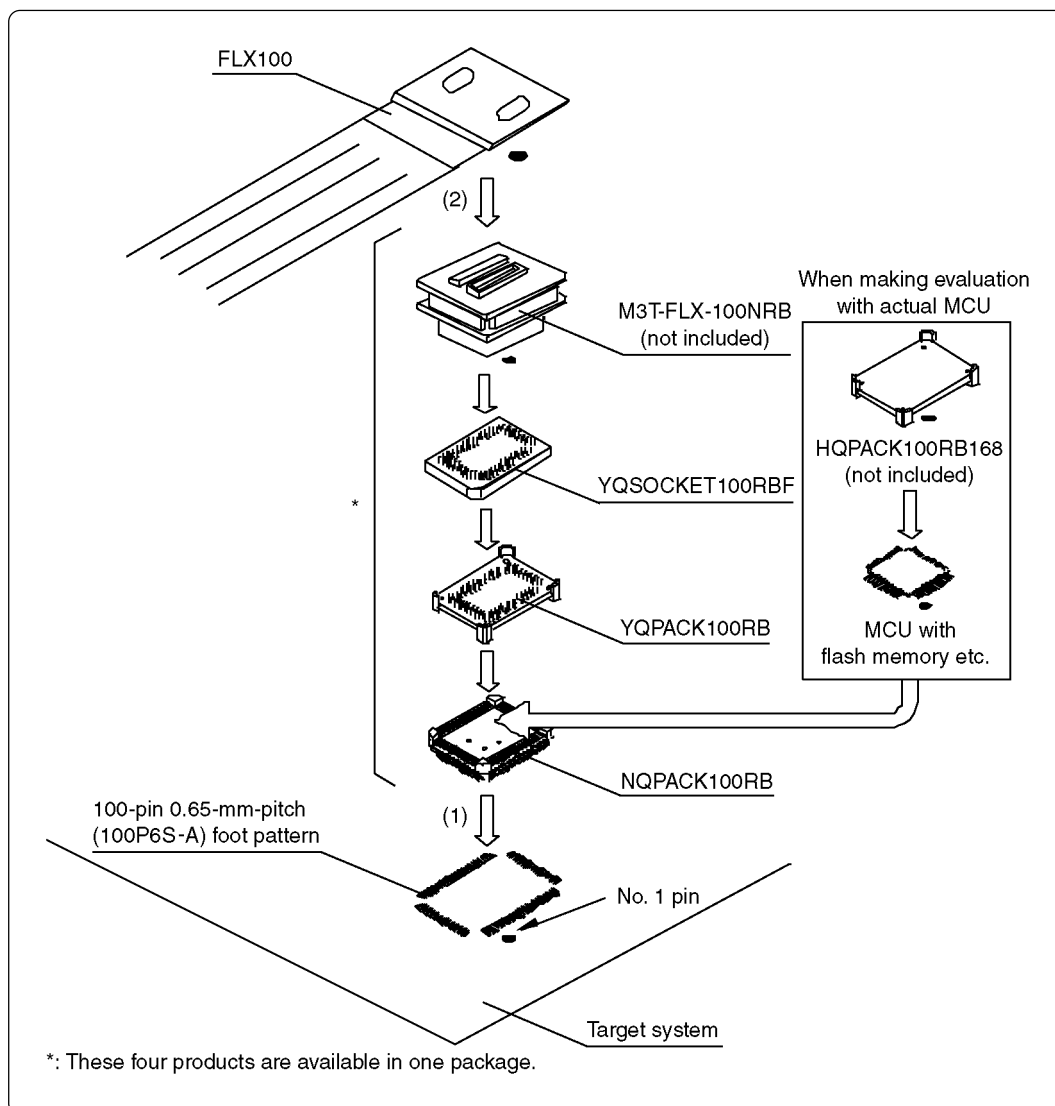


Figure 3.17 Connecting to a 100-pin 0.65-mm-pitch foot pattern (part 3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-FLX-100NRB are guaranteed for only 20 insertion/removal iterations.

Chapter 4. Usage

This chapter describes from turning on the power of this product to starting up the emulator debugger.

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Chapter 4. Usage

4.1 Making an MCU File

It is necessary to change the contents of the MCU file according to the MCU to be developed. Make the MCU file "M306V7.MCU" for M306V7 and store it in the "mcufiles" folder in the directory same as the emulator debugger is stored.

The contents of the MCU file (the SFR area, internal RAM area, internal ROM area, the name of the firmware file) are shown below. Change the settings according to the MCU to be debugged. Use your text editor for changing the contents of the MCU file.

The contents of the MCU file when using the M306V7FG are as follows:

| | | |
|---------|--------------------|--|
| 0 | : SFR area | Start address |
| 3FF | : | End address |
| 2C00 | : Internal RAM | Start address |
| 53FF | : | End address |
| C0000 | : Internal ROM | Start address |
| FFFFFF | : | End address |
| M30620B | : Name of firmware | (Do not change.) |
| 0 | : Expansion No. | M3T-PD30 V.4.00 or later required (Do not change.) |

4.2 Turning On the Power

(1) Checking the Connection of the Emulator System

Before turning the power ON, check the connection of the PC4701, emulation pod, converter board and target system.

(2) Turning On the Power

Power ON/OFF the target system and the PC4701 as simultaneously as possible.

CAUTION

Notes on Power Supply:

- The emulator's pin V_{CC} is connected to the target system in order to monitor target system voltage. For this reason, the emulator cannot supply power to the target system. Therefore, provide the target system with a separate power supply from that of the emulator.
- Keep target system power supply voltage within the MCU's specified range (V_{CCI} : 3.15 to 3.45 V, V_{CCE} : 4.75 to 5.25 V).
- Do not change target system power supply voltage after power has been activated.

(3) LED Display When PC4701 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 4.1 shows front panel LED lighting status when the emulator is turned ON.

