

CMOS 16-BIT SINGLE CHIP MICROCONTROLLER
S5U1C17001H2 User Manual
(ICDmini Ver2.0)

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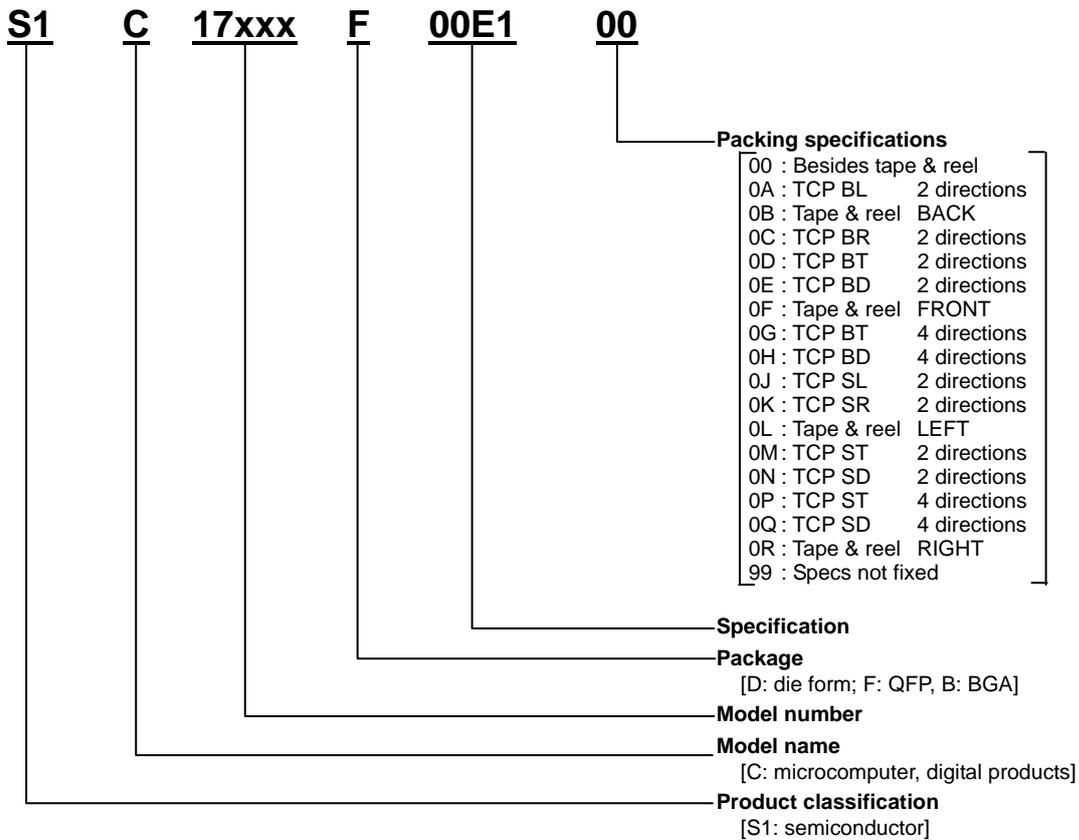
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Configuration of product number

Devices



Development tools

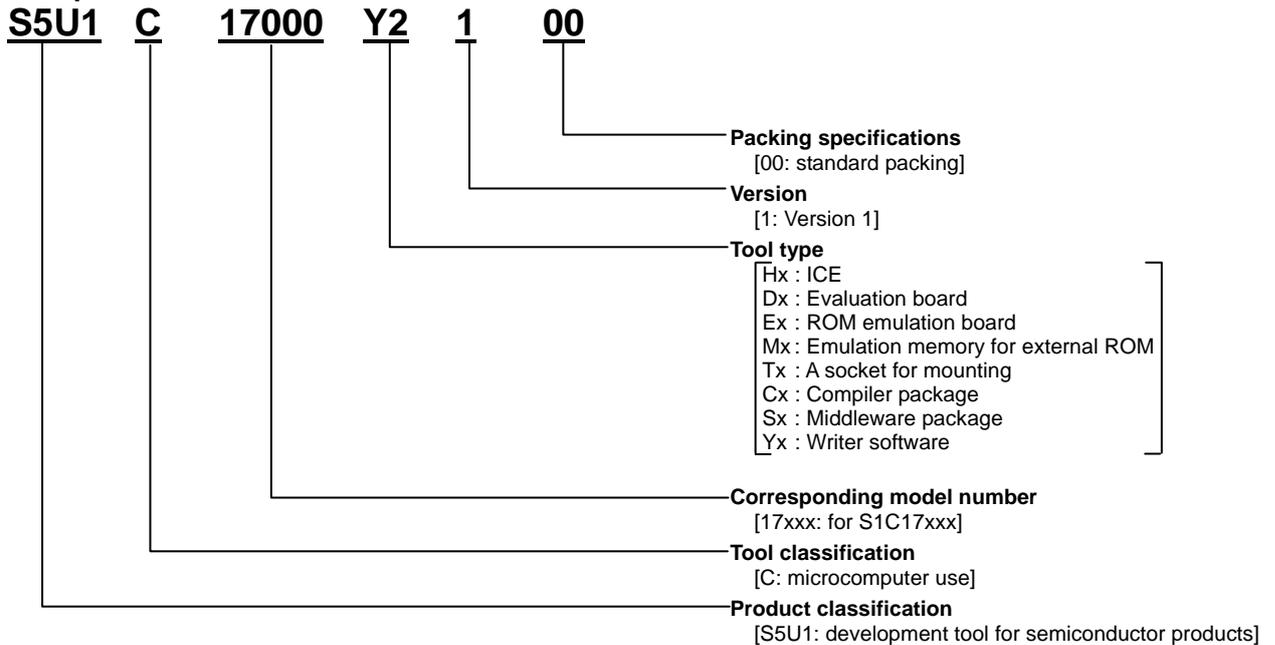


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Explanation of Terms (various modes)

S5U1C17001H (ICDmini)

ICD mode	Flash programmer mode
This mode is for debugging the target system. Debugging requires a host computer and the debugger gdb (included in the S5U1C17001C S1C17 Family C Compiler Package).	This mode is for programming the target system without using a host computer. Before programming can be performed, the program to be written must be saved to the S5U1C17001H (ICDmini) in ICD mode.

Debugger gdb (included in the S5U1C17001C S1C17 Family C Compiler Package)

Connect mode	
Simulator (SIM) mode	ICD Mini mode
The simulator mode simulates the target program execution on the host computer memory and no other tools are not required. However, the debug functions depending on the ICD cannot be used.	This is the mode to debug the target program using the S5U1C17001H (ICDmini) or S5U1C17002H (ICD board). The program will be executed on the target system. The S5U1C17001H (ICDmini) must be used in this mode.

Target (S1C17xxx)

Normal mode	Debug mode
<p>The normal mode is the normal state while the target system is executing the user program. The target enters debug mode by one of the conditions shown below.</p> <ul style="list-style-type: none"> • When a break condition set by the debugger (gdb) has met • When the break button on the gdb window is clicked while the debugger (gdb) is connected to the target • When a low level signal is input to the DSIO pin of the target system • When the CPU executes the brk instruction 	<p>In this mode, the target system accepts the control by the debugger (gdb). Various debugging operations, such as display and rewriting the registers/memory, can be performed. The target enters this mode when executing the startup sequence after connecting it to the S5U1C17001H (ICDmini).</p>

1. Overview

The S5U1C17001H (ICDmini) is a hardware tool (emulator) that allows software to be efficiently developed for the S1C17 Family of 16-bit processors and S1C33 Family of 32-bit processors. The S5U1C17001H is used to connect the S1C17 or S1C33 processor on the target system to the debugger (gdb). It provides a development environment for S1C17 and S1C33 Family software together with a debugger. It can also be used as a Flash programmer to program the Flash memory built into the processor on the target system.

This manual primarily explains how to use the S5U1C17001H. For details on the debugger (gdb) functions and commands, refer to the “S5U1C17001C Manual (C Compiler Package for S1C17 Family)” or “S5U1C33001C Manual (C Compiler Package for S1C33 Family).”



Figure 1.1 S5U1C17001H External View

Note: Do not open the case as it may cause a malfunction.

This manual applies to the following.

- S5U1C17001H2100 (ICDmini ver2.0)
- S5U1C17001H S1C17 firmware ver3.2, S1C33 firmware ver1.5^{*1}

*1: Products may be shipped installed with later versions than those indicated above, due to subsequent version upgrades.

Precautions before using the S5U1C17001H

Please read the sections shown below before getting started with the S5U1C17001H.

These sections, especially (2) and (3), describe the answers to frequently asked questions.

- (1) Chapter 2, Components Included with Package
Make sure all of the listed items are included with your package.
- (2) Section 4.2, Connecting to the Host Computer
Install the USB driver before the S5U1C17001H can be used.
- (3) Section 4.1, Connecting the Target System
Please pay particular attention to the Notes.

1. Overview

1.1 Features

Table 1.1.1 Features

S1C17 processor	S1C33 processor
Cores supported	
S1C17 Core	S1C33 STD Core S1C33 mini Core S1C33 PE Core S1C33 ADV Core
Host interface	
USB 1.1	
Debugger (gdb) mode	
ICD Mini mode	ICD6 mode
Program break functions	
PC break function Lapse of time break function Forced break function External forced break function (BRK IN pin input)	PC break function Lapse of time break function Forced break function External forced break function (BRK IN pin input) Area break function Bus break function (Selectable logical/physical address) Data break function
Trace function	
Not available	
Measurement of target program execution time	
Can be measured between 3 μ s and 6515 hours	In second units: 3 μ s to 36 minutes In μ s units: 3 μ s to 1.8 minutes
Cycle counting function	
Not available	Available
Standalone Flash programmer function	
Available	
Firmware update function	
Available	
DCLK frequency to communicate with the target ^{*1}	
4 kHz to 40 MHz ^{*2}	4 kHz to 40 MHz
Flash programming power voltage supply	
Available Variable voltage output: 6.0 V to 8.0 V (max. 100 mA)	Available Fixed voltage output: 7.0 V (max. 100 mA)
Target reset signal output	
Available	
Target system I/O interface voltage	
3.3 V, 1.8 V, or voltage input from target (1.0 V to 5.5 V)	
Target system interface connector	
4-pin connector ^{*3}	
Flash programming power supply connector	
4-pin connector	

*1: Clock frequency output from the DCLK pin while in Debugging mode.

