

CUSTOMER NOTIFICATION

SUD-DT-03-0327-1-E
July 31, 2003
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**IE-760047-G1-EM1**  
**Preliminary User's Manual**

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M5A 02.11-1

# INTRODUCTION

**Target Readers** This manual is intended for users who design and develop application systems using the V850ES/ST1.

**Purpose** The purpose of this manual is to describe the proper operation of the IE-760047-G1-EM1, and its basic specifications.

**Organization** This manual is broadly divided into the following parts.

- Overview
- Names and functions of parts
- Cautions

## How to Read This Manual

It is assumed that the reader of this manual has general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers. The IE-760047-G1-EM1 is used connected to the IE-V850ES-G1 in-circuit emulator. This manual explains the basic setup procedure and switch settings of the IE-V850ES-G1 when it is connected to the IE-760047-G1-EM1. For the names and functions of parts, and the connection of elements, refer to the IE-V850ES-G1 User's Manual.

To learn about the basic specifications and operation methods.

→ Read this manual in the order of the CONTENTS.

To learn the operation methods and command functions, etc., of the IE-V850ES-G1 and IE-760047-G1-EM1.

→ Read the user's manual of the debugger (sold separately) that is used.

## Conventions

**Note:** Footnote for item marked with **Note** in the text.

**Caution:** Information requiring particular attention.

**Remark:** Supplementary information.

Numeral representation: Binary ... xxxx or xxxxB

Decimal ... xxx

Hexadecimal ... xxxH

Units for representing powers of 2 (address space or memory space):

K (kilo):  $2^{10} = 1,024$

M (mega):  $2^{20} = 1,024^2$

**Terminology**

The meanings of terms used in this manual are listed below.

Term	Meaning
Target device	Refers to the device targeted for emulation.
Target system	Refers to the system targeted for debugging. This includes the target program and the hardware created by the user. In the narrow sense, it means hardware only.

**Related Document** When using this manual, refer to the following manuals.

The related documents indicated in this publication may include preliminary versions.

However, preliminary versions are not marked as such.

- Documents related to development tools (user's manuals)

Document Name	Document Number	
IE-V850ES-G1	U16313E	
IE-760047-G1-EM1	This manual	
CA850 (Ver.2.50 or later) [C compiler package]	Operation	U16053E
	C Language	U16054E
	Project Manager plus	U16055E
	Assembly Language	U16042E
ID850 (Ver.2.51) [Integrated debugger]	Operation Windows-Based	U16217E
SM850 (Ver.2.50) [System simulator]	Operation Windows-Based	U16218E
RX850 [Real-time OS]	Basics	U13430E
	Installation	U13410E
RX850 Pro [Real-time OS]	Fundamental	U13773E
	Installation	U13774E
RD850 [Task debugger]	Windows-Based	U13737E
RD850 Pro [Task debugger]	Windows-Based	U13916E
AZ850 [System performance analyzer]		U14410E

# CONTENTS

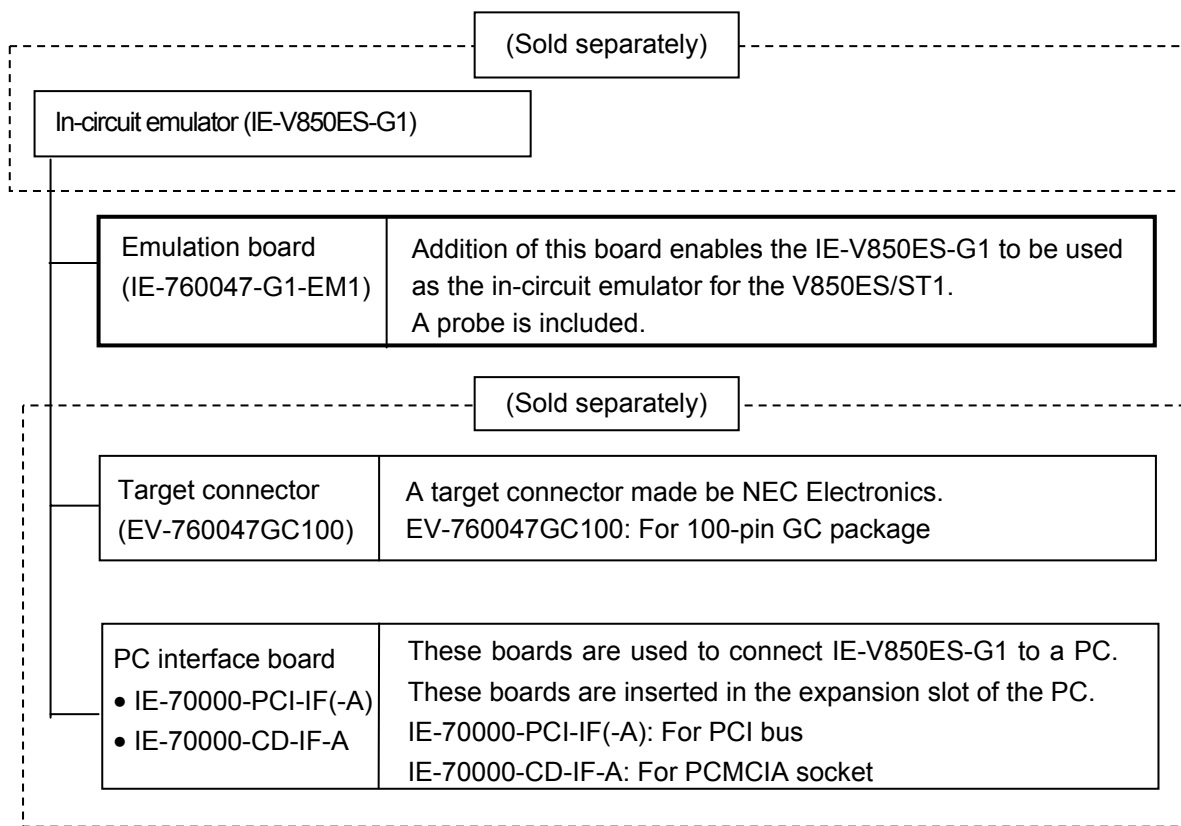
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## CHAPTER 1 OVERVIEW

