QE for USB V2.0.0

Release Note

Thank you very much for using the QE for USB V2.0.0.

This release documentation, we have indicated this product installation, restrictions and so on.

Contents

1. About QE for USB

1.1 Summary

QE for USB is one of the solution toolkits that operate on the e² studio integrated development environment. It is an embedded software development tool that supports the development of USB systems. USB system debugging can be done easily, shortening development time and reducing costs.

1.2 New Functions

1. RA2L2 support
   Added RA2L2 to the supported MCU.
2. Added debugging function for USB Type-C
   Added a view to check the Type-C status of MCU (RA2L2) equipped with Type-C.
   - USB Type-C Check (QE) View
3. Added VBUS voltage and current monitoring function
   Added a view to check the USB VBUS in a graph. To use this function, a sample program is required to monitor the VBUS of the board.
   - USB VBUS Monitor (QE) View
4. Added Workflow view
   Added a view to check the procedure for using QE for USB.
   - USB Workflow (QE) View
5. Added a view to check USB driver messages
   Added a view to display the messages output by the USB driver.
   - USB DEBUG Message (QE) View

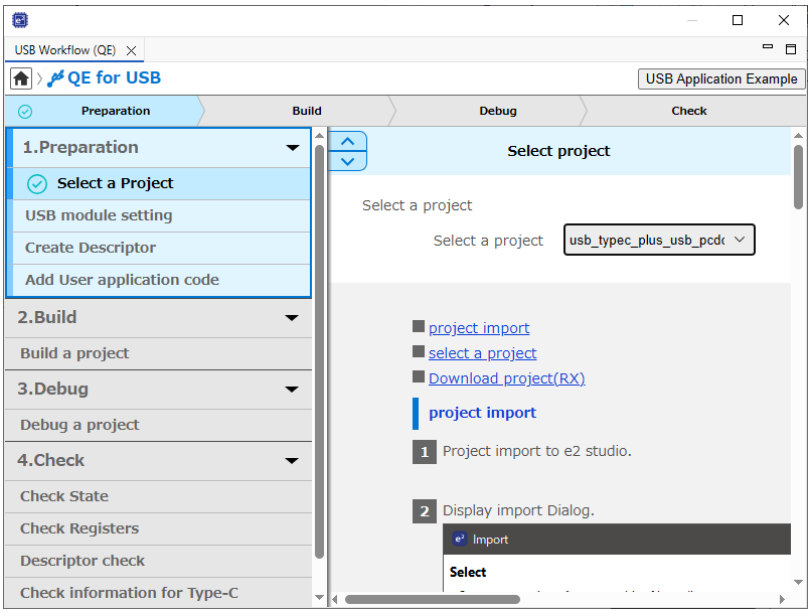
1.3 USB Workflow (QE) View

Displays the procedure for using the application. First, import the USB driver sample project into the e² studio and select the project in the USB Workflow (QE) view.

For a sample project of the USB driver, refer to the following page.

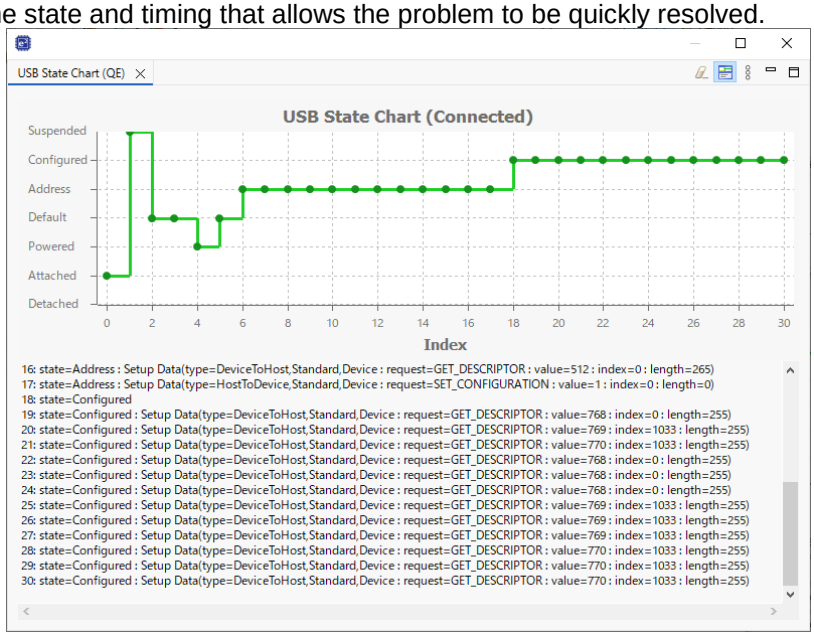
RX, RL78: https://www.renesas.com/software-tool/usb-drivers

