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Application Notes

# Renesas E10A-USB Emulator Introductory Guide for SH/Tiny (SH7125)

## Application Notes

## Renesas Single-Chip Microcomputer SuperH RISC engine Family SH/Tiny Series

Renesas Electronics
www.renesas-electoronics.com

Rev.1.00 2007.02

# Renesas E10A-USB Emulator

## Introduction

### Notes

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### Glossary

| | | | |
|---|---|---|---|
| CPU | Central Processing Unit | RSK | Renesas Starter Kit |
| HEW | High-performance Embedded Workshop | RTE | Renesas Technology Europe Ltd. |
| LED | Light Emitting Diode | RSO | Renesas Solutions Corporation |
| PC | Program Counter | MCU | Micro-Controller Unit |

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# 1. Overview

This introductory guide (application note) is intended for first-time users of the E10A-USB emulator. It provides simple descriptions regarding the E10A-USB emulator to help the user easily follow a straight path from unpacking of the emulator to running and stopping of a program without getting lost on the way.

The operating procedures are described in sections 4 through 6. Take the following steps to try using the emulator, starting from installation of the program and proceeding to the simple execution examples.

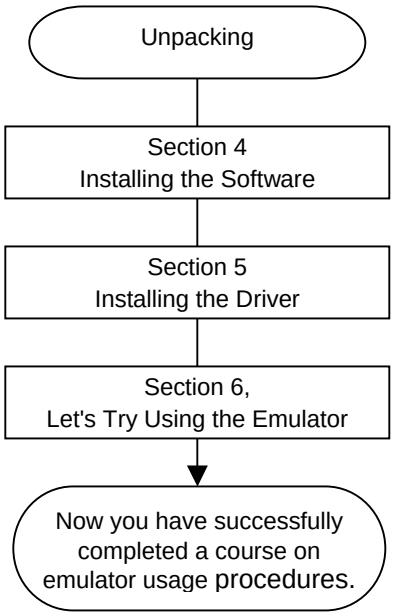



**Figure 1.1 Flowchart of Procedure Descriptions**

This guide assumes the use of the following machines and tools.

(1) Host computer

(2) E10A-USB emulator (HS0005KCU02H manufactured by Renesas)

(3) SH7125 series debugging MCU board (HS7125EDB01H manufactured by Renesas)

# 2. Components and Environment

This section shows the components of the E10A-USB emulator and the SH7125 series debugging MCU board. Unpack the E10A-USB emulator and MCU board packages and check the components against the component lists.

## 2.1 Components

(1) Table 2.1 is a list of the E10A-USB emulator components.

**Table 2.1 Components of the E10A-USB Emulator**

| Classi-fication | Component | Appearance | Quan-tity | Remarks |
|---|---|---|---|---|
| Hard-ware | Emulator box | | 1 | HS0005KCU01H:<br>Depth: 65.0 mm, Width: 97.0 mm,<br>Height: 20.0 mm, Mass: 72.9 g<br>or<br>HS0005KCU02H:<br>Depth: 65.0 mm, Width: 97.0 mm,<br>Height: 20.0 mm, Mass: 73.7 g |
| | User system interface cable | | 1 | 14-pin type:<br>Length: 20 cm, Mass: 33.1 g |
| | User system interface cable | | 1 | 36-pin type:<br>Length: 20 cm, Mass: 49.2 g<br>(only for HS0005KCU02H) |
| | USB cable | | 1 | Length: 150 cm, Mass: 50.6 g |
| Soft-ware | E10A-USB emulator setup program,<br><br>SuperH™ Family E10A-USB Emulator User's Manual,<br><br>Supplementary Information on Using the SH7125 Series Debugging MCU Board*,<br><br>and<br><br>Test program manual for HS0005KCU01H and HS0005KCU02H | | 1 | HS0005KCU01SR,<br><br>HS0005KCU01HJ,<br>HS0005KCU01HE,<br><br>HS7125DBKCU01HJ,<br>HS7125DBKCU01HE,<br><br>HS0005TM01HJ, and<br>HS0005TM01HE<br>(provided on a CD-R) |

Note: Additional documents for the MCUs supported by the emulator are included. Check the target MCU and refer to its additional document.

(2) Table 2.2 is a list of the components of the SH7125 series debugging MCU board.
In the product package as shipped, the main unit of the debugging MCU board is connected to the user system interface board with flexible flat cables (FFC). Do not detach the boards from each other.

**Table 2.2 Components of the SH7125 Series Debugging MCU Board**

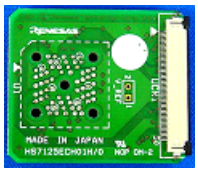
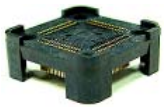
| Classi-fication | Component | Appearance | Quan-tity | Remarks |
|---|---|---|---|---|
| Hardware | Debugging MCU board main unit | | 1 | Depth: 80.0 mm, Width: 85.0 mm,<br>Height: 22.3 mm, Mass: 55.2 g<br>*The main unit of the debugging MCU board is connected to the user system interface board with the FFC cables. Do not disconnect these components. |
| | FFC cables | | 2 | Length: 150.0 mm, Mass: 1.4 g |
| | User system interface board |  | 1 | Depth: 35.0 mm, Width: 40.0 mm,<br>Height: 10.3 mm, Mass: 8.5 g |
| | Power cable | | 1 | Length: 0.5 m |
| | IC socket | | 1 | Connect the IC socket to the user system.<br>*The IC socket provided will differ according to the supported MCU. |
| | Socket cover |  | 1 | For installing the MCU<br>*The socket cover provided will differ according to the supported MCU. |
| | Screws (M2.0 x 10 mm) | | 4 | For fastening the user system interface board |
| | Screws (M2.0 x 6 mm) | | 4 | For fastening the socket cover |

**Table 2.2 Components of the SH7125 Series Debugging MCU Board (cont)**

| Classi-fication | Component | Appearance | Quan-tity | Remarks |
|---|---|---|---|---|
| Hardware | Guide pins |  | 2 or 3 | *The quantity will differ according to the supported device.<br>Two guide pins are provided for the SH7125 (PLQP0064KB-A) and SH7124 (PLQP0048JA-A), and three are provided for the SH7125 (PRQP0064GB-A). |
| | Screwdriver | | 1 | |
| | User's manual | | 1 | SH7125 Series Debugging MCU Board User's Manual |

## 2.2 Operating Environment

The software products provided together with the E10A-USB emulator operate on the host computer and OS version shown in table 2.3.

**Table 2.3 Operating Environment**

| | |
|---|---|
| Host computer | IBM PC/AT with the USB1.1 or USB2.0 (Full-Speed) interface |
| OS | Microsoft Windows® 2000 or XP |
| CPU | Pentium® III or higher-performance CPU<br>(1 GHz or higher performance recommended) |
| Memory | 128 Mbytes or more (512 Mbytes or more recommended) |
| HDD | Installation disk capacity: 100 Mbytes or more.<br>Prepare an area at least double the memory capacity (four-times or more recommended) as the swap area. |
| CD-ROM drive | Required to install the software |
| Display | Monitor resolution: 1024 x 768 or higher |

## 2.3 MCU Board (HS7125EDB01H Manufactured by Renesas)

The SH7125 series debugging MCU board (HS7125EDB01H) supports the Renesas' SH/Tiny (SH7125) series microcomputer.

The debugging MCU board is connected to the user system through the IC socket on the user system. The user system can be debugged under conditions similar to the actual application conditions. The debugging MCU board enables

debugging anywhere indoors or out with the E10A-USB emulator. The host computer for controlling the debugging MCU board must be an IBM PC compatible machine with USB 1.1/2.0 (Full-Speed).

This guide describes the operation of the E10A-USB emulator when connected to the single-unit SH7125 series debugging MCU board.

## 2.4 CD-ROM

The CD-ROM provided together with the E10A-USB emulator includes the software products necessary for program development and the online manual. The following shows the files and programs stored in each folder.

**Table 2.4 Contents of the E10A-USB Emulator CD-ROM**

| Folder | Contents | Description |
|---|---|---|
| Dlls | Microsoft® runtime library | A runtime library for the High-performance Embedded Workshop. The version is checked as part of the installation process and this library is copied to the hard disk when necessary. |
| Drivers | E10A-USB emulator drivers | USB drivers for the E10A-USB emulator |
| Help | E10A-USB emulator online help | An online help file. This is copied to the hard disk as part of the installation process. |
| Manual | E10A-USB emulator manuals | E10A-USB emulator user's manuals. They are provided as PDF files. |

## 2.5 Machines and Tools to be Prepared by the User

Please prepare the following machines and tools.

- Host computer
- 5-VDC external power source unit (for the SH7125 series debugging MCU board)
- Crystal resonator with an oscillating frequency of 10 MHz to 12.5 MHz (this guide describes an example of using a 12-MHz resonator).
- SuperH™ family C/C++ compiler package (*1)
- Update files for the E10A-USB emulator software (*2)
- Update files for integrated development environment High-performance Embedded Workshop (*2)

Notes: 1. If you have not purchased a C compiler product package, a free evaluation-version C compiler is available from the Renesas website.
http://www.renesas.com/support (Global site)
http://japan.renesas.com/support (Japan site)
For the limitations on the free evaluation-version C compiler, refer to section 7.1, Limitations on Free Evaluation-Version C Compiler.

2. Please visit the Renesas website and obtain update modules if a newer version exists.
After the software in the CD-ROM has been installed, the latest versions can be easily found through the installed AutoUpdate Utility.

# 3. Product Specifications

## 3.1 High-performance Embedded Workshop

The High-performance Embedded Workshop integrates software development tools, such as the C compiler, assembler, emulator software, and editor, into a common graphical user interface (GUI) to make software development more efficient.

## 3.2 Emulator Software

The emulator software operates on the host computer and communicates with the firmware that is stored in the flash memory in the target microcomputer on the user system board to provide high-level debugging functions. This emulator software has the following features.

1) Source-line debugging is available in assembly language, structured assembly language, and C language.
2) Ten hardware breakpoints with the address condition are available. Software breaks can be set for up to 255 points.
3) The user program can be debugged in realtime by writing it to the flash memory in the target microcomputer.

# 4. Installing the Software

## 4.1 Installing the Provided Software

### 4.1.1 Before Starting Installation

(1) Do not connect the E10A-USB emulator to the host computer before the provided software is installed.
— Installing the provided software transfers the E10A-USB emulator driver to the host computer, and the new hardware detection processing will automatically start.

(2) When you have both the free evaluation version and the production version of the compiler, use the production version.
— If you have installed the production-version C/C++ compiler package for the SuperH™ RISC engine family, or if you purchased a production-version compiler package and E10A-USB emulator together, you do not need to install the free-evaluation version.
— For the limitations on the free evaluation-version C/C++ compiler package for the SuperH™ RISC engine family, refer to section 7.1, Limitations on Free Evaluation-Version C Compiler.

(3) Dialog Boxes for Installation
— If you have installed the High-performance Embedded Workshop in the target host computer, some dialog boxes may be skipped during the provided software installation.

### 4.1.2 How to Install the Software

(1) The following shows the procedure for installing the software necessary for the E10A-USB emulator. Insert the E10A-USB emulator CD-ROM in the host computer and the installation program will automatically start through the automatic play function of the drive.
If the installation program does not start, execute Autorun.exe from the CD-ROM. For details on the CD-ROM, refer to section 2.4, CD-ROM.

(2) The [Choose Setup Language] dialog box will appear. Select [English] and click the [Next] button.

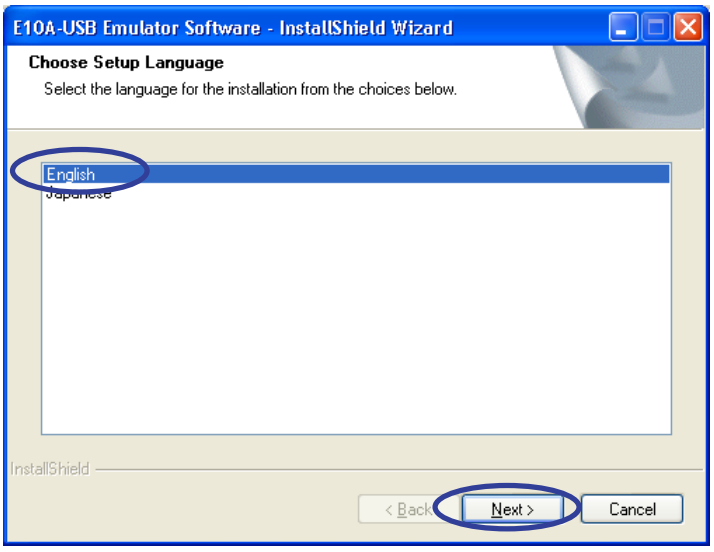



**Figure 4.1 Choosing the Language for Installation**

(3) The [E10A-USB Emulator Software] installation starts as the first component in the full-screen mode.