The IE-760047-G1-EM1 is an emulation board for the IE-V850ES-G1 in-circuit emulator. By connecting the IE-760047-G1-EM1 and IE-V850ES-G1, hardware and software can be debugged efficiently in system development using the V850E/ST1.

In this manual, the basic setup procedure and switch settings of the IE-V850ES-G1 when using the IE-760047-G1-EM1 are described. For the names and functions of the parts of the IE-V850ES-G1, and for the connection of elements, refer to the IE-V850ES-G1 User's Manual.

### 1.1 Hardware Configuration



## 1.2 Features (When Connected to IE-V850ES-G1)

- Maximum operating frequency: 20MHz (at 3.0 to 3.6 V operation)
- The following pins can be masked.  
\_RESET, NMI
- The dimensions of the IE-760047-G1-EM1 are as follows.

Parameter		Value
External dimensions	Height	35 mm
	Length	205 mm
	Width	140 mm

## 1.3 Function Specifications (When Connected to IE-V850ES-G1)

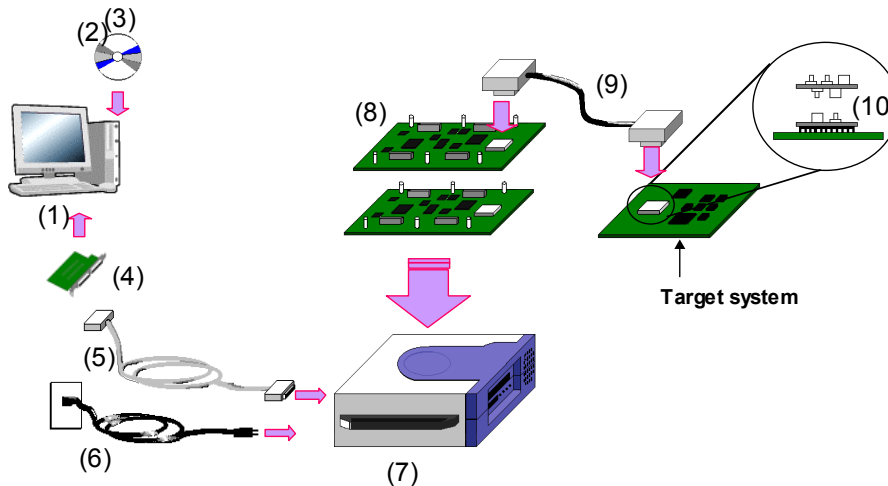
Parameter		Specification
Emulation memory capacity	Internal ROM	768 KB
	User memory	4 MB
Coverage memory capacity for execution/pass detection	Internal ROM	256 KB
	External memory	1 MB
Coverage memory capacity for memory access detection	External memory	1 MB
Coverage memory capacity for branching entry number counting	Internal ROM	256 KB
	External memory	1 MB
Trace memory capacity		168 bits × 32K frames
Time measurement function		On-chip timer: 3
External logic probe		8-bit external trace possible
		Event setting for trace/break possible
Break function		Event break
		Step execute break
		Forced break
		Fail safe break <ul style="list-style-type: none"> <li>• Illegal access to peripheral I/O</li> <li>• Access to guard space</li> <li>• Write to the ROM space</li> </ul>

**Caution** Some of the functions may not be supported, depending on the debugger used.

## 1.4 System Configuration

The system configuration when connecting the IE-V850ES-G1 to the IE-760047-G1-EM1 and a PC (PC-9800 series or PC/AT compatible) is shown below.