RA: https://github.com/renesas/ra-fsp-examples



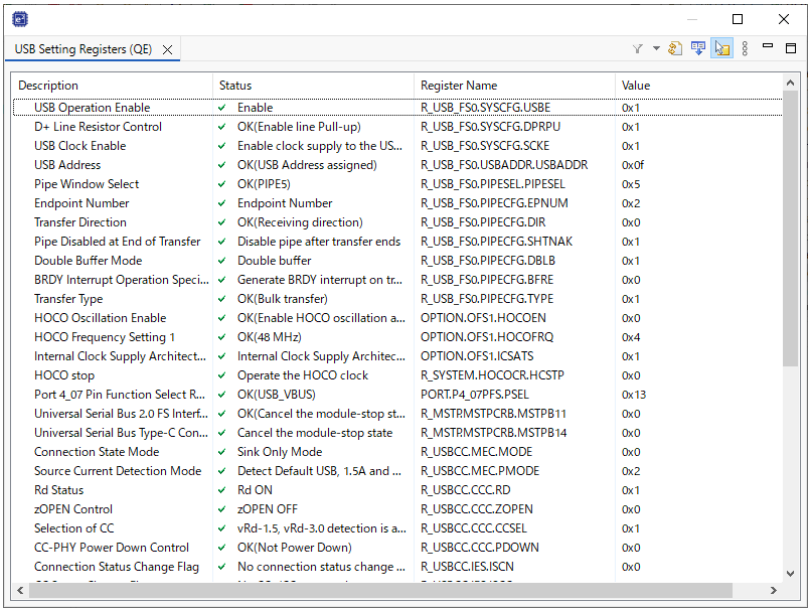
1.4 USB State Chart (QE) View

This view displays state transitions of USB connection (enumeration) processing in real time. It helps user to confirm the success of a connection, if the connection fails and processing stops, user can visually check the state and timing that allows the problem to be quickly resolved.



1.5 USB Setting Registers (QE) View

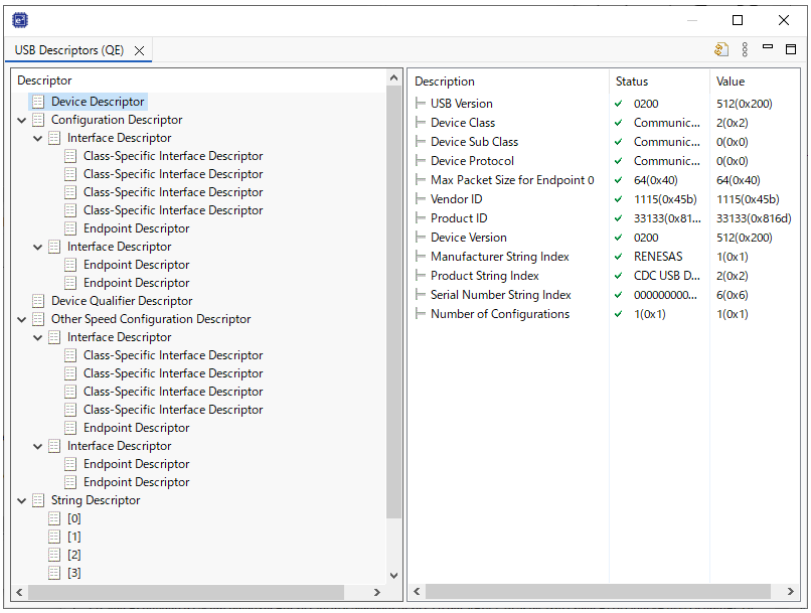
This view lists the values and descriptions of the registers related to USB connection settings. If a register is not set to a correct value needed for connection, it is marked as "NG" and user can find problems simply by opening this view.