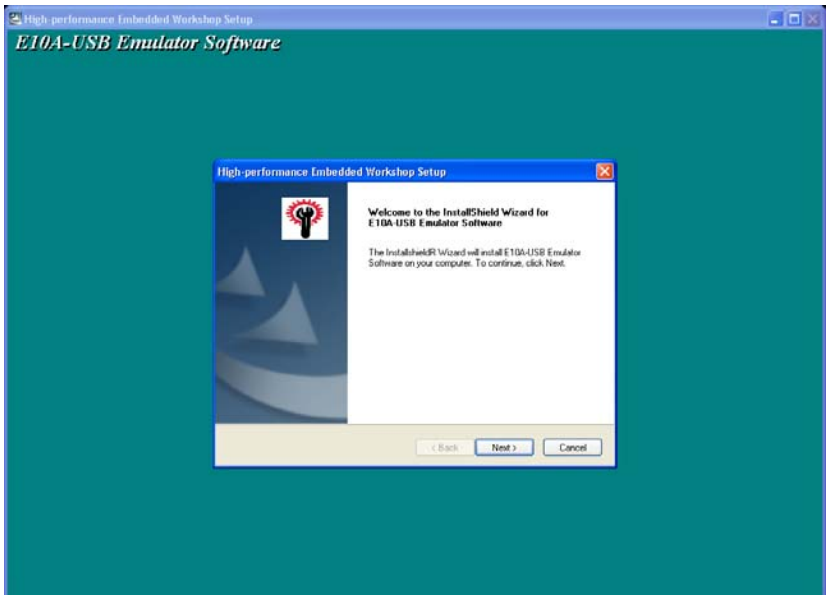



**Figure 4.2 Starting the E10A-USB Emulator Software Installation**

(4) The [Welcome to the InstallShield Wizard for E10A-USB Emulator Software] dialog box will appear. Click the [Next] button.

**Figure 4.3 Dialog Box for Starting the E10A-USB Emulator Software Installation**

(5) The [License Agreement] dialog box will appear. Read the contents and click the [Yes] button.

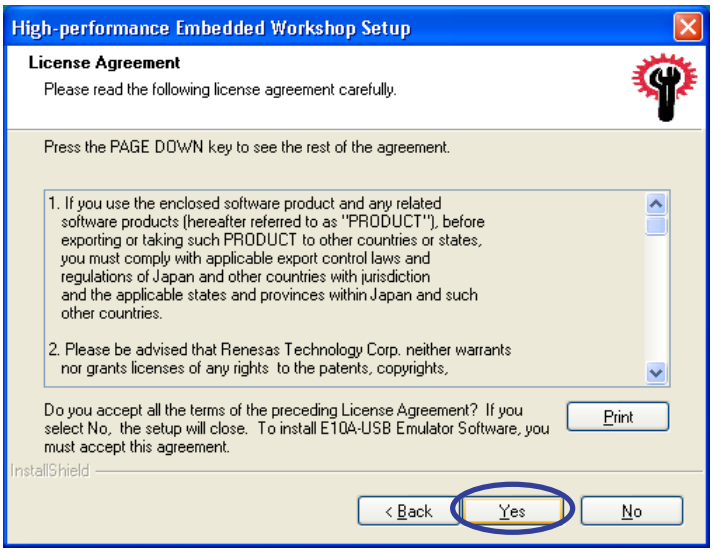



**Figure 4.4 License Agreement for the E10A-USB Emulator Software**

(6) The [Choose Destination Location] dialog box will appear. To change [Installation folder], click the [Browse…] button and select the target folder. Check [Installation folder], and click the [Next] button. This guide shows an example of using the default installation folder.

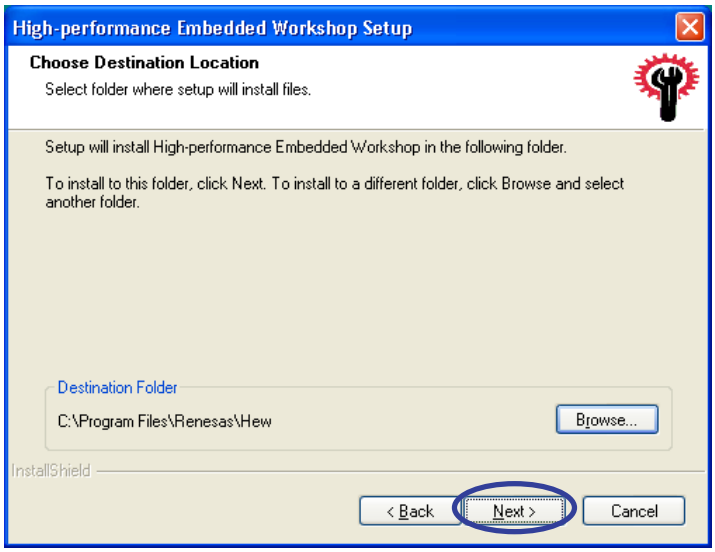



**Figure 4.5 Choosing the Folder for E10A-USB Emulator Software Installation**

The installation folder may differ depending on the version of the High-performance Embedded Workshop earlier installed.

(a) The emulator software is installed in the same folder as the High-performance Embedded Workshop Ver.2.
When the High-performance Embedded Workshop Ver.2 was installed first and then updated (Ver.2->Ver.3, Ver.2->Ver.4, or Ver.2->Ver.3->Ver.4).

(b) The emulator software is installed in the same folder as the High-performance Embedded Workshop Ver.3.
When the High-performance Embedded Workshop Ver.3 was installed first.

(7) The [Start Copying Files] dialog box will appear. Click the [Next] button.

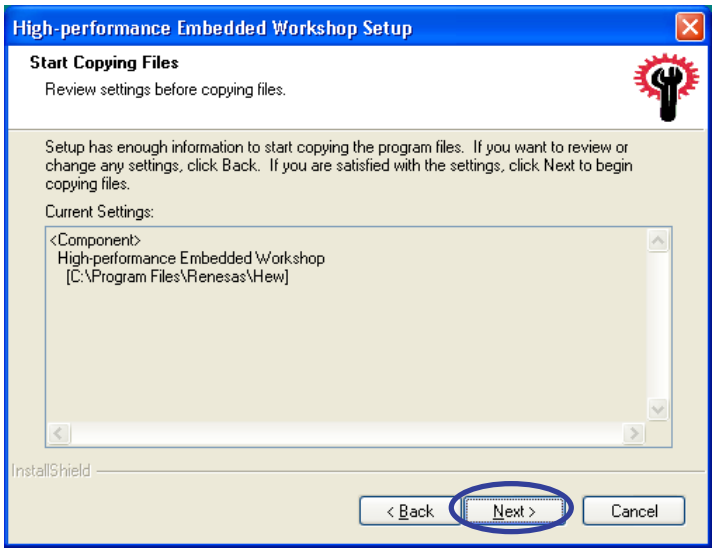



**Figure 4.6 High-performance Embedded Workshop Components to Be Installed**

(8) The following progress bar will be displayed while the program files are being copied.

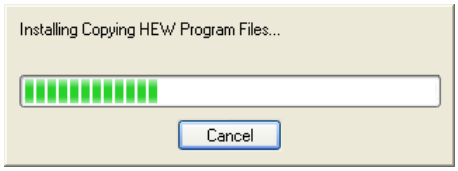



**Figure 4.7 Progress Bar for Software Installation**

(9) The [InstallShield Wizard Complete] dialog box will appear. Click the [Finish] button.

**Figure 4.8 Completing High-performance Embedded Workshop Components**

(10) Next, installation of the E10A-USB emulator component will start. The [Select Device Group] will appear. Select the [Super H RISC engine family] radio button and click [Next].

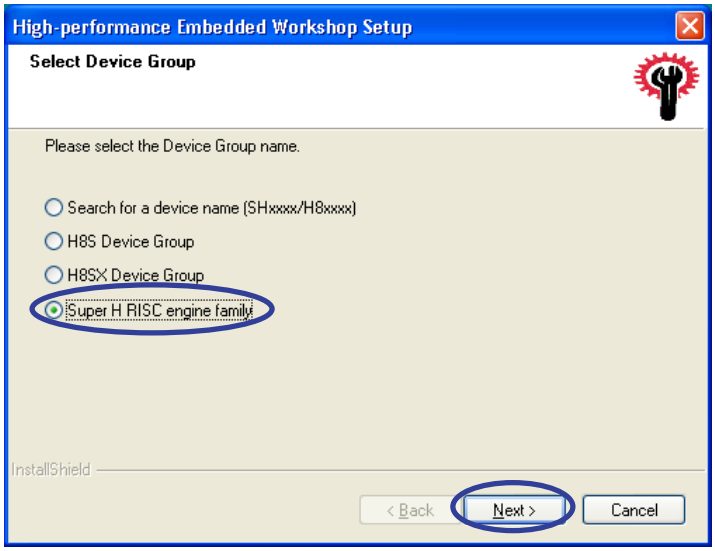



**Figure 4.9 Selecting Device Group**

(11) For the SH7125 series described in this guide, select [SH-2 Device Group] and click the [Next] button.

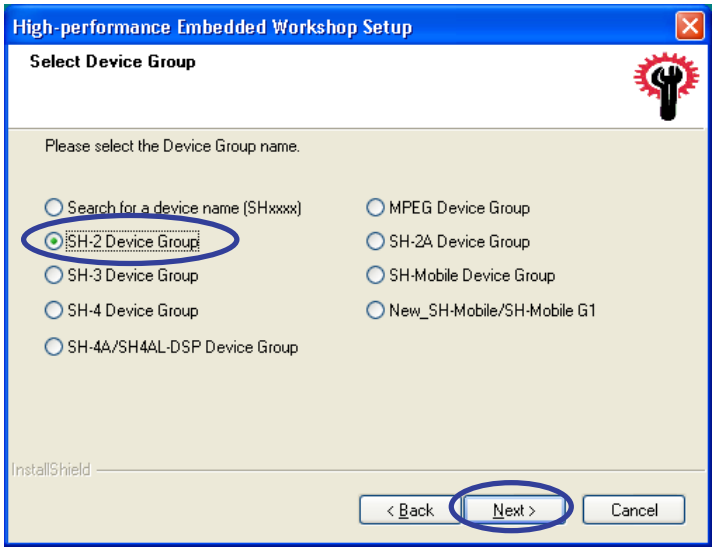



**Figure 4.10 Selecting the SuperH Device Group**

(12) The [Start Copying Files] dialog box will appear. Click the [Next] button.

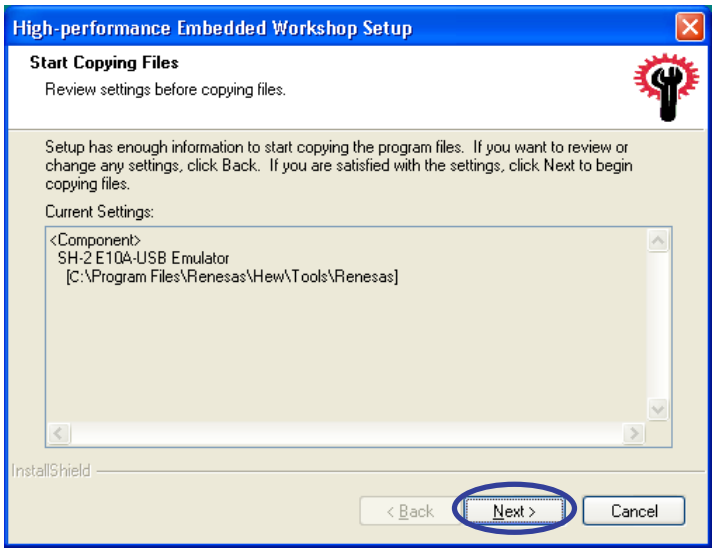



**Figure 4.11 Starting Copying of the E10A-USB Emulator Component**

(13) The following progress bar will be displayed while the program files are being copied.

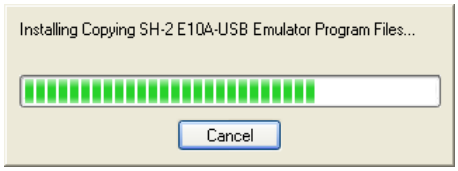



**Figure 4.12 Progress Bar for E10A-USB Emulator Program Copying**

(14) The [InstallShield Wizard Complete] dialog box will appear. Click the [Finish] button.

