RZ/A1LU Group

RZ/A1LU Software Package Quick Start Guide

1. Introduction

This is the Quick Start Guide for the RZ/A1LU Software Package which works on RZ/A1LU Stream it! RZ V2.3 Target board and the operation of Renesas e2 studio or IAR Embedded Workbench.

In this software package, users can get some experience to use software components of this package and can start to develop own system, by stepping each sections of this document.

Table 1. All Samples of this package

Name	Description
GuilianiDemo	Demo of the HMI Framework "Guiliani" by TES Electronic Solutions. Pre-Built binary of GuilianiDemo is included in this package.
GUI Sample	Very simple application which using “Guiliani”. Sample application for getting data from GUI and setting data to GUI
SDK for Camera Sample	Display camera input and control several image adjustments.
Touch Panel Sample	Detect a touch event and JPEG decode sample.
Web Server Sample	Target board works as web server. User can control LED and monitor the directory listing of any USB Mass Storage devices in the PC web browser.
USB Host Sample	Mass storage class access via File System, HID class (Mouse/Keyboard), and CDC class are available.
USB Function Sample	HID class (Mouse) and CDC class are available.
ADC Sample	Monitor the voltage read.
Sound Sample (Play/Record)	“Play” provides playing a fixed sound that included in sample. “Record” provides listening to the mic input.

2. Preparation

Ensure all switches and jumpers are set to their defaults as shown in the RZ Stream it! Kit User's Manual For e2 studio (R20UT3823EG).

2.1 Tool

RZ/A1LU Software Package can be used following environment. Please check your environment before continuing.

User can choose e^2 studio or IAR Embedded Workbench as develop environment.

Tools:

e^2 studio (free of charge)

- IDE: e^2 studio v2021-10 or later
- Tool Chain: GNU Arm Embedded Toolchain: 9-2020-q2-update

Available from https://developer.arm.com/open-source/gnu-toolchain/gnu-rm

IAR Embedded Workbench (charge)

- IDE: IAR Embedded Workbench V8.30.1 or later

Available from https://www.iar.com/iar-embedded-workbench/#!?architecture=Arm

JLink drivers (free of charge) v6.12n or later

JLink drivers need to be installed both case of e^2 studio and IAR Embedded Workbench.

Available from https://www.segger.com/downloads/jlink/

Target Board:

- Product code: YSTREAM-IT-RZ-V2.3

Bootloader:

This package includes bootloader as binary file. If user would like to get source code, download from following.

https://www.renesas.com/en-eu/solutions/key-technology/human-interface/rz-stream-it.html

2.2 Virtual Serial Port Connection

Connect CN10 on the Stream it! RZ V2.3 to a Windows™ PC, this provides a USB virtual serial port.

When the Stream it! RZ V2.3 is first connected the PC will look for a suitable driver. This driver is installed during the installation process, the PC should automatically find and install it. The PC will report it is installing a driver and report a driver has been installed successfully. The COMx port number allocated to the virtual serial port can be found in Window™ Device Manager.

2.3 Serial Terminal

Start serial terminal program (such as PuTTY, HyperTerminal or Tera Term) using the following configuration:

- Baud rate:115200
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None
- COM Port: As shown in Windows™ Device Manager.

3. Trying “GuilianiDemo”

The HMI Framework "Guiliani" by TES Electronic Solutions allows rapid implementations of smooth, intuitive and high-performance GUIs on cost and energy efficient embedded devices. This Software Package includes the Pre-built “GuilianiDemo” of TES Electronic Solutions and user can try out this demo. In the case of making customize display image, the WYSIWYG PC Editor "GSE" is required. The "GSE" is included in this package. Furthermore, a world-wide, unlimited and perpetual production-license for Guiliani-Lite is offered free-of-charge via the "Prepaid by Renesas" program. For more detail, please visit TES Electronic Solutions web site and download Guiliani SDK from following URL.

guiliani.de : https://www.guiliani.de/mediawiki/index.php?title=Downloads:EvalKits
Guiliani 2.2 SDK including GSE and GuilianiDemo for Renesas RZ/A (StreamIt) with eGML (FreeRTOS V10.4.3-LTS-patch1 for e² studio 2021-10)
Guiliani 2.2 SDK including GSE and GuilianiDemo for Renesas RZ/A (StreamIt) with eGML (FreeRTOS V10.4.3-LTS-patch1 for EWARM 8.40.1)

By stepping the following sequence, user can launch the “GuilianiDemo”.