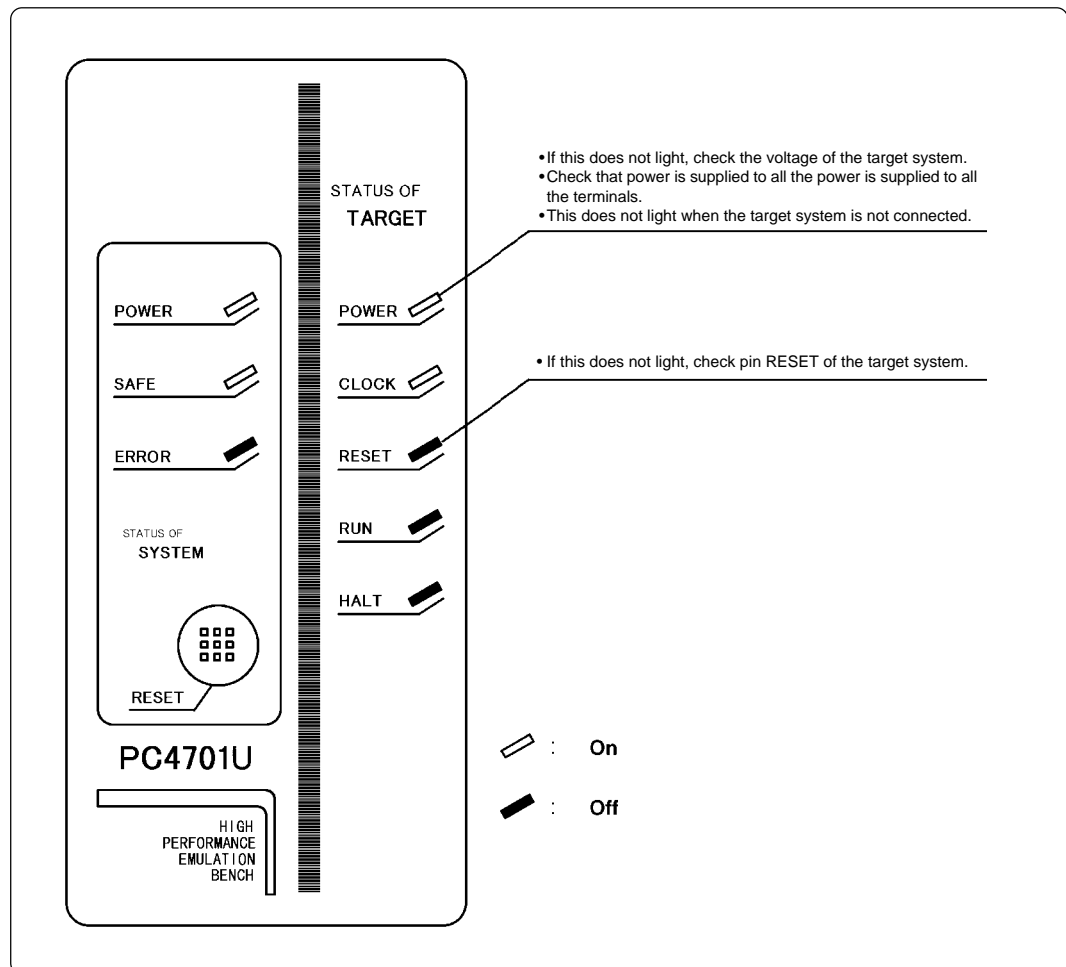


Figure 4.1 LED display when the power turned on

IMPORTANT

Note on Memory Expansion Mode and Microprocessor Mode:

- To use the memory expansion or microprocessor mode, be sure to set pins RDY* and HOLD* so that they are not active at startup. Otherwise the emulator system will not startup normally.

Note on CLOCK LED:

- If CLOCK LED does not turn on, check the following:
 - Immediately after starting PC4701 (before starting the emulator debugger)
 - > Check the oscillation circuit within the emulation pod oscillates normally.
 - After starting the emulator debugger (after setting the Init dialog box)
 - > Check the oscillation circuit set in the Init dialog box oscillates normally.

4.3 Downloading Firmware

(1) When It is Necessary to Download Firmware

It is necessary to download firmware when:

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

(2) Downloading Firmware in Maintenance Mode

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

- (1) Within 2 seconds of activating power to the emulator, press the RESET switch on the emulator front panel. This will switch the emulator to maintenance mode.
- (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 interface about 20 seconds
 - LPT interface about 20 seconds
 - Dedicated parallel interface about 30 seconds
 - Serial interface about 5 minutes

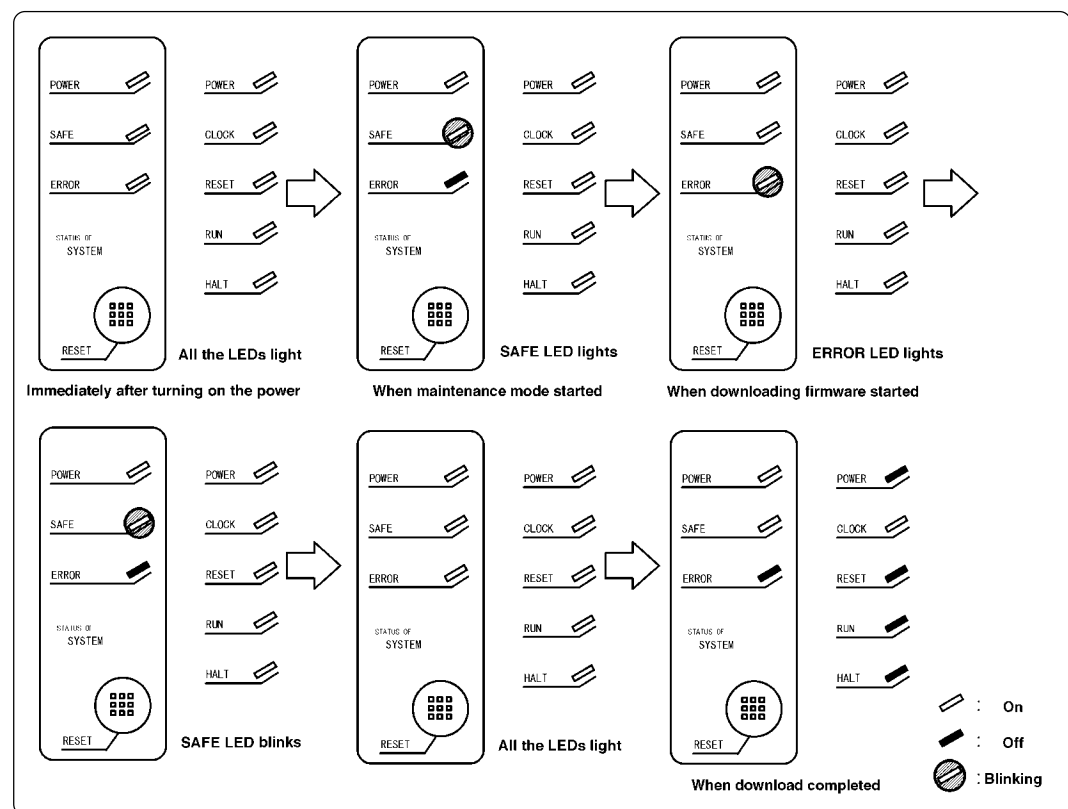


Figure 4.2 Downloading firmware in maintenance mode

IMPORTANT

Note on Downloading Firmware:

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

4.4 Self-check

(1) Self-check Procedure

To run the emulator self-check, do so as explained here below. While the self-check is in progress, LEDs will change as shown in Figure 4.4.

- (1) Set the switches in the emulation pod same as the factory settings (see Figure 4.3).
- (2) If the target system is connected, disconnect it.
- (3) Within 2 seconds of activating power to the emulator, press the RESET switch on the emulator front panel to switch the emulator to maintenance mode.
- (4) Check the "SAFE" LED starts blinking and then press the system RESET switch again.
- (5) The self-check will start. If the normal result is displayed in about 1 minute, the self-check terminated normally.

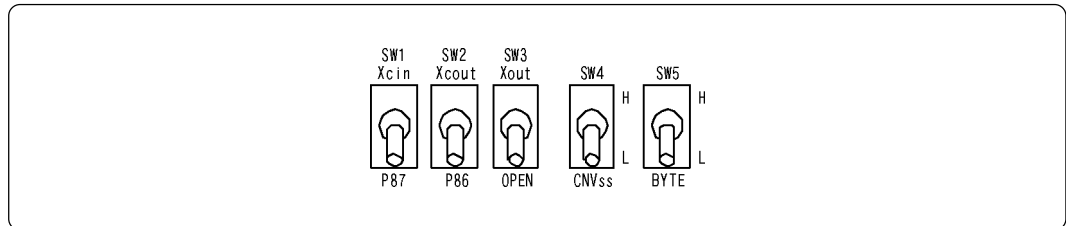


Figure 4.3 Switch settings when running the self-check

(2) If an Error is Detected in the Self-check

If the self-check does not result normally (SYSTEM STATUS ERROR and TARGET STATUS ERROR in Figure 4.4), check the following.

- Check the connection of the emulation pod and the PC4701.
- Download the proper firmware.
- Check if the switches in this product are set same as the factory-settings (Figure 4.3 above).

IMPORTANT

Note on Self-check:

- If the self-check does not result normally (excluding target system errors), the emulation pod may be damaged. Contact your local distributor.