**Figure 4.13 Completing the E10A-USB Emulator Program**

(15) Next, installation of the AutoUpdate will start. The [Configure AutoUpdate] dialog box will appear. Select the desired update detection frequency from the [Scheduling] menu and click the [OK] button.

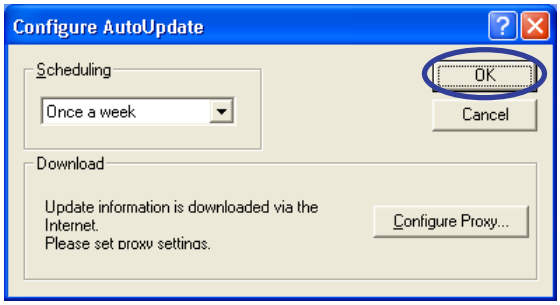



**Figure 4.14 Configure AutoUpdate Dialog Box**

(16) The [Welcome to the AutoUpdate Wizard] dialog box will appear. Click the [Next] button.

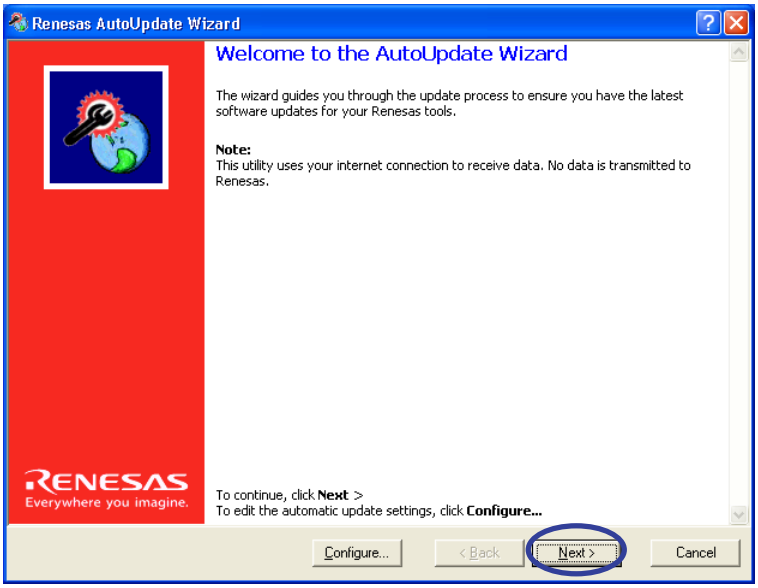



**Figure 4.15 Starting AutoUpdate Installation**

(17) The [Looking for Updates] dialog box will appear. Click the [Next] button.

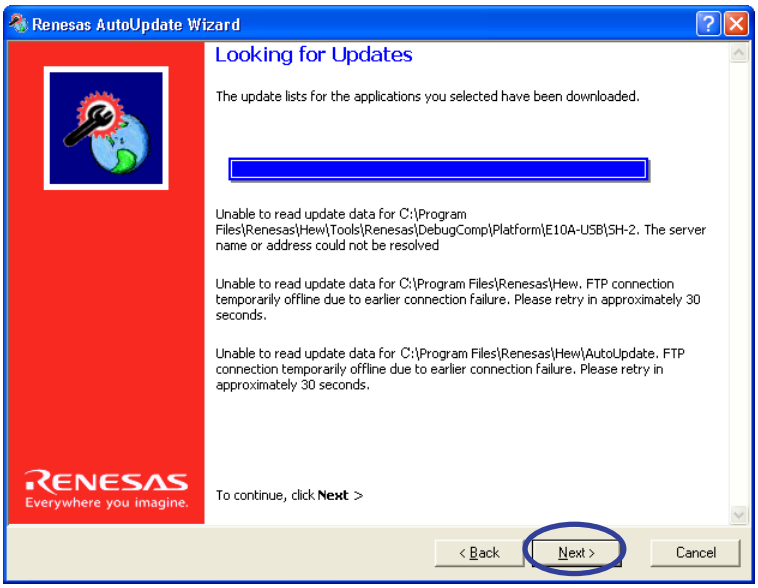



**Figure 4.16 Starting AutoUpdate Installation**

This figure shows an example where the host computer is not connected to the Internet.

(18) The dialog box for finishing the AutoUpdate installation will appear. Click the [Finish] button.

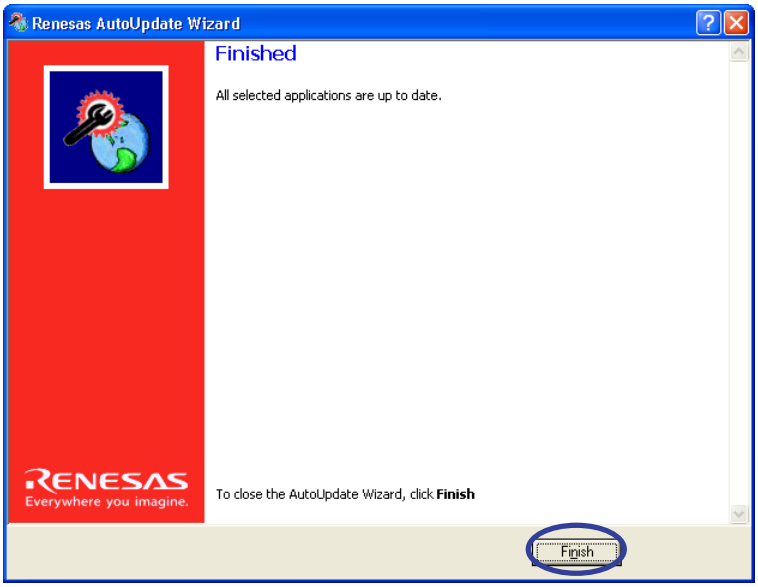



**Figure 4.17 Finishing AutoUpdate Installation**

Installation from the CD-ROM is completed through these steps.

# 5. Installing the Driver

Before connecting the main unit of the E10A-USB emulator to the host computer, be sure to check that the supplied software is installed in the computer. Installing the provided software transfers the E10A-USB emulator driver to the host computer, and the new hardware detection processing will automatically start.

## 5.1 Wizard for Adding Hardware

(1) Connect the E10A-USB emulator to the host computer through the USB cable.

(2) The [Found New Hardware Wizard] dialog box will appear. Select the [No, not this time] radio button and click [Next].

**Figure 5.1 [Found New Hardware Wizard] Dialog Box**

This guide shows an example of the wizard in Windows® XP Service Pack 2 (SP2).

(3) The [Welcome to the Found New Hardware Wizard] dialog box will appear. Select the [Install the software automatically (Recommended)] radio button and click [Next].

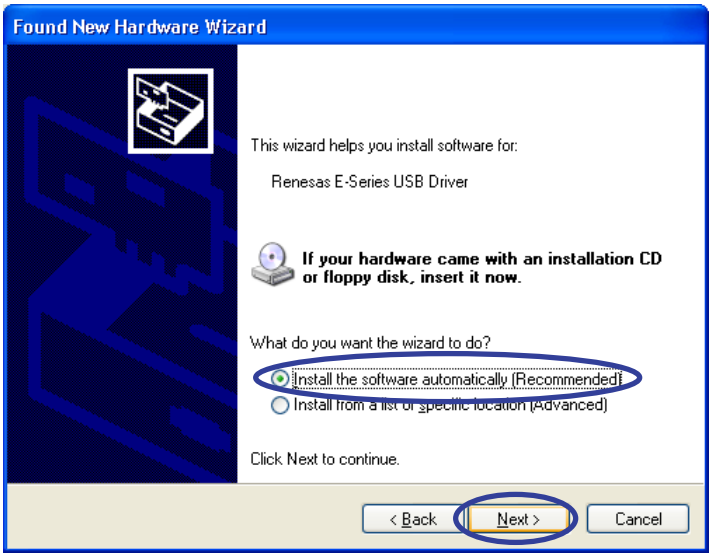



**Figure 5.2 Selecting the Driver Software Installation Method**

(4) Windows® automatically detects and installs the driver.

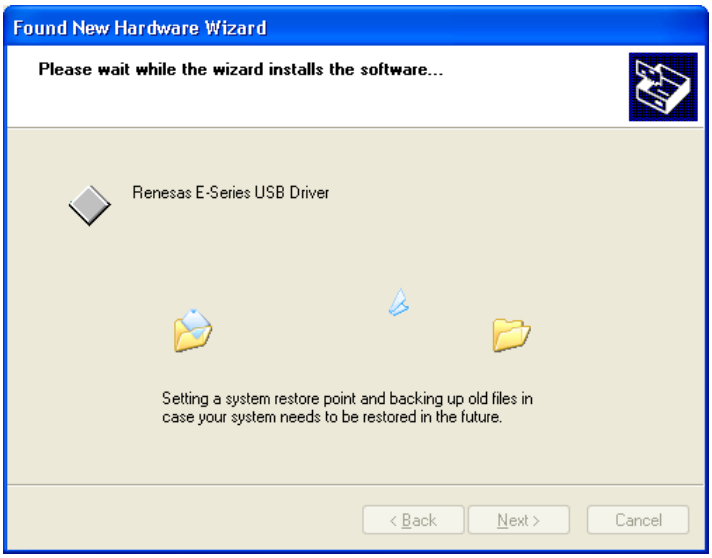



**Figure 5.3 Dialog Box Shown during Driver Installation**

Note: When a driver is installed in Windows® XP, a warning message from the Windows® logo test may be displayed, but this is not a problem. Select [Continue Anyway] to proceed with driver installation.

(5) The [Completing the Found New Hardware Wizard] dialog box will appear. Click the [Finish] button.

**Figure 5.4 [Completing the Found New Hardware Wizard] Dialog Box**

Driver installation is completed through these steps.

# 6. Let's Try Using the E10A-USB Emulator

This section describes the basic usage of the E10A-USB emulator with regard to the sample program in the supplied CD-ROM.

## 6.1 Before Starting

### 6.1.1 Checking the Software

This example uses the High-performance Embedded Workshop and the E10A-USB emulator software supplied with the emulator. Be sure to check that the software is installed in the computer before using the emulator. If any software is not installed, install it as described in section 4, Installing the Software.

### 6.1.2 Checking the Connections

Before using the E10A-USB emulator, be sure to check that the host computer, USB cable, E10A-USB emulator, user system interface cable, and user system (MCU board: HS7125EDB01H) are connected as shown in figure 6.1. If the connections are not complete, connect them as shown in figure 6.1.

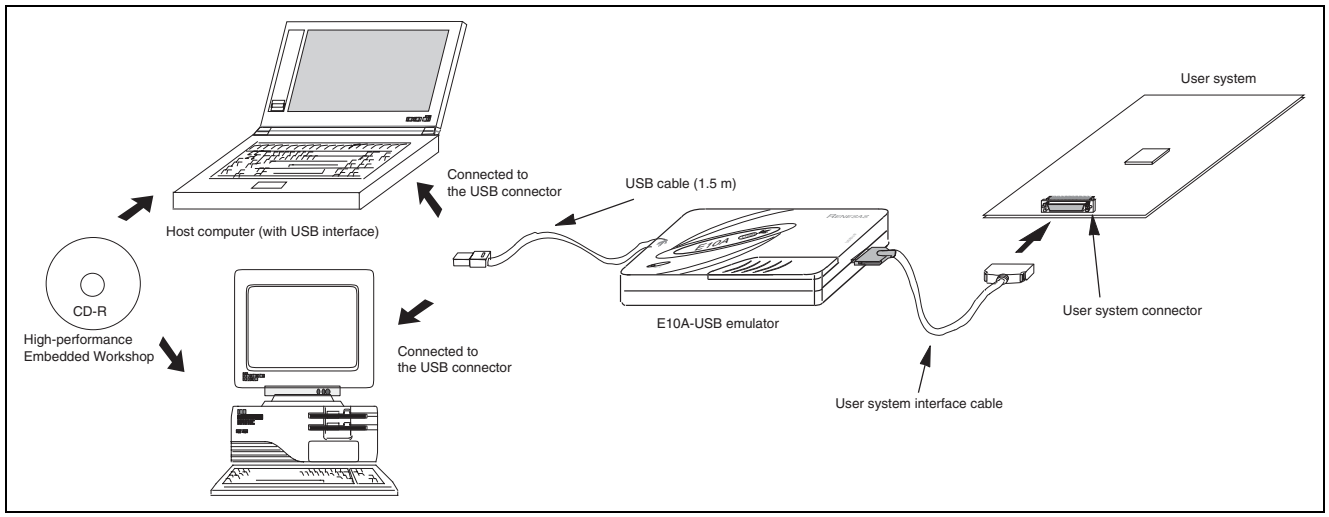



**Figure 6.1 Checking the Connections**

### 6.1.3 Setting MCU Board Switches

(1) Setting the Power-Selection Switch

Set switch SW1 to the [EXTERNAL] label side (in the direction of the red arrow in figure 6.2).