Description	Status	Register Name	Value
USB Operation Enable	Enable	R_USB_FS0.SYSCFG.USBE	0x1
D+ Line Resistor Control	OK(Enable line Pull-up)	R_USB_FS0.SYSCFG.DPRPU	0x1
USB Clock Enable	Enable clock supply to the US...	R_USB_FS0.SYSCFG.SCKE	0x1
USB Address	OK(USB Address assigned)	R_USB_FS0.USBADDR.USBADDR	0x0f
Pipe Window Select	OK(PIPE5)	R_USB_FS0.PIPESEL.PIPESEL	0x5
Endpoint Number	Endpoint Number	R_USB_FS0.PIPECFG.EPNUM	0x2
Transfer Direction	OK(Receiving direction)	R_USB_FS0.PIPECFG.DIR	0x0
Pipe Disabled at End of Transfer	Disable pipe after transfer ends	R_USB_FS0.PIPECFG.SHTNAK	0x1
Double Buffer Mode	Double buffer	R_USB_FS0.PIPECFG.DBLB	0x1
BRDY Interrupt Operation Speci...	Generate BRDY interrupt on tr...	R_USB_FS0.PIPECFG.BFRE	0x0
Transfer Type	OK(Bulk transfer)	R_USB_FS0.PIPECFG.TYPE	0x1
HOCO Oscillation Enable	OK(Enable HOCO oscillation a...	OPTION.OFS1.HOCOEN	0x0
HOCO Frequency Setting 1	OK(48 MHz)	OPTION.OFS1.HOCOFRQ	0x4
Internal Clock Supply Architect...	Internal Clock Supply Architec...	OPTION.OFS1.ICSATS	0x1
HOCO stop	Operate the HOCO clock	R_SYSTEM.HOCOCR.HCSTP	0x0
Port 4_07 Pin Function Select R...	OK(USB_VBUS)	PORT.P4_07PFS.PSEL	0x13
Universal Serial Bus 2.0 FS Interf...	OK(Cancel the module-stop st...	R_MSTP.MSTPCRB.MSTPB11	0x0
Universal Serial Bus Type-C Con...	Cancel the module-stop state	R_MSTP.MSTPCRB.MSTPB14	0x0
Connection State Mode	Sink Only Mode	R_USBCC.MEC.MODE	0x0
Source Current Detection Mode	Detect Default USB, 1.5A and ...	R_USBCC.MEC.PMODE	0x2
Rd Status	Rd ON	R_USBCC.CCC.RD	0x1
zOPEN Control	zOPEN OFF	R_USBCC.CCC.ZOPEN	0x0
Selection of CC	vRd-1.5, vRd-3.0 detection is a...	R_USBCC.CCC.CCSEL	0x1
CC-PHY Power Down Control	OK(Not Power Down)	R_USBCC.CCC.PDOWN	0x0
Connection Status Change Flag	No connection status change ...	R_USBCC.IES.ISCN	0x0

