

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

# Connection of SH7290 E10A Emulator

HS7290KCM01H HS7290KCM02H HS7290KCI01H  
HS7290KCI02H with User System

# 1. Connecting the E10A Emulator with the User System

To connect the E10A emulator (hereinafter referred to as the emulator), the H-UDI port connector must be installed on the user system to connect the user system interface cable. When designing the user system, refer to the recommended circuit between the H-UDI port connector and the MCU. In addition, read the E10A emulator user's manual and hardware manual for the related device.

Table 1.1 shows the type number of the E10A emulator, the corresponding connector type, and the use of AUD function.

**Table 1.1 Type Number, AUD Function, and Connector Type**

Type Number	Connector	AUD Function
HS7290KCM02H, HS7290KCI02H	36-pin connector	Available
HS7290KCM01H, HS7290KCI01H	14-pin connector	Not available

The H-UDI port connector has the 36-pin and 14-pin types as described below. Use them according to the purpose of the usage.

1. 36-pin type (with AUD function)  
The AUD trace function is supported. A large amount of trace information can be acquired in realtime. The window trace function is also supported for acquiring memory access in the specified range (memory access address or memory access data) by tracing.
2. 14-pin type (without AUD function)  
The AUD trace function cannot be used because only the H-UDI function is supported. For tracing, only the internal trace function is supported. Since the 14-pin type connector is smaller than the 36-pin type (1/2.5), the area where the connector is installed on the user system can be reduced.

## 2. Installing the H-UDI Port Connector on the User System

Table 2.1 shows the recommended H-UDI port connectors for the emulator.

**Table 2.1 Recommended H-UDI Port Connectors**

Connector	Type Number	Manufacturer	Specifications
36-pin connector	DX10M-36S	Hirose Electric Co., Ltd.	Screw type
	DX10M-36SE, DX10G1M-36SE		Lock-pin type
14-pin connector	2514-6002	Sumitomo 3M Limited	14-pin straight type

**Note:** When the 36-pin connector is used, do not connect any components under the H-UDI connector. When the 14-pin connector is used, do not install any components within 3 mm of the H-UDI port connector.

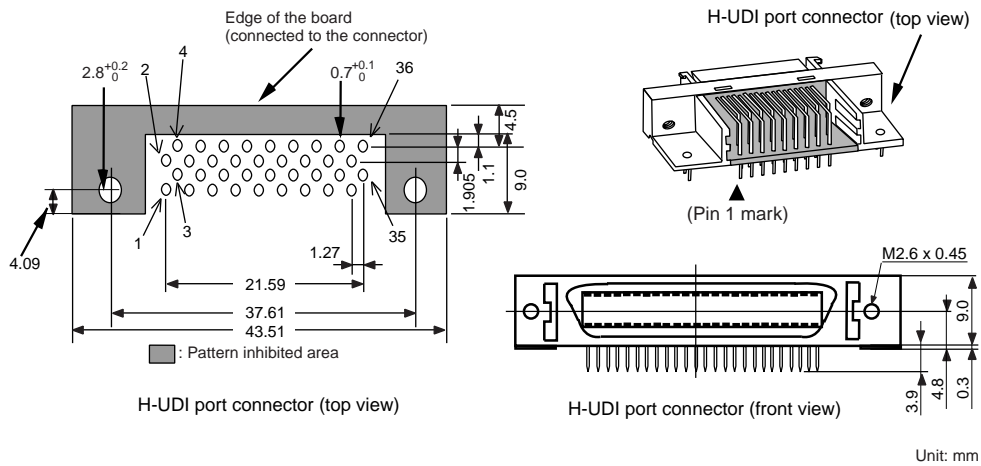
### 3. Pin Arrangement of the H-UDI Port Connector

Figures 3.1 and 3.2 show the pin arrangement of the 36-pin and 14-pin H-UDI port connectors, respectively.

Note: Note that the pin number assignment of the H-UDI port connector shown below differs from that of the connector manufacturer.

