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RENESAS

User's Manual

IE-780308-R-EM

Emulation Board

Document No. U11362EJ2V0UMJ1 (2nd edition)
Date Published October 2000 N CP(K)

Phase-out/Discontinued

[MEMO]

This product is designed to be used in a commercial or industrial district. If it is used in a residential district or in an area in the vicinity of a residential district, radio and TV receivers in the district may be affected.
Use this product correctly by carefully reading its User's Manual.

M7A 98.8

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- Ordering information
- Product release schedule
- Availability of related technical literature
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MAJOR REVISIONS IN THIS EDITION

Page	Contents
Throughout	The following devices have been added as the target devices: μPD780058, 780058Y subseries μPD78052(A), 78053(A), 78054(A), 78058F(A), 78058FY(A), 78064B(A)
	The following target devices have been develped: μPD78056F, 78058F, 78P058F, 78056FY, 78058FY, 78P058FY, 780306, 780308, 780306Y, 780308Y
p.17 to p.26	**Figures 3-1, 3-3, 3-5, 3-6, 3-8, 3-9 Emulation Circuit Evaluation Circuit Diagram** have been modified.
p.47	Power supply capacity in **APPENDIX A IE-780308-R-EM PRODUCT SPECIFICATIONS** has been changed.
p.53, p.54	EV-9500GK-80 in the old edition B.2.1 has been changed to the TGK-080SDW conversion adapter of Tokyo Eletech Corp. EV-9500GC-100 in the old edition B.2.2 has been changed to the TGC-100SDW conversion adapter of Tokyo Eletech Corp.
p.66	The μPD780018AY subseries has been added to **Table D-1. IE-78000R System Configuraion**.
p.71	**APPENDIX F REVISION HISTORY** has been added.

The mark ★ shows the major revised points.

Phase-out/Discontinued

[MEMO]

PREFACE

Product Outline

The IE-780308-R-EM, in combination with the IE-78000-R, is used for debugging the following target devices of the 78K/0 series 8-bit single-chip microcontrollers.

★ • μPD78054 subseries : μPD78052, 78053, 78054, 78P054, 78055, 78056, 78058, 78P058, 78052(A), 78053(A), 78054(A)
• μPD78054Y subseries : μPD78052Y, 78053Y, 78054Y, 78055Y, 78056Y, 78058Y, 78P058Y
★ • μPD78058F subseries : μPD78056F, 78058F, 78P058F, 78058F(A)
★ • μPD78058FY subseries : μPD78056FY, 78058FY, 78P058FY, 78058FY(A)
• μPD78064 subseries : μPD78062, 78063, 78064, 78P064, 78062(A), 78063(A), 78064(A)
• μPD78064Y subseries : μPD78062Y, 78063Y, 78064Y
★ • μPD78064B subseries : μPD78064B, 78P064B, 78064B(A)
• μPD780308 subseries : μPD780306, 780308, 78P0308[Note 1]
• μPD780308Y subseries : μPD780306Y, 780308Y, 78P0308Y[Note 1]
★ • μPD780058 subseries : μPD780053[Note 1], 780054[Note 1], 780055[Note 1], 780056[Note 1], 780058[Note 1], 78F0058[Note 1]
★ • μPD780058Y subseries : μPD780053Y[Note 2], 780054Y[Note 2], 780055Y[Note 2], 780056Y[Note 2], 780058Y[Note 2], 78F0058Y[Note 2]

Notes 1. Under development
2. Under planning

Intended Readership

This manual is intended for engineers who perform system debugging using the IE-78000-R in combination with the IE-780308-R-EM.

Engineers reading this manual are assumed to have sufficient knowledge regarding functions and use of the above target devices and the debugger.

Organization

There are three manuals relating to use of the IE-78000-R: This manual, supplied with the IE-780308-R-EM, the manual supplied with the IE-78000-R and the manual supplied with the screen debugger (Introduction and reference volumes).

IE-780308-R-EM User's Manual (This manual)	IE-78000-R User's Manual
(Supplied with IE-780308-R-EM) • Function Outline • IE-780308-R-EM Connection Method • Emulation Probe Connection Method	(Supplied with IE-78000-R) • Basic specifications • System Configuration • External Interface Functions

SD78K/0 Screen Debugger User's Manual - Introduction	SD78K/0 Screen Debugger User's Manual - Reference

(Supplied with Screen Debugger)

- Simple Method of Use of IE-78000-R
- Function Outline
- Command Descriptions
- Menu Descriptions

Purpose

The purpose of this manual is to explain the basic functions and proper connection method of the IE-780308-R-EM.

How to Read This Manual

For an understanding of the basic specification
→ Read **CHAPTER 1 GENERAL**.

When connecting the IE-780308-R-EM
→ Read **CHAPTER 2 INSTALLATION PROCEDURE** and **IE-78000-R User's Manual**.

When setting the clock
→ Read **CHAPTER 4 CLOCK SETTING**.

Terminology

Terminology used in this manual is explained in the table below.

Term	Meaning
Emulation device	Generic term for the device performing target device emulation in the emulator. Includes the emulation CPU.
Emulation CPU	CPU section executing the user-written program in the emulator.
Target device	The device which is the object of emulation (real chip).
Target program	The program which is the object of debugging (user-written program).
Target system	The system which is the object of debugging (user-created system). Includes the target program and user-created hardware. In a narrower sense, designates the hardware only.

Legend

Note : Explanation of an item marked with **Note** in the text.
Caution : Information to be particularly noted.
Remark : Supplementary information.
Procedure : Procedure for connection, setting, etc.

Related Documents

The documents referred to in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name		Document Number	
		Japanese	English
IE-78000-R user's manual		U11376J	U11376E
IE-78000-R-BK user's manual		EEU-867	EEU-1427
IE-780308-R-EM user's manual		U11362J	This manual
EP-78064 user's manual		EEU-934	EEU-1469
EP-78230 user's manual		EEU-985	EEU-1515
EP-78054GK-R user's manual		EEU-932	EEU-1468
PG-1500 PROM programmer user's manual		U11940J	EEU-1335
SD78K/0 screen debugger user's manual	Introduction	EEU-852	—
PC-9800 series (MS-DOS™) based	Reference	U10952J	—
SD78K/0 screen debugger user's manual	Introduction	EEU-5024	U10539E
IBM PC/AT™ (PC DOS™) based	Reference	U11279J	U11279E

Caution These documents are subject to change without notice. Be sure to use the latest documents when you design your system.

Phase-out/Discontinued

[MEMO]

CONTENTS

LIST OF FIGURES

LIST OF TABLES

[MEMO]

CHAPTER 1 GENERAL

The IE-780308-R-EM is an emulation board for use with the IE-78000-R development system for 78K/0 series 8-bit single-chip microcontroller. Combination of this board with the separately available IE-78000-R and emulation probe allows efficient emulation of the subseries of the μPD78054, 78054Y, 78058F, 78058FY, 78064, 78064Y, 78064B, 780308, 780308Y, 780058, 780058Y. ★

1.1 FEATURES

Connecting the IE-780308-R-EM to the IE-78000-R offers the following features:

(1) Target device peripheral functions (I/O ports, etc.) can be emulated.
(2) I/O port statuses during emulation can be traced.
(3) Use/non-use of mask option resistors and switchover of the emulation target can be controlled by software.
(4) Low voltage operation (V_{DD} = 2.0 to 5.0 V)

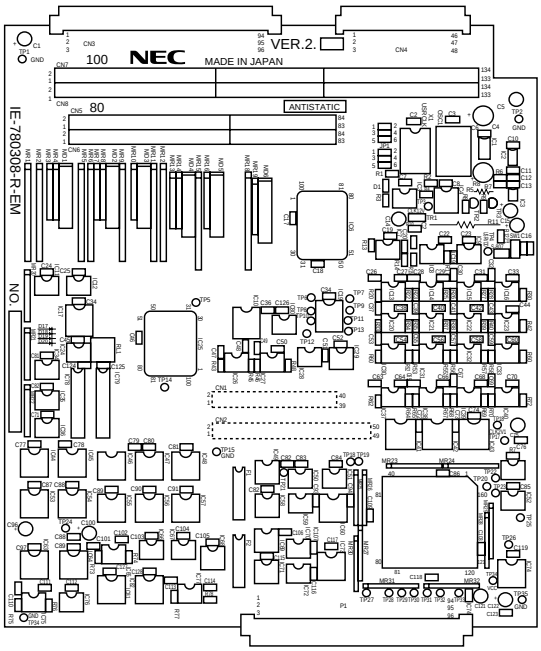
1.2 IE-780308-R-EM COMPONENTS

The IE-780308-R-EM comprises the following components. Please check that all these items are included in the package.

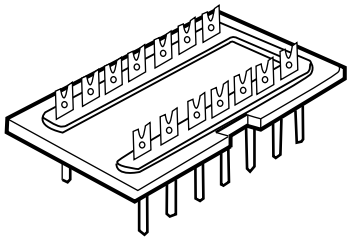
(1) IE-780308-R-EM × 1
(2) Part holders (with cover) × 2
(3) Screws × 5
(4) User's Manual (this manual) × 1

Figure 1-1. IE-780308-R-EM Components

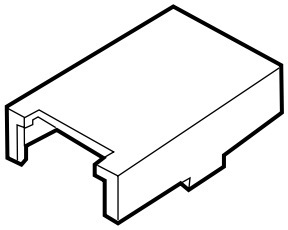
(1) IE-780308-R-EM



(2) Part Holder[Note]

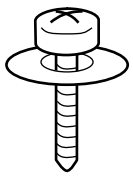


Part Holder Cover

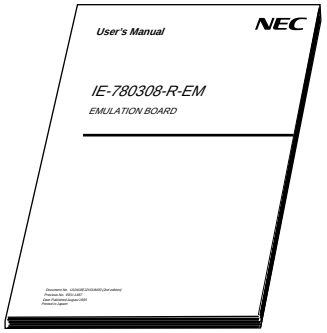


Note The actual part holders are supplied with the cover shown on the right fitted.

(3) Screw



(4) User's Manual (This Manual)



1.3 IE-780308-R-EM EXTERNAL VIEW AND PART NAMES

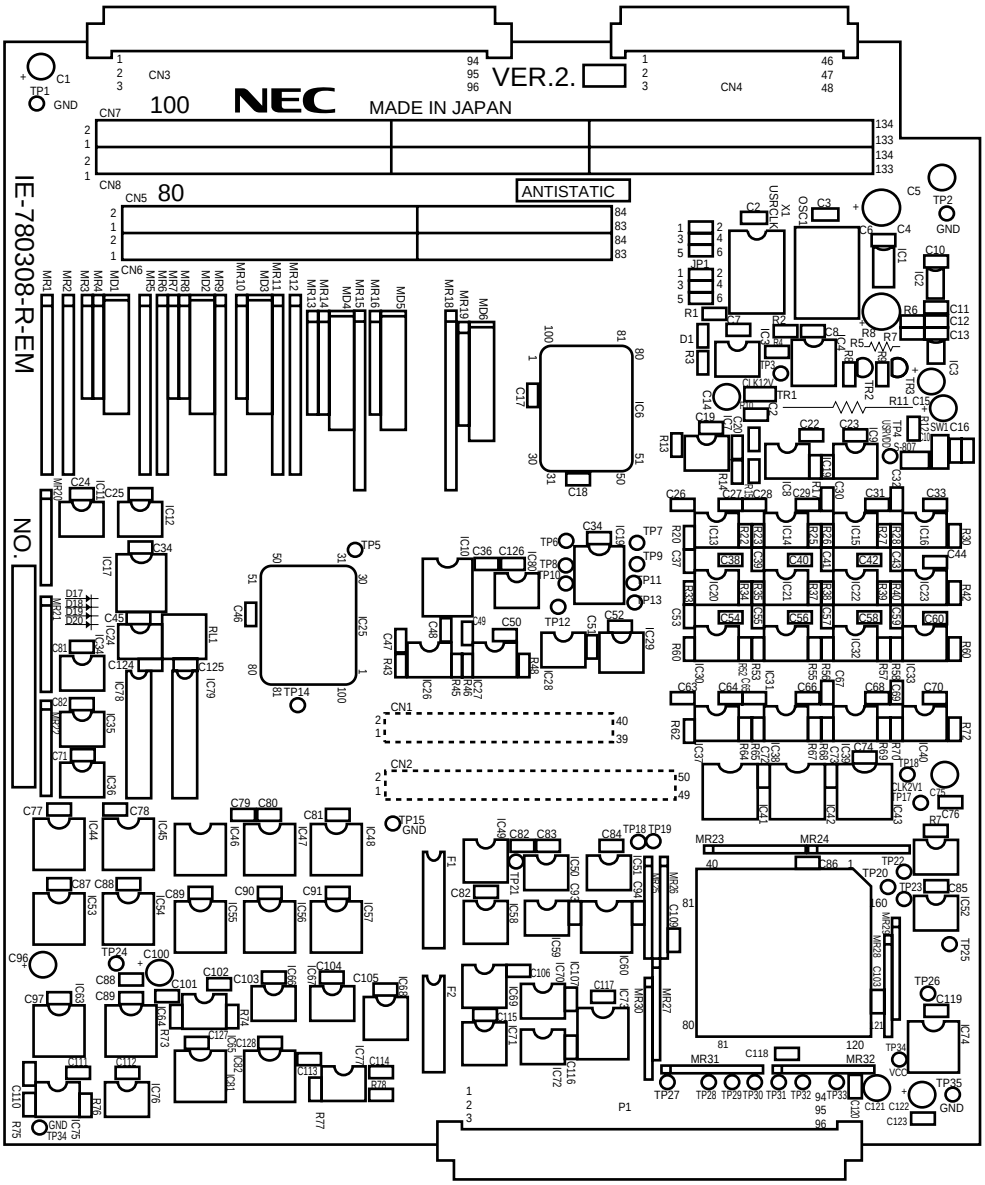


Table 1-1. Names of IE-780308-R-EM Parts

Name	Description
CN1	Break board connectors
CN2	
CN3	Emulation probe connectors
CN4	
CN5	Connector board connector
CN6	
CN7	
CN8	
P1	Mother bus connector

1.4 TARGET DEVICES

Target devices for which emulation is possible using the IE-78000-R in conjunction with the IE-780308-R-EM are shown below. The names of the device files to be installed in development of each product and the names of the CPU series to be input when starting the screen debugger (SD78K/0) are also shown.

Table 1-2. Target Device

	Target Device		Device File[Note 1]	CPU Series Name
	μPD78054 subseries	μPD78052, 78053, 78054, 78P054, 78055, 78056, 78058, 78P058, 78052(A), 78053(A), 78054(A)	DF78054.DF1 DF78054.SFR	78054
	μPD78054Y subseries	μPD78052Y, 78053Y, 78054Y, 78055Y, 78056Y, 78058Y, 78P058Y		
★	μPD78058F subseries	μPD78056F, 78058F, 78P058F, 78058F(A)		78058
★	μPD78058FY subseries	μPD78056FY, 78058FY, 78P058FY, 78058F(A)		
	μPD78064 subseries	μPD78062, 78063, 78064, 78P064, 78062(A), 78063(A), 78064(A)	DF78064.DF1 DF78064.SFR	78064
	μPD78064Y subseries	μPD78062Y, 78063Y, 78064Y		
★	μPD78064B subseries	μPD78064B, 78P064B, 78064B(A)		
	μPD780308 subseries	μPD780306, 780308, 78P0308[Note 2]	DF780308.DF1[Note 2] DF780308.SFR[Note 2]	780308
	μPD780308Y subseries	μPD780306Y, 780308Y, 78P0308Y[Note 2]		
★	μPD780058 subseries	μPD780053[Note 2], 780054[Note 2], 780055[Note 2] 780056[Note 2], 780058[Note 2], 78F0058[Note 2]	DF780058.DF1[Note 2] DF780058.SFR[Note 2]	780058
★	μPD780058Y subseries	μPD780053Y[Note 3], 780054Y[Note 3], 780055Y[Note 3] 780056Y[Note 3], 780058Y[Note 3], 78F0058Y[Note 3]		

Notes 1. Sold separately

2. Under development

3. Under Planning

1.5 EMULATION PROBES

Emulation probes are sold separately. The appropriate probe should be used for the target device package. Tables 1-3 and 1-5 show target devices for emulation probes.

Table 1-3. EP-78230GC-R and Target Devices (1/2)

Package	Target Device	
80-pin plastic QFP (14 × 14 mm, resin thickness 2.7 mm)	μPD78052GC-×××-3B9 μPD78054GC-×××-3B9 μPD78055GC-×××-3B9 μPD78058GC-×××-3B9 μPD78052GC(A)-×××-3B9 μPD78054GC(A)-×××-3B9	μPD78053GC-×××-3B9 μPD78P054GC-3B9 μPD78056GC-×××-3B9 μPD78P058GC-3B9 μPD78053GC(A)-×××-3B9
	μPD78052YGC-×××-3B9 μPD78054YGC-×××-3B9 μPD78056YGC-×××-3B9 μPD78P058YGC-3B9	μPD78053YGC-×××-3B9 μPD78055YGC-×××-3B9 μPD78058YGC-×××-3B9
	μPD78056FGC-×××-3B9 μPD78P058FGC-3B9	μPD78058FGC-×××-3B9 μPD78058FGC(A)-×××-3B9
	μPD78056FYGC-×××-3B9 μPD78P058FYGC-3B9	μPD78058FYGC-×××-3B9
	μPD780053GC-×××-3B9Note 1 μPD780055GC-×××-3B9Note 1 μPD780058GC-×××-3B9Note 1	μPD780054GC-×××-3B9Note 1 μPD780056GC-×××-3B9Note 1 μPD78F0058GC-3B9Note 1
	μPD780053YGC-×××-3B9Note 2 μPD780055YGC-×××-3B9Note 2 μPD780058YGC-×××-3B9Note 2	μPD780054YGC-×××-3B9Note 2 μPD780056YGC-×××-3B9Note 2 μPD78F0058YGC-3B9Note 2
80-pin plastic QFP (14 × 14 mm, resin thickness 1.4 mm)	μPD78052GC-×××-8BT μPD78054GC-×××-8BT μPD78055GC-×××-8BT μPD78058GC-×××-8BT	μPD78053GC-×××-8BT μPD78P054GC-8BTNote 1 μPD78056GC-×××-8BT μPD78P058GC-8BTNote 2
	μPD78052YGC-×××-8BTNote 2 μPD78054YGC-×××-8BTNote 2 μPD78056YGC-×××-8BTNote 2 μPD78P058YGC-8BTNote 2	μPD78053YGC-×××-8BTNote 2 μPD78055YGC-×××-8BTNote 2 μPD78058YGC-×××-8BTNote 2
	μPD78056FGC-×××-8BTNote 2 μPD78P058FGC-8BTNote 1	μPD78058FGC-×××-8BTNote 1

Note 1. Under development

2. Under planning

Table 1-3. EP-78230GC-R and Target Devices (2/2)

Package	Target Device	
80-pin plastic QFP (14 × 14 mm, resin thickness 1.4 mm)	μPD78056FYGC-×××-8BT[Note 1] μPD78P058FYGC-8BT[Note 1]	μPD78058FYGC-×××-8BT[Note 1]
	μPD780053GC-×××-8BT[Note 2] μPD780055GC-×××-8BT[Note 2] μPD780058GC-×××-8BT[Note 2]	μPD780054GC-×××-8BT[Note 2] μPD780056GC-×××-8BT[Note 2] μPD78F0058YGC-8BT[Note 2]
	μPD780053YGC-×××-8BT[Note 2] μPD780055YGC-×××-8BT[Note 2] μPD780058YGC-×××-8BT[Note 2]	μPD780054YGC-×××-8BT[Note 2] μPD780056YGC-×××-8BT[Note 2] μPD78F0058YGC-8BT[Note 2]
80-pin ceramic WQFN (14 × 14 mm)	μPD78P054KK-T	μPD78P058KK-T
	μPD78P058YKK-T	

