To our customers,

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April 1st, 2010
Renesas Electronics Corporation

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

User's Manual

# Connection of SH7197 E10A Emulator

## HS7197KCM01H HS7197KCM02H HS7197KCI01H HS7197KCI02H with User System

Renesas Electronics
www.renesas.com

Rev.A

# 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 hardware manual for the related MCU.

Table 1.1 shows the type numbers of the 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 |
|---|---|---|
| HS7197KCM02H, HS7197KCI02H | 36-pin connector | Available |
| HS7197KCM01H, HS7197KCI01H | 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.

- 36-pin type (with AUD function)
  The AUD trace function is supported. A large amount of trace information can be acquired in realtime.
- 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 connector for the emulator.

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

| 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.**

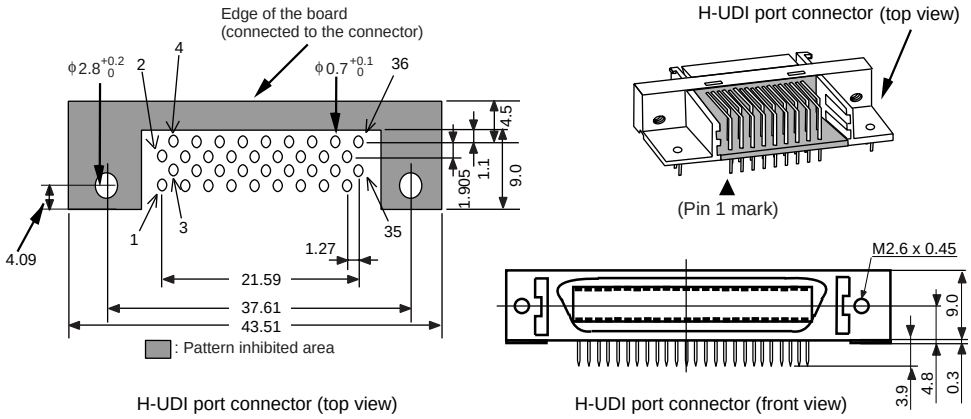
# 3. Pin Arrangement of the H-UDI Port Connector

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. LQFP -216 | CSP -216 | LQFP -208 | Pin No. | Signal | Input/ Output*1 | MCU Pin No. LQFP -216 | CSP -216 | LQFP -208 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | NC | — | | | | 19 | TMS | Input | 142 | AH12 | 137 |
| 2 | GND | — | | | | 20 | GND | — | | | |
| 3 | AUDATA0 | I/O | 140 | AH13 | 135 | 21*2 | /TRST | Input | 141 | AJ13 | 136 |
| 4 | GND | — | | | | 22 | GND | — | | | |
| 5 | AUDATA1 | I/O | 138 | AH14 | 133 | 23 | TDI | Input | 143 | AJ12 | 138 |
| 6 | GND | — | | | | 24 | GND | — | | | |
| 7 | AUDATA2 | I/O | 136 | AH15 | 131 | 25 | TDO | Output | 125 | AJ21 | 120 |
| 8 | GND | — | | | | 26 | GND | — | | | |
| 9 | AUDATA3 | I/O | 135 | AJ16 | 130 | 27*2 | /ASEBRKAK | Output | 133 | AJ17 | 128 |
| 10 | GND | — | | | | 28 | GND | — | | | |
| 11*2 | /AUDSYNC | Output | 97 | AB29 | 94 | 29 | NC | — | | | |
| 12 | GND | — | | | | 30 | GND | — | | | |
| 13 | NC | — | | | | 31*2 | /RESET | Output | 200 | K02 | 193 |
| 14 | GND | — | | | | 32 | GND | — | | | |
| 15 | NC | — | | | | 33*3 | GND | Output | | | |
| 16 | GND | — | | | | 34 | GND | — | | | |
| 17 | TCK | Input | 144 | AH11 | 139 | 35 | AUDCK | Input | 156 | AH05 | 151 |
| 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. | | |
|---|---|---|---|---|---|
| | | | LQFP-216 | CSP-216 | LQFP-208 |
| 1 | TCK | Input | 144 | AH11 | 139 |
| 2*2 | /TRST | Input | 141 | AJ13 | 136 |
| 3 | TDO | Output | 125 | AJ21 | 120 |
| 4*2 | /ASEBRKAK | Output | 133 | AJ17 | 128 |
| 5 | TMS | Input | 142 | AH12 | 137 |
| 6 | TDI | Input | 143 | AJ12 | 138 |
| 7*2 | /RESET | Output | 200 | K02 | 193 |
| 11 | Not connected | — | — | — | — |
| 8 to 10<br>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.

