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CMOS 16-BIT SINGLE CHIP MICROCONTROLLER

ICDmini Ver. 3.0
(S5U1C17001H3)
User Manual

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Table of Contents

1. Overview	1
1.1 Features	2
1.2 Operating Environment	2
2. Package Contents	3
3. Name and Function of Each Part	4
3.1 Right Side Panel (Target System Interface Connector)	4
3.2 Left Side Panel (USB Connector)	4
3.3 Top Panel (LEDs)	5
4. Connections	6
4.1 Connecting with the Target System	6
4.1.1 Target System Interface Connector	7
4.1.2 Pin Description	8
4.2 Connecting to the Host Computer	9
5. Firmware Update	10
6. Precautions	12
6.1 Notes on Use of ICDmini Ver. 3.0	12
6.2 Other	12
7. Troubleshooting	13
8. Specifications	14
8.1 ICDmini Ver. 3.0	14
8.1.1 ICDmini Ver. 3.0 Specifications	14
8.1.2 Operating Environment	14
8.1.3 Electrical Characteristics	14
8.2 USB Cable	14
8.3 Target System Connection Cable	14
Appendix A Differences from ICDmini Ver. 2.0	15
Appendix B ICDmini Ver1.0, 1.1, and 2.0 Compatible Cable Specifications	16
B.1 Pin Assignment Table	16
B.2 Component Specifications	16
Appendix C Operable Condition Examples (Reference)	17
Revision History	18

1. Overview

The ICDmini Ver. 3.0 (S5U1C17001H3) is a hardware tool (emulator) that allows developers to efficiently develop software for the Seiko Epson S1C17 Family 16-bit microcontrollers (hereinafter referred as S1C17 MCU). The ICDmini Ver. 3.0 provides an interface function to connect the S1C17 MCU on the target system and the host computer and is capable being used for debugging and emulation of the target system software.

This manual describes how to use the ICDmini Ver. 3.0 hardware. For details on the functions of the control software running on the host computer (debugger) and its commands, refer to the manual for the S1C17 Family C Compiler Package Ver. 3.0.0 or later.



Figure 1.1 ICDmini Ver. 3.0 External View

1. Overview

1.1 Features

Table 1.1.1 Features of ICDmini Ver. 3.0

Item	Feature
Core CPU supported	S1C17 Core
Host interface	USB Ver. 2.0 (Full speed)
Program break functions	PC break and forced break functions
Target program running time measurement function	Available
Clock (DCLK) frequency for communicating with the target MCU	Max. 24 MHz *1
Flash memory programming power supply	Available (Either 7.0 V or 7.5 V output voltage can be selected from the host computer.)
Target system reset signal output	Available
Target system I/O interface voltage range	1.2 V to 5.5 V (input from the target system) or 3.3 V fixed *2
Target system interface connector	2.54 mm-pitch 10-pin connector *3
Power supply for target system	Available (3.3 V, max. 100 mA)
*1 Clock frequency that is output from the S1C17 MCU's DCLK pin during debug mode	
*2 After power is turned on, the ICD mini Ver. 3.0 is configured so that the I/O interface voltage will be supplied from the target system. It can be reconfigured from the host computer. For more information, refer to the manual for the S1C17 Family C Compiler Package Ver. 3.0.0 or later.	
*3 A target system connection cable with the target system side connectors compatible with the ICDmini Ver. 1.0, 1.1, and 2.0 is available as an option.	

1.2 Operating Environment

The ICDmini Ver. 3.0 requires a PC equipped with a USB port as the host computer. For the operating systems supported, refer to the manual for the S1C17 Family C Compiler Package Ver. 3.0.0 or later.

2. Package Contents

The following lists the contents of the ICDmini Ver. 3.0 package:

- (1) ICDmini Ver. 3.0 main unit 1
- (2) USB cable 1
- (3) 10-pin target system connection cable 1
- (4) Precautions for use 1 (English/Japanese)

Please prepare the item shown below, as it is not included in this package.

- S1C17 Family C Compiler Package Ver. 3.0.0 or later



Figure 2.1 Contents of ICDmini Ver. 3.0 Package

3. Name and Function of Each Part

3. Name and Function of Each Part

This chapter shows the name and function of each part in the ICDmini Ver. 3.0.

3.1 Right Side Panel (Target System Interface Connector)

This connector is used to connect a target system. For more information, refer to Chapter 4.