Note 1. Under development

2. Under planning

Table 1-4. EP-78054GK-R and Target Devices

Package	Target Device	
80-pin plastic TQFP (12 × 12 mm)	μPD78052GK-×××-BE9 μPD78054GK-×××-BE9 μPD78058GK-×××-BE9	μPD78053GK-×××-BE9 μPD78P054GK-×××-BE9
	μPD78058FGK-×××-BE9	μPD78P058FGK-BE9
	μPD78058FYGK-×××-BE9	μPD78P058FYGK-BE9
	μPD780053GK-×××-BE9[Note 1] μPD780055GK-×××-BE9[Note 1] μPD780058GK-×××-BE9[Note 1]	μPD780054GK-×××-BE9[Note 1] μPD780056GK-×××-BE9[Note 1] μPD78F0058GK-BE9[Note 1]
	μPD780053YGK-×××-BE9[Note 2] μPD780055YGK-×××-BE9[Note 2] μPD780058YGK-×××-BE9[Note 2]	μPD780054YGK-×××-BE9[Note 2] μPD780056YGK-×××-BE9[Note 2] μPD78F0058YGK-BE9[Note 2]

Note 1. Under development

2. Under planning

Table 1-5. EP-78064GC-R and Target Devices

Package	Target Device	
100-pin plastic QFP (fine pitch) (14 × 14 mm, resin thickness 1.45 mm)	μPD78062GC-×××-7EA μPD78064GC-×××-7EA μPD78062GC(A)-×××-7EA μPD78064GC(A)-×××-7EA	μPD78063GC-×××-7EA μPD78P064GC-7EA μPD78063GC(A)-×××-7EA
	μPD78062YGC-×××-7EA μPD78064YGC-×××-7EA	μPD78063YGC-×××-7EA
	μPD78064BGC-×××-7EA μPD78064BGC(A)-×××-7EA	μPD78P064BGC-7EA
100-pin plastic LQFP (fine pitch) (14 × 14 mm, resin thickness 1.40 mm)	μPD78062GC-×××-8EU μPD78064GC-×××-8EU μPD78062GC(A)-×××-8EU[Note 2] μPD78064GC(A)-×××-8EU[Note 2]	μPD78063GC-×××-8EU μPD78P064GC-8EU μPD78063GC(A)-×××-8EU[Note 2]
	μPD78062YGC-×××-8EU μPD78064YGC-×××-8EU	μPD78063YGC-×××-8EU
	μPD78064BGC-×××-8EU	μPD78P064BGC-8EU
	μPD780306GC-×××-8EU[Note 1] μPD78P0308GC-8EU[Note 1]	μPD780308GC-×××-8EU[Note 1]
	μPD780306YGC-×××-8EU[Note 1] μPD78P0308YGC-8EU[Note 1]	μPD780308YGC-×××-8EU[Note 1]

Note 1. Under development

2. Under planning

Table 1-6. EP-78064GF-R and Target Devices

Package	Target Device	
100-pin plastic QFP (14 × 20 mm)	μPD78062GF-×××-3BA μPD78064GF-×××-3BA μPD78062GF(A)-×××-3BA μPD78064GF(A)-×××-3BA	μPD78063GF-×××-3BA μPD78P064GF-3BA μPD78063GF(A)-×××-3BA
	μPD78062YGF-×××-3BA μPD78064YGF-×××-3BA	μPD78063YGF-×××-3BA
	μPD78064BGF-×××-3BA μPD78064BGF(A)-×××-3BA	μPD78P064BGF-3BA
	μPD780306GF-×××-3BA μPD780308GF-3BA[Note]	μPD780308GF-×××-3BA
	μPD780306YGF-×××-3BA μPD78P0308YGF-3BA[Note]	μPD780308YGF-×××-3BA
100-pin ceramic WQFN (14 × 20 mm)	μPD78P064KL-T[Note]	
	μPD78P0308KL-T[Note]	μPD78P0308YKL-T[Note]

Note Under development

1.6 NOTES ON USE OF IE-780308-R-EM

(1) Ensure that the power supply for the IE-78000-R and the target system is OFF before connecting or disconnecting to/from the IE-78000-R and the target device, or changing switch settings, etc.

(2) When carrying out target device emulation using the IE-780308-R-EM in conjunction with the IE-78000-R, there are certain differences from the operation of the actual device (see **CHAPTER 3 DIFFERENCES FROM TARGET DEVICE**).

(3) When performing data input from external sense clips, it should be held down to less than +15 V.

(4) When performing data output from external sense clips, the external sense clips function as open collector outputs, and therefore pull-up resistors should be connected on the target system.

(5) The emulation probe earth clip must be connected to the signal ground line of the target system.

(6) Port trace is not possible for the following ports.

- With μPD78054, 78054Y, 78058F, 78058FY, 780058, 780058Y subseries as the object: P7, P13
- With μPD78064, 78064Y, 78064B, 780308, 780308Y subseries as the object : P7

(7) The target system V_{DD} must be between 2.0 V and 5.0 V.

(8) Be sure to turn off the power to the IE-78000-R before setting JP1 that switches between the on-board 5-MHz clock and the parts holder clock.

(9) P8 and P9 of the port trace data are undefined for LCD output.

(10) The power must be turned on for the IE-78000-R first, then target system, and turned off for the target system first, then IE-78000-R.

(11) When performing emulation of the target device by using the IE-780308-R-EM, use a screen debugger of Ver.2.00 or later.

[MEMO]

CHAPTER 2 INSTALLATION PROCEDURE

This chapter describes the procedure for connecting the following items to the IE-780308-R-EM and setting up the 78K/0 series development system.

- The break board (IE-78000-R-BK) installed in the IE-78000-R
- The IE-78000-R
- The connector board and emulation probe (sold separately)

The power supply for the IE-78000-R and the target system must be OFF when connecting or disconnecting any item.

For the method of connecting the emulation probe and target system, see User's manuals for each emulation probe.

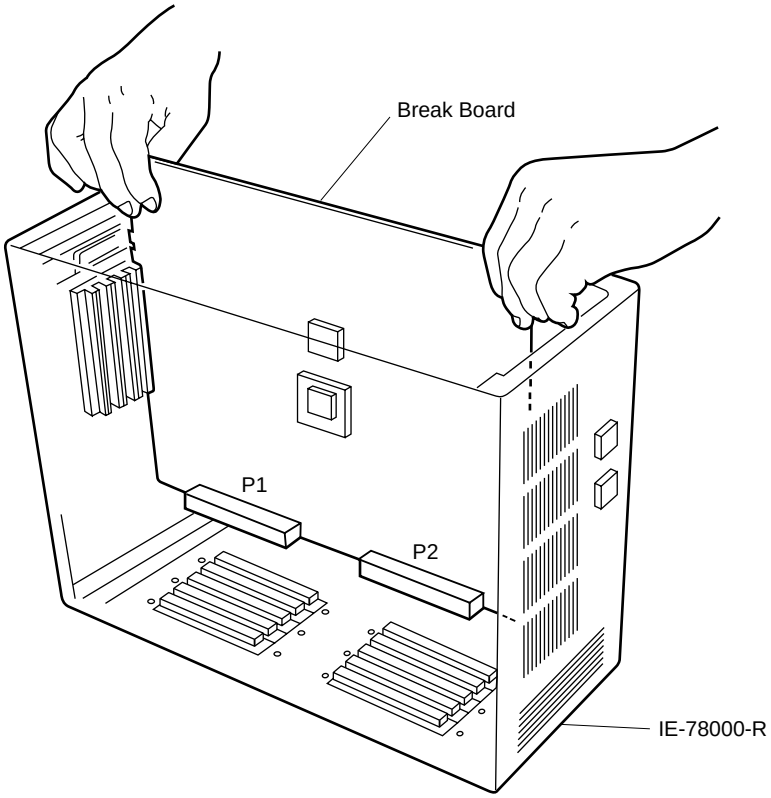
The connection of the IE-780308-R-EM, break board, IE-78000-R, connector board, and emulation board is described below.

Procedure

<1> Remove the 6 screws in the top of the IE-78000-R and open the lid.

<2> Remove the J1 and J2 cables connecting the control/trace board (IE-78000-R-CS-A) and the break board.

<3> Pull forward the card pullers on either side of the break board, and remove the break board from the slot.



<4> Connect the break board to the IE-780308-R-EM.
Connect connectors CN1 and CN2 on the break board to connectors CN1 and CN2 on the IE-780308-R-EM, and secure with the screws provided.

Caution Check that CN1 and CN2 are properly aligned.

<5> When a user clock is used, mount the main system clock to the emulation board and the subsystem clock to the break board using a part holder. (See **CHAPTER 4 CLOCK SETTING**.)

<6> Set the IE-78000-R operating voltage by means of SW1 on the IE-780308-R-EM.

- When internal power supply of IE-78000-R is used : IE
- When target system power supply is used : USER

<7> Connect connector board with the IE-780308-R-EM, which is separately supplied with emulation probe.

(a) To emulate the μPD78054, 78058F, 78058FY, 780058, and 780058Y Subseries

Connectors CN5 and CN6 of IE-780308-R-EM	⟷ Connect	Connectors CN2 and CN3 of connector board supplied with EP-78230GC-R or connectors CN3 and CN4 of connector board supplied with EP-78054GK-R

(b) To emulate the μPD78054Y Subseries

Connectors CN5 and CN6 of IE-780308-R-EM	⟷ Connect	Connectors CN2 and CN3 of connector board supplied with EP-78230GC-R

(c) To emulate the μPD78064, 78064Y, 780308, and 780308Y Subseries

Connectors CN7 and CN8 of IE-780308-R-EM	⟷ Connect	Connectors CN7 and CN8 of connector board supplied with EP-78064GC-R or EP-78064GF-R

(d) To emulate the μPD78064B Subseries

Connectors CN7 and CN8 of IE-780308-R-EM	⟷ Connect	Connectors CN7 and CN8 of connector board supplied with EP-78064GF-R

<8> Connect the IE-780308-R-EM to the mother-board slots in the IE-78000-R housing (the break board in the 2nd slot from the right, the IE-780308-R-EM in the 3rd slot).

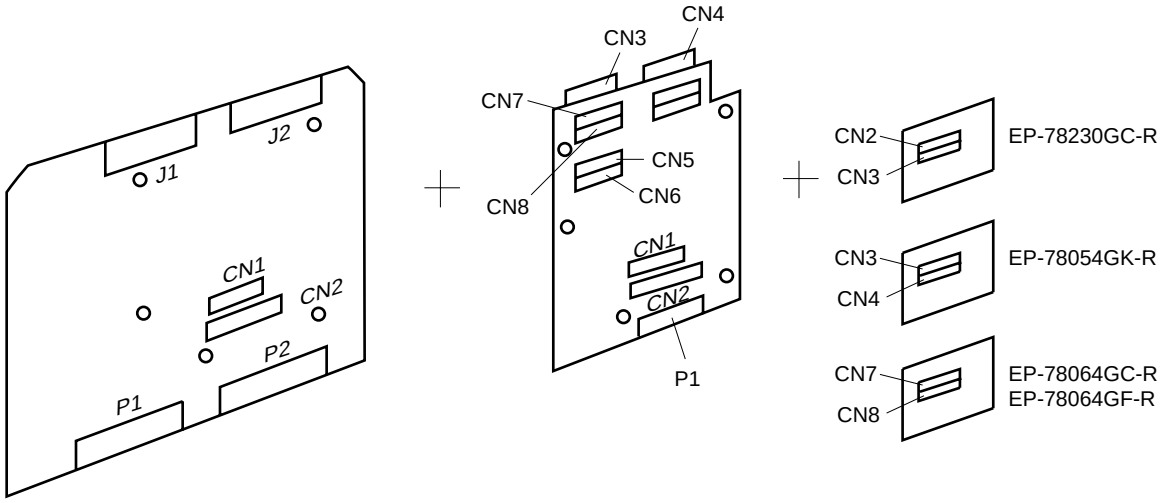
<9> Re-connect the J1 and J2 cables in their original positions.

<10> Check the position of the boards, then close the lid.

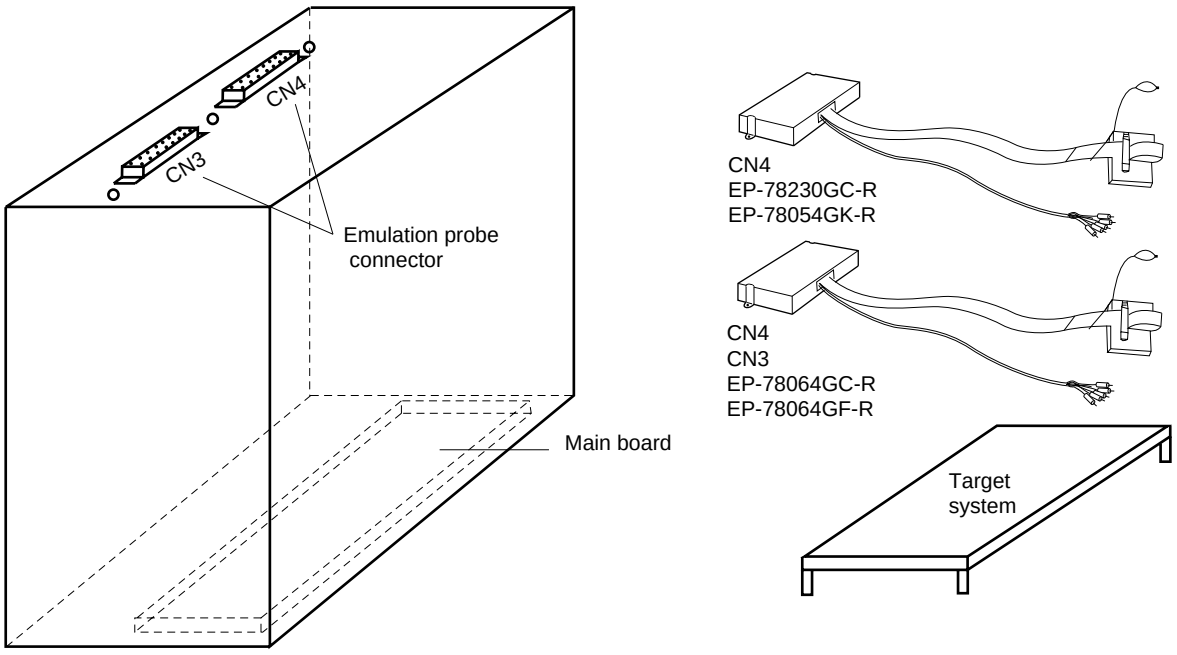
<11> Connect emulation probe connectors CN3 and CN4 to connectors CN3 and CN4 on the top of the IE-78000-R, and screw down.

Phase-out/Discontinued

IE-78000-R-BK **IE-780308-R-EM** Connector board (supplied with emulation board)



Emulation probe for your target system



IE-78000-R housing

CHAPTER 3 DIFFERENCES FROM TARGET DEVICE

When target device emulation is performed using the IE-780308-R-EM in conjunction with the IE-78000-R, there are certain differences from the operation of the actual target device. These differences are described in this chapter.

3.1 DIFFERENCES IN PORT FUNCTIONS

(1) P07/XT1 pin is a port pin multiplexed with subsystem clock input. The function of this pin can be switched with the configuration panel of the screen debugger when the in-circuit emulator is used, however, this function is not available on the IE-780308-R-EM.

(2) P60-P63 of the μPD78054, 78054Y, 78058F, 78058FY, 780058, and 780058Y Subseries are N-ch open-drain pins that can use the internal pull-up resistor by a mask option and can withstand +15 V. Whether or not the pull-up resistor is connected can be specified by the configuration panel of the screen debugger.
The μPD78064, 78064Y, 78064B, 780308 and 780308 Subseries do not have P60-63.

3.2 TARGET INTERFACE CIRCUIT

The purpose of the target interface circuit is to have the same operations as the target device performed in the IE-78000-R. It comprises the emulation device and various gates (CMOS, TTL and other ICs).

When debugging is performed with the target system connected to the IE-78000-R, the IE-78000-R target interface circuit performs emulation as though the actual target device were operating in the target system.

The target device has a CMOS LSI configuration. The target interface circuit emulation device also has a CMOS LSI configuration, and is virtually identical to the target device in terms of DC characteristics and AC characteristics (when operating on V_{DD} = 2.0 to 5.0 V).

However, where emulation device signal input/output is performed via gates in the target interface circuit, DC and AC characteristics differ from those of the target device.

In particular, regarding AC characteristics, there is a gate delay time (which differs from gate to gate) each time a gate is passed through.

The above points must be taken into consideration when designing the target system.

Caution When the IE-78000-R and IE-780308-R-EM are connected to the target system, 2.0 to 5.0 V must be supplied as the target system power supply (V_{DD}).

3.2.1 Circuits which Input/Output Signals to/from Emulation Device Directly or via Resistor

(1) μPD78054, 78054Y, 78058F, 78058FY, 780058, 780058Y Subseries as target

(a) Port-related signals

In these circuits, the following signals are interfaced:

- Port 0 related signals
- Port 1 related signals
- Port 2 related signals
- Port 3 related signals
- Port 4 related signals
- Port 5 related signals
- Port 6 related signals
- Port 7 related signals
- Port 12 related signals
- Port 13 related signals

★ **Figure 3-1. Emulation Circuit Equivalent Circuit Diagram 1 (1/3)**

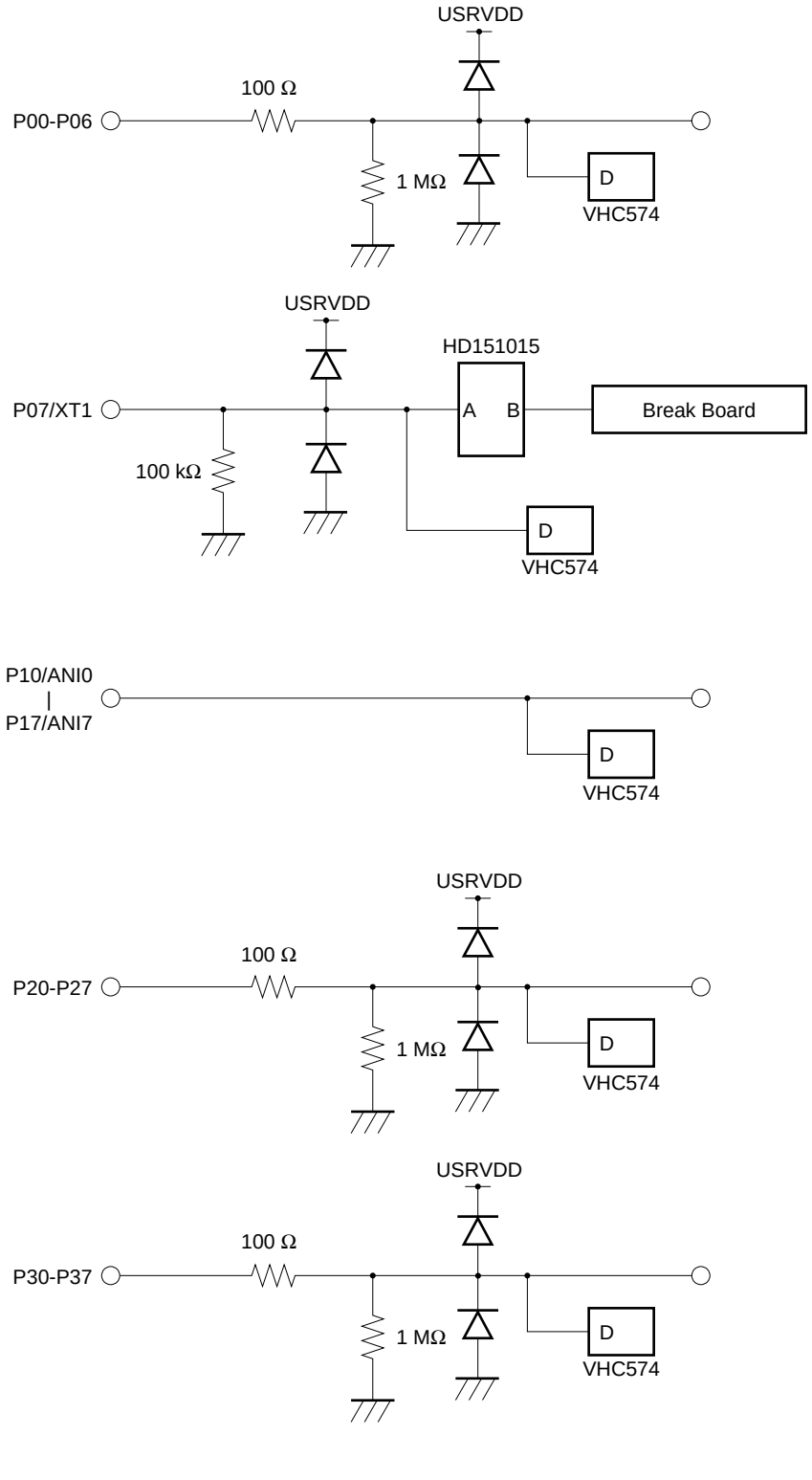


Figure 3-1. Emulation Circuit Equivalent Circuit Diagram 1 (2/3)