Pin No.	Signal	Input/ Output*1	Note	Pin No.	Signal	Input/ Output*1	Note
1	AUDCK	Output		19	TMS	Input	
2	GND	—		20	GND	—	
3	AUDATA0	Output		21 <sup>*2</sup>	/TRST	Input	
4	GND	—		22	GND	—	
5	AUDATA1	Output		23	TDI	Input	
6	GND	—		24	GND	—	
7	AUDATA2	Output		25	TDO	Output	
8	GND	—		26	GND	—	
9	AUDATA3	Output		27 <sup>*2</sup>	/ASEBRKAK	Output	
10	GND	—		28	GND	—	
11 <sup>*2</sup>	/AUDSYNC	Output		29 <sup>*2</sup>	/CA	Output	U-standby detection
12	GND	—		30	GND	—	
13	NC	—		31 <sup>*2</sup>	/RESETP	Output	User reset
14	GND	—		32	GND	—	
15	NC	—		33 <sup>*3</sup>	GND	Output	
16	GND	—		34	GND	—	
17	TCK	Input		35	NC	—	
18	GND	—		36	GND	—	

- Notes: 1. Input to or output from the user system.  
2. The slash (/) means that the signal is active-low.  
3. The emulator monitors the GND signal of the user system and detects whether or not the user system is connected.

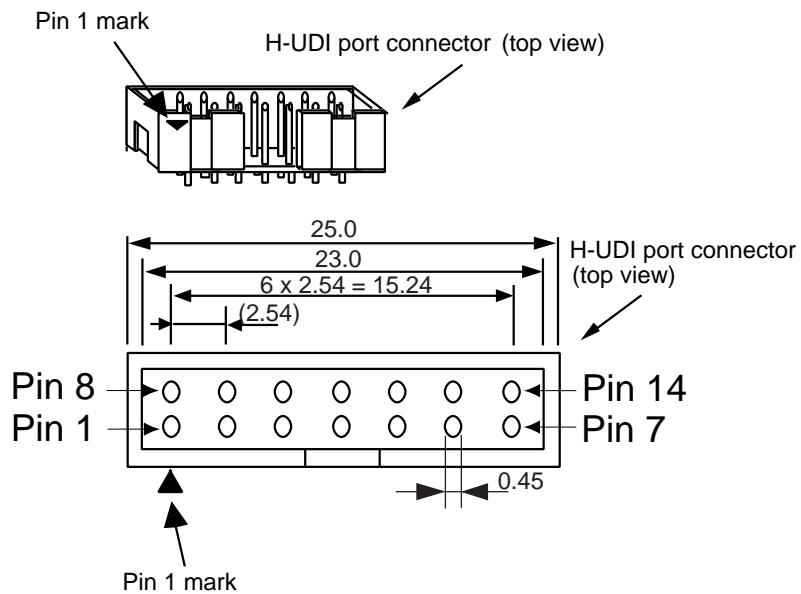


**Figure 3.1 Pin Arrangement of the H-UDI Port Connector (36 Pins)**



Pin No.	Signal	Input/ Output**1	Note
1	TCK	Input	
2*2	/TRST	Input	
3	TDO	Output	
4*2	/ASEBRKAK	Output	
5	TMS	Input	
6	TDI	Input	
7*2	/RESETP	Output	
11	/CA	Output	
8 to 10	GND	—	
12 to 13			
14*3	GND	Output	

- Notes: 1. Input to or output from the user system.  
2. The slash (/) means that the signal is active-low.  
3. The emulator monitors the GND signal of the user system and detects whether or not the user system is connected.