**Figure 1-1. System Configuration**



### Remark

- <1>: PC (PC-9800 series or PC/AT compatibles)
- <2>: Debugger (sold separately)
- <3>: Device file
- <4>: PC interface board (for PCI bus or PCMCIA: Sold separately)
- <5>: PC interface cable (included with the IE-V850ES-G1 [sold separately])
- <6>: Power supply cable (included with the IE-V850ES-G1 [sold separately])
- <7>: In-circuit emulator (IE-V850ES-G1: Sold separately)
- <8>: In-circuit emulator emulation board (IE-760047-G1-EM1: This product)
- <9>: Probe (included with the IE-760047-G1-EM1)
- <10>: EV-760047GC100 (Sold separately)

## 1.5 Packing Contents

The packing box contains the emulation board (IE-760047-G1-EM1), package details, user's manual, and guarantee card. If there are any missing or damaged items, please contact an NEC Electronics sales representative.

- (a) SEM screw: 6
- (b) 6-pin header (for mounting OSC1 clock oscillator): 1
- (c) Cell spacer: 6
- (d) Front panel: 1

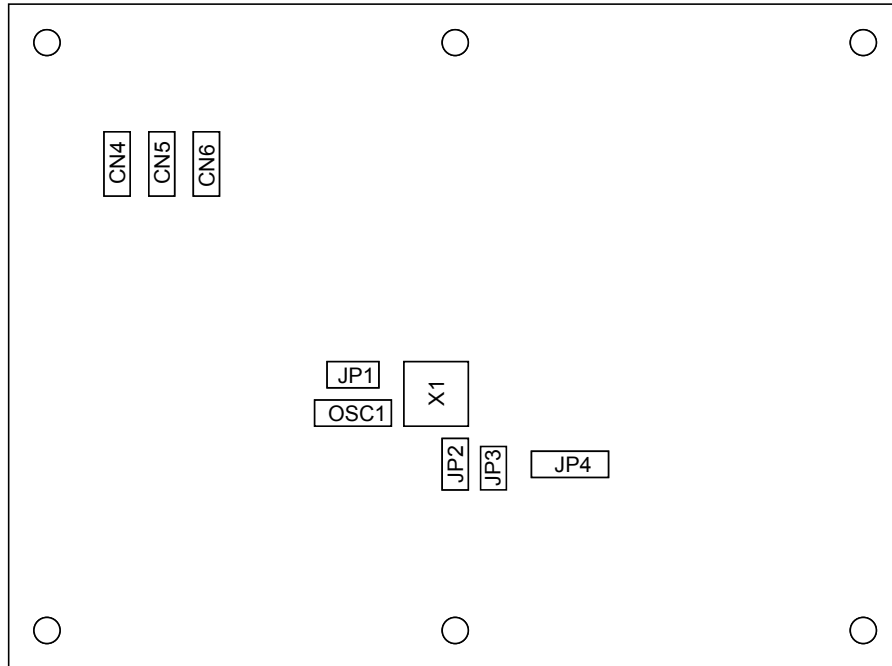


## CHAPTER 2 NAMES AND FUNCTIONS OF PARTS

This chapter describes the names and functions of the parts in the IE-760047-G1-EM1. For details of the IE-V850ES-G1, refer to the IE-V850ES-G1 User's Manual.

### 2.1 Names and Functions of Parts in IE-760047-G1-EM1

Figure 2-1. Part Names of IE-760047-G1-EM1



(1) X1, OSC1: These are the sockets used to mount the main clock oscillator.

(Refer to **3.2 Clock Settings** for details.)

(2) JP1: This is the jumper used to switch the main clock supply.

- Set JP1 as shown below when using the X1 clock on the IE-760047-G1-EM1 as the main clock.  
1-2: Shorted, 3-4: Shorted, 5-6: Leave open, 7-8: Leave open (default setting)
- Set JP1 as shown below when using the OSC1 clock on the IE-760047-G1-EM1 as the main clock  
1-2: Leave open, 3-4: Leave open, 5-6: Leave open, 7-8: Leave open

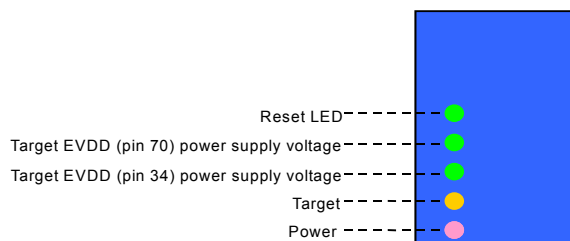
(3) JP2, JP3, JP4: Not used.

(4) CN4, CN5, CN6: Probe connector.

## 2.2 LEDs Controlled by IE-760047-G1-EM1

Some of the LEDs mounted on the IE-V850ES-G1 are controlled by the IE-760047-G1-EM1. Refer to the IE-V850ES-G1 User's Manual for details of the LEDs controlled by the IE-V850ES-G1.

**Figure 2-2. LEDs Controlled by IE-760047-G1-EM1**



### (1) Reset LED

The status of the `_RESET` signal input from the target system is shown below.