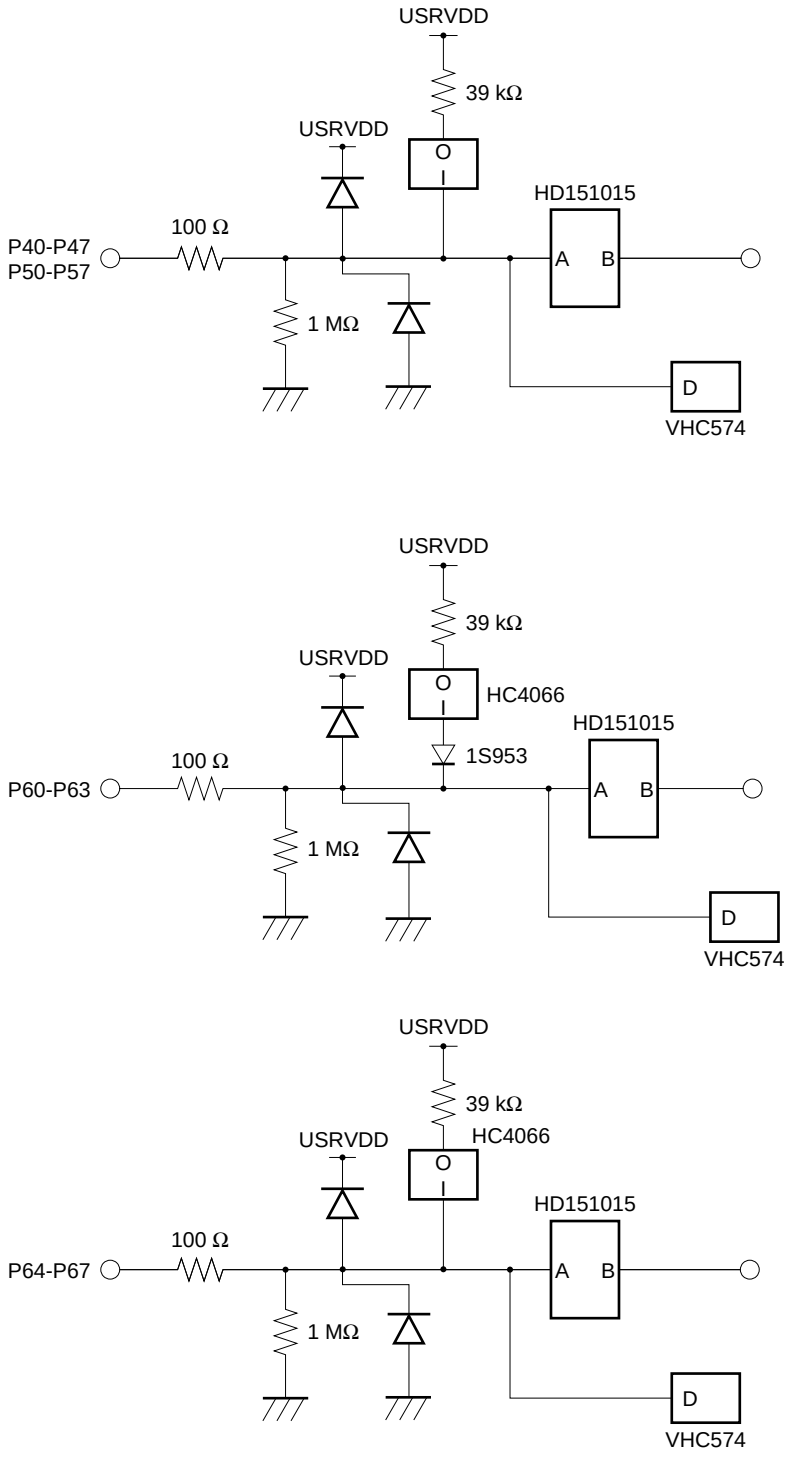
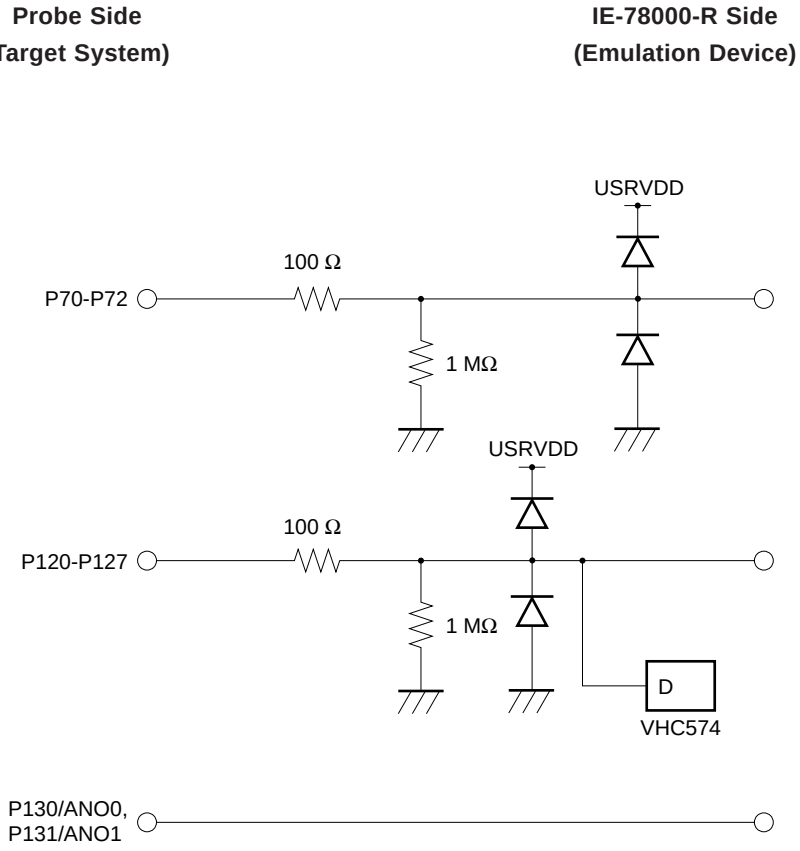
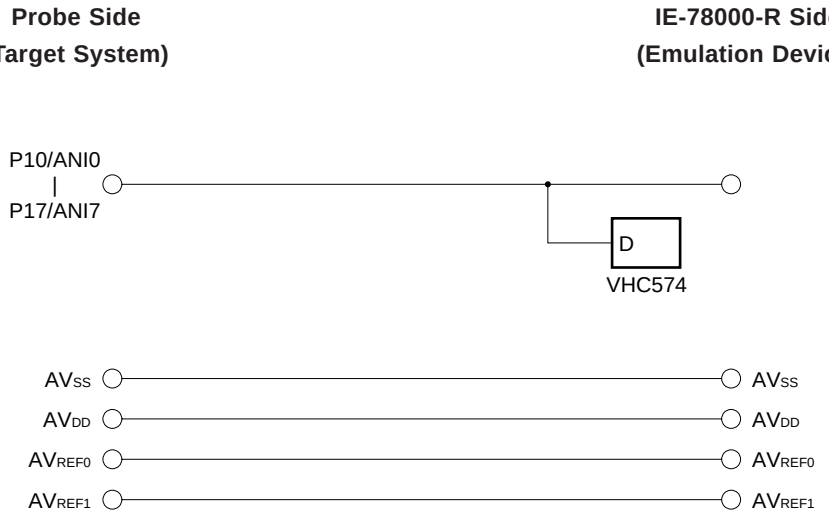


Figure 3-1. Emulation Circuit Equivalent Circuit Diagram 1 (3/3)



(b) Analog-related signals

Figure 3-2. Emulation Circuit Equivalent Circuit Diagram 2



(2) μPD78064, 78064Y, 78064B as target

(a) Port-related signals

In these circuits, the following signals are interfaced:

- Port 0 related signals
- Port 1 related signals
- Port 2 related signals
- Port 3 related signals
- Port 7 related signals
- Port 8 related signals
- Port 9 related signals
- Port 10 related signals
- Port 11 related signals

★ **Figure 3-3. Emulation Circuit Equivalent Circuit Diagram 3 (1/2)**

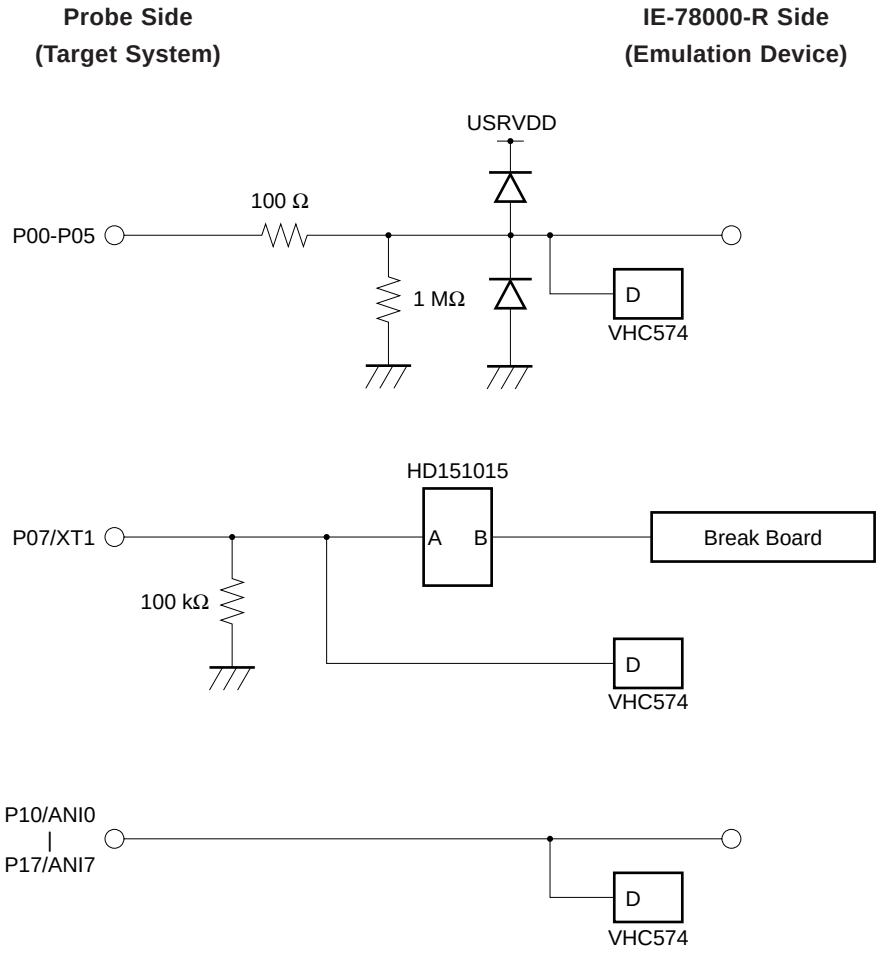
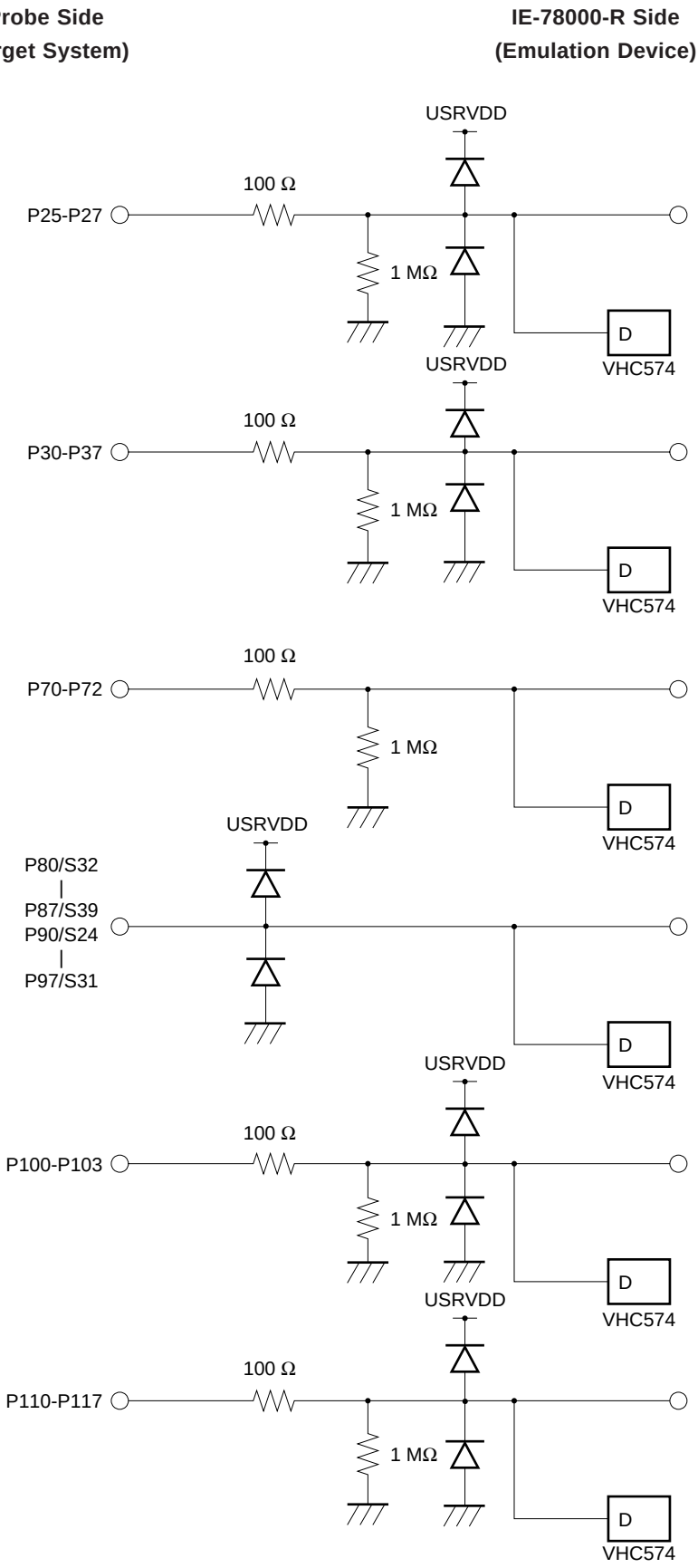
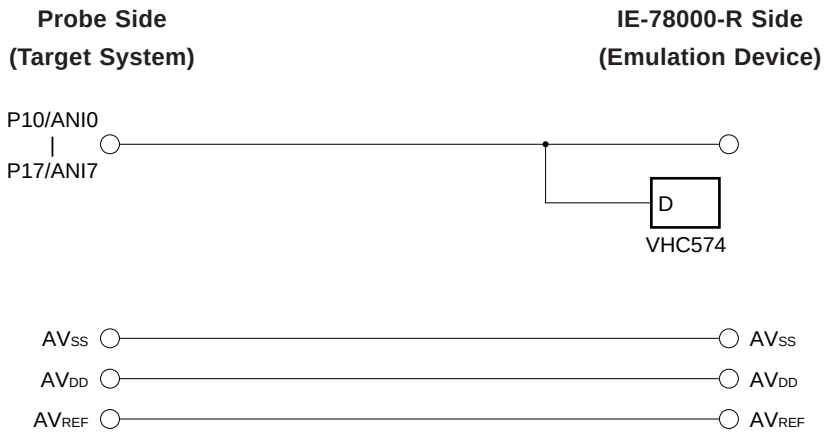


Figure 3-3. Emulation Circuit Equivalent Circuit Diagram 3 (2/2)



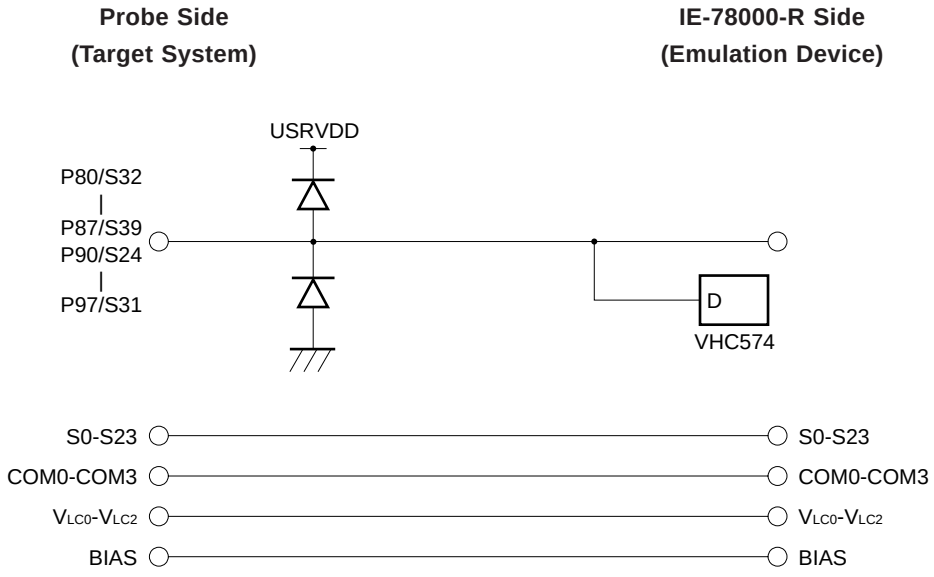
(b) Analog-related signals

Figure 3-4. Emulation Circuit Equivalent Circuit Diagram 4



(c) LCD-related signals

★ **Figure 3-5. Emulation Circuit Equivalent Circuit Diagram 5**



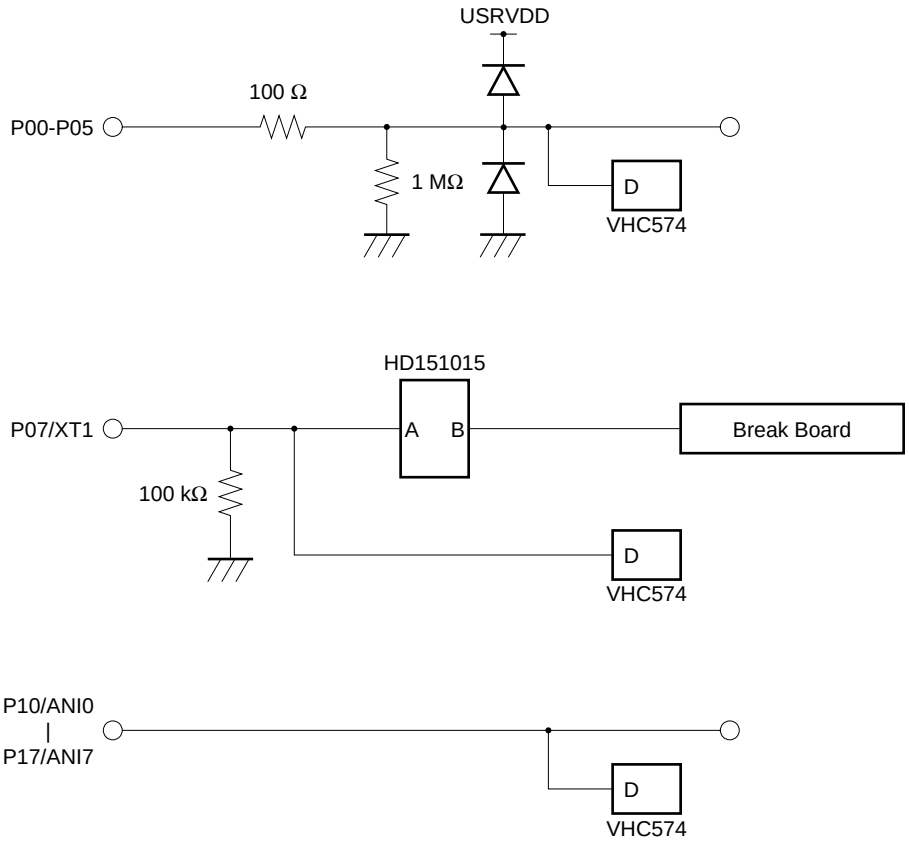
(3) μPD780308 and 780308Y Subseries as target

