RX64M Group

R01AN2609EJ0100
Rev.1.00
Apr 01, 2015

The camera function and The Sound Play Function Demonstration using the HMI expansion board

RX Driver Package Application

Introduction

This application note describes a program for demonstrating camera functionality and audio playback functionality using the HMI expansion board.

A web server system utilizing the M3S-T4-Tiny TCP/IP protocol stack is also embedded in the demonstrations, and operations such as display of capture data imported from a camera module and starting and stopping playback of audio data are controlled using a web browser.

The demonstration program is based on the RX Driver Package (RDP). RDP is a software platform that includes in a single package device drivers and middleware that support Firmware Integration Technology (FIT), which aims to simplify the task of embedding peripheral function module drivers, etc. It includes device drivers for the on-chip peripheral modules of RX microcontrollers, middleware developed for RX microcontrollers, interface modules of various types, and the Board Support Package (BSP) module. Users can combine the modules contained in RDP as they like and can easily build systems by creating applications using these modules. The term RDP application is used to refer collectively to sample applications that operate in combination with RDP.

The central focus of this application note is the procedure for running the demonstrations. The CPU board (RSK board) of the Renesas Starter Kit+ for RX64M (RSK) and the HMI expansion board are required in order to use this application note.

Refer to the URL below for information on the Renesas Starter Kit+ for RX64M. (This page also contains information on the HMI expansion board.)

http://renesas.com/rskrx64m

Target Device

RX64M Group（RSK board + HMI Expansion Board）

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1. Overview

1.1 This Application Note

This application note contains a program for demonstrating camera functionality and audio playback functionality using the HMI expansion board. Two demonstrations are provided: one covering camera functionality and one covering audio playback functionality. A web server system utilizing the M3S-T4-Tiny TCP/IP protocol stack is embedded, and operations such as display of capture data imported from a camera module and starting and stopping playback of audio data are controlled using a web browser. The central focus of this application note is the procedure for running the demonstrations. The demonstration program is based on RDP. The RSK board and the HMI expansion board are required in order to use this application note. (The state in which the boards are connected is referred to below as the "evaluation board.")

The camera functionality and audio playback functionality cannot be used at the same time because they require different settings on the evaluation board. They also have different program debugging environments.

A USB memory device or an SD card is needed to run the demonstrations. However, the demonstration program does not include an SD host interface (SDHI) module because it is necessary to agree to the SD Host/Ancillary Product License Agreement (SD HALA) to develop a host device that conforms to the SD standard. Please contact a Renesas representative directly if you wish to use an SD card to run the demonstrations.

To check the camera functionality, purchase the OV7670 (OmniVision). Headphones that can connect to a mini jack are necessary to check the audio playback functionality.

1.2 Operating Environment

This application note operates in the following environment.

Table 1 Operating Environment

Microcontroller	RX64M Group
Evaluation board	Renesas Starter Kit+ for RX64M CPU Board(R0K50564MC010BE) HMI Expansion Board (R0K50564MB001BR)
Integrated development environment (IDE)	e² studio V3.1.0.00 or later or CS+ V2.02.00 or later
Cross tools	RX Family C/C++ Compiler Package V2.02.00 or later
Emulator	E1(include in RSK)
Web browser	Internet Explorer 8 or Internet Explorer 11 (Add "192.168.0.3" to Compatibility View Settings.)

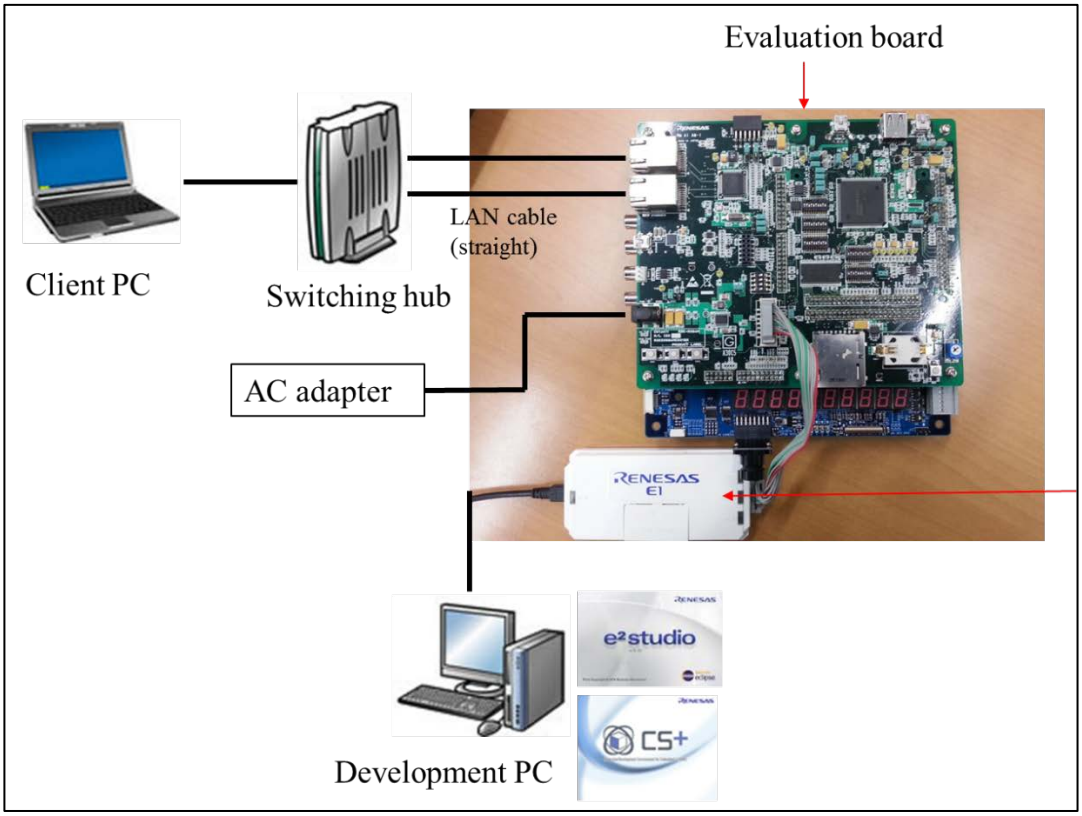


Figure 1 Sample Operating Environment

1.3 Module Structure

The demonstration program consists of two main parts: RDP and the RDP application.

RDP is a software platform that includes in a single package device drivers and middleware that support Firmware Integration Technology (FIT). It provides an environment that makes it easy to evaluate the many peripheral functions of RX microcontrollers.

The term RDP application is used to refer collectively to sample applications that operate in combination with RDP.

The structure of the modules of the demonstration program is shown below.

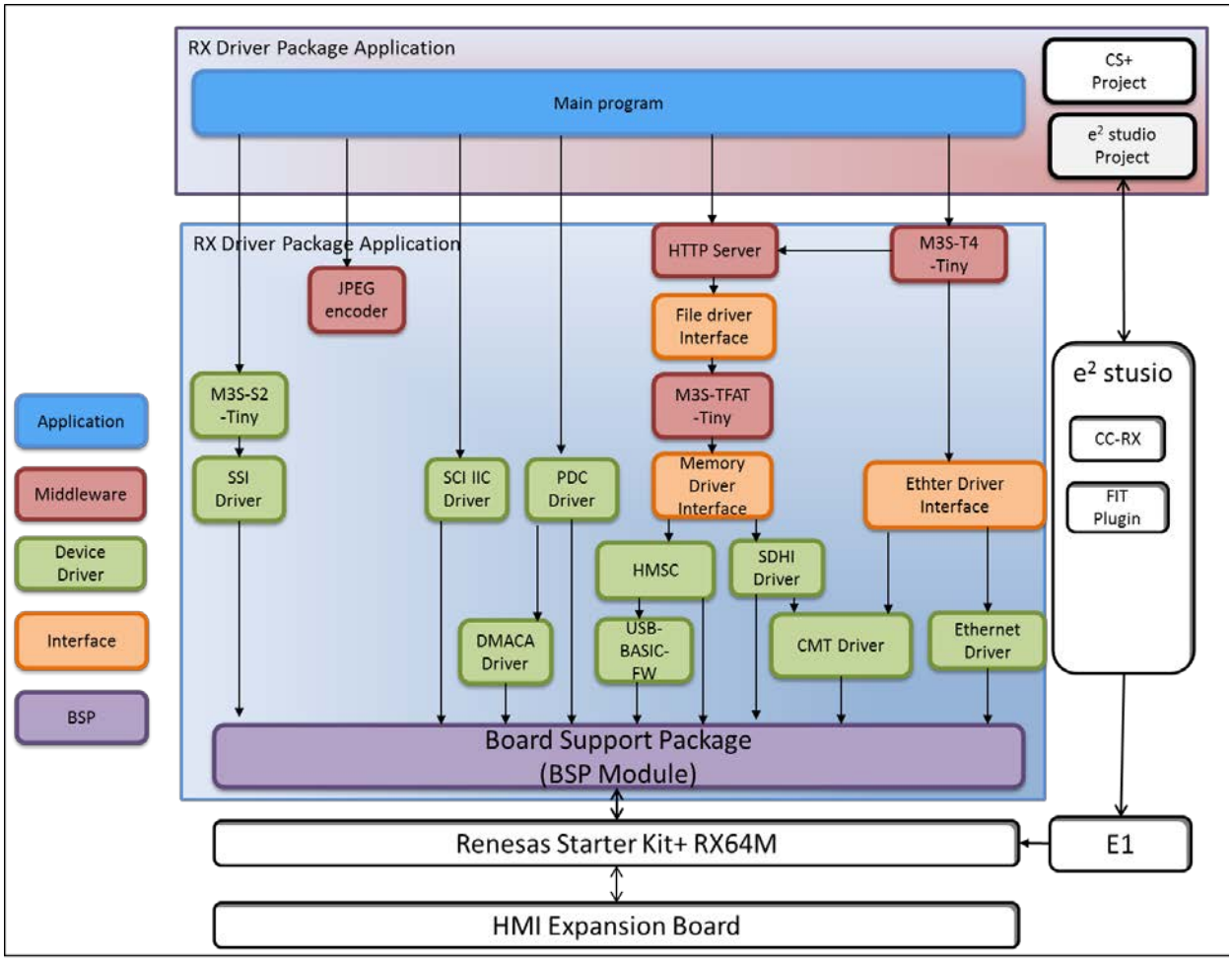


Figure 2 Module Structure

Table 2 Module List

Type	Module name	FIT module name	Revision
Board Support Package	Board Support Package (BSP Module)	r_bsp	Rev.2.80
Device Driver	CMT Driver (Compare Match Timer)	r_cmt_rx	Rev.1.00
Device Driver	DMACA Driver (DMA controller)	r_dmaca_rx	Rev.1.02
Device Driver	DTC Driver (Data Transfer Controller) choice with DMA and DTC	r_dtc_rx	Rev.2.02
Device Driver	Ethernet Driver (ETHER controller)	r_ether_rx	Rev.1.01
Middleware	JPEG encoder	r_jpege_rx	Rev.1.00
Device Driver	PDC Driver (Parallel Data Capture Unit)	r_pdc_rxv	Rev.1.01

Middleware	M3S-S2-Tiny (ASPCM Encoder / Decoder)	r_s2_rx	Rev.3.02
Device Driver	SCI IIC Driver (simple IIC)	r_sci_iic_rx	Rev.1.50
Device Driver	SDHI Driver (SD Host Interface)	r_sdhi_rx	Rev.1.00
Device Driver	SSI Driver (Serial Sound Interface)	r_ssi_api_rx	Rev.1.11
Interface	Ether Driver Interface	r_t4_driver_rx64m	Rev.1.02
Interface	File Driver Interface	r_t4_file_driver_rx	Rev.1.01
Middleware	HTTP Server (Web Server)	r_t4_http_server_rx	Rev.1.04
Middleware	M3S-T4-Tiny (TCP/IP protocol stack)	r_t4_rx	Rev.2.02
Interface	Memory Driver Interface	r_tfat_driver_rx	Rev.1.01
Middleware	M3S-TFAT-Tiny (Open Source FAT File System)	r_tfat_rx	Rev.3.01
Middleware	USB-BASIC-FW (USB Basic Host and Peripheral Driver)	r_usb_basic	Rev.1.10
Middleware	HMSC (USB Host Mass Storage Class Driver)	r_usb_hmsc	Rev.1.10
Application	Main Program	--- (src folder)	---

Note: Each FIT module contains documentation that explains its usage.

1.4 File Structure

The file structure of this application note is shown below.

Table 3 File Structure

Name			Description
r01an2609ej0100_rx64m.pdf			Installation guide (this document)
Workspace (workspace)			
	Sample program (sample)		
		rx64m_rsk_audio [Note]	Audio playback functionality demonstration project
		rx64m_rsk_camera [Note]	Camera functionality demonstration project

Note: Each project contains FIT modules among those listed in Table 2.

1.5 Projects

This application note includes projects for e² studio and CS+ to allow users to build and run the demonstration program. These projects register both a build structure (build mode in CS+) that stores the build settings and a debug structure (debug tool in CS+) that stores debug settings.

The table below lists the build structure and debug structure registered in these projects.

Table 4 Project Settings

	Structure	Description
Build structure (referred to as build mode in CS+)	HardwareDebug (Debug on hardware)	This structure is used to generate a load module with debugging information included. Main settings · Debug information present · No optimization (-optimize=0)
Debug structure (referred to as debug tool in CS+)	HardwareDebug (E1) (This is RX E1 (JTAG) in CS+)	Used for hardware debugging over an E1 emulator using a load module generated by HardwareDebug (Debug on hardware).

2. Board Settings

To use this application note, it is necessary first to change the settings on the RSK board and then connect it to the HMI expansion board.

Two demonstrations are provided, one for camera functionality and one for audio playback functionality, but different settings are used for each.

The description of the changes is based on the following documents:

- RX64M Group Renesas Starter Kit+ User's Manual Rev.1.00
  (r20ut2590eg0100_rsk+rx64m_user_manual.pdf)
- R0K50564MB001BR HMI Expansion Board User's Manual Rev.1.01
  (r20ut3056ej0101_rx64mevum.pdf)

2.1 Attaching Connectors

To connect the RSK board to the HMI expansion board, it is first necessary to attach the connectors provided with the HMI expansion board to the back of the RSK board (seven locations as shown in Figure 3).

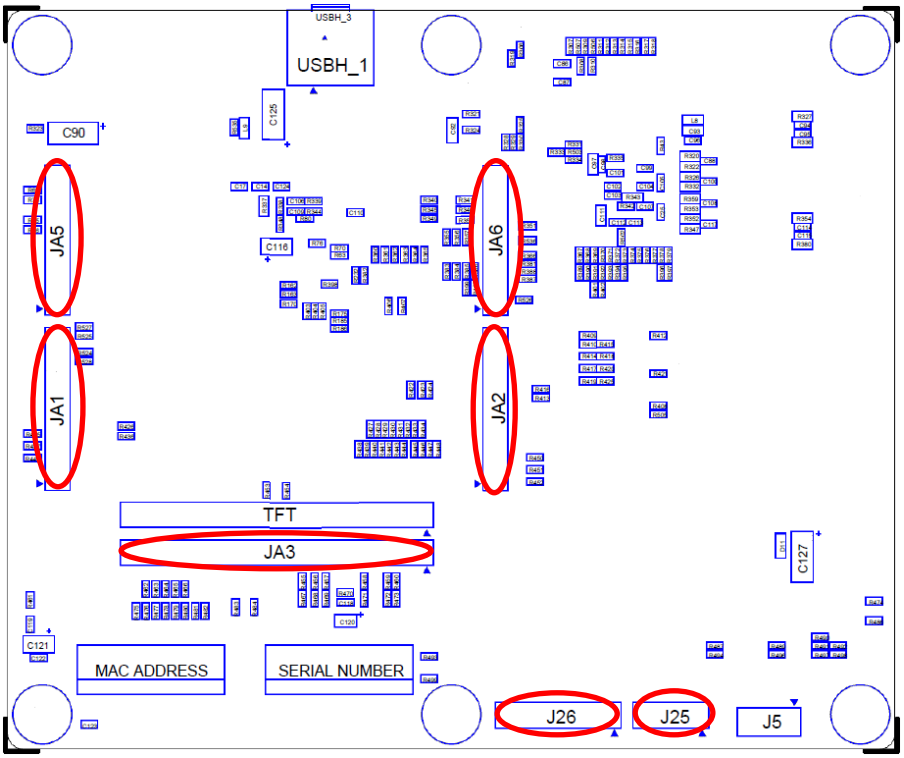


Figure 3 Connector Attachment Locations (Locations Circled in Red, Component Arrangement Diagram: Solder Side/Back Side)

2.2 Setting Changes

2.2.1 Implementing Camera Functionality

Mount and remove resistors, and change the jumper settings, as indicated in table 3.34, Settings for RSK+ for RX64M CPU Board when Camera Interface Used, in R0K50564MB001BR HMI Expansion Board User's Manual, Rev. 1.01 (see Table 5).