1. Connect your PC and Stream it! Board
   A. Connect LCD sub-board and Stream it! board.
   B. Connect JTAG connector of Stream it! and PC via J-Link.
   C. Connect CN18 of Stream it! and PC
2. Download the “GuilianiDemo”.
   The file “FlashGuilianiDemo.bat” will install the demo. Select the three options one by one.
   A. Unzip this software package zip file. Also unzip “gcc.zip” or “iccarm.zip”. it depends on environment which using.
   B. Launch “RZA1_SoftwarePackage\GuilianiDemo\FlashTools\FlashGuilianiDemo.bat".

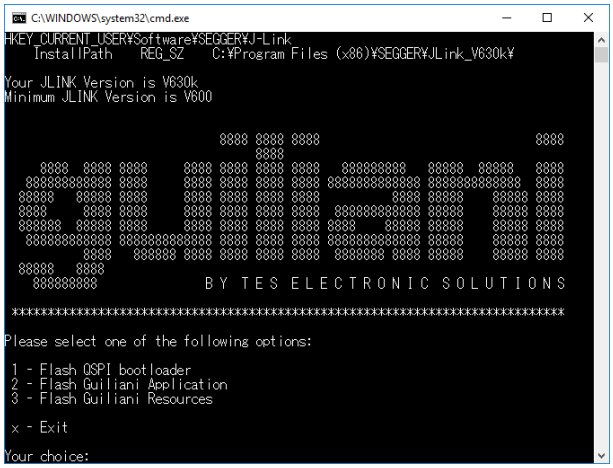


Figure 1. Application to flash Guiliani application

- Input “1[enter]” to flash QSPI bootloader.
- Input “2[enter]” to select Stream it! board.
- Input “y[enter]” to start flashing.
- completing flash, press any key to return to the main menu.

- Input “2[enter]” to flash Guiliani Application.
- Input “2[enter]” to select Stream it! board.
- After completing flash, press any key to return to the main menu.

- Input “3[enter]” to flash Guiliani Resources.
- Input “2[enter]” to select Stream it! board.
- After completing flash, press any key to return to the main menu.
- Push Reset button of Stream IT! board to run the “GuilianiDemo”.

4. Trying GUI Sample of RZ/A1LU Software Package

The GUI Sample is a sample application that indicates how to connect H/W and Guiliani library. This sample provides functions such as led controlling from GUI and display the value of real time clock value to GUI. In other words, this sample shows bidirectional control between H/W and GUI.

Following figure shows the image of the screen displayed on Stream it! board.

