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April 1st, 2010
Renesas Electronics Corporation

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Flash Microcomputer On-Board Programming Adapter Board

User's Manual

Renesas Microcomputer Development Environment System

HS0008EASF5HE

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READ FIRST

- **READ this user's manual before using this adapter board.**
- **KEEP the user's manual handy for future reference.**
- **Do not attempt to use the adapter board until you fully understand its mechanism.**

Adapter Board:

Throughout this document, the term "adapter board" shall be defined as the adapter board main unit and attached cables manufactured by Renesas Technology Corp.

The user system or a host computer is not included in this definition.

Purpose of the Adapter Board:

The adapter board, which is connected between a host computer and the user system, has a function that can write/erase user application programs on the flash memory incorporated in the flash microcomputer on the user system (on-board) when it is used with the on-board programming tool.

Therefore, the burden on the peripheral circuit required during on-board programming can be minimized. This board can be used for all flash microcomputers incorporating a flash memory using Vcc and PVcc and cannot be used for flash microcomputers in which 12 V is applied to Vpp pin and MD pin.

This adapter board must only be used for the above purpose.

Limited Applications:

This adapter board is not authorized for use in MEDICAL, atomic energy, aeronautical or space technology applications without consent of the appropriate officer of a Renesas sales company. Such use includes, but is not limited to, use in life support systems. Buyers of this adapter board must notify the relevant Renesas sales offices before planning to use the product in such applications.

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Target User of the Adapter board:

This adapter board should only be used by those who have carefully read and thoroughly understood the information and restrictions contained in the user's manual. Do not attempt to use the adapter board until you fully understand its mechanism.

It is highly recommended that first-time users be instructed by users that are well versed in the operation of the adapter board.

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Figures:

Some figures in this user's manual may show items different from your actual system.

Limited Anticipation of Danger:

Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the adapter board are therefore not all inclusive. Therefore, you must use the adapter board safely at your own risk.

SAFETY PAGE

READ FIRST

- **READ** this user's manual before using this adapter board.
- **KEEP** the user's manual handy for future reference.
- **Do not attempt to use the adapter board until you fully understand its mechanism.**

DEFINITION OF SIGNAL WORDS



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the adapter board or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

- 1. Always switch OFF the adapter board and user system before connecting or disconnecting any CABLES, PARTS, or cable head.**
- 2. Before connecting, always make sure that pin 1 on both sides are correctly aligned.**
- 3. The adapter board can be used for flash microcomputers to which $V_{cc} = 2.7\text{ V}$ to 5.25 V , $PV_{cc} = 2.7\text{ V}$ to 5.25 V is supplied from a single power source.
The adapter board cannot be used for flash microcomputers in which 12 V is applied to both the V_{pp} pin and MD pin.
The values of V_{cc} and PV_{cc} must not exceed the guaranteed operation ranges.**

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Section 1 Overview

The adapter board HS0008EASF5H, connected between a host computer and the user system, can write and erase user application programs on the flash memory incorporated in the flash microcomputer on the user system (on-board) when it is used with the on-board programming tool HS6400FWIW5SR. Therefore, the burden on the peripheral circuit required during on-board programming can be reduced.

A system configuration using the adapter board is shown in figure 1.1. This board can only be used for the microcomputers that incorporate a flash memory and use V_{cc} (2.7 V to 5.25 V) and PV_{cc} (2.7 V to 5.25 V).