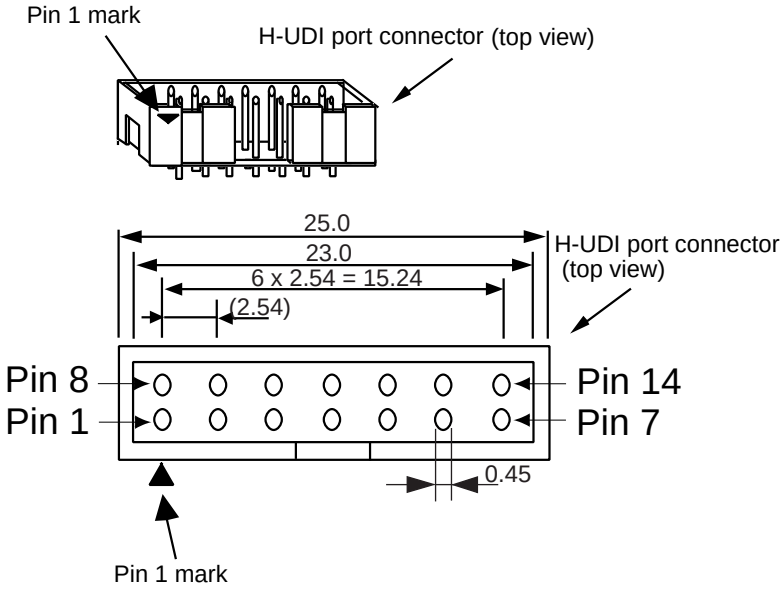



**Figure 3.2 Pin Arrangement of the H-UDI Port Connector (14 Pins)**

# 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 /RESETP pin 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 resistance values shown in figure 4.1 are recommended.
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. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related MCU.