Be sure to connect the power cable to the MCU board and supply 5-VDC power from the external power source unit.

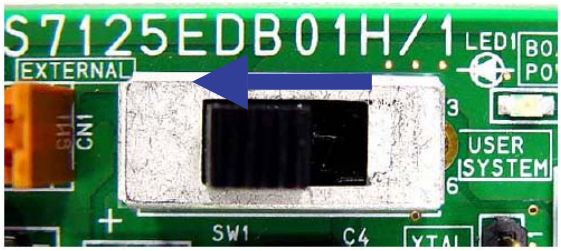



**Figure 6.2 Power-Selection Switch (SW1) on the MCU Board**

(2) Setting the User-System Input Signal Enabling/Disabling Switches

Set the switch marked as [UCON] (no.3) of switch SW2 to [DISABLE] as shown in figure 6.3. This enables single-unit operation of the MCU board. The other switches can be left in their initial state set at shipment ([ENABLE]).

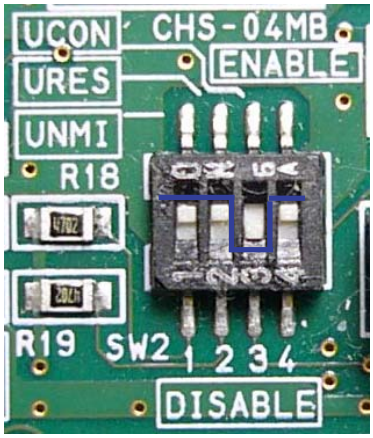



**Figure 6.3 User-System Input Signal Enabling/Disabling Switches (SW2)**

(3) Setting the Clock-Selection Jumper

Put a jumper on the [XTAL] label side of jumper pin SW3 (close pins 1 and 2) as indicated by a red rectangle in figure 6.4. Install a crystal resonator with an oscillating frequency of 10 MHz to 12.5 MHz on the MCU board. This guide describes an example where a 12-MHz resonator is used.

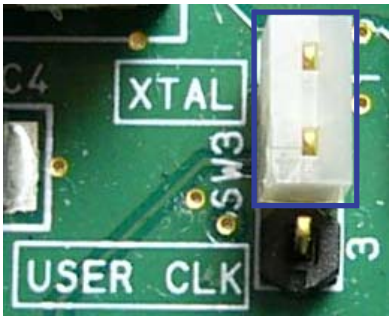



**Figure 6.4 Clock-Selection Jumper (SW3) on the MCU Board**

## 6.2 Activating the High-performance Embedded Workshop

### 6.2.1 Activating the High-performance Embedded Workshop

Activate the High-performance Embedded Workshop by opening the [Start] menu and selecting [All Programs], [Renesas], [High-performance Embedded Workshop], and [High-performance Embedded Workshop] in that order.

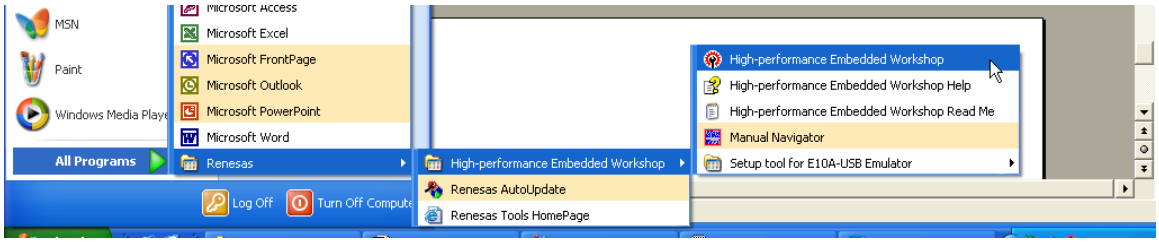



**Figure 6.5 Activating the High-Performance Embedded Workshop**

This guide shows an example where the High-performance Embedded Workshop has been updated to V.4.01.xx through the Renesas website.

## 6.3 Sample Program Execution Procedures

This section guides you through the procedures for loading the sample program in memory, executing it, and viewing the resultant trace information through the following procedures.

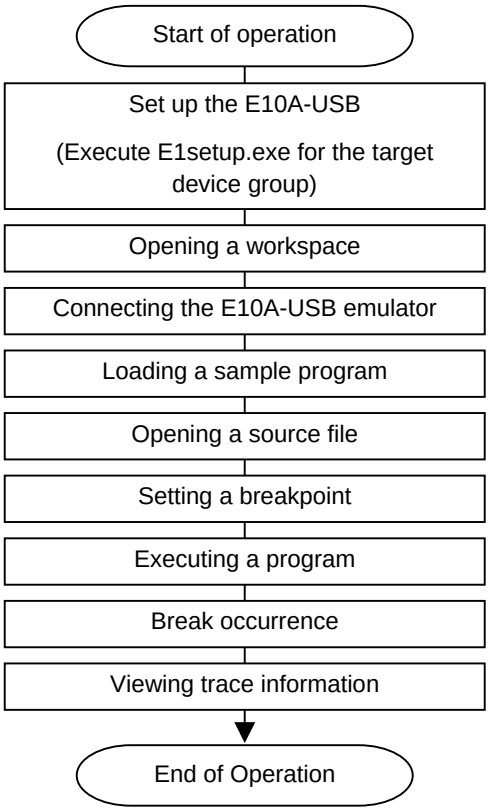



**Figure 6.6 Procedures for Sample Program Execution**

### 6.3.1 E10A-USB Setup

Before the E10A-USB emulator is used for the first time, the E10A-USB emulator firmware should be set up using the setup tool through the following steps.

(1) Connect the E10A-USB emulator to the host computer through the USB cable.
When the emulator is connected for the first time, the driver should be installed; follow the wizard for adding hardware as described in section 5, Installing the Driver.

(2) Ensure that the E10A-USB emulator is connected to the host computer, open the [Start] menu and select [All Programs], [Renesas], [High-performance Embedded Workshop], [Setup tool for E10A-USB Emulator], and [SH-2 Device Group] in that order. A tool for setting up the E10A-USB emulator is activated (E1setup.exe). The shortcut of this tool was stored in the [Start] menu when the E10A-USB emulator software was installed as described in section 4, Installing the Software.

(3) During the E10A-USB emulator firmware setup, a message box of the setup tool will prompt you to set DIP switch SW1 on the E10A-USB emulator; follow the instruction in the message box.

**Figure 6.7 Prompt for Setting E10A-USB Emulator Switch**

The above message box appears if DIP switch SW1 on the E10A-USB emulator is not correctly set. In this case, set the switch to "1", disconnect then reconnect the USB cable, and click the [OK] button.
When you use the emulator for the first time after you purchased it, if this message box appears repeatedly even if the DIP switch (SW1) is correctly set, driver installation may not have been completed; complete driver installation before connecting the emulator.

Note: When the [Found New Hardware] dialog box appears after the USB cable is reconnected, select the [Install from a list or specific location] radio button and specify the folder "Drivers\USB\XP" in the CD-ROM for the search location. When you use another version of Windows® OS, specify a correct folder with the name of the OS.
The [Found New Hardware] dialog box appears when the emulator connection is set up for the first time or when the emulator is connected to a different USB port on the host computer for the first time. It may take some time until this dialog box appears.

(4) After the tool for setting up the E10A-USB emulator (E1setup.exe) is activated, the following dialog box will appear.

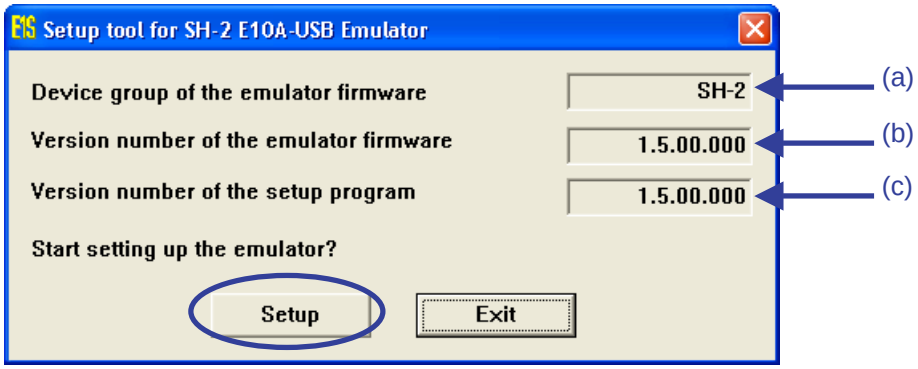



**Figure 6.8 E10A-USB Setup Tool**

(a) Device group of the emulator firmware: Name of the device group currently set.
(b) Version number of the emulator firmware: Version number of the control software installed in the E10A-USB emulator.
(c) Version number of the setup program: Version number of the setup program.

If the version numbers shown in (b) and (c) are the same, setup of the emulator is not required.
Set up the emulator only when "-.-.--.---" is shown in (b) or the version number of (b) is older than that of (c).

(5) Click the [Setup] button to start setup. The following dialog box will appear. Set DIP switch SW1 to '0', disconnect then reconnect the USB cable, and click the [OK] button.

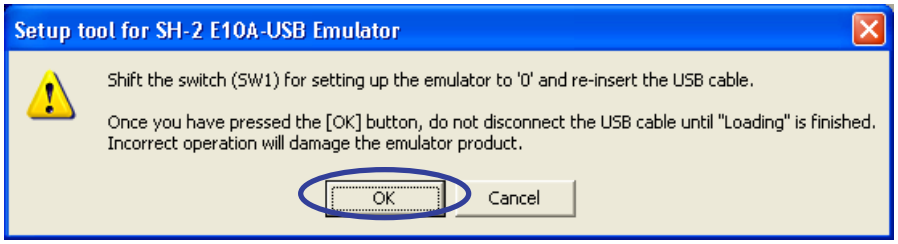



**Figure 6.9 Dialog Box for Confirming Firmware Writing**

Notes: 1. When the [Found New Hardware] dialog box appears after the USB cable is reconnected, select the [Install from a list or specific location] radio button and specify the folder "Drivers\USB\XP" in the CD-ROM for the search location. When you use another version of Windows® OS, specify a correct folder with the name of the OS.
The [Found New Hardware] dialog box appears when the emulator connection is set up for the first time or when the emulator is connected to a different USB port on the host computer for the first time. It may take some time until this dialog box appears.
2. In Windows® 2000 or Windows® XP, a dialog box will appear to show the disconnection of the USB, but this is not a problem.

(6) The following progress bar will be displayed while the E10A-USB emulator firmware is being written.

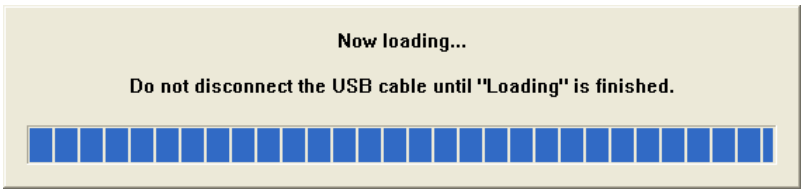



**Figure 6.10 Starting Setup**

Note: Do not turn off the host computer or disconnect the USB cable while setting up the E10A-USB emulator; if such an attempt is made, the E10A-USB emulator may be damaged.

(7) The following dialog box will appear when E10A-USB emulator has been successfully completed. Click the [OK] button.

**Figure 6.11 Message for Showing Completion of Setup**

(8) After E10A-USB emulator setup, the following message will appear. Set DIP switch SW1 to ’1’, disconnect then reconnect the USB cable, and click the [OK] button.

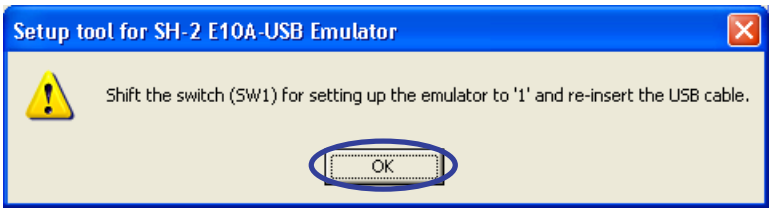



**Figure 6.12 Prompt for Setting E10A-USB Emulator Switch (at Completion)**

Notes: 1. Be sure to set DIP switch SW1 to ’1’ except when the setup tool is used.
2. When the emulator is used for a different product group, the firmware should be set up through the setup tool or license tool for that device group.
To use the setup tool for the new device group, the license tool for the device group should also be installed. For details on the license tool for adding a device group, refer to section 3.10.2, Setting up the Emulator by Using the License Tool to Add a Device Group, in the SuperH™ Family E10A-USB Emulator User's Manual.