Figure 3.1.1 ICDmini Ver. 3.0 Right Side View

3.2 Left Side Panel (USB Connector)

This connector is used to connect the host computer using a USB cable. The ICDmini Ver. 3.0 should be connected directly to the USB port of the host computer.



Figure 3.2.1 ICDmini Ver. 3.0 Left Side View

3.3 Top Panel (LEDs)

These LEDs indicate power on and debugging statuses.

- POWER (green)

This LED starts blinking immediately after the ICDmini Ver. 3.0 is connected to the host computer. It changes to lighting when the communication between the ICDmini Ver. 3.0 and the host computer is established.

- EMU (red)

This LED lights to indicate that the target MCU has entered DEBUG mode when the connection between the host computer, the ICDmini Ver. 3.0, and the target system is established.

When the debugger on the host computer issues an instruction to execute the target program, this LED starts blinking to indicate that the program on the target system is being executed. When the power supply of the target system is off or the target system is not connected to the ICDmini Ver. 3.0, this LED is turned off. However, once this LED starts blinking by executing the target program, it continues blinking even if the power supply of the target system is turned off or the target system is disconnected after that.



Figure 3.3.1 ICDmini Ver. 3.0 Top View

4. Connections

4. Connections

4.1 Connecting with the Target System

The following shows examples of wiring between the ICDmini Ver. 3.0 and the target system.

- When the power voltage for interfacing with the S1C17 MCU is supplied from the target system to the ICDmini Ver. 3.0

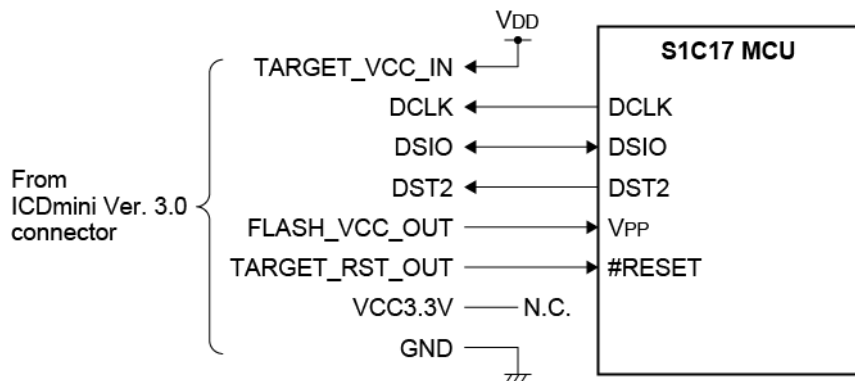


Figure 4.1.1(a) Target System Connection Example 1

- When the power voltage (3.3 V) for interfacing with the S1C17 MCU is supplied from the ICDmini Ver. 3.0 to the target system

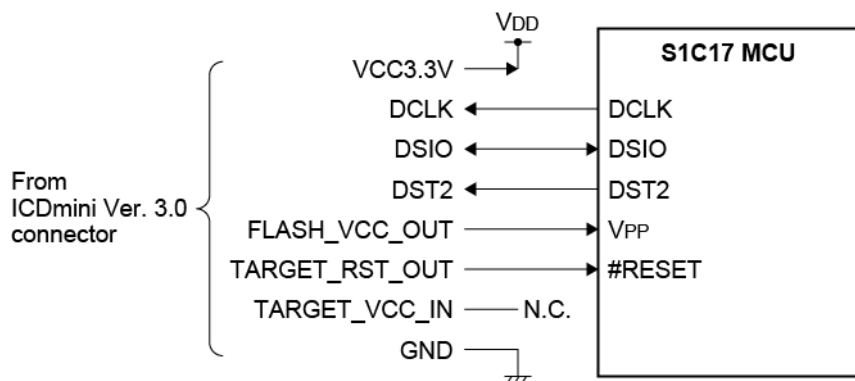


Figure 4.1.1(b) Target System Connection Example 2

Note!

Refer to the “Basic External Connection Diagram” in the Technical Manual for the target S1C17 MCU to determine the wiring and elements to be connected.

4.1.1 Target System Interface Connector

This connector is used for the purposes listed below.

