

# Trace Compass with LTTng

User's Manual: Getting Started Guide

Integrated Development Environment  
e<sup>2</sup> studio

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (<http://www.renesas.com>).

## Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
  2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
  3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
  4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
  5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.  
"Standard": Computers; office equipment; communications equipment; test and measurement equipment;  
audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment;  
industrial robots; etc.  
"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights);  
large-scale communication equipment; key financial terminal systems; safety control equipment; etc.
- Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
  7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
  8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
  9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
  10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
  11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
  12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

# How to Use This Manual

This manual describes how to use how to use features of the Trace Compass from e<sup>2</sup> studio for RZ/G board.

<b>Readers</b>	This manual is intended for Renesas MCU developers who wish to understand how to use Trace Compass for viewing LTTng trace data with e <sup>2</sup> studio.
<b>Purpose</b>	This manual aims to provide user with the explanation of the functions provided in Trace Compass and LTTng when they commence the development of their hardware and software systems using the targeted devices.
<b>How to Read This Manual</b>	Please read guide and do installation, configuration and debug sequentially.
<b>Conventions</b>	Data significance: Higher digits on the left and lower digits on the right Note: Footnote for item marked with Note in the text Numeric representation: Decimal ... XXXX Hexadecimal ... 0xXXXX

# Table of Contents

1. Introduction.....	5
1.1 Required Resources.....	5
1.2 Main Process for create trace project.....	6
2. Set up environment.....	7
2.1 Set up Linux system build server.....	7
2.2 Install e <sup>2</sup> studio.....	7
3. Create Linux system image with kernel configurations related to LTTng.....	8
3.1 Create Embedded Linux Custom BSP Project.....	8
3.2 Set kernel configurations related with LTTng.....	8
3.3 Build Linux system image.....	9
3.4 Boot target device by Linux system image.....	9
4. Environment setting for Trace compass debugging.....	10
4.1 Obtaining Target Board IP Address.....	10
4.2 Set IP Address on PC (Cross Lan cable network only).....	13
4.3 Set Remote Host in e <sup>2</sup> studio.....	15
4.4 Importing and Generating Trace project.....	22
5. Tracing Perspective.....	24
5.1 Colors.....	25
5.2 Histogram.....	29
5.3 State System Explorer.....	31
5.4 Statistics.....	32
5.5 Synchronization.....	33
5.6 Time Chart.....	34
6. LTTng Perspective.....	35
6.1 Control.....	36
6.2 Control Flow.....	36
6.3 CPU Usage.....	41
6.4 Resources.....	42

# 1. Introduction

Trace Compass is a tool for viewing and analyzing any type of logs or traces. Its goal is to provide views, graphs, metrics, etc. to help extract useful information from traces, in a way that is more user-friendly and informative than huge text dumps.

LTTng, stands for the Linux Trace Toolkit: next generation, is an open source software toolkit which you can use to simultaneously trace the Linux kernel, user applications, and user libraries.

This getting started guide describes how to use Trace Compass on Renesas e<sup>2</sup> studio with LTTng trace data.

## 1.1 Required Resources

The procedure in this guide applies to RZ/G board. The following resources are required:

- Supported devices (RZ/G Series)
- A PC running Microsoft® Windows® 7, 8 or 10
- e<sup>2</sup> studio

**Note.** Check version information of e<sup>2</sup> studio for supporting RZ/G.

See document named '**RZ/G Linux Platform Development Environment User's Manual for the Linux Customization Tool, the Verification and Analysis Tools**' that is orderable in [Renesas Market Place](#) web page.

## 1.2 Main Process for create trace project

To create a trace project, the following process are required:

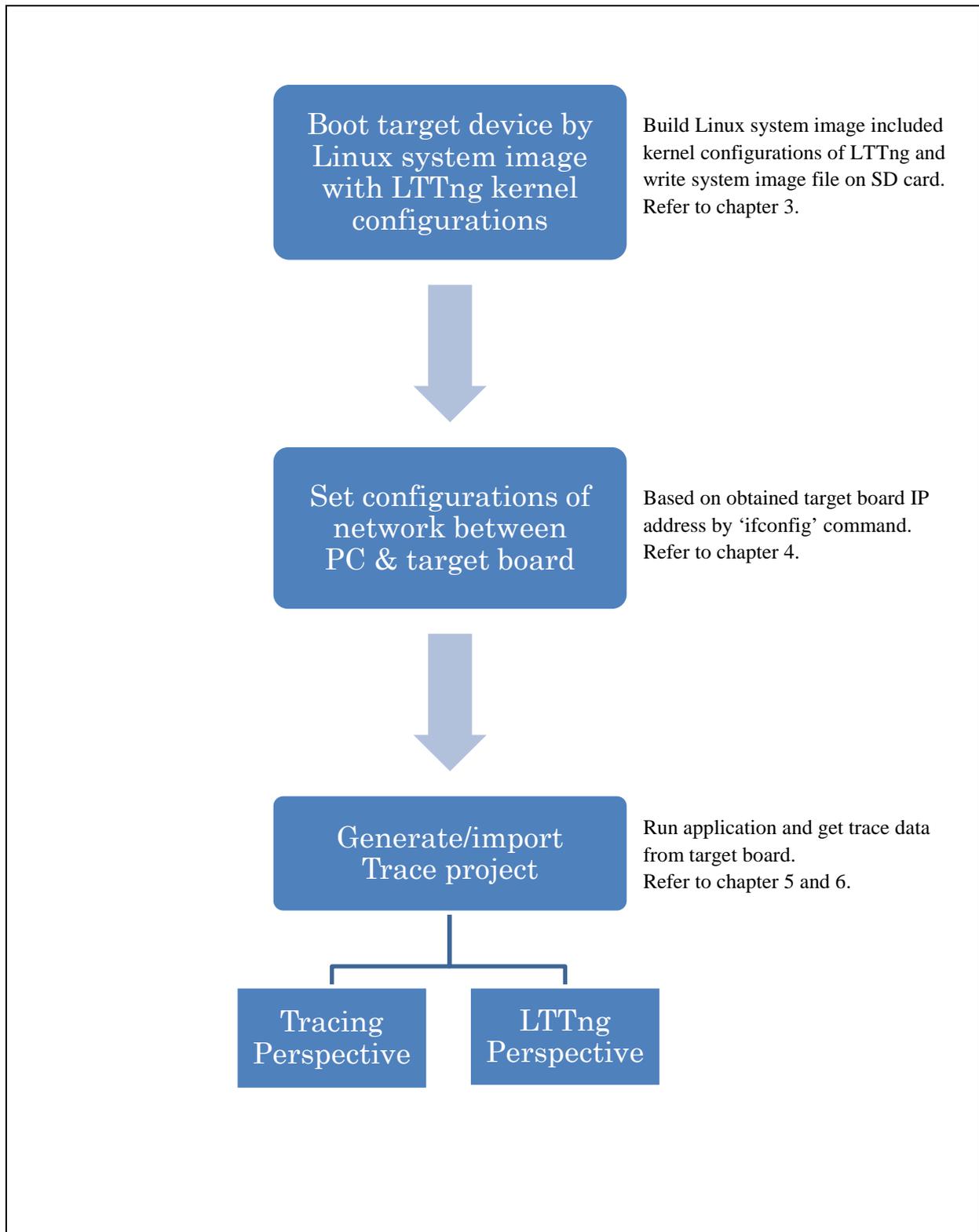


Figure 1-1 Basic operation

## 2. Set up environment

### 2.1 Set up Linux system build server

If you use Renesas Electronics' RZ/G Linux platform,

- Set up Linux system build server. You can refer to document named '**Build Server Setup Manual**' can be ordered at 'Market – Documentation' in [Renesas Market Place](#) web page. If you have problems for setting up build server, please contact Renesas electronics via [Renesas Market Place](#).

**Note.** All descriptions in this document are based on this way.

- Alternatively, refer to <https://elinux.org/RZ-G/Boards/Yocto> about how to build Linux system image file for RZ/G by Host PC. (In this case, you can't use 'RZ/G LinuxPF customization' plug-in for e<sup>2</sup> studio.)

### 2.2 Install e<sup>2</sup> studio

Please refer to document in below list.

- For installation of e<sup>2</sup> studio and common components  
: [e<sup>2</sup> studio Integrated Development Environment User's Manual: Getting Started Guide](#) chapter 2.1
- For e<sup>2</sup> studio's components installation which are related with RZ/G such as 'RZ/G LinuxPF Customization Tool' plug-in  
: Please order the document named '**RZ/G Linux Platform Development Environment User's Manual for the Linux Customization Tool, the Verification and Analysis Tools**' at 'Market' – 'Documentation' in [Renesas Market Place](#) web page and see chapter 2.

## 3. Create Linux system image with kernel configurations related to LTTng

### 3.1 Create Embedded Linux Custom BSP Project

Startup e<sup>2</sup> studio. (For the detail steps about start up e<sup>2</sup> studio, please refer to [e<sup>2</sup> studio Integrated Development Environment User's Manual: Getting Started Guide](#).)

For making Linux system image included kernel configs of LTTng, 'Embedded Linux Custom BSP Project' is needed for customizing Linux features. See chapter 3.5.2 of the document named '**RZ/G Linux Platform Development Environment User's Manual for the Linux Customization Tool, the Verification and Analysis Tools**' that is orderable in [Renesas Market Place](#) web page.

### 3.2 Set kernel configurations related with LTTng

Please check, add and modify Linux kernel configs in below list, are enabled or disabled. And then build Linux system image.

Name	Configs	y/n
FTRACE		y
	FUNCTION_TRACER	y
	TRACEPOINTS	y
	FTRACE_SYSCALLS	n
	FUNCTION_GRAPH_TRACER	n
User defined		
	LTTNG	y
	STAGING	y

**Figure 3-1 Linux kernel configs related to LTTng**

Please refer to chapter 3.12 of the document named '**RZ/G Linux Platform Development Environment User's Manual for the Linux Customization Tool, the Verification and Analysis Tools**' to do the settings, and set the configurations as per below picture:

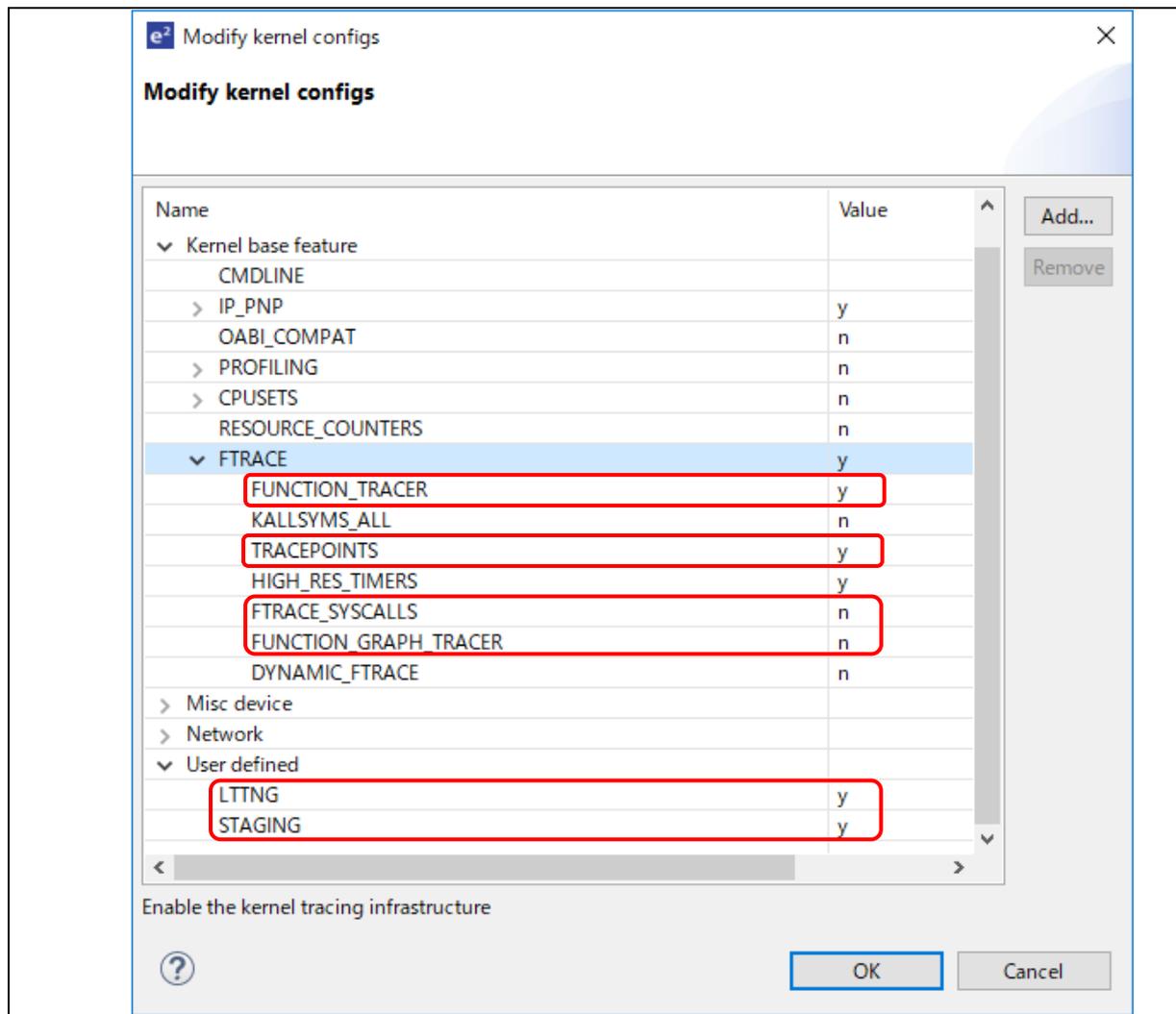


Figure 3-2 Modify kernel configs: Linux kernel configs related to LTTng

### 3.3 Build Linux system image

After setting kernel configuration for enabling LTTng, build Linux system image for SD card. (See chapter 3.8 of document named '**RZ/G Linux Platform Development Environment User's Manual for the Linux Customization Tool, the Verification and Analysis Tools**')

### 3.4 Boot target device by Linux system image

After building Linux system image for SD card, download and write Linux system image to SD card (See chapter 3.9 and 3.10 of document named '**RZ/G Linux Platform Development Environment User's Manual for the Linux Customization Tool, the Verification and Analysis Tools**') and boot target device by SD card.

## 4.Environment setting for Trace compass debugging

### 4.1 Obtaining Target Board IP Address

- (1) Remove the SD card from PC and insert it into card slot of upper layer on the target board.
- (2) Provide power through 'POWER JACK', then:
  - a. Use USB type-b cable to connect between PC and target board 'DEBUG PORT'.
  - b. Use cross LAN cable to connect between PC and target board 'ETHERNET-1 USB HOST' port. (See Chapter 4.2)
  - c. Or use LAN cable to connect between Router, which is connected to PC, and target board 'ETHERNET-1 USB HOST' port. (Skip Chapter 4.2)

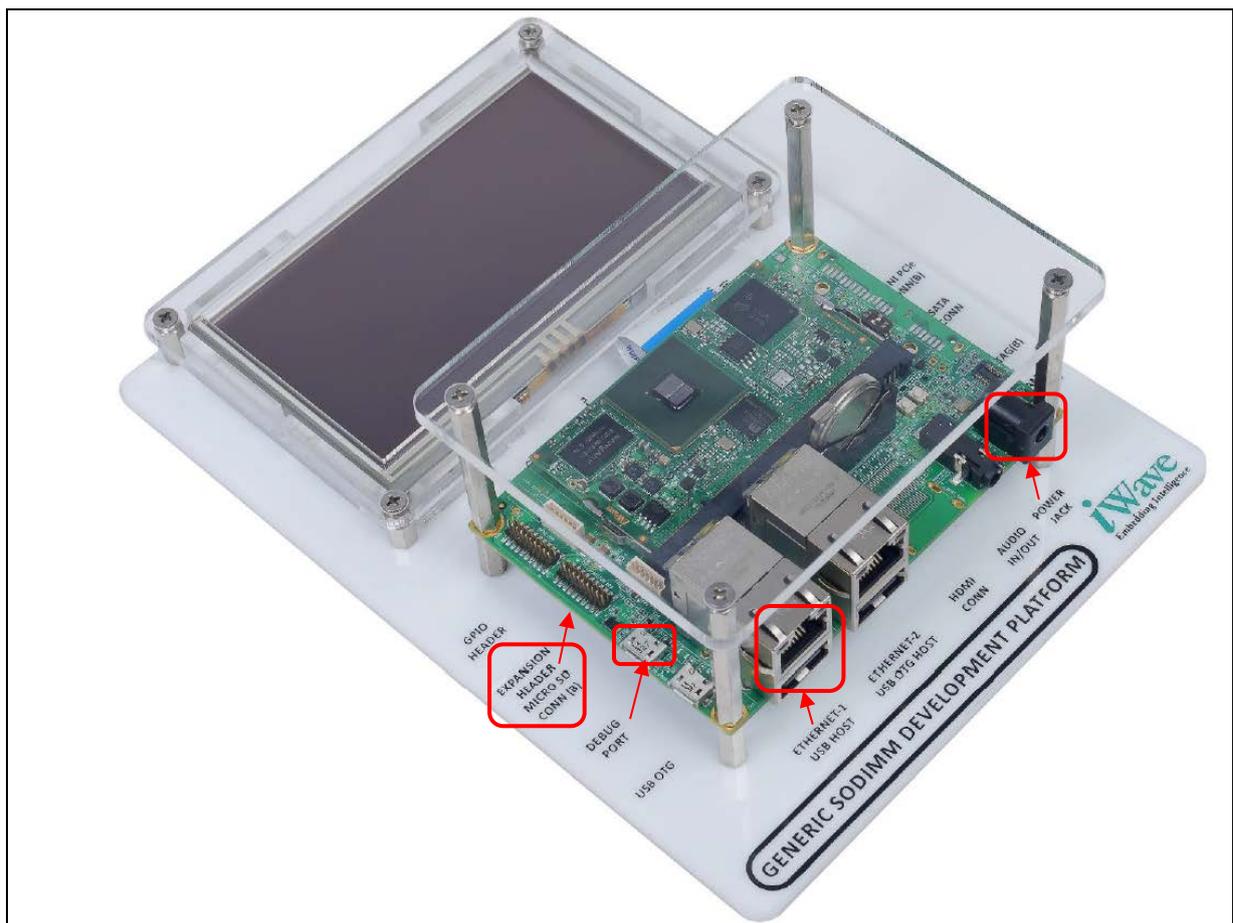


Figure 4-1 Port location

- (3) Click [Open Terminal] button in e<sup>2</sup> studio menu, and do the following settings in the pop-up window:

Choose terminal: Serial Terminal

Bit/sec: 115200

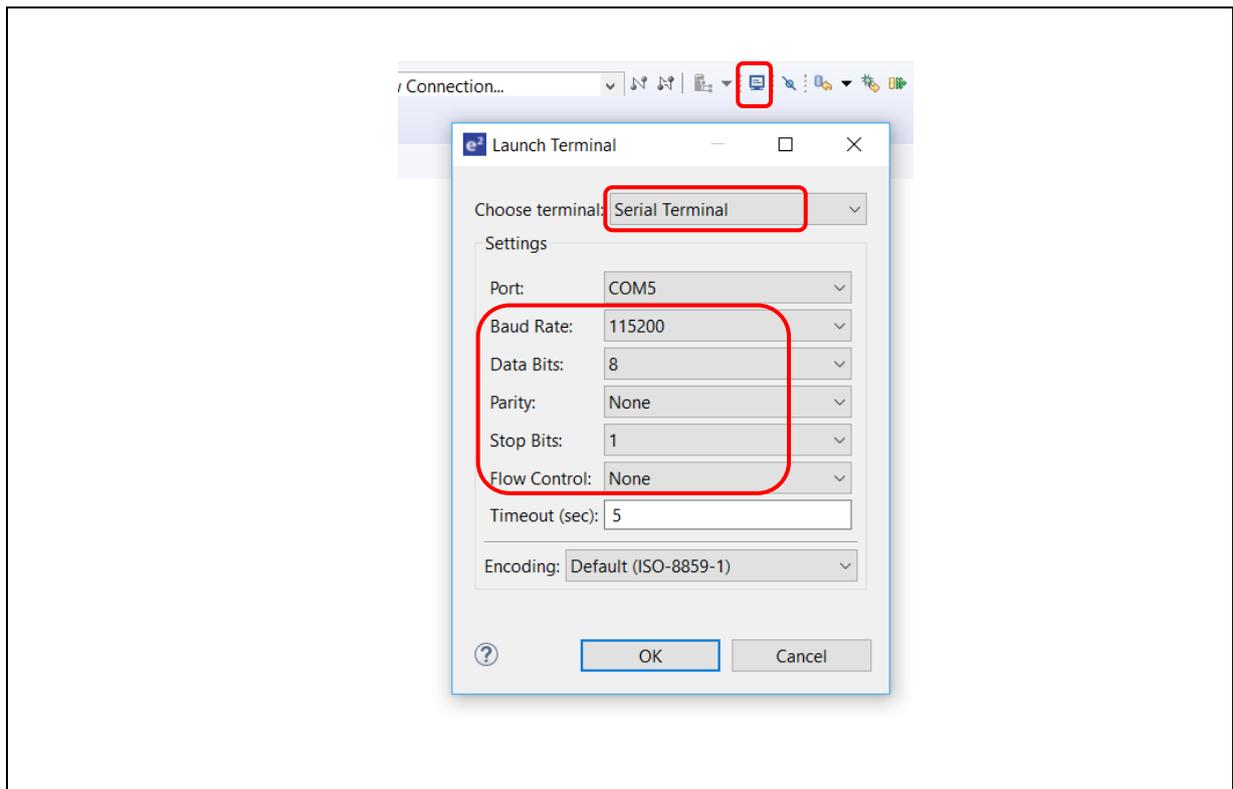
Data bit: 8

Parity: none

Stop bit: 1

Flow control: none

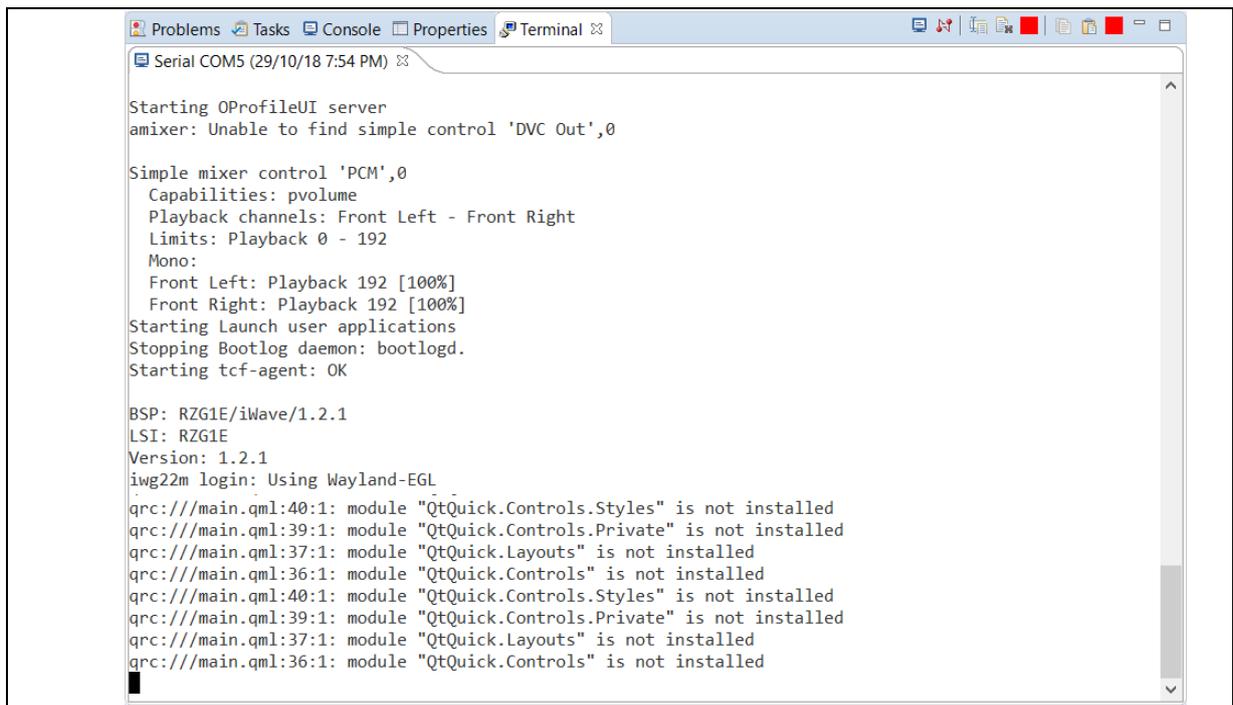
Then click [OK] to open the terminal.



**Figure 4-2 Launch terminal setting**

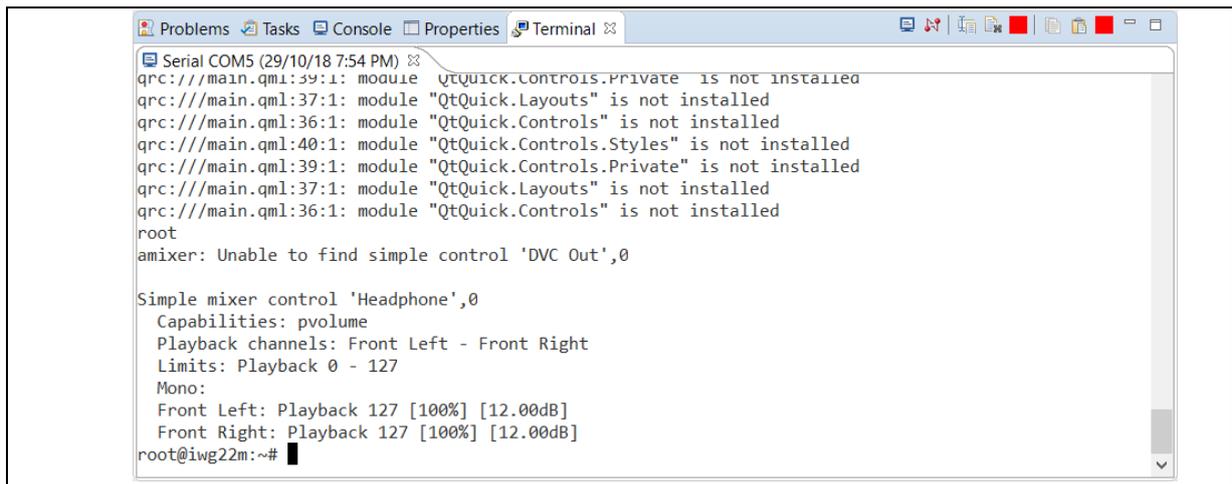
(4) In [Terminal] tab, 'iwg22m login: Using Wayland-EGL' information should be shown.

*Note: if this information is not shown, please power off the board, then power on the board.*



**Figure 4-3 Open terminal**

- (5) In [Terminal] tab, enter 'root' to login.



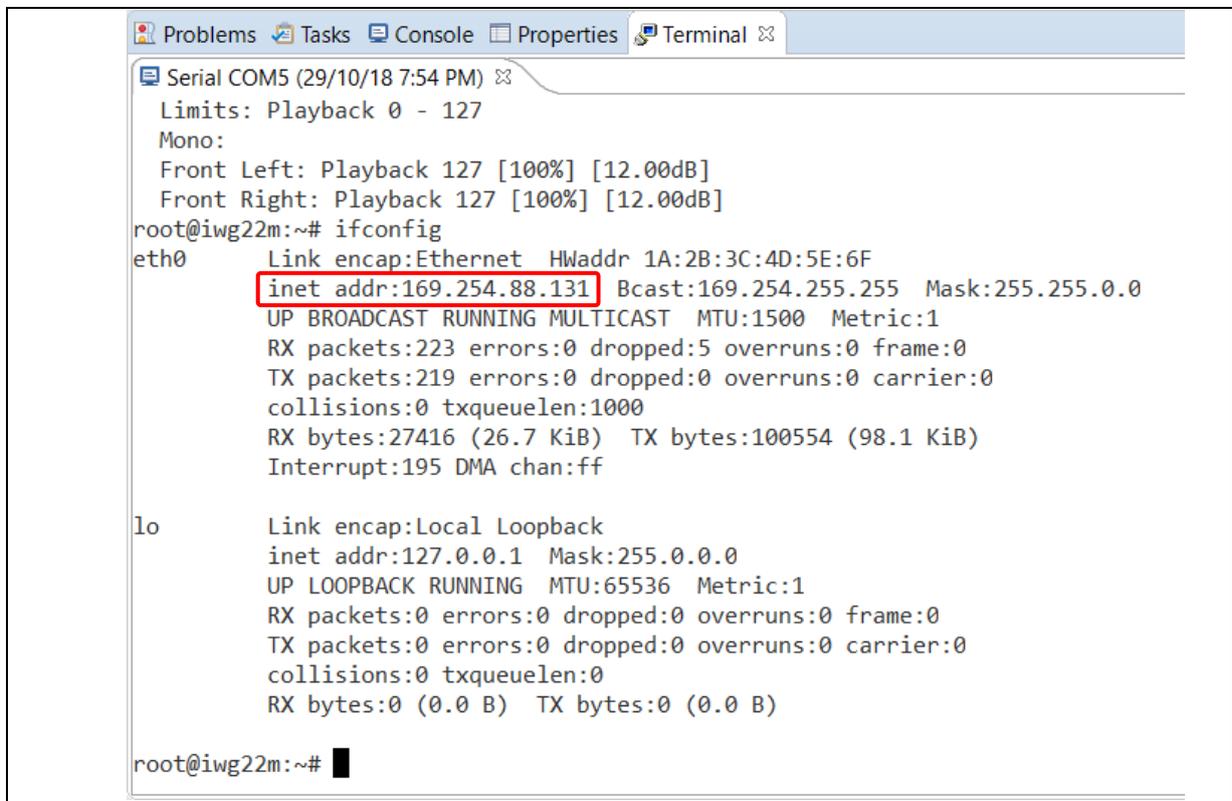
```
Serial COM5 (29/10/18 7:54 PM)
qrc:///main.qml:39:1: module "QtQuick.Controls.Private" is not installed
qrc:///main.qml:37:1: module "QtQuick.Layouts" is not installed
qrc:///main.qml:36:1: module "QtQuick.Controls" is not installed
qrc:///main.qml:40:1: module "QtQuick.Controls.Styles" is not installed
qrc:///main.qml:39:1: module "QtQuick.Controls.Private" is not installed
qrc:///main.qml:37:1: module "QtQuick.Layouts" is not installed
qrc:///main.qml:36:1: module "QtQuick.Controls" is not installed
root
amixer: Unable to find simple control 'DVC Out',0

Simple mixer control 'Headphone',0
  Capabilities: pvolume
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 127
  Mono:
  Front Left: Playback 127 [100%] [12.00dB]
  Front Right: Playback 127 [100%] [12.00dB]
root@iwg22m:~#
```

Figure 4-4 Login in terminal

- (6) In [Terminal] tab, enter 'ifconfig' to get the target board IP address, e.g.: 169.254.88.131 (each board should have a fixed IP address which may not be the same as this address).

*Note: if this information is not shown, please wait for a few minutes, and type 'ifconfig' again.*



```
Serial COM5 (29/10/18 7:54 PM)
Limits: Playback 0 - 127
Mono:
Front Left: Playback 127 [100%] [12.00dB]
Front Right: Playback 127 [100%] [12.00dB]
root@iwg22m:~# ifconfig
eth0      Link encap:Ethernet  HWaddr 1A:2B:3C:4D:5E:6F
          inet addr:169.254.88.131  Bcast:169.254.255.255  Mask:255.255.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:223 errors:0 dropped:5 overruns:0 frame:0
          TX packets:219 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:27416 (26.7 KiB)  TX bytes:100554 (98.1 KiB)
          Interrupt:195 DMA chan:ff

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

root@iwg22m:~#
```

Figure 4-5 Get the target board IP address

## 4.2 Set IP Address on PC (Cross Lan cable network only)

Do this step when host PC and target board are connected via LAN cable. If connected via router, skip this chapter.

- (1) In Windows 10 OS environment, under [Network & Internet] setting,
  - a. Click [Proxy] to open setup page.
  - b. Ensure that [Manual proxy setup] is set to off.

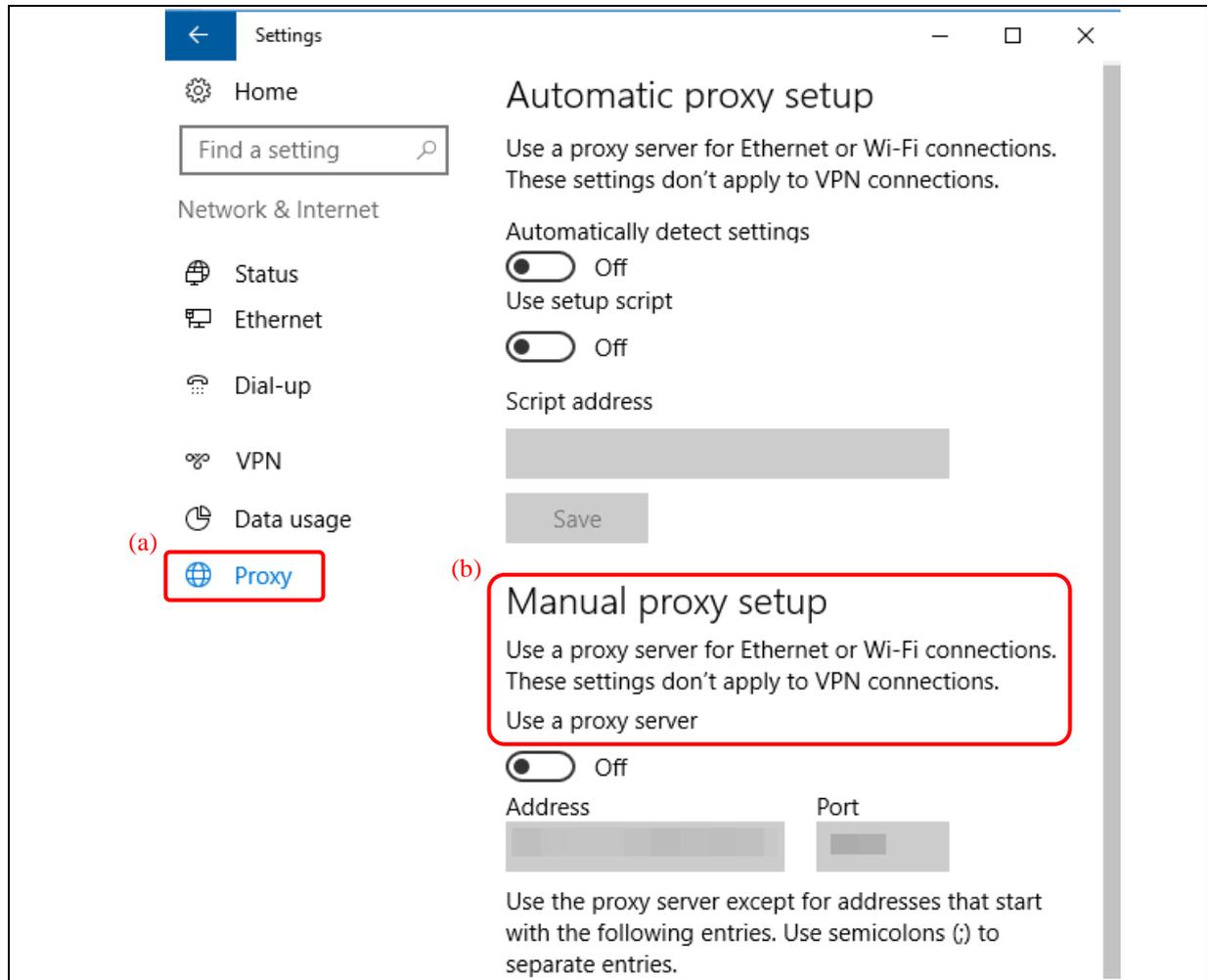


Figure 4-6 Setting IP address on PC

- (2) Under [Network & Internet] setting:
  - a. Click [Ethernet] to open setup page.
  - b. Click [Change adapter option].
  - c. In the pop-up window, right click the 'Ethernet' and select [Properties].