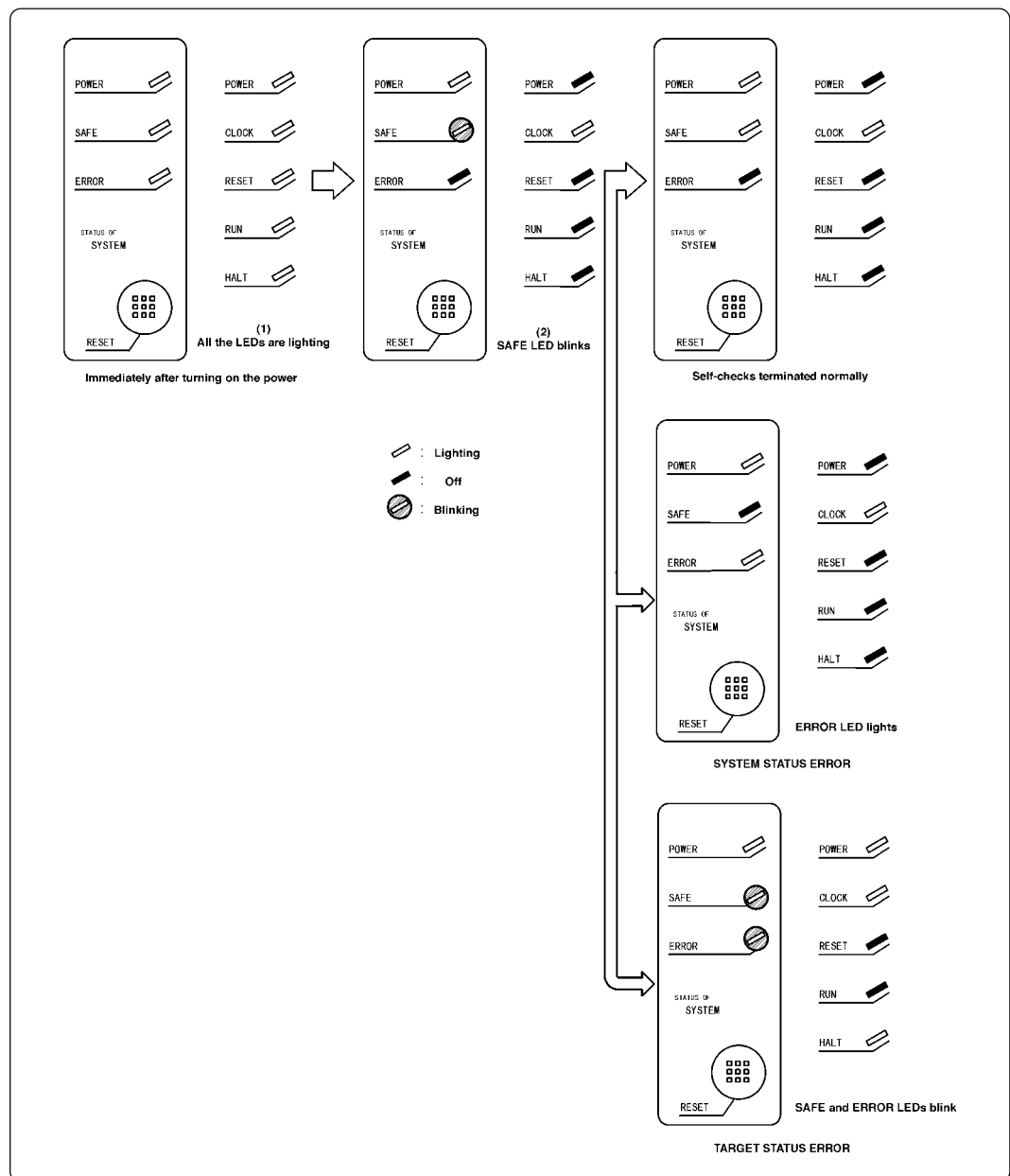


Figure 4.4 Self-check procedure

Chapter 5. Specifications

This chapter describes specifications of this product.

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Chapter 5. Specifications

5.1 Specifications

Table 5.1 lists the specifications of the M306V7T-RPD-E.

Table 5.1 Specifications of the M306V7T-RPD-E

| | | |
|---|---|---|
| Emulators | PC4701 (excluding PC4700L and PC4701L) | |
| Applicable MCUs | M306V7 | |
| Evaluation MCU | M306V7FGFP MCU for tools only (x2) | |
| Usable modes | Single-chip mode Memory expansion mode Microprocessor mode | |
| Emulation memory | 1 MB, max. operating frequency 16 MHz (no-wait) | |
| Maximum operating frequency | 16 MHz (no-dividing) | |
| Clock supply | X _{IN} -X _{OUT} | Internal oscillator circuit board (OSC-3) Switchable to external oscillator input. |
| | X _{CIN} -X _{COUT} | Internal oscillator (fixed 32.768 kHz) Switchable to external oscillator input. |
| Operating voltage | VCCI: 3.15 to 3.45 V VCCE: 4.75 to 5.25 V | |
| Operating temperature | 5 to 35°C (no dew) | |
| Storage temperature | -10 to 60°C (no dew) | |
| Power supply to emulation pod | Supplied from PC4701 | |
| Connection to target system Refer to "3.9 Connecting the Target System" (page 36). | 100-pin 0.65-mm-pitch QFP (100P6S-A): (1) M3T-FLX-100LCC (included) + M3T-DUMMY100S (not included) (2) M3T-FLX-100LCC (included) + M3T-DIRECT100S (not included) (3) M3T-FLX-100NRB (not included) 100-pin LCC socket: M3T-FLX-100LCC (included) | |
| Overseas standards | <ul style="list-style-type: none"> • U.S. EMI standards (FCC part 15 Class A) • CE marking (EN55022, EN55024) | |

5.2 Connection Diagrams

Figures 5.1 and 5.2 show the connection diagrams of the M306V7T-RPD-E. These connection diagrams mainly show the interface section, and the circuits which are not connected to the target system such as the emulator's control system are omitted.