Table 5 "Table 3.34 Settings for RSK+ for RX64M CPU Board when Camera Interface Used"

Type	Part No.	Setting and limitation	Notes
Resistor	R317, R330, R490, R518	Remove 0Ω resistor	P17 is used for the serial EEPROM control signal, and P32 and P33 are used for the CAN control signal. P20, P21 and P22 are used for the USB control signal, and P00 and P01 are used for the PMOD1 control signal on the RSK+ for RX64M CPU Board. Also the PDC singles are multiplexed with the SSI signal, therefore, they aren't possible to concurrently use the camera interface while the said signals are used on the RSK+ for RX64M CPU Board. P12 and P13 are used for the EEPROM control signal on the RSK+ for RX64M CPU Board, so used by specifying an address.
	R267, R270, R271, R273, R274, R290	Mount 0Ω resistor	
Jumper	J15, J17	Open	

The general location of the components is shown in Figure 4 and Figure 5.

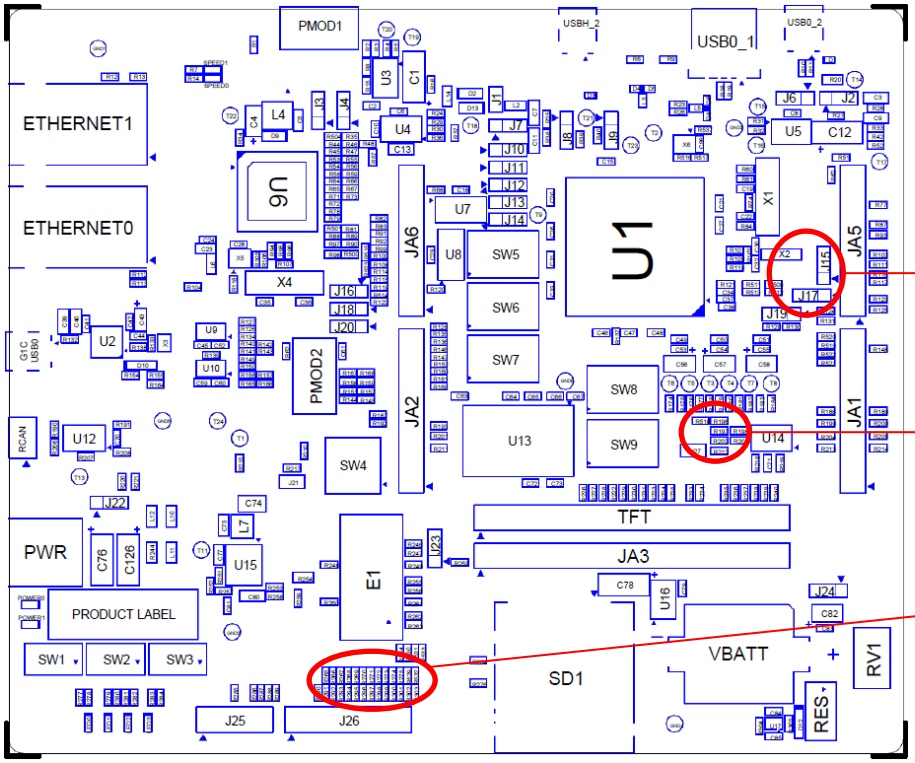


Figure 4 Locations of Setting Changes (Component Arrangement Diagram: Component Side/Front Side)

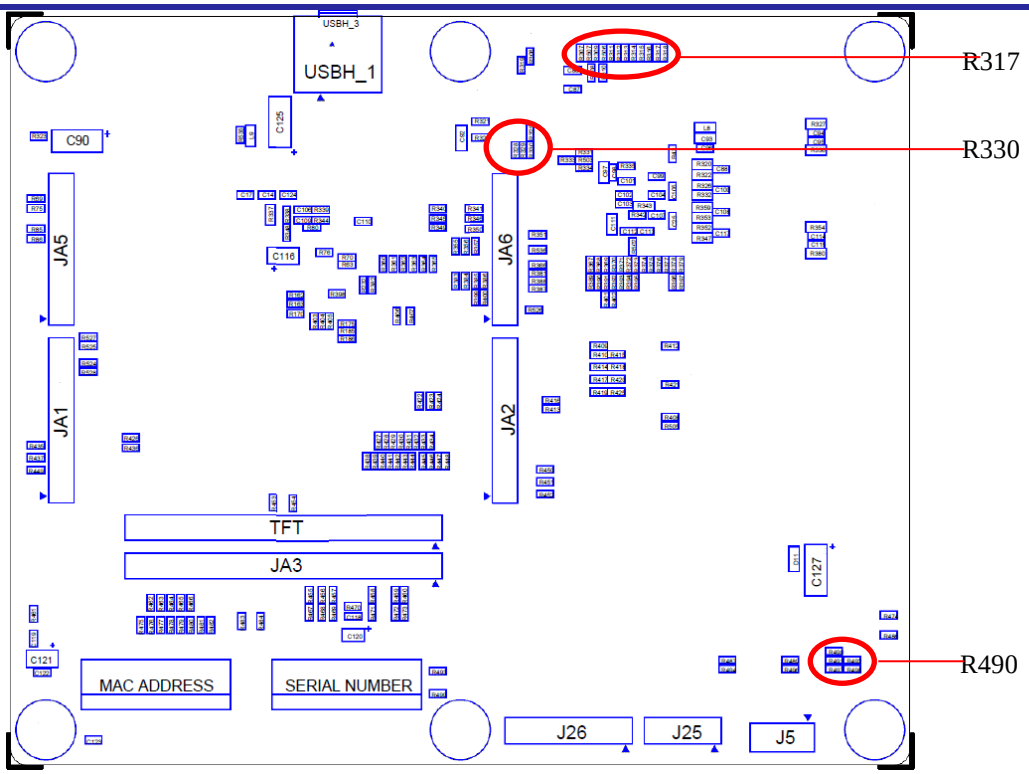


Figure 5 Locations of Setting Changes (Component Arrangement Diagram: Solder Side/Back Side)

2.2.2 Implementing Audio Playback Functionality

As when implementing camera functionality, changes to the settings are required. Table 6 reproduces the contents of table 3.30, Settings for RSK+ for RX64M CPU Board when Sound I/O Interface Used, in R0K50564MB001BR HMI Expansion Board User's Manual, Rev. 1.01.

Table 6 "Table 3.30 Settings for RSK+ for RX64M CPU Board when Sound I/O Interface Used"

Type	Part No.	Setting and limitation	Notes
Resistor	R100, R115, R268, R269, R317, R330, R481, R518	Remove 0Ω resistor	On the RSK+ for RX64M CPU Board, P17 is used for the serial EEPROM control signal, and P20, P21 and P22 are used for the USB control signal. Also, the SSI-related signal is multiplexed with the PCD-related signal. Therefore, it is not possible to concurrently use the sound I/O interface while the said signals are used on the RSK+ for RX64M CPU Board.
	R99, R114, R285, R286, R287, R288, R289, R476	Mount 0Ω resistor	

The general location of the components is shown in Figure 6 and Figure 7.

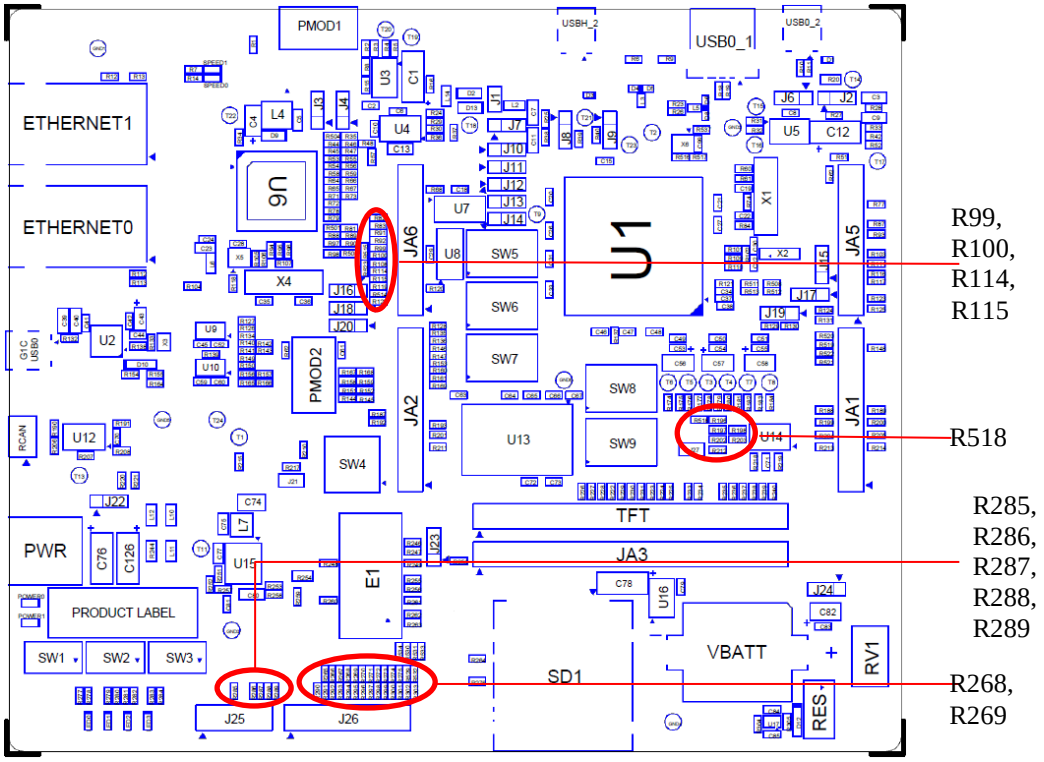


Figure 6 Locations of Setting Changes (Component Arrangement Diagram: Component Side/Front Side)

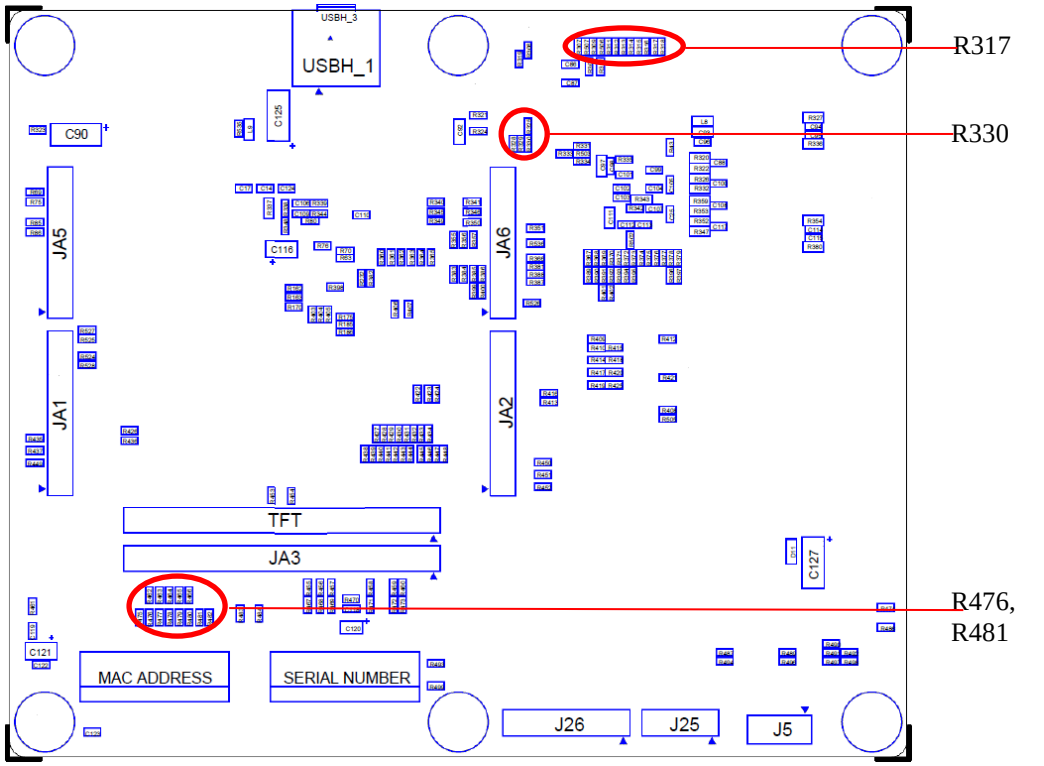


Figure 7 Locations of Setting Changes (Component Arrangement Diagram: Solder Side/Back Side)

2.3 Storage Settings

Either a USB memory device or an SD card is required to use this application note. On the RSK board, jumpers, etc., can be placed on the multifunction pins to exclude specific functions. It is necessary to check the settings beforehand to ensure that the storage will operate correctly when connected.

Make sure to perform the necessary settings on the storage to be used.

2.3.1 Using USB Memory

The RSK board has four USB connectors: USB0 Function, USB0 Host, USBA Function, and USBA Host. This application note uses the USBA Function connector (USBH_1 on the back of the board).

Confirm the following jumper settings:

J1: Open

J7: Pins 1 and 2 shorted

J8: Pins 2 and 3 shorted

J9: Pins 2 and 3 shorted

Figure 8 shows the sizes and locations of the components.

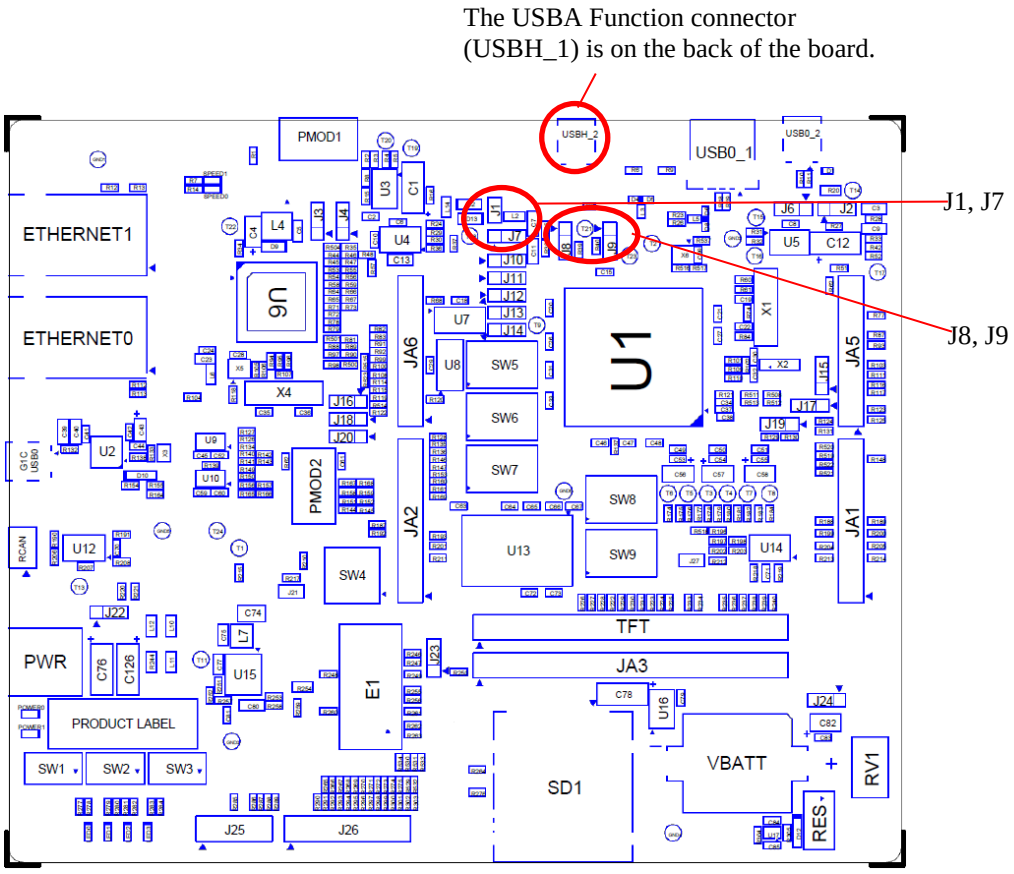


Figure 8 Jumper Setting Confirmation Locations (Component Arrangement Diagram: Component Side/Front Side)

For detailed information on the jumpers, see 6.23, USB Configuration, in RX64M Group Renesas Starter Kit+ User' Manual, Rev. 1.00.

2.3.2 Using an SD Card

The SD host interface (SDHI) connected to the SD card slot and the external SDRAM signal line are assigned to the same port, so it is necessary to change the DIP switch settings on the RSK board.

Figure 9 shows the setting values. For details, see 6.20, SDHI Configuration, in RX64M Group Renesas Starter Kit+ User's Manual, Rev. 1.00.