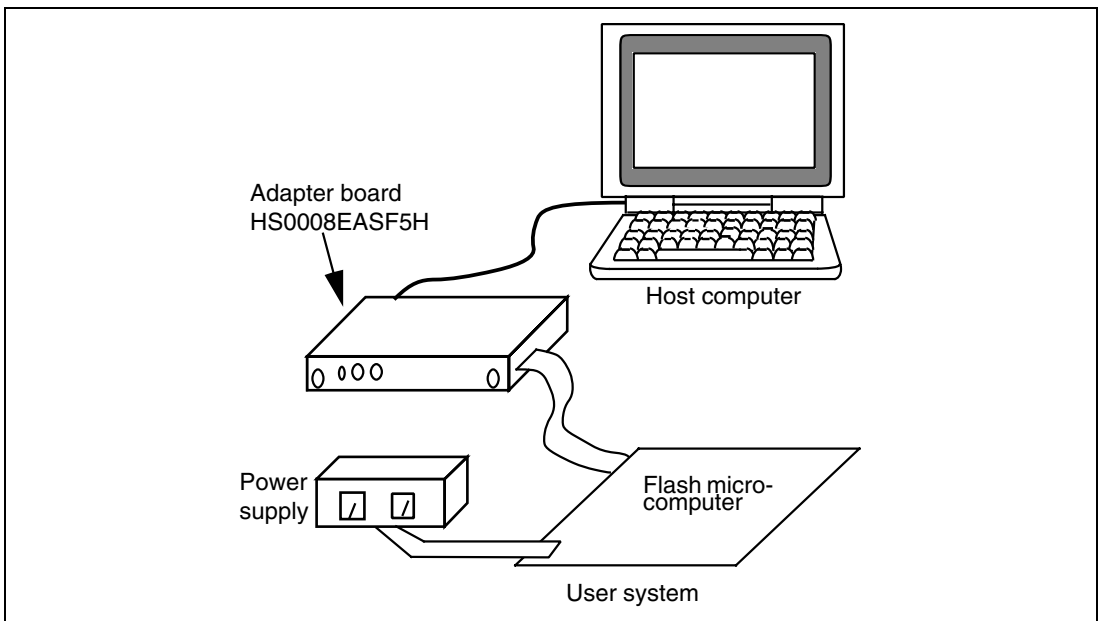


Figure 1.1 System Configuration Using Adapter Board

Section 2 Configuration

The configuration and components of the adapter board are shown in figure 2.1 and table 2.1, respectively.

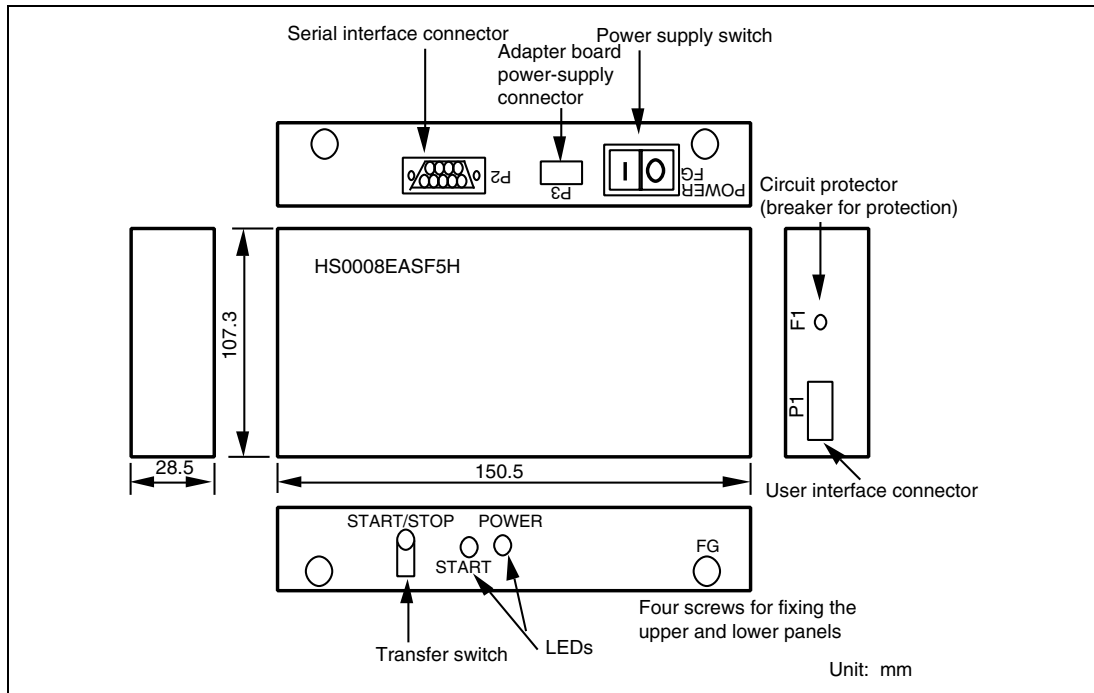


Figure 2.1 Adapter Board

Table 2.1 Components

Item Name	Description	Quantity
Adapter board	Main unit	1
Serial interface cable	Connection between main unit and host computer (2000 mm)	1
User system interface cable	Connection between main unit and user system (300 mm)	1
User system interface cable connector	Connection between main unit and user system	1
Adapter board power cable	Adapter board power supply(1000 mm)	1

Section 3 Connectors, Switches, and LEDs

3.1 Connectors

This adapter board has connectors P1, P2, and P3.

3.1.1 User Interface Connector (P1)

WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the adapter board or will result in PERSONAL INJURY.

- 1. Always switch OFF the adapter board and the user system before connecting or disconnecting ANY CABLES or PARTS.**
- 2. Before connecting, always make sure that pin 1 on both sides are correctly aligned.**
- 3. When disconnecting cables, take care not to put excessive stress on the cables.**

The signals required for writing to flash memory are shown in figures 3.1 and 3.2. Connect the adapter board and the user system using the user system interface cable provided (with an 20-pole connector on each end) and a user system interface cable connector (used for connecting the cable to the user system). The user system interface cable provided straight-matches the pins in the adapter board to those in the user system, as shown in figure 3.2.