(a) Port-related signals

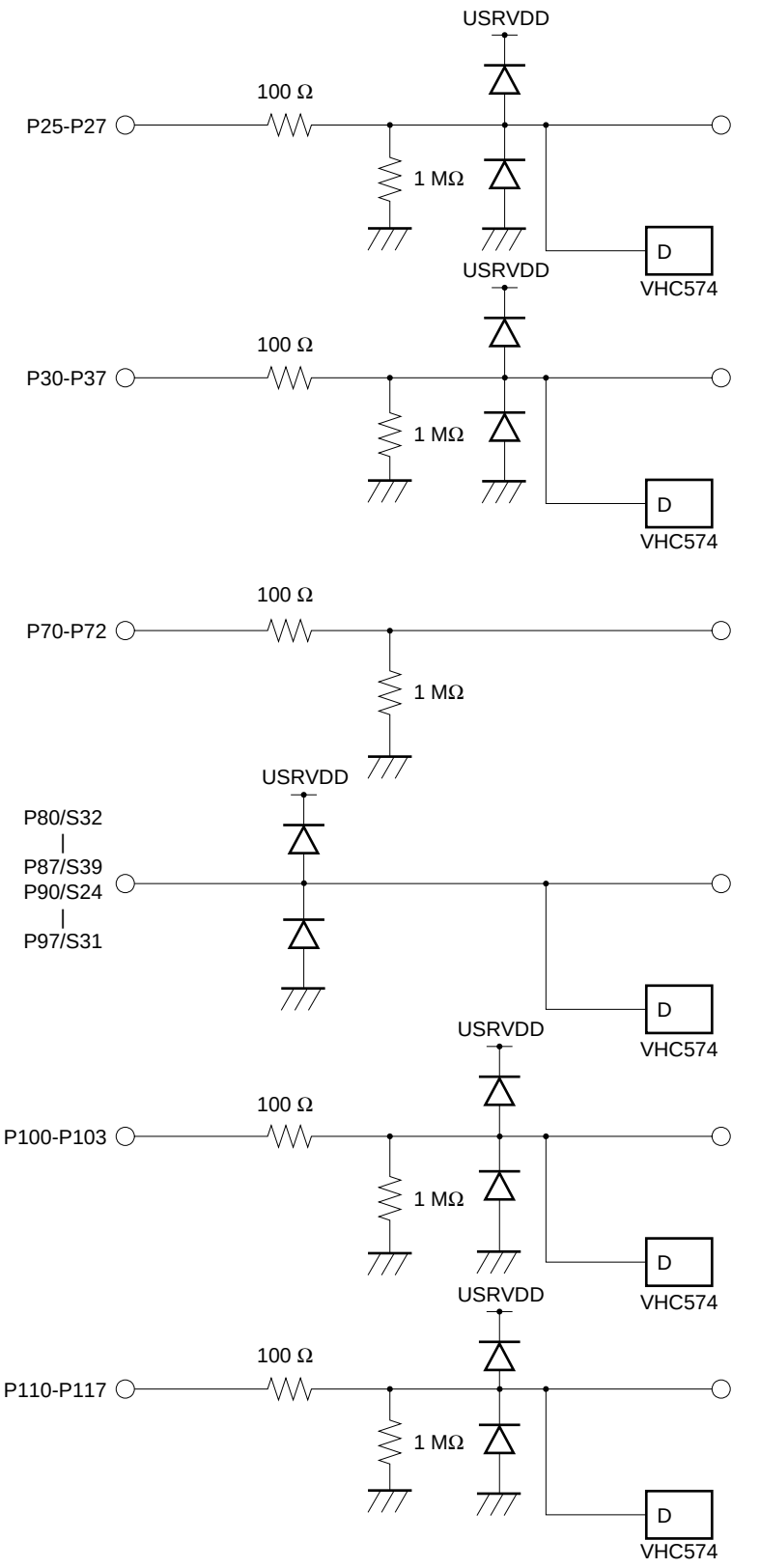
In these circuits, the following signals are interfaced:

- Port 0 related signals
- Port 1 related signals
- Port 2 related signals
- Port 3 related signals
- Port 7 related signals
- Port 8 related signals
- Port 9 related signals
- Port 10 related signals
- Port 11 related signals

★ **Figure 3-6. Emulation Circuit Equivalent Circuit Diagram 6 (1/2)**

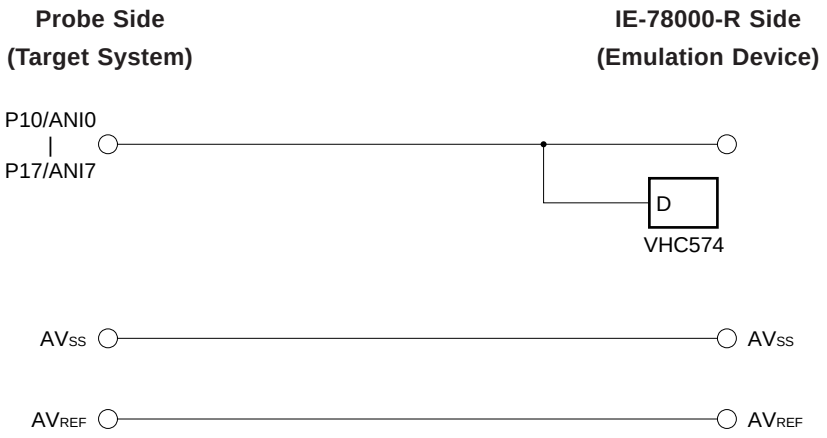


★ **Figure 3-6. Emulation Circuit Equivalent Circuit Diagram 6 (2/2)**



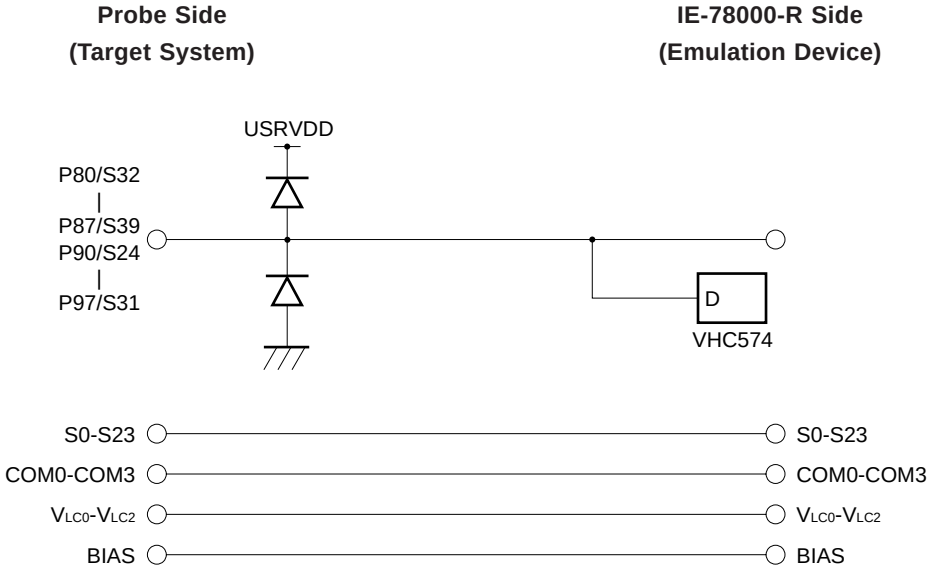
(b) Analog-related signals

Figure 3-7. Emulation Circuit Equivalent Circuit Diagram 7



(c) LCD-related signals

★ **Figure 3-8. Emulation Circuit Equivalent Circuit Diagram 8**

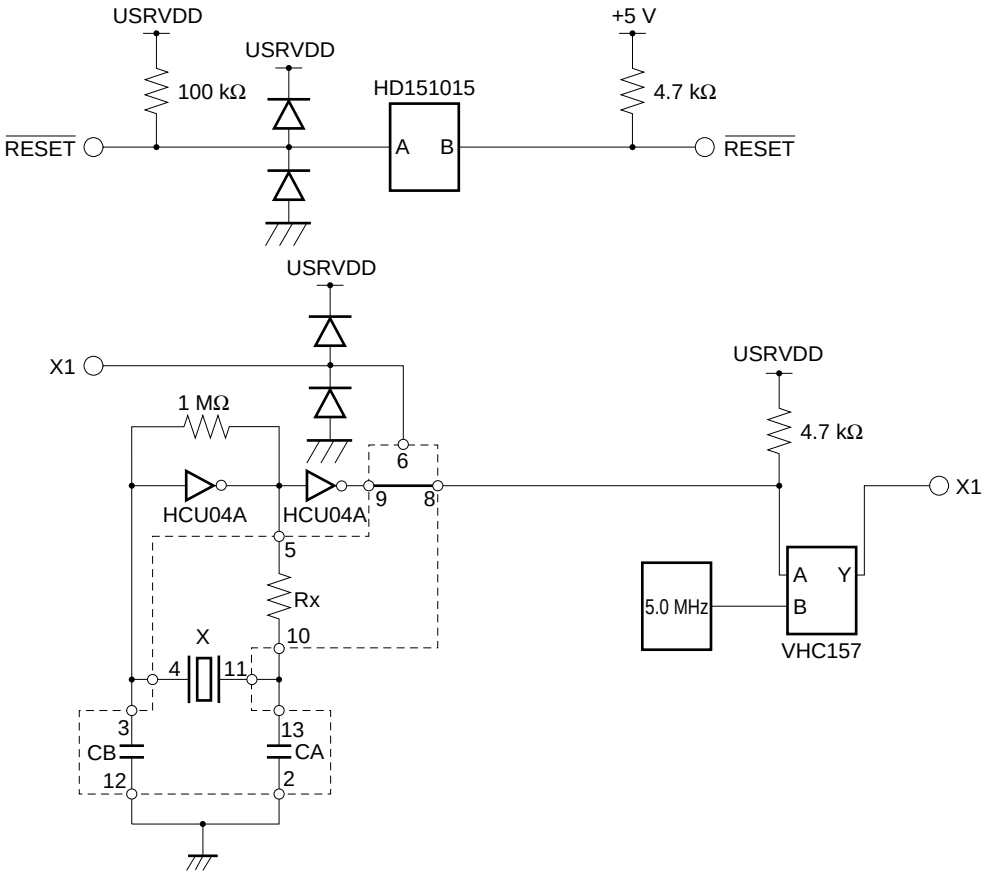


3.2.2 Circuits which Input Signals to/from Emulation Device via Gate

These circuits interface the following signals:

- $\overline{\text{RESET}}$ signal
- Clock input related signals

★ **Figure 3-9. Emulation Circuit Equivalent Circuit Diagram 9**



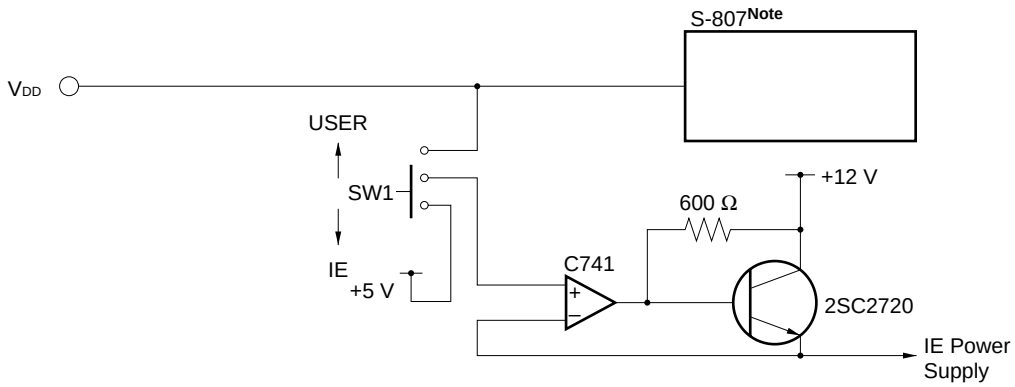
Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

3.2.3 Circuit which Inputs Signals to Control/Trace Module

This circuit interfaces the following signal:

- V_{DD} signal

Figure 3-10. Emulation Circuit Equivalent Circuit Diagram 10



Note The S-807 is an IC manufactured by Seiko Electronics Industries, Inc.

[MEMO]

CHAPTER 4 CLOCK SETTING

This chapter describes the clock setting method.

4.1 OUTLINE OF CLOCK SETTING

The main system clock for use in debugging can be selected from (1) to (3) below.
The subsystem clock can be selected from (2) or (3).

(1) Clock mounted on the emulation board
(2) Clock mounted by the user
(3) External clock

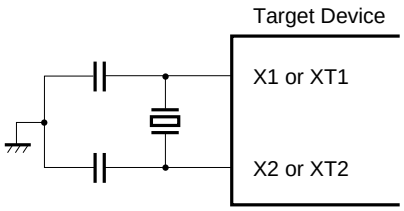
If an internal clock is incorporated in the target system, (1) “Clock mounted on the emulation board” or (2) “Clock mounted by the user” should be selected. An internal clock means the use of an oscillator in the target device with a resonator connected to the target device. The external circuit is shown in Figure 4-1(a). The resonator mounted in the target system is not used during emulation. The clock mounted on the emulation board installed in the IE-78000-R is used.

If an external clock is incorporated in the target system, (3) “External clock” should be selected. An external clock means supplying a clock from outside the target device, and the oscillator in the target device is not used. The external circuit is shown in Figure 4-1(b).

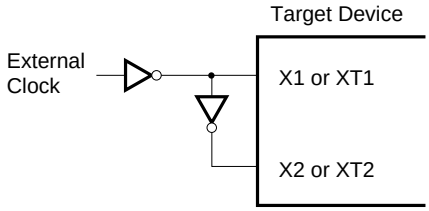
Caution The subsystem clock resonator is not mounted on any board of the IE-78000-R. When the subsystem clock is used, the user should either mount it on the break board, or use an external clock.

Figure 4-1. System Clock Oscillator External Circuit

(a) Internal Clock



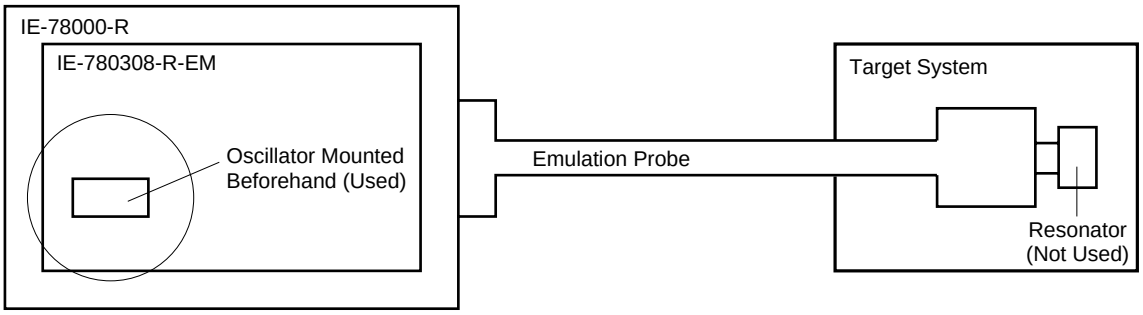
(b) External Clock



(1) Clock mounted on the emulation board

A crystal oscillator is already mounted on the emulation board. The frequency is 5.0 MHz.

Figure 4-2. When Using Clock Mounted on Emulation Board

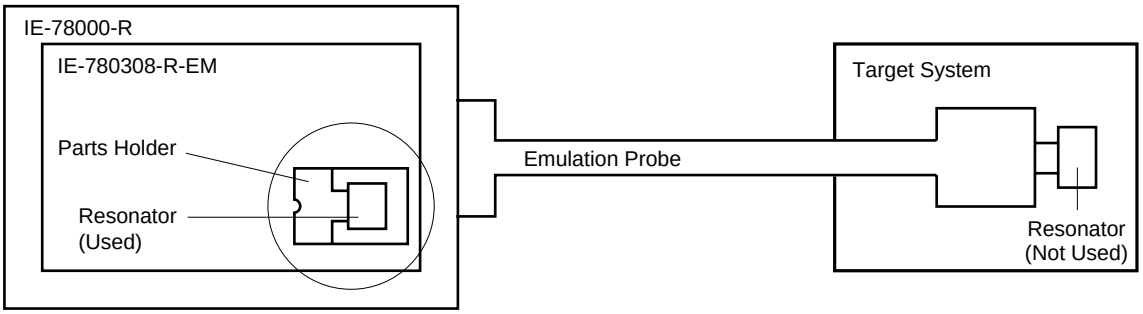


Remark The clock supplied from the oscillator on the IE-780308-R-EM (circled) is used.

(2) Clock mounted by the user

A clock that matches the specifications set by the user can be mounted on the IE-780308-R-EM. The resonator to be used is mounted on a parts holder and that parts holder is installed on the IE-780308-R-EM.
This is useful if you want to perform debugging at a different frequency from that of the clock mounted beforehand.

Figure 4-3. When Using Clock Mounted by User

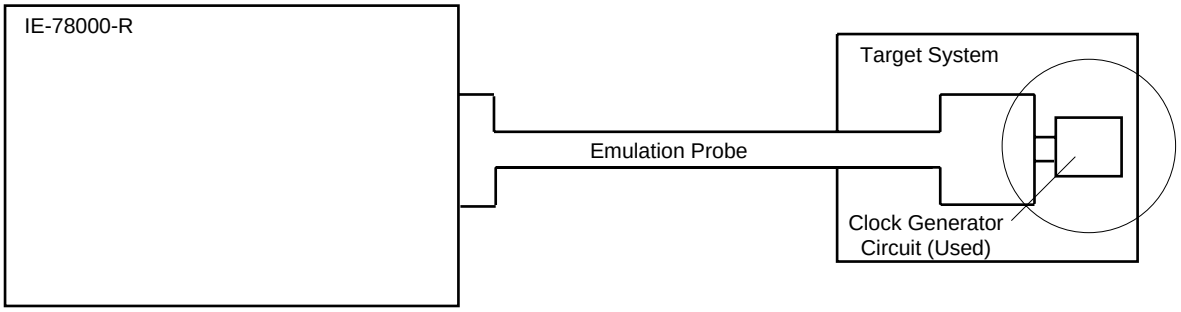


Remark The clock supplied from the resonator on the IE-780308-R-EM (circled) is used.

(3) External clock

The external clock on the target system can be used via an emulation probe.

Figure 4-4. Using an External Clock



Remark The clock supplied by the clock generator circuit (circled in the above figure) is used.

Table 4-1 shows the settings of the main system clock.

Table 4-1. Main System Clock Settings

Main System Clock Frequency		X1 (MAIN) Component Block of IE-78000-R-BK	IE-780308-R-EM		Clock Setting for Screen Debugger
			X1 (USRCLK) Component Block	JP1	
To use emulation board mounted clock	5.0 MHz	6-8 shorted	6-8 shorted	1-2 shorted (AUTO)	IE
To use user mounted clock	A frequency other than 5.0 MHz		Create oscillation circuit		USER
To use external clock			6-8 shorted		

Caution Be sure to turn off the power to IE-78000-R before you set JP1 for switching 5.0 MHz clock and component clock on the board.

Remarks 1. On shipping of IE-780308-R-EM, the main system clock settings are the case of “To Use Emulation Board Mounted Clock”.

2. When you emulate the target device by using IE-780308-R-EM, use the screen debugger Ver. 2.00 or higher.

4.2 MAIN SYSTEM CLOCK SETTING

4.2.1 When Using Clock Mounted on Emulation Board

A parts holder, wired as shown in Figure 4-5, is fitted in the X1 USRCLK socket on the IE-780308-R-EM when the product is shipped. If the parts holder state is the same as when the product was shipped, no particular hardware settings are necessary. If the user provides a parts holder because of a change from another clock source or loss of the wired parts holder, etc., the connection procedure shown below should be followed.

