

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

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

# Connection of SH7706 E10A Emulator

HS7706KCM01H HS7706KCM02H HS7706KCI01H  
HS7706KCI02H 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 MCU.

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
HS7706KCM02H, HS7706KCI02H	36-pin connector	Available
HS7706KCM01H, HS7706KCI01H	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.
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**

<b>Connector</b>	<b>Type Number</b>	<b>Manufacturer</b>	<b>Specifications</b>
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.

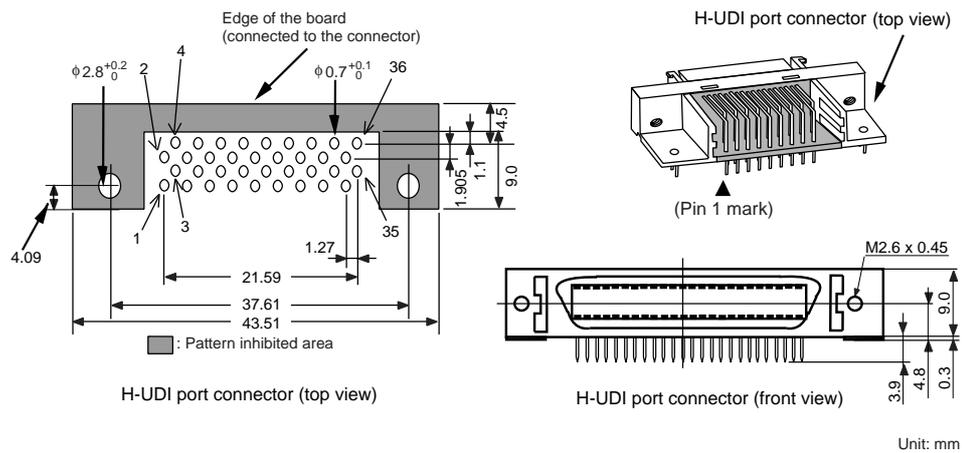
### 3. Pin Arrangement of the H-UDI Port Connector

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	MCU Pin No.			Pin No.	Signal	Input/ Output*1	MCU Pin No.		
			FP-176	TBP-208	Note				FP-176	TBP-208	Note
1	NC	—				19	TMS	Input	118	G16	
2	GND	—				20	GND	—			
3	AUDATA0	I/O	109	K15		21*2	/TRST	Input	119	G15	
4	GND	—				22	GND	—			
5	AUDATA1	I/O	110	K16		23	TDI	Input	114	J17	
6	GND	—				24	GND	—			
7	AUDATA2	I/O	111	K17		25	TDO	Output	120	G14	
8	GND	—				26	GND	—			
9	AUDATA3	I/O	112	J14		27*2	/ASEBRKAK	Output	121	F16	
10	GND	—				28	GND	—			
11*2	/AUDSYNC	Output	113	J16		29	NC	—			
12	GND	—				30	GND	—			
13	NC	—				31*2	/RESETP	Output	165	A6	
14	GND	—				32	GND	—			
15	NC	—				33*3	GND	Output			
16	GND	—				34	GND	—			
17	TCK	Input	116	H17		35	AUDCK	Input	159	C9	
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	MCU Pin No.		Note
			FP-176	TBP-208	
1	TCK	Input	116	H17	
2*2	/TRST	Input	119	G15	
3	TDO	Output	120	G14	
4*2	/ASEBRKAK	Output	121	F16	
5	TMS	Input	118	G16	
6	TDI	Input	114	J17	
7*2	/RESETP	Output	165	A6	
11	Not connected	—	—	—	
8 to 10 and 12 to 13	GND	—	—	—	
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.