### 6.3.2 Opening a Workspace

(1) The [Welcome!] dialog box will appear on the High-performance Embedded Workshop screen.

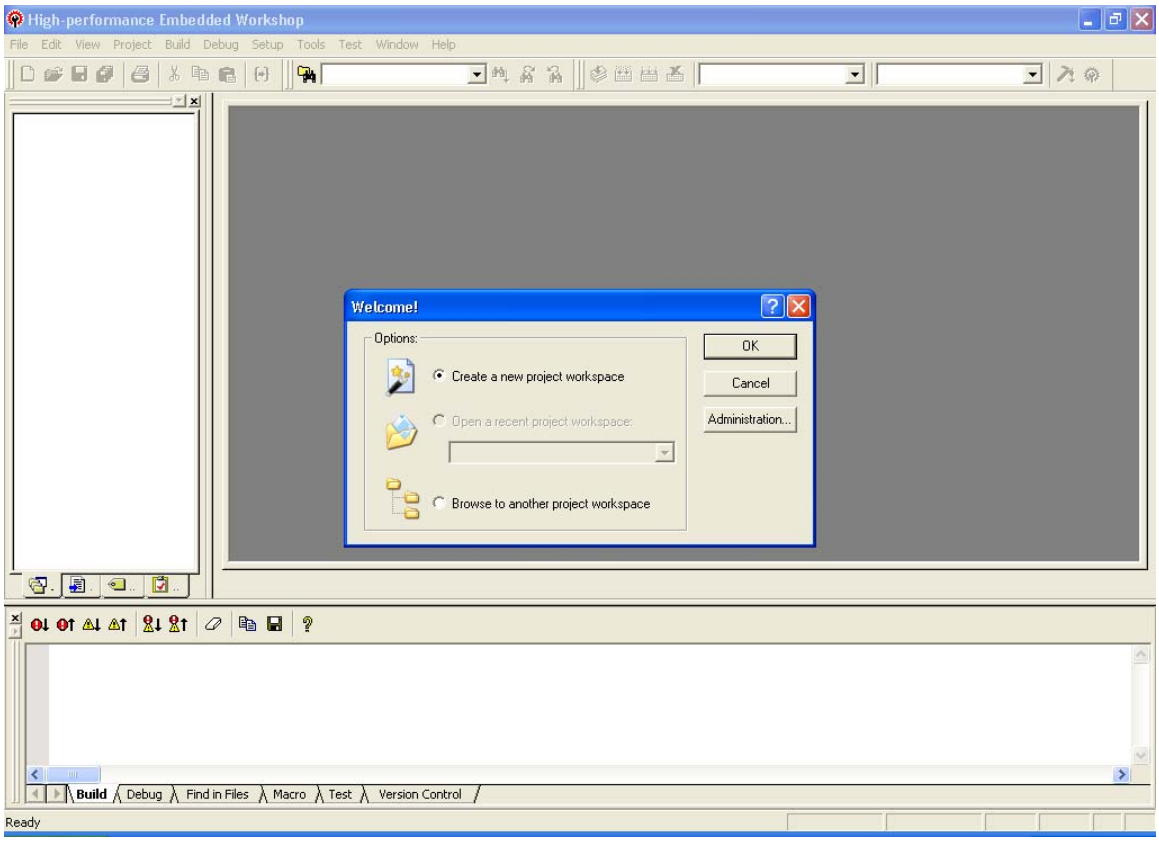



**Figure 6.13 Startup Screen of the High-Performance Embedded Workshop**

Select the [Browse to another project workspace] radio button in the [Welcome!] dialog box and click the [OK] button.

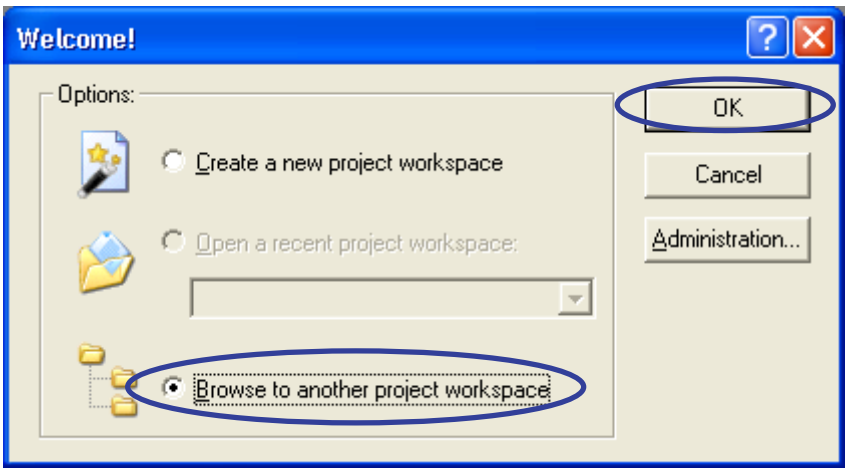



**Figure 6.14 Selecting the Workspace Processing**

(2) The [Open Workspace] dialog box will appear.

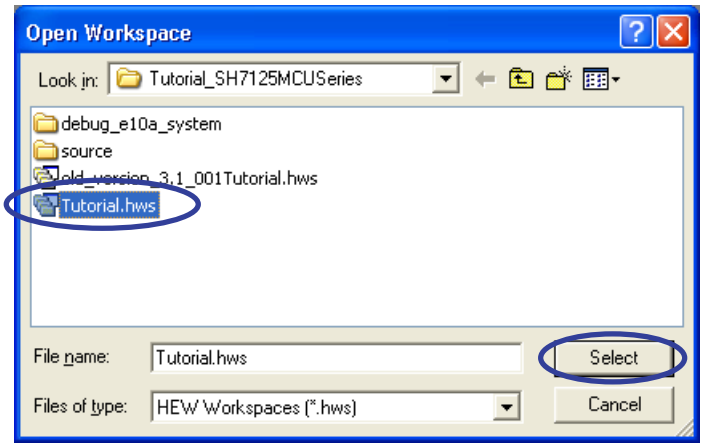



**Figure 6.15 Selecting a Workspace File**

When the software from the CD-ROM of this product has been installed, workspace "Tutorial.hws" is stored in the folder structure shown below (standard location). Specify the correct location by opening the folders in order. Select the workspace "Tutorial.hws" and click the [Select] button.

| |
|---|
| C:\WorkSpace\Tutorial\E10A-USB\SH-2\SH7080SerTutorial\Tutorial_SH7125MCUSeries\Tutorial.hws |
| C:\WorkSpace<br>└ Tutorial<br>└ E10A-USB<br>└ SH-2<br>└ SH7080Series<br>└ Tutorial_SH7125MCUSeries<br>└ Tutorial.hws |

**Figure 6.16 Folder Including the Workspace File**

The above folder may not be specifiable depending on the user environment. In this case, select the following folder.
C:\hew3\Tools\Renesas\DebugComp\Platform\E10-USB\SH-2\SH7080Series\Tutorial_SH7125MCUSeries
C:\hew2\Tools\Renesas\DebugComp\Platform\E10-USB\SH-2\SH7080Series\Tutorial_SH7125MCUSeries

Note: The drive name C: should be read as the name of the drive where the OS is installed in your computer.

(3) If the workspace version is old, the following dialog box will appear. To update it to the new version, click the [OK] button.

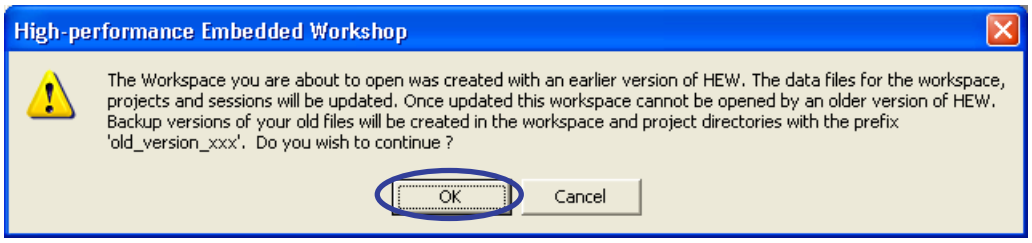



**Figure 6.17 Dialog Box Shown for Old-Version Workspace**

(4) If the directory information of the workspace differs from the current directory, a dialog box will prompt you to confirm the current directory. Click the [Yes] button.

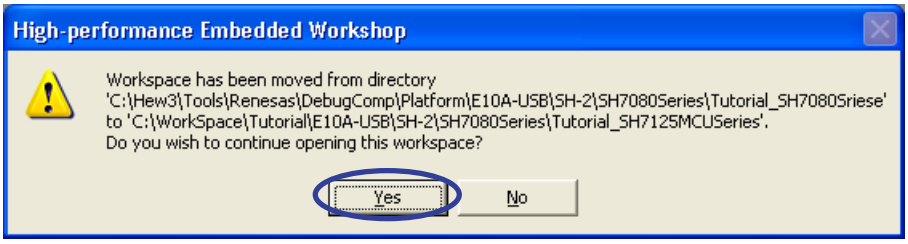



**Figure 6.18 Dialog Box for Confirming Current Workspace Directory**

### 6.3.3 Connecting the E10A-USB Emulator

(1) The [Select Emulator mode] dialog box will appear.

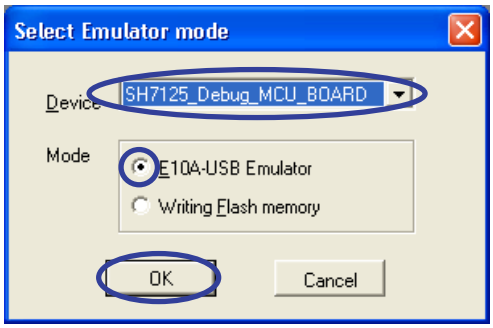



**Figure 6.19 Selecting the Emulator Mode**

In the [Device] menu, the name of the device mounted on the user system should be specified.
Select [SH7125_Debug_MCU_BOARD] here.
Select the [E10A-USB Emulator] radio button for [Mode] and click the [OK] button.

(2) When the E10A-USB emulator is connected for the first time, the [Please choose driver] dialog box will appear. Click the [OK] button.

**Figure 6.20 Prompt to Choose the Driver for the First-Time Connection of the E10A-USB Emulator**

(3) When the E10A-USB emulator is connected for the first time, the [Driver Details] dialog box will appear. Select [Renesas E-Series USB Driver], and [USB interface] and the unique channel number for the host computer will be automatically displayed. Check the contents of [Details] and click the [Close] button.

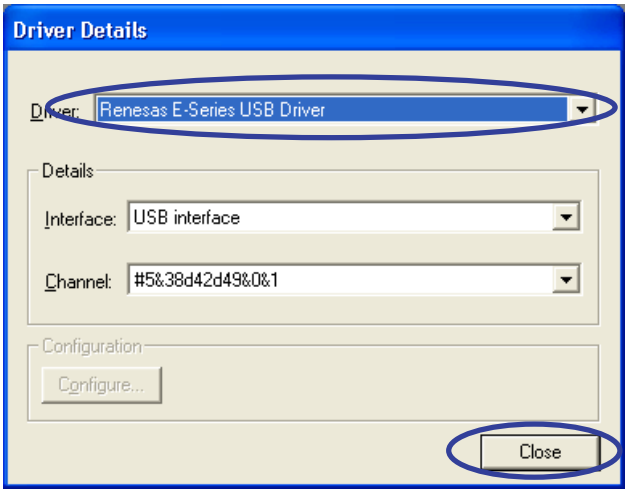



**Figure 6.21 Selecting Details of the Driver**

If the E10A-USB emulator had been connected to the host computer through a USB before, the [Please choose driver] dialog box and [Driver Details] dialog box are skipped.

(4) A dialog box will prompt you to input a reset signal. Turn on the power to the debugging MCU board, set the reset switch (SW4) on the debugging MCU board to input a reset signal to the user system, and click the [OK] button.

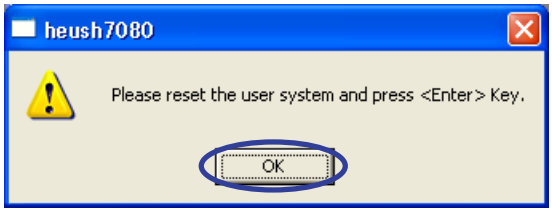



**Figure 6.22 Prompt for Reset Signal Input to the User System**

The reset switch (SW4) on the debugging MCU board should be turned from "3" to "1" and then to "3" ("3" and "1" are silk-screened labels) to manually input a reset signal to the debugging MCU board.
Set the reset switch only when a reset input is requested through a dialog box; otherwise, leave it set to "3".
If the MCU board has not received a reset signal correctly or a problem has been found in the power supply, the error message shown in figure 6.23 will appear. Solve the problem and click the [Retry] button. To abort the processing, click the [Abort] button.