**Lit (ON):** The target system is connected and the `_RESET` signal is active (GND level).

**Extinguished (OFF):** The target system is not connected or the `_RESET` signal is inactive (VDD level).

### (2) Target EVDD (pin 70) power supply LED

The status of EVDD (pin 70) connected to the target system is shown below.

**Lit (ON):** The target system is connected and voltage is being applied to EVDD (pin 70).

**Extinguished (OFF):** The target system is not connected or voltage is not being applied to EVDD (pin 70).

### (3) Target EVDD (pin 34) power supply LED

The status of EVDD (pin 34) connected to the target system is shown below.

**Lit (ON):** The target system is connected and voltage is being applied to EVDD (pin 34).

**Extinguished (OFF):** The target system is not connected or voltage is not being applied to EVDD (pin 34).

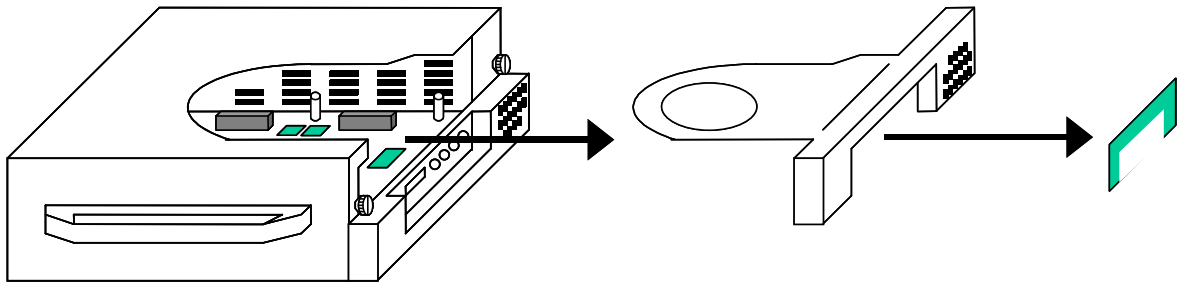
## CHAPTER 3 INSTALLATION

This chapter explains how to connect the IE-760047-G1-EM1 to related products and how to exchange the resonators.

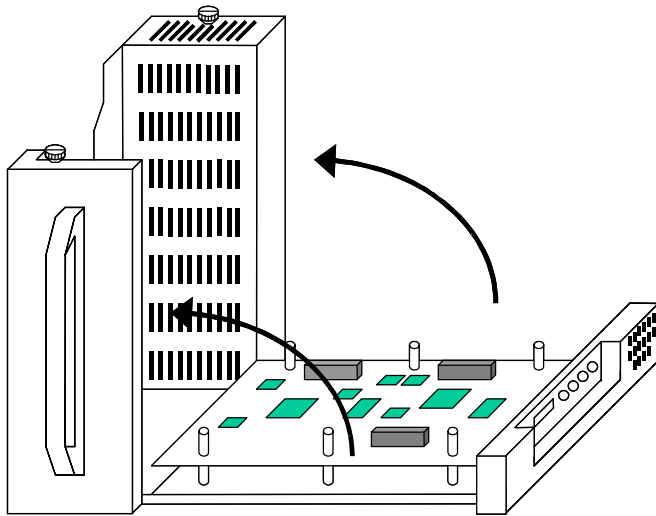
### 3.1 Connecting IE-V850ES-G1 and IE-760047-G1-EM1

How to connect the IE-V850ES-G1 to the IE-760047-G1-EM1 is shown below.

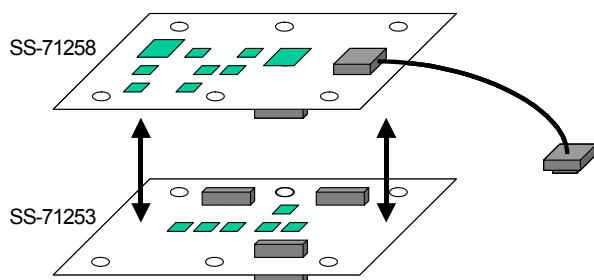
(1) Remove front cover 1 of the IE-V850ES-G1 by putting it out.



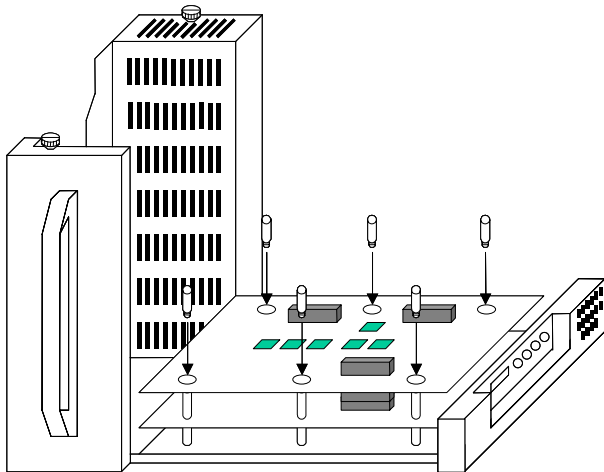
(2) Raise the main unit of the IE-V850ES-G1.