When the screen debugger (SD78K/0) is started, clock should be set to “IE” in the initial value setting screen or configuration panel IE setting (selection of clock in emulator).

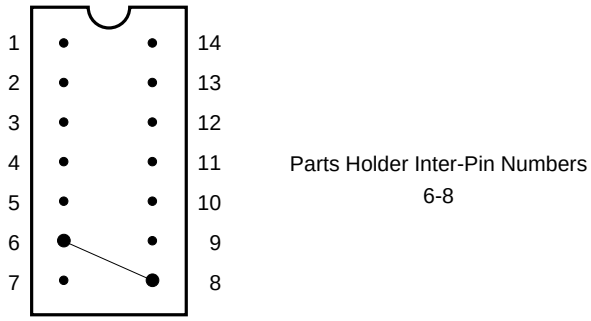
Items to be prepared

- Parts holder (IE-78000-R accessory)
- Lead wire
- Set of soldering tools

Procedure

<1> Solder and wire the parts holder provided with the lead wire.

Figure 4-5. Lead Wiring Diagram (When Clock Mounted on Emulation Board is Used as Main System Clock)

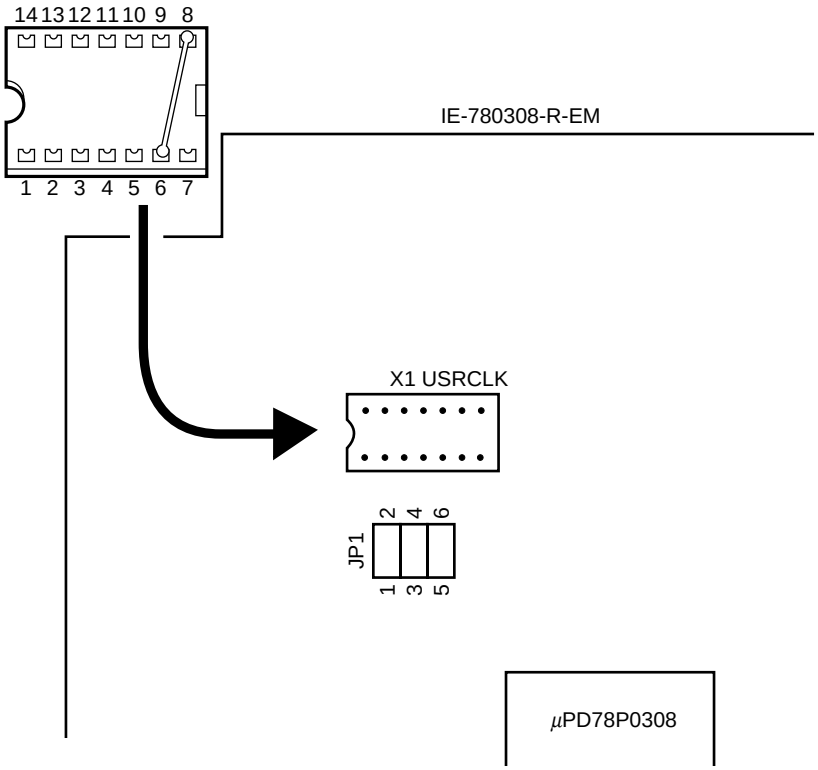


<2> Prepare the break board and the IE-780308-R-EM.

<3> Insert parts holder in the socket (marked “X1 USRCLK”) on the IE-780308-R-EM. Ensure that the pin <1> mark is correctly oriented when inserting the parts holder.

<4> Confirm that the component mounted on the X1 (MAIN) socket on the break board is wired as shown in Figure 4-5.

Figure 4-6. Parts Holder Mounting Location (When Clock Mounted on Emulation Board is Used as Main System Clock)



<5> Install the IE-780308-R-EM and break board in the IE-78000-R.

4.2.2 When Using Clock Mounted by User

The settings shown in (1) or (2) below must be performed depending on the type of clock used.

When the screen debugger is started, clock should be selected to “USER” in the initial value setting screen or configuration panel IE setting (user clock selection).

(1) When ceramic resonator/crystal resonator is used

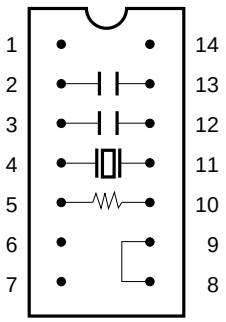
Items to be prepared

- Parts holder (IE-78000-R accessory)
- Ceramic resonator or crystal resonator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Set of soldering tools

Procedure

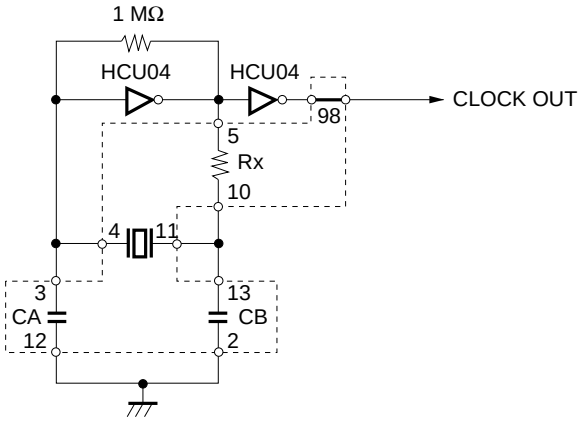
<1> Solder the ceramic resonator or crystal resonator to be used and resistor Rx, capacitor CA and capacitor CB appropriate to the oscillation frequency of the resonator to the parts holder provided as shown below.

Parts Holder



Pin No.	Connection
2-13	Capacitor CB
3-12	Capacitor CA
4-11	Ceramic resonator/crystal resonator
5-10	Resistor Rx
8-9	Shorted

Circuit Diagram



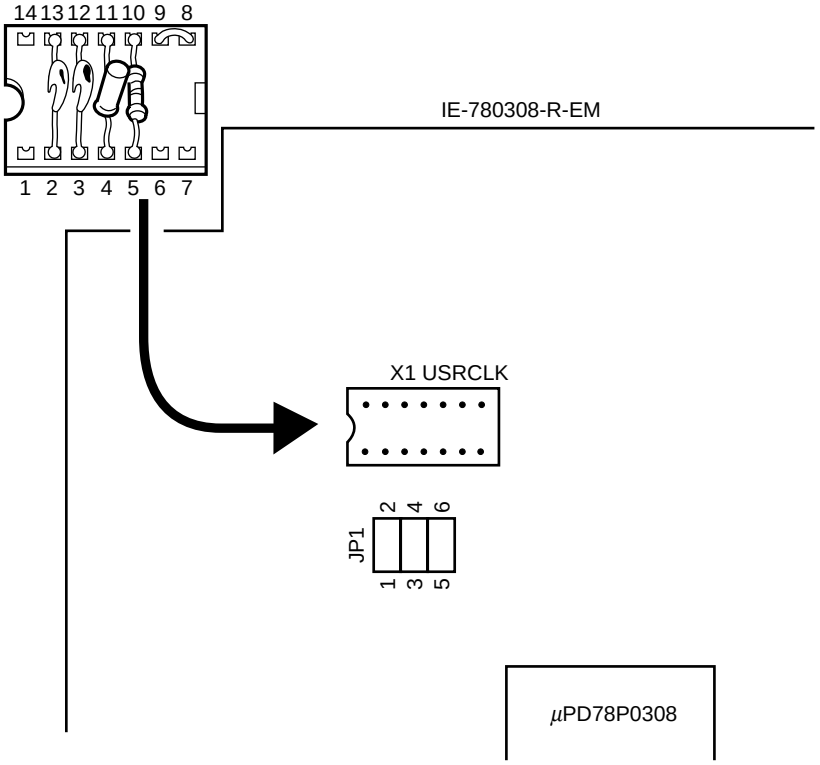
Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

<2> Prepare the break board and the IE-780308-R-EM.

<3> Remove the external clock parts holder inserted in the socket (marked “X1 USRCLK”) on the IE-780308-R-EM.

<4> Insert parts holder <1> in the socket (X1 USRCLK) from which the external clock parts holder was removed in <3>. Ensure that the pin 1 mark is correctly oriented when inserting the parts holder.

Figure 4-7. Parts Holder Mounting Location (When Clock Mounted by User is Used as Main System Clock)

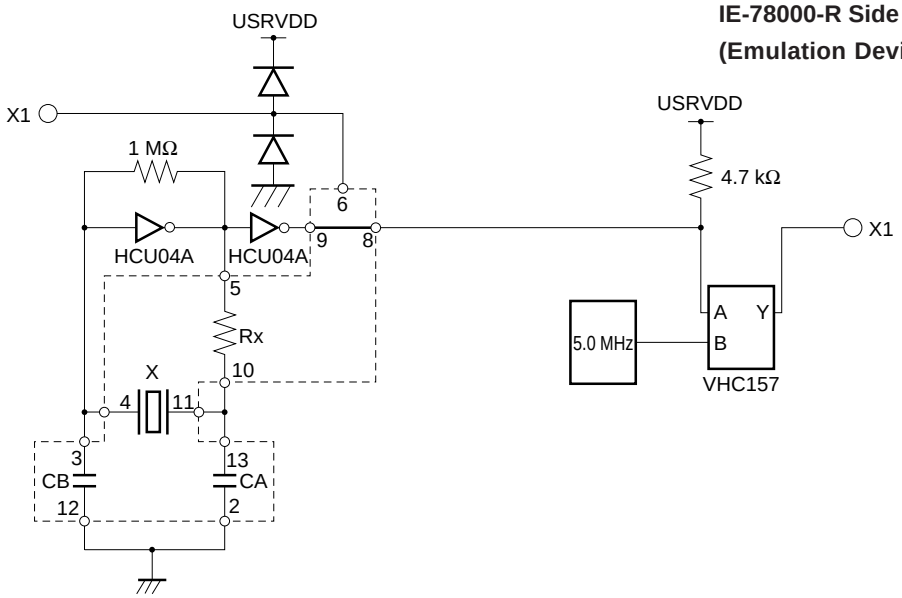


<5> Confirm that the component mounted on the X1 (MAIN) socket on the break board is wired as shown in Figure 4-5.

<6> Install the emulation board and break board in the IE-78000-R.

The following circuit is configured by means of the above procedure, enabling the clock to be supplied to the emulation device from the mounted resonator.

★



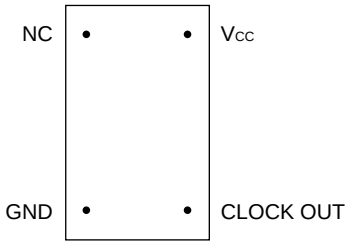
Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

(2) When crystal oscillator is used

Items to be prepared

- Crystal oscillator (with pins as shown in Figure 4-8)

Figure 4-8. Crystal Oscillator (When Clock Mounted by User is Used as Main System Clock)

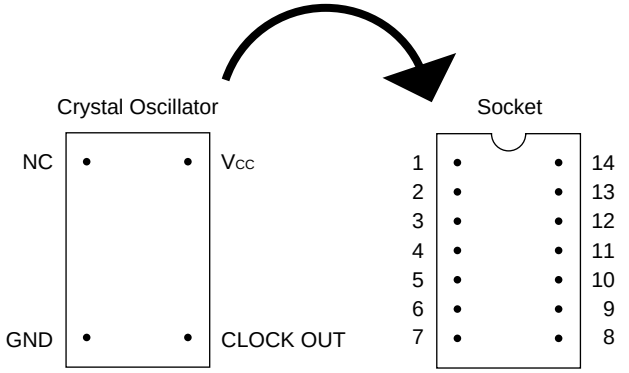


Procedure

<1> Prepare the break board and the IE-780308-R-EM.

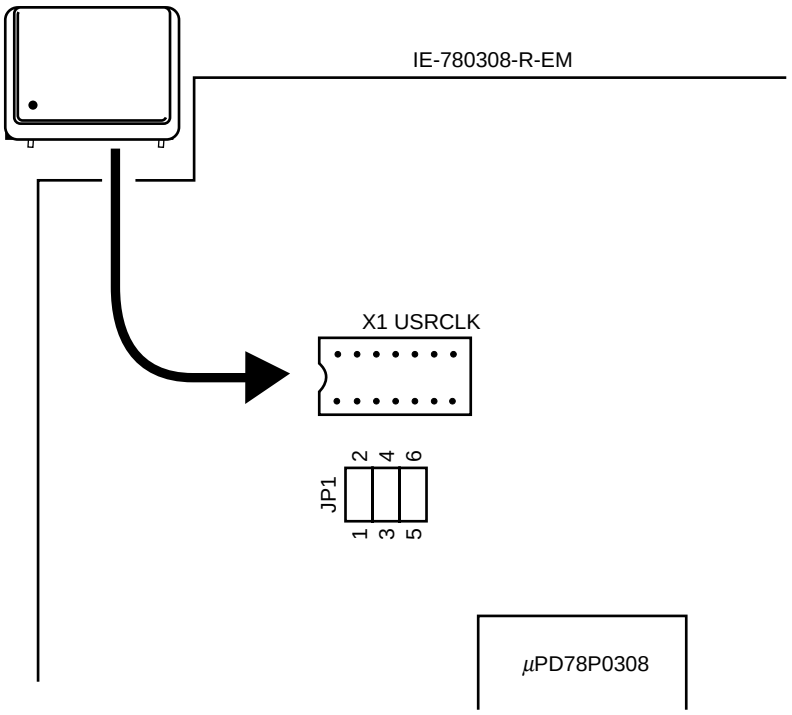
<2> Remove the external clock parts holder inserted in the socket (marked “X1 USRCLK”) on the IE-780308-R-EM.

<3> Insert the crystal oscillator in the socket (X1 USRCLK) from which the external clock parts holder was removed in <2>. The crystal oscillator pins should be inserted in the socket holes as shown below.



Crystal Oscillator Pin	Socket Hole No.
NC	1
GND	7
CLOCK OUT	8
Vcc	14

Figure 4-9. Crystal Oscillator Mounting Location (When Clock Mounted by User is Used as Main System Clock)

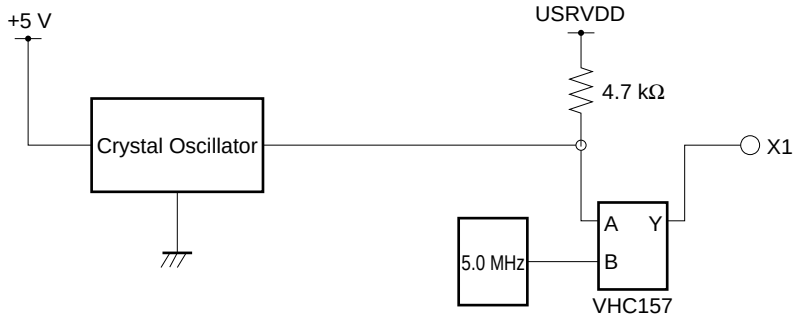


<4> Confirm that the component mounted on the X1 (MAIN) socket on the break board is wired as shown in Figure 4-5.

<5> Install the emulation board and break board in the IE-78000-R.

The following circuit is configured by means of the above procedure, enabling the clock to be supplied to the emulation device from the mounted oscillator.

★ **IE-78000-R Side (Emulation Device)**



4.2.3 When Using External Clock

A parts holder, wired as shown in Figure 4-10, is fitted in the X1 USRCLK socket on the IE-780308-R-EM when the product is shipped. If the parts holder state is the same as when the product was shipped, no particular hardware settings are necessary. If the user provides a parts holder because of a change from another clock source or loss of the wired parts holder, etc., the connection procedure shown below should be followed.

When the screen debugger is started, clock should be set to USER in the initial value setting screen or configuration panel clock setting (user clock selection).

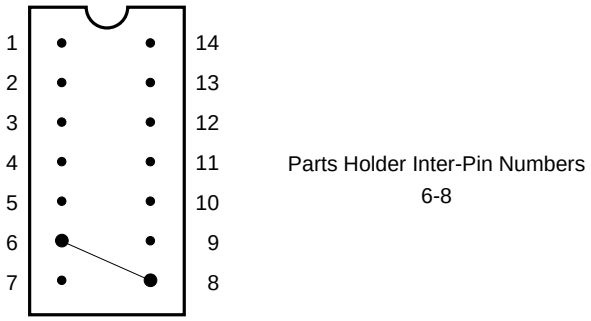
Items to be prepared

- Parts holder (IE-78000-R accessory)
- Lead wire
- Set of soldering tools

Procedure

<1> Solder and wire the parts holder provided with the lead wire.

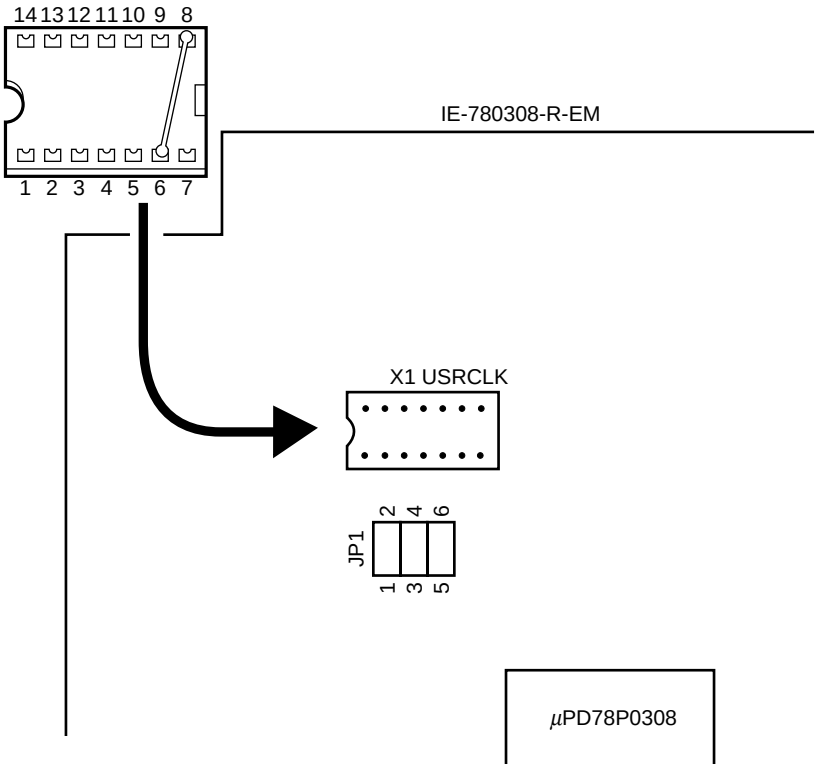
Figure 4-10. Lead Wiring Diagram (When External Clock is Used as Main System Clock)



<2> Prepare the break board and the IE-780308-R-EM.

<3> Insert parts holder <1> in the socket (marked “X1 USRCLK”) on the IE-780308-R-EM. Ensure that the pin 1 mark is correctly oriented when inserting the parts holder.

Figure 4-11. Parts Holder Mounting Location (When External Clock is Used as Main System Clock)

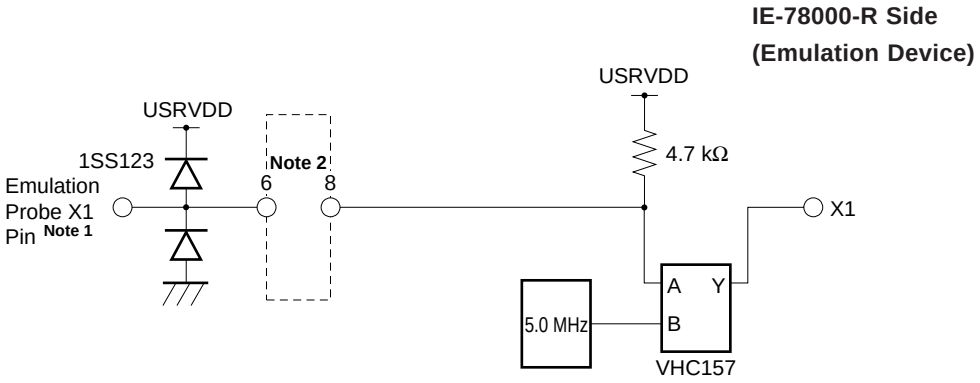


<4> Confirm that the component mounted on the X1 (MAIN) socket on the break board is wired as shown in Figure 4-5.