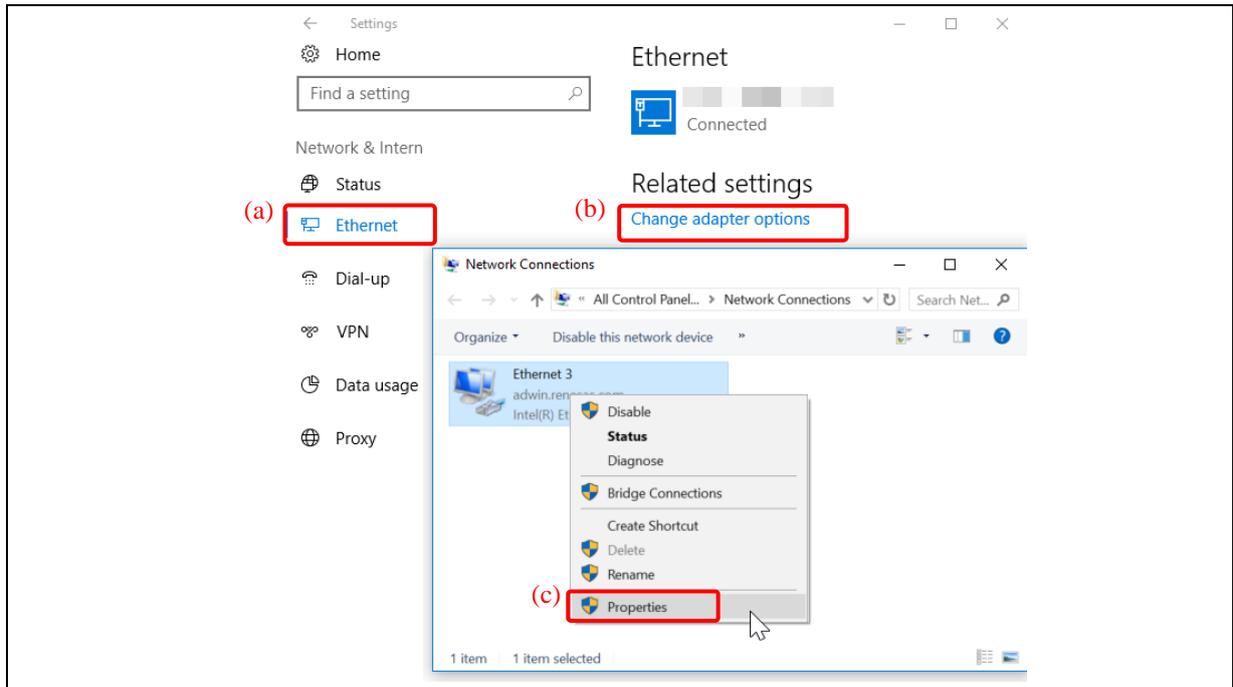


Figure 4-7 Setting IP address on PC: Network device's Properties

- (3) In the pop-up window:
  - a. Select [Internet Protocol Version 4 (TCP/IPv4)].
  - b. Click [Properties].

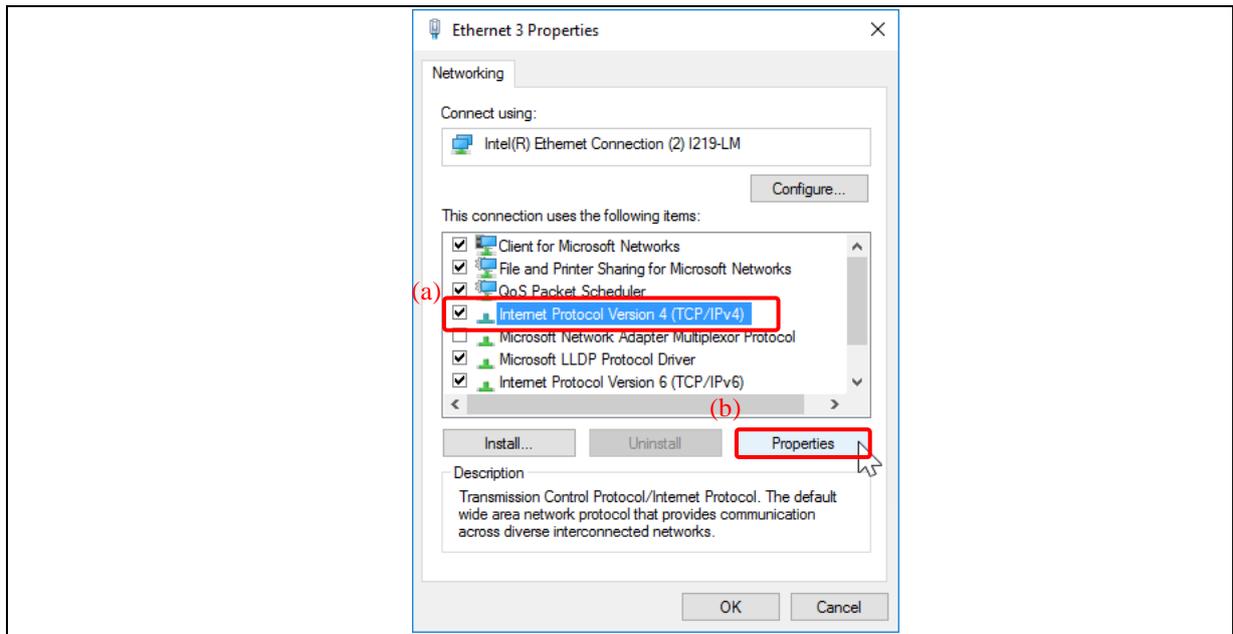


Figure 4-8 Setting IP address on PC: TCP/IPv4

- (4) In the pop-up window:
  - a. Select button for [Use the following IP address] and set the following:  
IP address: (e.g.: 169.254.88.131)  
Subnet mask: 255.255.255.0 (It may differ by network environment.)
  - b. Select button for [Use the following DNS server address].
  - c. Click [OK] for confirm the settings for the TCP/IPv4 properties.

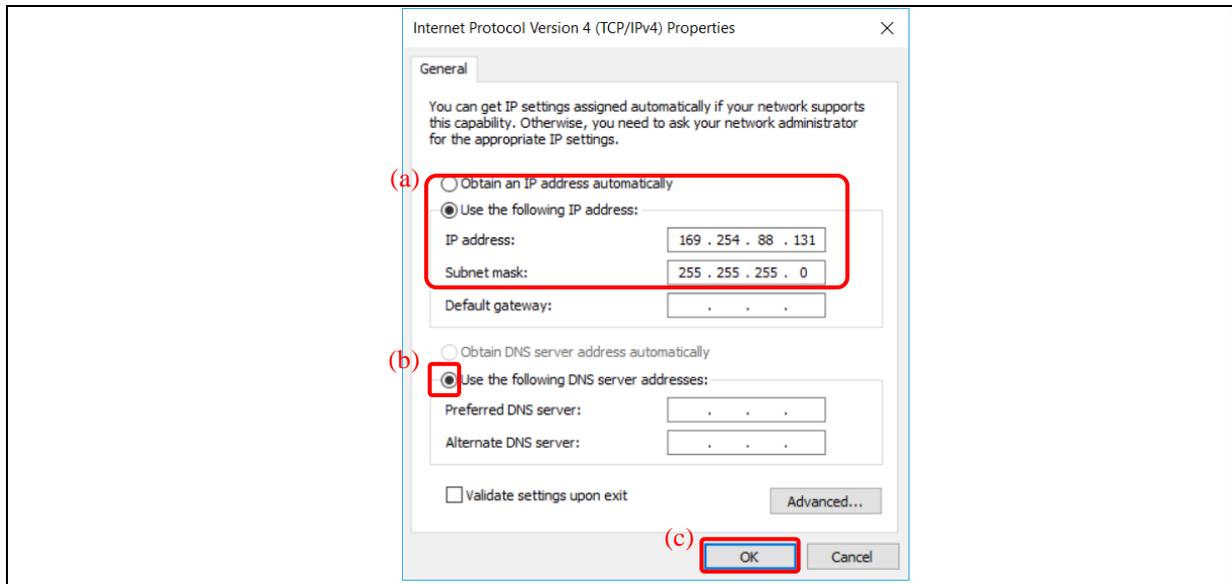


Figure 4-9 Setting IP address on PC: IP address, Subnet mask

### 4.3 Set Remote Host in e<sup>2</sup> studio

- (1) Select [Windows] > [Perspective] > [Open Perspective] > [Other...].  
Select [LTTng Kernel] and press [OK].

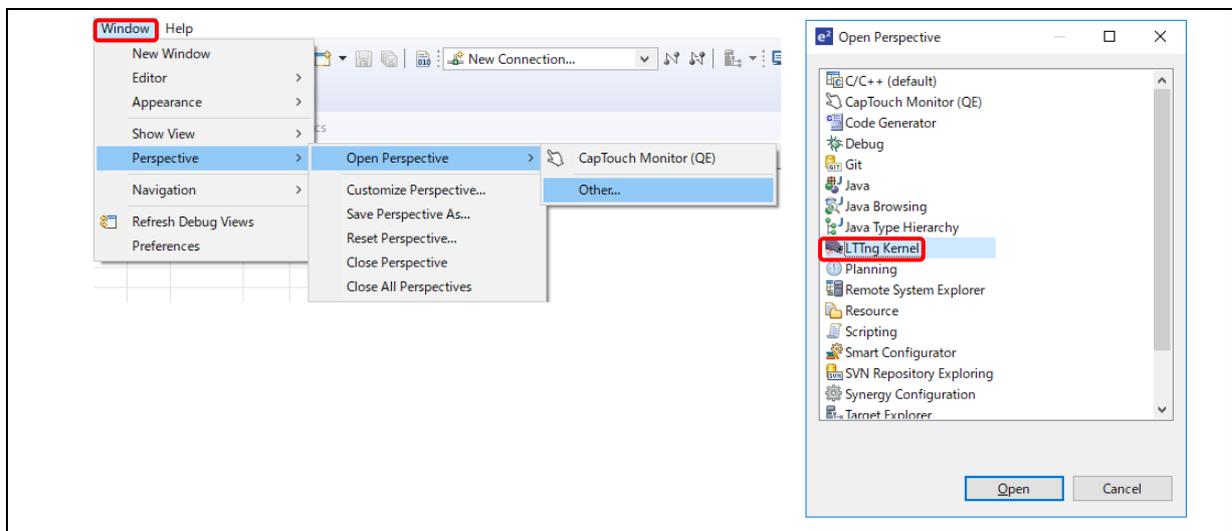
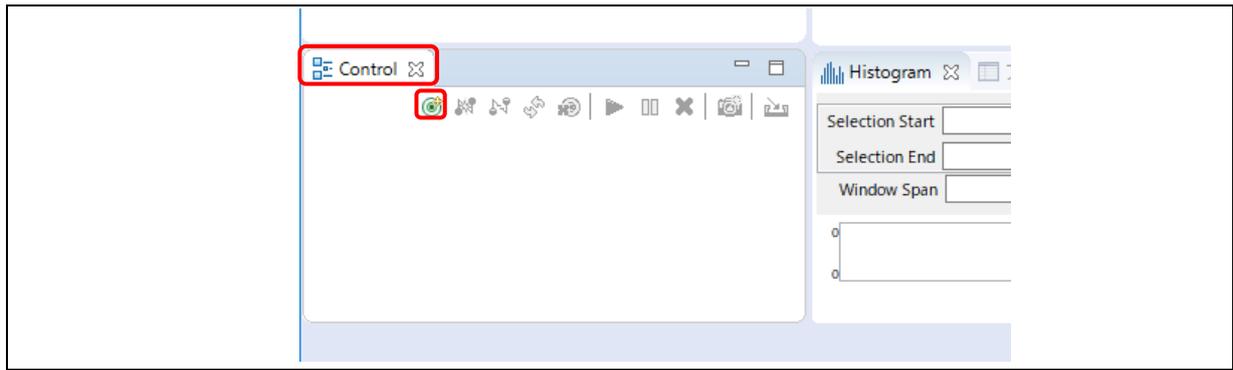


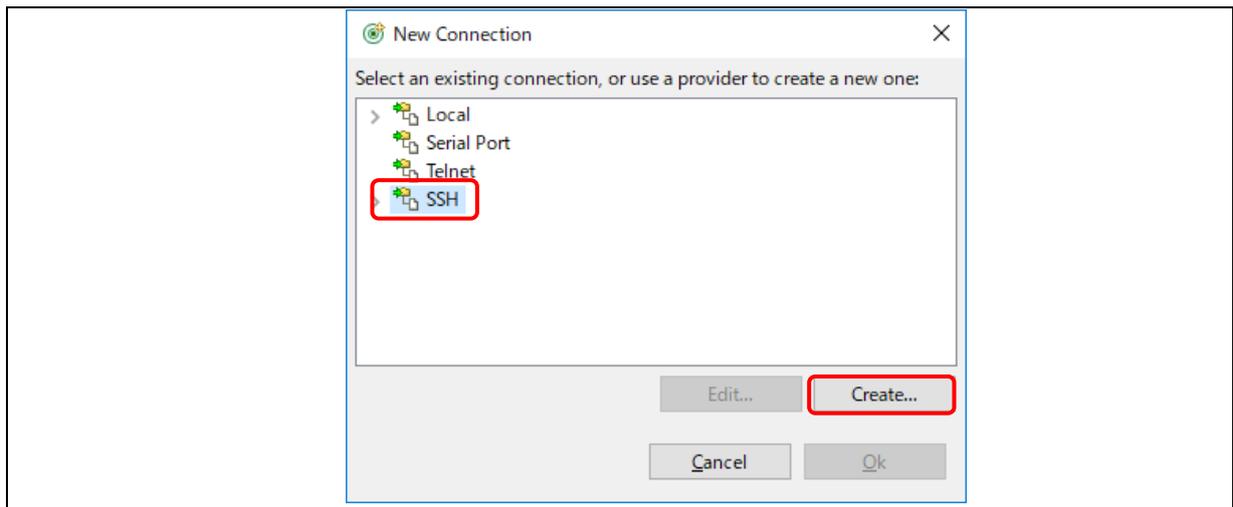
Figure 4-10 Open perspective: LTTng Kernel

(2) In 'Control' tab, Click [New Connection...].



**Figure 4-11 New Connection...**

(3) Select [SSH] and Click [Create...].



**Figure 4-12 Create connection via SSH**

(4) Connection name: Remote Host

Host: (e.g.: 169.254.88.131)

User: root (RZ/G default. If you set another user account ID, input that.)

Select 'Password based authentication'

Password: Input password if you set password of user account.

Then click [Finish]

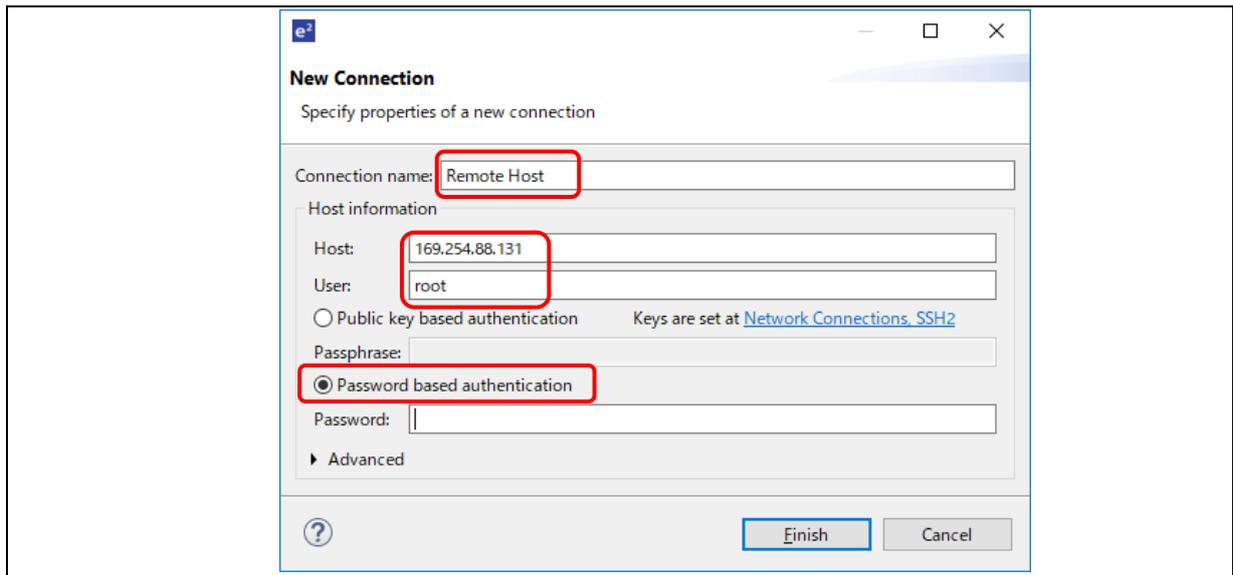


Figure 4-13 Edit Connection

(5) 'Connecting to host failed' message is shown when running connection at first but click OK.

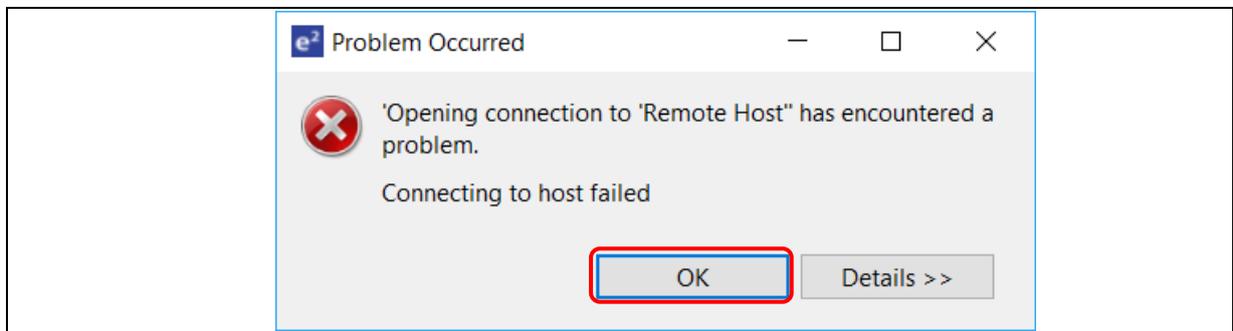


Figure 4-14 Problem occurred window

(6) In control view, connection you made is shown, click [Remote Host] first, then click [Connect] button.