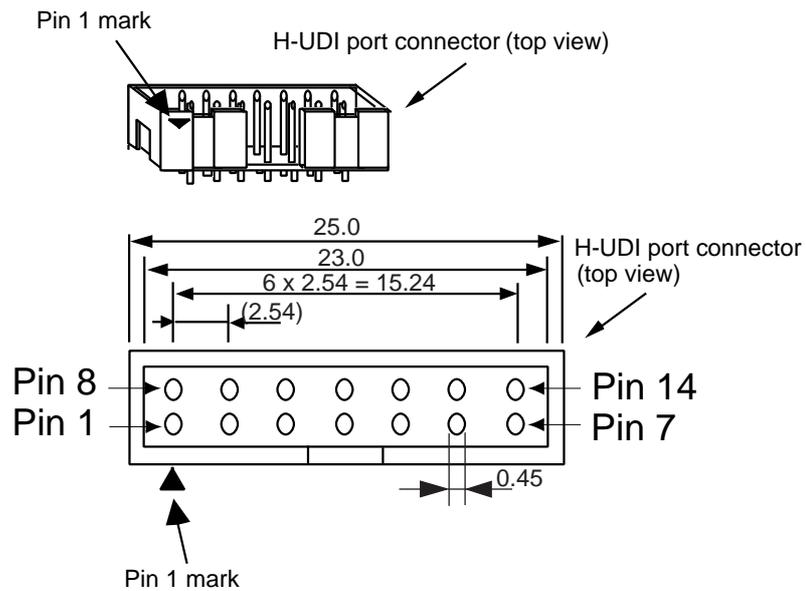


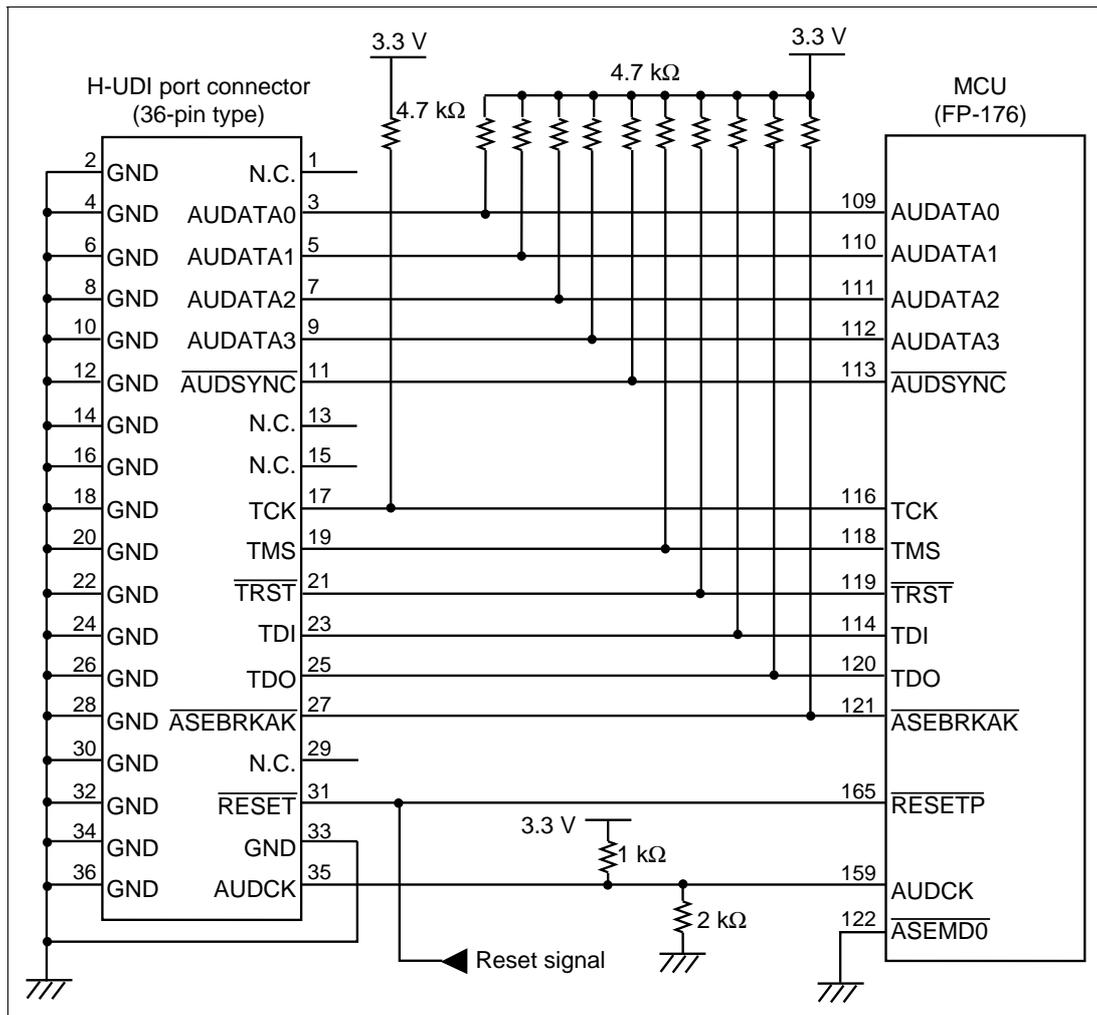
Figure 3.2 Pin Arrangement of the H-UDI Port Connector (14 Pins)

## 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 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. When a joined resistance is used for pull-up, it may be affected by a noise. Separate TCK from other resistances.
  3. The reset signal in the user system is input to the /RESETP pin (pin 165) of the MCU. Connect this signal to the H-UDI port connector as the output from the user system.
  4. When the emulator is used, the AUDCK pin must be an end resistance (pulled up or down by a resistance of several kilo-ohms) because it may be affected by a reflected noise from the user system interface cable.
  5. The processing of the /ASEMD0 pin differs depending on whether the emulator is used or not. As the emulator does not control this pin, it must be controlled by a switch on the board.
    - (1) When the emulator is used: /ASEMD0 = low (ASE mode)
    - (2) When the emulator is not used: /ASEMD0 = high (normal mode)
  6. 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.
  7. The resistance values shown in figure 4.1 are recommended.
  8. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related MCU.