<5> Install the IE-780308-R-EM and break board in the IE-78000-R.

The following circuit is configured by means of the above procedure, enabling the clock signal on the target system to be supplied to the emulation device.

★



Notes 1. Target device pin name

2. Parts holder pin numbers

Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

4.3 SUBSYSTEM CLOCK SETTING

4.3.1 When Using Clock Mounted by User

The settings shown in (1) or (2) below must be performed depending on the type of clock used.

No particular settings are required on the screen debugger.

(1) When ceramic resonator/crystal resonator is used

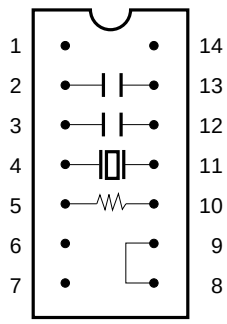
Items to be prepared

- Parts holder (IE-78000-R accessory)
- Ceramic resonator or crystal resonator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Set of soldering tools

Procedure

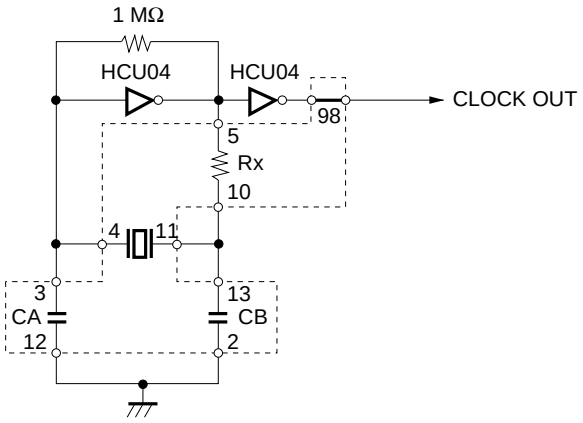
<1> Solder the ceramic resonator or crystal resonator to be used and resistor Rx, capacitor CA and capacitor CB appropriate to the oscillation frequency of the resonator to the parts holder provided as shown below.

Parts Holder



Pin No.	Connection
2-13	Capacitor CB
3-12	Capacitor CA
4-11	Ceramic resonator/crystal resonator
5-10	Resistor Rx
8-9	Shorted

Circuit Diagram



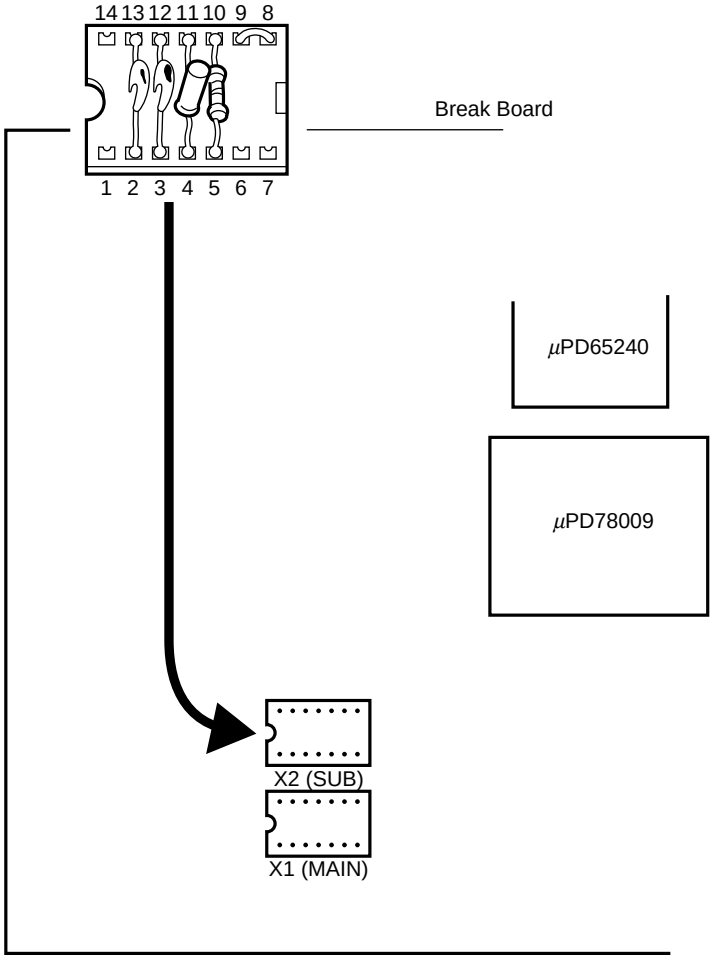
Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

<2> Prepare the break board and the IE-780308-R-EM.

<3> Remove the external clock parts holder inserted in the socket (marked “X2 (SUB)”) on the break board.

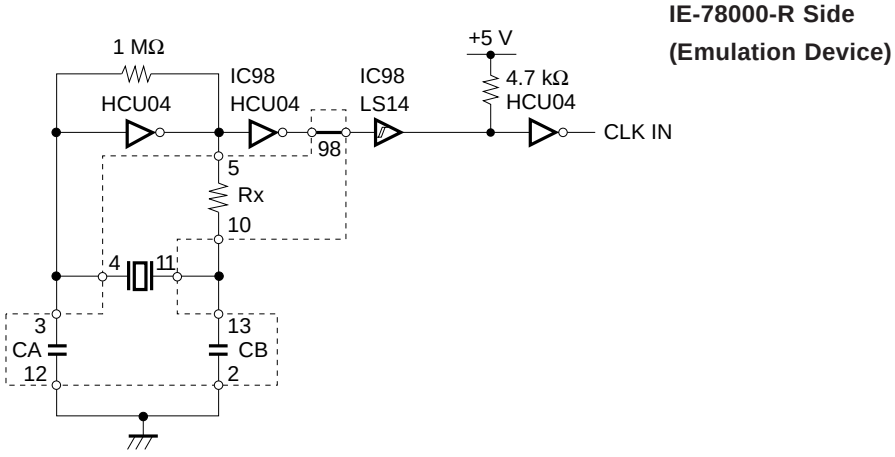
<4> Insert parts holder <1> in the socket X2 (SUB) from which the external clock parts holder was removed in <3>. Ensure that the pin 1 mark is correctly oriented when inserting the parts holder.

Figure 4-12. Parts Holder Mounting Location (When Clock Mounted by User is Used as Subsystem Clock)



<5> Install the IE-780308-R-EM and break board in the IE-78000-R.

The following circuit is configured by means of the above procedure, enabling the clock to be supplied to the emulation device from the mounted resonator.



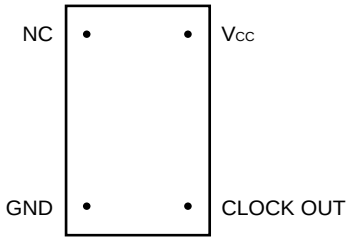
Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

(2) When crystal oscillator is used

Items to be prepared

- Crystal oscillator (with pins as shown in Figure 4-13)

Figure 4-13. Crystal Oscillator (When Clock Mounted by User is Used as Subsystem Clock)

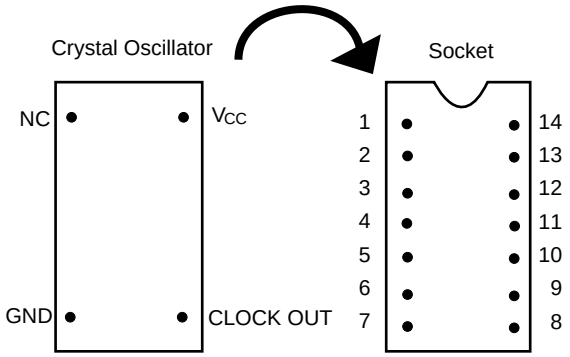


Procedure

<1> Prepare the break board and the IE-780308-R-EM.

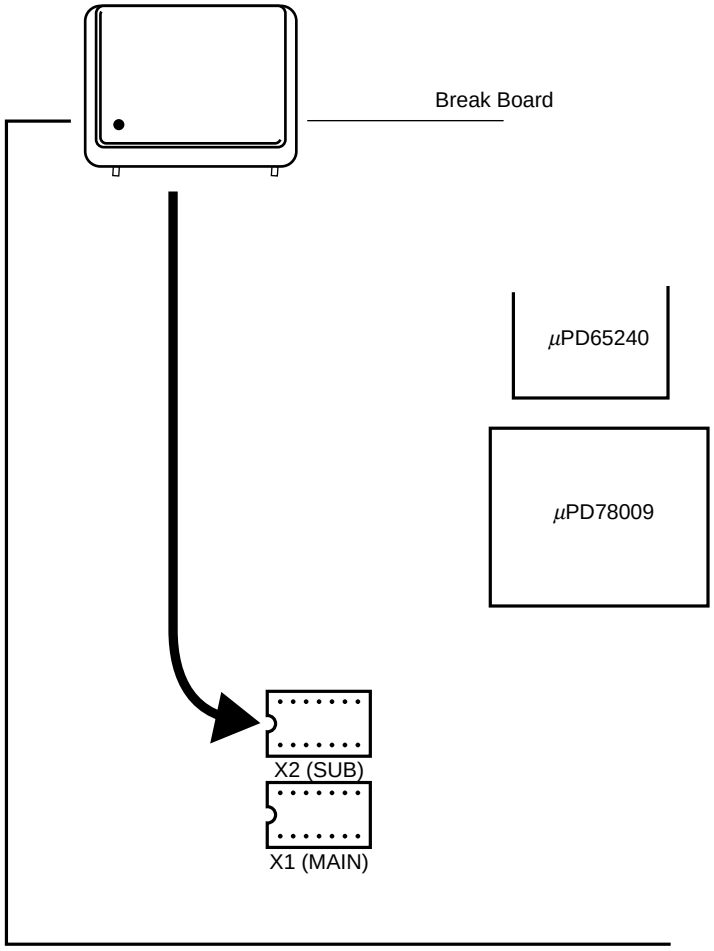
<2> Remove the external clock parts holder inserted in the socket (marked “X2 (SUB)”) on the break board.

<3> Insert the crystal oscillator in the socket X2 (SUB) from which the external clock parts holder was removed in <2>. The crystal oscillator pins should be inserted in the socket holes as shown below.



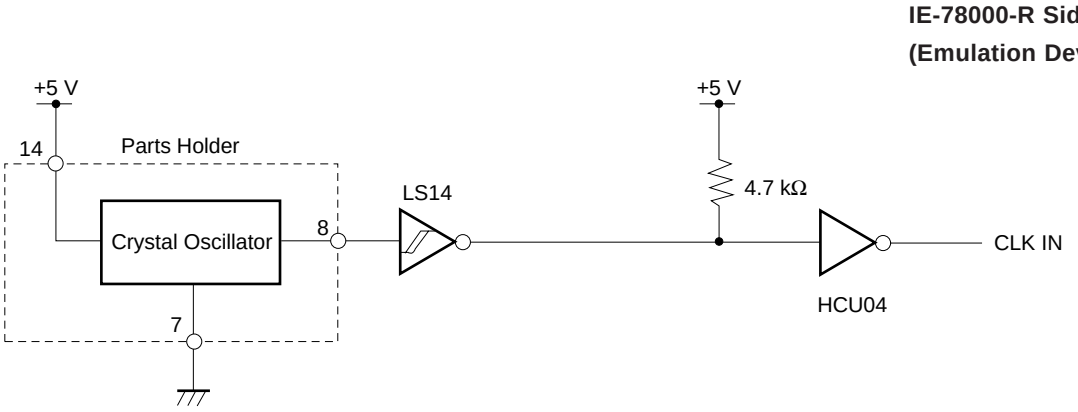
Crystal Oscillator Pin	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
VCC	14

Fig. 4-14. Crystal Oscillator Mounting Location (When Clock Mounted by User is Used as Subsystem Clock)



<4> Install the IE-780308-R-EM and break board in the IE-78000-R.

The following circuit is configured by means of the above procedure, enabling the clock to be supplied to the emulation device from the mounted oscillator.



4.3.2 When Using External Clock

A parts holder, wired as shown in Figure 4-15, is fitted in the X2 (SUB) socket on the break board when the product is shipped. If the parts holder state is the same as when the product was shipped, no particular hardware settings are necessary. If the user provides a parts holder because of a change from another clock source or loss of the wired parts holder, etc., the connection procedure shown below should be followed.

No particular settings are required on the screen debugger.

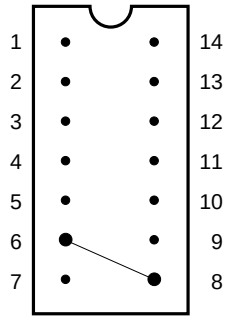
Items to be prepared

- Parts holder (IE-78000-R accessory)
- Lead wire
- Set of soldering tools

Procedure

<1> Solder and wire the parts holder provided with the lead wire.

Figure 4-15. Lead Wiring Diagram (When External Clock is Used as Subsystem Clock)

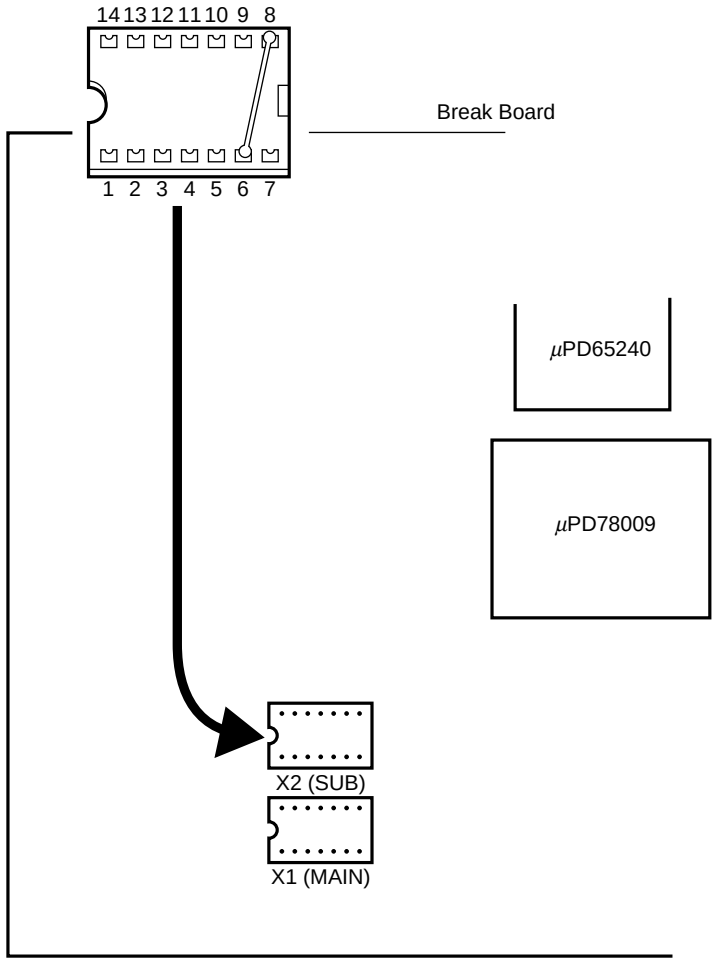


Parts Holder Inter-Pin Numbers
6-8

<2> Prepare the break board and the IE-780308-R-EM.

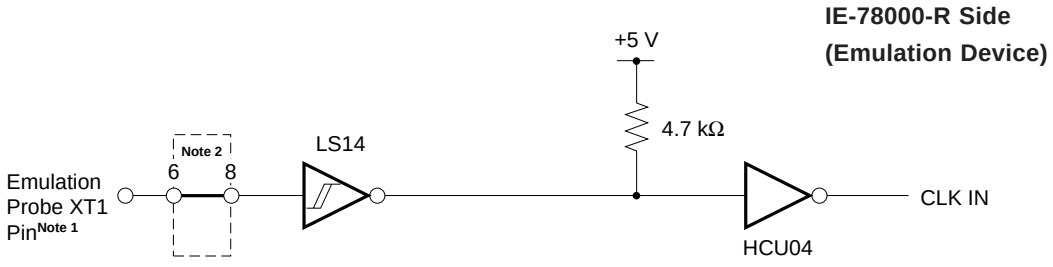
<3> Insert parts holder <1> in the socket (marked “X2 (SUB)”) on the break board. Ensure that the pin 1 mark is correctly oriented when inserting the parts holder.

Figure 4-16. Parts Holder Mounting Location (When External Clock is Used as Subsystem Clock)



<4> Install the IE-780308-R-EM and break board in the IE-78000-R.

The following circuit is configured by means of the above procedure, enabling the clock signal on the target system to be supplied to the emulation device.



Notes 1. Target device pin name

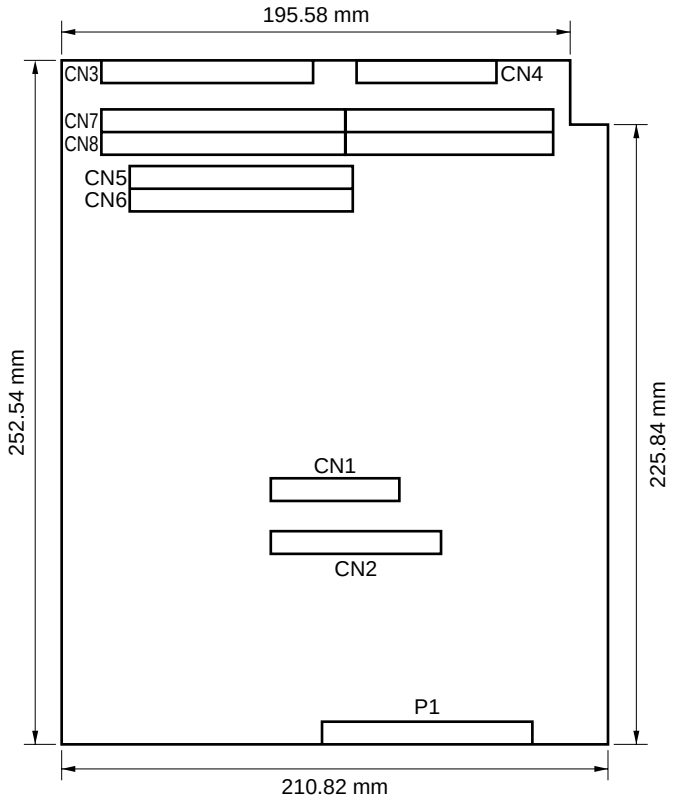
2. Parts holder pin numbers

Remark The area enclosed by the dotted line is the part of the circuit mounted on the parts holder.