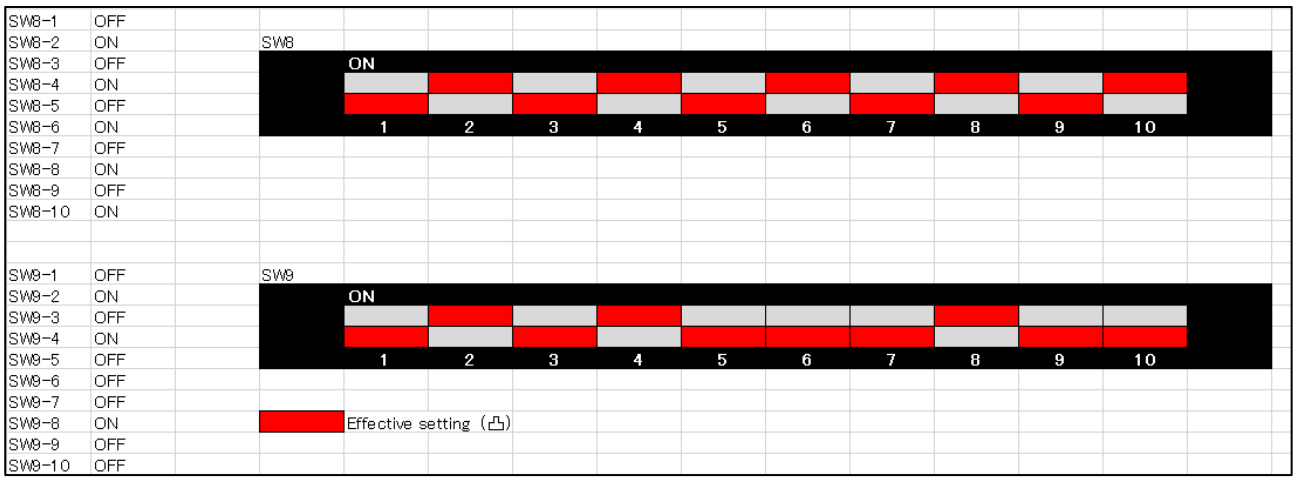


Figure 9 DIP Switch Settings When Using SD Card

2.4 Other

2.4.1 Implementing Camera Functionality

Confirm that the supplied camera module is connected to the HMI expansion board.

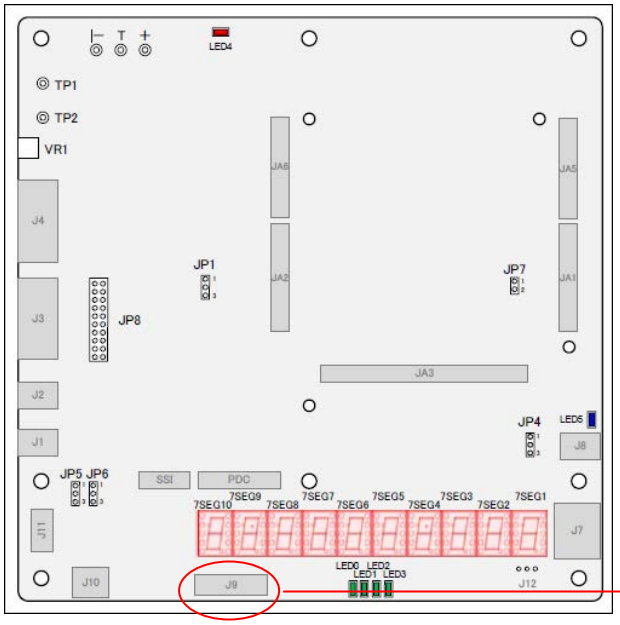


Figure 10 HMI Expansion Board Connector Arrangement Diagram (Camera Module Description)

2.4.2 Implementing Audio Playback Functionality

Insert a headphone plug into the jack on the HMI expansion board.

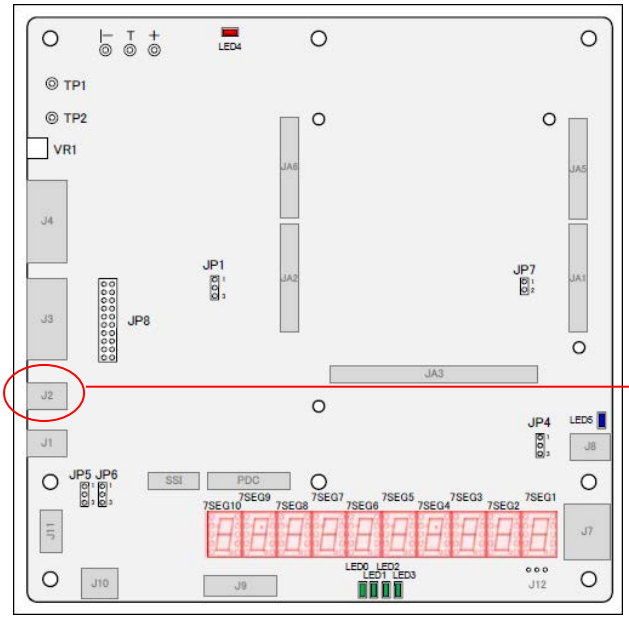


Figure 11 HMI Expansion Board Connector Arrangement Diagram (Headphone Stereo Mini Jack Description)

3. Acquiring a Development Environment

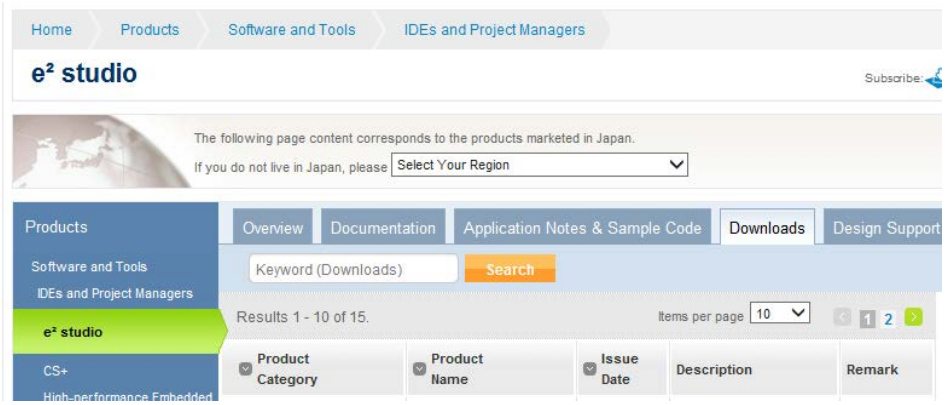
To run the program included in this application note, it is necessary to acquire a software development environment. This section describes the steps for using e² studio.

3.1 Acquire and Install e² studio

The e² studio can be downloaded from the Renesas web site.

1. Access the following URL to display the e² studio download page.

http://www.renesas.com/e2studio_download

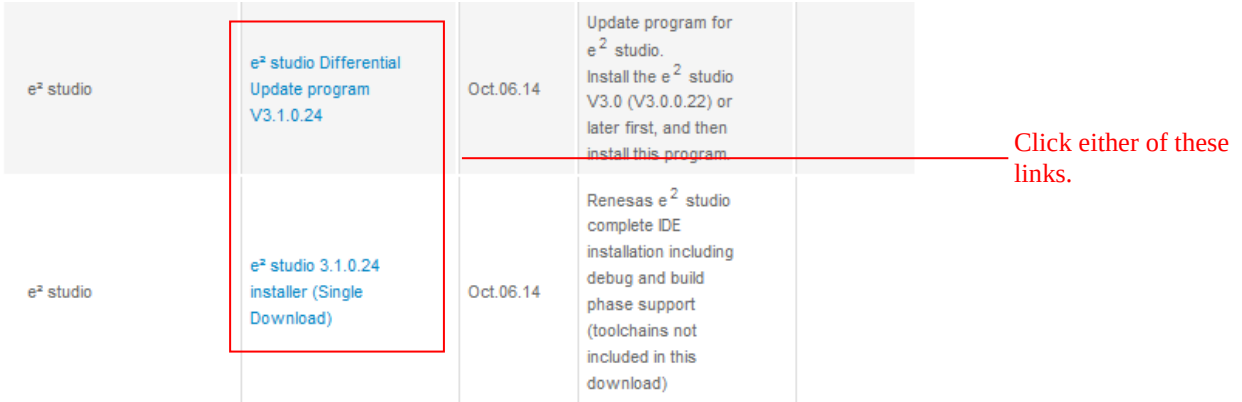


2. Download the e² studio installer.

Three options are available for downloading the e² studio integrated environment: “installer (Multipart Download),” “installer (Single Download),” and “Differential Update.”

Of the displayed items, click Install the e² studio 3.1.0.24 installer. (Although there are two versions, one that is broken up into smaller sections, and one that can be downloaded in a single operation, the contents are the same.)

Next, download the e² studio installer by following the instructions displayed.



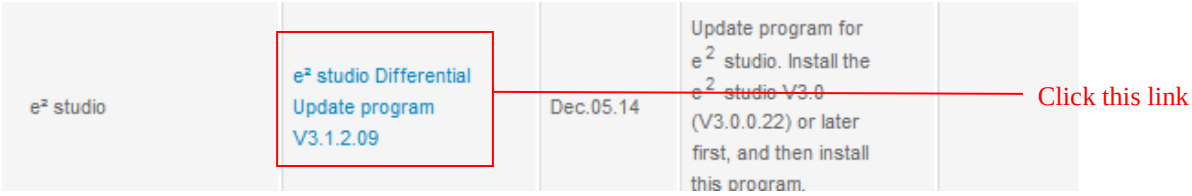
3. Run the downloaded e^2 studio installer to install e^2 studio on your personal computer.

See the e^2 studio Integrated Development Environment User's Manual: Getting Started Guide for details on the installation procedure.

http://documentation.renesas.com/doc/products/tool/doc/r20ut2771ej0200_e2_start_s.pdf

4. Download the differential update program.

If a newer version is available, download the differential update program.



Follow the instructions on the next page that appears to download the e² studio installer.

3.2 Acquire a Compiler Package

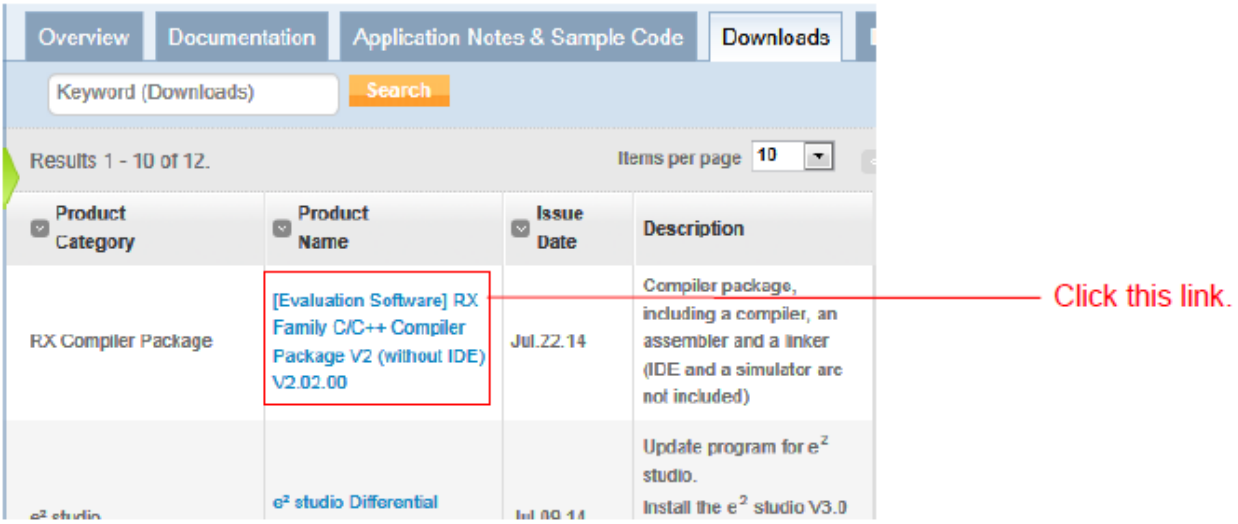
The RX Family C/C++ Compiler Package, V2.02.00 or later, is required to build this web server system. This section assumes the user does not own the commercial version and will be using the free evaluation version.

1. Access the following URL to display the e^2 studio download page.

   http://www.renesas.com/e2studio_download

2. Of the displayed items, click [Evaluation Software] RX Family C/C++ Compiler Package V2 (without IDE) V2.02.00.

   Follow the instructions on the page displayed next to download the compiler installer.



If a newer version is available, download it.

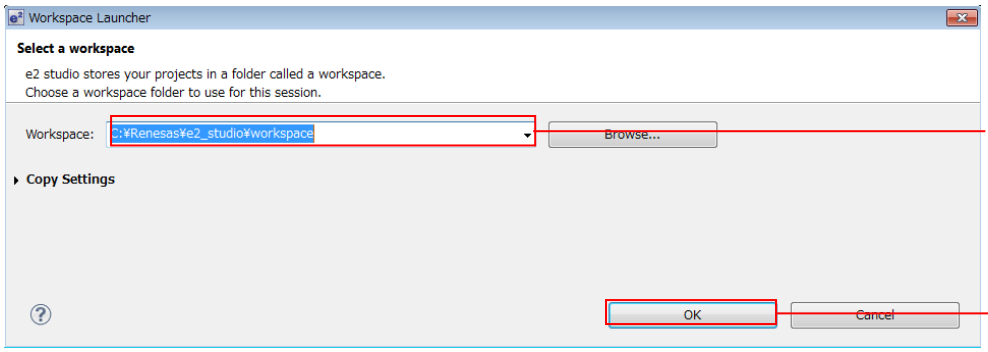
3. Run the downloaded compiler installer to install the compiler on your personal computer.

4. Creating the Demonstration Environment

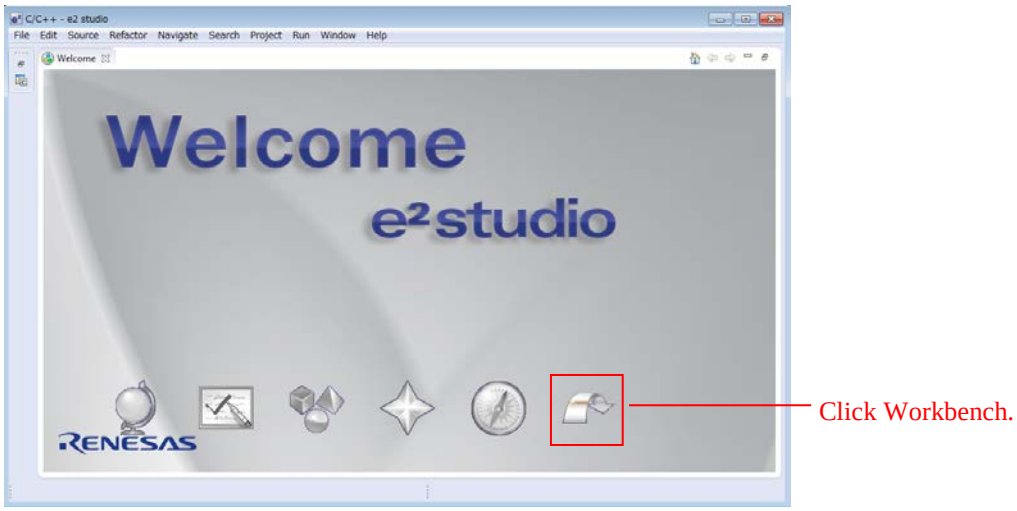
4.1 Create a Workspace

1. Start e^2 studio.

2. Enter an arbitrary workspace folder in the displayed dialog box and click OK.



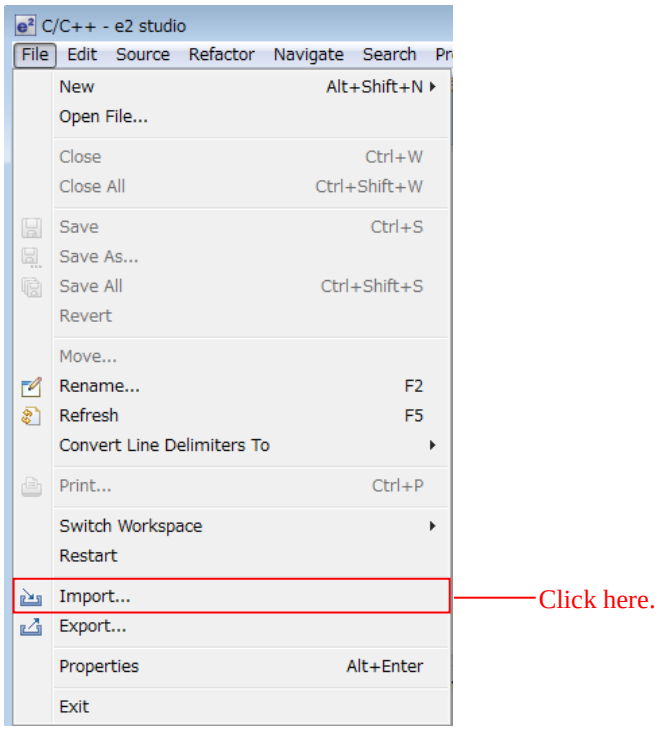
3. When the following window is displayed, click Workbench.