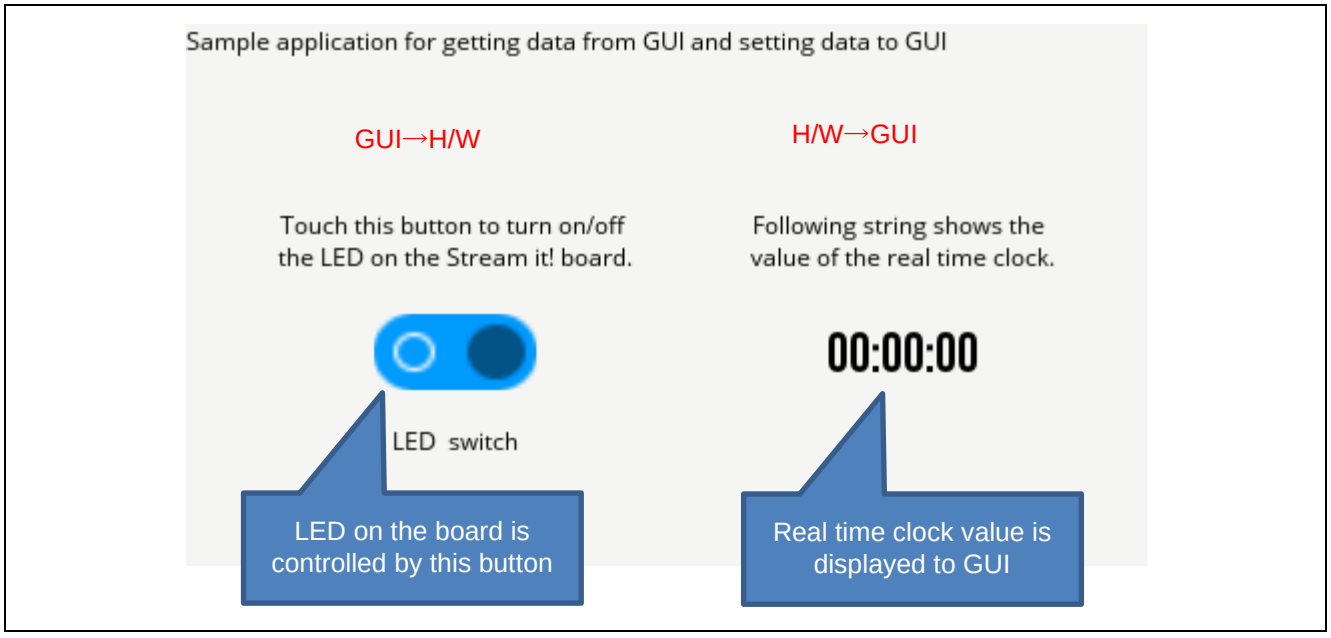


Figure 2. The image displayed on the board

By stepping the following sequence, user can run this sample application.

4.1 Download the GUI resource file of GUI Sample to target board

The GUI resource file for GUI Sample is different from GuilianiDemo. It is required to download before running this sample.

- Attach J-Link LITE ARM to the target board and PC
- Ensure the Stream it! TFT LCD's connector (CN1) is connected to the Stream it! Board's LCD connector (CN7)
- Connect a micro USB between your PC and the connector marked CN10 to power the target.
- Launch "RZA1LU_Sample\src\tes\FlashTools\FlashGuilianiDemo.bat".

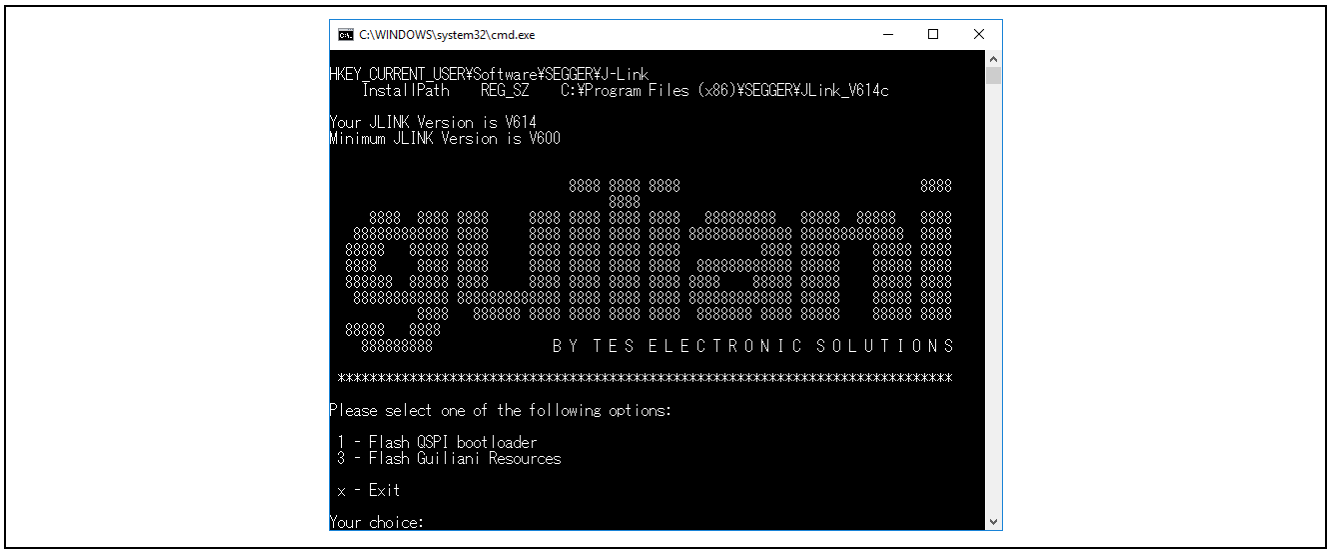
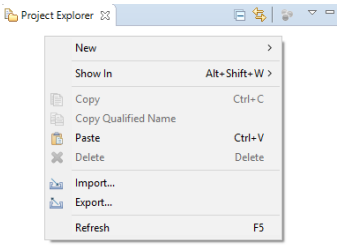


Figure 3. Application to flash GUI sample application (has menu 1 and 3 only)

- Input "3[enter]" to flash Guiliani Resources.
- Input "2[enter]" to select Stream it! board.
- After completing flash, press any key to return to the main menu.