APPENDIX A IE-780308-R-EM PRODUCT SPECIFICATIONS

Product name	:	IE-780308-R-EM
Peripheral emulation device	:	μPD78P054, 78P0308
Operating temperature	:	0 to 50 °C
Humidity	:	10 to 80% RH (no condensation)
Storage temperature	:	–15 to +60 °C
Power supply	:	Power supply capacity : DC 100 mA (MAX.) 0.50 W +2 V
		2.0 A (MAX.) 10.0 W +5 V
		3.8 mA (MAX.) 0.05 W +12 V

Printed wiring board dimensions:



Connectors : Connectors on IE-780308-R-EM board

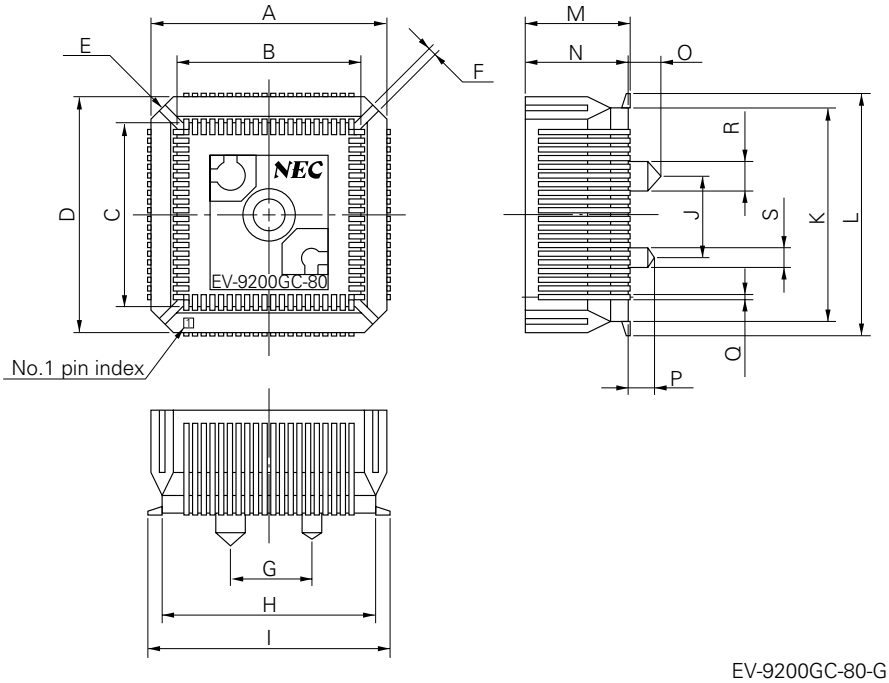
CN1	Break board connectors
CN2	
CN3	Emulation probe connectors
CN4	
CN5	Connector board connectors
CN6	
CN7	
CN8	
P1	Mother bus connector

APPENDIX B CONVERSION SOCKET AND CONVERSION ADAPTER

B.1 CONVERSION SOCKET PACKAGE DRAWINGS AND RECOMMENDED BOARD MOUNTING PATTERN

B.1.1 EV-9200GC-80

Figure B-1. EV-9200GC-80 Package Drawings (Reference)

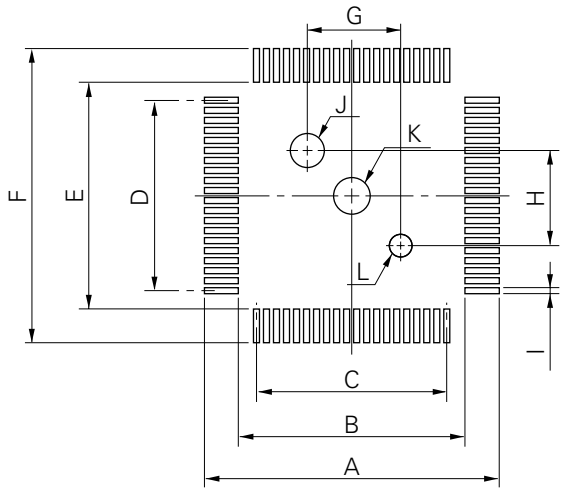


EV-9200GC-80-G1E

ITEM	MILLIMETERS	INCHES
A	18.0	0.709
B	14.4	0.567
C	14.4	0.567
D	18.0	0.709
E	4-C 2.0	4-C 0.079
F	0.8	0.031
G	6.0	0.236
H	16.0	0.63
I	18.7	0.736
J	6.0	0.236
K	16.0	0.63
L	18.7	0.736
M	8.2	0.323
N	8.0	0.315
O	2.5	0.098
P	2.0	0.079
Q	0.35	0.014
R	φ2.3	φ0.091
S	φ1.5	φ0.059

Figure B-2. EV-9200GC-80 Recommended Board Mounting Pattern (Reference)

Based on EV-9200GC-80
(2) Pad drawing (in mm)



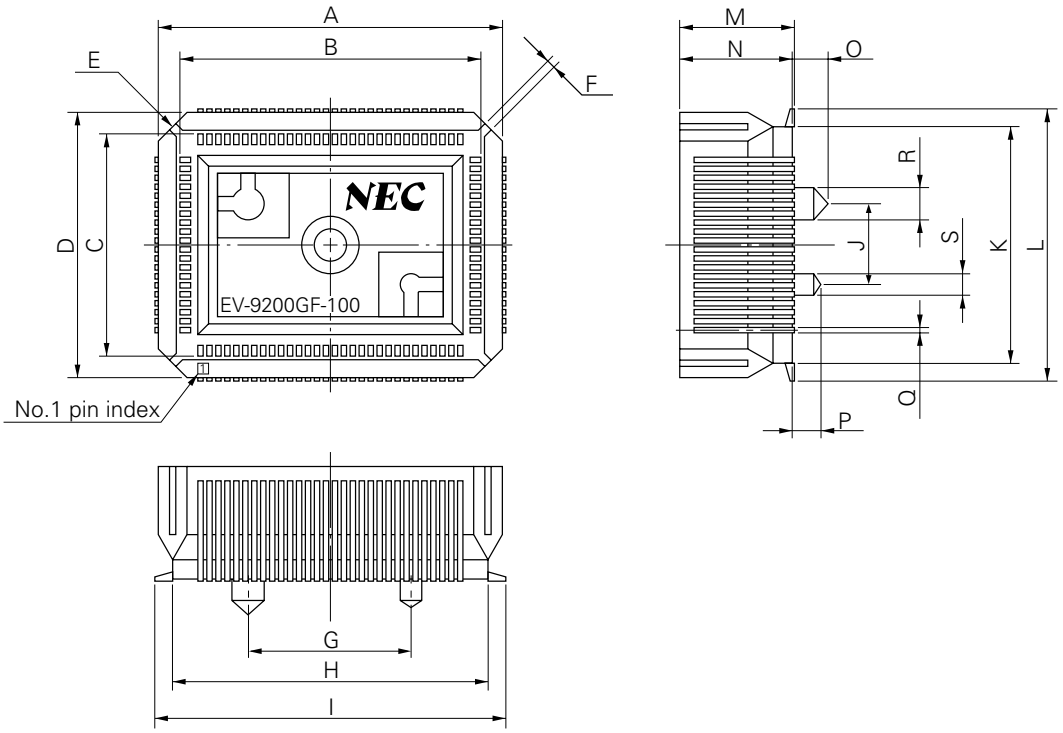
EV-9200GC-80-P1E

ITEM	MILLIMETERS	INCHES
A	19.7	0.776
B	15.0	0.591
C	$0.65\pm0.02\times19=12.35\pm0.05$	$0.026^{+0.001}_{-0.002}\times0.748=0.486^{+0.003}_{-0.002}$
D	$0.65\pm0.02\times19=12.35\pm0.05$	$0.026^{+0.001}_{-0.002}\times0.748=0.486^{+0.003}_{-0.002}$
E	15.0	0.591
F	19.7	0.776
G	6.0 ± 0.05	$0.236^{+0.003}_{-0.002}$
H	6.0 ± 0.05	$0.236^{+0.003}_{-0.002}$
I	0.35 ± 0.02	$0.014^{+0.001}_{-0.001}$
J	$\phi2.36\pm0.03$	$\phi0.093^{+0.001}_{-0.002}$
K	$\phi2.3$	$\phi0.091$
L	$\phi1.57\pm0.03$	$\phi0.062^{+0.001}_{-0.002}$

Caution Dimensions of mount pad for EV-9200 and that for target device (QFP) may be different in some parts. For the recommended mount pad dimensions for QFP, refer to "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (C10535E).

B.1.2 EV-9200-GF-100

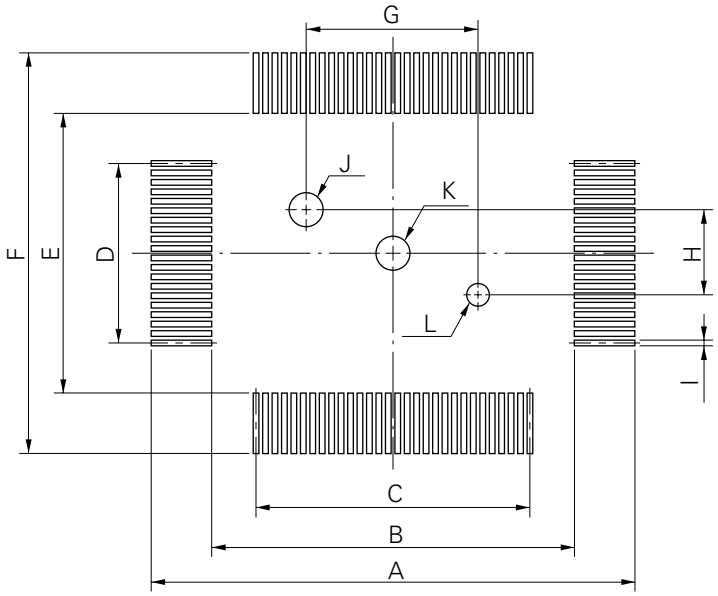
Figure B-3. EV-9200GF-100 Package Drawings (Reference)



EV-9200GF-100-G0E

ITEM	MILLIMETERS	INCHES
A	24.6	0.969
B	21	0.827
C	15	0.591
D	18.6	0.732
E	4-C 2	4-C 0.079
F	0.8	0.031
G	12.0	0.472
H	22.6	0.89
I	25.3	0.996
J	6.0	0.236
K	16.6	0.654
L	19.3	076
M	8.2	0.323
N	8.0	0.315
O	2.5	0.098
P	2.0	0.079
Q	0.35	0.014
R	ϕ2.3	ϕ0.091
S	ϕ1.5	ϕ0.059

Figure B-4. EV-9200GF-100 Recommended Board Mount Pattern (Reference)



EV-9200GF-100-P1E

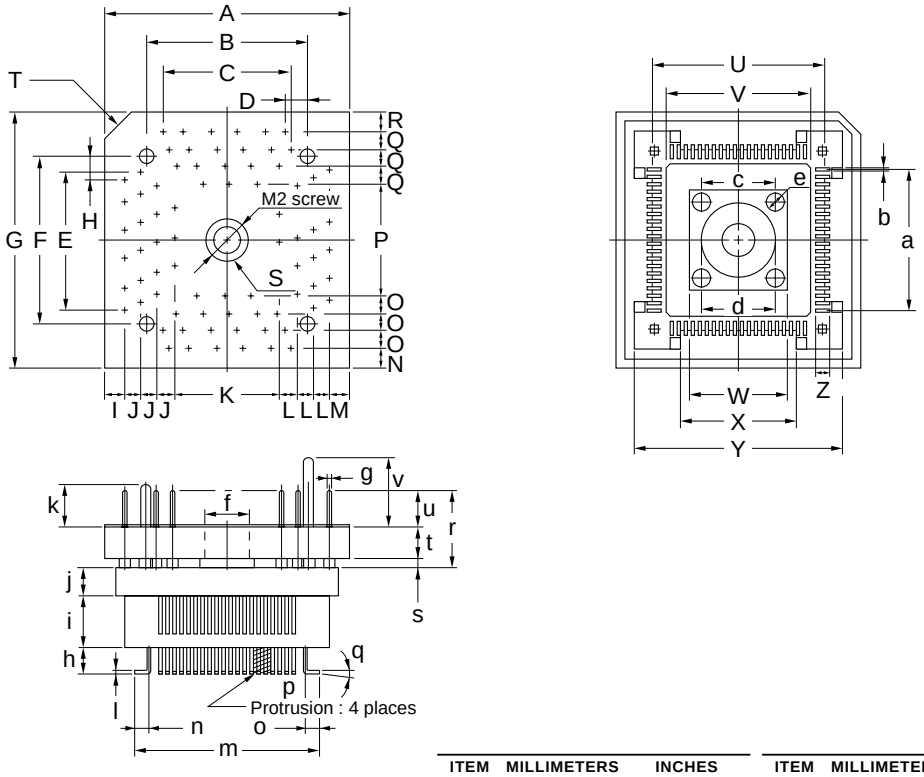
ITEM	MILLIMETERS	INCHES
A	26.3	1.035
B	21.6	0.85
C	0.65±0.02 × 29=18.85±0.05	$0.026^{+0.001}_{-0.002} \times 1.142 = 0.742^{+0.002}_{-0.002}$
D	0.65±0.02 × 19=12.35±0.05	$0.026^{+0.001}_{-0.002} \times 0.748 = 0.486^{+0.003}_{-0.002}$
E	15.6	0.614
F	20.3	0.799
G	12±0.05	$0.472^{+0.003}_{-0.002}$
H	6±0.05	$0.236^{+0.003}_{-0.002}$
I	0.35±0.02	$0.014^{+0.001}_{-0.001}$
J	ϕ2.36±0.03	$\phi 0.093^{+0.001}_{-0.002}$
K	ϕ2.3	ϕ0.091
L	ϕ1.57±0.03	$\phi 0.062^{+0.001}_{-0.002}$

Caution Dimensions of mount pad for EV-9200 and that for target device (QFP) may be different in some parts. For the recommended mount pad dimensions for QFP, refer to "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (C10535E).

B.2 CONVERSION ADAPTER PACKAGE DRAWINGS

★ B.2.1 TGK-080SDW (EV-9500GK-80)

Figure B-5. TGK-080SDW Package Drawings (Reference)



ITEM	MILLIMETERS	INCHES
A	18.0	0.709
B	11.77	0.463
C	0.5x19=9.5	0.020x0.748=0.374
D	0.5	0.020
E	0.5x19=9.5	0.020x0.748=0.374
F	11.77	0.463
G	18.0	0.709
H	0.5	0.020
I	1.58	0.062
J	1.2	0.047
K	7.64	0.301
L	1.2	0.047
M	1.58	0.062
N	1.58	0.062
O	1.2	0.047
P	7.64	0.301
Q	1.2	0.047
R	1.58	0.062
S	ϕ3.55	ϕ0.140
T	C 2.0	C 0.079
U	12.31	0.485
V	10.17	0.400
W	6.8	0.268
X	8.24	0.324
Y	14.8	0.583
Z	1.4±0.2	0.055±0.008

ITEM	MILLIMETERS	INCHES
a	0.5x19=9.5±0.10	0.020x0.748=0.374±0.004
b	0.25	0.010
c	ϕ5.3	ϕ0.209
d	ϕ5.3	ϕ0.209
e	ϕ1.3	ϕ0.051
f	ϕ3.55	ϕ0.140
g	ϕ0.3	ϕ0.012
h	1.85±0.2	0.073±0.008
i	3.5	0.138
j	2.0	0.079
k	3.0	0.118
l	0.25	0.010
m	14.0	0.551
n	1.4±0.2	0.055±0.008
o	1.4±0.2	0.055±0.008
p	h=1.8 ϕ1.3	h=0.071 ϕ0.051
q	0~5°	0.000~0.197°
r	5.9	0.232
s	0.8	0.031
t	2.4	0.094
u	2.7	0.106
v	3.9	0.154

TGK-080SDW-G1E

Note Product of Tokyo Eletech Corp.

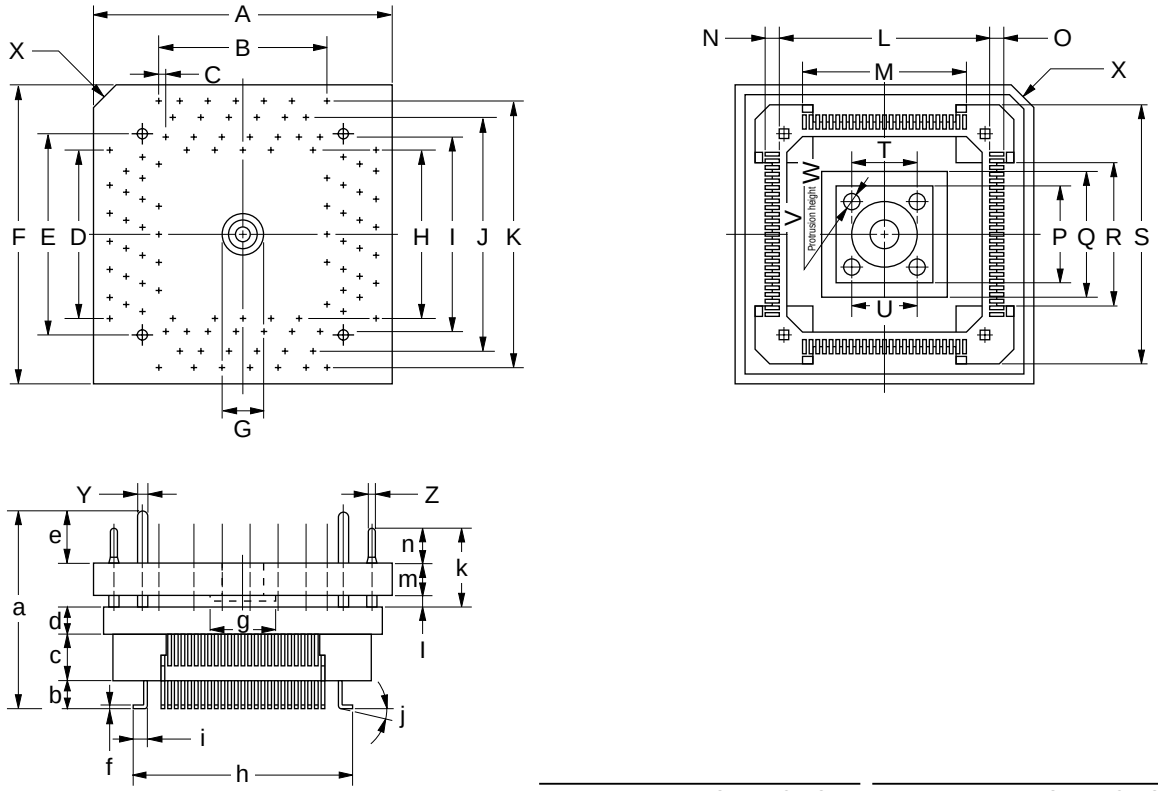
Remarks 1. TGK-080SDW is a product of Tokyo Eletech Corp. (Tokyo (03) 5295-1661) To purchase this product, contact a NEC distributor.

2. The name in parentheses is the old NEC product name.

Phase-out/Discontinued

★ B.2.2 TGC-100SDW (EV-9500GC-100)

Figure B-6. TGC-100SDW Package Drawings (Reference)



ITEM	MILLIMETERS	INCHES
A	21.55	0.848
B	0.5x24=12	0.020x0.945=0.472
C	0.5	0.020
D	0.5x24=12	0.020x0.945=0.472
E	15.0	0.591
F	21.55	0.848
G	ϕ3.55	ϕ0.140
H	10.9	0.429
I	13.3	0.524
J	15.7	0.618
K	18.1	0.713
L	13.75	0.541
M	0.5x24=12.0	0.020x0.945=0.472
N	1.125±0.3	0.044±0.012
O	1.125±0.2	0.044±0.008
P	7.5	0.295
Q	10.0	0.394
R	11.3	0.445
S	18.1	0.713
T	ϕ5.0	ϕ0.197
U	5.0	0.197
V	4-ϕ1.3	4-ϕ0.051
W	1.8	0.071
X	C 2.0	C 0.079
Y	ϕ0.9	ϕ0.035
Z	ϕ0.3	ϕ0.012

ITEM	MILLIMETERS	INCHES
a	14.45	0.569
b	1.85±0.25	0.073±0.010
c	3.5	0.138
d	2.0	0.079
e	3.9	0.154
f	0.25	0.010
g	ϕ4.5	ϕ0.177
h	16.0	0.630
i	1.125±0.3	0.044±0.012
j	0~5°	0.000~0.197°
k	5.9	0.232
l	0.8	0.031
m	2.4	0.094
n	2.7	0.106

TGC-100SDW-G1E

Note Product of Tokyo Eletech Corp.

Remarks 1. TGK-100SDW is a product of Tokyo Eletech Corp. (Tokyo (03) 5295-1661) To purchase this product, contact a NEC distributor.