A 3428-6002LCPL manufactured by Sumitomo 3M Ltd. (former part code: 3428-6002 LCSC) is used as the user-system interface cable connector.

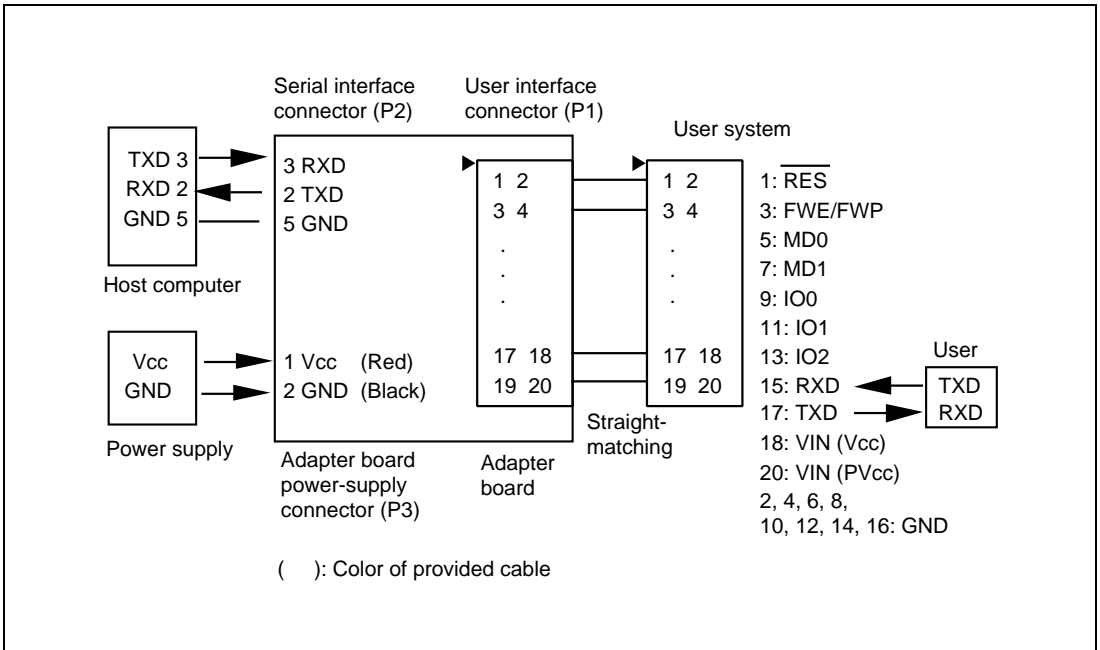


Figure 3.1 Connector Pin Location

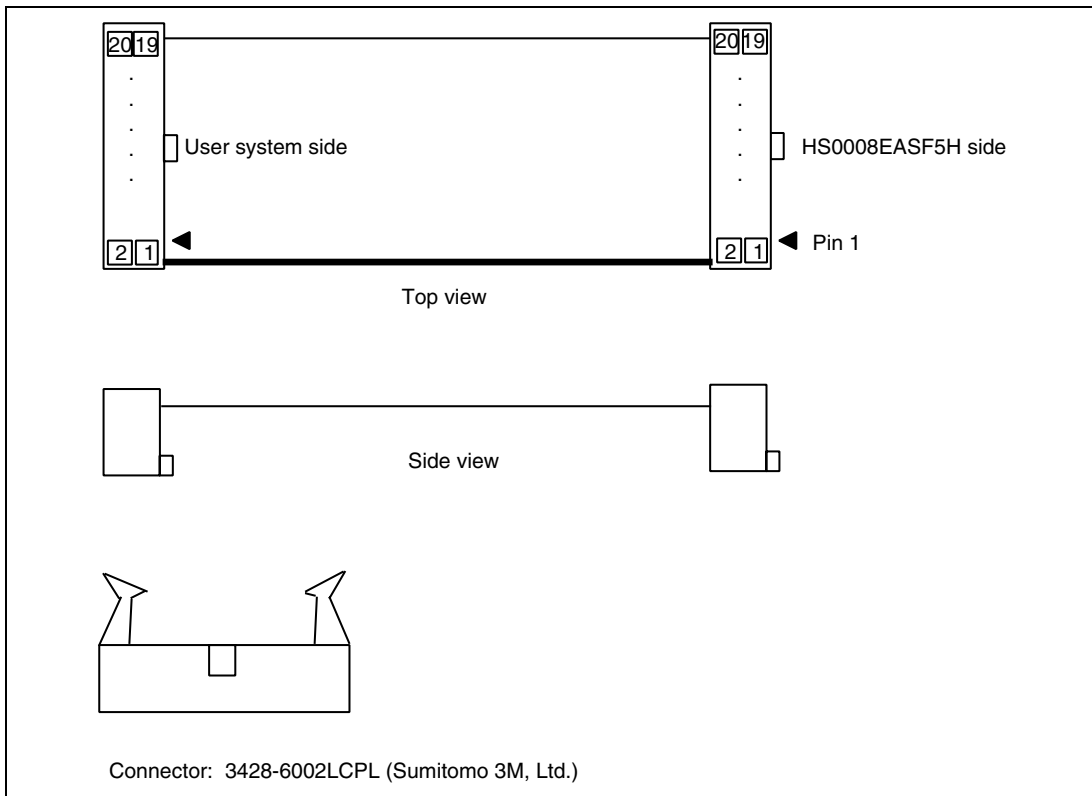
**Figure 3.2 User System Interface Cable**