4.2 Importing Software Package into IDE

In the case using e² studio and GCC toolchain.



- The Software Package is distributed as an archive file. Build project of this Software Package can be imported into e² studio from the Project Import Menu.
- Launch e² studio from the start menu.
- Set the “RZA1_SoftwarePackage” directory which has “RZA1LU_Sample” sub-directory for the workspace directory.
- In the e² studio welcome screen, click ‘workbench’.
- Right-click in the Project Explorer window and select ‘Import’.
- Under ‘Import Source’ select General > Existing Projects into Workspace and click ‘Next’.
- Select “Browse” at the right of “Select root directory:”, and “Browse For Folder” dialog box will be appeared.
- Press “OK”.
- Ensure the ‘RZA1LU_Sample’ project is ticked, then click ‘Finish’.

In the case of using IAR toolchain.

- Double click the following file. “RZA1_SoftwarePackage\RZA1LU_Sample\RZA1LU_Sample.eww”.

4.3 Build and Download to target board

- This step only needs to be performed once; For the board in the initial state, you need to set the boot program once. Execute the “Program_RZ_A1LU_boot.bat” which is put in “RZA1LU_Sample\util\dos_scripts”.

In the case using e² studio and GCC toolchain.

- Select the ‘RZA1LU_Sample’ project by left clicking on it, then click the arrow next to build button (hammer icon) and select ‘HardwareDebug’ from the drop-down menu.

- e² studio will now build the project. (Note)
- Once this is complete, debugging can be started by clicking on the debug button (bug ico

- e² studio may ask you to ‘Confirm Perspective Switch’, click ‘Yes’.
- Once the code has been downloaded, click the ‘Resume’ button to run the code.

In the case using IAR toolchain.

- Select the ‘RZA1LU_Sample’ project by left clicking on it, then click the build button.
- IAR Embedded Workbench will now build the project. (Note)

- Once this is complete, debugging can be started by clicking on the download debug butto

- Once the code has been downloaded, click the execute button to run the code.

Note: Please mind the length of your workspace path. If the path is too long, there is a possible that build will be error.

4.4 Launching the GUI Sample

After running sample code, the serial terminal will show the welcome banner. The GUI Sample will be start after input “gui[enter]” on the command console.

For more detail of this sample, please refer to GUI Sample Program Application Note(R01AN4413).

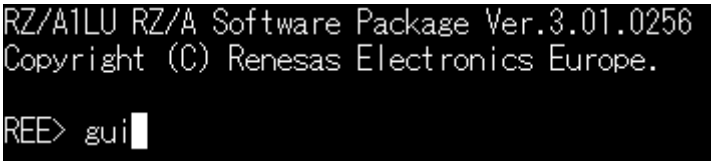


Figure 4. Command to launch the GUI Sample

5. Trying another sample application

User can set enable/disable to each sample application by “application_cfg.h” which is placed in “RZA1LU_Sample\src\renesas\configuration”. (Note) After changing “application_cfg.h”, rebuild and download to confirm aimed application is enabled. Please mind that whole sample application definition cannot be set enable same time due to target board specification and memory size. If a sample application enabled, the function can be controlled via terminal console like section 4.4. Whole console commands are shown in following tables.