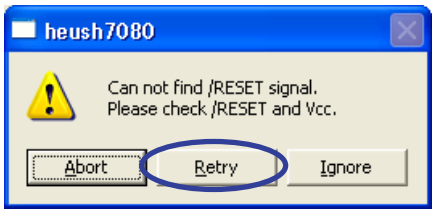



**Figure 6.23 Reset/Vcc Signal Error Message**

(5) The [System Clock] dialog box will appear. Enter the oscillating frequency of the crystal resonator installed on the MCU board and click the [OK] button. In this example, a 12-MHz crystal resonator is used, so "12.00" (12.00 MHz) is entered.

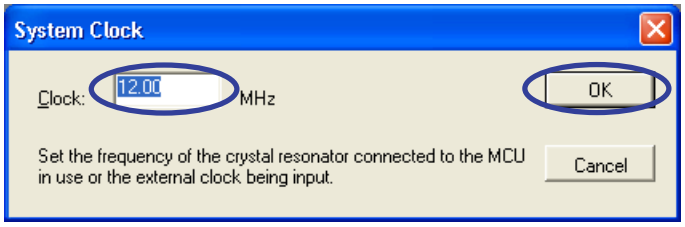



**Figure 6.24 Specifying Operating Frequency**

(6) The [ID Code] dialog box will appear. Enter "E10A" here and click the [OK] button.

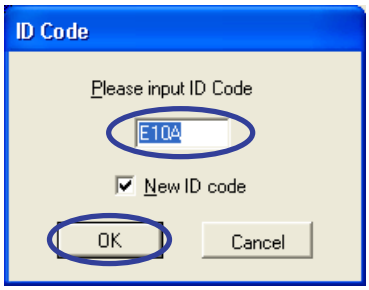



**Figure 6.25 Specifying the ID Code**

(7) While the E10A-USB emulator connection is in progress, the [Connecting] dialog box is shown.

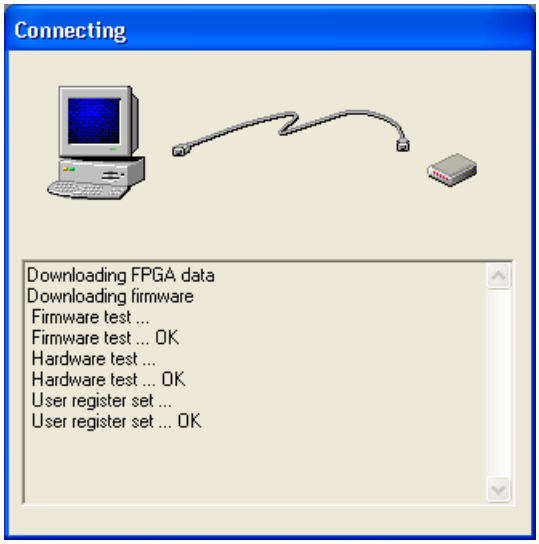



**Figure 6.26 Dialog Box Shown during E10A-USB Emulator Connection**

(8) [Connected] is displayed in the [Debug] tab and the E10A-USB emulator is now operative.

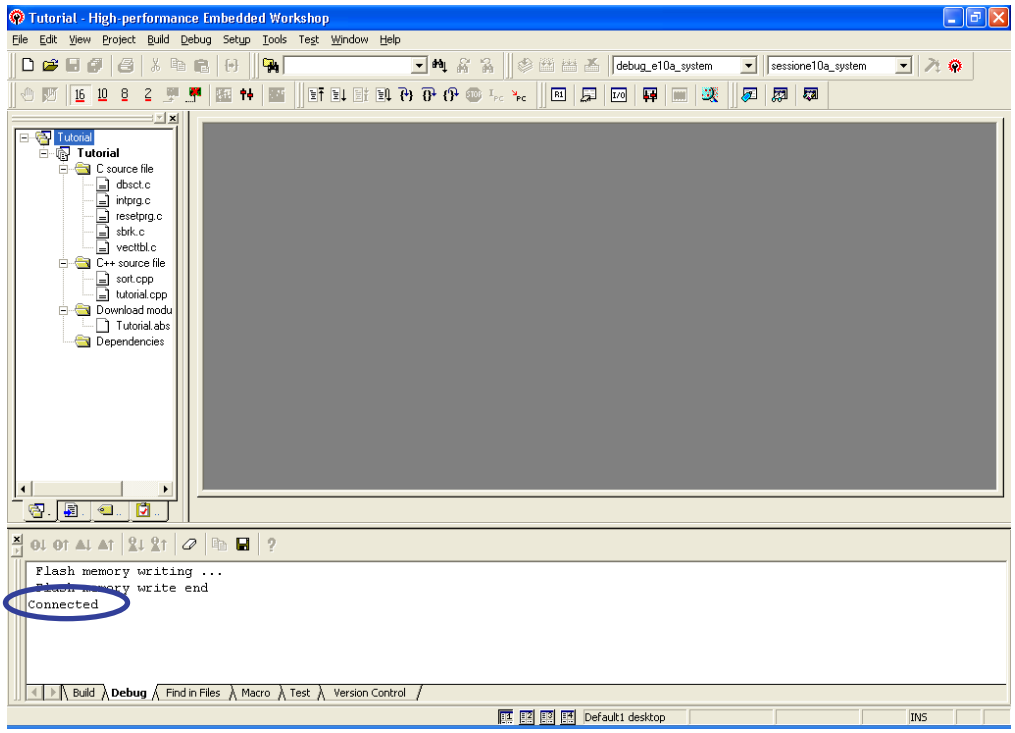



**Figure 6.27 Message Shown when E10A-USB Emulator Connection is Established**

### 6.3.4 Loading a Sample Program

(1) Select [Download Modules] form the [Debug] menu to load the sample program.

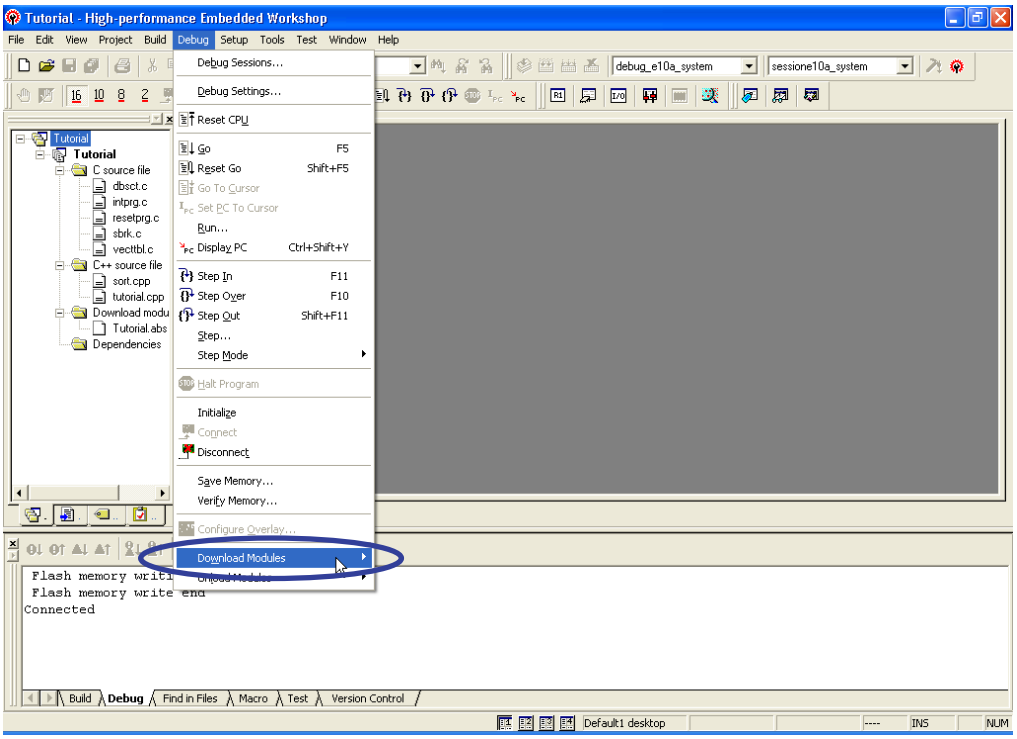



**Figure 6.28 Downloading the Sample Program**

(2) Select the file "Tutorial.abs" registered in the workspace.

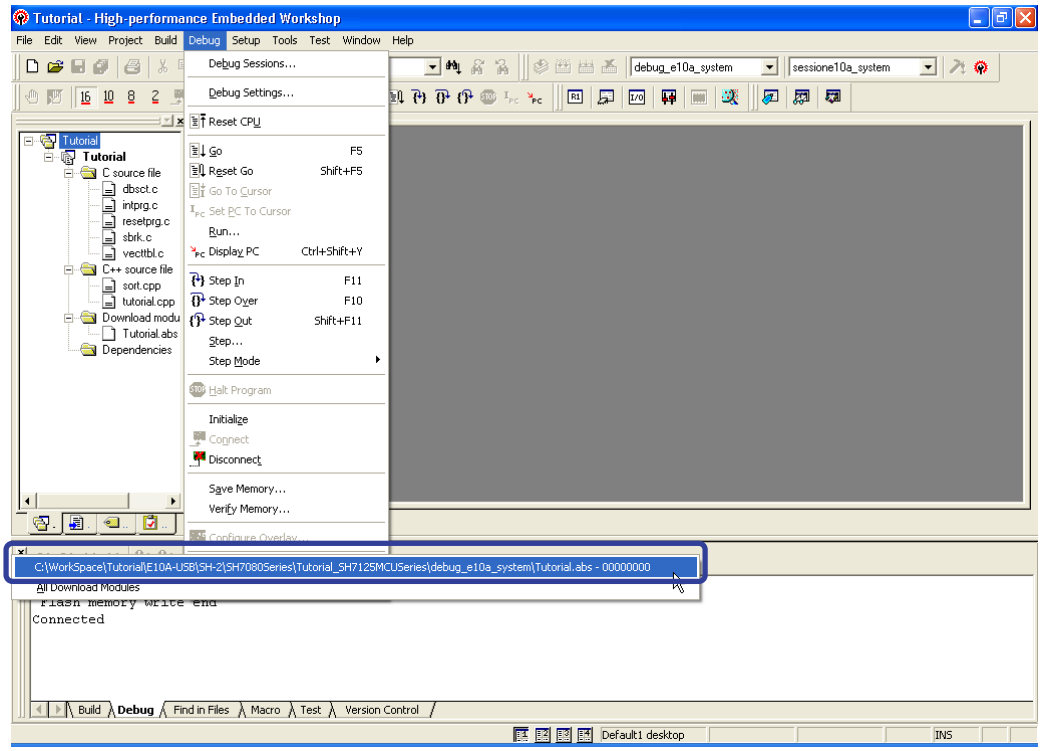



**Figure 6.29 Selecting the Sample Program File**

### 6.3.5 Opening a Source File

(1) Double-click the source file name "tutorial.cpp" in the workspace to open the source code.

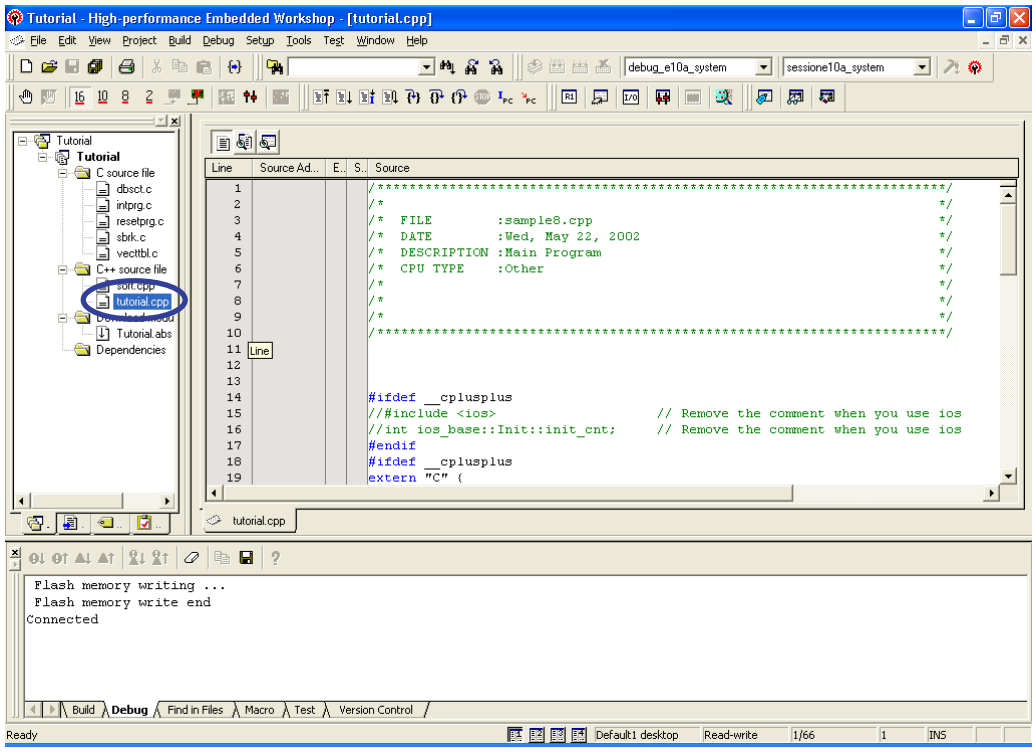



**Figure 6.30 Opening a Source File**

### 6.3.6 Setting a Breakpoint

(1) Scroll the source code display to show line 48 by using the scroll bar.