Table 3.1 Correspondence between Signals and Numbers Indicated on the User System Interface Cable

Number on Cable	Signal
1	RES
2	GND
3	FWE/FWP
4	GND
5	MD0
6	GND
7	MD1
8	GND
9	IO0
10	GND
11	IO1
12	GND
13	IO2
14	GND
15	RXD (TXD for the user system)
16	GND
17	TXD (RXD for the user system)
18	VIN (Vcc)
19	NC
20	VIN (PVcc)

If the device has Vcc and PVcc, provide Vcc (pin 18) and PVcc (pin 20) to the VIN pin of the P1 connector. If the condition is Vcc = PVcc and the device that does not have both Vcc and PVcc is used, provide Vcc (pin 18) or PVcc (pin 20) to the two VIN pins of the P1 connector.

When the target microcomputer requires port control during on-board programming, connect necessary port signals. For details, refer to table 3.5 in section 3.2.8, S3, S4, S5, and S6 Setting Examples.

3.1.1 Serial Interface Connector (P2)

Connect the adapter board and host computer using the serial interface cable provided.

3.1.2 Adapter Board Power-Supply Connector (P3)

Supply power to the adapter board from the user system power supply (V_{cc} : 2.7 V to 5.25 V, PV_{cc} : 2.7 V to 5.25 V) via the VIN pin of the user system interface cable.

If the device does not use the PV_{cc} , provide V_{cc} to the two VIN pins.

If the current supply capability of the user system power supply is insufficient, power (V_{cc} 5 V \pm 5%) can be supplied using a separate power supply from the P3 connector to the adapter board.

3.2 Switches

3.2.1 Transfer Switch (START/STOP)

- When control sequence 1 has been selected:
Pressing this switch once initiates programming control (in the mode selected by the switches). In this case, the START LED (red) is turned on. Pressing this switch again after the program has been transferred terminates programming control. At this time, the START LED (red) is turned off and the high level is output by the RES pin.
- When control sequence 2 has been selected:
Pressing this switch once initiates programming control (in the mode selected by the switches). In this case, the START LED (red) is turned on. Pressing this switch again after the program has been transferred terminates programming control. At this time, the START LED (red) is turned off and the low level is output by the RES pin.

Refer to section 5.2, Writing Processing, for details of the control sequences.

CAUTION

After program transfer, press the transfer switch (START/STOP) and confirm that the START LED (red) is turned off. If the user system power supply VIN (Vcc: 2.7 V to 5.25 V, PVcc: 2.7 V to 5.25 V) is turned off while the START LED is on, the user system will be damaged.

For details on activating the on-board programming tool, refer to the On-Board Programming Tool User's Manual.

Activate the on-board programming tool, and select the boot mode or user program mode displayed on the host computer. The hardware setting sequence is displayed. **Then press the transfer switch.** The START LED (red) is turned on and a programming control is initiated.

After programming the flash memory in the selected mode, confirm the end message, **press the transfer switch again**, and complete the programming control. At this time, the START LED is turned off.

3.2.2 Power-Supply Switch (POWER)

The following two power-supply methods are available for this adapter board.

- Power is supplied from the user system power supply via the user system interface cable and connector (VIN pin).
- As a countermeasure against insufficient current supply by the above method, power is supplied through the power-supply connector (P3). In this case, the user must prepare a separate power supply.

Vcc 5 V \pm 5% is supplied to the power-supply connector (P3) of the adapter board. This switch works as the power-supply switch (on and off) of the adapter board only when power is supplied from the power-supply connector (P3) of the adapter board. (Refer to figure 3.3.) In this case, power also needs to be supplied through the VIN pin of the user system interface cable.

When power is supplied to the adapter board only from the user system power supply, this power-supply switch does not work. In this case, the power-supply switch on the user system is used as the power-supply switch for the adapter board.