Table 2. Console Commands (1/3)

Command Type	Command	Description
General Commands	date DD/MM/YYYY <CR>	Set the date
	time hh:mm:ss <CR>	Set the time
	mem a l <CR>	Reads memory from address H'a length H'l
	drivers <CR>	List driver table note driver may not be loaded
	handles <CR>	List opened driver information
	ver <CR>	Show the application version
Platform Commands	mperf <CR>	Check the speed of writing to RAM
	led a s <CR>	Sets LED a state to On s = 1, Off s = 0, Toggle s = ^
	restart <CR>	Restart the system with a WDT reset
	logout <CR>	Exit a login shell
	sys <CR>	Shows the system resource usage information
	task <CR>	List tasks
	help <CR>	Show the help screen
Touchscreen Commands (Refer to section 5.6)	tsdemo <CR>	run the touch screen demo
Camera SDK Commands (Refer to section 5.5)	sdk <CR>	run the SDK for camera demo, requires screen and camera modules
ADC Application Commands (Refer to section 5.7)	adcdemo <CR>	run the ADC application demo
USB HID class Mouse Commands (Refer to section 5.4)	hidmouse <CR>	Provides HID mouse implementation, follow on screen instructions
USB CDC class (Refer to section 5.4)	cdcconsole <CR>	Run CDC console, requires a terminal program
Sound Application Commands (Refer to section 5.8)	play <CR>	run play sound application
	record <CR>	run record sound application
Gui commands	gui <CR>	run GUI Sample

Note: The definition “R_SELF_INSERT_APP_PMOD” in the “application_cfg.h” is test application for RSPI driver. This definition is set disable as default setting. If user want to confirm this application, Okaya PMOD™ display which included in Renesas Starter Kit+ for RZ/A1H (YR0K77210S011BE) required. And also ensure that the define “R_SELF_INSERT_APP_SDK_CAMERA”, “R_SELF_INSERT_APP_TOUCH_SCREEN”, “R_SELF_INSERT_APP_GUI” are disabled in the “application_cfg.h”.

Table 3. Console Commands (2/3)

Command Type	Command	Description
USB Commands	usbm <CR>	Monitors the data from a mouse
	usbk <CR>	Invokes USB console reading data from a USB keyboard
USB Mass Storage Commands (*) (Refer to section 5.3)	vol <CR>	Volume information for the working drive
	type f <CR>	Write text file f to the console
	copy s d <CR>	Copy file "s" to destination "d"
	view f <CR>	view contents of file "f"
	dir <CR>	List the working directory
	pwd <CR>	Print the working directory
	cd d <CR>	Change working directory to "d"
	del f <CR>	Delete file "f"
	md n <CR>	Make "n" in the working directory
	rd d <CR>	Delete directory "d"
	ren s d <CR>	Rename / move file "s" to "d"
	disk <CR>	List the available disk drives
	eject d <CR>	Eject disk "d"
	dismount <CR>	Dismount all mounted drives
	mount <CR>	Mount all Mass Storage devices
USB MS Test Commands	rperf f <CR>	Read file performance test
	wrperf f <CR>	Write file performance test
USB CDC Serial Port Commands	sopen <CR>	Opens a CDC device
	sclose <CR>	Closes an open CDC device
	sctltst <CR>	Perform control API tests for the CDC driver
	sttx n <CR>	Transmit n kbytes of data through the CDC device
	sloop <CR>	Loops-back received characters through the CDC device
	sbaud n <CR>	Set the baud rate to n
	scontrol n <CR>	Assert / Deassert RTS/DTR control signals n = 1 or 0
	sparity p <CR>	Sets the parity to N = none, E = Even, O = Odd
	sstop s <CR>	Sets the number of stop bits 1, 1.5 or 2
	sline <CR>	Returns the line status
	sbreak <CR>	Sets / clears the break signal
	stest s <CR>	Test all CDC driver functions with a loop-back connector
	sloopall <CR>	Loop-back test on max. 4 CDC devices (default baud rate)

*Note: After connect USB MSC devices, enter drive name such as “A:[Enter]” before use USB Mass Storage Commands. Please refer to section 5.3 .

Table 4 Console Commands (3/3)

Command Type	Command	Description
Ethernet Platform Commands (Refer to section 5.2)	readrom <CR>	Read the EEPROM
	rstrom <CR>	Reset all user data in the EEPROM
	ipconfig -o <CR>	where o is one of the or more following options -r = Reset to default settings -s = Save current settings -i:xxx.xxx.xxx.xxx = Set IP address -m:xxx.xxx.xxx.xxx = Set IP address mask -g:xxx.xxx.xxx.xxx = Set DHCP server gateway address -on = Enable DHCP -off = Disable DHCP -all = Display current settings (no option) = Command list display
	ifconfig -o <CR>	where o is one of the above options
	setmacaddress -o <CR>	where o is one of the following options -a:xx:xx:xx:xx:xx:xx = Set MAC address and save -s = Save current settings (no option) = Command list display

5.1 General Functionality

- The serial terminal will show the welcome banner.
- Type '?' <CR> on the serial terminal to view available commands.
- All commands start after <CR> is pressed; this is not shown again in this document.