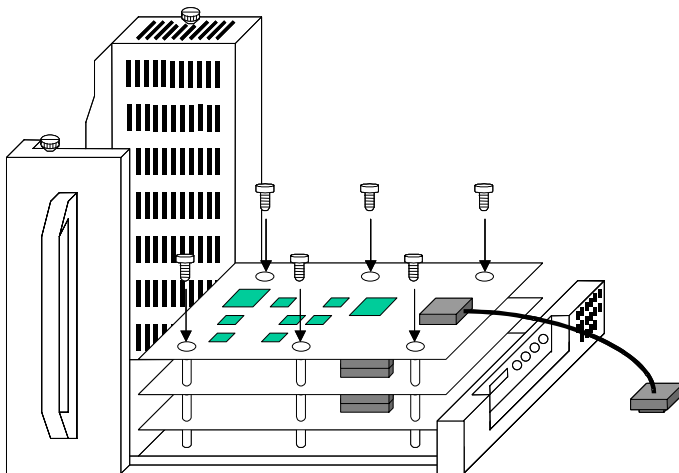
(3) Separate the IE-760047-G1-EM1 into the top board (SS-71258) and bottom board (SS-71253).



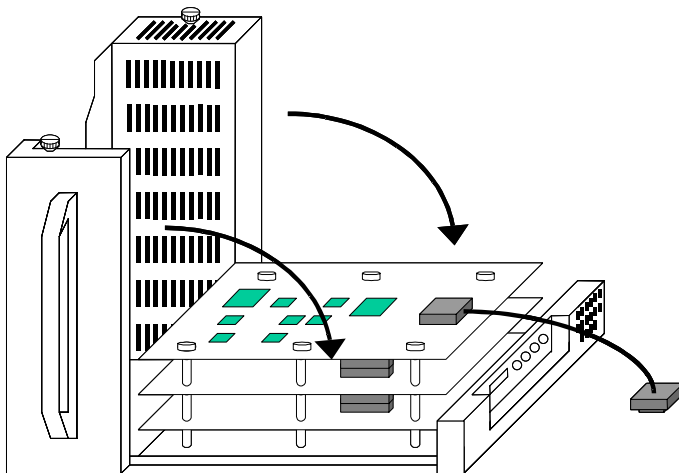
(4) Lay the IE-760047-G1-EM1 (SS-71253) horizontally on the main board of the IE-V850ES-G1, align the boards at three connector blocks, and fix them using the cell spacers supplied with the IE-760047-G1-EM1.



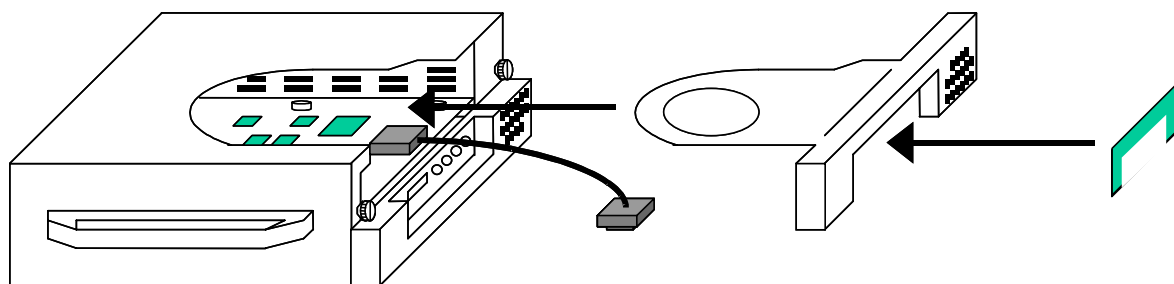
(5) Lay the IE-760047-G1-EM1 (SS-71258) horizontally on the main board of the IE-V850ES-G1, align the boards at three connector blocks, and fix them at the six cell spacers using the six screws supplied with the IE-760047-G1-EM1.



(6) Pull down the main unit of the IE-V850ES-G1.



(6) Fix the front panel on front cover 1 and then on the IE-V850ES-G1.



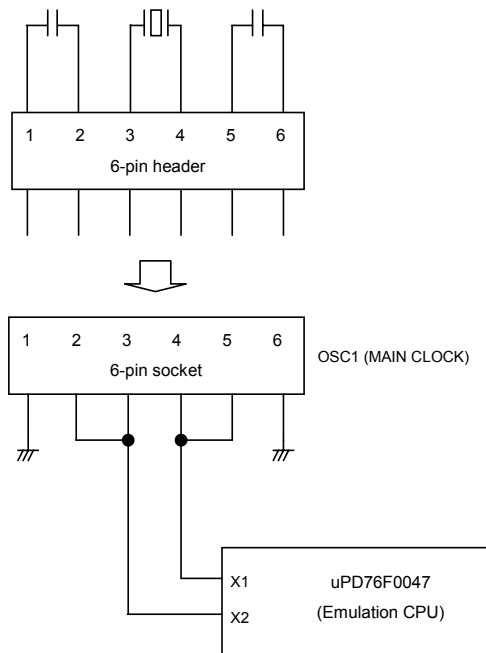
### 3.2 Clock Settings

**The IE-760047-G1-EM1 does not support clock input from the target system.**

When changing the main clock frequency, therefore, exchange the oscillator mounted on X1 (main clock) on the IE-760047-G1-EM1 for another oscillator with the desired frequency, or mount the desired oscillator and capacitor in OSC1. When the product is shipped, the following oscillators are mounted for generating each clock.