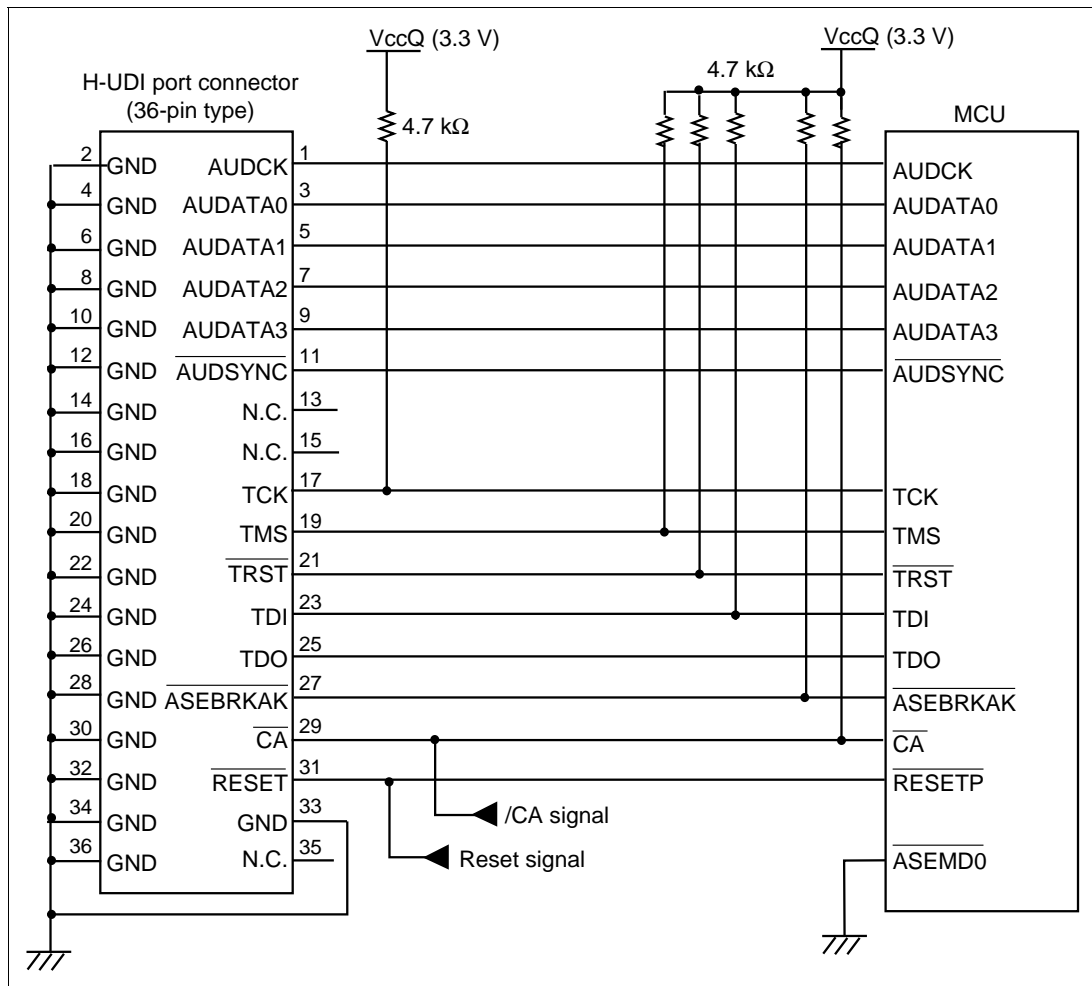
**Figure 3.2 Pin Arrangement of the H-UDI Port Connector (14 Pins)**

## 4. Recommended Circuit between the H-UDI Port Connector and MCU

### 4.1 Recommended Circuit (36-Pin Type)

Figure 4.1 shows a recommended circuit for connection between the H-UDI port connector (36 pins) and the MCU.

- Notes:
1. Do not connect anything to the N.C. pin of the H-UDI port connector.
  2. Note that the processing of the /ASEMD0 pin differs depending on whether the emulator is used or not. In addition, the /ASEMD0 pin must be switched on the board because it is not controlled by the emulator.
    - (1) When the emulator is used: /ASEMD0 = low (ASE mode)
    - (2) When the emulator is not used: /ASEMD0 = high (normal mode)
  3. The /CA and reset signals in the user system are input to the /CA and /RESETP pins of the MCU. Connect these signals to the H-UDI port connector as the output from the user system.
  4. When a joined resistance is used for pull-up, it may be affected by a noise. Separate TCK from other resistances.
  5. When the emulator is used, the /CA pin must be pulled up by a resistance of several kilo-ohms whether the U-standby function is used or not.
  6. The processing of the /TRST pin differs depending on whether the emulator is connected or not.
  7. The pattern between the H-UDI port connector and the MCU must be as short as possible. Do not connect the signal lines to other components on the board.
  8. The resistance values shown in figure 4.1 are recommended.
  9. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related device.