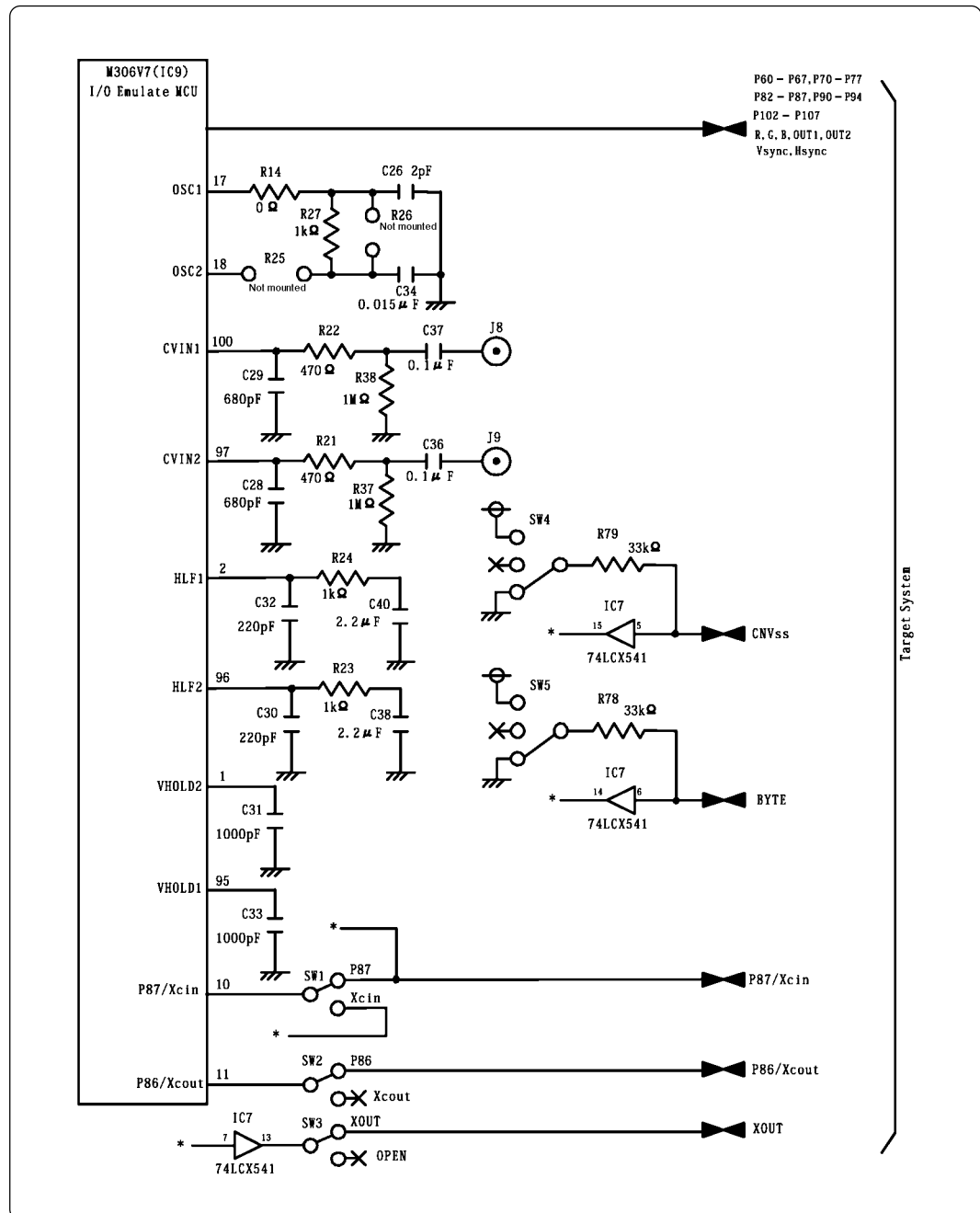


Figure 5.1 Connection diagram 1/2

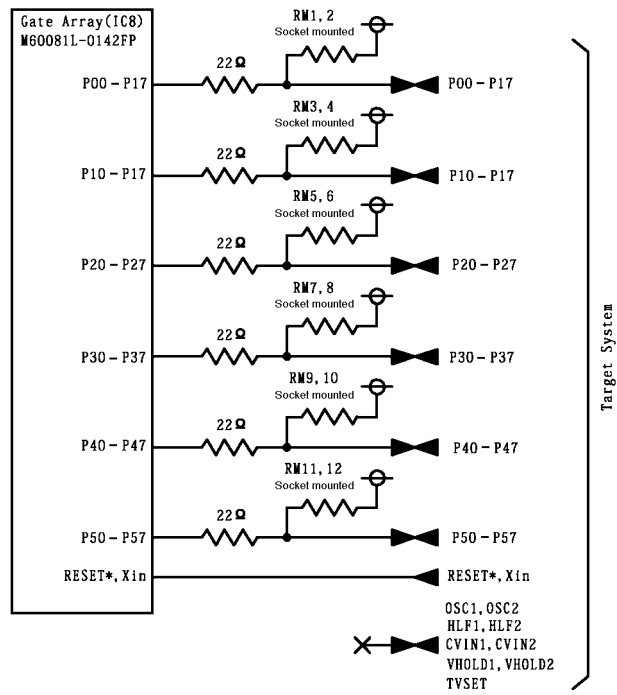


Figure 5.2 Connection diagram 2/2

5.3 Operation Timing in Memory Expansion and Microprocessor Modes

As there are a flexible cable and other devices between this product and the target system, I/O timing will differ from that of the actual MCU. Use the following as a reference when using the emulation pod.

(1) The output signals (address, RD*, WR*, etc.) of the evaluation MCU mounted on this product is output delayed by about 4 ns.

(2) It takes longer time to setup the data than the actual MCU by about 8 ns.

(1) No-Wait

Table 5.2 and Figure 5.3 show the bus timing in memory expansion mode and microprocessor mode.

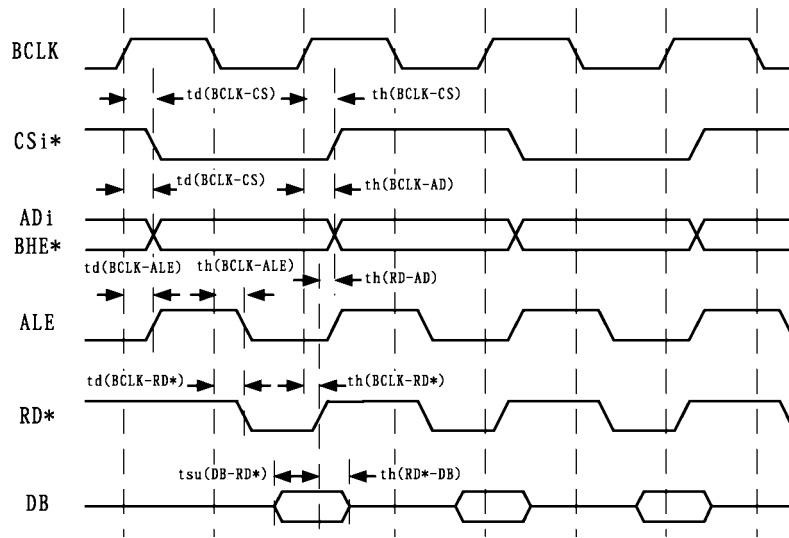
Table 5.2 Bus timing in memory expansion mode and microprocessor mode (no-wait)

| Symbol | Item | Actual MCU [ns] | | This product [ns] | |
|--------------|---|-----------------|------|-------------------|----------|
| | | Min. | Max. | Min. | Max. |
| td(BCLK-AD) | Address output delay time | | 35 | | See left |
| th(BCLK-AD) | Address output hold time (BCLK standard) | 4 | | See left | |
| td(RD-AD) | Address output hold time (RD standard) | 0 | | See left | |
| th(WR-AD) | Address output hold time (WR standard) | 0 | | See left | |
| td(BCLK-CS) | Chip-select output delay time | | 35 | | See left |
| th(BCLK-CS) | Chip-select output delay time (BCLK standard) | 4 | | See left | |
| td(BCLK-ALE) | ALE signal output delay time | | 35 | | See left |
| th(BCLK-ALE) | ALE signal output hold time | -4 | | See left | |
| td(BCLK-RD) | RD signal output delay time | | 35 | | See left |
| th(BCLK-RD) | RD signal output hold time | 0 | | See left | |
| td(BCLK-WR) | WR signal output delay time | | 35 | | See left |
| th(BCLK-WR) | WR signal output hold time | 0 | | See left | |
| td(BCLK-DB) | Data output delay time (BCLK standard) | | 40 | | See left |
| th(BCLK-DB) | Data output hold time (BCLK standard) | 4 | | See left | |
| td(DB-WR) | Data output delay time (WR standard) | (*1) | | See left | |
| th(WR-DB) | Data output hold time (WR standard) | 0 | | See left | |

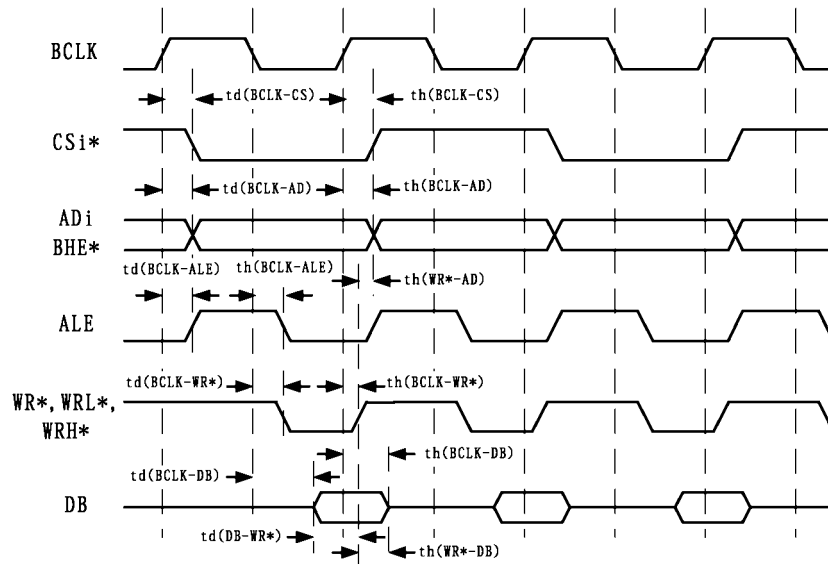
*1 Calculated by the following formula according to the frequency of BCLK.

$$td(DB-WR) = \frac{10^9}{f(BCLK) \times 2} - 40 \text{ [ns]}$$

Read:



Write:



Conditions:

Input timing voltage
Output timing voltage

| | $V_{CC1} = 3.3 \text{ V}$ | $V_{CCE} = 5.0 \text{ V}$ |
|-------------------|---------------------------|---------------------------|
| V_{IL} / V_{IH} | 0.52 V / 1.65 V | 1.0 V / 4.0 V |
| V_{OL} / V_{OH} | 1.65 V / 1.65 V | 1.65 V / 1.65 V |

Figure 5.3 Timing requirements in memory expansion mode and microprocessor mode (no-wait)

(2) With Wait, Accessing External Memory Area

Table 5.3 and Figure 5.4 show the bus timing in memory expansion mode and microprocessor mode (with wait).