Figure 4-15 Control view: Connect button

(7) [Provider] node and [Sessions] node will appear if connection is successful.

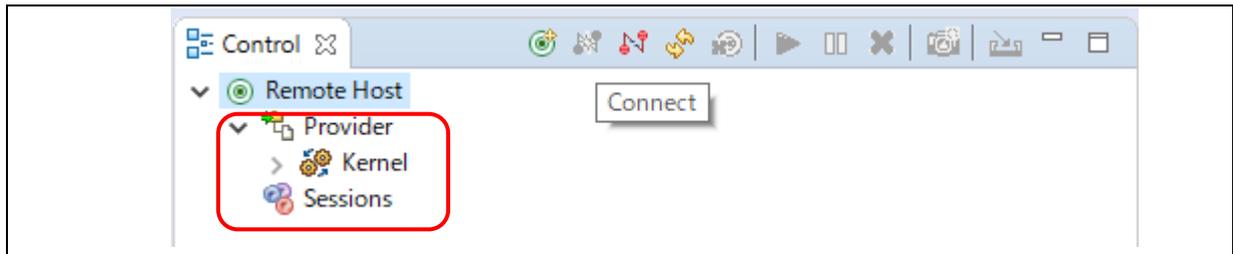


Figure 4-16 Control view: Connected status

(8) Traceable events list will appear when expanding [Kernel] node.

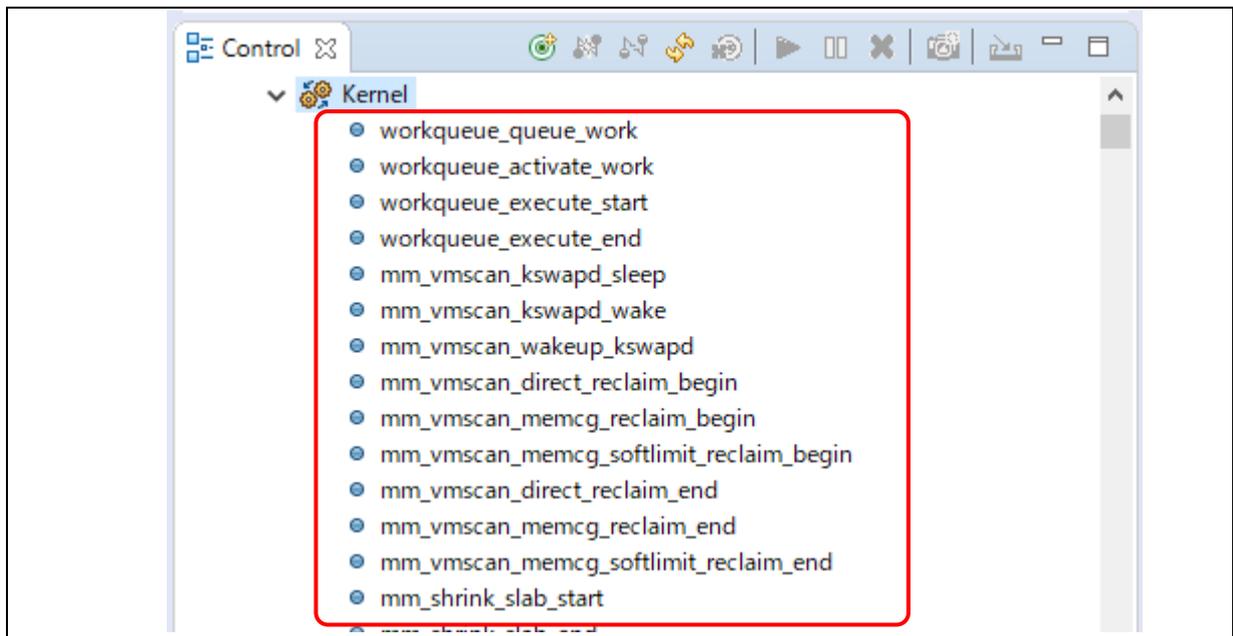


Figure 4-17 Control view: Kernel API list

(9) Right click on [Sessions] then select [Create Session...].



Figure 4-18 Control view: Create Session

(10) Enter name on [Session Name] text box (e.g. MySession01), click [OK].

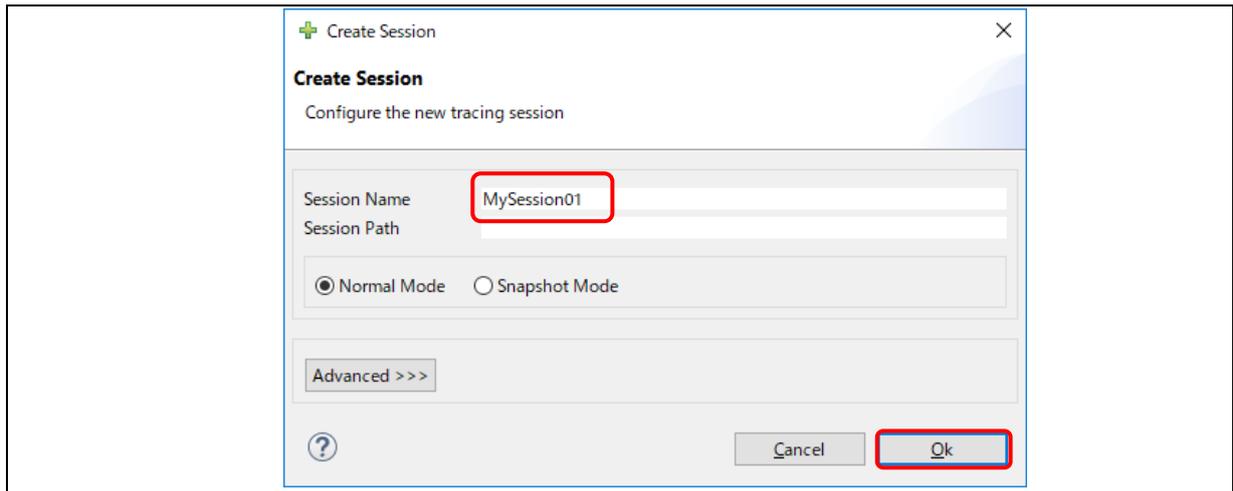


Figure 4-19 Create session: Input session name

(11) Right click [MySession01], select [Enable Channel...].

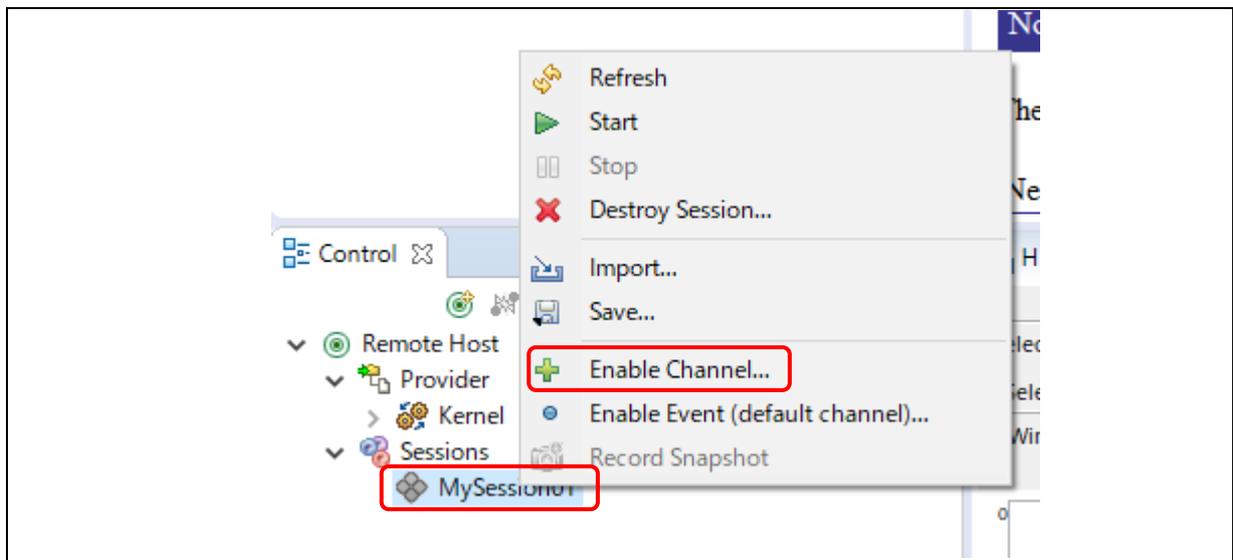


Figure 4-20 Enable channel

(12) Write name on [Channel Name] (e.g. MyChannel01). Click [OK].

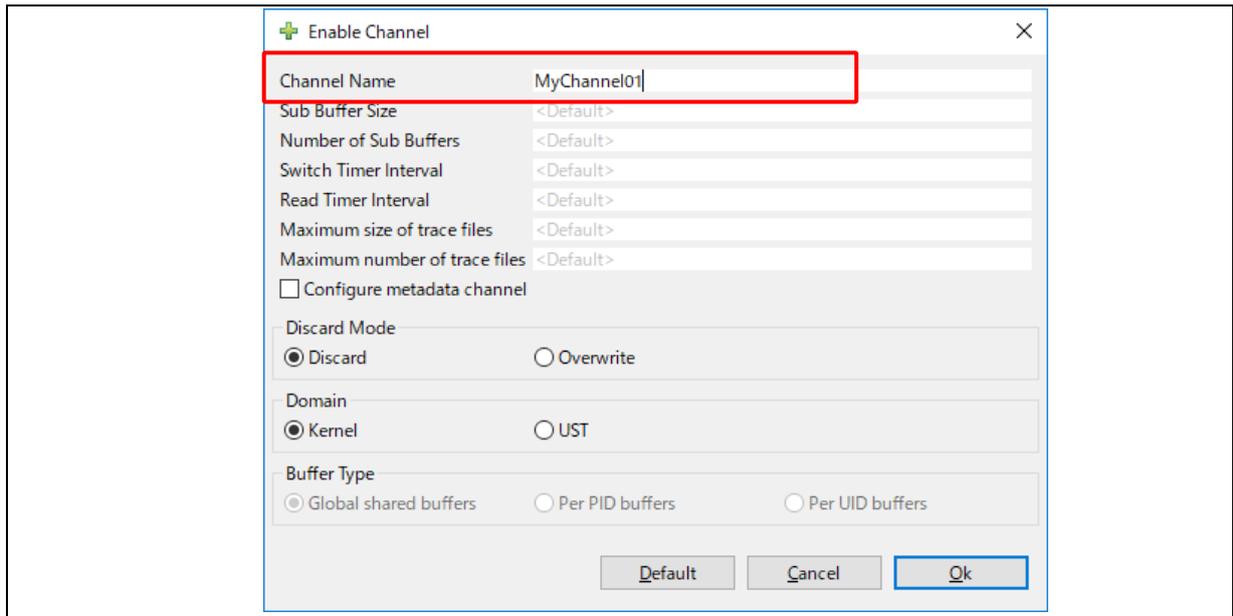


Figure 4-21 Enable channel: Input channel name

(13) Right click [MyChannel01], select [Enable Event].

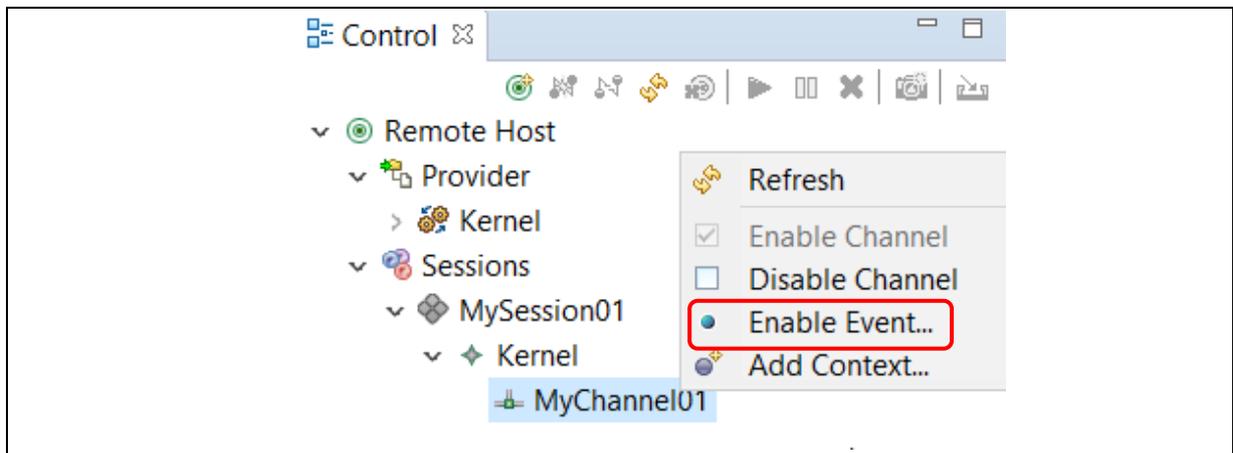
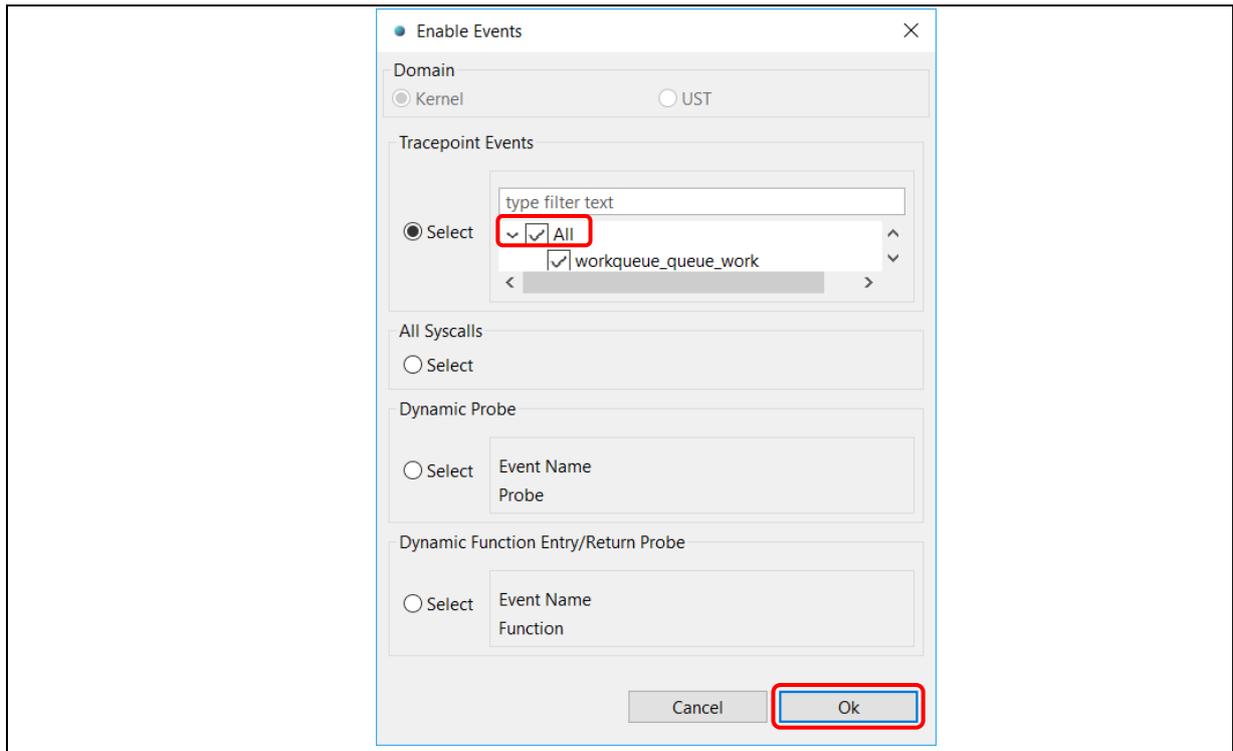


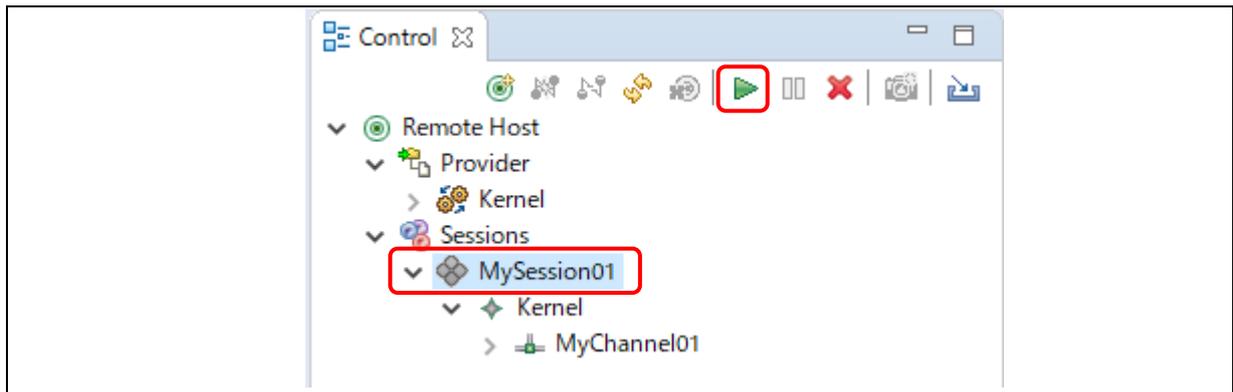
Figure 4-22 Enable Event

(14) Tick [All] check box. Click [OK].



**Figure 4-23 Enable Event: Select Tracepoint Events**

(15) Select [MySession01] node. Click [Start].



**Figure 4-24 MySession01: Start**

(16) After a while, click [Stop].