*2: Reference values for data download speed are published on the user's site for each S1C processor model.

*3: If connecting a 10-pin connector, refer to "4.1.1.1 Connecting to S1C33 processor 10-pin connector."

Table 1.1.2 Differences between S5U1C17001H Products

	S5U1C17001H1100 (ICDmini Ver1.0)	S5U1C17001H1200 (ICDmini Ver1.1)	S5U1C17001H2100 (ICDmini Ver2.0)
Firmware (FW) version as shipped	S1C17 FW Ver1.0 or S1C17 FW Ver1.1	S1C17 FW Ver1.1	S1C17 FW Ver3.2
	S1C33 FW not supported	S1C33 FW not supported	S1C33 FW Ver1.5
Flash programming voltage supply	Fixed 7.0 V voltage (max. 30 mA) output with S1C17 processor selected	Fixed 7.0 V voltage (max. 30 mA) output with S1C17 processor selected	Variable 6.0 V to 8.0 V voltage (max. 100 mA) output with S1C17 processor selected ^{*1}
	Fixed 7.0 V voltage (max. 30 mA) output with S1C33 processor selected	Fixed 7.0 V voltage (max. 30 mA) output with S1C33 processor selected	Fixed 7.0 V voltage (max. 30 mA) output with S1C33 processor selected ^{*1}
Flash programming voltage supply to V _{pp} pin	Not supported	Not supported	Supported
Supported target system I/O voltage	3.3 V, 1.8 V, or voltage input from target (1.0 V to 5.0 V)	3.3 V, 1.8 V, or voltage input from target (1.0 V to 5.5 V)	3.3 V, 1.8 V, or voltage input from target (1.0 V to 5.5 V)
Target system power supply	Not available	Not available	3.3 V (max. 100 mA) output pin
			1.8 V (max. 100 mA) output pin
Flash programming power supply cable (with black connector)	Not available	Not available	Available

*1: Supported from S1C17 firmware Ver3.0 and S1C33 firmware Ver1.4 onward.

1.2 Operating Environment

As the host computer, the S5U1C17001H uses a PC with a USB port (USB 1.1) available.

For details concerning operating systems, refer to “Operating Environment” in the S5U1C17001C Manual.

2. Components Included with Package

2. Components Included with Package

The following shows the components included with the S5U1C17001H package:

- | | |
|--|--------------------------|
| (1) S5U1C17001H main unit..... | 1 |
| (2) USB cable | 1 |
| (3) Target interface cable (4-pin)..... | 1 |
| (4) Flash programming power supply cable (4-pin) | 2 |
| (5) User registration card | English/Japanese, 1 each |
| (6) Warranty card | English/Japanese, 1 each |
| (7) Usage precautions | English/Japanese, 1 each |
| (8) Manual download guide..... | English/Japanese, 1 each |

The items specified below are not included with the package. These items must be prepared separately.

When developing an S1C17 application

- S5U1C17001C (S1C17 Family C Compiler Package)
S1C17 Family debugger (gdb) included with package
- S5U1C17001C Manual
Included with S1C17 Family C Compiler Package

When developing an S1C33 application

- S5U1C33001C (S1C33 Family C Compiler Package)
S1C33 Family debugger (gdb) included with package
- S5U1C33001C Manual
Included with S1C33 Family C Compiler Package
- S5U1C17001H User Manual (ICDmini Ver2.0)
This manual can be downloaded from the Seiko Epson Electronic Devices website.



Figure 2.1 S5U1C17001H Package Contents

3. Name and Function of Each Part

The following shows the name of each part of the S5U1C17001H.

3.1 Left Side Panel

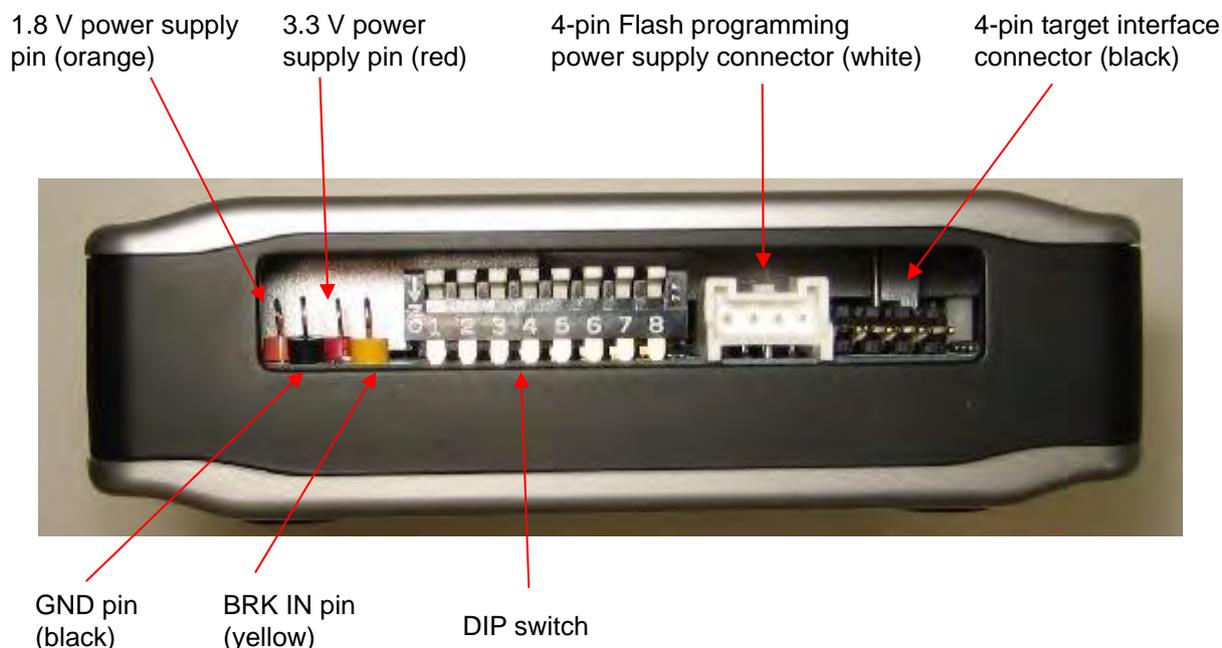


Figure 3.1.1 Left Side Panel

3.1.1 4-pin Target Interface Connector (black)

This connector is used to input/output the debug signals (DCLK, DSIO, and DST2) from/to the S1C processor on the target system. See Section 4.1.1, “Target Interface Connector,” for the pin assignment and connection.

3.1.2 4-pin Flash Programming Power Supply Connector (white)

This connector is used to output the reset signal to the target system and to supply a voltage for Flash programming (Note). Also it is used to input the target operating voltage when the target system voltage level is used for the debug signal interface. See Section 4.1.2, “Flash Programming Power Supply Connector,” for the pin assignment and connection.

Note: The S5U1C17001H includes a Flash programming power supply

When S1C17 processor is selected

Use in conjunction with S5U1C17001C (GNU17 v2.0.0 or later) outputs a variable voltage of 6.0 V to 8.0 V (max. 100 mA).

When S1C33 processor is selected

Setting SW8 to “On” outputs a fixed voltage of 7.0 V (max. 100 mA).

This must never be used with S1C processors for which usage instructions are not provided in the technical manual when supplying a voltage as the Flash programming power supply from the S5U1C17001H to the target. Otherwise, there is a risk of damaging the chip due to overvoltage. The VPP pin should be left open if a connector pin is provided on the target board without using the Flash programming voltage.

3. Name and Function of Each Part

3.1.3 DIP Switch

The DIP switch assembly is used to select the target CPU core, Flash programmer mode, DSIO signal level, connection test feature, firmware update feature, and Flash programming voltage output.

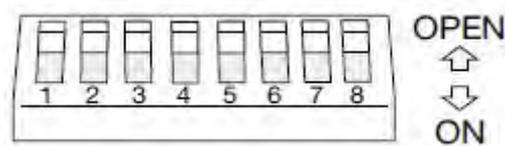


Figure 3.1.3.1 DIP Switch Assembly

Note: The changed switch settings will take effect after the RESET/START switch is pressed.

Selecting the target CPU core (SW1)

Table 3.1.3.1 SW1 Settings

SW1	Setting
OPEN (↑)	Target CPU is an S1C17xxx or a product in which the S1C17 Core is embedded (C17).
ON (↓)	Target CPU is an S1C33xxx or a product in which the S1C33 Core is embedded (C33).

Selecting either ICD Mode or Flash Programmer Mode (SW2 and SW3)

Table 3.1.3.2 SW2 and SW3 Settings

SW2	SW3	Setting
OPEN (↑)	OPEN (↑)	ICD mode (default)
ON (↓)	OPEN (↑)	Flash programmer mode Erase → program
OPEN (↑)	ON (↓)	Flash programmer mode Verify
ON (↓)	ON (↓)	Flash programmer mode Erase → program → verify

ICD mode: Mode for executing debugging commands from the debugger on the host computer
For more information on this mode, refer to “5 ICD Mode.”

Flash programmer mode: The S5U1C17001H operates as a standalone Flash programmer.
For more information on this mode, refer to “6 Flash Programmer Mode.”

Selecting the DSIO signal level (SW4 and SW5)

Table 3.1.3.3 SW4 and SW5 Settings

SW4	SW5	Setting
OPEN (↑)	OPEN (↑)	3.3 V (default)
OPEN (↑)	ON (↓)	1.8 V
ON (↓)	–	Voltage (1.0 to 5.5 V) input from the target

The target operating voltage should be input to Pin 4 on the Flash programming power supply connector.