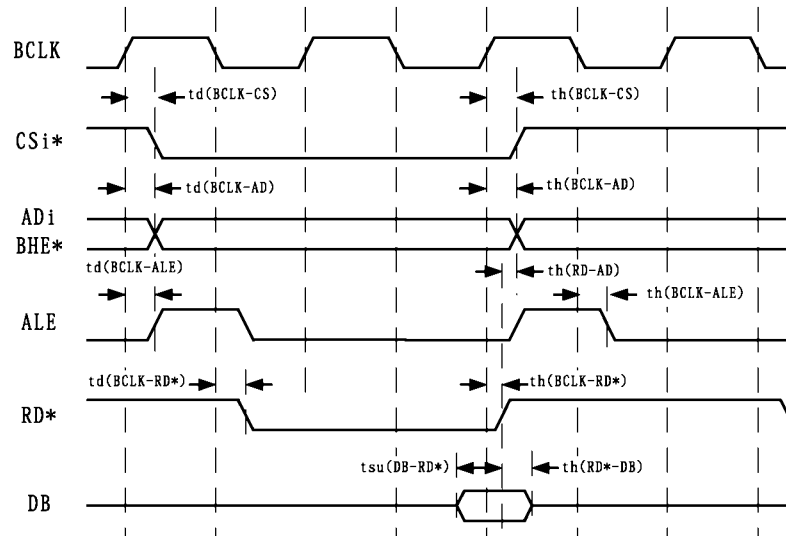
Table 5.3 Bus timing in memory expansion mode and microprocessor mode (with wait)

| Symbol | Item | Actual MCU [ns] | | This product [ns] | |
|--------------|---|-----------------|------|-------------------|----------|
| | | Min. | Max. | Min. | Max. |
| td(BCLK-AD) | Address output delay time | | 35 | | See left |
| th(BCLK-AD) | Address output hold time (BCLK standard) | 4 | | See left | |
| td(RD-AD) | Address output hold time (RD standard) | 0 | | See left | |
| th(WR-AD) | Address output hold time (WR standard) | 0 | | See left | |
| td(BCLK-CS) | Chip-select output delay time | | 35 | | See left |
| th(BCLK-CS) | Chip-select output delay time (BCLK standard) | 4 | | See left | |
| td(BCLK-ALE) | ALE signal output delay time | | 35 | | See left |
| th(BCLK-ALE) | ALE signal output hold time | -4 | | See left | |
| td(BCLK-RD) | RD signal output delay time | | 35 | | See left |
| th(BCLK-RD) | RD signal output hold time | 0 | | See left | |
| td(BCLK-WR) | WR signal output delay time | | 35 | | See left |
| th(BCLK-WR) | WR signal output hold time | 0 | | See left | |
| td(BCLK-DB) | Data output delay time (BCLK standard) | | 40 | | See left |
| th(BCLK-DB) | Data output hold time (BCLK standard) | 4 | | See left | |
| td(DB-WR) | Data output delay time (WR standard) | (*1) | | See left | |
| th(WR-DB) | Data output hold time (WR standard) | 0 | | See left | |

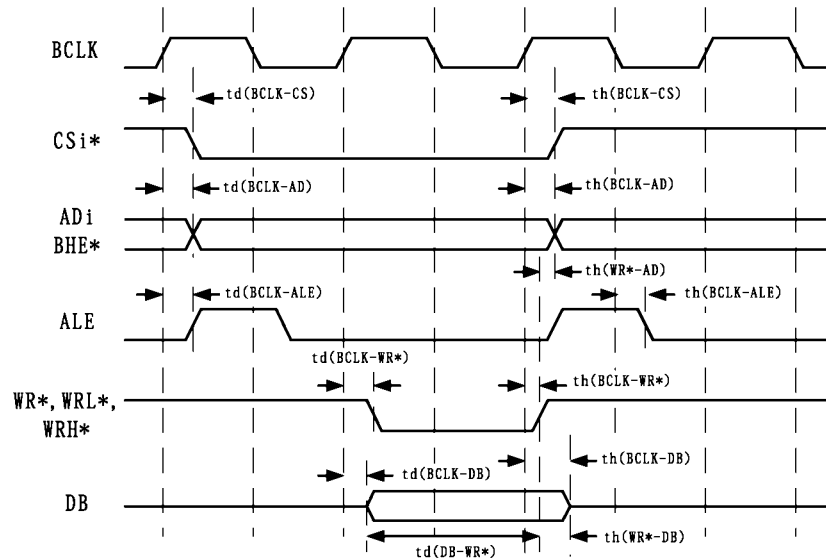
*1 Calculated by the following formula according to the frequency of BCLK.

$$td(DB-WR) = \frac{10^9}{f(BCLK) \times 2} - 40 \text{ [ns]}$$

Read:



Write:



Conditions:

Input timing voltage
Output timing voltage

| | $V_{CC1} = 3.3 \text{ V}$ | $V_{CC2} = 5.0 \text{ V}$ |
|-------------------|---------------------------|---------------------------|
| V_{IL} / V_{IH} | 0.52 V / 1.65 V | 1.0 V / 4.0 V |
| V_{OL} / V_{OH} | 1.65 V / 1.65 V | 1.65 V / 1.65 V |

Figure 5.4 Timing requirements in memory expansion mode and microprocessor mode (with wait)

(3) Timing Requirements

Table 5.4 shows timing requirements in memory expansion mode and microprocessor mode.

Table 5.4 Timing requirements

| Symbol | Item | Actual MCU [ns] | | This product [ns] | |
|----------------|-------------------------|-----------------|------|-------------------|----------|
| | | Min. | Max. | Min. | Max. |
| tsu(DB-RD) | Data input setup time | 40 | | See left | |
| tsu(RDY-BCLK) | RDY* input setup time | 30 | | 45 | |
| tsu(HOLD-BCLK) | HOLD* input setup time | 40 | | (*1) | |
| th(RD-DB) | Data input hold time | 0 | | See left | |
| th(BCLK-RDY) | RDY* input hold time | 0 | | See left | |
| th(BCLK-HOLD) | HOLD* input hold time | 0 | | See left | |
| td(BCLK-HDLA) | HLDA* output delay time | | 40 | | See left |

*1 Minimum 7 ns (The definition is different from that of actual MCUs. For details, see Figure 5.5.)