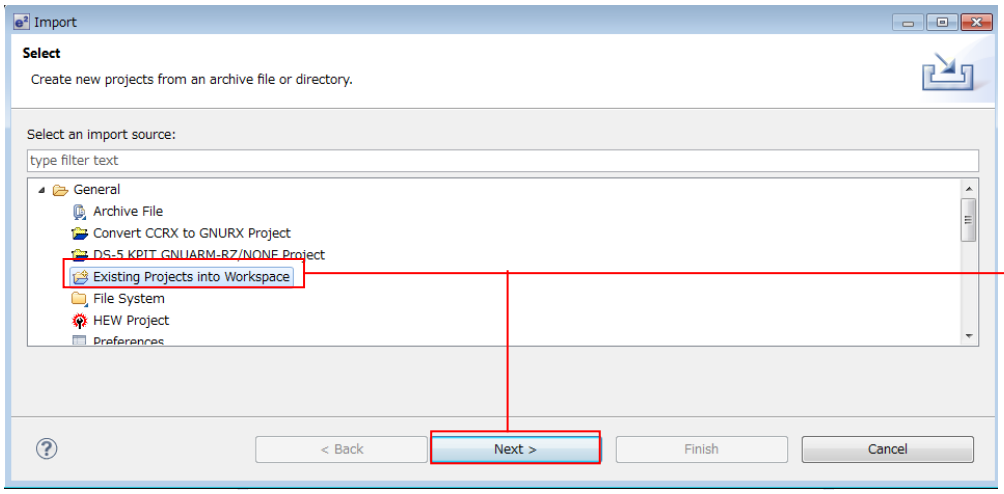
4.2 Import a Project

Import the project provided with this application note into the newly created workspace.

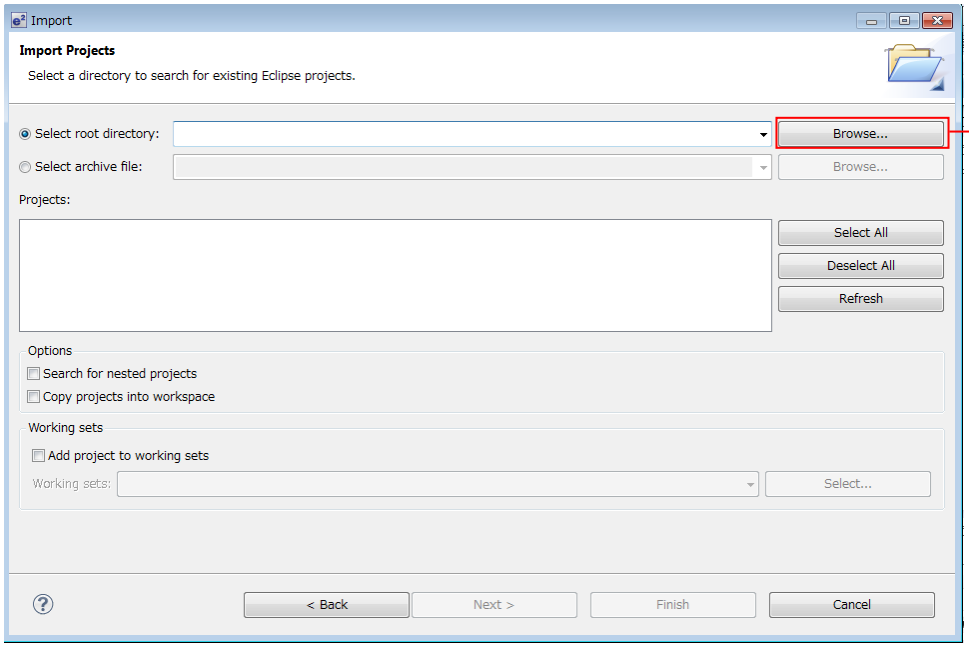
1. Select Import from the e^2 studio File menu.



2. Select Existing Projects into Workspace from General and click Next.



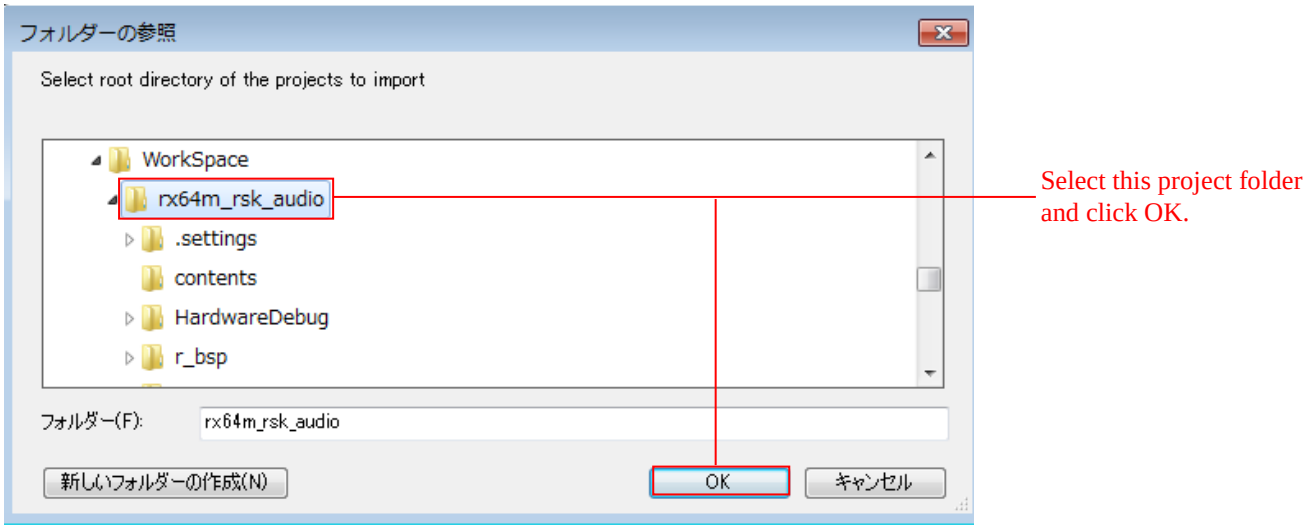
3. Click Browse.



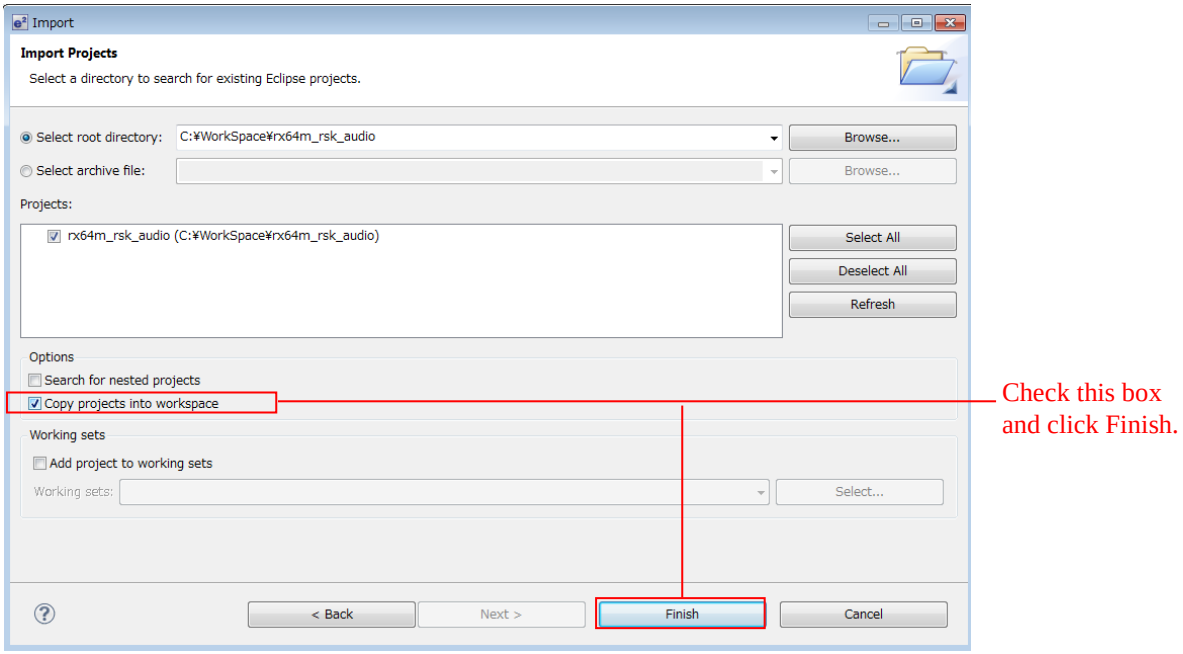
4. Select one of the project folders supplied with this application note, and click **OK**.

Camera functionality project: rx64m_rsk_camera

Audio playback functionality project: rx64m_rsk_audio



5. Check Copy projects into workspace and click Finish.

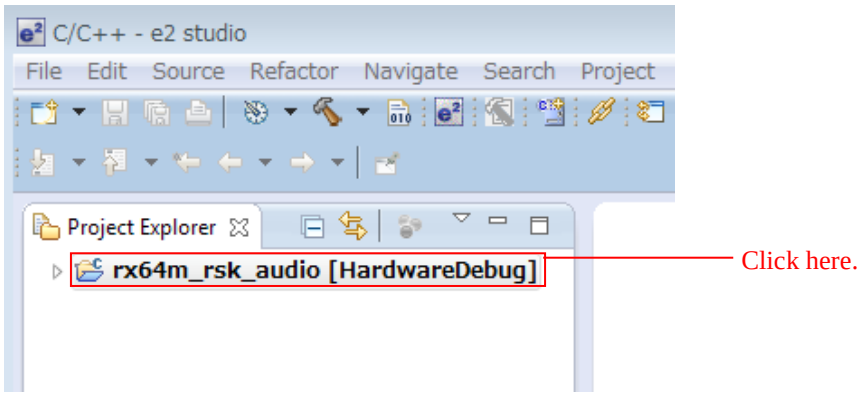


Note: It is not necessary to copy the projects to the workspace. If the box is left unchecked, the build target is created within the root directory.

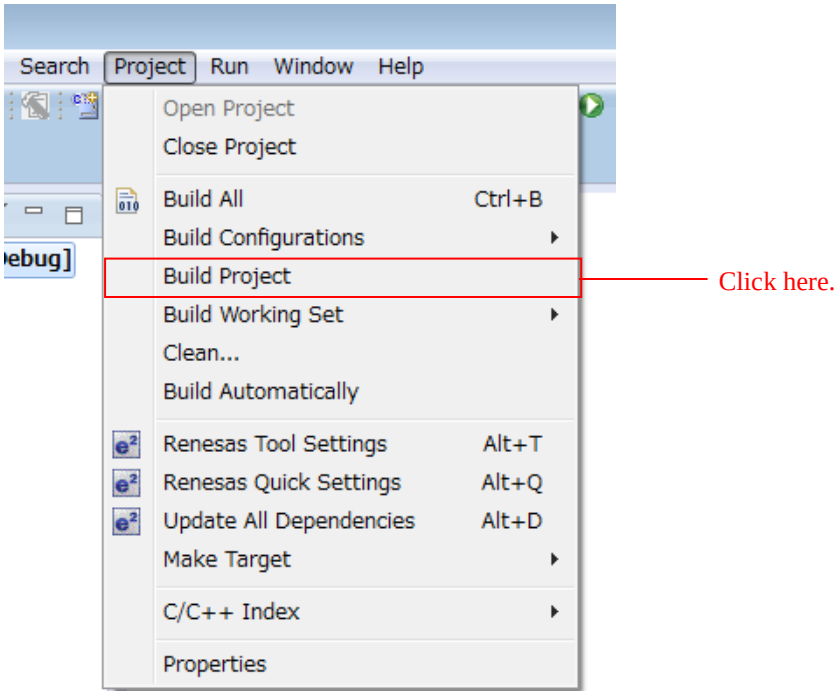
4.3 Build the Project

Use the following procedure to build the project and generate a load module.

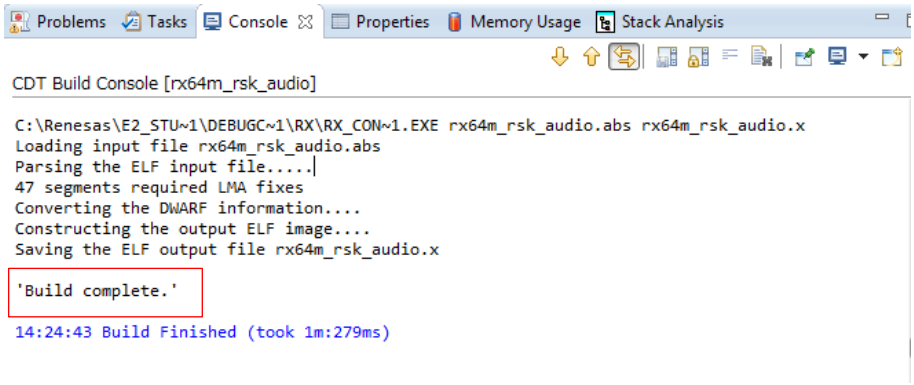
1. Click the project to build from the Project Explorer.



2. Click Build project from the Project menu.



3. When “Build complete” is displayed on the Console panel, the build will have completed.



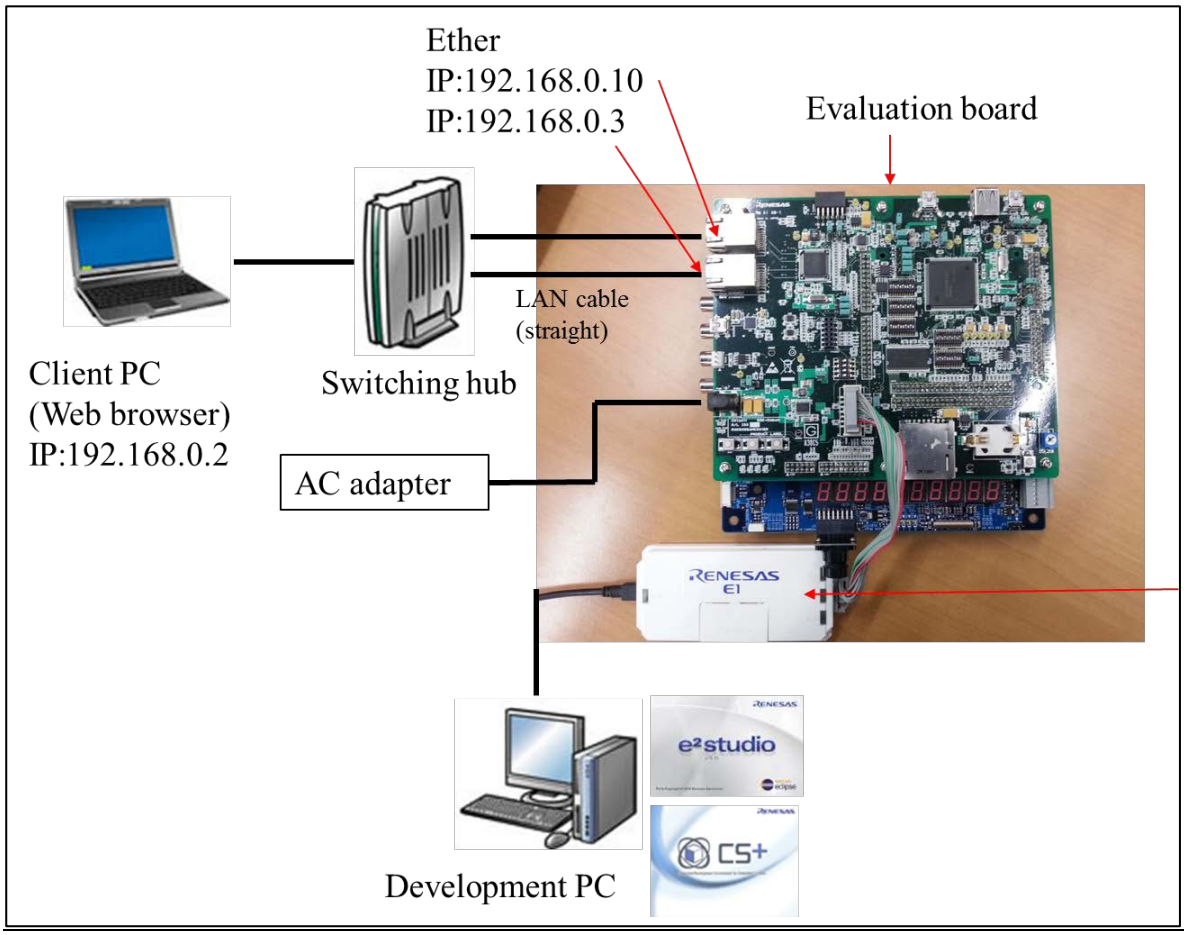
4.4 Hardware Configuration

The evaluation board must be configured before starting debugging.

A table of the required equipment and its configuration are shown below.