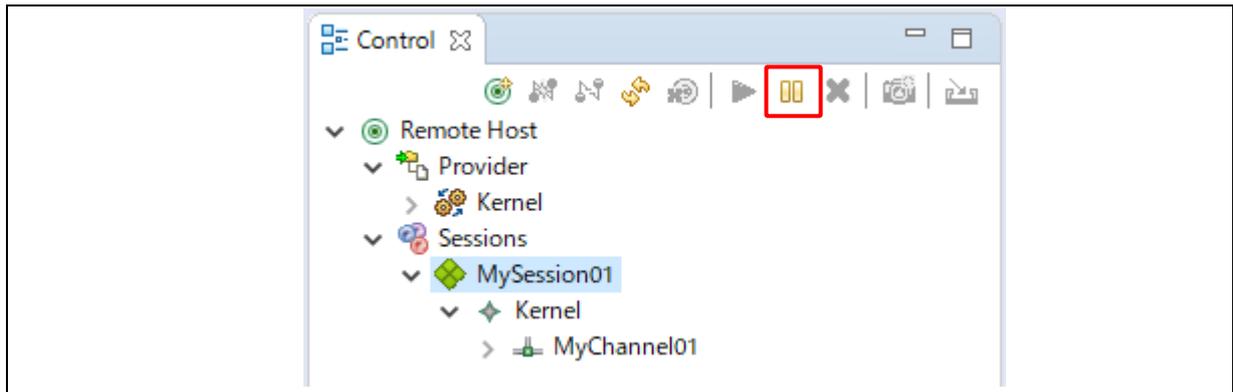


Figure 4-25 MySession01: Stop

#### 4.4 Importing and Generating Trace project

(1) Click [Import].

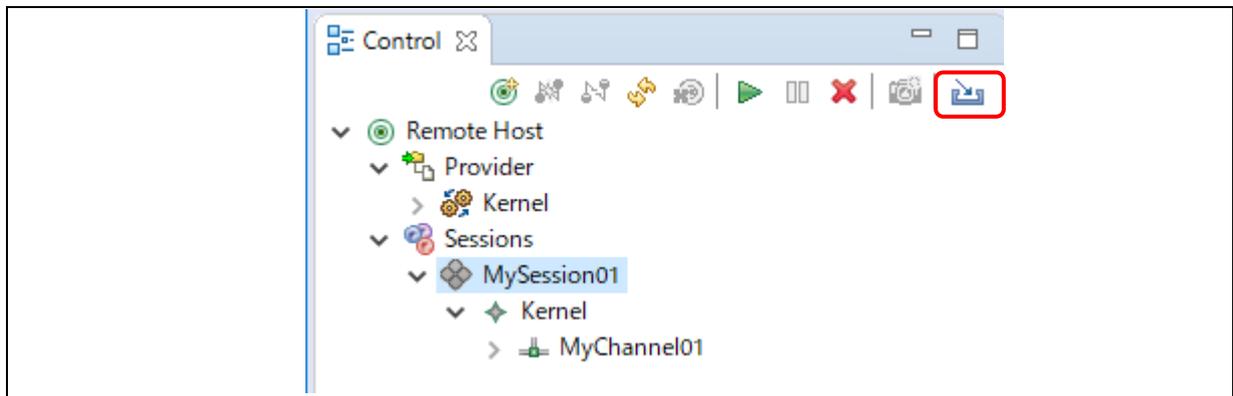
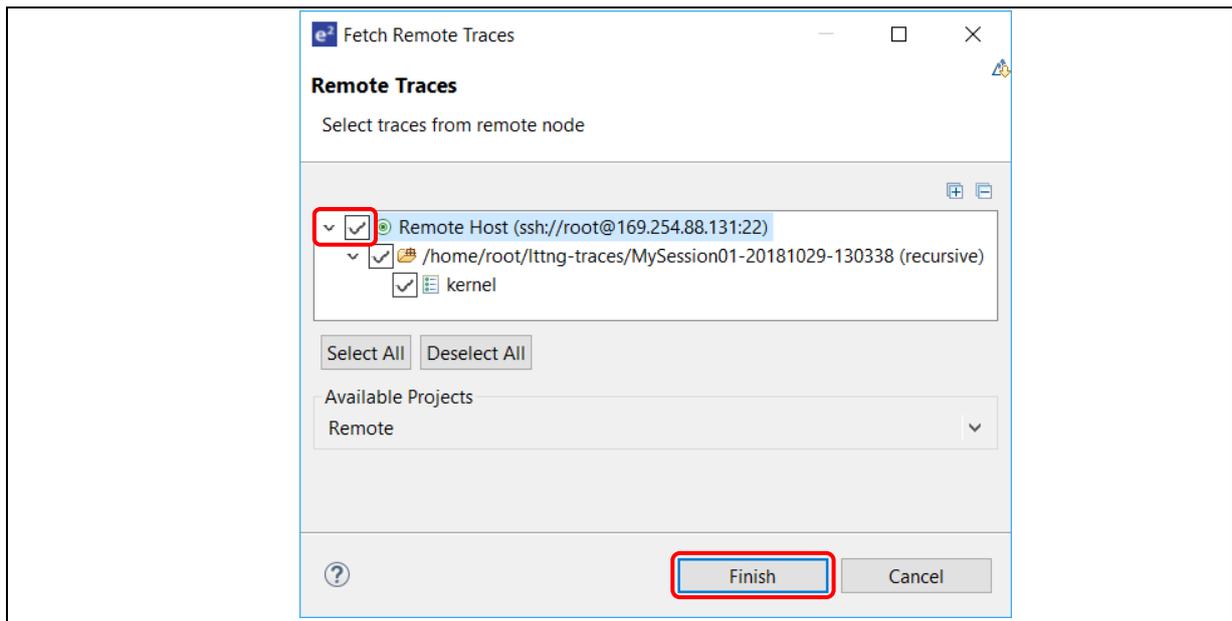


Figure 4-26 MySession01: Import to trace project

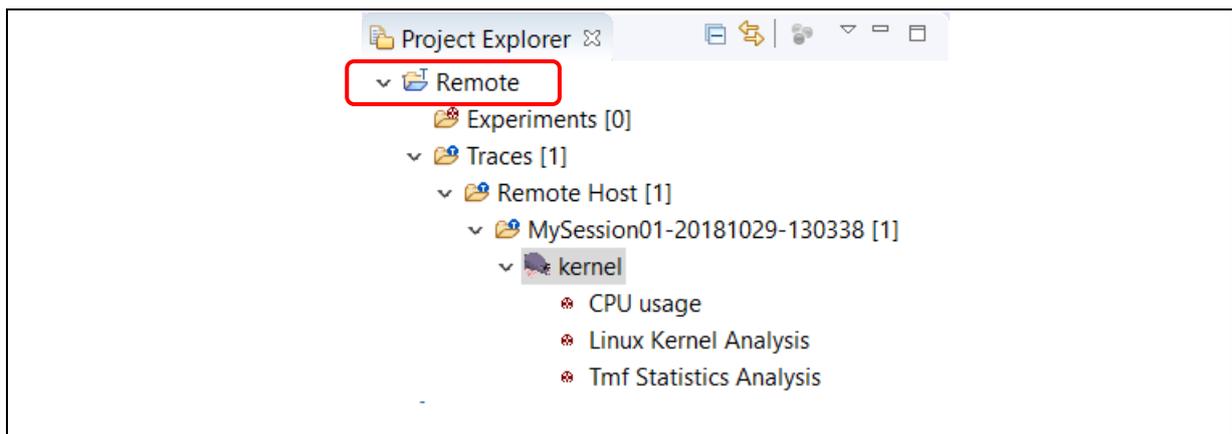
- (2) Select data for importing, Click [Finish].



**Figure 4-27 Remote traces: Select Remote Host, Session**

- (3) New Trace Project is generated, and data from the target board is enabled to watch in [Project Explorer] view.

The Project Explorer shows Tracing project with a small "T" decorator in the upper right of the project folder icon.



**Figure 4-28 Trace project in Project Explorer**

## 5. Tracing Perspective

Tracing Perspective can be opened from [Window] → [Show view] → [Other...] → [Tracing] but some view is not shown at default views location. If you need to see all tracing views,

- (1) Go to [Window] → [Show view] → [Other...].

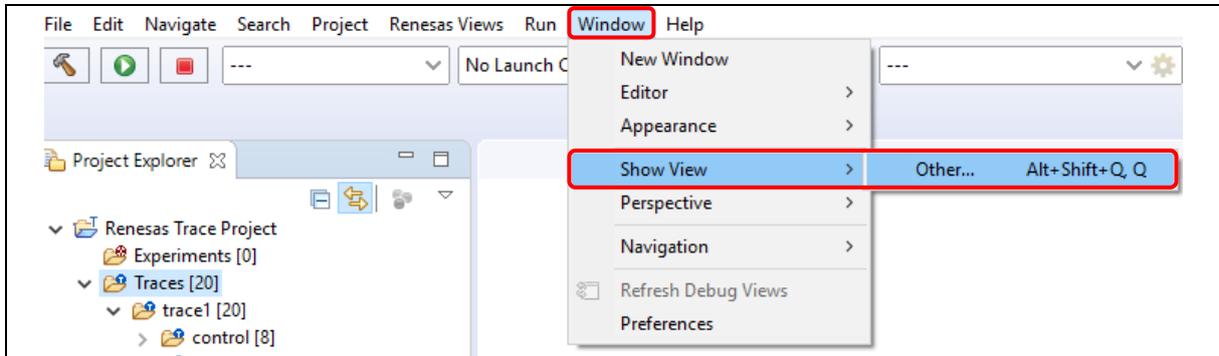


Figure 5-1 Open view: Other...

- (2) Under Tracing folder, click shift + [Call Stack] to [Time Chart] to open all the view under 'Tracing' folder.

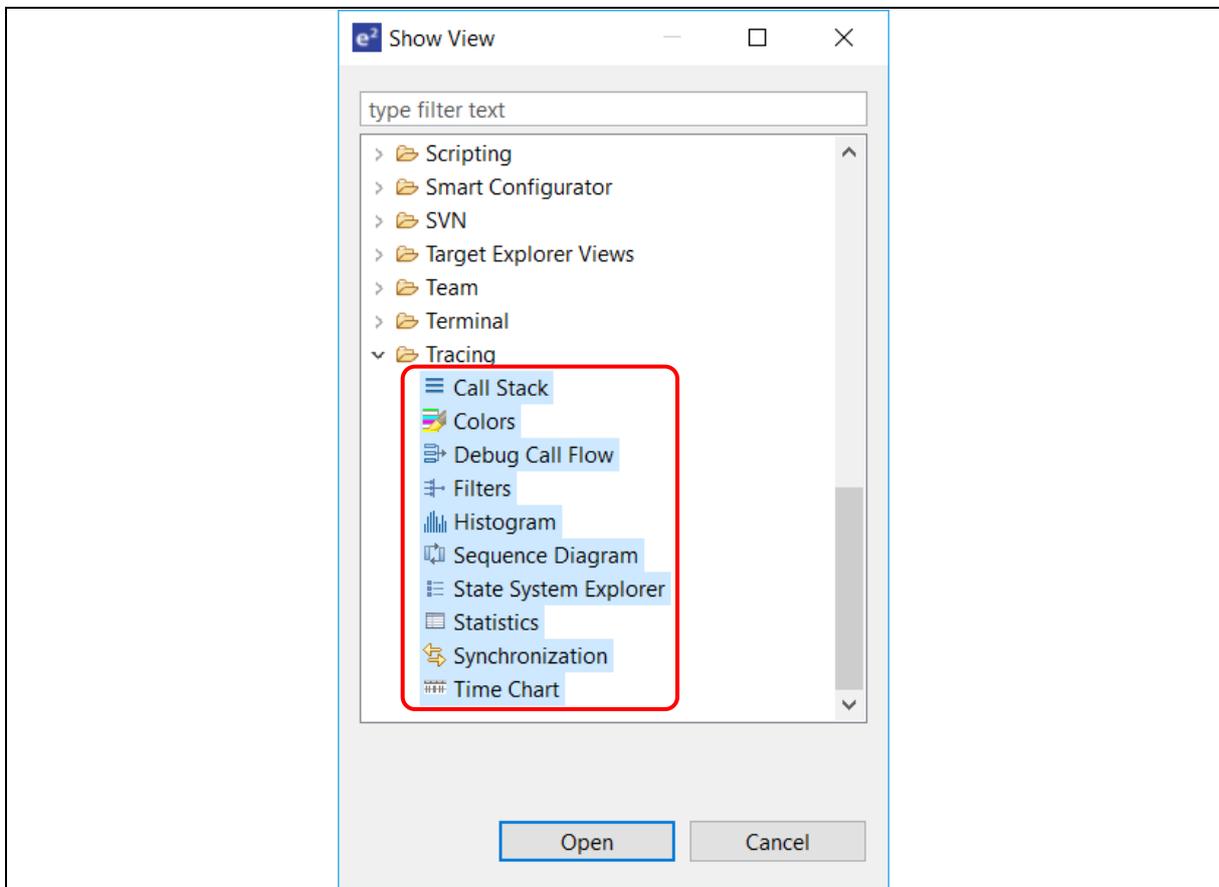


Figure 5-2 Open view: Select all views in Tracing category

## 5.1 Colors

The Colors view allows user to define a prioritized list of color settings.

A color setting associates a foreground and a background color (used in any events table), and a tick color (used in the Time Chart view), with an event filter.

- (1) Click [Insert new color settings] button to add colors settings.



Figure 5-3 Colors view

- (2) New color row will be shown in 'colors view' tab.

[FG], [BG] is the color setting for 'event table', [Text] is the previews for setting of [FG], [BG]

[Tick] is the color setting for 'Time Chart View, [  ] is the previews for setting of [Tick]

[Filter]: If the event matches multiple filters, the color setting with the highest priority will be used.

Click each button to set colors, for example:

[FG]: black

[BG]: gray

[Tick]: gray

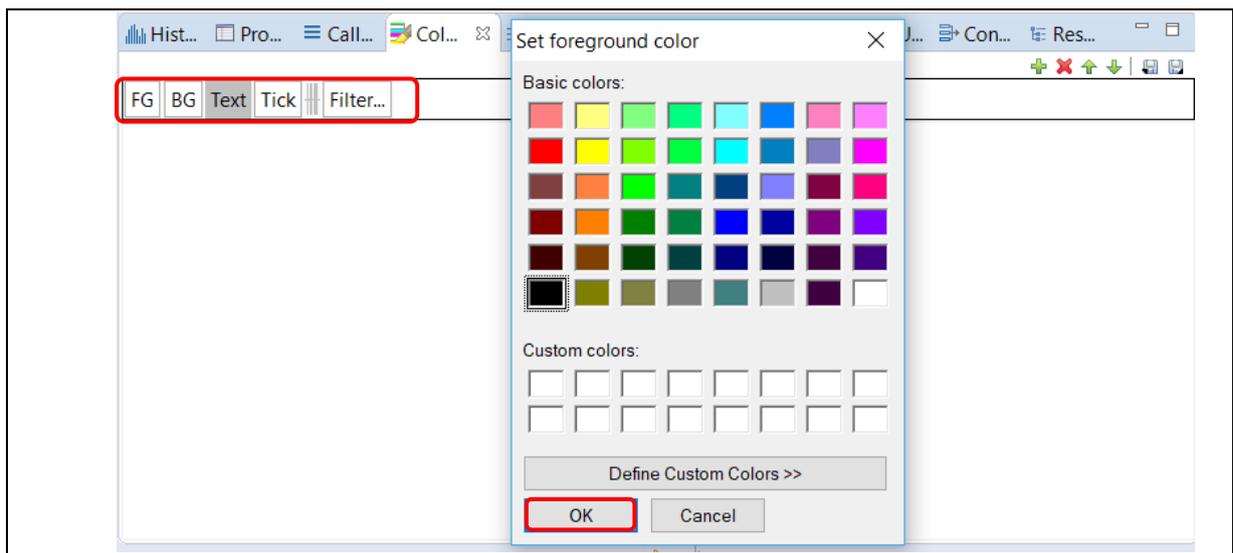
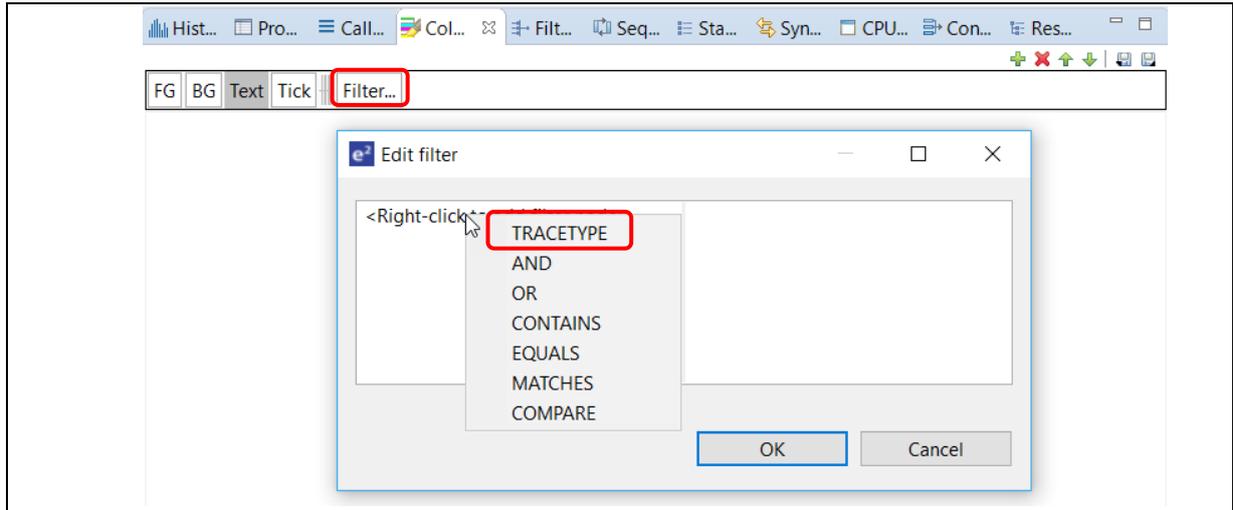


Figure 5-4 Set foreground color

- (3) Click [Filter] button to set apply conditions.