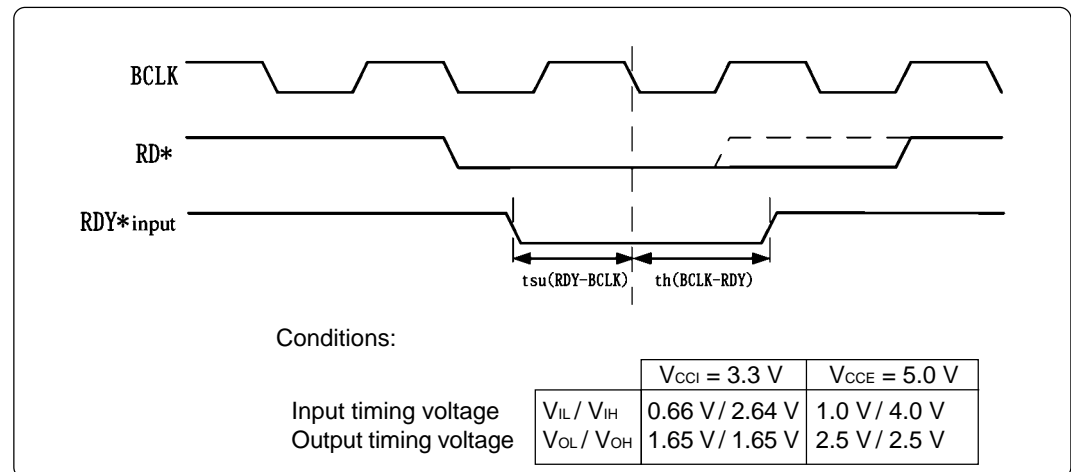
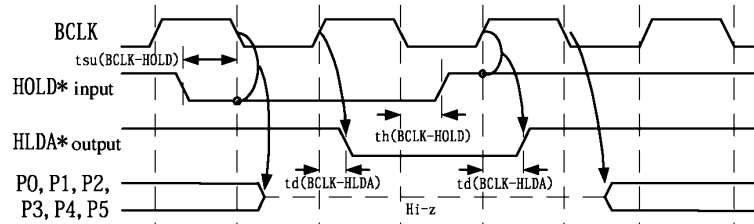
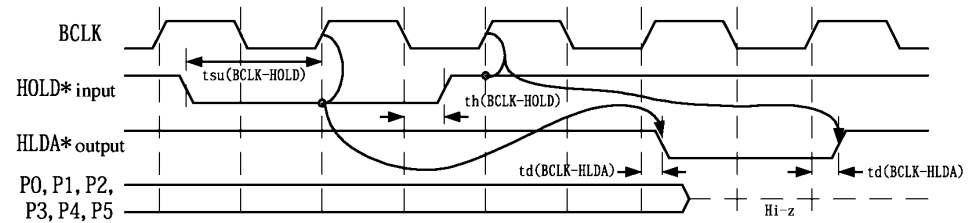


Figure 5.5 Timing requirements (RDY)

Actual MCU:



This product:



Note 1. P00 to P52 will be high-impedance regardless of the input level of BYTE pin and ports P40 to P43 function selection bit (PM06) of the processor mode register 0.

Note 2. This product will be high-impedance delaying by 2.5 cycles than an actual MCU.

Note 3. The setup time of HOLD is defined by the startup of BCLK, differently from that of actual MCUs.

Conditions:

Input timing voltage
Output timing voltage

| | $V_{CCI} = 3.3\text{ V}$ | $V_{CCE} = 5.0\text{ V}$ |
|-------------------|--------------------------|--------------------------|
| V_{IL} / V_{IH} | 0.66 V / 2.64 V | 1.0 V / 4.0 V |
| V_{OL} / V_{OH} | 1.65 V / 1.65 V | 2.5 V / 2.5 V |

Figure 5.6 Timing requirements (HOLD)

5.4 External Dimensions

(1) External Dimensions of the Emulation Pod

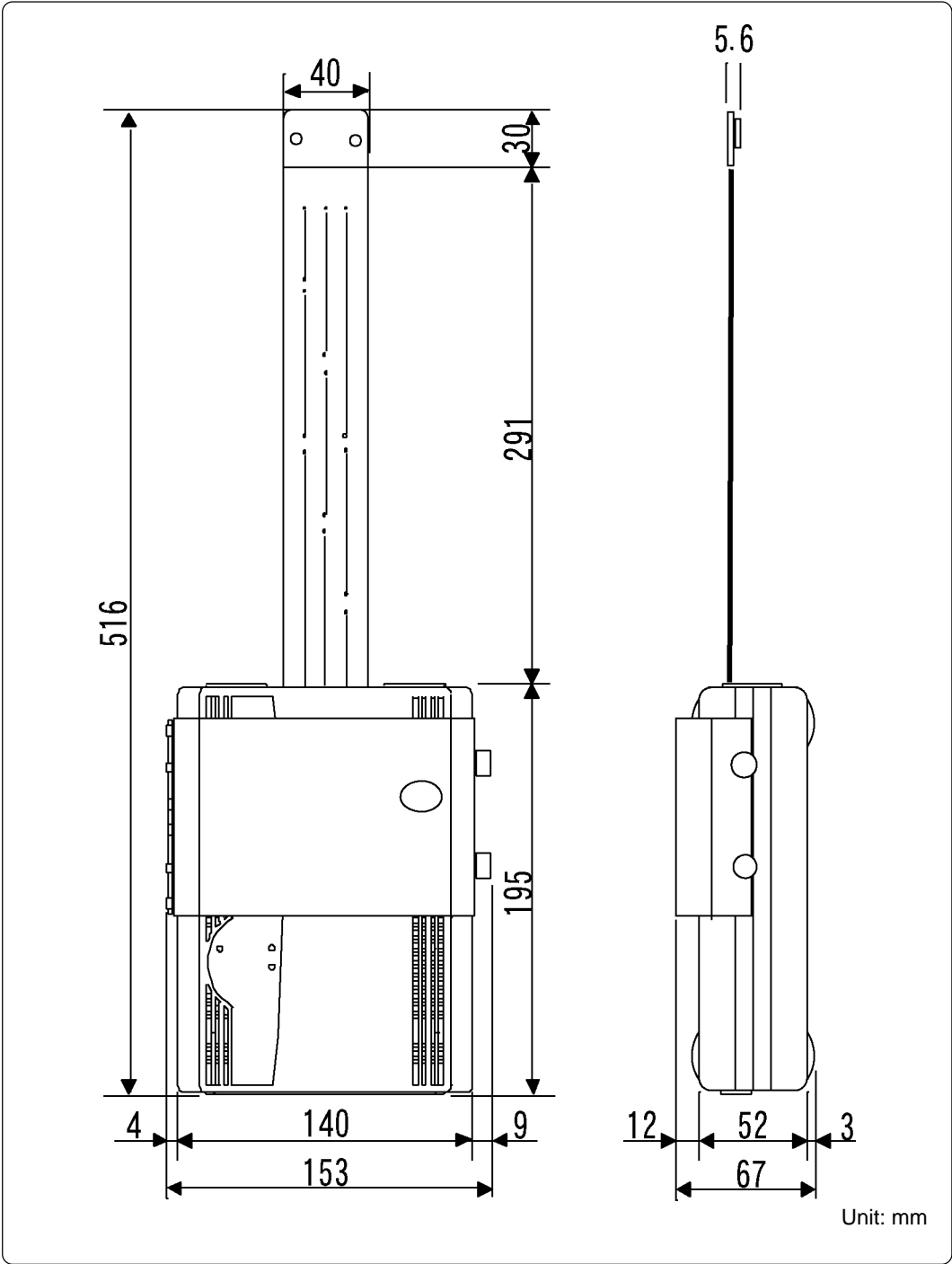


Figure 5.7 External dimensions of the M306V7T-RPD-E

(2) External Dimensions of Pitch Converter Board M3T-FLX-100LCC

Figure 5.8 shows external dimensions of converter board M3T-FLX-100LCC for 100-pin 0.65-mm-pitch LCC (100D0).