Enabling the connection test (SW6)

Table 3.1.3.4 SW6 Settings

SW6	Setting
OPEN (↑)	Omit connection test (default)
ON (↓)	Execute connection test

The connection test is a communication diagnostic feature at start up of the debugger.

3. Name and Function of Each Part

Setting firmware update mode (SW7)

Table 3.1.3.5 SW7 Settings

SW7	Setting
OPEN (↑)	Connect to the target (default)
ON (↓)	Do not connect to the target

When SW7 is set to ON, a connection between the S5U1C17001H and the debugger (gdb) can be established even if a target is not connected. See Chapter 7, “Firmware Update,” for how to update the firmware.

Enabling voltage output for Flash programming (SW8)

Table 3.1.3.6 SW8 Settings

SW8	Setting
OPEN (↑)	Stop Flash programming voltage (default)
ON (↓)	Output Flash programming voltage

Note: The S5U1C17001H includes a Flash programming power supply.

When S1C17 processor is selected

Use in conjunction with S5U1C17001C (GNU17 v2.0.0 or later) outputs a variable voltage of 6.0 V to 8.0 V (max. 100 mA).

When S1C33 processor is selected

Setting SW8 to “On” outputs a fixed voltage of 7.0 V (max. 100 mA).

This must never be used with S1C processors for which usage instructions are not provided in the technical manual when supplying a voltage as the Flash programming power supply from the S5U1C17001H to the target. Otherwise, there is a risk of damaging the chip due to overvoltage.

3. Name and Function of Each Part

3.1.4 BRK IN Pin

In ICD mode, if a Low level signal is input to this pin when the target program is being executed, execution of the target program is suspended. After a Low level is input to the BRK IN pin, a break will occur after a few instructions have been executed.

With S1C17 processor selected

In Flash programmer mode, inputting a Low level to this pin has the same effect as pressing the RESET/START switch (it starts erasing/writing/verification).

With S1C33 processor selected

In Flash programming mode: BRK IN pin does not function.

Note: The voltage to apply to the BRK IN pin must be 0 V for low level and 3.3 V or open for high level. The BRK IN pin is always pulled up to 3.3 V.

3.1.5 GND Pin

Connect this pin to the GND level (0 V).

3.1.6 3.3 V Output Pin

Pin capable of supplying a 3.3 V power supply (max. 100 mA) to the target system.

3.1.7 1.8 V Output Pin

Pin capable of supplying a 1.8 V power supply (max. 100 mA) to the target system.

3.2 Right Side Panel

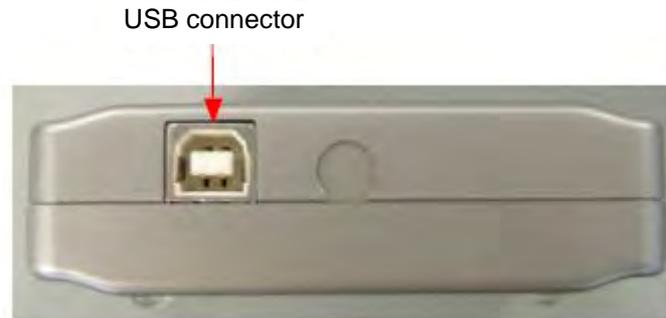


Figure 3.2.1 Right Side Panel

3.2.1 USB Connector

This connector is used to connect to a host computer using the supplied USB cable.

Note: When a bus-powered USB hub is used to connect the S5U1C17001H to the host computer, there may be a shortage of drive power. Especially if supplying the flash programming voltage, either connect directly to the host computer's USB port, or use an AC adapter (with USB 5 V output) capable of supplying power to the USB cable.

If using an AC adapter, set the S5U1C17001H mode to be used and confirm beforehand that erasing and writing is possible as desired.

3. Name and Function of Each Part

3.3 Top Panel

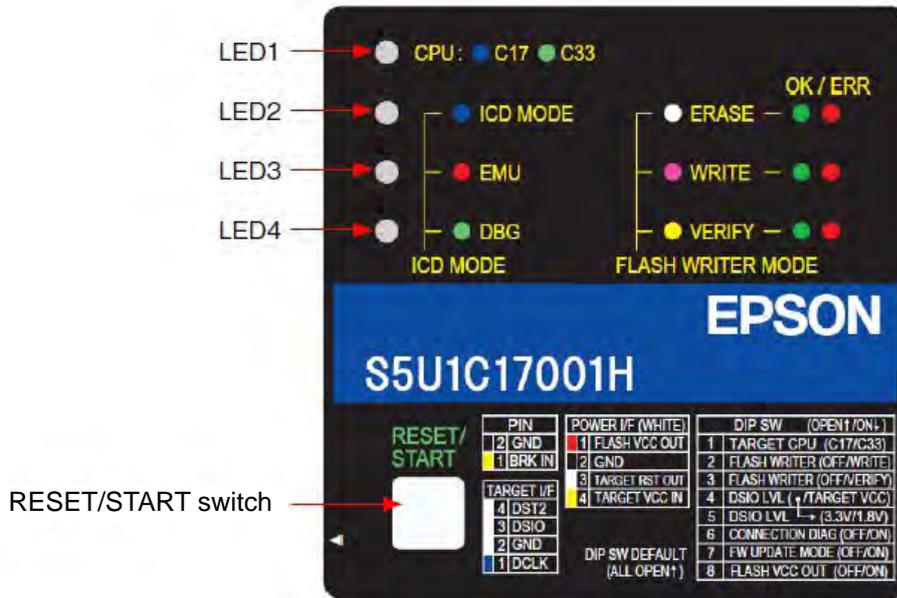


Figure 3.3.1 Top Panel

3.3.1 LED

The four LEDs located on the top panel indicate debugging and Flash programming statuses.

The indicated status differs between ICD mode and Flash programmer mode.

3.3.1.1 In ICD mode

LED1 (CPU)

This LED indicates the target CPU selected using SW1.

Table 3.3.1.1.1 LED1 Status

S1C17	S1C33	LED status	Status
✓	–	● (blue)	Target CPU is an S1C17xxx or a product in which the S1C17 Core is embedded (C17).
–	✓	● (green)	Target CPU is an S1C33xxx or a product in which the S1C33 Core is embedded (C33).

LED2 (ICD MODE)

Illuminates as shown below when ICD mode is selected using SW2 and SW3.

Table 3.3.1.1.2 LED2 Status

S1C17	S1C33	LED status	Status
✓	✓	● (blue)	The S5U1C17001H is being operated in ICD mode.

LED3 (EMU)

This LED lights when the target program is started from the debugger to indicate that the target system is executing the target program. Also this LED lights when the target system is in power-off status or it is not connected. In this case, the LED will go out by turning the target system on or by pressing the RESET/ START switch after connecting the target system properly.

Table 3.3.1.1.3 LED3 Status

S1C17	S1C33	LED status	Status
✓	✓	● (red)	The target system is in power-off status. The target system is not connected properly. The target system is executing the user program.
✓	✓	● (out)	Other

LED4 (DBG)

This LED indicates that the target S1C processor is placed in debug mode.

Table 3.3.1.1.4 LED4 Status

S1C17	S1C33	LED status	Status
✓	✓	● (green)	The target S1C processor is placed in debug mode. Also this LED rights with LED3 before the initial connection between the S5U1C17001H and the target S1C processor has been established.
✓	✓	● (out)	Other

✓ : Supported

– : Not supported

3.3.1.2 In Flash programmer mode

When the S5U1C17001H starts up in Flash programmer mode, LED2 lights in white (●), LED3 lights in magenta (●), or LED4 lights in yellow (●).

LED1 (CPU)

This LED indicates the target CPU selected using SW1.

Table 3.3.1.2.1 LED1 Status

S1C17	S1C33	LED status	Status
✓	–	● (blue)	Mode for products with embedded S1C17xxx or S1C17 Core (C17)
–	✓	● (green)	Mode for products with embedded S1C33xxx or S1C33 Core (C33)

LED2 (ERASE)

This LED indicates a Flash erasing selection/operation status.

Table 3.3.1.2.2 LED2 Status

S1C17	S1C33	LED status	Status
✓	✓	● (white)	The Flash erasing function is selected.
✓	✓	★ (blinking white)	The Flash memory is being erased.
✓	✓	● (green)	The Flash erasing operation has completed normally. (OK)
✓	✓	● (red)	A Flash erase error has occurred. (ERR)

3. Name and Function of Each Part

LED3 (WRITE)

This LED indicates a Flash programming selection/operation status.

Table 3.3.1.2.3 LED3 Status

S1C17	S1C33	LED status	Status
✓	✓	● (magenta)	The Flash programming function is selected. Write-back execution option setting
✓	✓	★ (blinking magenta)	The Flash memory is being programmed. Write-back operation in progress
✓	✓	● (green)	The Flash programming operation has completed normally. (OK) Write-back completed successfully. (OK) * Blinks when flash programmer mode non-execution option (-n) is set.
✓	✓	● (red)	A Flash program error has occurred. (ERR) Write-back completed successfully. (OK)

LED4 (VERIFY)

This LED indicates a Flash verification selection/operation status.