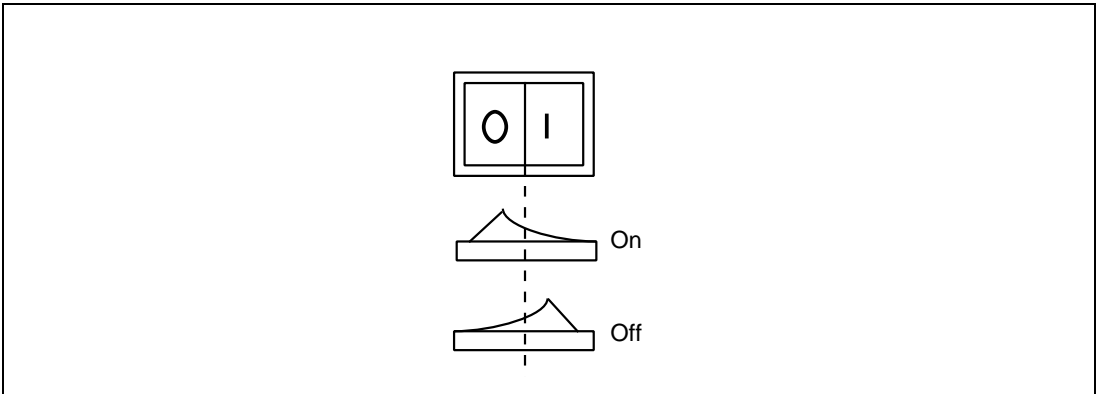


Figure 3.3 Power-Supply Switch (POWER)

3.2.3 Jumper Terminals for Power-Supply Switch (JP1)

The jumper terminals are inside the chassis. Open the upper panel by removing the screw in each corner attaching the upper and lower panels. After jumper setting, close the chassis by re-fixing the screws.

The following two methods are available for supplying power to the adapter board; appropriate jumper setting is required for these jumper terminals.

- To supply power from the user system via the user system interface cable connector (VIN pin), insert a jumper into 2 and 3.
- To supply power from power-supply connector (P3), prepare a power supply for the adapter board. Insert a jumper into 1 and 2 (default setting at shipment).

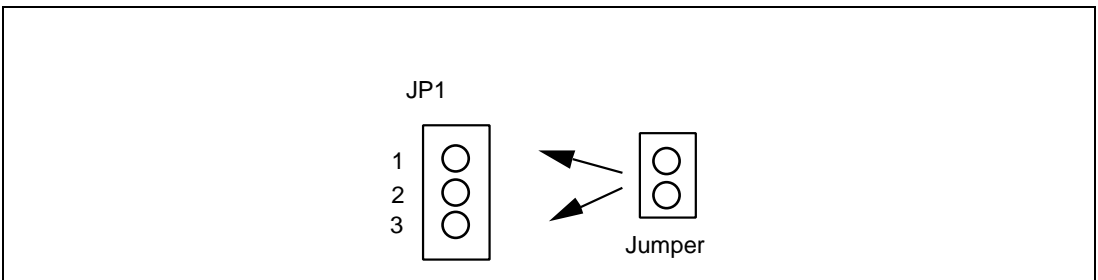


Figure 3.4 Jumper Terminals for Power-Supply Switch (JP1)

3.2.4 Circuit Protector (F1)

This adapter board is provided with a resumable circuit protector on the input section of the user system power supply to prevent damage to the system. If the circuit protector is turned off due to erroneous power-supply connection or excessive current (1 A or more), check the system, then return the circuit protector to the original state by pressing the switch in the hole with a thin pin or wire to activate the circuit protector (figure 3.5).