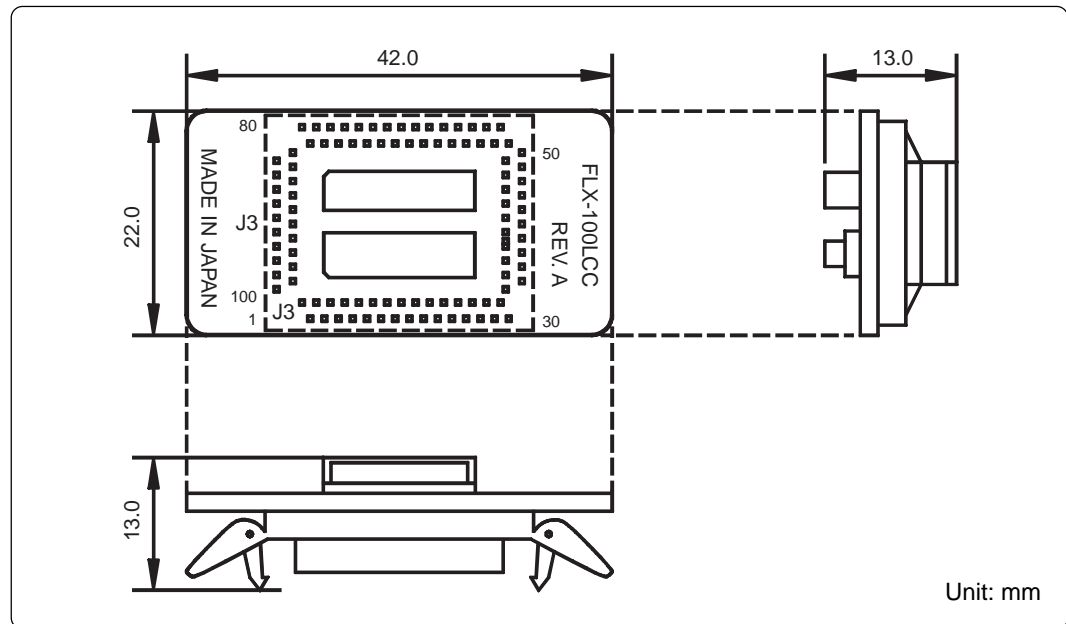


Figure 5.8 External dimensions of pitch converter board M3T-FLX-100LCC

(3) Reference Dimensional Drawing for a 100-pin 0.65-mm-pitch QFP Foot Pattern

Figure 5.9 shows an sample foot pattern for the following products.

- Renesas MCU package 100P6S-A
- Socket IC61-1004-051 (made by Yamaichi Electronics Co., Ltd.) for LCC
- IC socket AXS4003M291 (made by Matsushita Electric Works, Ltd.) for dummy IC (DUMMY100S)
- Pitch converter board M3T-FLX-100NRB (NQPAC100RB)

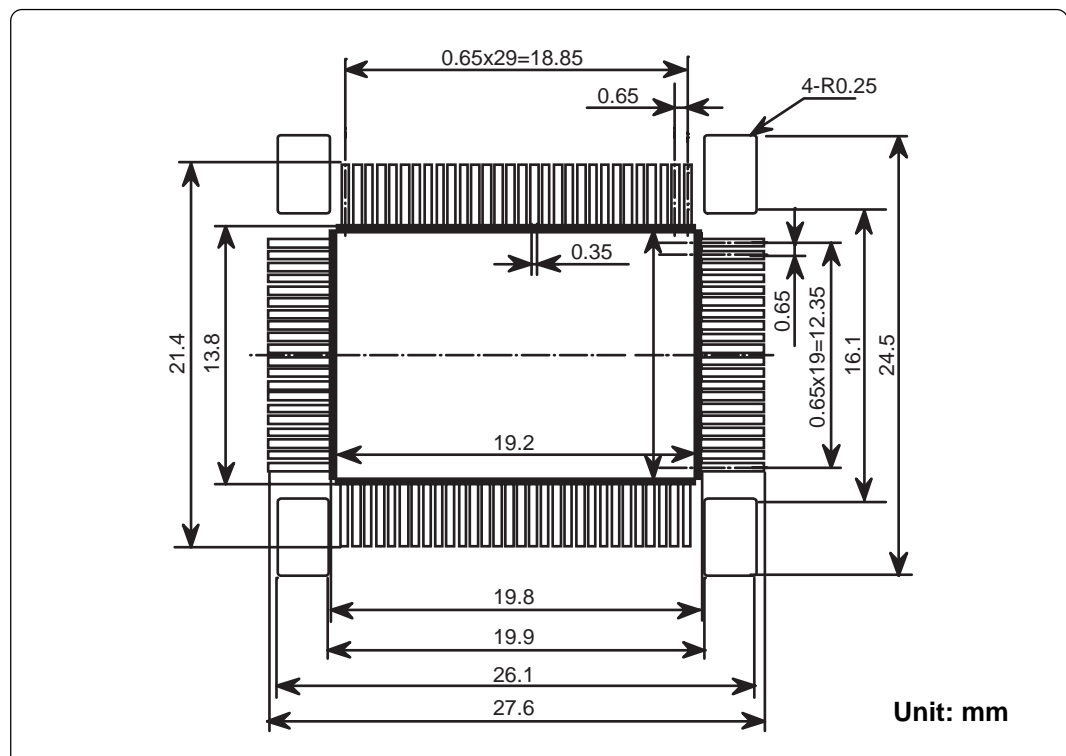


Figure 5.9 Reference dimensional drawing for a 100-pin 0.65-mm-pitch QFP foot pattern

Chapter 6. Troubleshooting

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

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Chapter 6. Troubleshooting

6.1 Flowchart to Remedy the Troubles

Figure 6.1 shows the flowchart to remedy the troubles from when power to the emulator is activated until the emulator debugger starts up. Check this while the target system is disconnected. For the latest FAQs visit the Renesas Tools Homepage.