- To communicate with the target S1C17 MCU
- To output a reset signal to the target system
- To supply the programming power voltage for the flash memory embedded in the target S1C17 MCU
- To input the target system interface voltage

Use the target system connection cable supplied with the ICDmini Ver. 3.0 to connect the target system. Table 4.1.1.1 lists the target system interface connector pin assignment.

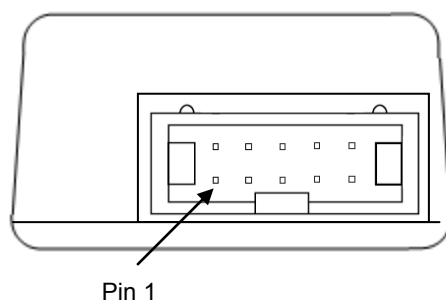


Figure 4.1.1.1 Target System Interface Connector on the ICDmini Ver. 3.0 Left Side Panel

Table 4.1.1.1 Target System Interface Connector Pin Assignment Table

Target System Interface Connector (10 pins)			
No	Pin name	I/O	Pin function
1	DCLK	I	Clock signal input for debugging
2	GND	–	Ground
3	DSIO	I/O	Serial communication signal input/output for debugging
4	DST2	I	Debug status signal input
5	FLASH_VCC_OUT	–	Flash memory programming voltage output
6	GND	–	Ground
7	TARGET_RST_OUT	O	Target system reset signal output
8	TARGET_VCC_IN	–	Target system power supply voltage input
9	VCC3.3V	–	Power supply (3.3 V)
10	N.C.	–	Unused

4. Connections

4.1.2 Pin Description

Table 4.1.2.1 Target System Interface Connector Pin Description

Pin name	Description
DCLK	Clock signal input for debugging. Connect this signal to the DCLK pin of the S1C17 MCU.
GND	Ground. Connect this signal to the ground of the S1C17 MCU.
DSIO	Serial communication signal input/output for debugging. Connect this signal to the DSIO pin of the S1C17 MCU.
DST2	Debug status signal input. Connect this signal to the DST2 pin of the S1C17 MCU.
FLASH_VCC_OUT	Flash memory programming voltage output. Connect this output to the VPP pin of the S1C17 MCU when a flash memory programming voltage is externally supplied to the S1C17 MCU that has a flash memory programming power supply pin (VPP).
GND	Ground. Connect this signal to the ground of the S1C17 MCU.
TARGET_RST_OUT	Target system reset signal output. Connect this signal to the #RESET pin of the S1C17 MCU. The TARGET_RST_OUT pin is configured as an Nch open drain output with a 10 kΩ pull-up resistor, so this signal can be input to the S1C17 MCU in a wired OR connection even if another reset signal, such as a user reset switch signal, must be input.
TARGET_VCC_IN	Target system power supply voltage input. Use this pin when supplying the interface power voltage from the target system.
VCC3.3V	Power supply pin. This pin always outputs 3.3 V for the target system. The maximum drive capability is 100 mA.

When connecting the above signals to the target system, the connection destinations should be determined using the ICDmini Ver. 3.0 internal circuit configuration shown below as a reference.