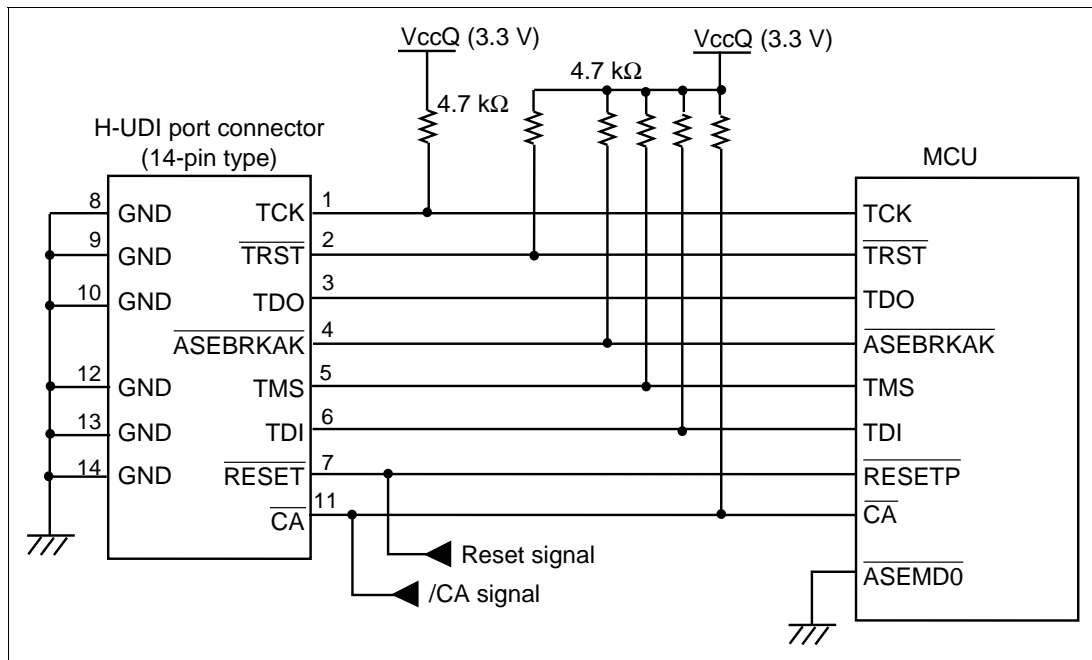


**Figure 4.1 Recommended Circuit for Connection between the H-UDI Port Connector and MCU (36-Pin Type)**

## 4.2 Recommended Circuit (14-Pin Type)

Figure 4.2 shows a recommended circuit for connection between the H-UDI port connector (14 pins) and the MCU.