http://www.renesas.com/eng/products/mpumcu/toolhp/faq/m16c/m16c_e.htm

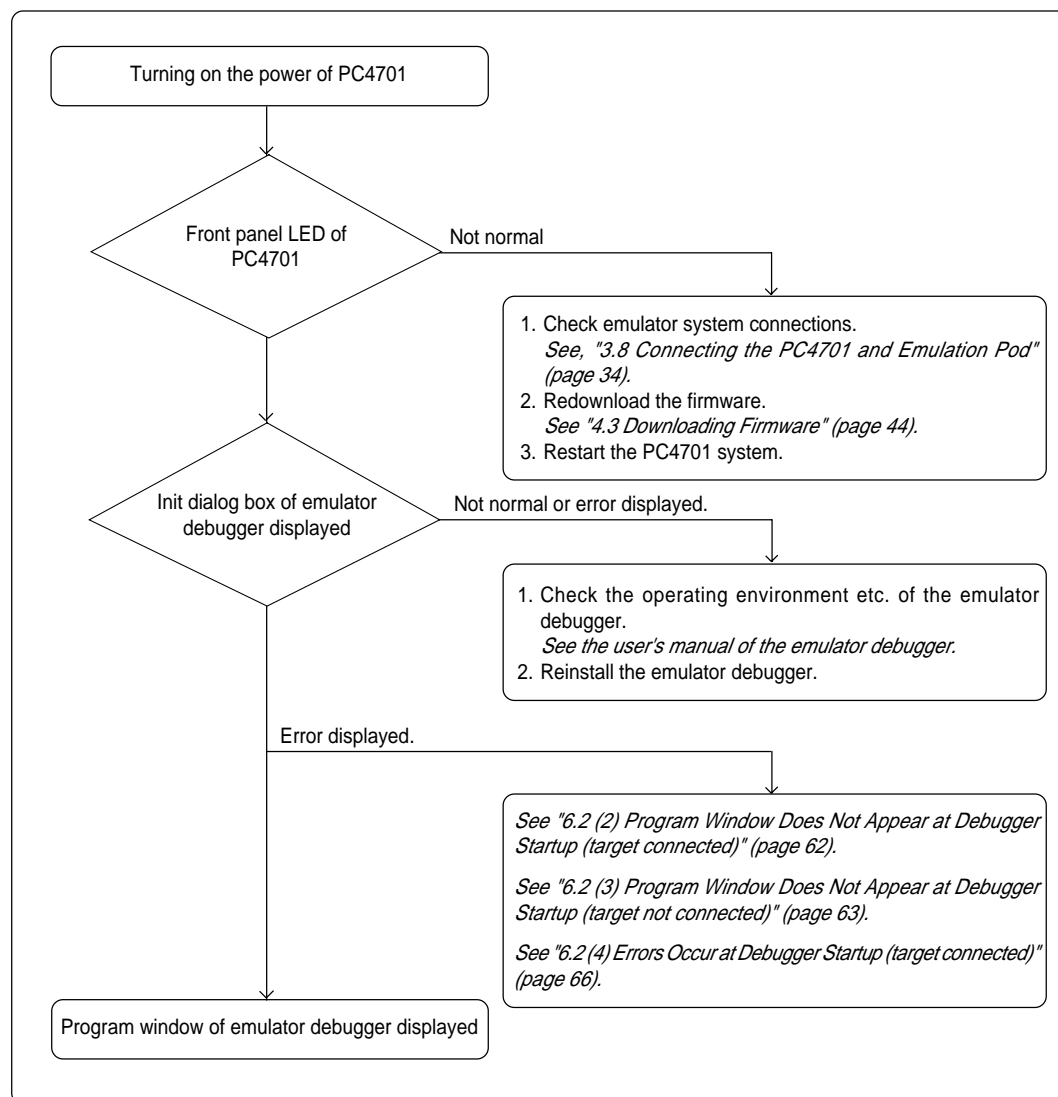


Figure 6.1 Flowchart to remedy the troubles

6.2 When the Emulator Debugger Does Not Start Up Properly

(1) When the LED Display of PC4701 is Abnormal

Table 6.1 LED's abnormal display and its checkpoints

| Error | Connection to the target system | Checkpoint |
|--|---------------------------------|--|
| LEDs do not light up. | - | Check the power cable is connected to the PC4701. <i>See the user's manual of the PC4701.</i> |
| All LEDs remain lit. | - | Check the connection between the PC4701 and this product. <i>See "3.8 Connecting the PC4701 and Emulation Pod" (page 34).</i> |
| The "POWER" LED of "STATUS OF TARGET" does not light up. | Connected | Check power is properly supplied to the target system and that the target system is properly grounded. |
| The "CLOCK" LED of "STATUS OF TARGET" does not light up. | Not connected | (1) Check that both the main and sub clocks of the emulator debugger are not set to "EXT". <i>See the CLK command of the emulator debugger.</i> (2) Check the oscillation circuit in the emulation pod is oscillating. <i>See "3.7 Selecting Clock Supply" (page 30).</i> |
| | Connected | (1) Check the oscillation circuit in the target system is oscillating. (2) Check the switches in the emulation pod are correctly set. <i>See "3.5 Setting Switches" (page 27).</i> |
| The RESET LED of "STATUS OF TARGET" does not go out. | Connected | Check the reset pin of the target system is pulled up. |

(2) Program Window Does Not Appear at Debugger Startup (target connected)

Table 6.2 Checkpoints of errors when starting up the emulator debugger (target connected)

| Error | Checkpoint |
|--|--|
| Communication error occurred Data was not sent to the target | Check all emulator debugger settings, interface cable connection and switches on the rear of the PC4701 match. <i>See the user's manuals of the PC4701 and the emulator debugger.</i> |
| Target system cannot be properly built | (1) Download the proper firmware. <i>See "4.3 Downloading Firmware" (page 44).</i> (2) Check the connection between the PC4701 and this product. <i>See "3.8 Connecting the PC4701 and Emulation Pod" (page 34).</i> |
| PD30 version is not the same version as the firmware in the target | Download the proper firmware. <i>See "4.3 Downloading Firmware" (page 44).</i> |
| Target MCU is in the reset state | Check the reset pin of the target system has changed from "L" to "H" level. |
| Target MCU cannot be reset | (1) In memory expansion mode or microprocessor mode, check pin RDY* and pin HOLD* are held "H" level. (2) If the reset circuit of the target system has a watchdog timer, disable the timer. (3) Check power is properly supplied to the target system and that the target system is properly grounded. |
| Target is in HOLD state | (1) The MCU is either in stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. <i>See the MCU specifications.</i> (2) The program may be uncontrollable in areas where memory not allocated. Recheck the map setting. <i>See the user's manual of the emulator debugger.</i> |
| Target clock is stopped | (1) Check the oscillation circuit of the target system is oscillating properly. (2) Check the switches in the emulation pod are correctly set. <i>See "3.5 Setting Switches" (page 27).</i> |
| Target MCU is not receiving power | Check power is properly supplied to the target system and that the target system is properly grounded. |

(3) Program Window Does Not Appear at Debugger Startup (target not connected)

Table 6.3 Checkpoints of errors when starting up the emulator debugger (target not connected)

| Error | Checkpoint |
|--|---|
| Communication error occurred Data was not sent to the target | Check all emulator debugger settings, interface cable connection and switches on the rear of the PC4701 match. <i>See the user's manuals of the PC4701 and the emulator debugger.</i> |
| Target system cannot be properly built | (1) Download the proper firmware. <i>See "4.3 Downloading Firmware" (page 44).</i> (2) Recheck the connection between the PC4701 and this product. <i>See "3.8 Connecting the PC4701 and Emulation Pod" (page 34).</i> |
| PD30 version is not the same version as the firmware in the target | Download the proper firmware. <i>See "4.3 Downloading Firmware" (page 44).</i> |
| Target is in HOLD state | The MCU is either in stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. <i>See the MCU specifications.</i> |
| Target clock is stopped | Check the switches in the emulation pod are correctly set. <i>See "3.5 Setting Switches" (page 27).</i> |

(4) Errors Occur at Debugger Startup (target connected)

Table 6.4 Checkpoints of errors when starting up the emulator debugger (target connected)

| Error | Checkpoint |
|-------------------------------|---|
| Target MCU is uncontrollable. | (1) In memory expansion mode or microprocessor mode, check pin RDY* and pin HOLD* are held "H" level. (2) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. <i>See the user's manual of the emulator debugger.</i> |

6.3 Operation Differs from That of Actual MCUs

(1) A-D Conversion Values are Different from Expected Values

Because a flexible board and other devices are used between the evaluation MCU and the target system, the A-D converter operates differently from the actual MCU. Make the final evaluation of the A-D converter from the actual MCU.

(2) Cannot Reset from the Target System

Set the time for starting up (0.2 V_{cc} to 0.8 V_{cc}) 1 μs or less.

(3) Data Values of ROM Area at Power-on Are Different

For this product, 04h (NOP) is written into the ROM area at power-on. Therefore, the data values are different from those of an actual MCU.

(4) HOLD* Control

When inputting "L" to pin HOLD* to run into the HOLD state, P00 to P52 will be in the HOLD state delaying by 2.5 cycles than the actual MCU.

(5) Outputs of ALE, Address and Others are Different from Those of Actual MCUs

- 1) ALE signal output in accessing the SFR area
- 2) Address, BHE* and ALE signal outputs in accessing the internal RAM and ROM
- 3) State of the data bus in stop mode and wait mode

6.4 How to Request for Support

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: X.X [V]
- Operating frequency: XX.X [MHz]
- Operating mode: Single-chip, memory expansion, or microprocessor mode

(2) Problem

Chapter 7. Maintenance and Guarantee

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

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Chapter 7. Maintenance and Guarantee

7.1 Maintenance

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.

7.2 Guarantee

If your product becomes faulty within twelve months after its purchase while being used under good conditions by observing "Precautions for Safety" described in Chapter 1 of 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.

7.3 Repair Provisions

(1) Repair with extra-charge

The products elapsed more than twelve months 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 twelve months 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.

7.4 How to Request for Repair

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

Customer



Fill in the Repair Request Sheet included with this product, then send it along with this product for repair to your local distributor. Make sure that information in the Repair Request Sheet is written in as much detail as possible to facilitate repair.

Distributor



After checking the contents of fault, the distributor should please send the faulty product along with the Repair Request Sheet to Renesas Solutions Corp.

Renesas Solutions

When the faulty product is repaired, it will be returned to the customer at the earliest convenience.

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.

MEMO

M306V7T-RPD-E User's Manual

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