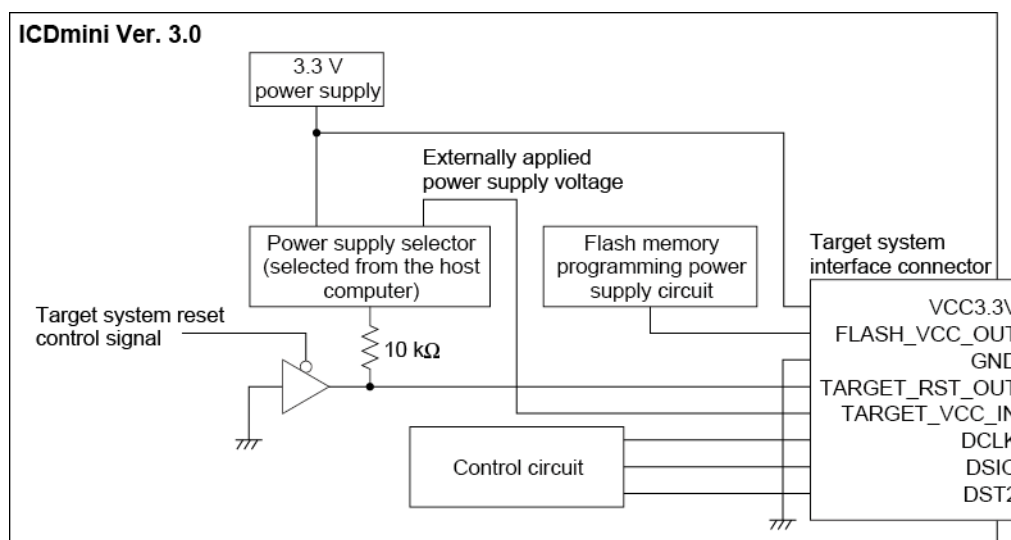


Figure 4.1.2.1 Configuration of ICDmini Ver. 3.0 Interface Power Supply and Reset Circuits

4.2 Connecting to the Host Computer

Use the USB cable included in this package to connect the ICDmini Ver. 3.0 to the host computer. When the ICDmini Ver. 3.0 is connected to the host computer for the first time, the host computer requests the USB driver to be installed. Install the USB driver by following the directions displayed by the host computer. (For detailed information on the operations, refer to the manual for the S1C17 Family C Compiler Package Ver. 3.0.0 or later.)

If the driver has already been installed, the POWER (green) LED on the ICDmini Ver. 3.0 top panel starts blinking and then it changes to lighting when the communication between the ICDmini Ver. 3.0 and the host computer is established.

In addition to the POWER LED, the EMU (red) LED lights if power to the target system has been turned on and the target S1C17 MCU is ready to start debugging.

Note!

The VCC3.3V pin in the target system interface connector always outputs a voltage of 3.3 V.

5. Firmware Update

5. Firmware Update

This chapter describes the procedure to update the ICDmini Ver. 3.0 firmware.

(1) Removing the bottom cover

Make sure that nothing is connected with the ICDmini Ver. 3.0 and remove the bottom cover by unscrewing the two screws.



Figure 5.1 Screw Positions on the Bottom Cover

(2) Setting the jumper switch

Remove the jumper pin, which is inserted into one side of the jumper switch terminals located at lower side of the PCB in the case, remove it once and then reinsert to short the jumper switch terminals. (Using tweezers allows removing/inserting of the jumper pin with relative ease.)

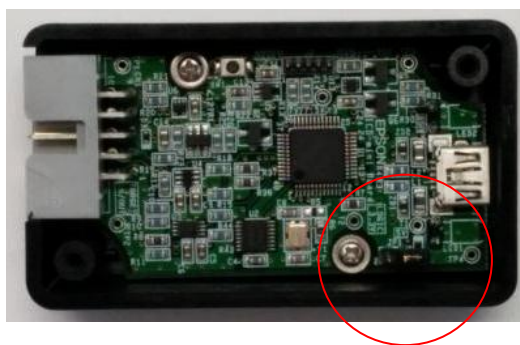


Figure 5.2 Jumper Switch Position in the Case

(3) Connecting with the host computer

With the bottom cover removed, connect the ICDmini Ver. 3.0 to the host computer using the supplied USB cable. Then open a file explorer on the host computer.

(4) Rewriting the firmware

An unused drive of the host computer is allocated to the ICDmini Ver. 3.0 as a storage device. The file explorer shows that the “firmware.bin” file exists in this drive. Replace this file with the latest firmware data file.

A display example using Explorer is shown below. In this example, E drive is allocated to the ICDmini Ver. 3.0 as a storage.