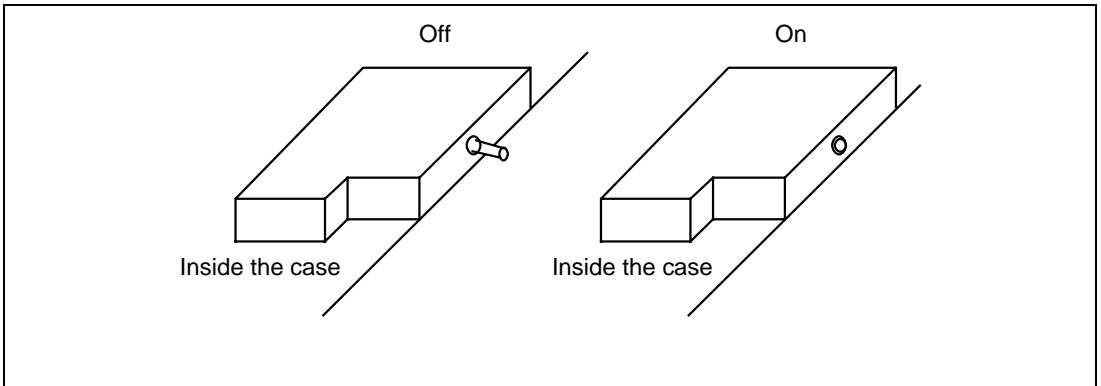


Figure 3.5 Circuit Protector Setting

3.2.5 Control-Signal Enable/Disable Switches (S4)

This adapter board is provided with switches so that each control signal can be enabled or disabled separately, as shown in table 3.2; the control-signal switches that are necessary to program the flash microcomputer should be set to E. These switches are inside the case. Open the upper panel by removing the screw in each corner between the upper and lower panels. After switch setting, reclose the case and refasten the screws.

Table 3.2 Control-Signal Enable/Disable Switches (S4)

Signal	E	D
FWE (S4-1)	Enabled	Disabled
MD0 (S4-2)	Enabled	Disabled
MD1 (S4-3)	Enabled	Disabled
IO0 (S4-4)	Enabled	Disabled
IO1 (S4-5)	Enabled	Disabled
IO2 (S4-6)	Enabled	Disabled

3.2.6 Low (0)/High (1) Switches (S3)

Level 0 or 1 can be selected by enabling the enable/disable switch (S4) (see table 3.2). Select 0 or 1 for the control signals according to the flash microcomputer you are using (to program the flash microcomputer). Also, S3-8 (the RES output selection switch) can switch the control sequence at the time of programming regardless of the setting of S4, so that the level output by the RES pin after power has been supplied or operation in a mode has been terminated can be selected. These switches are inside the case. Open the upper panel by removing the screw in each corner between the upper and lower panels. After switch setting, reclose the case and refasten the screws.

Table 3.3 Low (0)/High (1) Switches (S3)

Signal	0	1
FWE (S3-1)	Low	High
MD0 (S3-2)	Low	High
MD1 (S3-3)	Low	High
IO0 (S3-4)	Low	High
IO1 (S3-5)	Low	High
IO2 (S3-6)	Low	High
- (S3-7)	-	-
SQMD (S3-8)	Low output from RES (control sequence 2)	High output from RES (control sequence 1)

3.2.7 Vcc and PVcc Switches (S5 and S6)

Select Vcc or PVcc level for the control signals according to the flash microcomputer you are using (to program the flash microcomputer). The Vcc or PVcc level can be selected by the switch settings of S5 and S6 (see table 3.4). The switches are inside the case. Open the upper panel by removing the screw in each corner between the upper and lower panels. After switch setting, reclose the case and refasten the screws.

Table 3.4 Vcc and PVcc Switches (S5 and S6)

Signal	P	V
FWE (S5-1)	PVcc	Vcc
MD0 (S5-2)	PVcc	Vcc
MD1 (S5-3)	PVcc	Vcc
IO0 (S5-4)	PVcc	Vcc
IO1 (S6-1)	PVcc	Vcc
IO2 (S6-2)	PVcc	Vcc

3.2.8 S3, S4, S5, and S6 Setting Examples

Table 3.5 shows examples of S3 to S6 switch settings for on-board programming in boot mode. When using a flash microcomputer that is not listed in table 3.5, refer to the corresponding hardware manual.

Table 3.5 S3, S4, S5, and S6 Setting Examples

HS0008EASF5H	SH7055F			
P1 Connector Signal	MCU Signal	S4	S3	S5 and S6
VIN (Vcc)	Vcc	'1	'1	'1
VIN (PVcc)	PVcc2	'1	'1	'1
GND	Vss	'1	'1	'1
$\overline{\text{RES}}$	$\overline{\text{RES}}$	'1	'1	'1
TXD	RXD	'1	'1	'1
RXD	TXD	'1	'1	'1
FWE/FWP	FWE	E	1	C (S5-1)
MD0	MD1	E	0	P (S5-2)
MD1	MD2	E	1	P (S5-3)
IO0	— ³	D	²	²
IO1	— ³	D	²	²
IO2	— ³	D	²	²

- Notes: 1. The P1 connector signals and MCU signals on the user system must always be connected regardless of the S3, S4, S5, and S6 settings.
 2. Either setting is available.
 3. Need not be connected.

3.3 LEDs

3.3.1 START LED (START: Red)

This LED is turned on or off when the transfer switch (START/STOP) is pressed.

3.3.2 Power LED (POWER: Green)

This LED is on while the user system power supply VIN (Vcc: 2.7 V to 5.25 V, PVcc: 2.7 V to 5.25 V) or the power supply Vcc (5 V \pm 5%) dedicated to the adapter board is supplied.