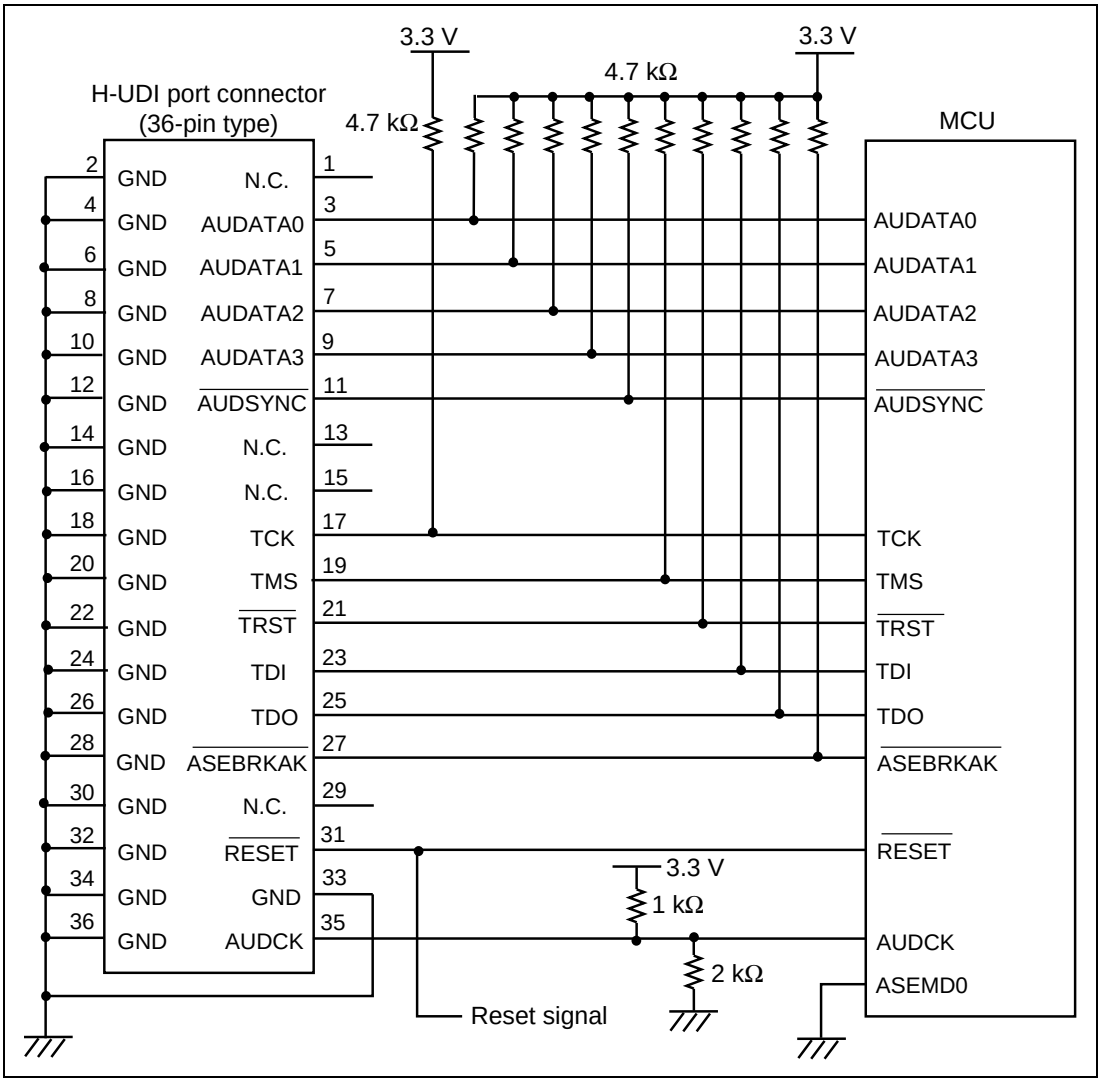



**Figure 4.1 Recommended Circuit for Connection between the H-UDI Port Connector and the MCU when Using the Emulator (36-Pin Type)**

## 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. 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 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 resistance values shown in figure 4.2 are recommended.
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. For the pin processing in cases where the emulator is not used, refer to the hardware manual of the related MCU.

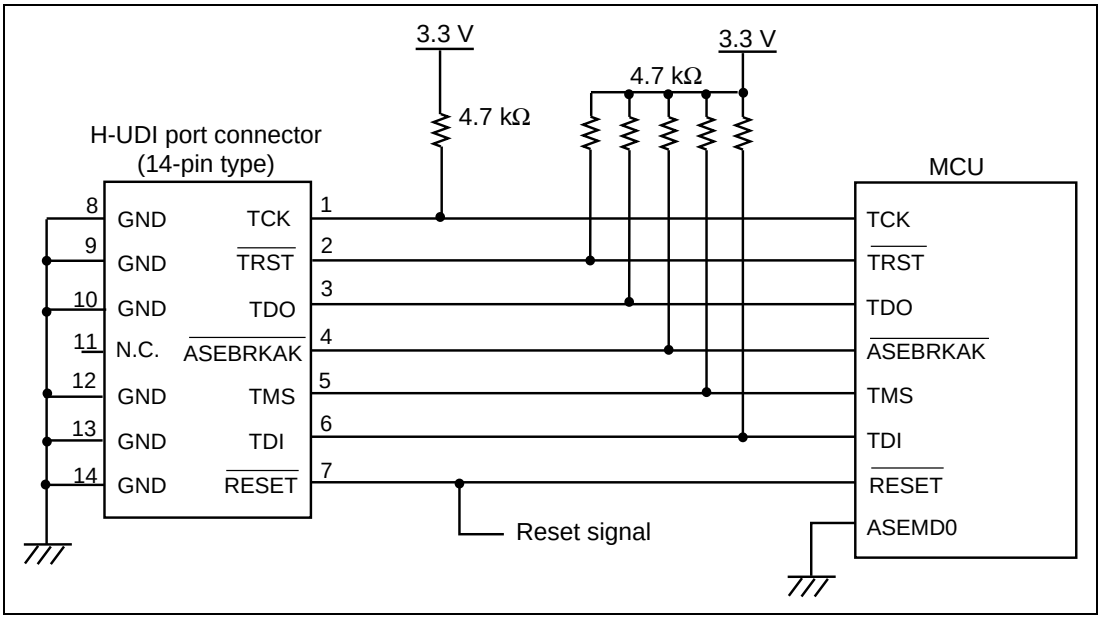



**Figure 4.2 Recommended Circuit for Connection between the H-UDI Port Connector and the MCU when Using the Emulator (14-Pin Type)**

# 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 |
|---|---|---|
| E | PTE0 input/output (port) | TDO (H-UDI) |
| F | PTF7 input (port) | TRST (AUD, H-UDI) |
| F | PTF6 input (port) | TMS (H-UDI) |
| F | PTF5 input (port) | TDI (H-UDI) |
| F | PTF4 input (port) | TCK (H-UDI) |
| G | PTG6 input (port) | /ASEMD0 (AUD, H-UDI) |
| G | PTG5 input (port) | /ASEBRKAK (H-UDI) |
| G | PTG3 input (port)* | AUDATA3 (AUD) |
| G | PTG2 input (port)* | AUDATA2 (AUD) |
| G | PTG1 input (port)* | AUDATA1 (AUD) |
| G | PTG0 input (port)* | AUDATA0 (AUD) |
| H | PTH0 input (port)* | AUDCK (AUD) |

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