Table 7 Hardware Configuration

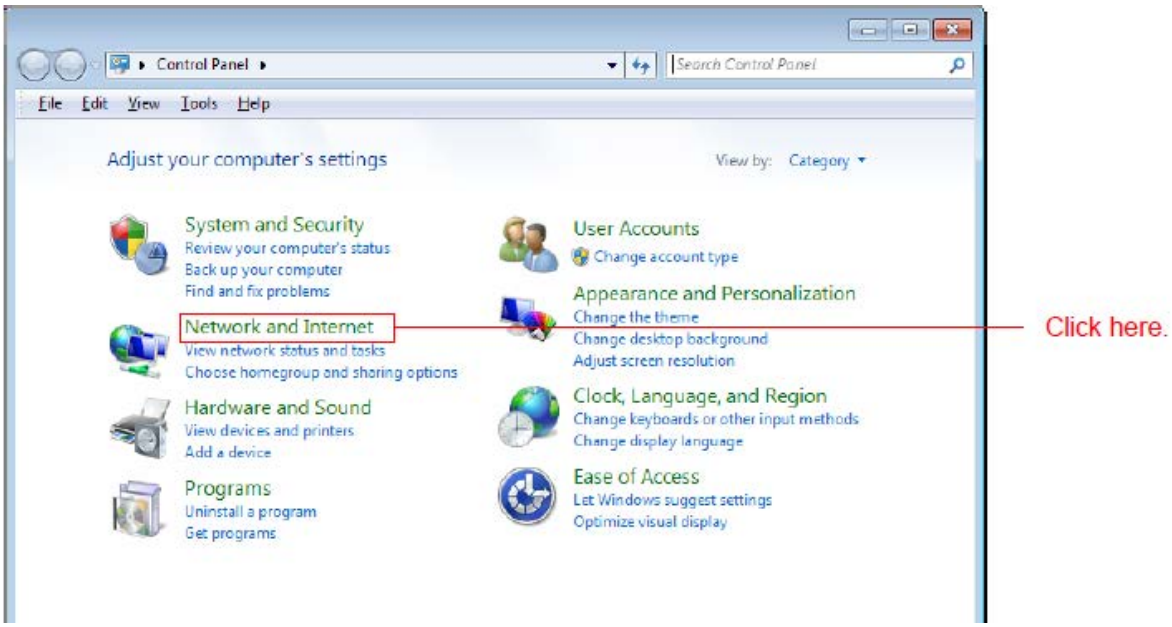
No.	Device	Supplementary Information
1	Development PC	Personal computer used for development
2	Evaluation board	RSK board connected to HMI expansion board
3	Client PC (web browser)	The development PC can be used for this function.
4	USB memory	Memory that is formatted as either FAT or FAT32.
5	To connect the client PC to the evaluation board (web server), one of the following network setups is necessary: 1. Using a switching hub a. Switching hub b. Two LAN cables (straight) (three when connecting two Ethernet channels) 2. Using crossover cable a. One LAN cable (crossover)	



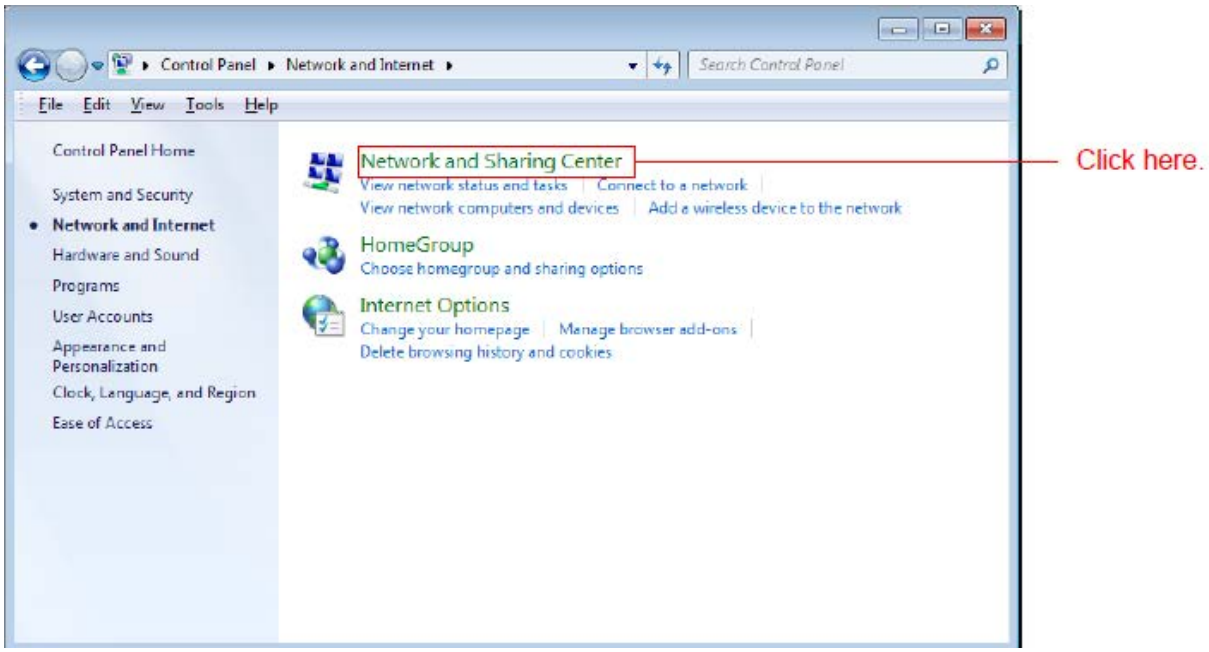
4.5 Set Up Client PC

Set up the network on the client PC. This section shows the procedure when using Windows 7 as an example.

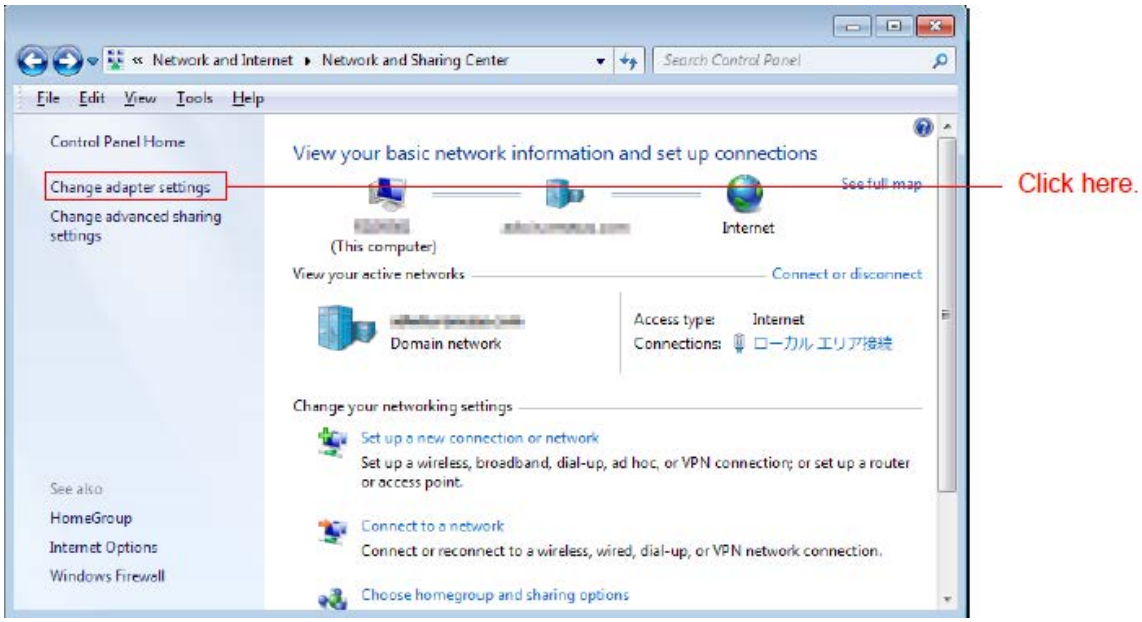
1. Open the Control Panel on the client PC and click Network and Internet.



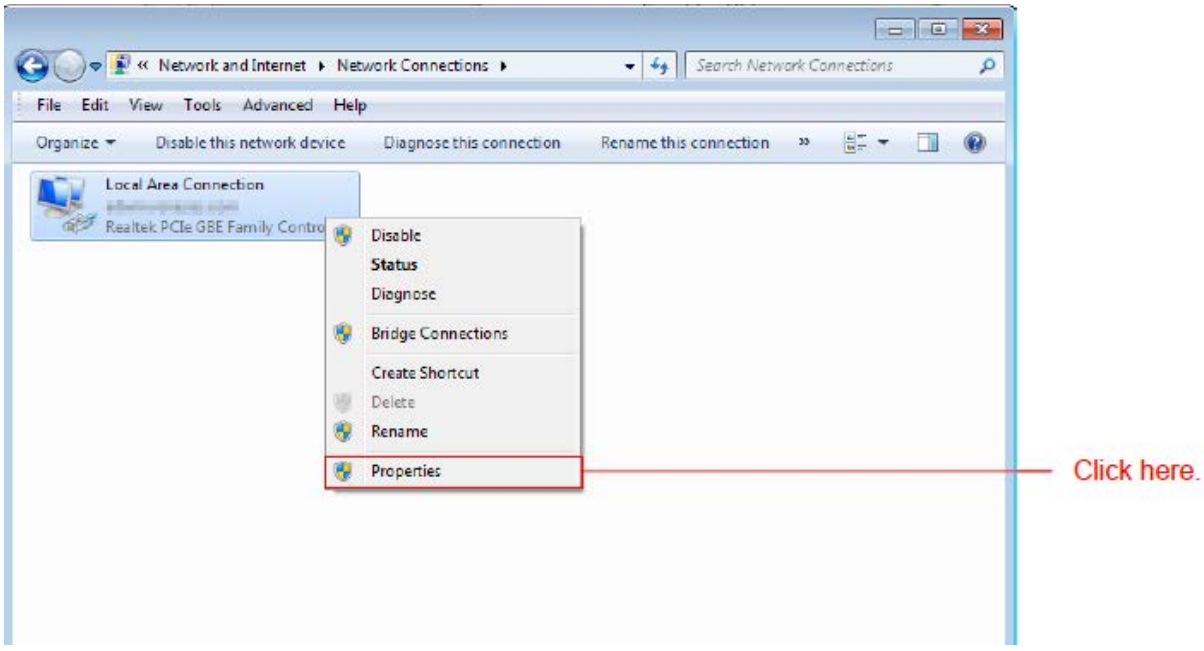
2. Click Network and Sharing Center.



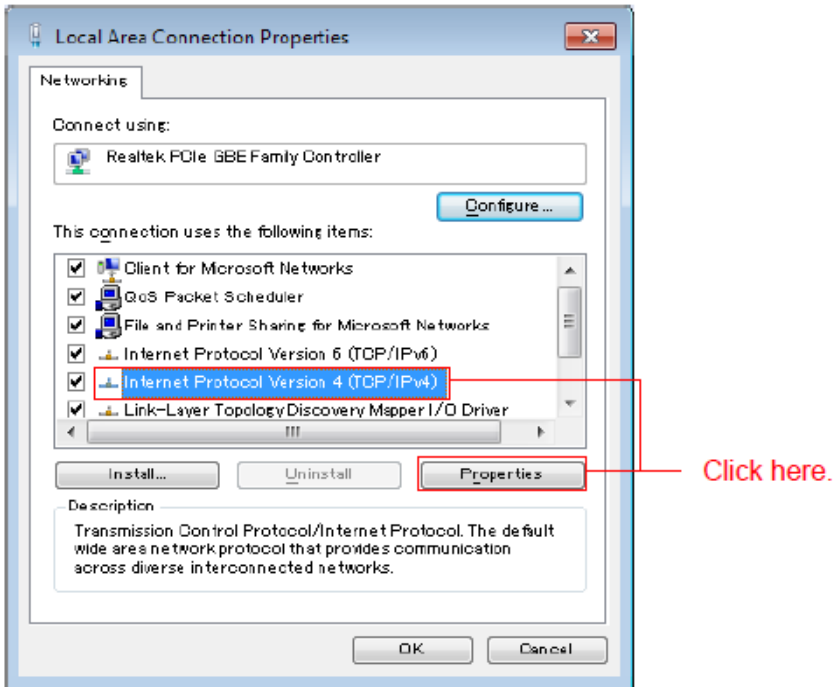
3. Click Change adapter settings.



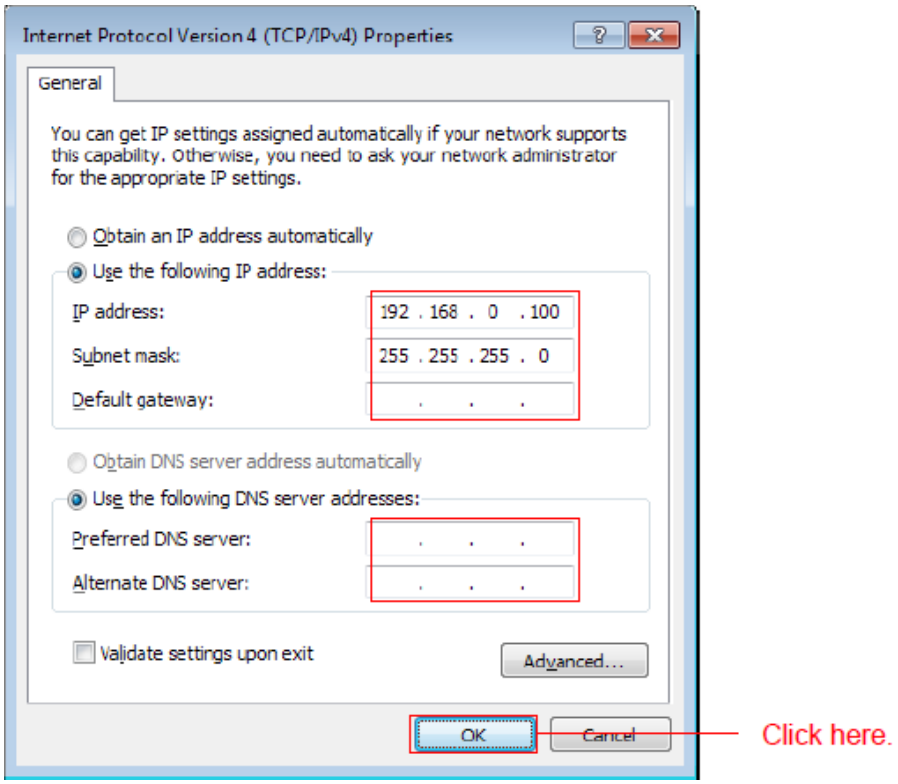
4. Right click Local Area Connection and select Properties.



5. Select Internet Protocol Version 4 (TCP/IPv4) and click Properties.



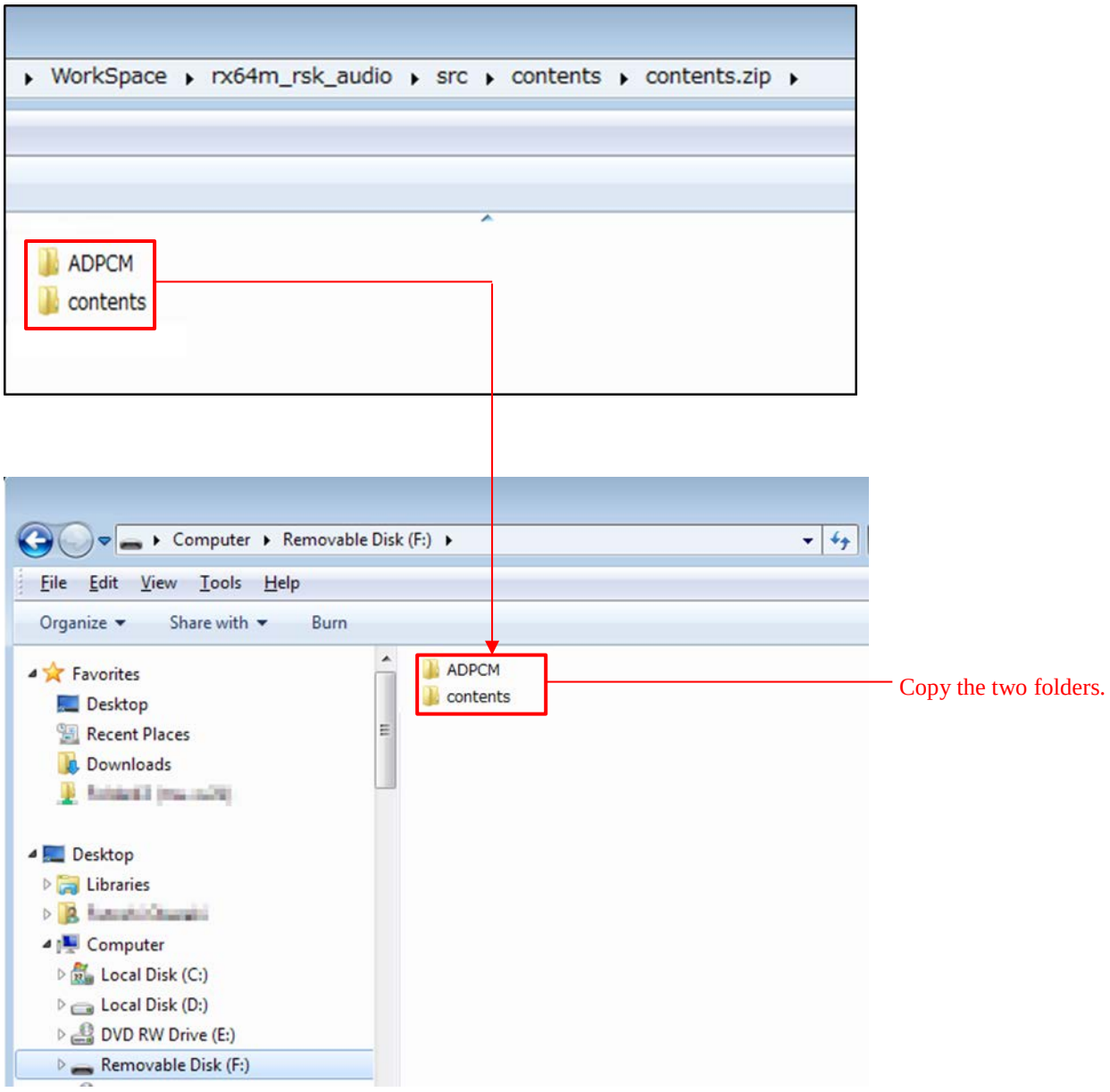
6. The IP address and other settings will be displayed. Set these as shown below and click OK.