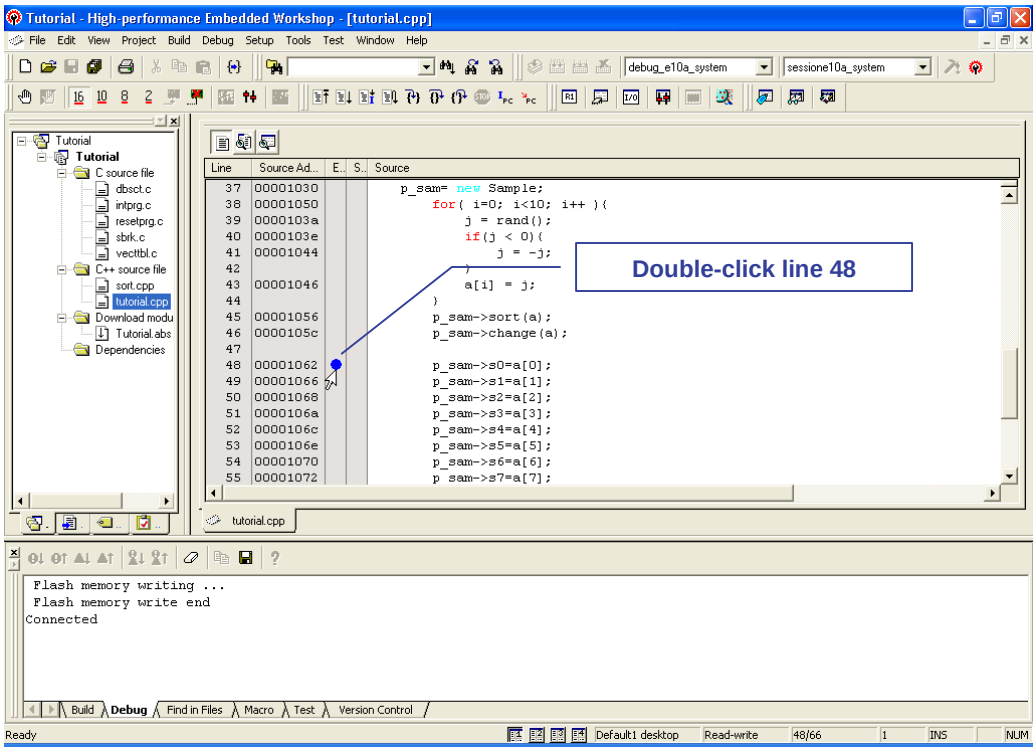



**Figure 6.31 Setting a Hardware Break**

Here, double-click the [Event] column on line 48 to set a break condition. A blue dot indicates that a break condition has been set. To clear a break condition previously set, double-click the blue dot.

The E10A-USB emulator provides two types of break function: a hardware break function and a software break function. This example uses the hardware break function. During debugging of the SH7125 program through the E10A-USB emulator, up to ten breakpoints can be set as an [Event]-type break (hardware break function). This type of break is advantageous because it does not require write access to the on-chip flash memory of the SH7125 to set or clear a break condition, since it is implemented by the break controller in the microcontroller, and thus it does not degrade flash memory endurance. In contrast, software break conditions can be set for up to 255 points, but the flash memory is written to every time a condition is set or cleared.

### 6.3.7 Executing a Program

(1) Select [Reset Go] from the [Debug] menu to execute a program.

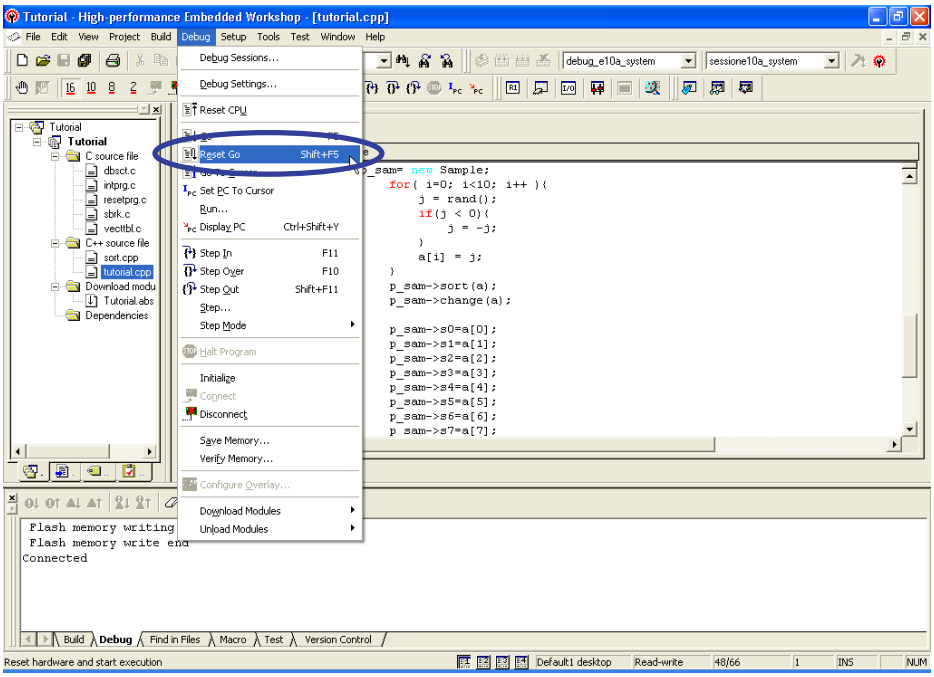



**Figure 6.32 Executing a Program after a Reset**

### 6.3.8 Break Occurrence

(1) When a break condition is satisfied, the source window shows the program stop position.

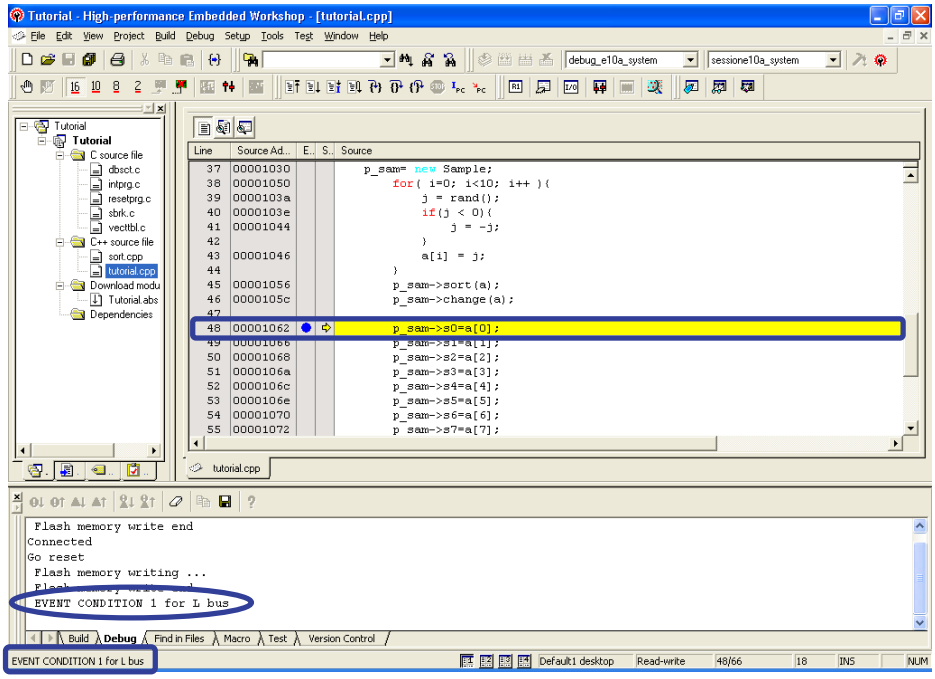



**Figure 6.33 Screen Showing Break Condition Satisfaction**

The yellow arrow points to the program counter location and the corresponding source line is highlighted in yellow. "EVENT CONDITION 1 for L bus" is displayed as the program stop cause in the [Debug] tab and on the status bar.

### 6.3.9 Viewing Trace Information

(1) The following describes an example of viewing trace information. Select [Code] and [Trace], in that order, from the [View] menu.

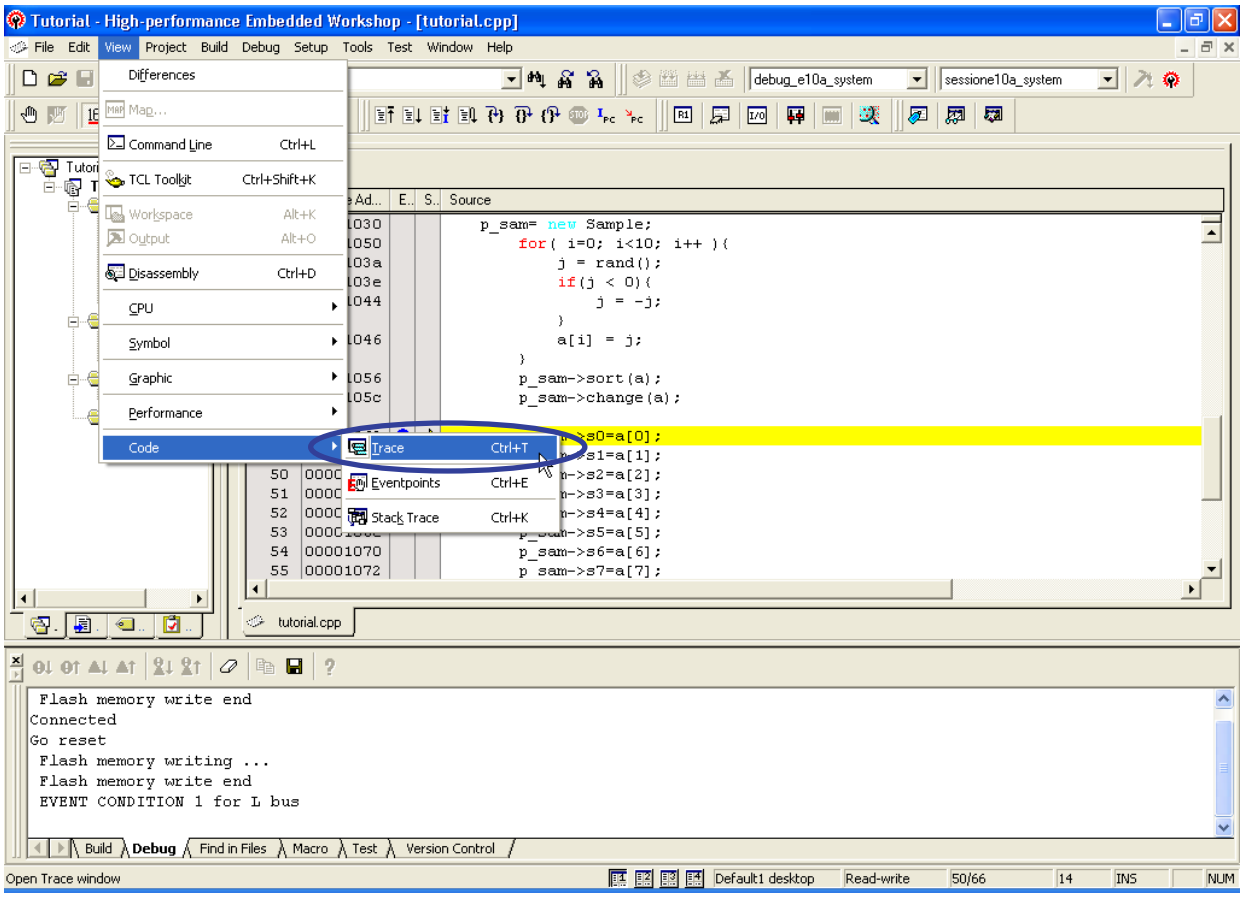



**Figure 6.34 Opening the Trace Window**

(2) The Trace window displays the trace information recorded during program execution.