Item	Settings
X1 (MAIN CLOCK)	A 20MHz oscillator is mounted on the IE-760047-G1-EM1 (at shipment). Set JP1 as shown below when using the clock mounted on X1 as the main clock. 1-2: Shorted, 3-4: Shorted, 5-6: Leave open, 7-8: Leave open (default settings)
OSC1 (MAIN CLOCK)	Not mounted (at shipment). When using the clock mounted on OSC1 as the main clock, mount a resonator and capacitor on the attached 6-pin header as shown in the figure below, and exchange it with the 6-pin header on OSC1 (MAIN CLOCK). Set JP1 as shown below. 1-2: Leave open, 3-4: Leave open, 5-6: Leave open, 7-8: Leave open

When supplying the main clock from OSC1, mount the resonator and capacitor on the attached 6-pin header and mount it on the 6-pin header on OSC1 (main clock) as shown in the figure below.



**The IE-760047-G1-EM1 does not support clock oscillation by the resonator on the target system.** Therefore, the IE-760047-G1-EM1 cannot emulate the operation between the resonator on the target system and oscillator inside the target device.

## CHAPTER 4 CAUTIONS

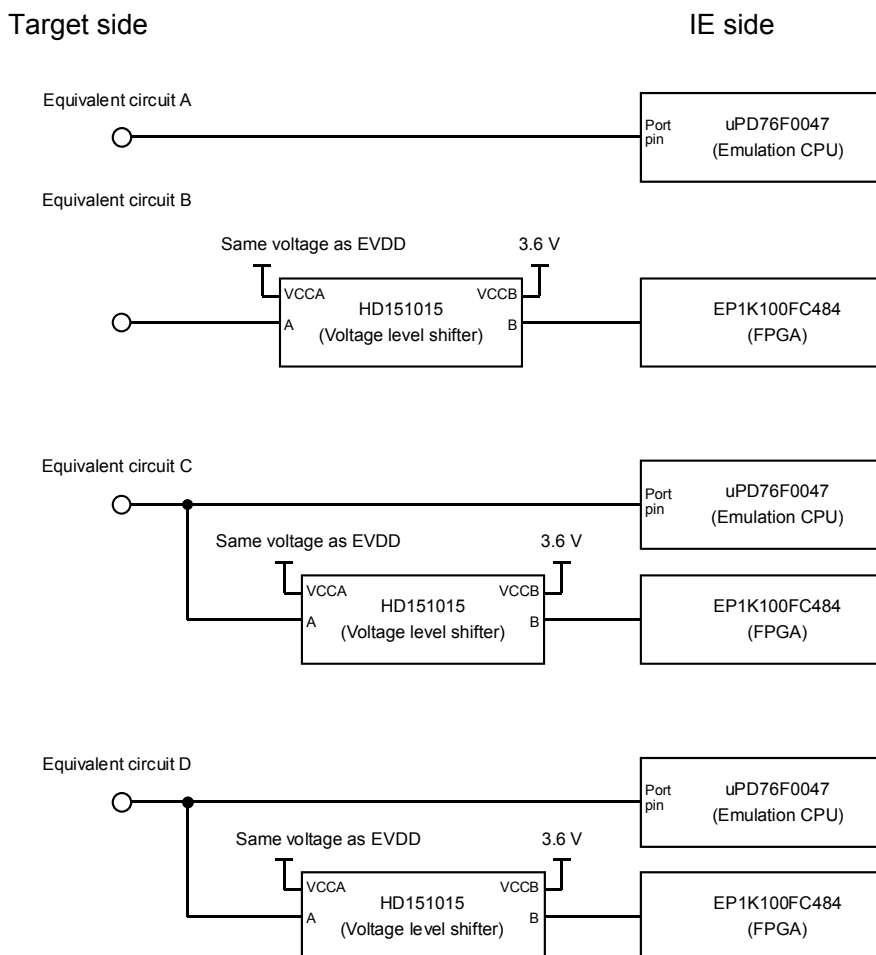
Take note of the following points when using the IE-760047-G1-EM1.

### 4.1 Connection to Target System

Be sure to turn off the power supply to the IE-V850ES-G1 before connecting it to the target system.

