To our customers,

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

April 1st, 2010
Renesas Electronics Corporation

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

User's Manual

Connection of SH7047F E10A Emulator

HS7047KCM01H HS7047KCM02H HS7047KCI01H HS7047KCI02H with User System

Renesas Electronics
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Rev.B

1. Connecting the E10A Emulator with the User System

To connect the E10A emulator (hereafter 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 the hardware manual for the related MCU.

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

Table 1.1 Type Number, AUD Function, and Connector Type

Type Number	Connector	AUD Function
HS7047KCM02H, HS7047KCI02H	36-pin connector	Available
HS7047KCM01H, HS7047KCI01H	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 RAM monitoring function, which accesses (reads or writes) the memory contents during program execution, is also supported.
2. 14-pin type (without AUD function)
   The user cannot use the AUD trace function 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.

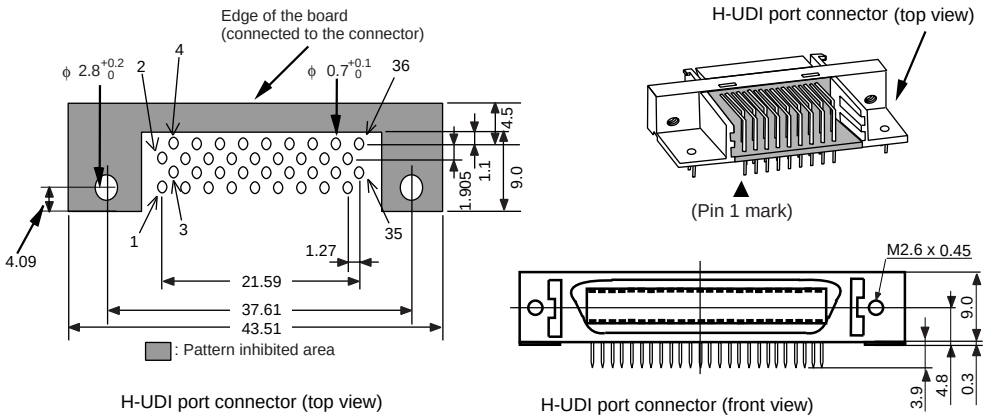
3. Pin Arrangement of the H-UDI Port Connector

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	MCU Pin No.	Note	Pin No.	Signal	Input/ Output*1	MCU Pin No.	Note
1	AUDCK	I/O	79		19	TMS	Input	59	
2	GND	——			20	GND	——		
3	AUDATA0	I/O	92		21*2	/TRST	Input	58	
4	GND	——			22	GND	——		
5	AUDATA1	I/O	90		23	TDI	Input	61	
6	GND	——			24	GND	——		
7	AUDATA2	I/O	88		25	TDO	Output	60	
8	GND	——			26	GND	——		
9	AUDATA3	I/O	86		27*2	/ASEBRKAK	Output	11	
10	GND	——			28	GND	——		
11*2	/AUDSYNC	I/O	78		29	CK	Output	51	
12	GND	——			30	GND	——		
13	AUDRST	Input	81		31*2	/RES	Output	87	User reset
14	GND	——			32	GND	——		
15	AUDMD	Input	80		33*3	GND	Output		
16	GND	——			34	GND	——		
17	TCK	Input	63		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.



Unit: mm

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

Pin No.	Signal	Input/ Output*[1]	MCU Pin No.
1	TCK	Input	63
2*[2]	/TRST	Input	58
3	TDO	Output	60
4*[2]	/ASEBRKAK	Output	11
5	TMS	Input	59
6	TDI	Input	61
7*[2]	/RES	Output	87
11	Not connected	—	—
8 to 10 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.

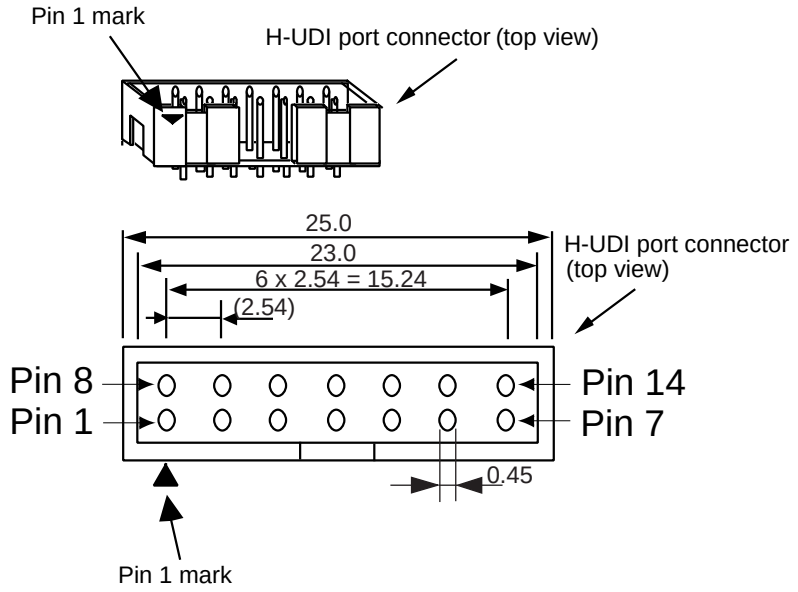


Figure 3.2 Pin Arrangement of the H-UDI Port Connector (14 Pins)