Table 3.3.1.2.4 LED4 status

S1C17	S1C33	LED status	Status
✓	✓	● (yellow)	The Flash verification function is selected. Write-back execution option setting
✓	✓	★ (blinking yellow)	The Flash memory is being verified. Write-back operation in progress
✓	✓	● (green)	The Flash verify operation has completed normally. (OK) Write-back completed successfully. (OK) * Blinks when flash programmer mode non-execution option (-n) is set.
✓	✓	● (red)	A Flash verify error has occurred. (ERR) Write-back completed successfully. (OK)

Table 3.3.1.2.5 Other Errors

S1C17	S1C33	LED status			Status
		LED1	LED2	LED3	
✓	–	★ (blinking red)	★ (blinking red)	★ (blinking magenta)	Flash programming voltage setting error (ERR) The error conditions are one of the following. (1) “-v” option was set by the “fwlp” command, but SW8 is open. (2) “-v” option was not set by the “fwlp” command, but SW8 is on. (3) “-v” option was set by the “fwlp” command, but the setting was out of range or not input. (4) “-v” option was set multiple times by the “fwlp” command.
✓	–	★ (blinking red)	★ (blinking red)	★ (blinking white)	Flash programming voltage output failure (ERR) Flash programming voltage setting processing failed in S5U1C17001H.
✓	–	★ (blinking red)	★ (blinking red)	★ (blinking blue)	Communication packet size setting error (ERR) (1) “-s” option was set by the “fwlp” command, but the setting was out of range or not input. (2) “-s” option was set multiple times by the “fwlp” command.
✓	–	★ (blinking red)	★ (blinking red)	★ (blinking yellow)	Write-back setting error (ERR) (1) “-b” option was set by the “fwlp” command, but the setting

3. Name and Function of Each Part

					was out of range or not input. (2) "-b" option was set multiple times by the "fwlp" command.
✓	–	★ (blinking red)	★ (blinking yellow)	★ (blinking red)	Flash programmer non-execution (erase, write, verify) setting error (ERR) (1) "-n" option was set by the "fwlp" command, but a text string was set. (2) "-n" option was set multiple times by the "fwlp" command.
✓	–	● (blinking red)	● (blinking red)	● (blinking red)	Flash programmer non-execution (erase, write, verify) setting error (ERR) Write-back execution option (-b) was not set.
✓	–	★ (blinking red)	★ (blinking blue)	★ (blinking red)	Timeout setting error (ERR) (1) "-t" option was set by the "fwlp" command, but the setting was out of range or not input. (2) "-t" option was set multiple times by the "fwlp" command.

✓ : Supported

– : Not supported

3.3.2 RESET/RESTART Switch

The function differs between ICD mode and Flash programmer mode.

In ICD mode

Click:

The firmware restarts and performs the initial sequence for connecting with the S1C processor on the target system. If the target board has not been connected physically, the S5U1C17001H enters initial connection waiting status.

When the TARGET RST OUT signal of the S5U1C17001H has been connected to the target system, a reset signal is output to the target system simultaneously.

In Flash programmer mode

Click:

The S5U1C17001H starts the selected Flash operation (erasing, programming, verification).

If the LED for the operation to be executed indicates OK or ERR, a hardware reset will return to default state.

The S5U1C17001H is subjected to a hardware reset while the Flash programmer is operating.

Press and hold (about three seconds):

Issues a hardware reset to the S5U1C17001H.

Note: When a DIP switch setting is changed, it will take effect by pressing the RESET/START switch (in both ICD and Flash programmer modes).

4. Connections

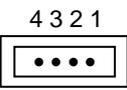
4. Connections

4.1 Connecting the Target System

4.1.1 Target Interface Connector

The 4-pin target interface connector (black) on the S5U1C17001H is used to input/output the debug signals from/to the S1C processor on the target system. Use the target interface cable attached to the S5U1C17001H to connect between this connector and the target system. This connection is always required to perform debugging. The pin assignment of the 4-pin connector (black) on the S5U1C17001H is shown in the table below. For the debug pin numbers on the S1C processor, refer to the technical manual of each model.

Table 4.1.1.1 Pin Assignment of the Target Interface Connector (Black)

	No.	Pin name	I/O	Pin function
	1	DCLK	I	Clock signal input pin for debugging
	2	GND	–	Power supply GND pin
	3	DSIO	I/O	Serial transfer I/O pin for debugging
	4	DST2	I	Debug status signal input pin

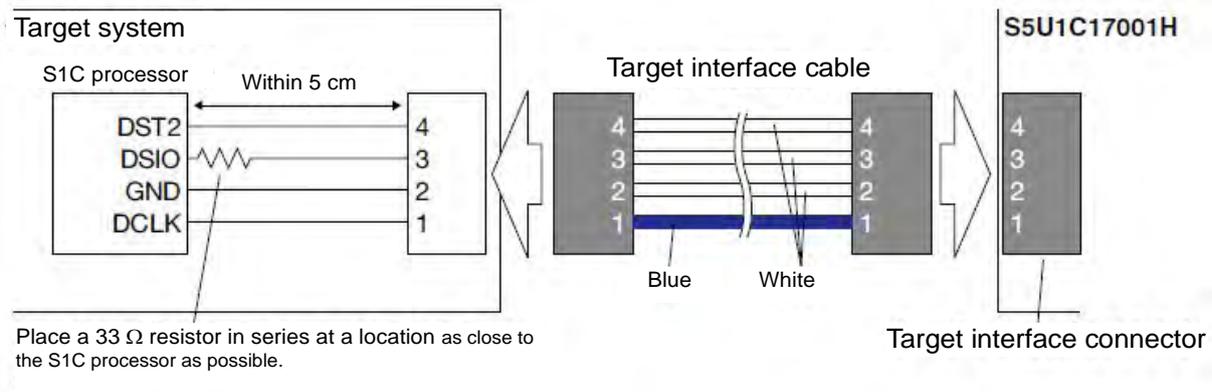


Figure 4.1.1.1 Connecting the Target System

- Notes:
- Set the interface level (3.3 V/1.8 V/target input) using the DIP switches SW4 and SW5, and select the CPU Core using the SW1 according to the target system before connecting the target system.
 - The signals connected to the S5U1C17001H are very high-speed signals, so the connector on the target system must be mounted within 5 cm from the S1C processor. If there is more distance between the connector and the S1C processor, the S5U1C17001H may not work properly.
 - When wiring the S1C processor to the target connector for connecting the S5U1C17001H, insert a 33 Ω resistor in series between the S1C processor DSIO pin and the connector. This resistor must be placed as close to the S1C processor as possible. Although the system can operate without this 33 Ω resistor, we recommend inserting this resistor to prevent malfunctions. The other pins are connected directly. A low-level input to the DSIO pin issues a forced break to set the S1C processor into debug mode. Although this signal is pulled up through about 100 kΩ internally, when not debugging, we recommend either removing the 33 Ω resistor to reduce noise and other problems or pulling this line up to the VDD level.
 - Be sure to use the supplied 4-pin cable for connecting the target system to the S5U1C17001H. Using another cable may cause a malfunction. If use of another cable is unavoidable, do not extend the target interface cable, and connect the cable directly to the S5U1C17001H so that the distance to the S1C processor on the target system is as short as possible (no more than 20 cm).
 - The 4-pin connector does not have a projection for preventing reverse insertion. Check the cable color (blue) of pin 1 to be sure the insertion of connector is proper when connecting it to the target system.

4.1.1.1 Connecting to the S1C33 processor 10-pin connector

Connect as shown below when connecting to the S1C33 processor 10-pin connector.

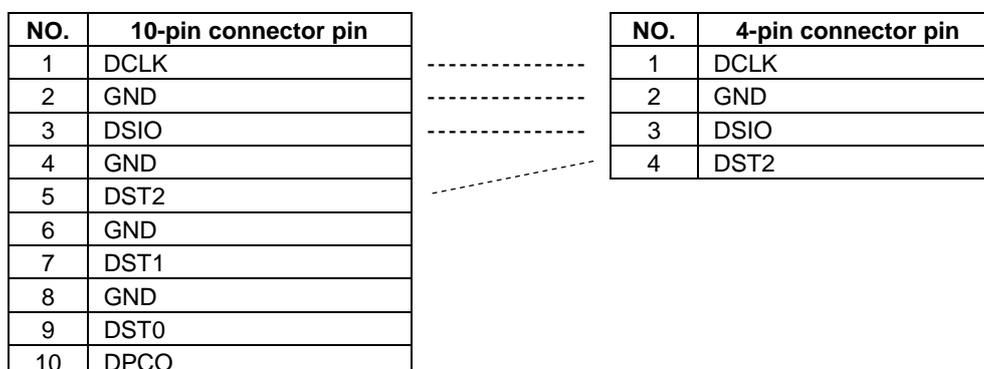


Figure 4.1.1.2 10-pin Connector Connection

The pins above not linked by dotted lines should be left open.

Note: Connect the S5U1C17001H to the S1C processor ensuring that the distance between them is as short as possible (no more than 20 cm).

Shielding the signal wire using GND is also effective in ensuring stable operation.

4. Connections

4.1.2 Flash Programming Power Supply Connector

The 4-pin Flash programming power supply connector (white) is used to output a reset signal and a Flash programming voltage to the target system, and to input the target interface voltage. These signals are not necessary for debugging. Connect between this connector and the target system using the Flash programming power supply cable attached to the S5U1C17001H as necessary. The pin assignment of the 4-pin connector (white) on the S5U1C17001H is shown in the table below.

Table 4.1.2.1 Pin Assignment of the Flash Programming Power Supply Connector (White)

	No.	Pin name	I/O	Pin function
	1	FLASH VCC OUT	O	Flash programming voltage output pin
2	GND	–	Power supply GND pin	
3	TARGET RST OUT	O	Target reset signal output pin	
4	TARGET VCC IN	I	Target voltage input pin	

* Pay attention to the pin number assignment. (It is the reverse order of the target interface connector.)

4.1.2.1 Target reset signal output (TARGET RST OUT)

By pressing the RESET/START switch in ICD mode, the TARGET RST OUT outputs a reset signal to the target system.

When using the TARGET RST OUT output, a reset circuit as shown in the figure below is recommended.

The connection to #RESET of target reset signal is not essential, although it allows debugging to be performed more efficiently.

When using the Flash protection function, it is best to have a connection. Connection is also recommended in the Flash programmer mode and when using the S5U1C17001H as the Gang Writer (Gang Programmer) using S5U1C17000Y2. For details of the Gang Writer, refer to the S5U1C17000Y2 Gang Writer Software Manual.