5.2 Web Server Sample

A definition "R_SELF_LOAD_MIDDLEWARE_ETHERNET_MODULES" and "R_SELF_LOAD_MIDDLEWARE_USB_HOST_CONTROLLER" in the "application_cfg.h" should be set enable when using this sample.

Ensure that the define "R_SELF_INSERT_APP_SDK_CAMERA", "R_SELF_INSERT_APP_TOUCH_SCREEN", "R_SELF_INSERT_APP_GUI" are disabled.
Please step following procedure to use this function.

5.2.1 Setting MAC Address

This step only needs to be performed once; the MAC addressed will be saved in to non-volatile EEPROM.

To enable ethernet type the command 'netstart', to disable Ethernet type 'netstop' and press Return.

- The target board has a sticker showing a unique MAC address. This needs to be written to the EEPROM by entering the command: 'setmacaddress –a:xx:xx:xx:xx:xx:xx -s', where xx is the address shown on the MAC address sticker.
- The serial terminal will show the welcome banner.

5.2.2 Ethernet Functionality

- IP address configuration depends if a static IP address is used or if a DHCP server is available:

Table 5. DHCP and Static IP Configuration

DHCP Configured	Static IP Configuration
a) Type 'ipconfig -on -s' to enable DHCP and save settings to EEPROM.	a) Type the following on a single line: ipconfig -i:`ip-address` -m:`subnet-mask` -g:`gateway-address` -off -s Where `addresses` and `masks` are in the format xxx.xxx.xxx.xxx for example: 192.168.172.123.
b) Connect Ethernet cable to CN6. The serial console will display the allocated `ip-address`.	b) Connect Ethernet cable to CN6.

- On the remote PC launch a Web Browser and enter the following in to the address bar:
  http://ip-address
  Where ip-address is the address used or allocated in the step above.
- The Web Browser will display webpages from the demonstration stored on the target board.

5.2.3 Web Pages

- The landing web page shows an image of the target board and some information of the demonstration. On the left there are four check boxes which control the target board User LED.
- The second tab ‘Mass Storage’ shows the directory listing of any USB Mass Storage devices inserted in to the target board. Clicking on a file name will open it in the PC web browser.
  On the left is a USB Read/Write speed test facility. The drive and test file size are selected from the drop down and the test started by clicking ‘Test’.

  Note: Due to limitations of some USB Mass Storage Class Devices, very large test sizes may not work as expected.

- The final tab ‘Administration’ demonstrates a simple secure webpage implemented on the target board. The sample is not intended to be a truly secure solution, only an example. By default, these are Username: admin Password: password, these both can be changed in the Administration page or via the serial terminal.
- The Software Package web server can support many simultaneous connections over Ethernet.

5.3 USB Host Sample

A definition “R_SELF_LOAD_MIDDLEWARE_USB_HOST_CONTROLLER” in the “application_cfg.h” should be set enable when using this sample.

Ensure that the define “R_SELF_INSERT_APP_CDC_SERIAL_PORT” and “R_SELF_INSERT_APP_HID_MOUSE” are disabled.
Please step following procedure to use this function.
Multiple USB devices may be connected to the Stream it! using a USB Hub with four ports or less (single tier). To provide sufficient power for all devices the hub must be externally powered. For this QSG only one device will be used at a time and inserted directly in to Stream it!.

- Insert a FAT formatted Mass Storage Device (USB Memory Stick, hard drive, etc.) in to CN2.
- Type ‘drivers’ - details of the USB device will be shown.
- Type 'a:' - the prompt changes to confirm the drive change.
- Type ‘dir’ - a directory listing of the drive will be shown.
- Type ‘?’ to see the available commands for file and folder manipulation.
- Remove the Mass Storage Device from CN2 ready for the next demonstration.

5.4 USB Function Sample

A definition “R_SELF_INSERT_APP_CDC_SERIAL_PORT” and “R_SELF_INSERT_APP_HID_MOUSE” in the “application_cfg.h” should be set enable when using this sample.