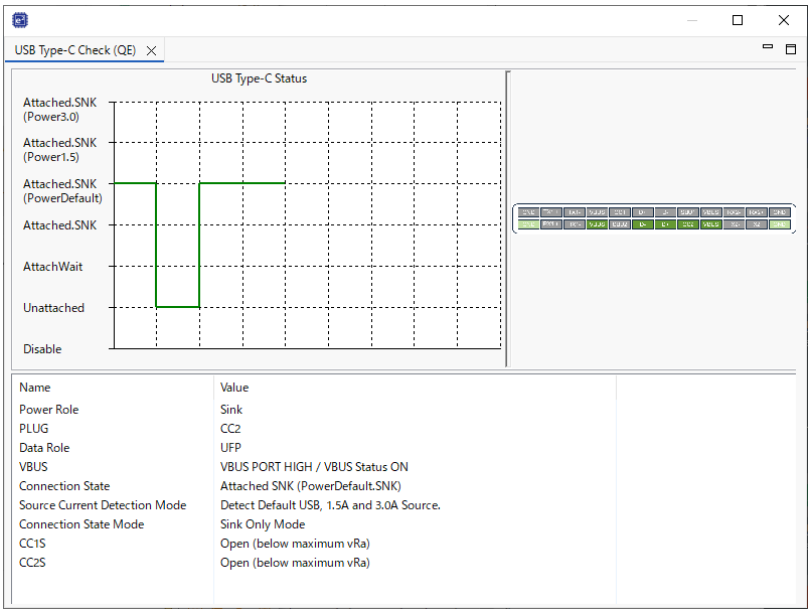
1.6 USB Descriptors (QE) View

This view lists the descriptors (values) to be used for USB connection (enumeration). If the status or value of a descriptor is incorrect, it is marked as "NG" and user can find incorrect settings simply by opening this view.



1.7 USB Type-C Check (QE) View

Displays information about USB Type-C connections on the screen based on MCU register information.

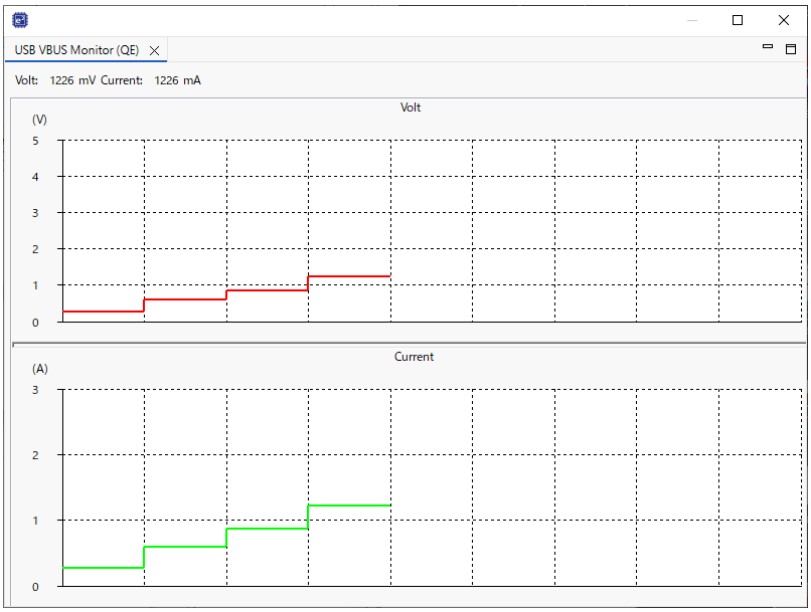


1.8 USB VBUS Monitor (QE) View

Displays the USB VBUS voltage and current measurement results on the screen. Display the values of the following variables in the graph.

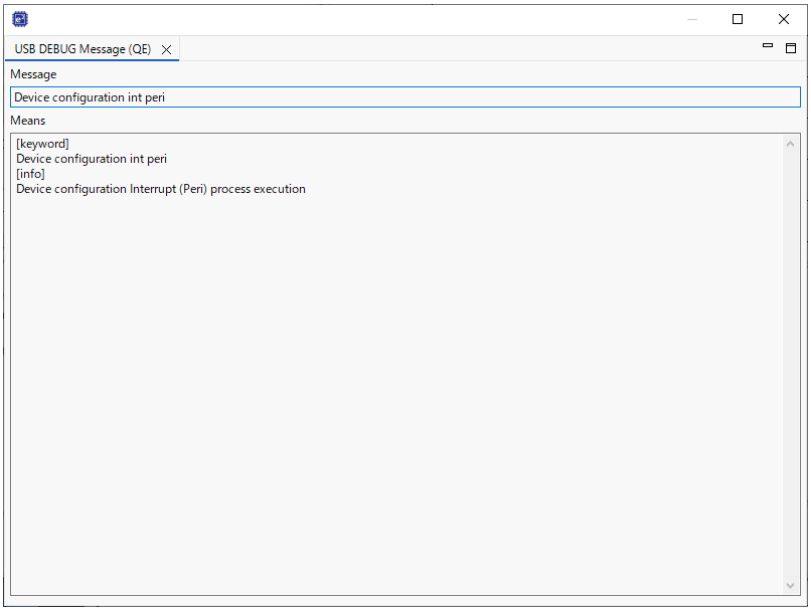
Voltage: g_VbusMonitor_VsenseData

Current: g_VbusMonitor_IsenseData



1.9 USB DEBUG Message (QE) View

The log information held in the MCU FW when using the debugger is acquired when the debugger operation is paused. A message is displayed when a USB driver compatible with this view is used.