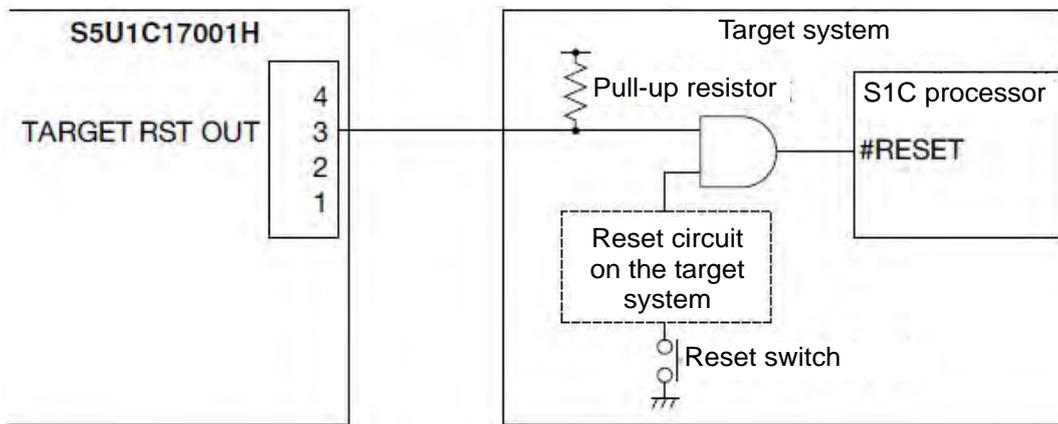


Figure 4.1.2.1 Example of Target Reset Circuit

4.1.2.2 Target voltage input (TARGET VCC IN)

In addition to 3.3 V and 1.8 V, the S5U1C17001H is capable of interfacing with the target system using the voltage (1.0 to 5.5 V) input from the target system. To use this function, set SW4 to ON and input the target voltage to the TARGET VCC IN pin.

4.1.2.3 Flash programming voltage output (FLASH VCC OUT)

Depending on the Flash memory built into the target S1C processor, it may be necessary to supply the Flash programming voltage to the VPP pin on the target for certain products. The S5U1C17001H is capable of supplying the Flash programming voltage from the FLASH VCC OUT pin. The voltage can be supplied as described below.

When S1C17 processor is selected

Use in conjunction with S5U1C17001C (GNU17 v2.0.0 or later) outputs a variable voltage of 6.0 V to 8.0 V (max. 100 mA).

For more details of the Flash programming voltage output method with the S1C17 processor selected, refer to “5.4 Flash Programming Voltage Setting” or “6. Flash Programmer Mode.”

When S1C33 processor is selected

Setting SW8 to “ON” outputs a fixed voltage of 7.0 V (max. 100 mA).

Setting SW8 to “ON”, always outputs a voltage of 7 V voltage from the FLASH VCC OUT pin regardless of whether the RESET/START switch is operated.

Note: Refer to the individual technical manual for each model to determine whether the Flash programming voltage supply is required. Do not use this voltage unless mentioned in the technical manual. Otherwise, there is a risk of damaging the S1C processor due to overvoltage.

4. Connections

4.2 Connecting to the Host Computer

Use the USB cable provided to connect the S5U1C17001H to the host computer. When the S5U1C17001H is connected to the host computer for the first time, the host computer will request that the USB driver be installed.

4.2.1 USB Driver Locations

The USB driver is located as shown below. Use the appropriate USB driver to suit the operating system.

When S1C17 processor is selected

The USB driver is located in the following directory created when the S5U1C17001C (GNU17) was installed.

User Folder\EPSON\GNU17\utility\drv_usb

When S1C33 processor is selected

The USB driver is located in the following directory created when the S5U1C33001C (GNU33) was installed.

User Folder\EPSON\GNU33\utility\drv_usb\Icd33v60

4.2.2 USB Driver Installation Procedure

Install the USB driver as follows.

- (1) First time the S5U1C17001H is connected to the host computer with the USB cable, the dialog box shown below will be displayed.

When S1C17 processor is selected



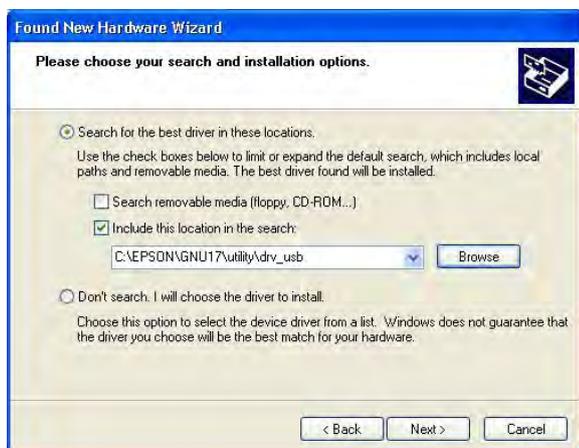
When S1C33 processor is selected



Figure 4.2.2.1 New Hardware Detection Start Screen

- (2) Install the USB driver by following the directions displayed by the wizard.
For more details of the USB driver browsing directories, refer to “4.2.1 USB Driver Locations.”

When S1C17 processor is selected



When S1C33 processor is selected



Figure 4.2.2.2 Driver Installation Screen

The device manager will be displayed as shown below when the USB driver has been installed correctly.

When S1C17 processor is selected



When S1C33 processor is selected



Figure 4.2.2.3 Driver Installation Complete Screen

Note: If the window above is not displayed correctly, try to reinstall the USB driver.

5. ICD Mode

5. ICD Mode

ICD mode is an S5U1C17001H operating mode for debugging the target system by connecting the S5U1C17001H to the debugger (gdb) on the host computer. The following explains the settings for activating ICD mode and operations.

Downloading the program to Flash can also be performed in this mode.

5.1 Specifying ICD Mode

Set the DIP switches as shown below to start up the S5U1C17001H in ICD mode.

When S1C17 processor is selected

SW1 = OPEN

When S1C33 processor is selected

SW1 = ON

Set SW2, SW3, and SW7 as follows.

SW2 = OPEN

SW3 = OPEN

SW7 = OPEN

SW4, SW5, SW6, and SW8 should be set as necessary.

Note: The DIP switch settings are enabled by pressing the RESET/START switch.

5.2 Activation in ICD Mode

After connecting the S5U1C17001H to the target system and the host computer, start up the S5U1C17001H by following the procedure described below. If the S5U1C17001H is started up in another procedure, it may not be connected to the target system normally.

5.2.1 When the TARGET RST OUT Signal is Not Connected

When the TARGET RST OUT signal is not connected to the reset input on the target system, start up the S5U1C17001H by the procedure described below.

- (1) Press the S5U1C17001H RESET/START switch.

LED1 ● (blue) or ● (green)

LED2 ● (blue)

LED3 ● (red)

LED4 ● (green)

- (2) Press the target system reset switch.

The LEDs illuminate as shown below once connection is successfully completed.

LED1 ● (blue) or ● (green)

LED2 ● (blue)

LED3 ● (out)

LED4 ● (green)

If the LEDs appear as shown below, repeat the procedure from step (1).

LED1 ● (blue) or ● (green)

LED2 ● (blue)

LED3 ● (red)

LED4 ● (green) or ● (out)

5.2.2 When the TARGET RST OUT Signal is Connected

When the TARGET RST OUT signal is connected to the reset input on the target system, just press the RESET/START switch on the S5U1C17001H for starting up. The S5U1C17001H automatically generates a target reset signal with the proper connection sequence.

- (1) Press the RESET/START switch on the S5U1C17001H.
The LEDs illuminate as shown below once connection is successfully completed.

LED1	● (blue) or ● (green)
LED2	● (blue)
LED3	● (out)
LED4	● (green)

If the LEDs appear as shown below, repeat the procedure from step (1).

- | | |
|------|-----------------------|
| LED1 | ● (blue) or ● (green) |
| LED2 | ● (blue) |
| LED3 | ● (red) |
| LED4 | ● (green) or ● (out) |

5.3 Starting Up the Debugger

Start up the debugger (gdb) on the host computer after the connection between the S5U1C17001H and the target S1C processor has been established by the operations described above.

When debugging using the debugger with the S5U1C17001H connected, the debugger must be set to each mode by executing the target command.

When the S1C17 processor is selected

(gdb) target icd usb ← ICD mini mode setting command

When the S1C33 processor is selected

(gdb) target icd6 usb ← ICD6 mode setting command

For more details of debugger commands and debugger operations, refer to the “S5U1C17001C Manual (S1C17 Family C compiler package)” or “S5U1C33001C Manual (S1C33 Family C compiler package).”

Note: Before disconnecting the S5U1C17001H from the host computer, be sure to terminate the debugger.

5. ICD Mode

5.4 Flash Programming Voltage Setting

This function can be set only when the S1C17 processor is selected.

A Flash programming voltage (Flash erasing and programming voltage) can be output to the S1C17 processor if required for Flash erasing and programming on the S1C17 processor in ICD mode. This must be used in conjunction with the S5U1C17001C (GNU17 Ver2.0.0 or later).

Refer to the corresponding technical manual to determine whether the Flash programming voltage supply is required to the S1C17 processor.

The Flash programming voltage is supplied to the S1C17 processor from the FLASH VCC OUT pin on the Flash programming power supply connector. For more details of the Flash programming power supply connector, refer to “4.1.2 Flash Programming Power Supply Connector.”

The following settings are required to output the Flash programming voltage.

(1) S5U1C17001H settings

Set the S5U1C17001H SW8 to “ON” to enable Flash programming voltage output.

Note: The DIP switch settings are not enabled until the RESET/SWITCH is pressed.

(2) Flash programming voltage settings

The Flash programming voltage settings can be set using the following commands after the S5U1C17001H and debugger (gdb) have been started up. The Flash programming voltage will differ depending on the model. For more details on the Flash programming voltage, refer to the corresponding technical manual.

Flash erasing/programming voltage setting and output start

(gdb) c17 flv *Voltage*

Voltage: Flash erasing/programming voltage (decimal value in 0.1 V units)

Decimal point and “0” must be included.