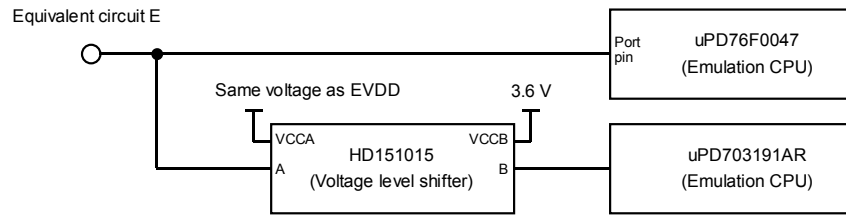
### 4.2 Characteristics of Target Interface

The target interface (signal to connect the in-circuit emulator and target system) operates, in terms of functions, as if the actual device is connected. In terms of characteristics, however, the operation differs from the actual device. The target interface of the IE-V850ES-G1 is any of the following equivalent circuits A to J. The processing of each target interface is shown in Tables 1.

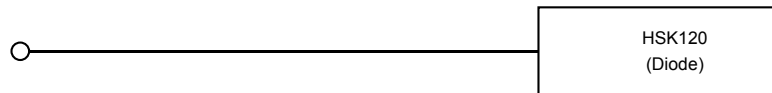


Target side

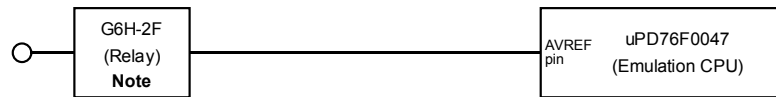
IE side



Equivalent circuit F

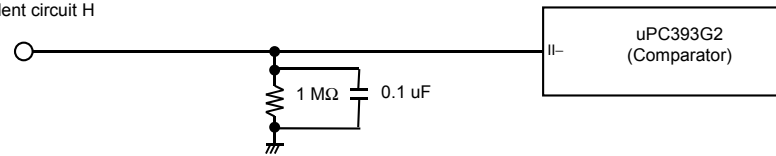


Equivalent circuit G

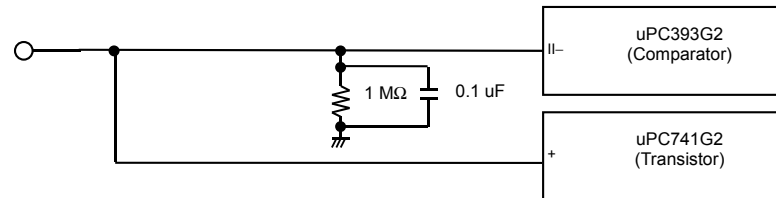


**Note** Conducts current only when the target system is connected.

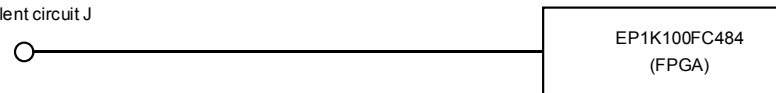
Equivalent circuit H



Equivalent circuit I



Equivalent circuit J





(1) Target interface for V850ES/ST1

Table 1. Target Interface Processing for V850ES/ST1

V850ES/ST1 Pin No	Target Interface Name (V850ES/ST1 Pin Name)	Handling in In-Circuit Emulator
1	AVREF0	Equivalent circuit G
2	AVSS	GND
3	P10/ANO0	Equivalent circuit A
4	P11/ANO1	Equivalent circuit A
5	AVREF1	Equivalent circuit G
6	PDH4/A20	Equivalent circuit D
7	PDH5/A21	Equivalent circuit D
8	IC/FLMD0	Leave open.
9	VDD	Equivalent circuit H
10	VDDOSC	Leave open.
11	VSS	GND
12	X1	Leave open.
13	X2	Leave open.
14	_RESET	Equivalent circuit F
15	PCS0/_CS0	Equivalent circuit J
16	PCS1/_CS1	Equivalent circuit J
17	P02/NMI	Equivalent circuit A
18	P03/INTP0/ADTRG	Equivalent circuit A
19	P04/INTP1	Equivalent circuit A
20	P05/INTP2	Equivalent circuit A
21	P06/INTP3	Equivalent circuit A
22	P40/SIB0	Equivalent circuit A
23	P41/SOB0	Equivalent circuit A
24	P42/_SCKB0	Equivalent circuit A
25	P30/TXDA0/SOB4	Equivalent circuit A
26	P31/INTP7/RXDA0/SIB4	Equivalent circuit A
27	P32/ASCKA0/_SCKB4/TIP00	Equivalent circuit A
28	P33/TIP01/TOP01	Equivalent circuit A
29	P34/TIP10	Equivalent circuit A
30	P35/TIP11/TOP11	Equivalent circuit A
31	P36	Equivalent circuit A
32	P37	Equivalent circuit A
33	EVSS	GND
34	EVDD	Equivalent circuit I
35	P38/TXDA2	Equivalent circuit A
36	P39/RXDA2	Equivalent circuit A
37	P50/RTP00	Equivalent circuit A
38	P51/RTP01	Equivalent circuit A
39	P52/RTP02	Equivalent circuit A
40	P53/RTP03	Equivalent circuit A
41	P54/RTP04	Equivalent circuit A
42	P55/RTP05	Equivalent circuit A
43	P90/A0	Equivalent circuit E
44	P91/A1	Equivalent circuit E
45	P92/A2/TIP41/TOP41	Equivalent circuit E
46	P93/A3/TIP40	Equivalent circuit E
47	P94/A4/TIP31/TOP31	Equivalent circuit E
48	P95/A5/TIP30	Equivalent circuit E
49	P96/A6/TIP21/TOP21	Equivalent circuit E