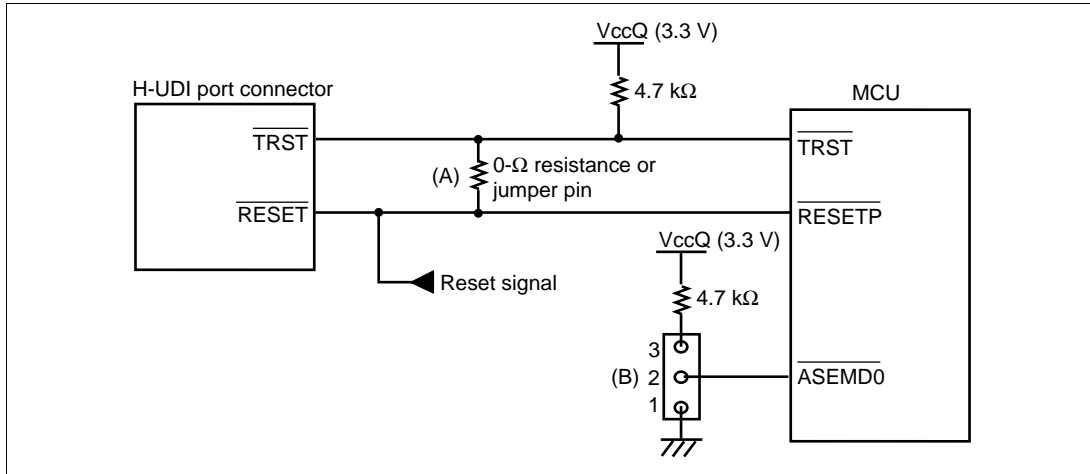
- Notes:
1. Do not connect anything to the N.C. pin of the H-UDI port connector.
  2. Note that the processing of the /ASEMD0 pin differs depending on whether the emulator is used or not. In addition, the /ASEMD0 pin must be switched on the board because it is not controlled by the emulator.
    - (1) When the emulator is used: /ASEMD0 = low (ASE mode)
    - (2) When the emulator is not used: /ASEMD0 = high (normal mode)
  3. The /CA and reset signals in the user system are input to the /CA and /RESETP pins of the MCU. Connect these signals to the H-UDI port connector as the output from the user system.
  4. When a joined resistance is used for pull-up, it may be affected by a noise. Separate TCK from other resistances.
  5. When the emulator is used, the /CA pin must be pulled up by a resistance of several kilo-ohms whether the U-standby function is used or not.
  6. The processing of the /TRST pin differs depending on whether the emulator is connected or not.
  7. The pattern between the H-UDI port connector and the MCU must be as short as possible. Do not connect the signal lines to other components on the board.
  8. The resistance values shown in figure 4.2 are recommended.
  9. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related device.



**Figure 4.2 Recommended Circuit for Connection between the H-UDI Port Connector and MCU (14-Pin Type)**

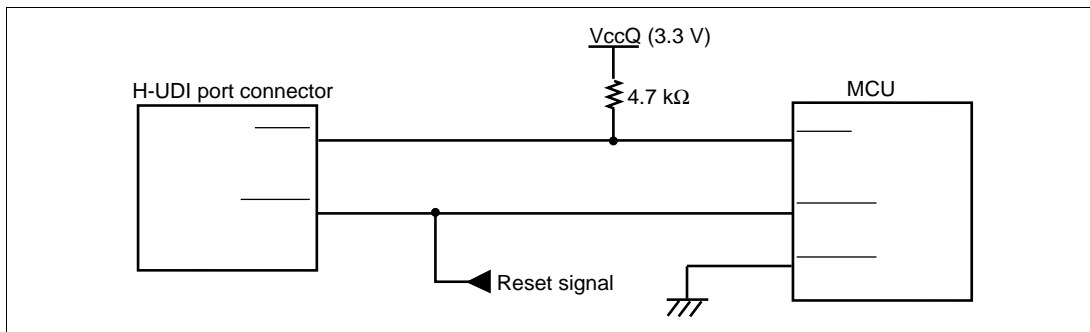
**Note: Examples of Connecting ASEMD0 and TRST Signals**

The wiring of the ASEMD0 and TRST signals depends on whether the emulator is used or not. It is recommended that these signals be switched by the 0-Ω resistance or a jumper pin, as shown below.



(1) When the user system is used by connecting the emulator:

- (A) OPEN (0-Ω resistance or a jumper pin removed): controlled by TRST alone
- (B) 1-2 SHORT: /ASEMD0 = low (ASE mode)



- (2) When the user system is independently used without using the emulator:
- (A) SHORT (0- $\Omega$  resistance or a jumper pin connected): TRST is controlled by the reset signal
  - (B) 2-3 SHORT: /ASEMD0 = high (normal mode)