Voltage setting range: 6.0 V ≤ Voltage ≤ 8.0 V

Supply current: max. 100 mA

Flash erasing/programming voltage output canceling

(gdb) c17 flvs

This must always be executed after executing the c17 flv command.

Example: Set Flash erasing voltage to 7.5 V, programming voltage to 7.0 V, and then cancel.

```
⋮
(gdb) c17 flv 7.5 ..... Flash erasing voltage 7.5 V setting, output start
Set flash voltage 7.5V
(gdb) c17 fle 8000 1 32 ..... Erase Flash memory
(gdb) c17 flvs ..... Cancel Flash erasing voltage output
Stop output flash voltage.
⋮
(gdb) c17 flv 7.0 ..... Flash programming voltage 7.0 V setting, output start
Set flash voltage 7.0V
(gdb) load ..... Program Flash memory
(gdb) c17 flvs ..... Cancel Flash programming voltage output
Stop output flash voltage.
⋮
```

For information on debugger (gdb) operations and other commands, refer to the “S5U1C17001C Manual (S1C17 Family C Compiler Package).”

6. Flash Programmer Mode

As flash writer at main unit, flash programmer mode is an S5U1C17001H operating mode for using it as a standalone Flash programmer. This section describes the preparation and operations for using the Flash programmer mode.

It is not used when debugging programs.

This operation is used only when the S5U1C17001H is used as a Flash programmer without a host computer for mass production etc.

6.1 Preparation for Using Flash Programmer Mode

The S5U1C17001H is capable of programming data such as programs saved to the internal Flash memory directly to the target system.

First save the Flash erasing/programming program (FLS program) and user program to the S5U1C17001H internal memory as described below.

- (1) Start up the S5U1C17001H in ICD mode.
Refer to “5.2 Activation in ICD Mode.”
- (2) Start up the debugger.
Refer to “5.3 Starting Up the Debugger.”
- (3) Save the FLS program corresponding to the target system (S1C processor) or external Flash memory to the S5U1C17001H internal memory using the debugger (gdb) “fwlp” command.
- (4) Load the data to be written to the target Flash memory to the S5U1C17001H using the “fwld” command.
- (5) Quit the debugger.
For details of debugger (gdb) start/end procedures and how to create saf format files, refer to the S5U1C17001C Manual (S1C17 Family C Compiler Package) or the S5U1C33001C Manual (S1C33 Family C Compiler Package).

6.1.1 fwlp Command

The debugger (gdb) “fwlp” command is used to save FLS programs for the target system (S1C processor) or external flash memory in the S5U1C17001H internal memory.

6.1.1.1 Command format

```
(gdb) S1c fwlp Filename EraseEntryAddr WriteEntryAddr [Comment]
```

S1c: Target processor command (“c17” or “c33”)

Filename: Erasing/programming program file name (FLS program name)

EraseEntryAddr: Erase routine address

WriteEntryAddr: Write routine address

Comment: Data/address information identifier comment (can be omitted)
Enclose in double quotes if it includes spaces.

The following options (v, s, b, n, t) can be specified in the comment section only when the S1C17 processor has been selected.

-v	
Function	Flash programming voltage control option Specifying the “-v” option within the comment section allows the flash programming voltage to be set.

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Format	-vEraseVoltage-WriteVoltage EraseVoltage: Erase voltage WriteVoltage: Write voltage
Parameters	EraseVoltage: $6.0\text{ V} \leq \text{EraseVoltage} \leq 8.0\text{ V}$ WriteVoltage: $6.0\text{ V} \leq \text{WriteVoltage} \leq 8.0\text{ V}$ The maximum current is 100 mA.

-s	
Function	Communication packet size specification option Specifying the “-s” option within the comment section allows the communication packet size to be set for transferring user programs.
Format	-sSendSize SendSize: Communication packet size
Parameters	SendSize: $1\text{Byte} \leq \text{SendSize} \leq 1010\text{ Byte (base 10)}$

-b	
Function	Write-back execution option Specifying the “-b” option within the comment section allows the flash memory data embedded in the target to be read and re-written. This option can be used in conjunction with the Flash programmer mode non-execution option (-n) to execute the write-back function only.
Format	-bWriteBackEntryAddr-ProgramSize WriteBackEntryAddr: Write-back routine address ProgramSize: Write-back FLS program size
Parameters	WriteBackEntryAddr: $0x000000 \leq \text{WriteBackEntryAddr} \leq 0xfffffe(\text{hexadecimal})$ ProgramSize: $0000 < \text{ProgramSize} \leq 8192(\text{base 10})$

-n	
Function	Flash programmer mode non-execution option Specifying the “-n” option within the comment section allows the flash programmer functions (erase, write, and verify) not to be executed. This option is used in conjunction with the Write-back execution option (-b).
Format	-n

-t	
Function	Timeout specification option Specifying the “-t” option within the comment section allows a timeout to be set.
Format	-tTimeOut TimeOut: Timeout value
Parameters	TimeOut: $1\text{ s} \leq \text{TimeOut} \leq 1073741823\text{ s (base 10)}$

- Note:
- Options are identified by “delimiter character (NULL, space) + ‘-’ + Option.” Data will be treated as data/address information identifier comments if it does not follow this format.
 - The option format must always be terminated with a delimiter character (NULL, space).
 - Delimiter characters are also essential between options and between options and comments. An option error will occur if these are not set.
 - Option settings may use either upper case or lower case.
 - An option error will occur if the same option is set more than once.

6.1.1.2 Command setting example

When S1C17 processor is selected

Example: Save FLS program fwr17701v11.saf to S5U1C17001H internal memory.
With erasing routine address 0x48 and writing routine address 0x80
(gdb) c17 fwlp. fwr17701v11.saf 0x48 0x80

Example: When flash programming voltage and communication packet size setting are required
Set the communication packet size to 128 bytes, the flash erase voltage to 7.5 V, and the write voltage to 7.0 V, and save the FLS program fwr17651v11.saf to the S5U1C17001H internal memory.
For erasing routine address 0x9c and writing routine address 0x68
(gdb)c17 fwlp fwr17651v11.saf 0x9c 0x68 "-v7.5-7.0 -s128"

Example: To execute write-back function
Set the write-back routine address to 0x10 and the write-back FLS program size to 1312 bytes, and save the dedicated write-back function execution FLS program fwr17f57_writeback.saf to the S5U1C17001H internal memory.
For erasing routine address 0x9c and writing routine address 0x68
(gdb)c17 fwlp fwr17f57_writeback.saf 0x9c 0x68 "-v7.5-7.0 -s128 -b0x10-1312"

For more details of FLS programs such as erasing and writing routine addresses, refer to the "ReadMe" shown below created when the GNU17 was installed.

User folder\EPSON\GNU17\mcu_model\model\fls

When S1C33 processor is selected

Example: Save FLS program fls_program.saf to S5U1C17001H internal memory.
With erasing routine address 0x14c and writing routine address 0x180
(gdb) c33 fwlp fls_program.saf 0x14c 0x180

For more details of FLS programs such as erasing and writing routine addresses, refer to the documentation included with the FLS program.

6.1.2 fwld Command

The debugger (gdb) "fwld" command is used to save data to be written to the target flash memory in the S5U1C17001H internal memory.

6.1.2.1 Command format

```
(gdb) S1c fwld Filename EraseStartBlock EraseEndBlock EraseParam [Comment]
```

S1c: Target processor command ("c17" or "c33")

Filename: Data file name (Motorola S3 format)

EraseStartBlock: Erase start block

EraseEndBlock: Erase end block

EraseParam: Flash memory start address

Comment: Data/address information identifier comment (can be omitted)

Enclose in double quotes if it includes spaces.

6.1.2.2 Command setting example

When S1C17 is selected

Example: With S1C processor that supports chip erasing
To erase all sectors and load user_program.saf from Flash 0x8000 address
(gdb) c17 fwld user_program.saf 0 0 0x8000

6. Flash Programmer Mode

Example: With S1C processor that supports sector erasing
To erase sectors 0 to 31 and load user_program.saf from Flash 0x8000 address
Specify sector number + 1 when specifying erase start/end blocks.
(gdb) c17 fwld user_program.saf 1 32 0x8000

The procedure for specifying the sectors for erasing will differ depending on the S1C17 model. For details of the particular method, refer to the “ReadMe” shown below created when the GNU17 was installed.
User folder\EPSON\GNU17\mcu_model\model\fls

When S1C33 is selected

Example: To erase all sectors and load user_program.saf from Flash 0xc00000 address
(gdb) c33 fwld user_program.saf 0 0 0xc00000

Example: To erase sectors 0 to 141 and load user_program.saf from Flash 0xc00000 address
Specify the corresponding sector number when specifying erase start/end blocks.
(gdb) c33 fwld user_program.saf 0 141 0xc00000

For more details of fwld commands, refer to the documentation included with the FLS program.

6.2 Operations in Flash Programmer Mode

The following describes how to start up the S5U1C17001H and procedure for Flash programming.

- (1) Set SW2 and SW3 according to the Flash operation to be performed.
One of the three sequences, erasing and programming, verification only, or erasing, programming, and verification, can be selected.

Table 6.2.1 DIP Switch Settings in Flash Programmer Mode

SW2	SW3	Setting
OPEN (↑)	OPEN (↑)	ICD mode (default)
ON (↓)	OPEN (↑)	Flash programmer mode Erase → program
OPEN (↑)	ON (↓)	Flash programmer mode Verify
ON (↓)	ON (↓)	Flash programmer mode Erase → program → verify

- (2) If Flash programming voltage output is required, set SW8 to “ON.”

When S1C17 processor is selected

The Flash programming voltage set by the “fwlp” command is output only for erasing or programming from the FLASH VCC OUT pin.

When S1C33 processor is selected

A voltage of 7 V is output continuously from the FLASH VCC OUT pin.

Note: Refer to the individual technical manual for each model to determine whether the Flash programming voltage supply is required. Do not use this voltage unless specifically mentioned in the technical manual. Otherwise, there is a risk of damaging the S1C processor due to overvoltage.