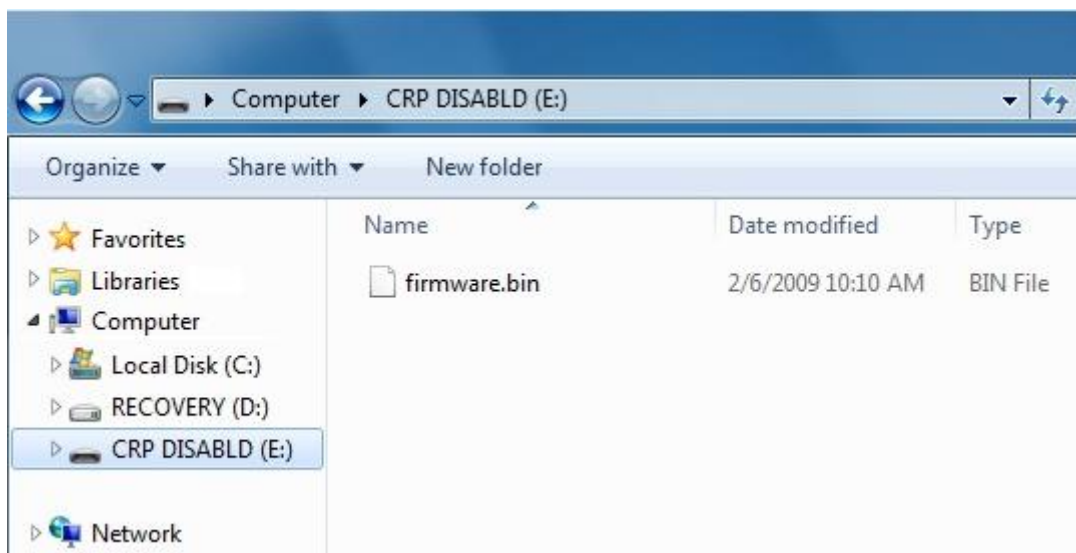


Figure 5.3 Example of Drive Allocation to ICDmini Ver. 3.0 (Storage)

(5) Disconnecting the ICDmini Ver. 3.0

After the firmware has been updated, remove the ICDmini Ver. 3.0 device from the host computer by clicking the Safely Remove Hardware icon in the notification area, at the right of the taskbar, and select “Eject LPC1XXX IFLASH” in the list of devices that appears. Then unplug the ICDmini Ver. 3.0 from the host computer.

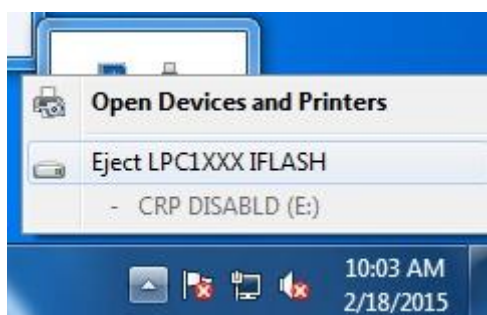


Figure 5.4 Removing ICDmini Ver. 3.0 (Storage)

(6) Resetting the jumper switch and attaching the bottom cover

Remove the jumper pin set in Step (2) and put it back into the original position. Then attach the bottom cover paying attention to the direction (align the side of the cover with the notch to the 10-pin connector side).

6. Precautions

6. Precautions

6.1 Notes on Use of ICDmini Ver. 3.0

- Turning power on/off

The ICDmini Ver. 3.0 requires at least a 10-second interval between turning power off once and turning power on again by unplugging and plugging the USB cable. If not enough interval is taken between power off and on, the power-on reset may not be performed normally and the ICDmini Ver. 3.0 may not operate normally or it may cause a malfunction.

- Connecting with the target system

Since very high-speed signals are connected to the ICDmini Ver. 3.0, the connector on the target system must be placed within 5 cm from the target S1C17 MCU. Otherwise, the ICDmini Ver. 3.0 may not operate normally. Furthermore, the supplied 10-pin cable or an optional 10-pin cable compatible with the the ICDmini Ver. 1.0, 1.1, and 2.0 (refer to Appendix B) should be used for connecting the ICDmini Ver. 3.0 with the target system.

- Operating the ICDmini Ver. 3.0 system

To operate the ICDmini Ver. 3.0 system, a target system that includes an actual S1C17 MCU should be prepared by the user, as no target system board is included in the ICDmini Ver. 3.0 package.

- Wiring between the S1C17 MCU to the connector on the target system

For the signals and elements to be connected, refer to the Technical Manual for the target S1C17 MCU.

- Target system interface voltage

The allowable voltage range of the signals input to the ICDmini Ver. 3.0 through the target system connection cable is 1.2 to 5.5 V. If a voltage that exceeds the range is applied, the ICDmini Ver. 3.0 may become damaged. The target system to be connected should be designed so that voltage out of the range, especially overvoltage that may occur when the target system is turned on and off, will not be applied to the ICDmini Ver. 3.0.

- Execution counter

The execution counter included in the ICDmini Ver. 3.0 can measure execution time up to 4,294.967295 seconds. The minimum resolution is 1 μ s, so a time shorter than 1 μ s cannot be measured. A measurement error within ± 30 ppm may occur due to the accuracy of the resonator included in the ICDmini Ver. 3.0.