1.10 Supported Environment

- Windows 10, Windows 11
- Renesas e^2 studio 2025-04.1

1.11 Supported Microcontroller

- RA2L2
- RX71M
- RX65N/RX651
- RX64M
- RX231
- RX111
- RL78/G1C
- RL78/L1C

2. Installation and Uninstallation

2.1 Installing This Product

Use either of the following procedures to install this product.

2.1.1 Install from the "Renesas Software Installer" menu of e² studio

1. Start e² studio.
2. Select the [Renesas Views] – [Renesas Software Installer] menu of e² studio to open the [Renesas Software Installer] dialog box.
3. Select the [Renesas QE] and click the [Next>] button.
4. Select the [QE for USB (v2.0.0)] check box and click the [Finish] button.
5. Check that the [Renesas QE for USB] check box is selected in the [Install] dialog box and click the [Next>] button.
6. Check that the [Renesas QE for USB] check box is selected as the target of installation and click the [Finish] button.
7. If the dialog of the Security Warning is displayed, click the [Install anyway] button to continue installation.
8. When prompted to restart e² studio, restart it.
9. Start this product from the [Renesas Views] - [Renesas QE] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio.

2.1.2 Install using QE (zip file) downloaded from the Renesas website

1. Start e² studio.
2. From the [Help] menu, select [Install New Software...] to open the [Install] dialog box.
3. Click the [Add...] button to open the [Add Repository] dialog box.
4. Click the [Archive...] button, select the installation file (zip file) in the opened file selection dialog box, and then click the [Open] button.
5. Click the [OK] button in the [Add Repository] dialog box.
6. Expand the [Renesas QE] item shown in the [Install] dialog box, select the [Renesas QE common] check box and the [Renesas QE for USB] check box, and then click the [Next>] button.
   * If you check off the [Contact all update sites during installation to find required software] checkbox, you can shorten the installation time.
7. Check that the [Renesas QE common] and the [Renesas QE for USB] are selected as the target of installation and click the [Finish] button.
8. If the dialog of the trust certificate is displayed, check that “Unsigned” checkbox, and click the [Trust Selected] button to continue installation.
9. When prompted to restart e² studio, restart it.
10. Start this product from the [Renesas Views] - [Renesas QE] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio.

2.2 Uninstalling This Product

Use the following procedure to uninstall this product.

1. Start e^2 studio.
2. Select [Help -> About e^2 studio] to open the [About e^2 studio] dialog box.
3. Click the [Installation Details] button to open the [e^2 studio Installation Details] dialog box.
4. Select [Renesas QE for USB] displayed on the [Installed Software] tabbed page and click the [Uninstall...] button to open the [Uninstall] dialog box.
5. Check the displayed information and click the [Finish] button.
6. When prompted to restart e^2 studio, restart it.

3. Notes / Restrictions

3.1 Usage Considerations

Please pay attention to the following items.

3.1.1 Notes on using EK-RA2L2

1. When using J-Link as a debugging tool in an EK-RA2L2 project, the MCU program may raise an exception and stop at Default Handler when opening the USB State Chart (QE) view.

   Workaround:
   If you want to use the USB State Chart (QE), use E2 Emulator Lite.

3.1.2 Notes of USB VBUS Monitor (QE) View

1. To use the USB VBUS Monitor (QE) view, a board that can monitor VBUS and a sample program are required. Also, due to naming conventions in the sample program, variable names may be different from those referenced by the USB VBUS Monitor (QE) view.

   Workaround:
   Change the variable name of the VBUS voltage and current in the sample program to the following name.
   Voltage: g_VbusMonitor_VsenseData
   Current: g_VbusMonitor_IsenseData

3.1.3 Notes of Installation

1. When installing QE for USB V2.0.0, the "Trust Artifacts" dialog box displays the QE for USB plug-in as unsigned.

   Workaround:
   Check "Unsigned" and click the "Trust Selected" button to continue the installation.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Jun.10.25	-	First edition issued.

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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