- (3) If the DIP switches have been altered while power is supplied via the USB cable, press the RESET/START switch to switch the S5U1C17001H to Flash programmer mode.
If you change the DIP switch settings with the power off, connect the USB cable of the ICDmini to the USB port of the host computer or to a 5 V AC USB adapter (see “3.2 Right Side Panel”) to supply power. In the Flash programmer mode, only power is required from the USB cable and there is no communication with the host computer.

Waiting for connection with the target

●ERASE	● (out)
●WRITE	● (red)
●VERIFY	● (green)

For more information on errors, refer to “3.3.1.2 In Flash programmer mode.”

After connecting with the target

The LEDs illuminate as shown below for the selected operations once it has started up successfully.

	Erase → Write	Verify	Erase → Write → Verify
●ERASE	● (white)	● (out)	● (white)
●WRITE	● (magenta)	● (out)	● (magenta)
●VERIFY	● (out)	● (yellow)	● (yellow)

- (4) Connect the target system to the S5U1C17001H.
- (5) Press the RESET/START switch to start user program programming.

The S5U1C17001H starts the selected Flash operation.

The LED indicates the operation being executed.

	During erasing	During programming	During verification
●ERASE	★ (blinking white)	–	–
●WRITE	–	★ (blinking magenta)	–
●VERIFY	–	–	★ (blinking yellow)

When the S1C17 processor is selected, the Flash programmer can also be started by inputting a low level signal to the BRK IN pin instead of using the RESET/START switch.

- (6) When the Flash operation has finished, the LED lights as shown below to indicate that the operation has completed normally or an error has occurred.

When completed normally

	Erasing has completed	Programming has completed	Verification has completed
●ERASE	● (green)	–	–
●WRITE	–	● (green)	–
●VERIFY	–	–	● (green)

When an error has occurred

	Erase error	Program error	Verify error
●ERASE	● (red)	–	–
●WRITE	–	● (red)	–
●VERIFY	–	–	● (red)

For more information on errors, refer to “3.3.1.2 In Flash programmer mode.”

- (7) Disconnect the target system.
- (8) Return to Step (4) to continue the same Flash operation.
Return to Step (1) to change the Flash operation.
When finishing Flash programming, disconnect the USB cable and set the DIP switch back to ICD mode.

7. Firmware Update

7. Firmware Update

The S5U1C17001H has a firmware update function using the debugger (gdb). The following shows the procedure to update the S5U1C17001H firmware.

The firmware can also be updated using the firmware update package available on the Epson microcontroller users' site.

Note: Before the firmware can be updated, the USB driver must be installed. For installation of the USB driver, see Section 4.2, "Connecting to the Host Computer."

- (1) Connect only S5U1C17001H to the host computer using USB cable.
- (2) Set the S5U1C17001H DIP switches.
Set SW7 to "ON" to select Firmware update mode.
Set the switches shown below to suit the S1C to be updated.

When S1C17 processor is selected

SW1 = OPEN

When S1C33 processor is selected

SW1 = ON

Set all other switches to "OPEN."

- (3) Press the RESET/START switch.
The S5U1C17001H LEDs illuminate as shown below.
LED1 ● (blue) or ● (green)
LED2 ● (blue)
LED3 ● (red) or ● (out)
LED4 ● (green)
- (4) Start up the debugger (gdb).
For details of how to start the debugger (gdb), refer to the "S5U1C17001C Manual (S1C17 Family C Compiler Package)" or "S5U1C33001C Manual (S1C33 Family C Compiler Package)."
- (5) Connect the debugger (gdb) to the S5U1C17001H.
Execute the following commands via the console window in accordance with the S1C debugger (gdb).

When S1C17 processor is selected

(gdb) target icd usb

When S1C33 processor is selected

(gdb) target icd6 usb

The following is displayed after the commands have been entered.

When S1C17 processor is selected

```
(gdb) target icd usb
C17 ICD17 debugging
Connecting with target (ID_OK) ..... done
ICD Initializing (ICD_INITIALIZE) ... done
Read ICD Version (ICD_VER_READ) ..... done
ICDmini hardware version ..... 2.0
ICDmini software version ..... 3.2 ← Enables version information to be checked
Debug base address (ID_DATA_READ) .. xxxx
Boot address (ICD_DATA_READ) ..... xxxx
Hardware break MAX .....xx
```

When S1C33 processor is selected

```
(gdb) target icd6 usb
C33 ICD33 debugging
Connecting with target ... done
CPU type and debug unit address setting ... done
Initializing ..... done
CPU cold resetting ..... done
Target connection test ..... omitted
ICD hardware version ... 2.0
ICD software version ... 1.5 ← Enables version information to be checked
CPU type and debug unit address setting ... done
CPU cold resetting ..... done
Boot address ..... xxxx
```

- (6) Check the current firmware version, and enter the following commands if updating is required.

When S1C17 processor is selected

```
(gdb) c17 firmupdate path\filename.saf
```

When S1C33 processor is selected

```
(gdb) c33 firmupdate path\filename.saf
```

path: Path for location of new firmware

filename.saf: File name for new firmware

The process is complete when the following is displayed after the commands have been entered.

When S1C17 processor is selected

```
Erase flash data ...done
Load flash data ...done
ICD firmware update ...done
Please quit gdb, and power off ICD when LED2/LED3/LED4 is green.
(LED is green in the case of SVT17701).
```

When S1C33 processor is selected

```
Erase flash data ...done
Load flash data ...done
ICD firmware update ...done
Please quit gdb, and power off ICD when OK LED is on.
```

This procedure may take about 15 minutes.

While firmware updating is in progress, do not reset the S5U1C17001H or turn off the power. Otherwise it may not be possible to restart the S5U1C17001H.

- (7) Press the RESET/START switch. The LEDs illuminate or blink as shown below.

Firmware update successful

LEDs illuminate in sequence LED1 ● → LED2 ● → LED3 ●

After which:

```
LED1      ● (blue) or ● (green)
LED2      ● (green: successfully erased)
LED3      ● (green: successfully written or verified)
LED4      ● (green: firmware update successfully completed)
```

7. Firmware Update

Firmware update failure

If the firmware version was older than the current firmware version

If an appropriate new firmware is not used

LED1 ● (blue) or ● (green)

LED2 ★ (blinking red)

LED3 ★ (blinking red)

LED4 ● (out)

This error can be reset by repeating from step (1).

If Flash erasing/programming/verifying failed

LED1 ● (blue) or ● (green)

LED2 ● (red: erase failed)

LED3 ● (red: write or verify failed)

LED4 ● (red: firmware update failed)

If this error occurs, the S5U1C17001H may be faulty.

Please contact a Seiko Epson sales office.

- (8) Set SW7 to “OPEN” and press the RESET/START switch again.
The firmware restarts.
If firmware updating failed, the original firmware restarts.

If a malfunction occurs during a firmware update and the S5U1C17001H does not operate normally, please contact our sales office.

8. Precautions

8.1 Restrictions on Debugging

The debugging using the S5U1C17001H is subject to the restrictions specified below.

Operation of the internal peripheral circuits

The peripheral circuits of the target system S1C processor stop operating when the debugger (gdb) on the host computer is ready to accept commands, that is, unless the target program is running. For this reason, the peripheral circuits do not operate in real time when the target program is executed in the single-step mode. For details on single-step execution, refer to the “Debugger” section in the “S5U1C17001C Manual (C Compiler Package for S1C17 Family).”

Interrupts when the target program is not running

If an interrupt request to the S1C Core is generated by the target system when the target program is not running, interrupt processing is paused. The interrupt that has been paused is serviced immediately before the target program is executed or immediately after one instruction is executed after the debugger (gdb) on the host computer has directed that the target program be executed.

Interrupts when the target program is executed in a single step

If an interrupt request to the S1C Core is generated by the target system during single-step execution of the target program, including functions and subroutines (STEP), the interrupt request is paused. During single-step execution of the target program, not including functions and subroutines (NEXT), an interrupt request received within a function or subroutine is serviced without being paused and an interrupt received in other parts of the program is paused as with the STEP command. The interrupt that has been paused is serviced immediately before the target program is executed or immediately after one instruction is executed after the debugger (gdb) on the host computer has directed that the target program be executed. For details on single-step execution (STEP and NEXT), refer to the “Debugger” section in the “S5U1C17001C Manual (C Compiler Package for S1C17 Family).”

Execution counter

- (1) The measuring execution times up to 6515 hours.
- (2) A 3 μ s or less of program execution time cannot be measured correctly.
- (3) As it includes the precision of the oscillator built into ICDmini and the processing of debug mode entry/exit, the measurement result contains the following error.
measuring result = actual time (± 50 ppm) + debug mode entry/exit processing (around 40 cycles)

The counter is also used for clocking of the lapse of time break function, therefore, execution times cannot be measured when the lapse of time break function is used.

Reset sequence

The sequence from when the S5U1C17001H is powered on until the target program is executed is entirely different from that of the actual S1C processor.

However, a sequence for the reset request input from the target system while the target program is being executed is the same as that for the actual S1C processor.

Regarding the reset sequence in the actual S1C processor, refer to the technical manual of each model.

Break functions when a reset request is accepted

Note that the hardware PC break and software PC break functions will be disabled if a reset request (reset input or reset interrupt from the watchdog timer) is accepted while the S1C processor on the target system is executing the target program in normal mode.

It will be enabled again when the S1C processor enters debug mode.

8. Precautions

I/O memory dump by the S5U1C17001H

Note that some S1C peripheral circuits may change the control register status due to their specifications when the I/O memory is read using the memory dump function of the S5U1C17001H or when the target program execution is suspended. For details on the memory dump function, refer to the “Debugger” section in the “S5U1C17001C Manual (C Compiler Package for S1C17 Family).”

8.2 Differences from the Actual IC

The S5U1C17001H is different from the actual IC in the way specified below. If this difference is not taken into consideration in an application, the program may not operate normally in the actual IC.

Register initialization

The initial CPU register values may be different from those of the actual IC. Therefore, be sure not to create a program that depends on the initialized value.