2. The name in parentheses is the old NEC product name.

APPENDIX C PIN CORRESPONDENCE TABLE OF EMULATION PROBE

EP-78230GC-R, EP-78054GK-R

CN3 Pin No.	Emulation Probe	CN3 Pin No.	Emulation Probe	CN3 Pin No.	Emulation Probe	CN3 Pin No.	Emulation Probe
1	GND	25	15	49	34	73	61
2		26	16	50	33	74	NC
3	EXT0	27	17	51	32	75	
4	EXT1	28	18	52	31	76	70
5	EXT2	29	19	53	41	77	69
6	EXT3	30	20	54	42	78	68
7	EXT4	31	21	55	43	79	67
8	EXT5	32	NC	56	44	80	66
9	EXT6	33		57	45	81	65
10	EXT7	34	30	58	46	82	64
11	1	35	29	59	47	83	63
12	2	36	28	60	48	84	62
13	3	37	27	61	49	85	80
14	4	38	26	62	50	86	79
15	5	39	25	63	51	87	78
16	6	40	24	64	52	88	77
★ 17	7	41	23	65	53	89	76
★ 18	8	42	22	66	54	90	75
19	9	43	40	67	55	91	74
20	10	44	39	68	56	92	73
21	11	45	38	69	57	93	72
22	12	46	37	70	58	94	71
23	13	47	36	71	59	95	GND
24	14	48	35	72	60	96	

Remark The meaning of the symbols and figures in the Emulation Probe column is as follows:

GND : Ground clip
EXT0–EXT7 : External sense clips 1–8
1–80 : Emulation probe tip pin numbers
NC : No Connection

EP-78064GC-R, EP-78064GF-R (1/2)

CN3 Pin No.	Emulation Probe	CN3 Pin No.	Emulation Probe	CN3 Pin No.	Emulation Probe	CN3 Pin No.	Emulation Probe
1	GND	25	3	49	15	73	45
2		26	2	50	14	74	46
3	30	27	1	51	100	75	47
4	29	28	NC	52	99	76	48
5	28	29		53	98	77	49
6	27	30		54	97	78	50
7	26	31		55	96	79	63
8	25	32		56	95	80	64
9	24	33		57	94	81	65
10	23	34		58	93	82	66
11	22	35		59	92	83	67
12	21	36	40	60	91	84	81
13	20	37	39	61	NC	85	82
14	19	38	38	62		86	83
15	13	39	37	63		87	84
16	12	40	36	64		88	85
17	11	41	35	65		89	86
18	10	42	34	66		90	87
19	9	43	33	67		91	88
20	8	44	32	68		92	89
21	7	45	31	69	41	93	90
22	6	46	18	70	42	94	NC
23	5	47	17	71	43	95	
24	4	48	16	72	44	96	

Remark The meanings of the symbols and figures in the Emulation Probe column is as follows:

GND : Ground clip

1–100 : Emulation probe tip pin numbers

NC : No connection

EP-78064GC-R, EP-78064GF-R (2/2)

CN4 Pin No.	Emulation Probe	CN4 Pin No.	Emulation Probe	CN4 Pin No.	Emulation Probe	CN4 Pin No.	Emulation Probe
1	NC	13	58	25	75	37	NC
2		14	59	26	76	38	
3		15	60	27	77	39	EXT0
4		16	61	28	78	40	EXT1
5		17	62	29	79	41	EXT2
6	51	18	68	30	80	42	EXT3
7	52	19	69	31	NC	43	EXT4
8	53	20	70	32		44	EXT5
9	54	21	71	33		45	EXT6
10	55	22	72	34		46	EXT7
11	56	23	73	35		47	GND
12	57	24	74	36		48	

Remark The meanings of the symbols and figures in the Emulation Probe column is as follows:

GND : Ground clip
EXT0–EXT7 : External sense clip
51–80 : Emulation probe tip pin numbers 1–8
NC : No connection

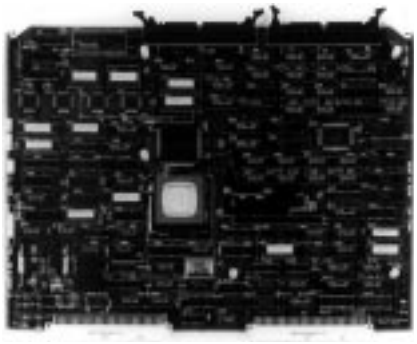
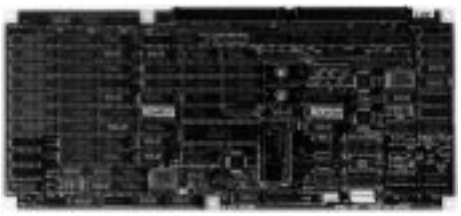
[MEMO]

APPENDIX D SYSTEM CONFIGURATION

Table D-1 shows the IE-78000-R system configuration list.

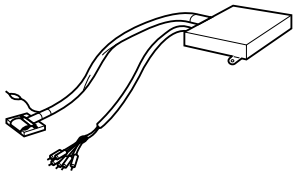
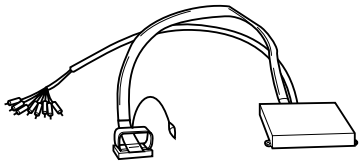
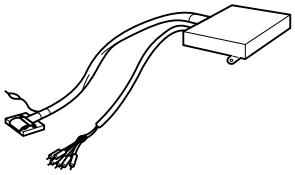
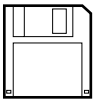
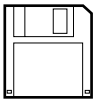
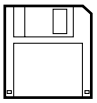
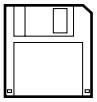
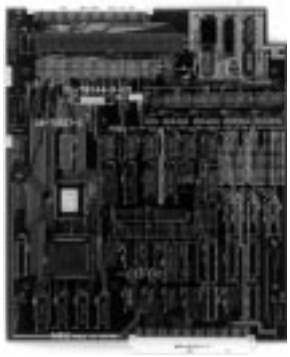
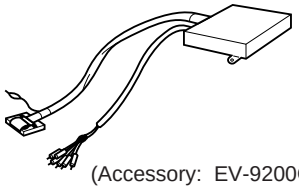
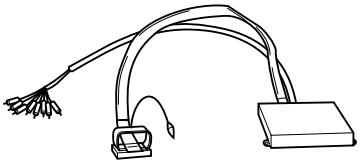
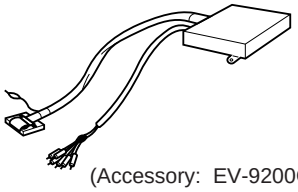
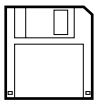
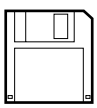
Phase-out/Discontinued

Table D-1. IE-78000-R System Configuration (1/8)

Target Device	Housing and Control/Trace Board	Break Board
μPD78002, 78002Y Subseries	 78K Series housing (w/power supply)	 IE-78000-R-BK (78K/0 Series common break board)
μPD78014, 78014Y Subseries		
μPD78018F, 78018FY Subseries		
μPD780001	 IE-78000-R-CS-A (78K Series common control/trace board)	
μPD78024 Subseries		
μPD78044F Subseries		

Phase-out/Discontinued

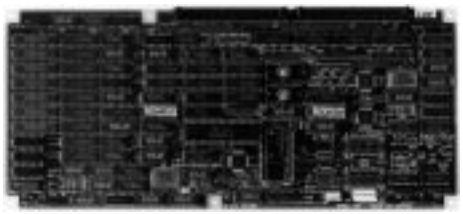
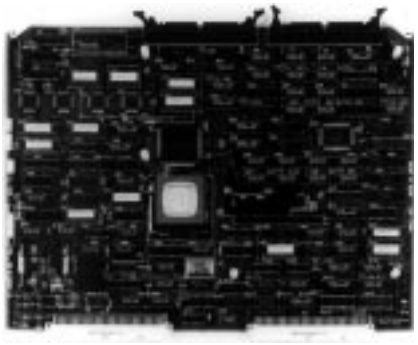
Table D-1. IE-78000-R System Configuration (2/8)

Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-78014-R-EM[Note 1] or  IE-78014-R-EM-A	 (Accessory: EV-9200GC-64 (1)) EP-78240GC-R  EP-78240CW-R  (Accessory: TGK-064SBW[Note 2] (1)) EP-78012GK-R[Note 3]	 SD78K/0 (with ROM)	 DF78002  DF78014  DF780001
 IE-78044-R-EM	 (Accessory: EV-9200G-64 (1)) EP-78024GF-R  EP-78024CW-R  (Accessory: EV-9200G-80 (1)) EP-78130GF-R		 DF78024  DF78044

★ **Notes 1.** For μPD78002, 78002Y, 78014, and 78014Y Subseries only
2. Product of Tokyo Eletech Corp.
3. For μPD78018F Subseries only

Phase-out/Discontinued

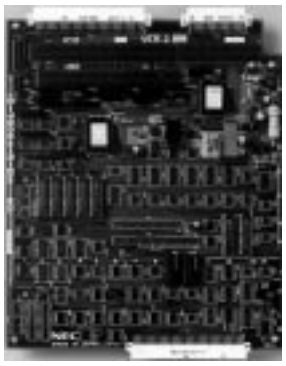
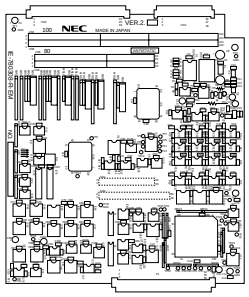
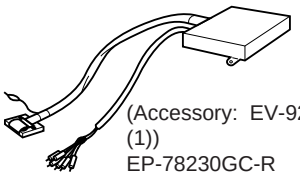
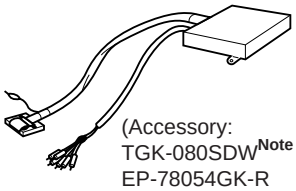
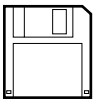
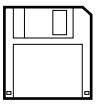
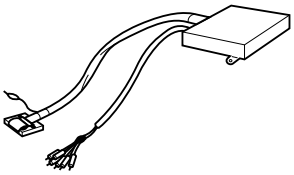
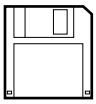
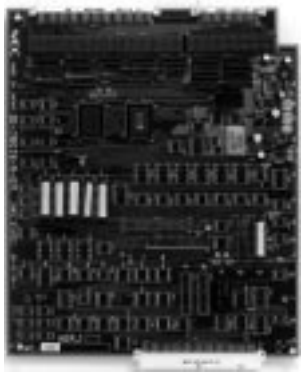
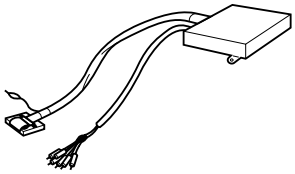
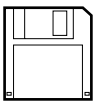
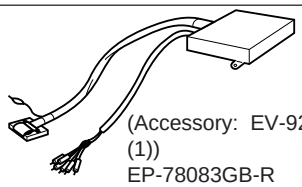
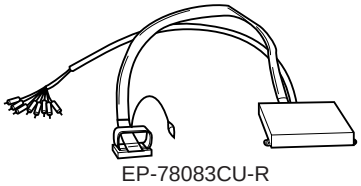
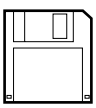
Table D-1. IE-78000-R System Configuration (3/8)

Target Device	Housing and Control/Trace Board	Break Board
μPD78054, 78054Y Subseries	 78K Series housing (w/power supply)  IE-78000-R-CS-A (78K Series common control/trace board)	 IE-78000-R-BK (78K/0 Series common break board)
μPD78058F, 78058FY Subseries		
★ μPD78058, 780058Y Subseries		
μPD78064, 78064Y Subseries		
μPD78064B Subseries		
μPD78070A μPD78070AY		
μPD78078, 78078Y Subseries		
μPD78083 Subseries		

Caution μPD780058 Subseries is under development. μPD780058Y Subseries is under planning.

Phase-out/Discontinued

Table D-1. IE-78000-R System Configuration (4/8)

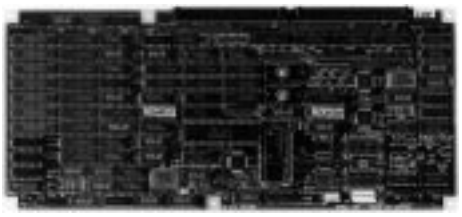
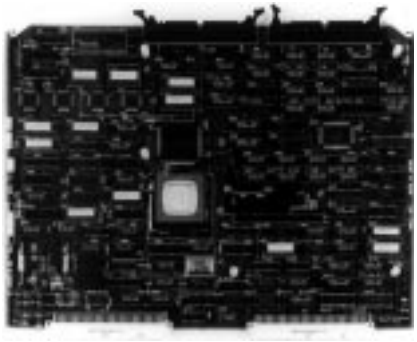
Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-78064-R-EM or  IE-780308-R-EM	 (Accessory: EV-9200GC-80 (1)) EP-78230GC-R  (Accessory: TGK-080SDW[Note 1] (1)) EP-78054GK-R	 SD78K/0 (with ROM)	 DF78054
	 (Accessory: TGC-100SDW[Note 1] (1)) EP-78064GC-R[Note 3]		 DF78064
 IE-78078-R-EM	 (Accessory: EV-9200GF-100 (1)) EP-78064GF-R		 DF78078
	 (Accessory: EV-9200G-44 (1)) EP-78083GB-R  EP-78083CU-R		 DF78083

★ **Notes 1.** Product of Tokyo Eletech Corp.

2. Supports the μPD78052, 78053, 78054, 78058, 78058F, 78058FY, 780058, and 780058Y Subseries only.

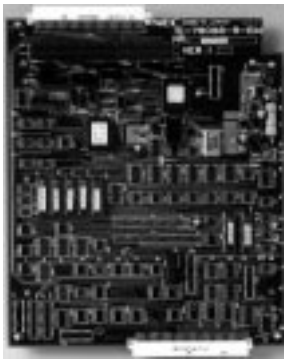
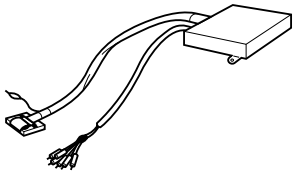
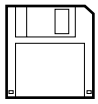
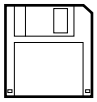
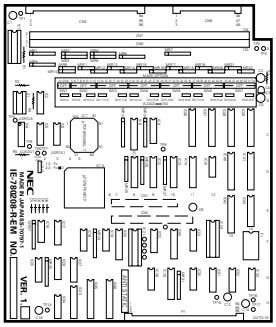
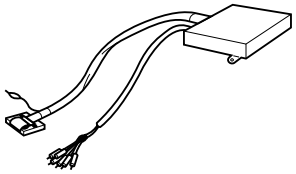
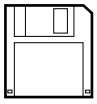
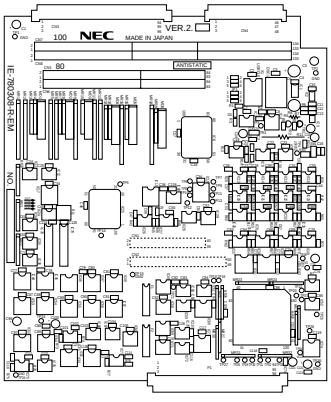
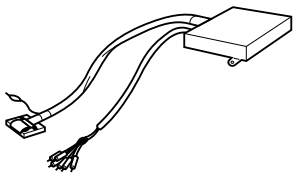
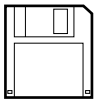
3. Supports the μPD78064, 78064Y, 78064B, 78078 Subseries, μPD78070A, and 78070AY only.

Table D-1. IE-78000-R System Configuration (5/8)

Target Device	Housing and Control/Trace Board	Break Board
μPD78098 Subseries μPD78098B Subseries μPD780208 Subseries μPD780308, 780308Y Subseries	 78K Series common housing (w/power supply)  IE-78000-R-CS-A (78K Series common control/trace board)	 IE-78000-R-BK (78K/0 Series common break board)

Phase-out/Discontinued

Table D-1. IE-78000-R System Configuration (6/8)

Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-78098-R-EM[Note 1] or IE-780908-R-EM	 (Accessory: EV-9200GC-80 (1)) EP-78230GC-R	 SD78K/0 (with ROM)	 DF78098
 IE-780208-R-EM	 (Accessory: TGC-100SDW[Note 2] (1)) EP-78064GC-R[Note 3]		 DF780208
 IE-780308-R-EM	 (Accessory: EV-9200GF-100 (1)) EP-78064GF-R		 DF78064

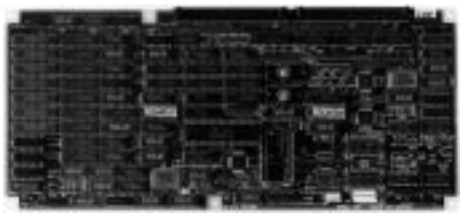
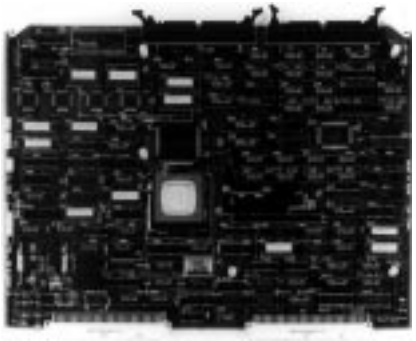
★ **Notes 1.** IE-78098-R-EM is a maintenance product.

★ **2.** Product of Tokyo Eletech Corp.

3. Supports the μPD780308 Subseries only.

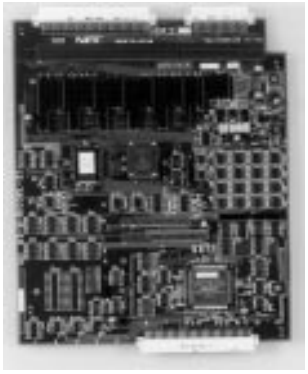
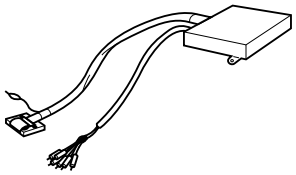
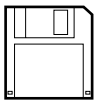
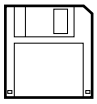
Phase-out/Discontinued

Table D-1. IE-78000-R System Configuration (7/8)

Target Device	Housing and Control/Trace Board	Break Board
★ μPD780018AY Subseries	 78K Series common housing (w/power supply)  IE-78000-R-CS-A (78K Series common control/trace board)	 IE-78000-R-BK (78K/0 Series common break board)

Caution μPD780018AY Subseries are under development.

Table D-1. IE-78000-R System Configuration (8/8)

Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-780018-R-EM	 (Accessory: EV-9200GF-100 (1)) EP-78064GF-R	 SD78K/0 (with ROM)	 DF780018[Note]

Note Under development

[MEMO]

APPENDIX E PERFORMING VERSION UPGRADE FROM OTHER IN-CIRCUIT EMULATOR TO IE-78000-R

If you already have a 78K series or 75X/XL series in-circuit emulator, you can upgrade it to the equivalent of the 78K/0 in-circuit emulator IE-78000-R by replacing the internal break board with the IE-78000-R-BK board.

Table E-1. System Upgrade Methods

Series Name	Current In-Circuit Emulator	Board to be Purchased
75X/XL series	IE-75000-R[Note], IE-75001-R	IE-78000-R-BK
78K/I series	IE-78130-R, IE-78140-R	
78K/II series	IE-78230-R[Note], IE-78230-R-A E-78240-R[Note], IE78240-R-A	
78K/III series	IE-78320-R[Note], IE-78327-R IE-78330-R, IE-78350-R	

Note Maintenance product

[MEMO]

APPENDIX F REVISION HISTORY

The following shows the revision history. The 'Applied to' column indicates the chapters in each edition which have been revised.

Edition	Major Revisions from the Previous Edition	Applied to
2nd edition	The following devices have been added as the target devices: μPD780058, 780058Y subseries μPD78052(A), 78053(A), 78054(A), 78058F(A), 78058FY(A), 78064B(A)	Throughout
	The following target devices have been developed: μPD78056F, 78058F, 78P058F, 78056FY, 78058FY, 78P058FY, 780306, 780308, 780306Y, 780308Y	
	Figures 3-1, 3-3, 3-5, 3-6, 3-8, 3-9 Emulation Circuit Evaluation Circuit Diagram have been modified.	CHAPTER 3 DIFFERENCES FROM TARGET DIVICE
	Power supply capacity has been changed.	APPENDIX A IE-780308-R-EM PRODUCT SPECIFICATIONS
	EV-9500GK-80 and EV-9500GC-100 have been changed to the TGK-080SDW and TGC-100SDW conversion adapters of Tokyo Eletech Corp. respectively.	APPENDIX B CONVERSION SOCKET AND CONVERSION ADAPTER
	The μPD780018AY subseries has been added as a target device in **Table D-1. IE-78000-R System Configuration**.	APPENDIX D SYSTEM CONFIGURATION

[MEMO]

Phase-out/Discontinued

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