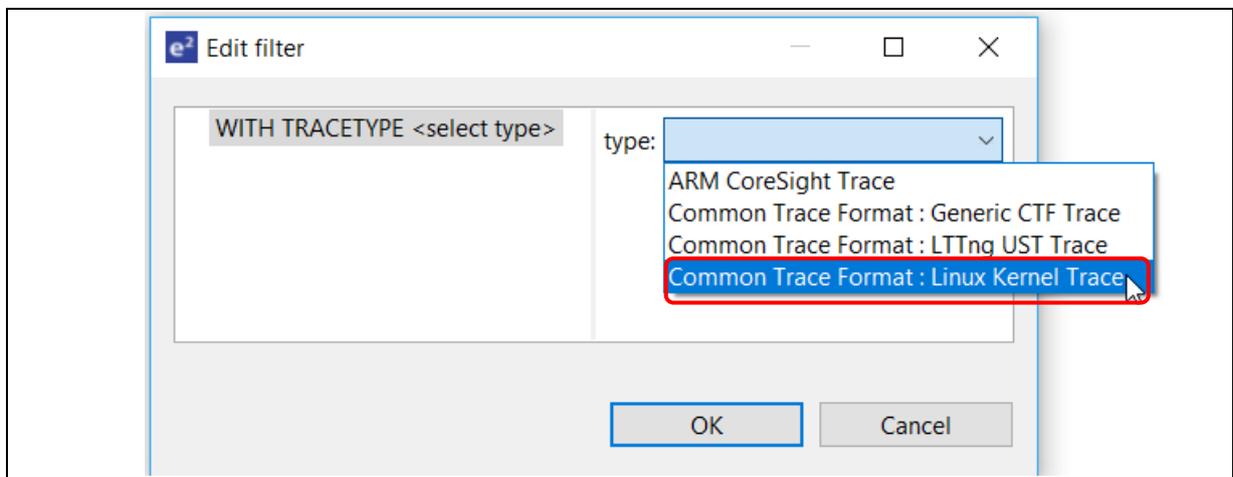
In the pop out [Editor filter] window, right click to select the operate object, for example: [TRACETYPE].



**Figure 5-5 Editor filter: Add operation**

- (4) Select corresponding trace type. Here, we use kernel and select:

Type: Common Trace Format: Linux Kernel Trace



**Figure 5-6 Editor filter: Select trace type**

- (5) Colors views allow user to set multi-color rules and manage them by using [up] [down] to set the priority.

Based on step (1) to (4), add one more color setting, and set the configuration as following:

[FG]: black

[BG]: Green

[Tick]: Green

[Filter]: [Contains]

Type: [common]

Aspect: Event type

Value: (e.g.: kmem\_cache\_alloc)

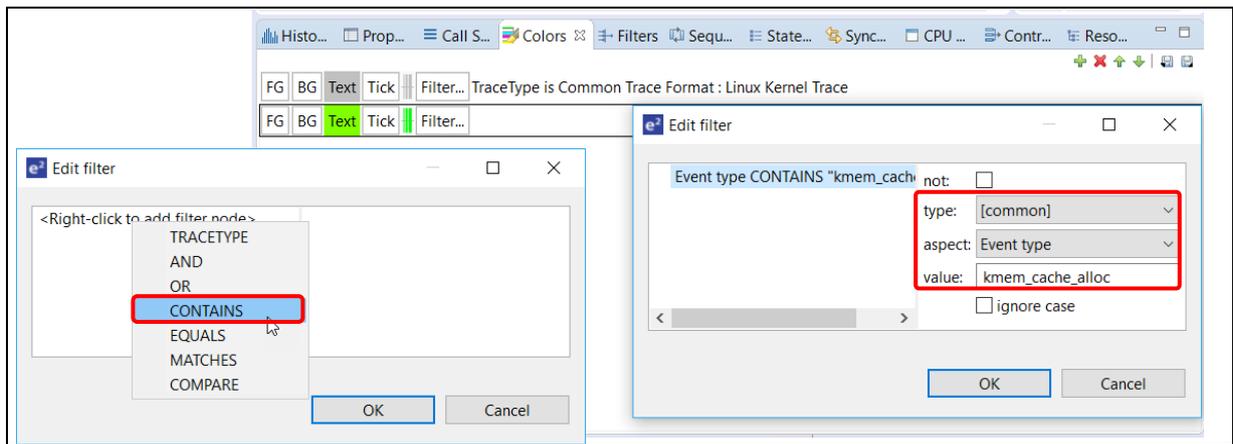


Figure 5-7 Editor filter example: Show event contained 'kmem\_cache\_alloc'

- (6) The colors setting 'gray background text color, gray tick color' were shown corresponding in [Event table] and [Time Chart View].

Note that the green color setting is not shown, use [up] and [down] button, to adjust its priority.

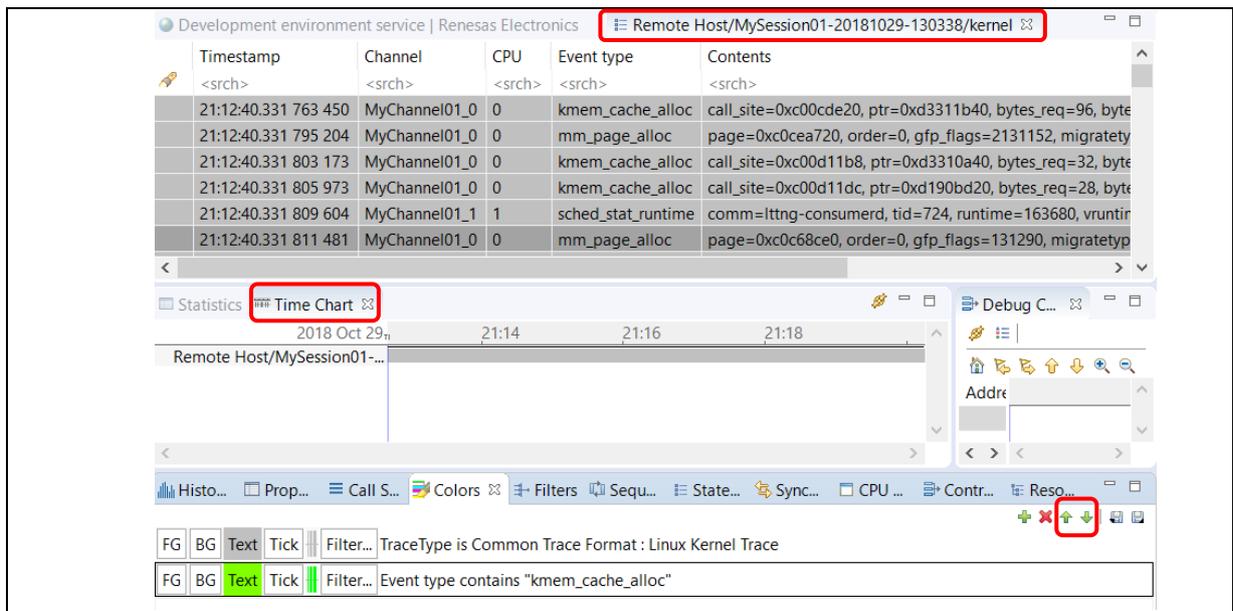


Figure 5-8 Color setting effects shown in various view

- (7) After changing the priority or the color settings, the color in [event table] and [Time Chart View] will change accordingly.

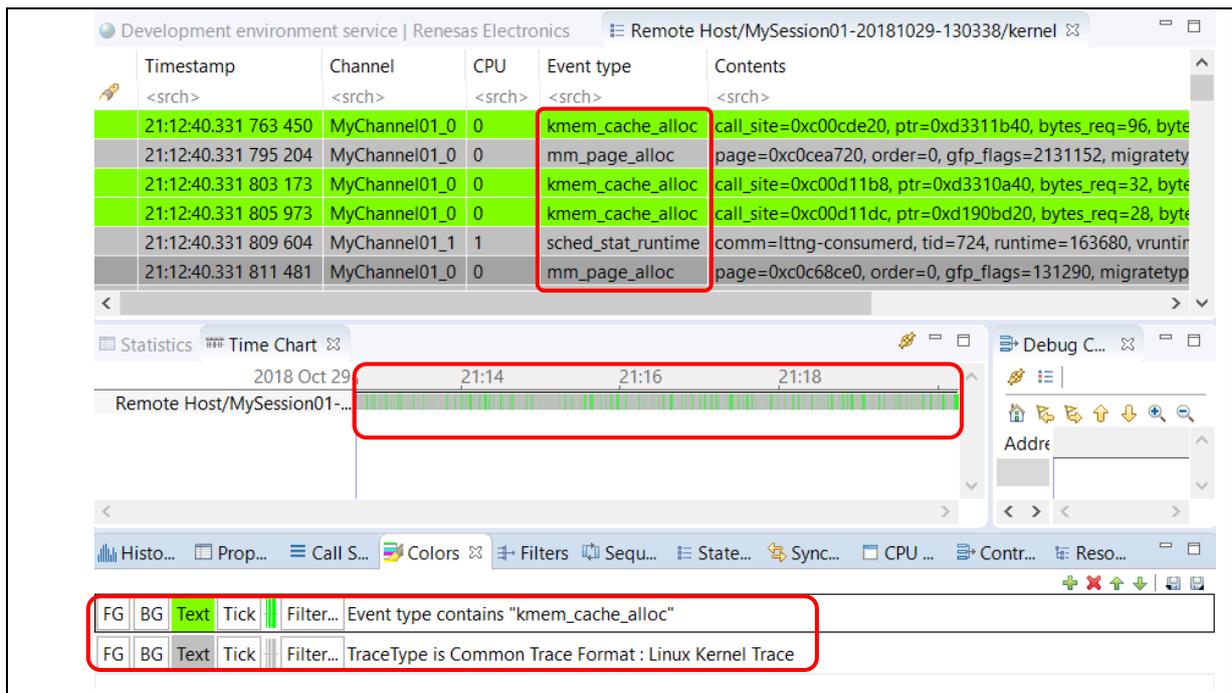


Figure 5-9 Color setting effects shown in various view

- (8) You could use [Export] and [Import] button to export or import the color settings.

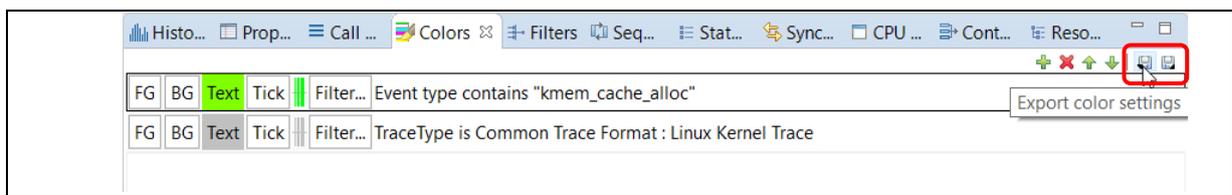


Figure 5-3 Export color settings

## 5.2 Histogram

The Histogram View displays the trace events distribution with respect to time. When streaming a trace, this view is dynamically updated as the events are received.

(1) Histogram has 2 graph views:

- Bottom side graph is the full histogram on whole timeline.
- Upper side graph is the section histogram on partial timeline.

On the top left, there are three text controls:

- Selection Start: Display the start time of the current selection.
- Selection End: Display the end time of the current selection.
- Window Span: Display the current zoom window size in seconds.



**Figure 5-4 Histogram view**

(2) User could set any two of the settings, [Selection Start], [Selection End] and [Window Span].

E.g.: click  button to disable the [Selection End].

[selection Start]: 21:16:00:000 000 000

[Window Spam]: 020.000 000 000

The partial timeline histogram will update accordingly: start from '21:15:50,000 000 000' to '21:16:10,000 000 000'.



**Figure 5-5 Histogram view: Select partial timeline**

- (3) In full histogram, left click + drag to set a selection range, the time range selected for histogram will change accordingly.



Figure 5-6 Histogram view: Change selected timeline

- (4) The Align Views toggle  button in the view menu allows to disable and enable the automatic time axis alignment of time-based views. Disabling the alignment in the Histogram view will disable this feature across all the views because it's a workspace preference.

The Hide Lost Events toggle  button in the local toolbar allows to hide the bars of lost events. When the button is selected, it can be toggled again to show the lost events.

The Activate Trace Coloring toggle  button in the local toolbar allows to use separate colors for each trace of an experiment. Note that this feature is not available if your experiment contains more than twenty-two traces. When activated, a legend is displayed at the bottom on the histogram view.

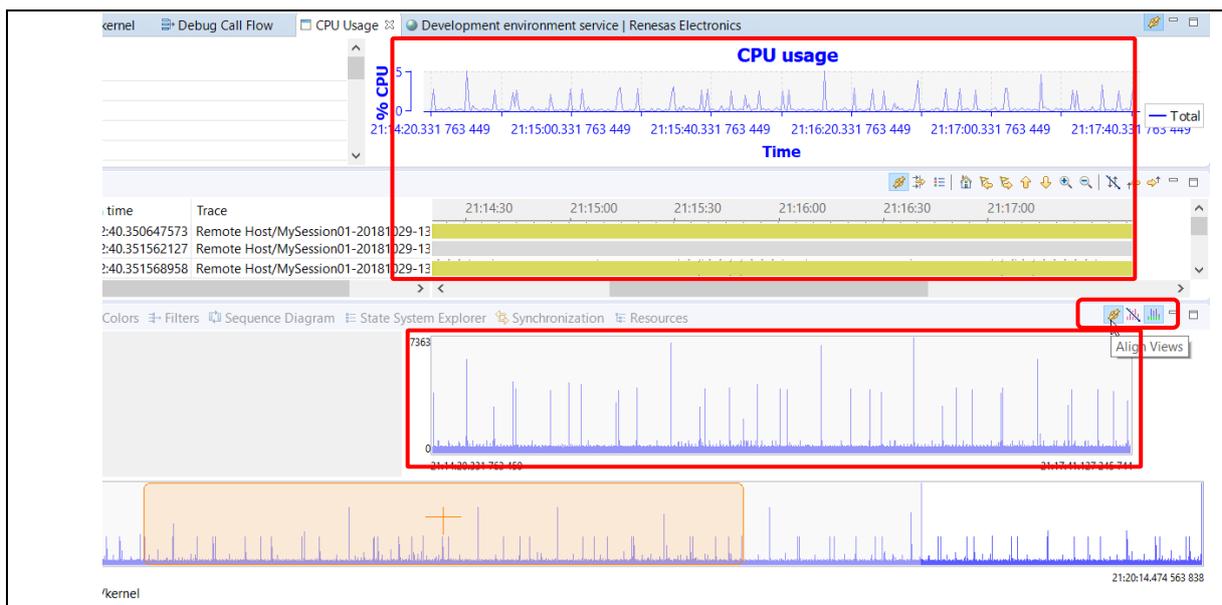


Figure 5-7 Histogram view: Align with CPU Usage view

- (5) Hovering the mouse over a histogram bar pops up an information window that displays the start/end time of the corresponding bar, as well as the number of events (and lost events) it represents. If the mouse is over the selection range, the selection span in seconds is displayed.

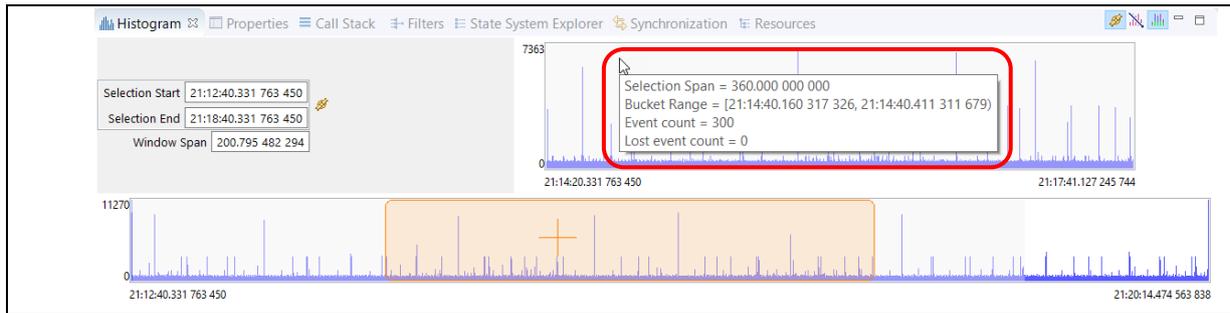


Figure 5-8 Pop up an information window

### 5.3 State System Explorer

The State System Explorer view allows user to inspect the state interval values of every attribute of a state system at specific time.

The view shows a tree of currently selected traces and their registered state system IDs. For each state system the tree structure of attributes is displayed. The attribute name, quark, value, start and end time, and full attribute path are shown for each attribute.

View time start from: 21:12:40.

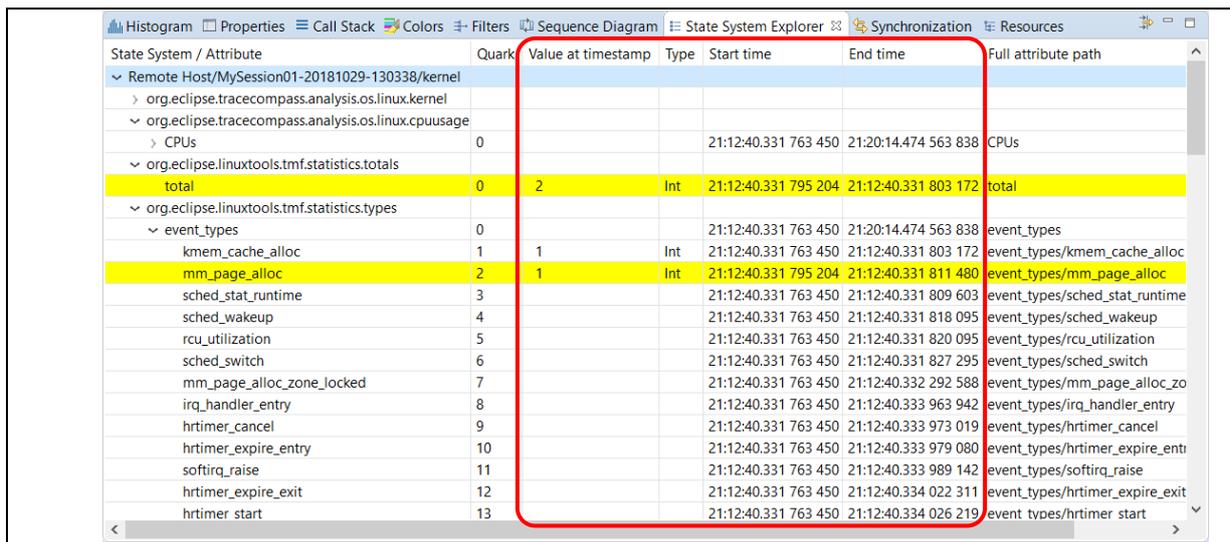


Figure 5-9 State System Explorer

To modify the time of attributes shown in the view, select a different current time in other views that support time synchronization (e.g. event table, histogram view). When a time range is selected, this view uses the begin time.