The initial values when the S5U1C17001H is connected are as follows:

```
r0-r7 : 0x000000
pc    : 0x008000(Note)
sp    : 0xfffffc
psr   : 0x00 (IL = 000, IE = 0, CVZN = 0000)
```

Note: The PC initial value is decided according to the TTBR register setting value (boot address). Refer to the technical manual of each model for the TTBR value.

8.3 Notes on Use of S5U1C17001H

Powering on/off

After turning off the power to the S5U1C17001H by disconnecting the USB cable, wait at least 10 seconds before turning the power on (connecting the USB cable) again. If the power is turned on immediately after it is turned off, the S5U1C17001H may not be initialized correctly in a power-on reset, and may cause a malfunction.

Connecting the target system

The signals connected to the S5U1C17001H are very high-speed signals, so the connector on the target system must be mounted within 5 cm from the target S1C processor. If there is more distance between the connector and the S1C processor, the S5U1C17001H may not work properly. Furthermore, be sure to use the supplied 4-pin cable for connecting the target system to the S5U1C17001H. Using another cable may cause a malfunction. If another cable must be necessarily used, do not extend the target interface cable and connect the cable directly to the S5U1C17001H so that the distance to the S1C processor on the target system will be shortest (not exceeding 20 cm).

Operation of the S5U1C17001H system

The S5U1C17001H can work by connecting a target system in which the actual S1C processor is mounted. Since the S5U1C17001H package does not include any board equivalent to a target system, please prepare separately.

Wiring between the S1C processor and target connector

When wiring the S1C processor to the target system connector for connecting the S5U1C17001H, insert a 33 Ω resistor in series between the S1C processor DSIO pin and the connector. This resistor must be placed as close to the S1C processor as possible. If the reset line is not connected, the system can be operated without this 33 Ω resistor. However, we recommend inserting this resistor to prevent malfunctions. The other pins are connected directly. The total length of the line must be under 5 cm. A low-level input to the DSIO pin issues a forced break to set the S1C processor into debug mode. Although this signal is pulled up through about 100 kΩ internally, when not debugging, we recommend either removing the 33 Ω resistor to reduce noise and other problems or pulling this line up to the VDD level.

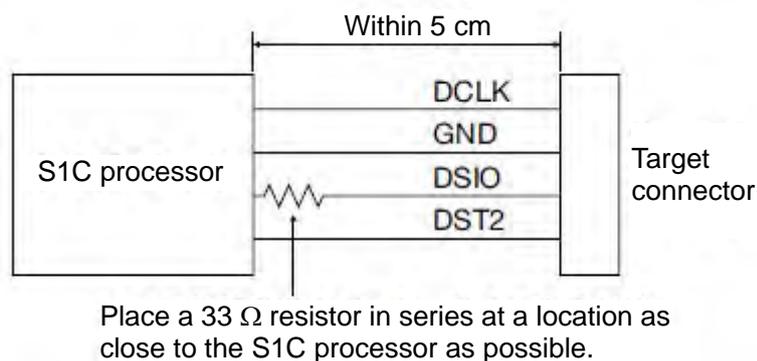


Figure 8.3.1 Wiring between S1C Processor and Target Connector

Reset request

Do not reset the target system while the target program execution is suspended as the S5U1C17001H will be unable to operate normally.

Notes on target system's interface

The allowable voltage range for the signals input from the target system is 1.0 to 5.5 V. The S5U1C17001H may fail if voltages that exceed this range are input. Therefore, target systems to be connected to the S5U1C17001H must be designed so that voltages outside this range are not applied. Take special care in designing the target system power supply, and design the target system so that over voltages are not applied to the S5U1C17001H when the target system power supply is turned on or off.

8.4 Differences between the S5U1C17001H and S5U1C33001H

The trace function cannot be used if S1C33 is selected with the S5U1C17001H.

9. Troubleshooting

9. Troubleshooting

The following shows the problems attributable to the hardware:

Table 9.1 Troubleshooting

Symptom	Cause/remedy
The LED3 (EMU) that lit when the S5U1C17001H was turned on does not go out.	(1) Is the target system turned on? → Turn the target system on. (2) Is the target system connected with the S5U1C17001H? → See Section 4.1, "Connecting the Target System," and check to see if the target system is connected correctly. (3) Was the start up sequence correct? → See Section 5.2, "Activation in ICD Mode," and start up in the correct order.
The following message appears when the debugger (gdb) in the host computer is invoked: Cannot open ICD17 usb driver. or Cannot open ICD33 usb driver.	(1) Is the S5U1C17001H connected to the host computer correctly? → See Section 4.2, "Connecting to the Host Computer" and check to see if the S5U1C17001H is connected to the host computer correctly. (2) Was the debugger (gdb) restarted after resetting the S5U1C17001H while the debugger is running? → See Section 5.2, "Activation in ICD Mode," and start up in the correct order.
The following message suddenly appears while the target program is being executed by the debugger (gdb) in the host computer: Break by external break. Program received signal SIGINT, Interrupt.	This problem is caused by low-level noise on the DSIO signal of the target system or when the BRK IN pin goes GND level. (1) Is the target system connected with a cable other than the supplied, or is the supplied cable used with extension cables? → Use the supplied cable. If it cannot be used then use extension cables that are as short as possible and shield them in order to avoid occurrence of low-level noise on the DSIO signal. (2) Is there any conductive material near the BRK IN pin? → Remove the conductive material.
The operation is unstable.	(1) Is the DSIO output level (SW4, SW5) set correctly? → See Section 3.1, "Left Side Panel," and make sure that the setting is correct. (2) Is the target system connected with a cable other than the one supplied, or is the supplied cable used with extension cables? → Use the supplied cable. If it cannot be used then use extension cables that are as short as possible and shield them in order to avoid occurrence of low-level noise on the DSIO signal.

10. Specifications

Table 10.1 Specifications

Components	Items	Specifications	Remarks
S5U1C17001H	Dimensions	100 mm (W) × 85 mm (L) × 25 mm (H)	Rubber feet included
	Input voltage	DC 5 V	
	Power consumption	2.5 W max.	
USB cable	Length	1 m	
	Connector	S5U1C17001H side : Standard-B type Host PC side : Standard-A type	
Target system interface cable (4 pins)	Length	Approx. 15 cm	
Flash programming power supply cable (4 pins)	Length	Approx. 15 cm	

Table 10.2 Recommended Connectors on the Target System

Components	Items	Specifications	Remarks
Target system interface connector (4 pins)	Connector	4-pin (straight): A2-4PA-2.54DS(71) (HRS)	
Flash programming power supply connector (4 pins, white)	Connector	4-pin (L angle): S04B-PASK-2 (JST)	
Flash programming power supply connector (4-pin, black)	Connector	4-pin (straight): A2-4PA-2.54DS (71) (HRS)	

Table 10.3 Operating Environment

Items	Specifications	Remarks
Operating temperature	5 to 35°C	
Storage temperature	-10 to 60°C	
Operating humidity	35 to 80%	
Storage humidity	20 to 90%	No condensation

10.1 Electrical Characteristics

Table 10.1.1 3.3 V and 1.8 V Output Pin Specifications

Output pin	Item	min	typ	max	Unit
3.3 V power supply pin	Current	–	–	100	mA
	Voltage	-1.0	–	+1.0	%
1.8 V power supply pin	Current	–	–	100	mA
	Voltage	-1.0	–	+1.0	%

* A stable power supply (+5.0 V) must be supplied via the USB connector.

Table 10.1.2 Flash Programming Voltage Specifications

Selected processor	Item	min	typ	max	Unit
S1C17	Current	–	–	100	mA
	Voltage	6.0	–	8.0	V
S1C33	Current	–	–	100	mA
	Voltage	–	7.0	–	V

Appendix

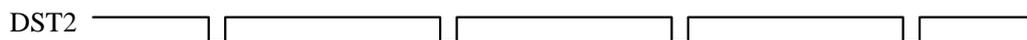
Initial Validation when Designing a Target System

This section explains the procedure for checking that the S1C processor mounted on the target system is working properly.

Step 1

Check that the most basic circuits such as the power supply, reset, and debugging pins are working normally.

- (1) With the S5U1C17001H switched on but not connected, input High → Low → High signals to the #RESET pin.
This resets the S1C processor.
- (2) Input a Low signal to the DSIO pin (input pin).
This sets the S1C processor to debug mode.
- (3) If DST2 pin (output pin) changes from Low to High, it indicates that the most basic functions of the S1C processor are working.
(If the S1C processor is set to the debug mode, the DST2 pin changes from Low to High.) Strictly speaking, if a Low signal is input continuously, the output from DST2 is as follows.



If DST2 pin (output pin) does not change from Low to High, check the hardware of the target system.

Step 2

Try to establish a connection with the S5U1C17001H.

- (1) Set the DIP switches of the S5U1C17001H.
The default is all open. Set the switches appropriately for the target system.
In this test, make the following settings at the minimum.

SW2 = OPEN
SW3 = OPEN
SW7 = OPEN
SW8 = OPEN

If the S1C processor is operating with IO voltage other than 3.3 V, it is necessary to change the settings of SW4 and SW5.

- (2) Connect the S5U1C17001H to a host computer installed with the S5U1C17001H USB driver, and connect the debugging pins (DCLK, DSIO, and DST2) and GND to the S5U1C17001H with the target interface cable provided.

The target is functioning normally if the LEDs on the top of the case are as follows.

LED1 ● (blue) or ● (green)
LED2 ● (blue)
LED3 ● (out)
LED4 ● (green)
⇒ Normal

LED1 ● (blue) or ● (green)
LED2 ● (blue)
LED3 ● (red)
LED4 ● (green)
⇒ Input High → Low → High signals to the #RESET pin.
(This resets the S1C processor.)

LED1 ● (blue) or ● (green)
LED2 ● (blue)
LED3 ● (red)
LED4 ● (out)

⇒ Press the RESET/START switch on the S5U1C17001H once and input High → Low → High signals to the #RESET pin.

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