6.2 Other

- The ICDmini Ver. 3.0 should be used so that the surface with screw holes is facing down.
- Use the USB cable and target system connection cable included in the ICDmini Ver. 3.0 package.
- The ICDmini Ver. 3.0 should be used indoors.
- Do not use the ICDmini Ver. 3.0 with the bottom cover left open except when the firmware is updated, as it may cause a malfunction.

7. Troubleshooting

The table below shows troubles caused by the hardware and their remedies.

Table 7.1 Troubleshooting

Symptom	Check/Remedy
Although the POWER LED changed from blinking to lighting after the ICDmini Ver. 3.0 was turned on, the EMU LED is not lit.	Is the target system turned on? → Turn the target system on.
	Is the target system connected to the ICDmini Ver. 3.0 properly? → Refer to Section 4.1, "Connecting with the Target System" and check the connection.
The debugger on the host computer displayed the message shown below after being launched. Cannot open ICD17 usb driver.	Is the host computer connected with the ICDmini Ver. 3.0 properly? → Refer to Section 4.2, "Connecting to the Host Computer" and check the connection.
The debugger on the host computer suddenly displayed the message shown below while it was executing the target program. Break by external break. Program received signal SIGINT, Interrupt.	It might be caused by low-level noise included in the DSIO signal on the target system. Is a cable other than the supplied cable used to connect with the target system, or is the supplied cable extended with another cable? → Use the supplied cable without being extended. If it must be extended, use an extension cable as short as possible and shield the wiring to reduce low-level noise mixed in the DSIO signal.
The operation is unstable.	Is the DSIO signal level configured correctly? → Refer to the manual for the S1C17 Family C Compiler Package Ver. 3.0.0 or later and check the signal level.
	Is a cable other than the supplied cable used to connect with the target system, or is the supplied cable extended with another cable? → Use the supplied cable without being extended. If it must be extended, use an extension cable as short as possible and shield the wiring to reduce low-level noise mixed in the DSIO signal.

8. Specifications

8. Specifications

8.1 Component Specifications

8.1.1 ICDmini Ver. 3.0

Table 8.1.1.1 ICDmini Ver. 3.0 Specifications

Item	Specification	Remarks
Dimensions	W 60 mm × H 20 mm × D 35 mm	
Input voltage	DC 5 V	
Power consumption	2.5 W or less	
Target system interface connector	7610-5002BL (3M)	
USB connector	513870530 (molex)	Mini-B

8.1.2 USB Cable

Table 8.1.2.1 USB Cable Specification

Item	Specification	Remarks
Dimensions	Approx. 1.5 m	Standard A to Mini-B

8.1.3 Target System Connection Cable

Table 8.1.3.1 Target System Connection Cable Specifications

Component	Item	Specification	Remarks
Target system connection cable (10 pins)	Product number	C-03796 (AKIZUKI)	Mail order code
	Length	Approx. 27 cm	

8.2 Operating Environment

Table 8.2.1 Operating Environment

Item	Specification	Remarks
Operating voltage	DC 5 V ± 5%	Supplied via the USB VBUS pin.
Operating temperature	5°C to 40°C	
Storage temperature	-10°C to 60°C	
Operating humidity	35% to 80%	No condensation
Storage humidity	20% to 85%	No condensation

8.3 Electrical Characteristics

Table 8.3.1 3.3 V Power Supply Pin Characteristics

Pin name	Item	Min.	Typ.	Max.	Unit
VCC3.3V	Current	–	–	100	mA
	Voltage	-5.0	–	+5.0	%

Appendix A Differences from ICDmini Ver. 2.0

The table below lists the differences between the ICDmini Ver. 2.0 and Ver. 3.0.