4.6 Preparing the Storage

The storage will be used for the content to be displayed in the web browser. Obtain storage that matches the settings made in 2.3.

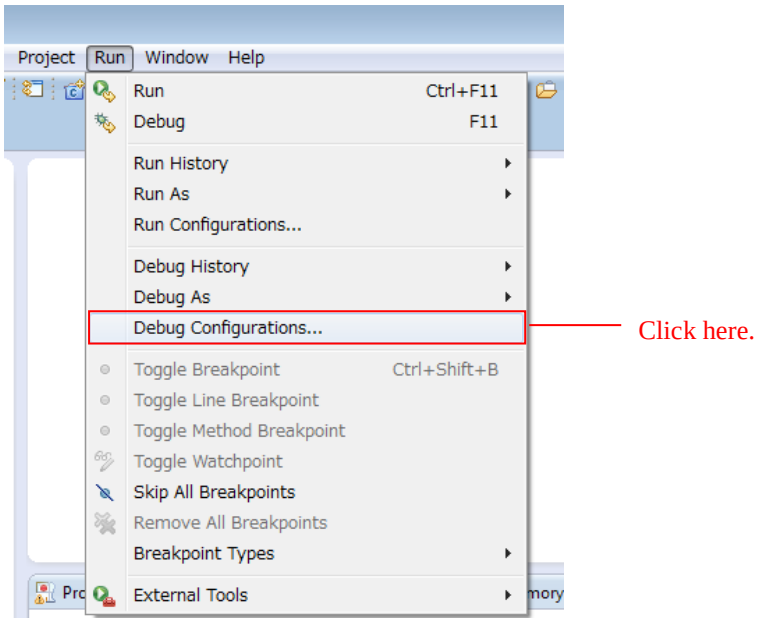
1. Open the **contents** folder within the **src** folder of the project. Open **contents.zip**, and copy **ADPCM** and **ROOT** to the storage.



5. Running the Demonstration Program

Follow the steps below to run the project. The description in this section applies to both demonstrations.

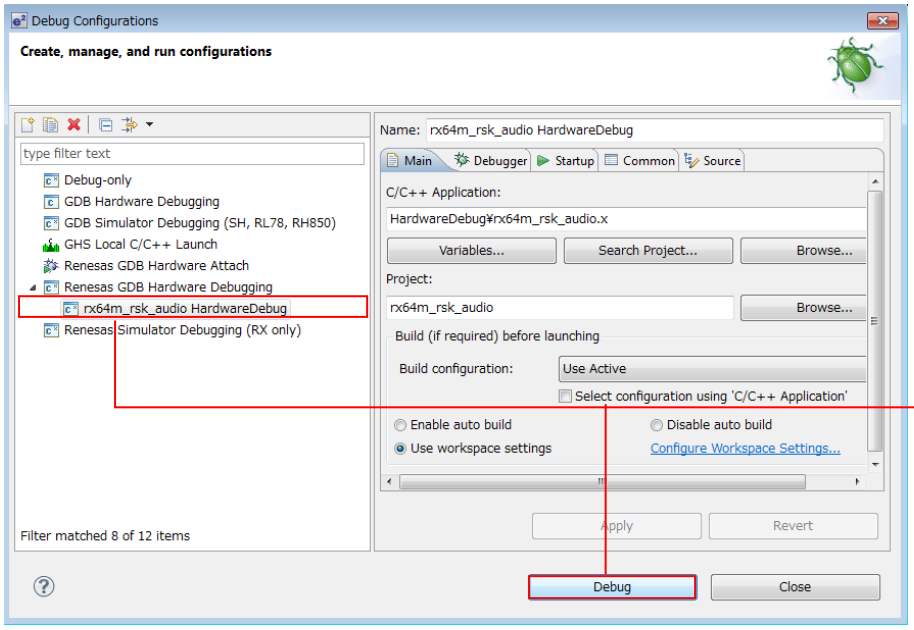
1. Connect the development PC to the E1 emulator with a USB cable.
2. Connect an adapter to the evaluation board, and power it on.
3. From the **Run** menu of e² studio, click **Debug Configurations…**.



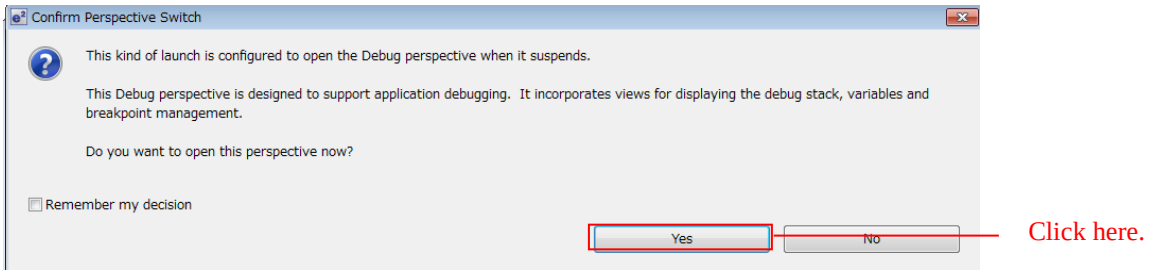
4. Under **Renesas GDB Hardware Debugging**, click one of the following projects and then click the **Debug** button. Select the project imported in 4.2.

   Camera functionality project: rx64m_rsk_camera HardwareDebug

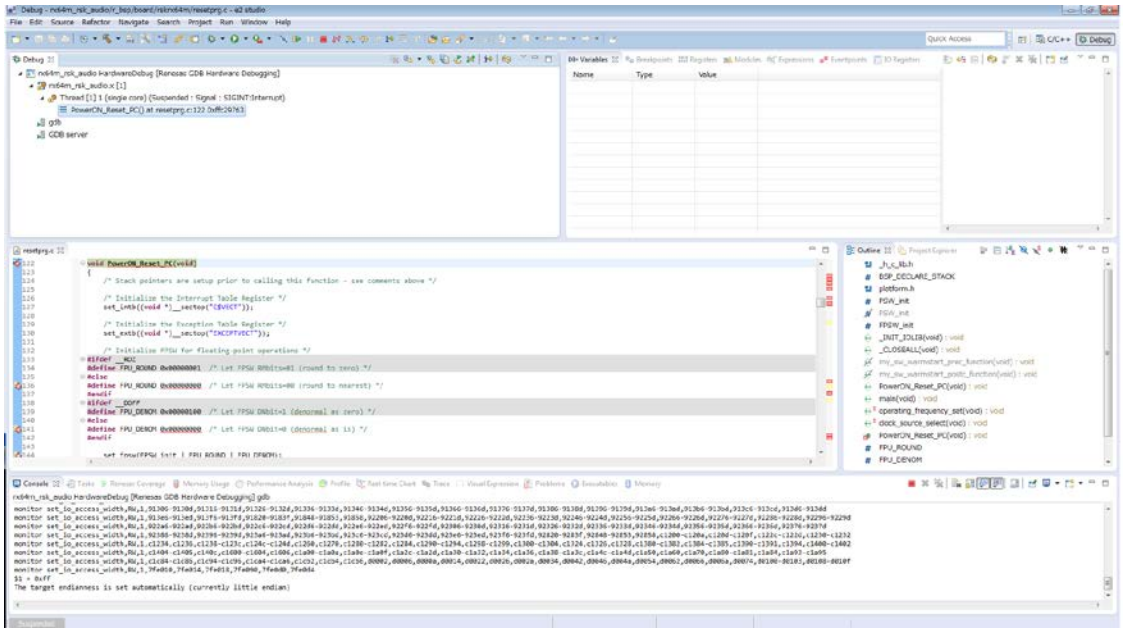
   Audio playback functionality project: rx64m_rsk_audio HardwareDebug



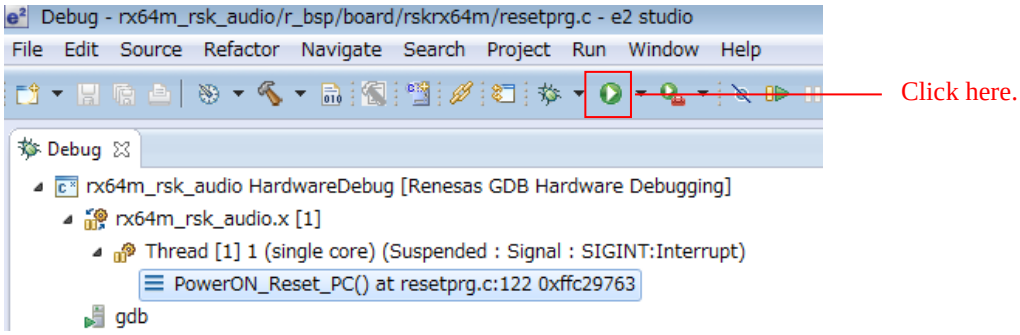
When the following message is displayed, click Yes.



When the load module download completes, a Debug perspective opens.



5. Click Resume on the toolbar. The program will be executed and a break will occur at the start of the main function.



After the break at the start of the main function, click Resume on the tool bar again.

Note: The break at the start of the main function can be removed in the debug configuration of e^2 studio.

6. Start a web browser on the client PC and enter the following address according to which port the LAN cable is connected.

Web Server Address (Ethernet0 Port Number)：http://192.168.0.3

Web Server Address (Ethernet1 Port Number)：http://192.168.0.10

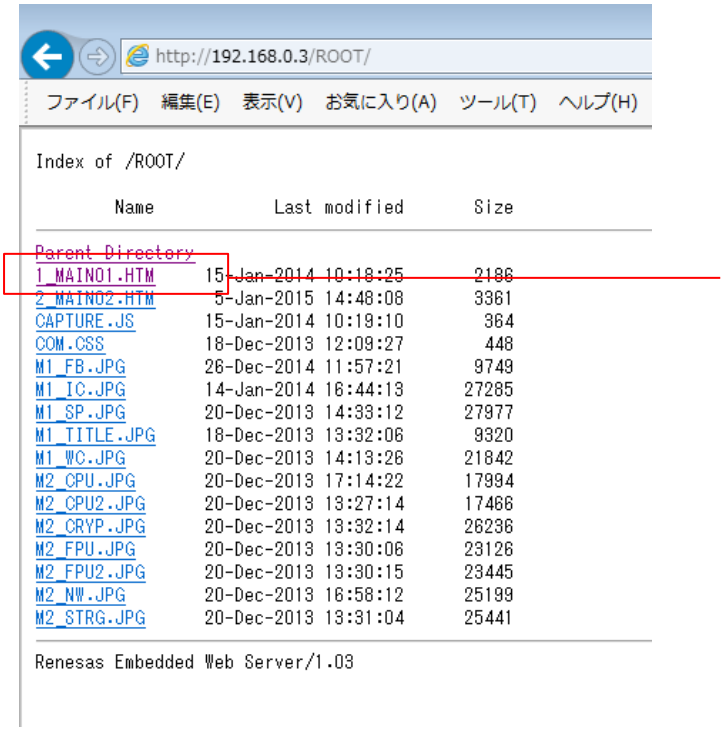
Note: Note that the web address can be changed in the configuration.

(rx64m_rsk_audio/r_t4_rx/src/config_tcpudp.c または、rx64m_rsk_camera/r_t4_rx/src/config_tcpudp.c)

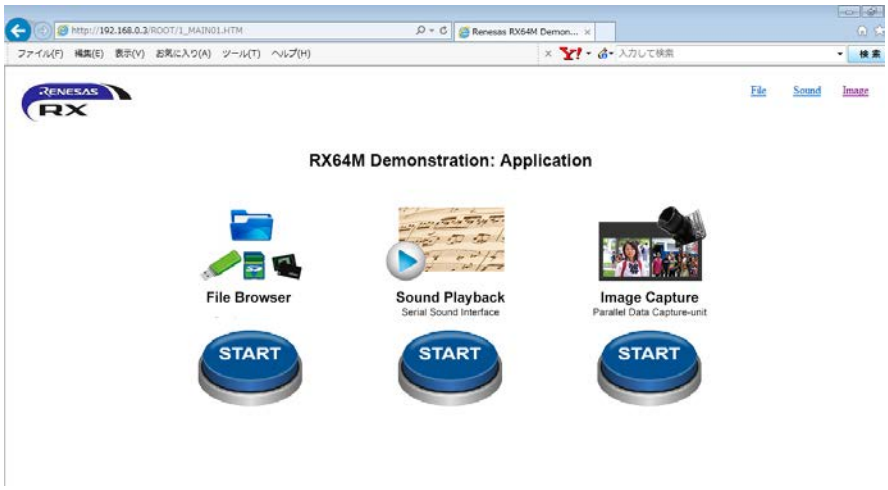
7. Display a list of folders in the web browser.

7-1. Select ROOT.

7-2. Select 1_MAIN01.HTM.



8. The top page of the demonstration is displayed.



Click on one of the START buttons to go to the associated page. The demonstration that can be run depends on the project imported in 4.2.

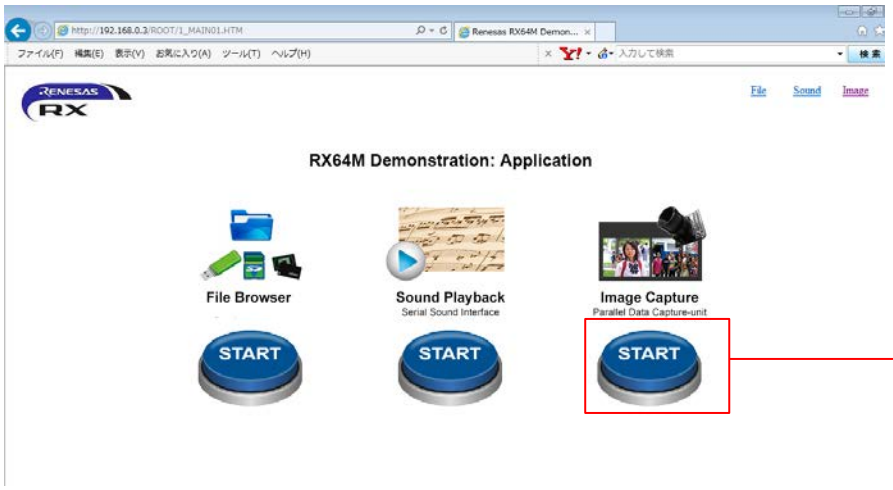
6. Demonstration Operation Specifications

From the demonstration top page, select the demonstration to run.

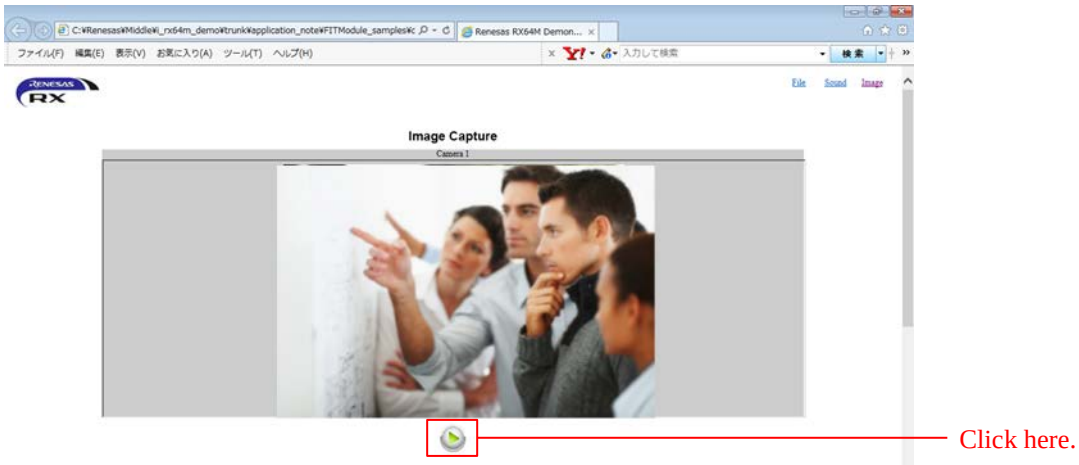
6.1 Camera Functionality Demonstration

The camera functionality project rx64m_rsk_camera can be used to demonstrate camera functions.

1. Go to the Image Capture page.



2. Image capture starts.



3. The captured image is updated at one-second intervals.

Camera Application Solution

Figure 12 shows a camera application solution using the GR-KAEDE board[1] that can be used for demonstrations of human detection, motion detection, and distortion correction.