Ensure that the define “R_SELF_LOAD_MIDDLEWARE_USB_HOST_CONTROLLER” is disabled.
Please step following procedure to use this function.

5.4.1 USB CDC Functionality

- Connect a USB host to USB host cable from the PC to the RZ Stream it! via CN2.
- Use the ‘cdcconsole’ to bring up the CDC functionality.
- Follow the instructions on the debug terminal
- Using the host PC’s Device manager, confirm that a new COM device is added when the cdcconsole is running.
- Ensure that another serial terminal program is configured and press any key on the first serial terminal program.
- Connect your second terminal to the virtual COM port,
  The cdcconsole application shall echo what is typed on the virtual console.

5.4.2 USB HID Mouse Functionality

- Use the ‘hidmouse’ to bring up the CDC functionality.
- Again the ‘?’ command shows the available commands for this functionality.
- To move the PC mouse, use the command ‘movexy’ followed by a desired x and y coordinate.
- Use ‘button1’ and ‘button2’ for the left and right click, respectively.
- To end the session, use the ‘logout’ command.

5.5 SDK for Camera Sample

A definition “R_SELF_INSERT_APP_SDK_CAMERA” in the “application_cfg.h” should be set enable when using this sample.

Ensure that the define “R_SELF_LOAD_MIDDLEWARE_ETHERNET_MODULES” is disabled.
Please step following procedure to use this function.

- Type ‘sdk’ <CR> on the serial terminal to view available commands.
- Then SDK for Camera application will be launched.
- Several Image Adjustment will be set. Please refer to the SDK for Camera Application Note(R01AN4312).

5.6 Touch Panel Sample

A definition “R_SELF_INSERT_APP_TOUCH_SCREEN” in the “application_cfg.h” should be set enable when using this sample.

Ensure that the define “R_SELF_LOAD_MIDDLEWARE_ETHERNET_MODULES” is disabled.
Please step following procedure to use this function.

- Type ‘tsdemo’ <CR> on the serial terminal to view available commands.
- Then Touch Panel application will be launched.
- The application will detect a touch event and draw a small green rectangle at the coordinates of the event. Please refer to the Touch Panel Utility Application Note(R01AN4314).

5.7 ADC Sample

A definition “R_SELF_INSERT_APP_ADC” in the “application_cfg.h” should be set enable when using this sample. Please step following procedure to use this function.

- Type ‘adcdemo’ <CR> on the serial terminal to execute the ADC functionality.
- The terminal will then display the voltage read on AN2.
- To change the value, turn the variable resistor P1.
- To end the session, press any key.

5.8 Sound Sample

A definition “R_SELF_INSERT_APP_SOUND” in the “application_cfg.h” should be set enable when using this sample. Please step following procedure to use this function.

- Plug in a headphone with a mic to connector, CN14.
- Type ‘play’ <CR> on the serial terminal to execute the sound functionality.
- Sound will play in the left and right channels.
- Type ‘record’ to listen to the mic input.

5.9 GUI Sample

A definition “R_SELF_INSERT_APP_GUI” in the “application_cfg.h” should be set enable when using this sample.

Ensure that the define “R_SELF_LOAD_MIDDLEWARE_ETHERNET_MODULES”, “R_SELF_INSERT_APP_SDK_CAMERA”, “R_SELF_INSERT_APP_TOUCH_SCREEN”, are disabled.
Please refer to section 4 to use this function.

6. Support

Online technical support and information is available at https://www.renesas.com

Technical Contact Details

America: techsupport.america@renesas.com

Europe: https://www.renesas.com/eu/en/support/contact.html

Japan & global: https://www.renesas.com/support/contact.html

Website and Support

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

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

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	May. 25, 2018	-	First edition issued
2.00	Jun. 29, 2018	Whole	Modified first touch procedure of this software package. Added description of new sample applications. Added description that indicates outline of console commands.
2.01	Oct. 31, 2018	5 6	Added Figure 4.2 Updated Technical Contact Details.
3.10	Oct. 11, 2021	Whole	Updated Toolchain Details. Reformatted to bring in line with new QSG format

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit 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. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time 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 time 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 time 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 time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. 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 the 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.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is 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. Additionally, 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.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of 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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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

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