Table A.1 Differences between the ICDmini Ver. 2.0 and Ver. 3.0

Item	ICDmini Ver.2.0 (S5U1C17001H2100)	ICDminiVer.3.0 (S5U1C17001H3100)
Core CPU supported	S1C17/S1C33	S1C17
Flash memory programming voltage (VPP) output	Available	Available
VPP voltage	6.0 V to 8.0 V variable voltage (when S1C17 is selected)	7.0 V or 7.5 V selectable fixed voltage
Target system I/O interface voltage	1.8 V or 3.3 V internal voltage, or 1.0 V to 5.5 V supplied from the target system	3.3 V internal voltage or 1.2 V to 5.5 V supplied from the target system
Target system interface voltage output	1.8 V or 3.3 V (max.100 mA)	3.3 V only (max.100 mA)
Flash memory programming power supply cable	Available	Integrated in the target system interface connector and cable
Flash memory programmer mode (multi-programmer support)	Available	Unavailable
Reset switch	Available	Unavailable
LED	Four 7-color LEDs	Two single color LEDs (green and red)
BRKIN and GND pins	Available	Unavailable
USB connector	Standard-B	Mini-B
Supplied cable	One 4-pin target system connection cable, two 4-pin flash memory programming power supply cables, and one USB (Standard-A to B) cable	One 10-pin target system connection cable *1 and one USB (Standard-A to Mini-B) cable
MCU supported	S1C17 and S1C33 Family MCUs	S1C17 Family MCUs except S1C17803 (when used with a 24 MHz or higher OSC3 clock)
Firmware update	Update using debugger commands	Update using a file explorer on the host computer
*1 Includes a flash memory programming power supply pin		

Appendix B ICDmini Ver1.0, 1.1, and 2.0 Compatible Cable Specifications

Appendix B ICDmini Ver1.0, 1.1, and 2.0 Compatible Cable Specifications

The following shows the specifications of the target system connection cable (S5U1C17001W7200, option) compatible with the ICDmini Ver1.0, 1.1, and 2.0.

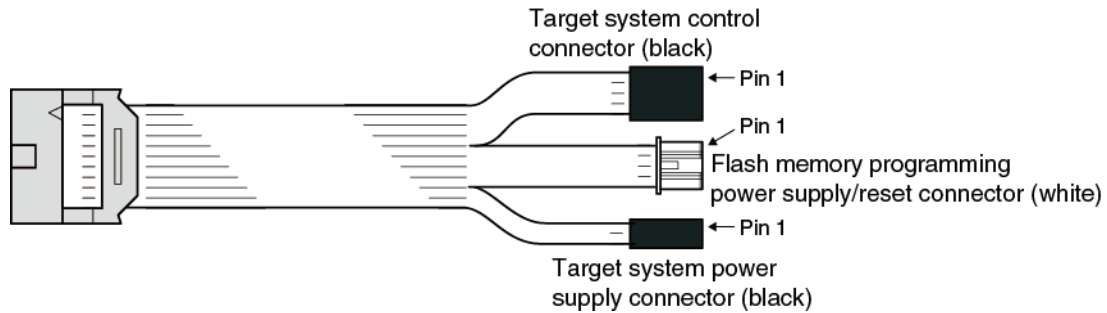


Figure B.1 ICDmini Ver1.0, 1.1, and 2.0 Compatible Cable

B.1 Pin Assignment Table

Table B.1.1 Pin Assignment Table

No.	Connector	No.	Connector
1	10-pin connector side	1	4-pin black connector side
2		2	
3		3	
4		4	
5		1	4-pin white connector side
6		2	
7		3	
8		4	
9		1	2-pin black connector side
10		2	

B.2 Component Specifications

Table B.2.1 Target System Connection Cable Specifications

Component	Item	Specification	Remarks
ICDmini Ver. 3.0 side connector	Product number	Connector: 7910- 6500SC (3M) Strain relief: 3448-7910 (3M)	
Target system connection cable (10 conductors to 4, 4, and 2 conductors)	Length	Approx. 30 cm	
Target system side connector	Product number	Connector (4 pins): RE-04 (JST) Connector (2 pins): RE-02 (JST) Contact: RF-SC2210(LF)(SN) (JST)	Black connectors
		Connector (4 pins): PAP-04V-S (JST) Contact: SPHD-002T-P0.5 (JST)	White connector

Appendix C Operable Condition Examples (Reference)

The table below lists some operable condition examples when using the ICDmini Ver. 3.0. These example cannot guarantee operations under the user's environment, as environmental conditions other than below must taken into consideration for actual operations.

Table C.1 Operable Condition Examples

Model	Target system interface voltage	Operating frequency (DCLK)	Target system connection cable length
S1C17W23	1.2 V	1 MHz	100 cm max.
S1C17801	3.3 V	24 MH (OSC3 = 48 MHz)	100 cm max.
S1C17803	5.0 V	20 MHz	100 cm max.

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