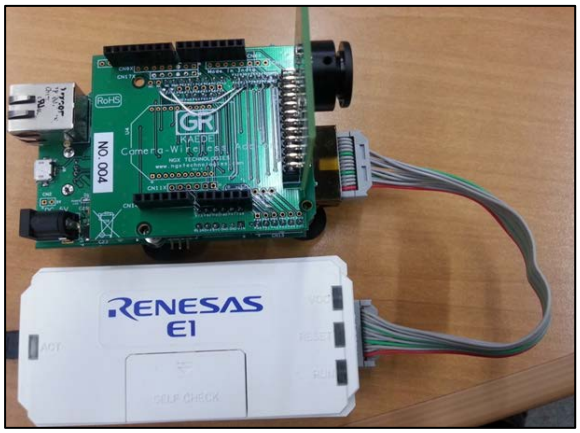


Figure 12 GR-KAEDE Board (Connected to E1 Emulator)

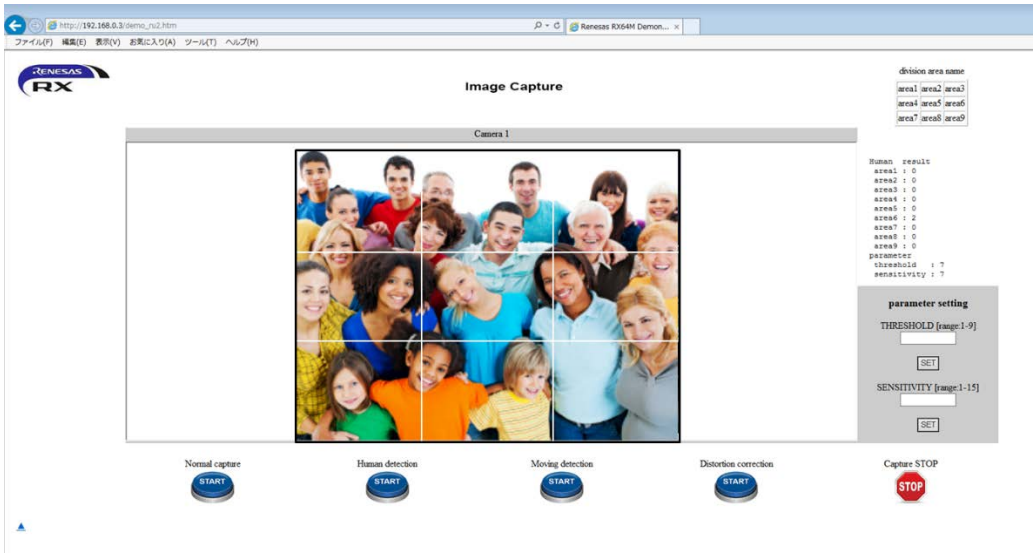


Figure 13 Human Detection Demonstration Page

In human detection mode the capture data is divided into nine equal areas, as shown in Figure 13, and the number of persons in each area is determined.

The camera application solution can also be run using an evaluation board, instead of the GR-KAEDE board.[2, 3]

Notes

1. GR-KAEDE is a GR reference board (compact electronic work board) for the RX64M available through the Gadget Renesas project. It is scheduled to go on sale in June 2015.

For information on Gadget Renesas visit the following URL:
http://japan.renesas.com/gr

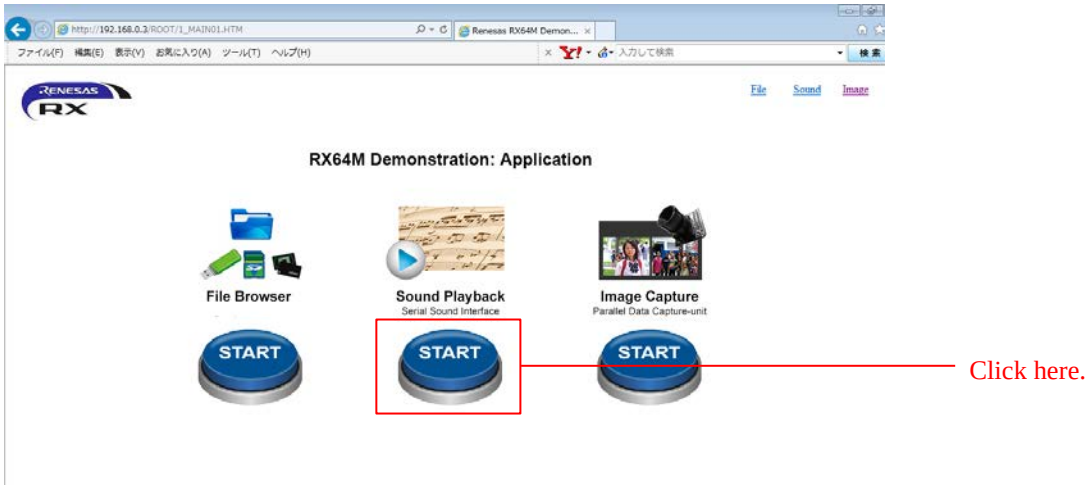
2. This application note does not include operations such as human detection. To accomplish such operations, it is necessary to have a RSK board with board code R0K50564MC000BE, to make changes to the board settings, and to make program modifications based on the camera application solution.

3. Contact a Renesas sales representative for details regarding human detection, motion detection, and distortion correction.

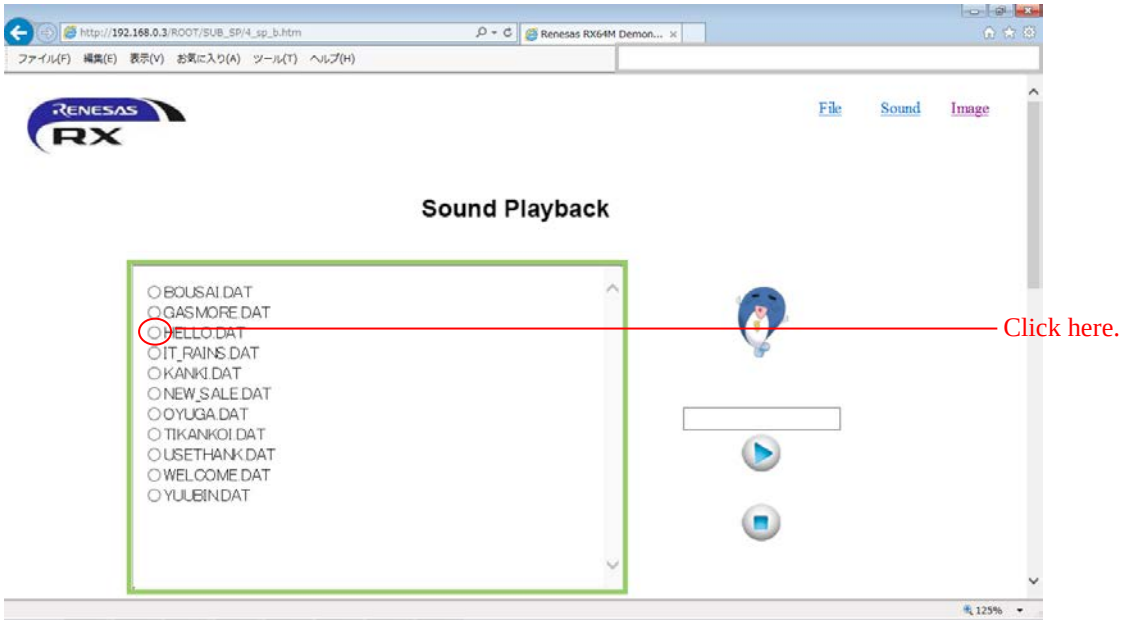
6.2 Audio Playback Functionality Demonstration

The audio playback functionality project rx64m_rsk_audio can be used to demonstrate audio functions.

1. Go to the Sound Playback page.

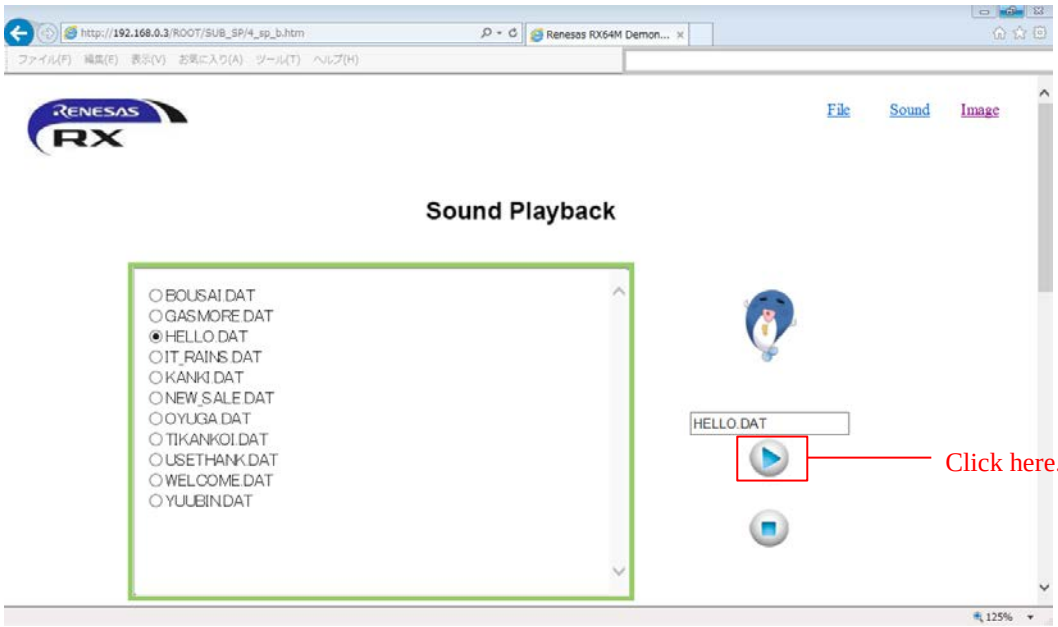


2. Select the data file to be played.
In this example, HELLO.DAT is selected.



The audio data file is read from the storage inserted in the evaluation board.

3. Click the play button.

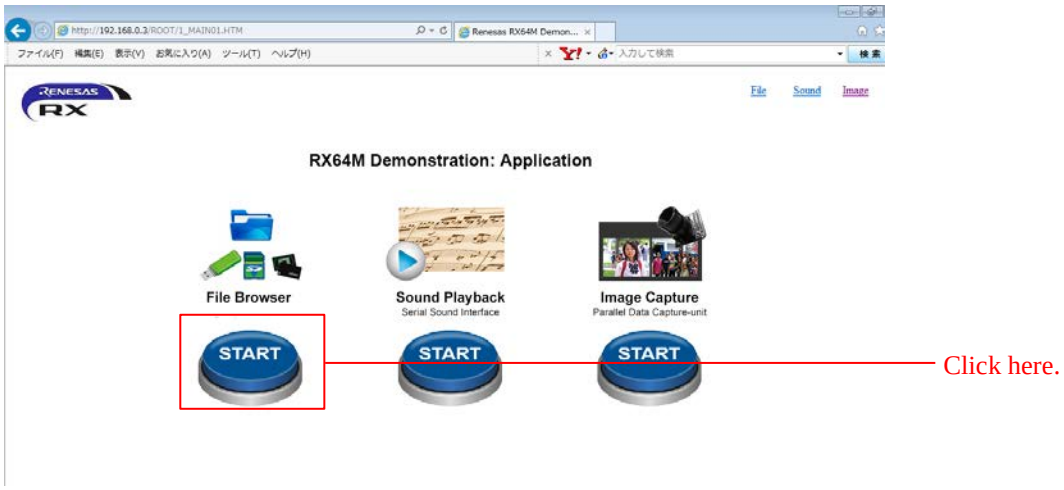


4. Audio playback starts.
The audio is output via the headphone jack of the evaluation board (HMI expansion board side).

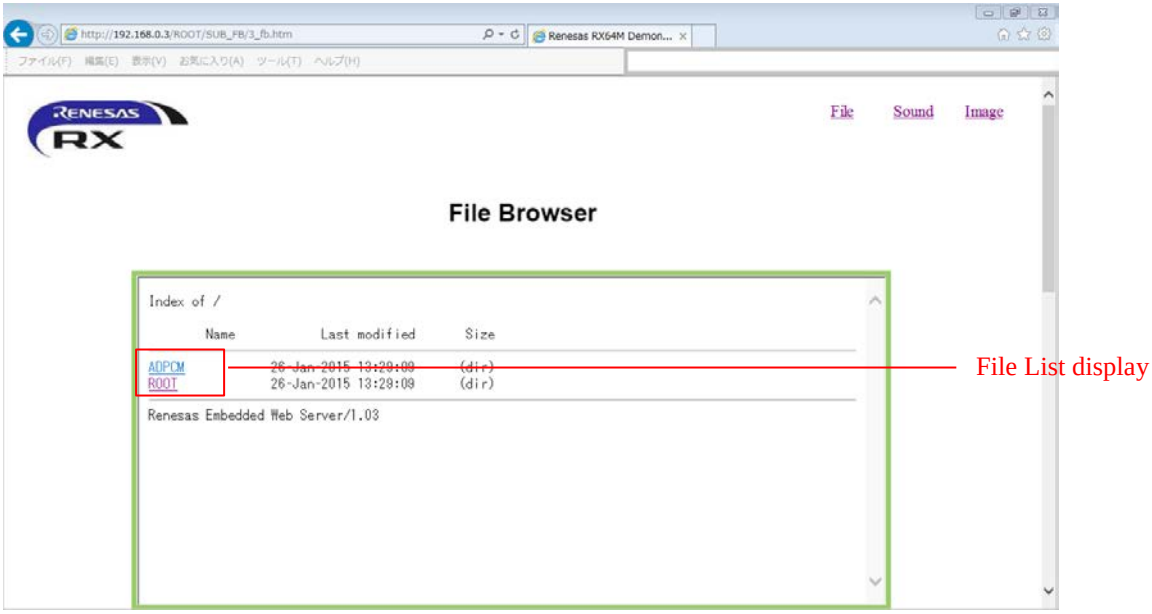
6.3 File Browser

Data is read from the storage. This item can be run from both types of demonstration.

1. Go to the File Browser page.



2. Perform the desired browser operation.



Click one of the folder names listed under **Name** to display the contents of that folder. Click on a file name to open the file.

7. Demonstration Program

7.1 RX Driver Package (RDP)

This application note includes an RDP application created using RDP. RDP is a collection of FIT modules, including middleware and a variety of drivers for RX microcontrollers.

Descriptions of the FIT modules used are omitted from this application note.

Each demonstration project contains FIT modules. The folder name of each module matches the FIT module name listed in 1.3. Each FIT module contains an associated application note (in the **doc** folder).

7.2 Main Program

7.2.1 File List

The files of the main program are listed below.

Table 8 Main Program File List

Folder Name	File Name	Description
src	main.c	Main source file
	ak4642.c	Stereo codec control source file
	ak4642.h	Stereo codec control header file
	led.c	LED initialization source file
	led.h	LED initialization header file
	ov_image_sensor.h	Camera module control parameters
	ov7670.c	Camera module control source file
	ov7670config.h	Camera module control header file j
	r_dmac_apl.c	DMA driver control source file
	r_dmac_apl.h	DMA driver control header file
	r_func_option.h	Function selection compile option header file
	r_http_server_cgi_sample.c	CGI sample source file (HTTP Server)
	r_jpeg_enc_apl.c	JPEG encoder control source file
	r_jpeg_enc_apl.h	JPEG encoder control header file
	r_pdc_apl.c	PDC driver control source file
	r_pdc_apl.h	PDC driver control header file
	r_sci_iic_apl.c	Simple IIC driver control source file
	r_sci_iic_apl.h	Simple IIC driver control header file
	r_sdhi_apl.c	SDHI driver control source file
	r_sdhi_apl.h	SDHI driver control header file
	r_ssi_apl.c	SSI driver control source file
	r_ssi_apl.h	SSI driver control header file
	r_sys_time.c	Web server system timer source file
	r_sys_time.h	Web server system timer header file
	r_usb_apl.c	USB driver control source file
	r_usb_apl.h	USB driver control header file
	r_usb_hmsc_apl.c	USB HMSC driver control source file
	r_usb_hmsc_apl.h	USB HMSC driver control header file
	sound_play.c	Audio playback control source file
	sound_play.h	Audio playback control header file

8. When CS+ is Used

This application note can be evaluated using CS+. Note that RX Family C/C++ Compiler Package V2.02.00 or later is required to build this application note under CS+. This section assumes the user does not own the commercial version and will be using the free evaluation version.