Section 4 Notes on Use

1. The $\overline{\text{RES}}$ pin of the adapter board is an open-collector output. Use a resistor that suits the user system to pull up the $\overline{\text{RES}}$ pin (around 1-k Ω is recommended).
2. Do not directly connect control signals FWP/FWE, MD0, MD1, IO0, IO1, or IO2 to Vcc or GND. The user interface of the adapter board is shown figure 4.1.
The resistance value is 20 Ω when analog switch HC4066 is on. It is recommended to pull up or pull down the resistance with 4.7-k Ω or more. (For revision A, 47 k Ω or more is recommended.)
3. After program transfer, press the transfer switch (START/STOP) and confirm that the START LED (red) is turned off. If the user system power supply VIN (Vcc: 2.7 V to 5.25 V, PVcc: 2.7 V to 5.25 V) is turned off while the START LED is on, the user system will be damaged.
4. The host computer (DOS/V compatible machines) with built-in Pentium[®] can be connected to the adapter board.
5. If the device has Vcc and PVcc, provide Vcc (pin 18) and PVcc (pin 20) to the VIN pin of the P1 connector. If the condition is Vcc = PVcc and the device that does not have both Vcc and PVcc is used, provide Vcc (pin 18) or PVcc (pin 20) to the two VIN pins of the P1 connector.

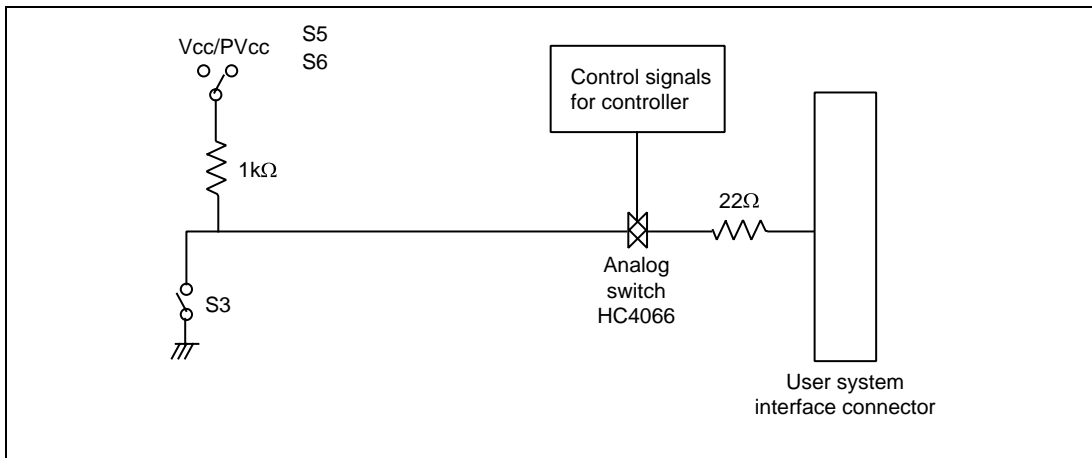


Figure 4.1 Control-Signal Circuit Example

Section 5 Specifications

5.1 Input Voltage and Consumption Current

- Power-supply input (VIN) from the user interface connector (Vcc: 2.7 V to 5.25 V, PVcc: 2.7 V to 5.25 V)
- Power-supply input (Vcc) from the P3 connector of the adapter board: 5 V \pm 5%
- Consumption current: 200 mA at 5 V or 330 mA at 3 V

5.2 Write Processing

For write processing, control sequence 1 or control sequence 2 is selectable. Select either according to the usage of the user system.

Set S3-8 to side 1: Select control sequence 1

Set S3-8 to side 0: Select control sequence 2

The respective control sequences are described below.

5.2.1 Specification of Control Sequence 1

1. When the user system power supply is turned on or the power switch is on, the high level is output by the $\overline{\text{RES}}$ pin.
2. When the transfer switch is pressed, the $\overline{\text{RES}}$ signal is held to the low level for 550 ms.
3. After 10 ms of the falling edge of the $\overline{\text{RES}}$ signal, 2.7- to 5.25-V application to the FWE/FWP pin starts or stops (figure 5.1).