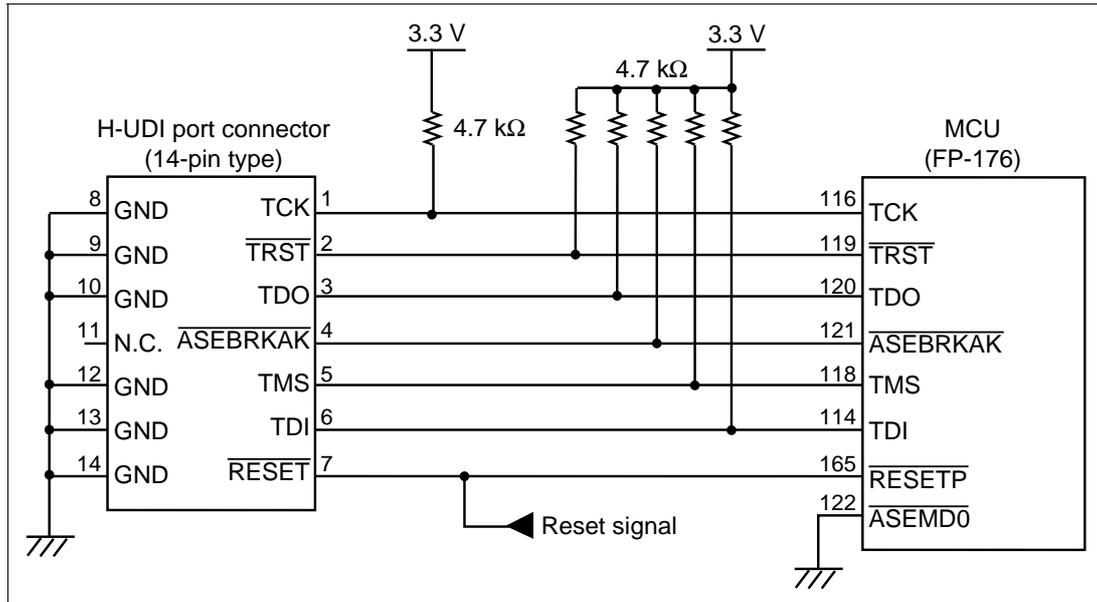


**Figure 4.1 Recommended Circuit for Connection between the H-UDI Port Connector and MCU (36-Pin Type)**

## 4.2 Recommended Circuit (14-Pin Type)

Figure 4.2 shows a recommended circuit between the H-UDI port connector and the MCU.

- Notes:
1. Do not connect anything to the N.C. pin of the H-UDI port connector.
  2. When a joined resistance is used for pull-up, it may be affected by a noise. Separate TCK from other resistances.
  3. The reset signal in the user system is input to the /RESETP pin (pin 165) of the MCU. Connect this signal to the H-UDI port connector as the output from the user system.
  4. The processing of the /ASEMD0 pin differs depending on whether the emulator is used or not. As the emulator does not control this pin, it must be controlled by a switch on the board.
    - (1) When the emulator is used: /ASEMD0 = low (ASE mode)
    - (2) When the emulator is not used: /ASEMD0 = high (normal mode)
  5. When the pins AUDATA0 and AUDATA1 are not used as input ports (PTG0 and PTG1) while using the 14-pin type emulator, these pins must be pulled up by a resistance of several kilo-ohms.
  6. 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.
  7. The resistance values shown in figure 4.2 are recommended.
  8. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related MCU.



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

## 5. Limitations

The AUD and H-UDI pins are multiplexed as shown below. When the emulator is used, function 1 in table 5.1 is not available.

**Table 5.1 Multiplex Functions**

Port	Function 1	Function 2
F	PTF6 input/output (port)	/ASEBRKAK (H-UDI)
F	PTF5 input/output (port)	TDO (H-UDI)
F	PTF4 input/output (port)*	/AUDSYNC (AUD)
F	PTF3 input/output (port)*	AUDATA3 (AUD)
F	PTF2 input/output (port)*	AUDATA2 (AUD)
F	PTF1 input/output (port)*	AUDATA1 (AUD)
F	PTF0 input/output (port)*	AUDATA0 (AUD)
G	PTG4 input/output (port)*	AUDCK (AUD)
G	PTG3 input/output (port)	/TRST (AUD, H-UDI)
G	PTG2 input/output (port)	TMS (H-UDI)
G	PTG1 input/output (port)	TCK (H-UDI)
G	PTG0 input/output (port)	TDI (H-UDI)

**Note:** Function 1 is available only when the AUD pin of the MCU is not connected to the emulator.