E.g., After selecting a different time in event table, the view time start from 21:16:01.

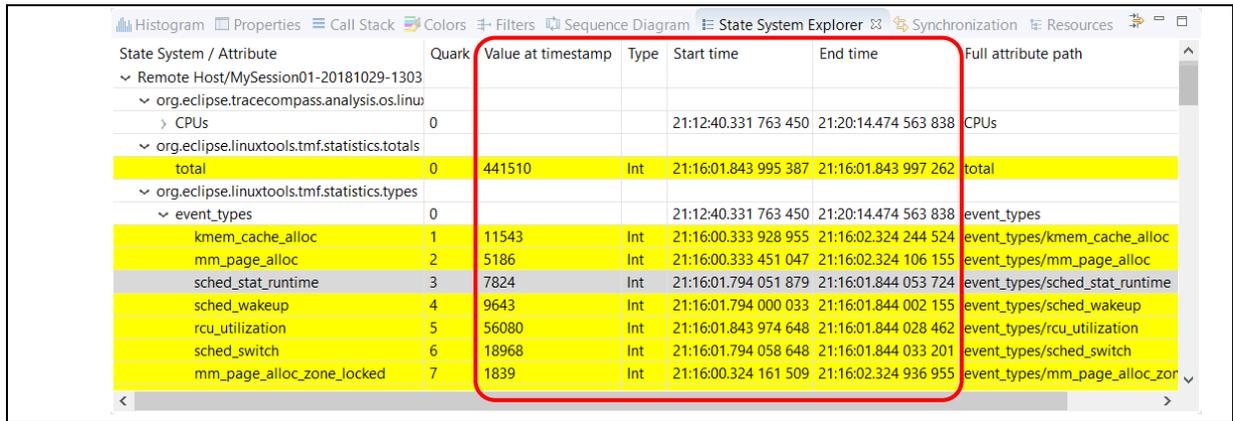


Figure 5-17 State System Explorer

### 5.4 Statistics

The Statistics View displays the various event counters that are collected when analyzing a trace. After opening a trace, the data is organized per trace.

This view shows 3 columns: Level, Events total and Events in selected time range.

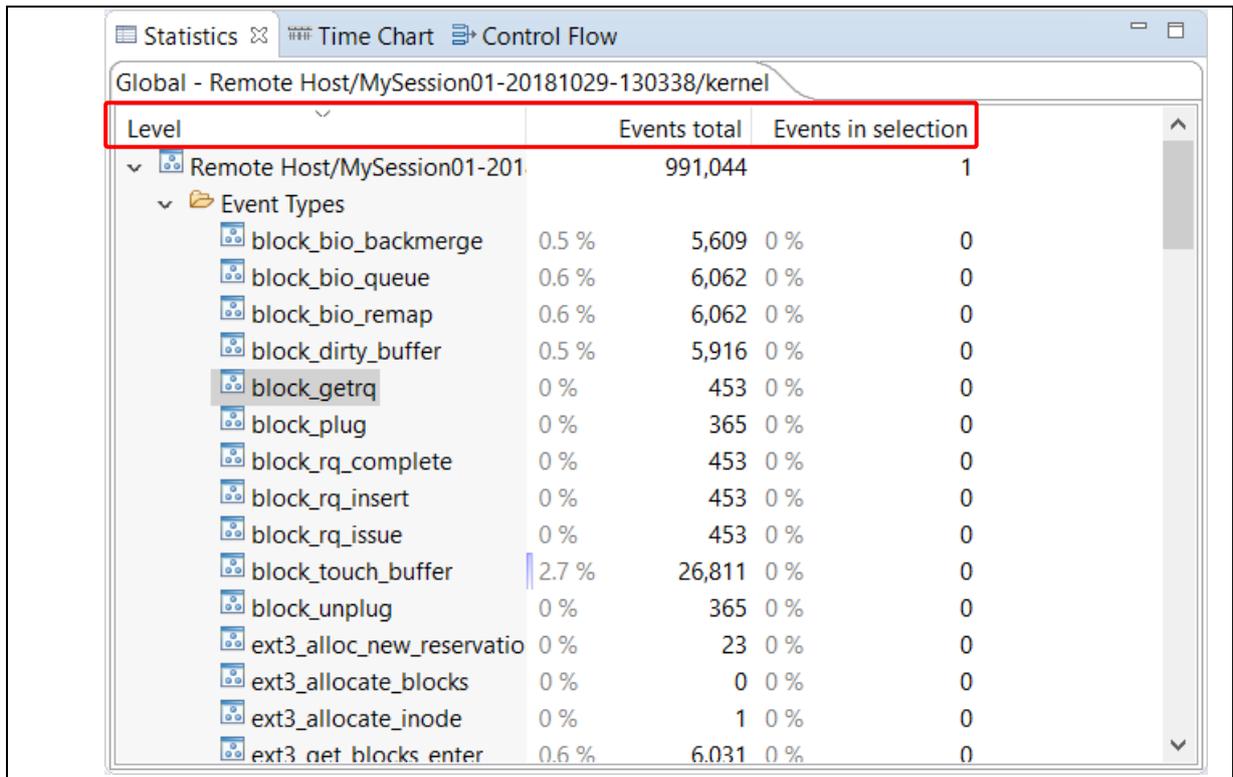


Figure 5-18 Statistics view

## 5.5 Synchronization

It is possible to synchronize traces from different machines so that they have the same time reference. Events from the reference trace will have the same timestamps as usual, but the events from traces synchronized with the first one will have their timestamps transformed according to the formula obtained after synchronization.

In order to synchronize traces, create a new experiment and select all traces that need to be synchronized. Right-click on the experiment and select **Synchronize traces**. For each trace whose time needs to be transformed, a new trace named as the original but followed by a '\_' will be created with the transformed timestamps, and the original trace will be replaced in the experiment. The original trace can still be accessed under the **Traces** folder.

Note that two opened instances of the same trace are never time synchronized with each other, regardless of the toggle option.

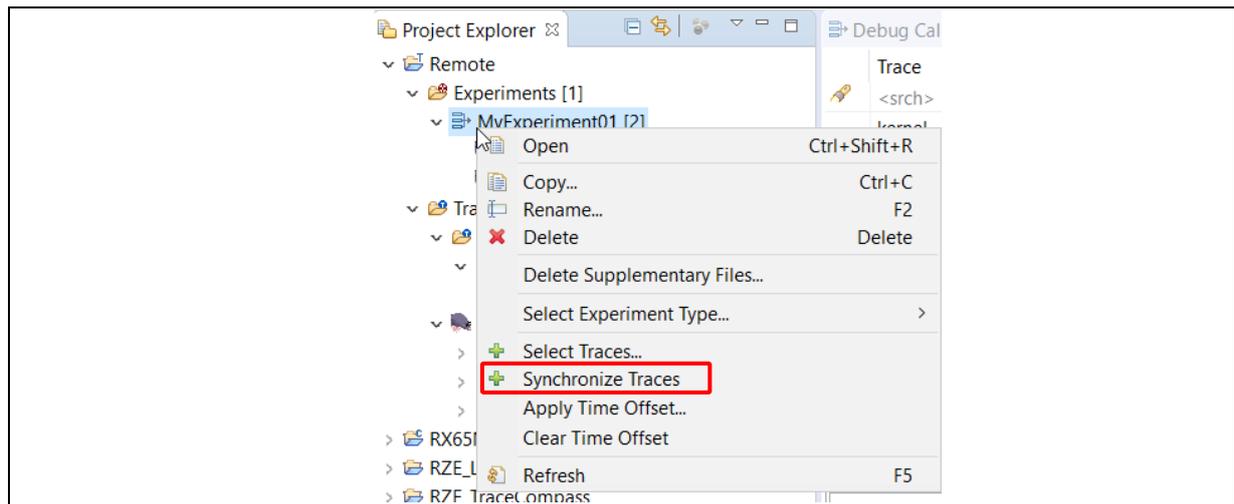


Figure 5-19 Add traces to Synchronize Traces

Information on the quality of the synchronization, the timestamp transformation formula and some synchronization statistics can be visualized in the Synchronization view.

Synchronization Information	Value
net_sync <==> net_sync2	{T0=net_sync, T1=net_sync2, Quality=Accurate, Alpha=1.0000010108584111904359504407234
T0	net_sync
T1	net_sync2
Quality	Accurate
Alpha	1.000001010858411190435950440723425
Beta	-1346443531105.521413976187750
Number of points in upper hull	3
Number of points in lower hull	4
Accuracy	8.131190197381218E-5
Number of matching packets received	77
Number of accurate packets	41
C_T0(t)	T_net_sync
C_T1(t)	1.000001010858411190435950440723425*T_net_sync + -1346443531105.521413976187750

Figure 5-10 Synchronization view

## 5.6 Time Chart

The Time Chart view allows user to visualize every open trace in a common time chart. Each trace is displayed in its own row and ticks are displayed for every punctual event.

As user zooms using the mouse wheel or by right-clicking and dragging in the time scale, more detailed event data is computed from the traces.

The tick colour could be changed as per preference, see setting at chapter 3.2 colour view.

The Align Views toggle button  in the view menu allows to disable and enable the automatic time axis alignment of time-based views.

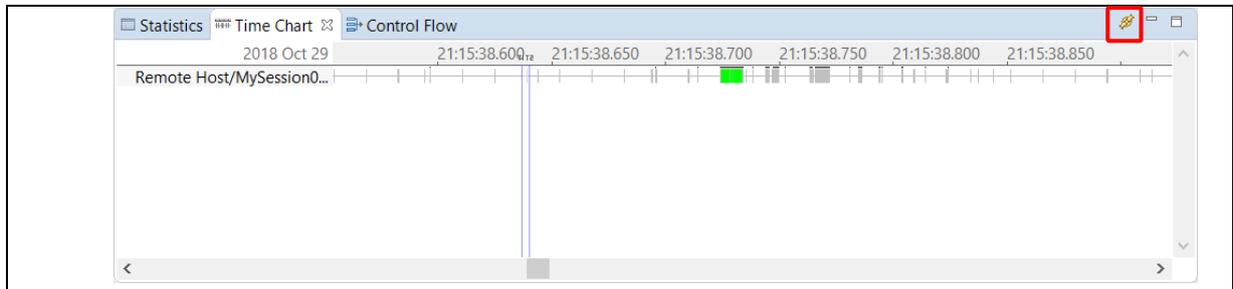


Figure 5-11 Time Chart view

## 6. LTTng Perspective

LTTng perspective can be opened from [Window] → [Show view] → [Other...] → [LTTng kernel] but some view is not shown at default views location. If you need to see LTTng views,

- (1) Go to [Window] → [Show view] → [Other...].

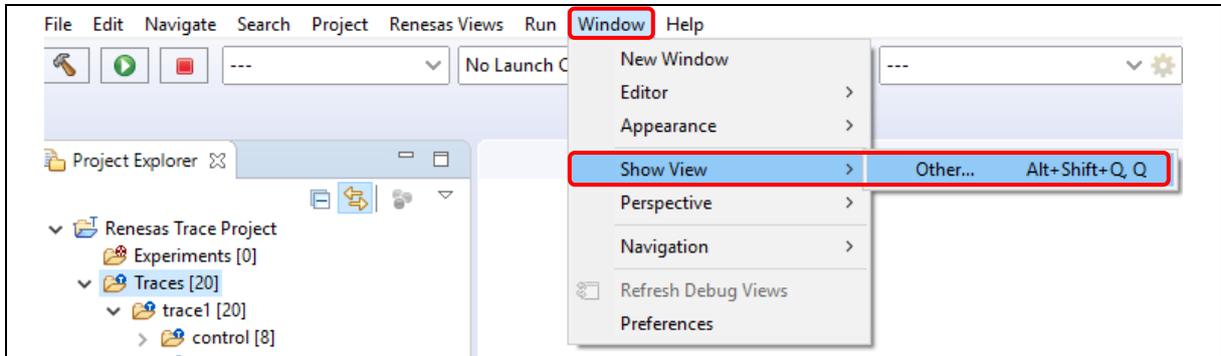


Figure 6-1 Show view

- (2) Click LTTng folder and select view you want.

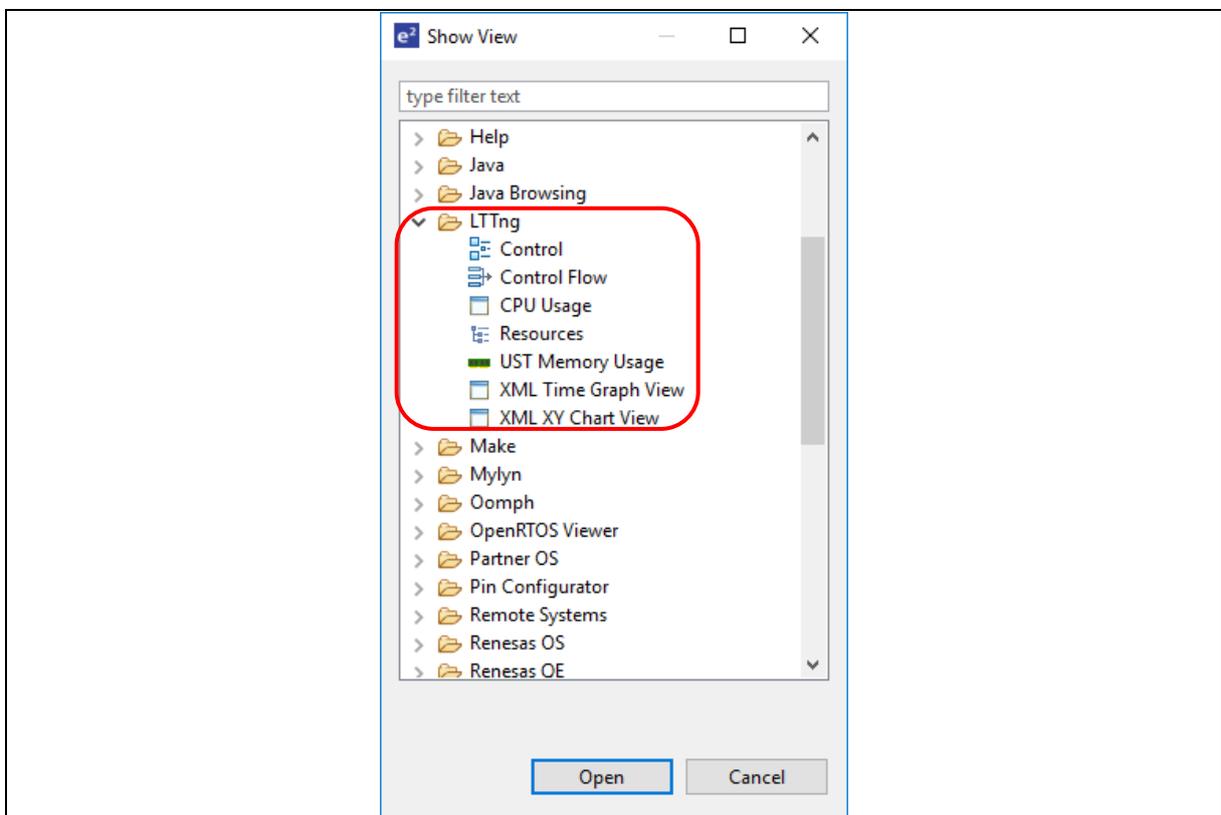


Figure 6-2 LTTng views

## 6.1 Control

The LTTng Tracer Control in e<sup>2</sup> studio for the LTTng Tracer toolchain (org.eclipse.tracecompass.lttng2) is done using SSH and requires an SSH server to be running on the remote host.

Please refer to chapter 4.3 for the setting of Remote host.

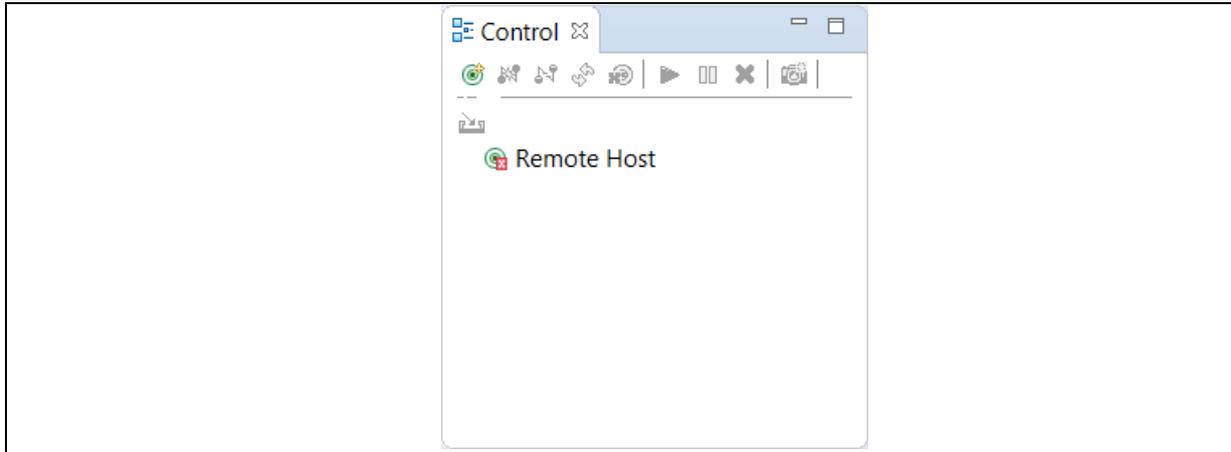


Figure 6-3 Control view

## 6.2 Control Flow

The Control Flow view is a LTTng-specific view that shows per-process events graphically.