4. Recommended Circuit between the H-UDI Port Connector and the 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 RES pin (pin 87) 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. When the emulator is used, connect the CK pin between the H-UDI port connector and the MCU via a buffer (74LVC125 is recommended) as shown in figure 4.1.
6. Note that the processing of the /DBGMD pin differs depending on whether or not the emulator is used. In addition, the /DBGMD pin must be switched on the board because it is not controlled by the emulator.
   (1) When the emulator is used: /DBGMD = low
   (2) When the emulator is not used: /DBGMD = high
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 MCU.

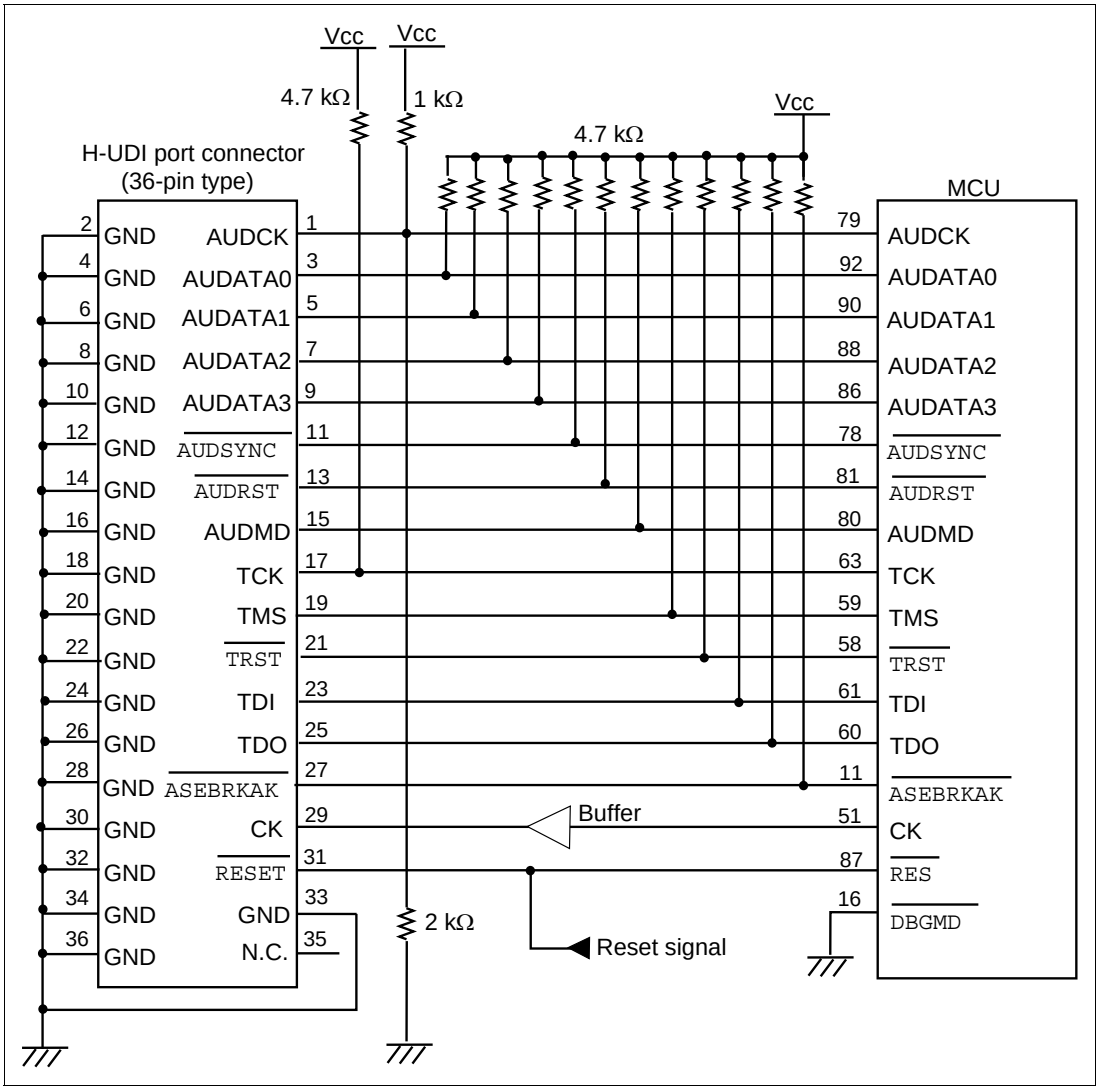


Figure 4.1 Recommended Circuit for Connection between the H-UDI Port Connector and the MCU (36-Pin Type)