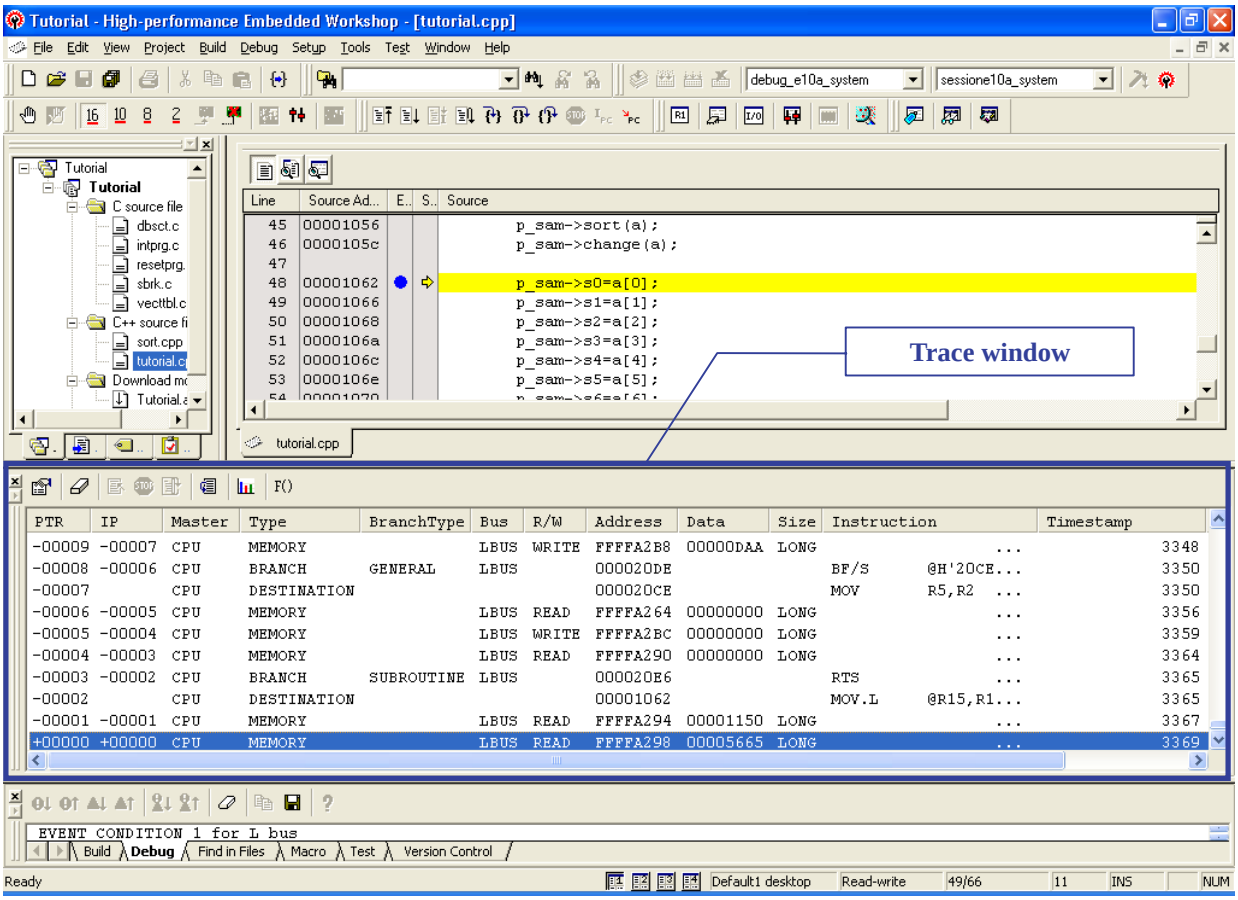



**Figure 6.35 Trace Window Display**

Through analysis of the trace information, the cause of the target event or the program execution path can be found, which makes debugging more efficient. The trace functions and the trace information to be displayed depend on the target device. For details of the trace functions, refer to the E10A-USB Emulator User's Manual.

# 7. Limitations

## 7.1 Limitations on Free Evaluation-Version C Compiler

1) The free evaluation-version compiler has no limitations in usage for 60 days after it is used for compilation for the first time.
2) From the 61st day on, the linkage size is limited to within 256 kbytes.

## 7.2 Limitations on Emulator Software

There are two types of documents related to the E10A-USB emulator: common documents and additional documents.

The common documents include the E10A-USB Emulator User's Manual and the Precautions on Using the E10A-USB Emulator.

An additional document is prepared for each device type. For example, for the SH7125 and SH7124 used in this guide, SuperH™ Family E10A-USB Emulator Additional Document for User's Manual (Supplementary Information on Using the SH7125 Series Debugging MCU Board) (REJ10J1424-0100) and SuperH™ Family E10A-USB Emulator Additional Document for User's Manual (Supplementary Information on Using the SH7125 and SH7124) (REJ10J1271-0200) are available.

Please refer to them for important information required when using the E10A-USB emulator.

## 7.3 Memory Map

Figure 7.1 shows the memory map of the 128-kbyte flash memory-version SH7125 or SH7124 in mode 3 (single-chip mode). In the 64-kbyte flash memory version, the on-chip ROM is allocated at addresses H'0 to H'FFFF.

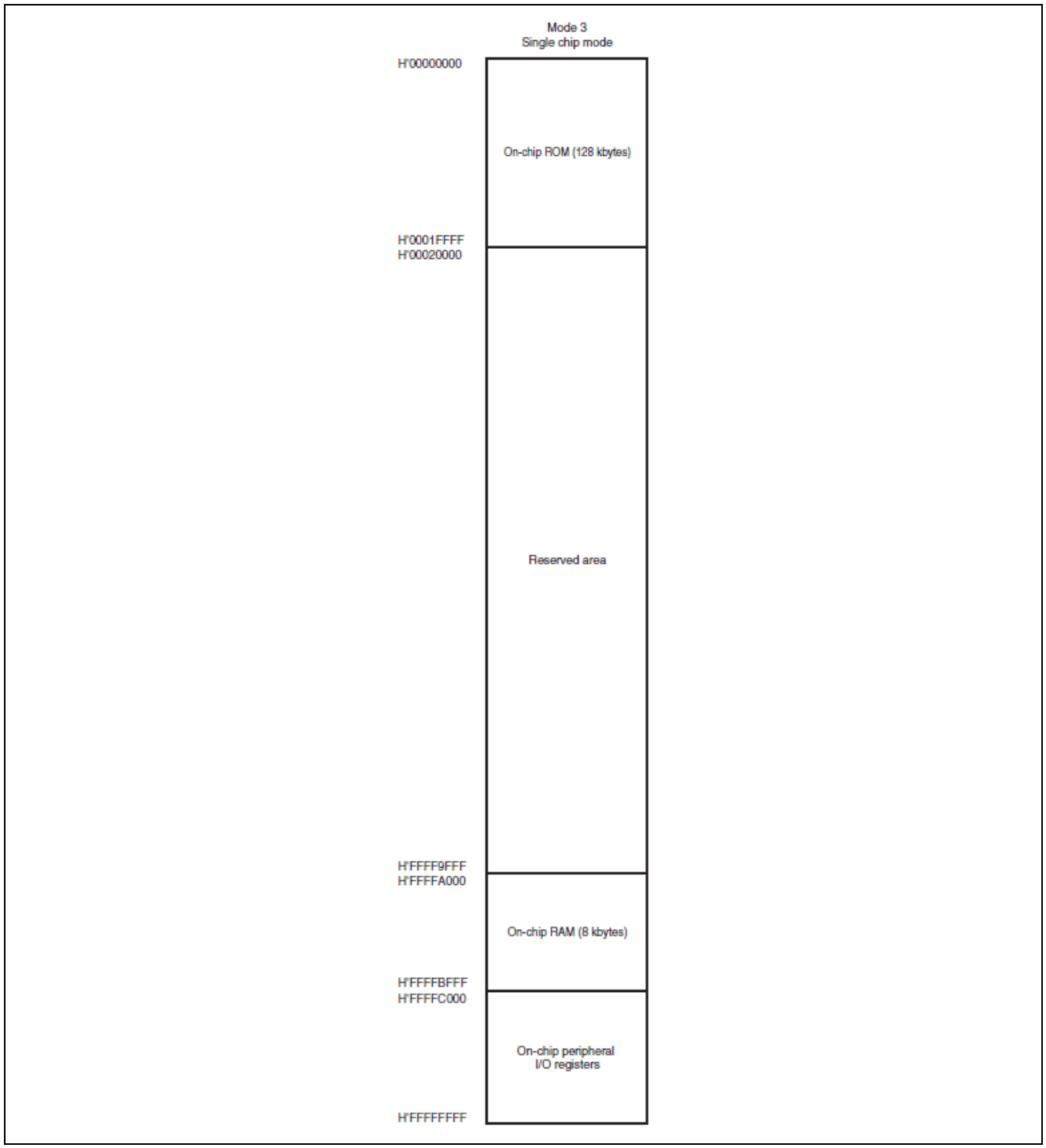



**Figure 7.1 Memory Map of the SH7125 or SH7124 (128-kbyte Flash Memory Version)**

# 8. Frequently Asked Questions

## 8.1 A communication error has occurred at startup.

If a communication error has occurred at startup, confirm the following.

1) The USB cable and user system interface cable are correctly connected.
2) The power is supplied to the MCU board from an external power source.
3) "SH7125_Debug_MCU_BOARD" was selected for [Select Emulator mode] when the E10A-USB emulator was connected.
4) The SH7125 debugging MCU board is set up for single-unit operation. Set SW2-3 to the DISABLE side to specify the single-unit operation mode.

## 8.2 A communication error has occurred during debugging.

If a communication error has occurred during debugging, confirm the following.

1) The firmware may have gone out of control due to user program execution (going out of control or accessing to the monitor area). Disconnect the USB cable of the E10A-USB emulator from the host computer, connect it again, and then restart the emulator software.
2) The H-UDI settings should not be modified. Do not access the H-UDI because the E10A-USB emulator uses it.

## 8.3 Do the on-chip peripheral modules work after a break occurs?

While the program is stopped due to a break, the CPU does not accept interrupts but the peripheral modules continue operation. For example, when the user program stops due to a break after a timer has started counting, the timer continues counting but the CPU does not accept timer interrupts. Note that the watchdog timer (WDT) stops counting while the program is stopped.

## 8.4 Other Frequently Asked Questions

Refer to the FAQs at the following website address for the questions and answers about the Renesas products including the E10A-USB emulator.

http://www.renesas.com/e10a_usb (Global site)

Access the above address and click the FAQs at the left side of the page.

## 9. Related Documents

The E10A-USB emulator and High-performance Embedded Workshop provide many other useful functions not mentioned in this document. Please refer to the following related documents for important information such as detailed specifications, technical information, or restrictions.

**Documents Related to the E10A-USB Emulator:**

- SuperH™ Family E10A-USB Emulator User's Manual
- SuperH™ Family E10A-USB Emulator Additional Document for User's Manual (Supplementary Information on Using the SH7125 Series Debugging MCU Board)
- SuperH™ Family E10A-USB Emulator Additional Document for User's Manual (Supplementary Information on Using the SH7125 and SH7124)
- Limitations on SuperH™ Family E10A-USB Emulator

**Documents Related to High-Performance Embedded Workshop:**

- High-performance Embedded Workshop V.4.01 User's Manual
- High-performance Embedded Workshop V.4.01 Release Note

**Documents Related to MCU:**

- SH7125 Group, SH7124 Group Hardware Manual
- SH-1/SH-2/SH-DSP Software Manual

**Document Related to SuperH™ Family C/C++ Compiler Package:**

- SuperH™ C/C++ Compiler Package V.9.00 User's Manual

## 10. For More Information

Access the following addresses for information on this product.

Ask technical questions about the E10A-USB emulator through the following e-mail addresses.

USA: techsupport.rta@renesas.com

Europe: tools.support.eu@renesas.com

Japan: csc@renesas.com

Information on the E10A-USB emulator is available at the following Renesas websites:

http://www.renesas.com/e10a_usb (Global site)

http://japan.renesas.com/e10a_usb (Japan site)

Information on the Renesas microcontrollers is available at the following Renesas websites:

http://www.renesas.com/ (Global site)

http://japan.renesas.com/ (Japan site)

## Revision Record

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Introductory Guide for SH/Tiny (SH7125)

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# Introductory Guide for SH/Tiny (SH7125)

Application Notes

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