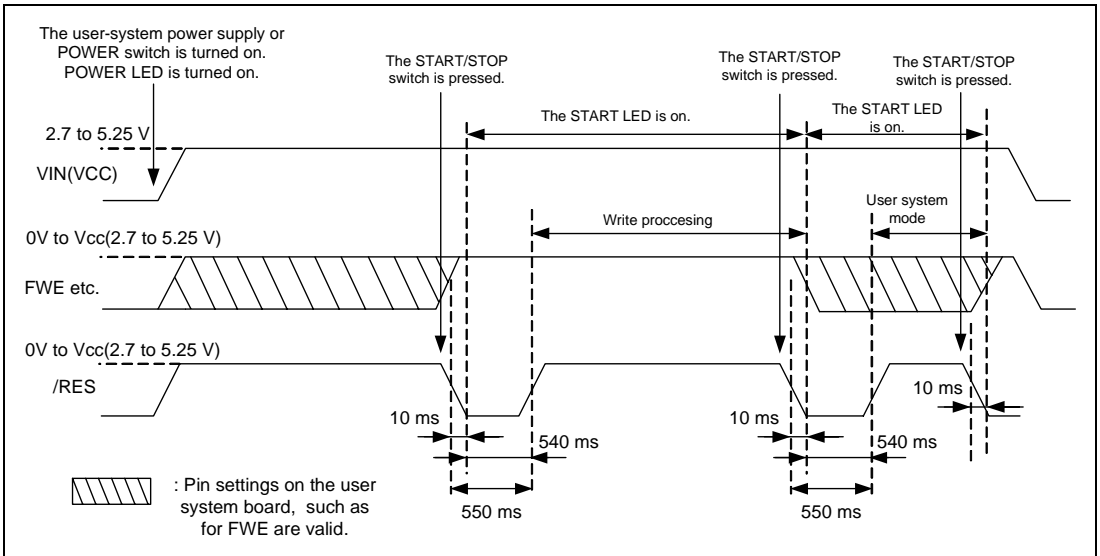


Figure 5.1 Reset Signal, 2.7- to 5.25-V Application, and Stop Timing (Control sequence 1)

5.2.2 Specification of the Control Sequence 2

1. When the user system power supply is turned on or the power switch is on, the low level is output by the RES pin.
2. After power has been turned on, pressing the transfer switch for the first time places the RES pin at the high level, and the user system makes the transition to programming processing etc.
3. After that, every time the transfer switch is pressed, the level of RES signal is inverted.
4. The control sequence 2 has the two following states: execution of programming etc. is in progress (the START LED is on) and the reset state (the START LED is off).
5. When the transition to programming processing etc. is made, the application of 2.7 to 5.25 V to the FWE/FWP pin starts or stops (figure 5.2) 10 ms after the transfer switch is pressed.

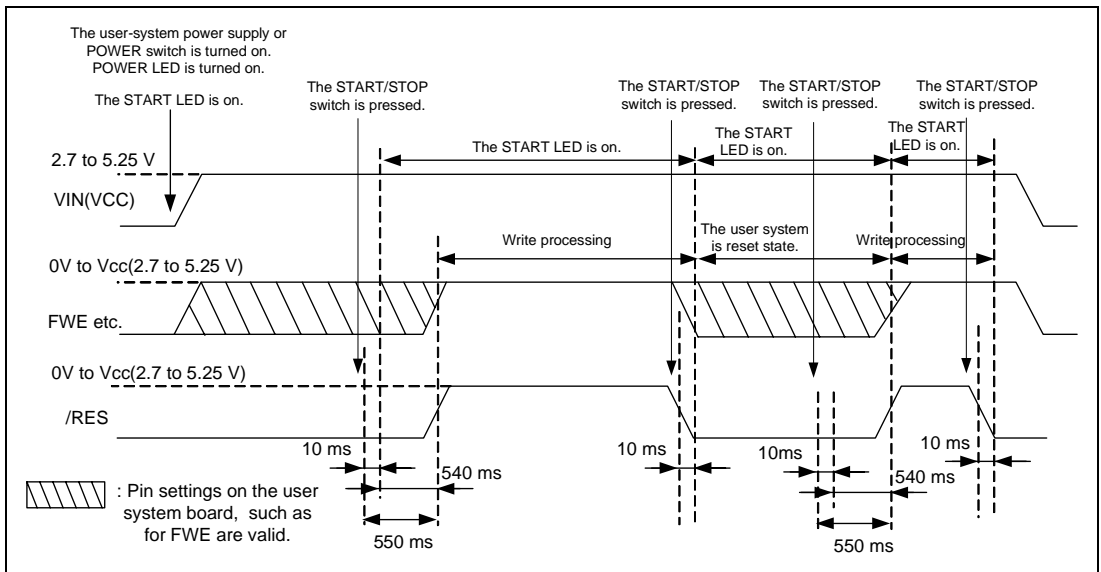


Figure 5.2 Reset Signal, 2.7- to 5.25-V Application, and Stop Timing (Control sequence 2)

**Flash Microcomputer
On-Board Programming Adapter Board
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Publication Date: Rev.1.00, October 2, 2009
Published by: Sales Strategic Planning Div.
Renesas Technology Corp.
Edited by: Customer Support Department
Global Strategic Communication Div.
Renesas Solutions Corp.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan



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REJ10J2064-0100