8.1 Acquire and Install CS+

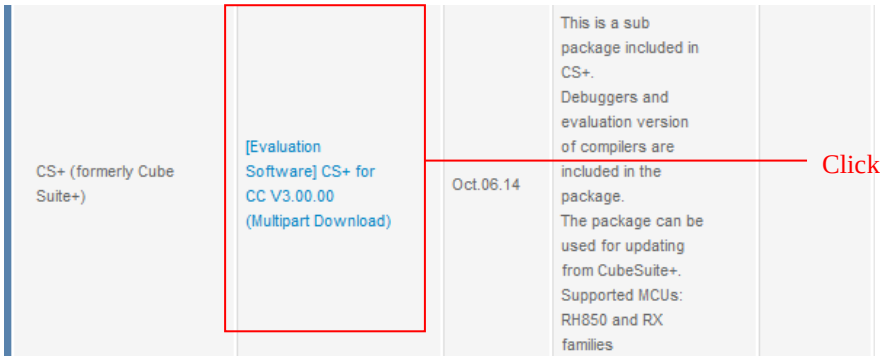
Download CS+ from the Renesas web site.

1. Access the following URL to display the CS+ download page.

http://www.renesas.com/cs+_download

2. Of the displayed items, click [Evaluation Software] CS+ V3.00.00. (Although there are two versions, one that is broken up into smaller sections, and one that can be downloaded in a single operation, the contents are the same.)

Next, download the CS+ installer by following the instructions displayed.



3. Run the downloaded CS+ installer to CS+ on your personal computer.

See the CS+ V2.02.00 Integrated Development Environment User's Manual: Start for details on the installation procedure.

http://documentation.renesas.com/doc/products/tool/doc/r20ut2865ej0100_qsst.pdf

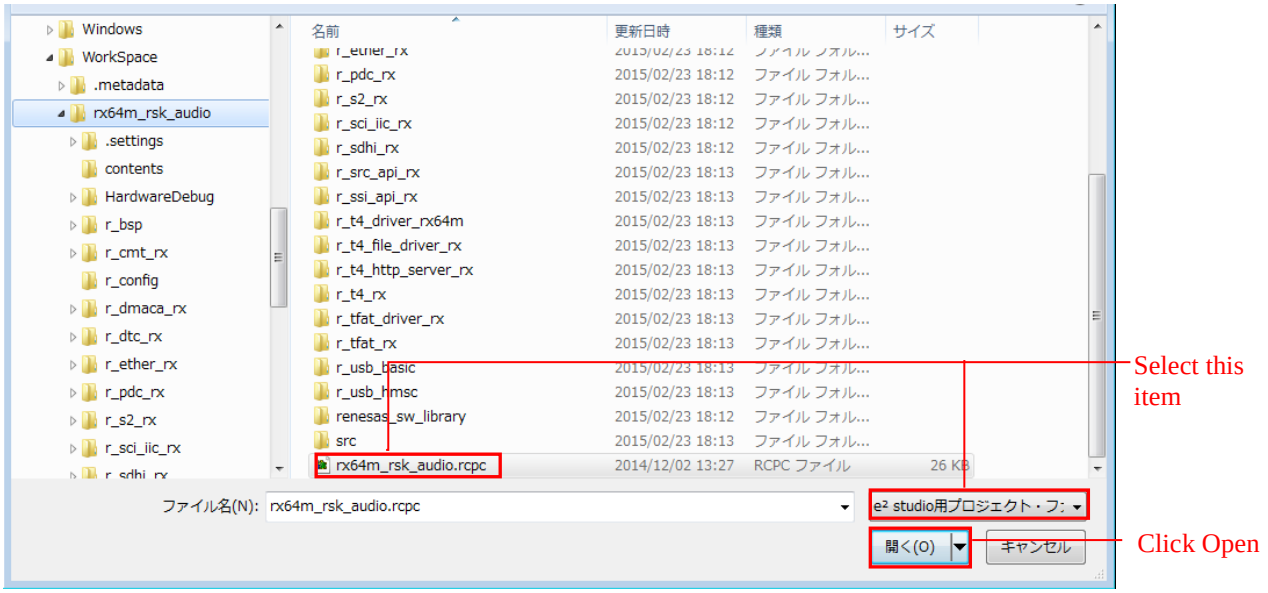
8.2 Install the Project

Install the Renesas common project files provided with this application note in CS+.

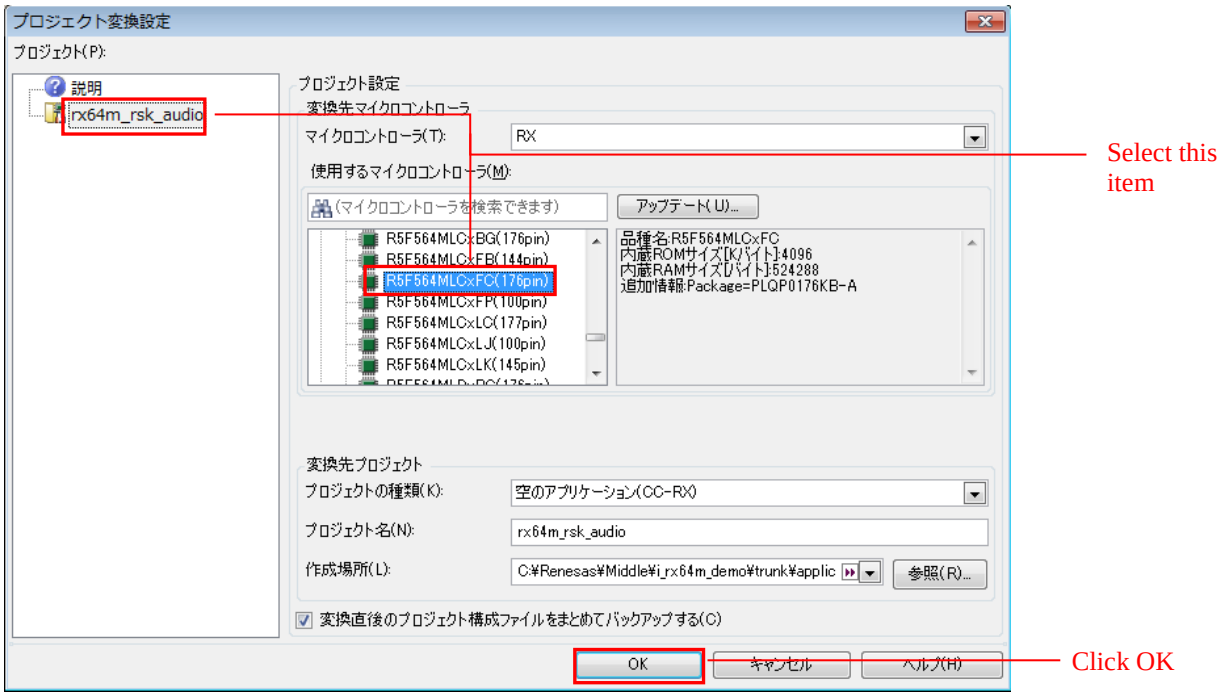
1. Decompress the ZIP file in which this application note is provided into an arbitrary folder.

2. Start CS+ and from the start screen, click GO under Open Existing e^2 studio/CubeSuite/High-performance Embedded Workshop/PM+ project.

3. Open the folder decompressed in step 1 above and of those entries, open Project. From there, select Renesas common project files (rx64m_rsk_audio.rcpc) and click Open.



4. After selecting the project from the project tree, select the items as shown below and click OK. Note that Microcontroller used must be selected to match the device actually mounted in the evaluation board used.

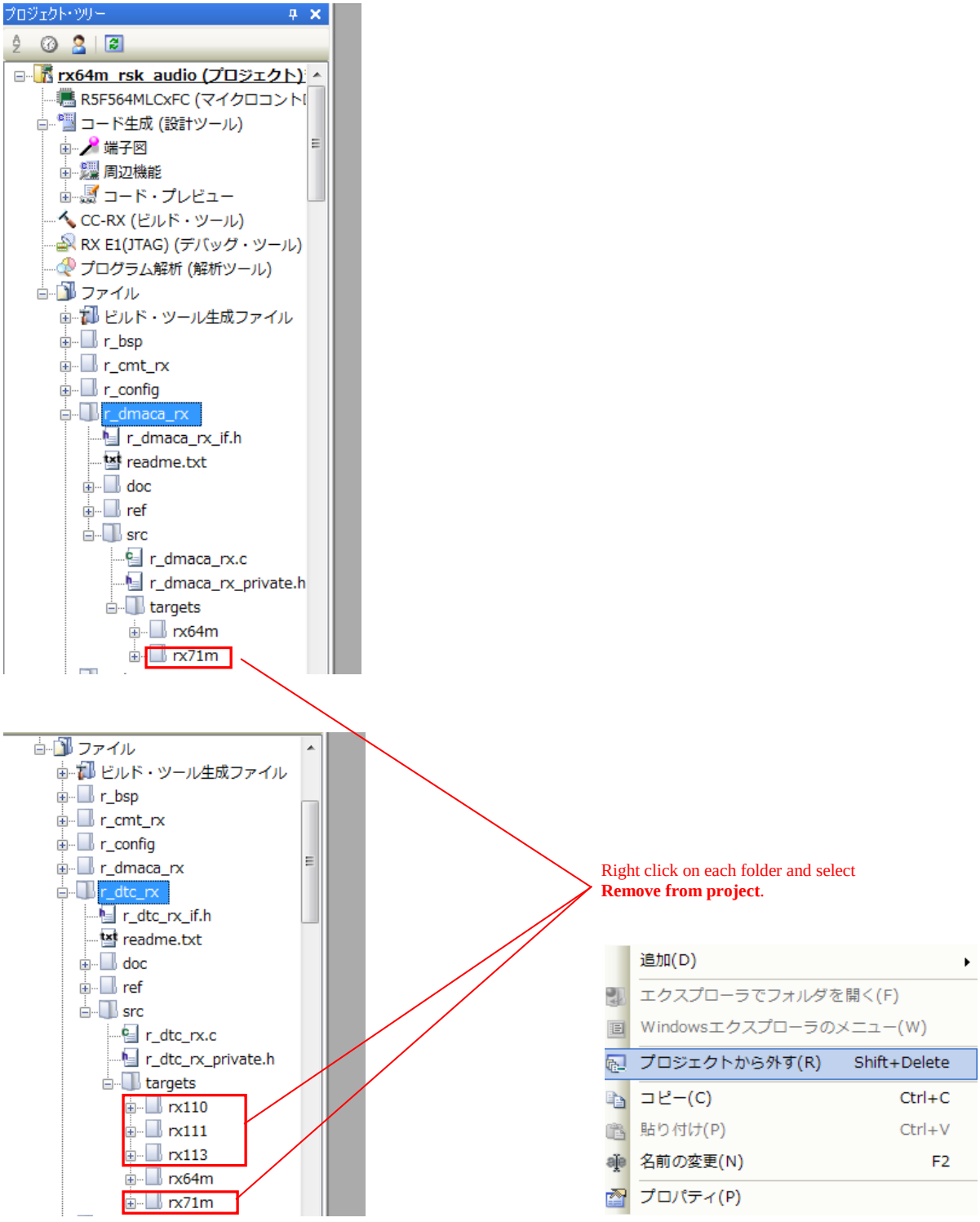


5. The project will be converted and the converted project opened. Also, the e^2 studio project will be backed up.

8.3 Changing Settings

In the Renesas common project file (ex.rx64m_rsk_audio.rcpc), change the settings that cannot be inherited.

1. Remove multiple folders from the project.



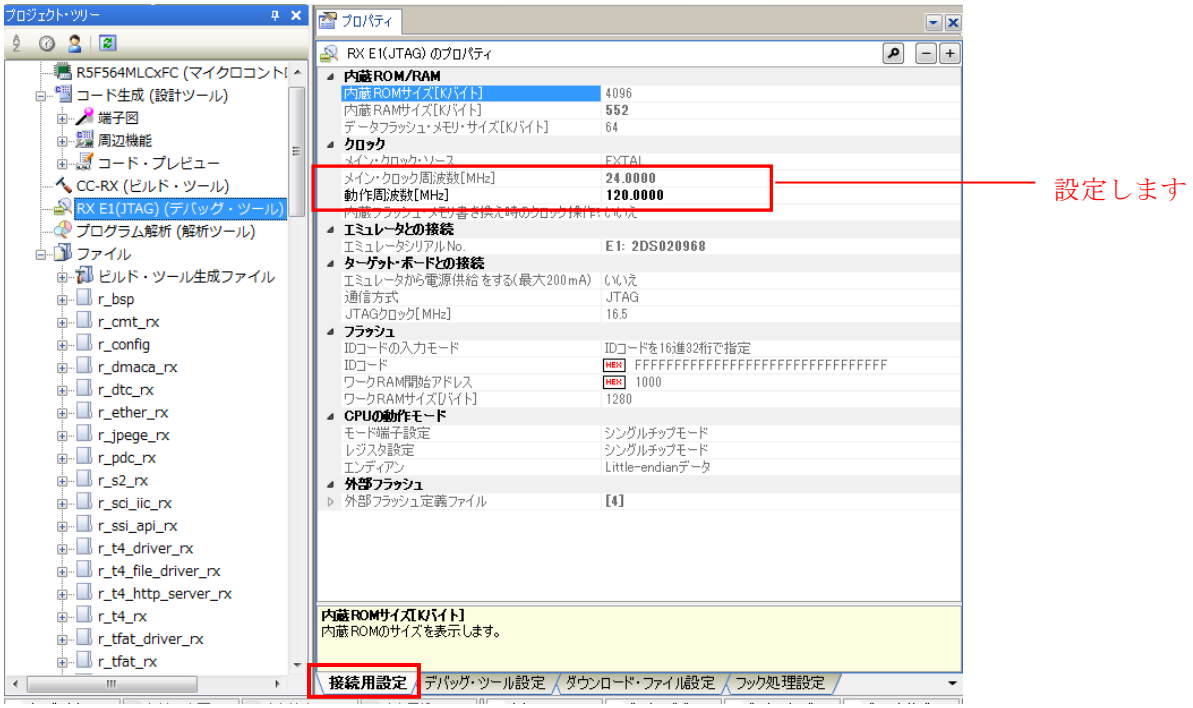
3. Build the project.
4. Select RX E1(JTAG)(G) as the debug tool.

Notes on Downloading Using JTAG

It is necessary to enter the clock settings manually.

1. Set **Main clock frequency [MHz]** to 24.

   Set **Operating frequency [MHz]** to 120.



-

9. Supplement

9.1 Notes on Using the Free Evaluation Version of the RX Family C/C++ Compiler Package

There is a usage period limitation and certain usage limitations on the free evaluation version of the RX Family C/C++ Compiler Package. If the usage period is exceeded, load modules may not be generated correctly due to the usage limitations. (The maximum link size is limited to 128 KB if more than 60 days have elapsed since the evaluation version of the RX compiler was first launched.)

See the page on evaluation software on the Renesas web site at the link below.

URL：http://www.renesas.com/products/tools/evaluation_software/index.jsp

9.2 Capture Data Update Delay on Web Browser

Depending on factors such as the state of the client PC, there may be cases where updating of capture data does not proceed smoothly. This situation can be improved by increasing the number of communication endpoints in the configuration file.

The following four locations in the three files shown below should be changed.

【rx64m_rsk_audio/r_t4_rx/src/config_tcpudp.c】

1. TCP reception point settings

```
/*** Definition of TCP reception point (only port number needs to be set) ***/
T_TCP_CREP tcp_crep[] =
{
   /* { attribute of reception point, {local IP address, local port number}} */
   { 0x0000, { 0, 80 }},
   { 0x0000, { 0, 80 }},
    { 0x0000, { 0, 80 }},
    { 0x0000, { 0, 80 }},

   { 0x0000, { 0, 80 }},  - Reception point 5 ← Newly added
        { 0x0000, { 0, 80 }}, - Reception point 6
        .
        .
};
```

If there are four reception points before the change…

2. TCP communication endpoint settings

```
/*** Definition of TCP communication end point
(only receive window size needs to be set) ***/
T_TCP_CCEP tcp_ccep[] =
{
   /* { attribute of TCP communication end point,
        top address of transmit window buffer, size of transmit window buffer,
        top address of receive window buffer, size of receive window buffer,
        address of callback routine }
   */
            { 0, 0, 0, 0, 1460, http_callback },
            { 0, 0, 0, 0, 1460, http_callback },
            { 0, 0, 0, 0, 1460, http_callback },
            { 0, 0, 0, 0, 1460, http_callback },

            { 0, 0, 0, 0, 1460, http_callback },    - Communication endpoint 5 ← Newly added
            { 0, 0, 0, 0, 1460, http_callback },    - Communication endpoint 6
                     .
                    .
}
```

If there are four communication endpoints before the change…

【rx64m_rsk_audio/r_config/r_t4_http_server_rx_config.h】

3. Communication endpoints used by HTTP server

```
#define         HTTP_TCP_CEP_NUM
```

【rx64m_rsk_audio /src/main.c】

4. Work area used by T4 (TCP/IP protocol stack)

To determine this value, run the program once and use the return value of tcpudp_get_ramsize() as the basis for the setting.

The processing in question is contained in the same file.

Website and Support

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

Inquiries
http://www.renesas.com/contact/

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Apr 01, 2015	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

   Handle unused pins in accordance with the directions given under Handling of Unused Pins in the manual.

   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

   The state of the product is undefined at the moment when power is supplied.

   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

   Access to reserved addresses is prohibited.

   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

   Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

   — The characteristics of an MPU or MCU in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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