V850ES/ST1 Pin No	Target Interface Name (V850ES/ST1 Pin Name)	Handling in In-Circuit Emulator
50	P97/A7/TIP20	Equivalent circuit E
51	P98/A8	Equivalent circuit E
52	P99/A9	Equivalent circuit E
53	P910/A10	Equivalent circuit E
54	P911/A11	Equivalent circuit E
55	P912/A12	Equivalent circuit E
56	P913/A13/INTP4	Equivalent circuit E
57	P914/A14/INTP5/TIP51/TOP51	Equivalent circuit E
58	P915/A15/INTP6/TIP50	Equivalent circuit E
59	PDH2/A18	Equivalent circuit C
60	PDH3/A19	Equivalent circuit C
61	PCM0/_WAIT	Equivalent circuit C
62	PCM1/CLKOUT	Equivalent circuit C
63	PCM2/_HLDAK	Equivalent circuit C
64	PCM3/_HLDRQ	Equivalent circuit C
65	PCT0/_WR0	Equivalent circuit C
66	PCT1/_WR1	Equivalent circuit C
67	PCT4/_RD	Equivalent circuit C
68	PCT6/ASTB	Equivalent circuit C
69	EVSS	GND
70	EVDD	Equivalent circuit I
71	PDL0/AD0	Equivalent circuit C
72	PDL1/AD1	Equivalent circuit C
73	PDL2/AD2	Equivalent circuit C
74	PDL3/AD3	Equivalent circuit C
75	PDL4/AD4	Equivalent circuit C
76	PDL5/AD5/FLMD1	Equivalent circuit C
77	PDL6/AD6	Equivalent circuit C
78	PDL7/AD7	Equivalent circuit C
79	PDL8/AD8	Equivalent circuit C
80	PDL9/AD9	Equivalent circuit C
81	PDL10/AD10	Equivalent circuit C
82	PDL11/AD11	Equivalent circuit C
83	PDL12/AD12	Equivalent circuit C
84	PDL13/AD13	Equivalent circuit C
85	PDL14/AD14	Equivalent circuit C
86	PDL15/AD15	Equivalent circuit C
87	PDH0/A16	Equivalent circuit C
88	PDH1/A17	Equivalent circuit C
89	PCS5	Equivalent circuit J
90	PCS4	Equivalent circuit J
91	PCS3/_CS3	Equivalent circuit J
92	PCS2/_CS2	Equivalent circuit J
93	P77 /ANI7	Equivalent circuit A
94	P76 /ANI6	Equivalent circuit A
95	P75/ ANI5	Equivalent circuit A
96	P74/ ANI4	Equivalent circuit A
97	P73/ ANI3	Equivalent circuit A
98	P72/ ANI2	Equivalent circuit A
99	P71/ ANI1	Equivalent circuit A
100	P70/ ANI0	Equivalent circuit A

### 4.3 Power Application/Power off Procedure

Follow the sequence shown below when activating or terminating the emulator.

- When activating the emulator: Power application to the emulator → Power application to the target → Debugger activation
- When terminating the emulator: Debugger termination → Power shutdown to the target → Emulator power shutdown

## CHAPTER 5 RESTRICTIONS

The IE-760047-G1-EM1 has the following restrictions.

### 5.1 Clock Generator

#### (1) Resonator to be connected

Oscillation by a resonator on the target system is not supported. Therefore, the clock oscillation operation on the target system cannot be emulated by the in-circuit emulator.

#### (2) Emulation of oscillation stabilization time after reset

Oscillation stabilization time is inserted after reset in the emulation target device, but it is not inserted in the in-circuit emulator.

#### (3) Operating clock after reset

The operating clock after reset is  $f_{xx}/8$  in the emulation target device, but in the in-circuit emulator, there may be a period in which the clock is not reset to  $f_{xx}/8$  (depending on the reset release timing).

### 5.2 Timing for Setting/Releasing Standby Mode

The timing for setting/releasing standby mode differs between the target device and the in-circuit emulator.

The differences are 1 clock or less for setting and 2 to 3 clocks for release.

### 5.3 Operation During Break

There may be differences between the operation of the in-circuit emulator and target device because the peripheral functions of the in-circuit emulator operate during a break.

(However, the watchdog timer counter stops when the in-circuit emulator is in a break operation.)