4.2 Recommended Circuit (14-Pin Type)

Figure 4.2 shows a recommended circuit 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. The reset signal in the user system is input to the RES pin (pin 87) of the MCU. Connect this signal to the H-UDI port connector as the output from the user system.
3. Note that the processing of the /DBGMD pin differs depending on whether or not the emulator is used. In addition, the /DBGMD pin must be switched on-board the user system because it is not controlled by the emulator.
   (1) When the emulator is used: /DBGMD = low
   (2) When the emulator is not used: /DBGMD = high
4. When a joined resistance is used for pull-up, it may be affected by a noise. Separate TCK from other resistances.
5. 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.
6. The resistance values shown in figure 4.2 are recommended.
7. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related MCU.

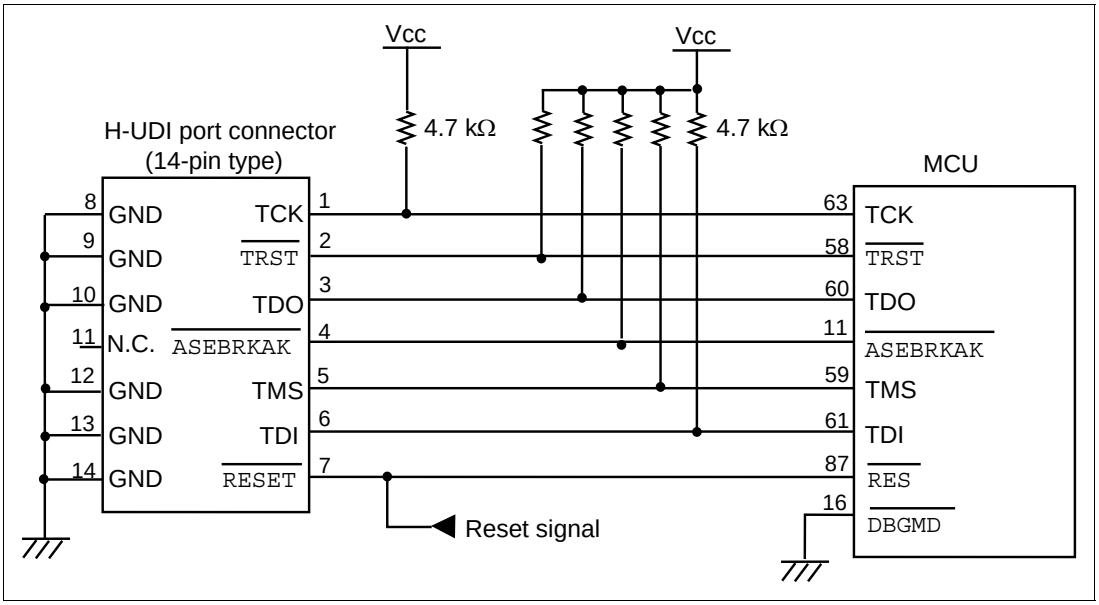


Figure 4.2 Recommended Circuit for Connection between the H-UDI Port Connector and the MCU (14-Pin Type)

5. Limitations

The AUD and H-UDI pins are multiplexed as shown in table 5.1. Note that function 1 cannot be used when the emulator is in use.

Table 5.1 Multiplexed Functions

Function 1	Function 2
PA15/CK/POE6/BACK	TRST (H-UDI)
PA14/RD/POE5	TMS (H-UDI)
PA13/POE4/BREQ	TDO (H-UDI)
PA12/WRL/UBCTRG	TDI (H-UDI)
PA10/CS0/RD/SCK2	TCK (H-UDI)
PD7/D7*	AUDSYNC (AUD)
PD6/D6*	AUDCK (AUD)
PD5/D5*	AUDMD (AUD)
PD4/D4*	AUDRST (AUD)
PD3/D3*	AUDATA3 (AUD)
PD2/D2/SCK2*	AUDATA2 (AUD)
PD1/D1/TXD2*	AUDATA1 (AUD)
PD0/D0/RXD2*	AUDATA0 (AUD)
PB5/IRQ3/POE3*	CK (AUD)

Note: Function 1 can be used when the AUD pins are not connected to the emulator.