After opening the trace, the element Control Flow is added under the Linux Kernel Analysis tree element in the Project Explorer. To open the view, double-click the Control Flow tree element.

Alternatively, select Control Flow under LTTng within the 'Show View' under 'Window' (Window → Show View → Other...):

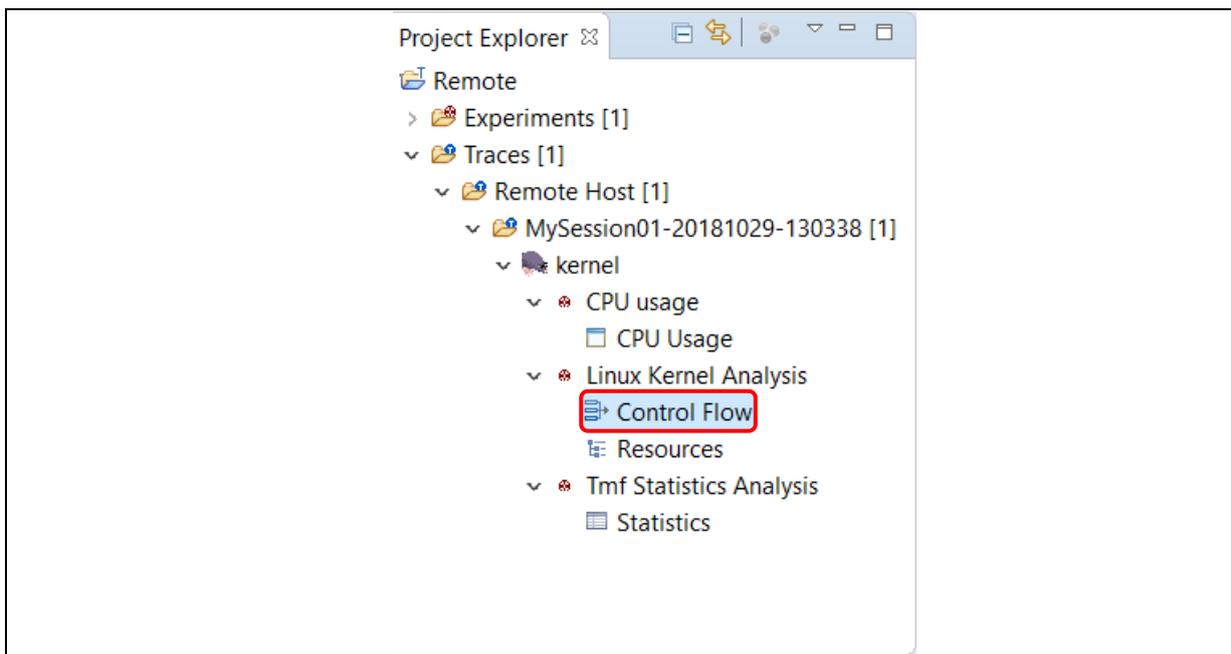
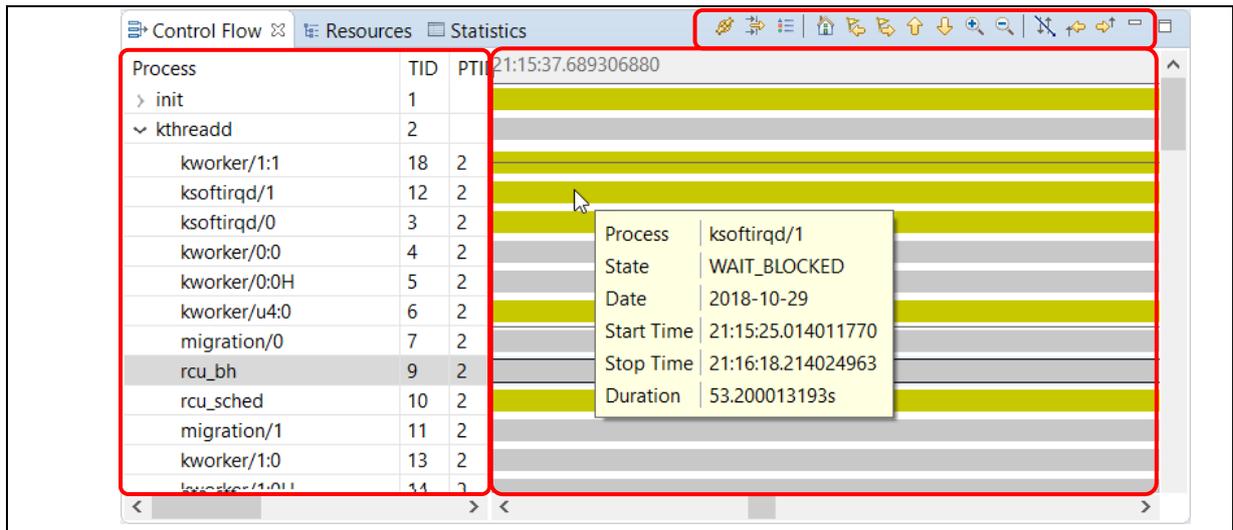


Figure 6-4 Control Flow

The view is divided into the following important sections: process tree and information, control flow and the toolbar. The time axis is aligned with other views that support automatic time axis alignment.

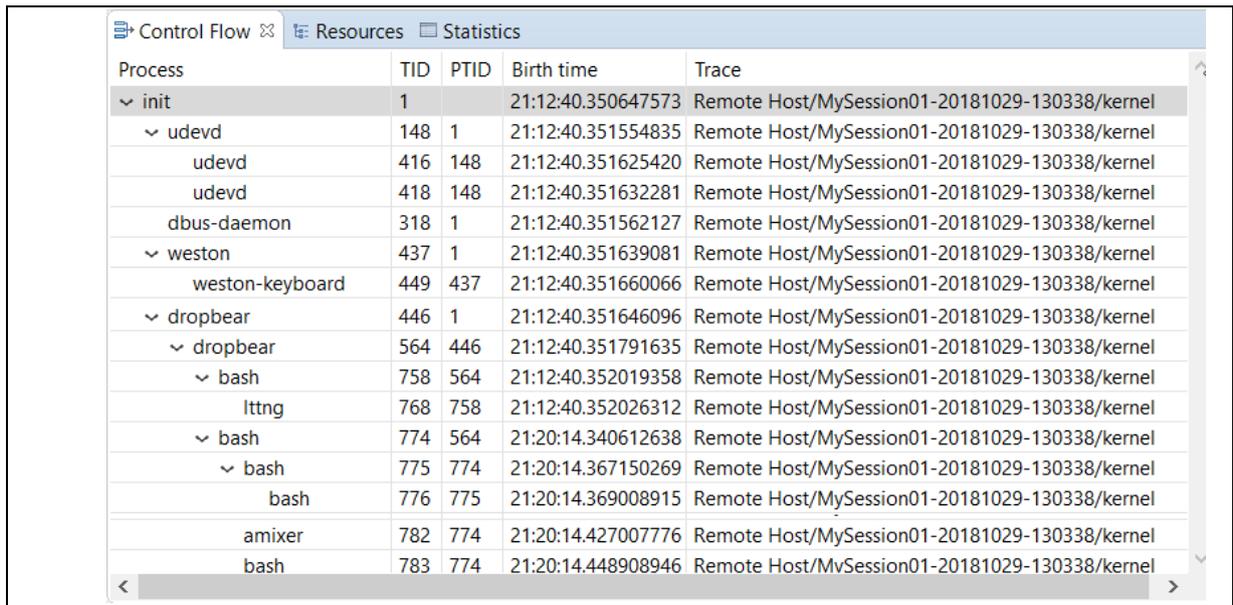


**Figure 6-5 Control Flow view: Process tree, control flow and toolbar**

- (1) Process tree and information: Processes are organized as a tree within this view. This way, child and parent processes are easy to identify.

A given process may be shown at different places within the tree since the nodes are unique (TID, birth time) couples.

The TID column shows the process node's thread ID and the PTID column shows its parent thread ID (nothing is shown if the process has no parent).



**Figure 6-6 Control Flow view: Detail information of processes**

- (2) Click [Filter] button to open filter window.  
 Untick the checkbox of 'kthread', then click [OK].

The process window will update accordingly: process for 'init' still viewable, while process 'kthread' disappear in the process tab.

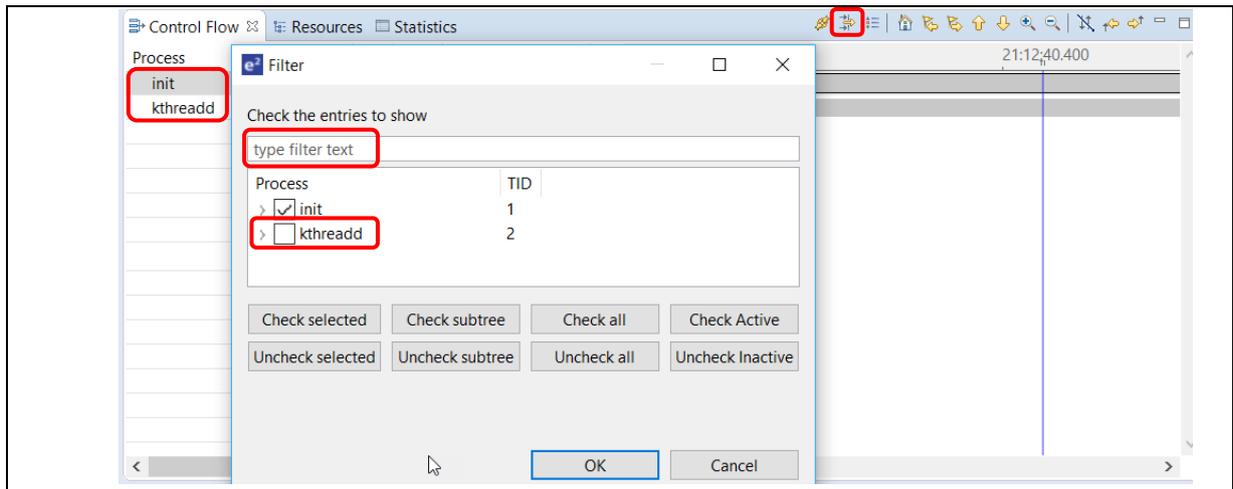


Figure 6-7 Control Flow view: Set filter

- (3) The colored bars you see represent states for the associated process node. When a process state changes in time, so does the color.

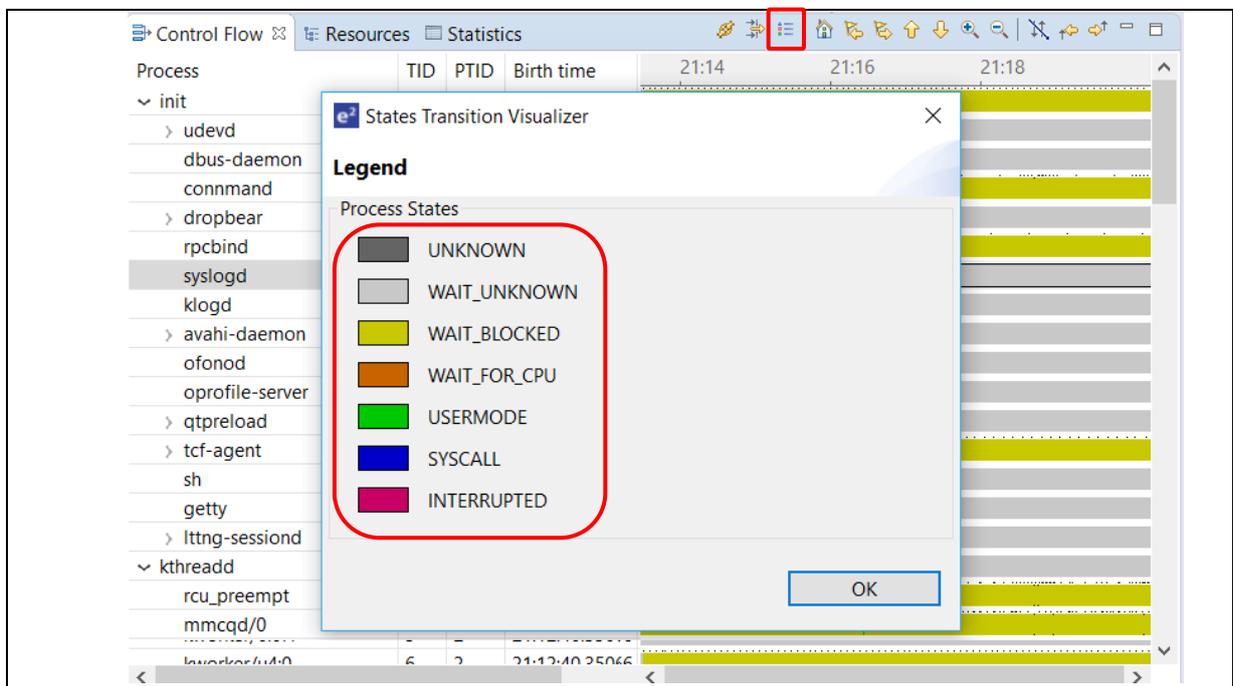


Figure 6-8 Control Flow view: Set color

- (4) You'll notice **small dots** over the colored bars at some places:

Those dots mean the underlying region is incomplete: there's not enough pixels to view all the events. In other words, you need to zoom in.

- (5) When zooming in, small dots start to disappear when no dots are left, you are viewing **all the events and states** within that region.



Figure 6-9 Control Flow view: Small dots in bars

- (6) Use [Zoom In], [Zoom Out] button and [Reset the time scale to the Default] to set the time scale.

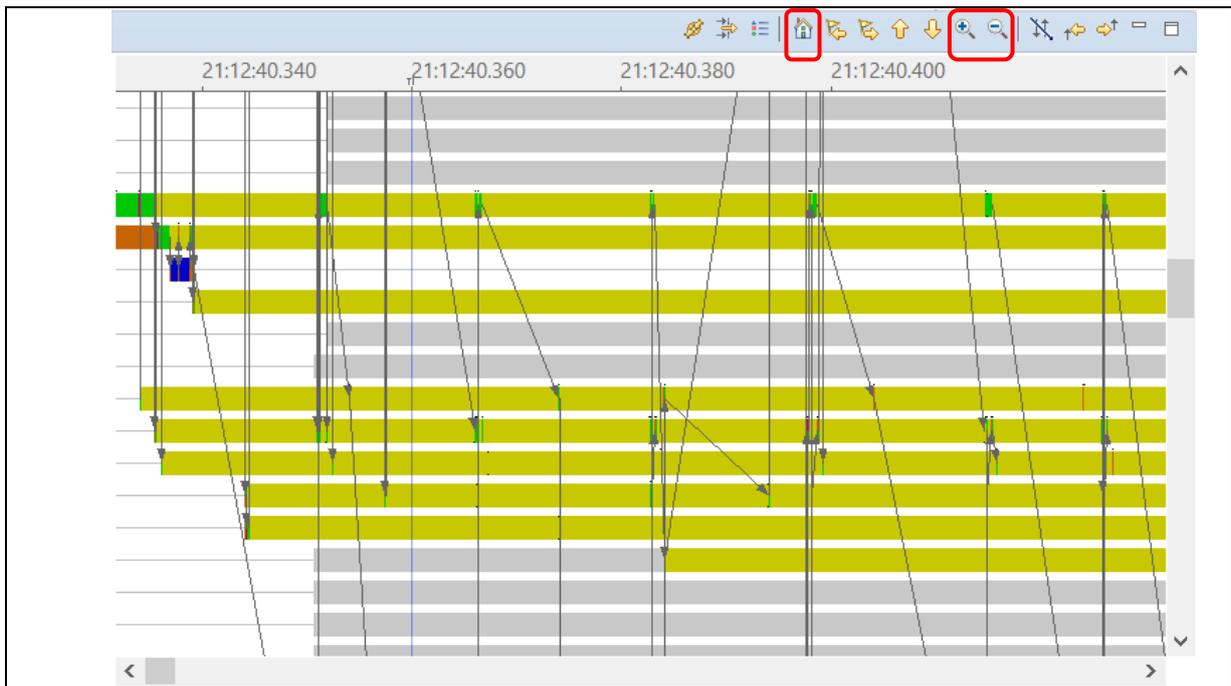


Figure 6-10 Control Flow view: [Zoom In], [Zoom Out] button

(7) Click following button to go to each process:

Button	Description	Button	Description
	select previous event		select next event
	select previous process		select next process
	Follow CPU backward		Follow CPU forward

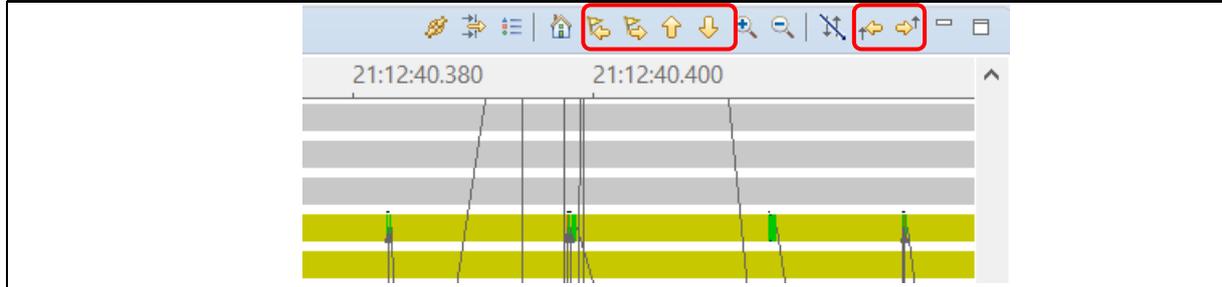
  


Figure 6-11 Control Flow view: Tool bar

(8) Hover the cursor over a colored bar and a tooltip will pop up:

The tooltip indicates:

- the process name
- the pointed state name
- the CPU (if applicable)
- the system call name (if applicable)
- the pointed state date and start/stop times
- the pointed state duration (seconds)

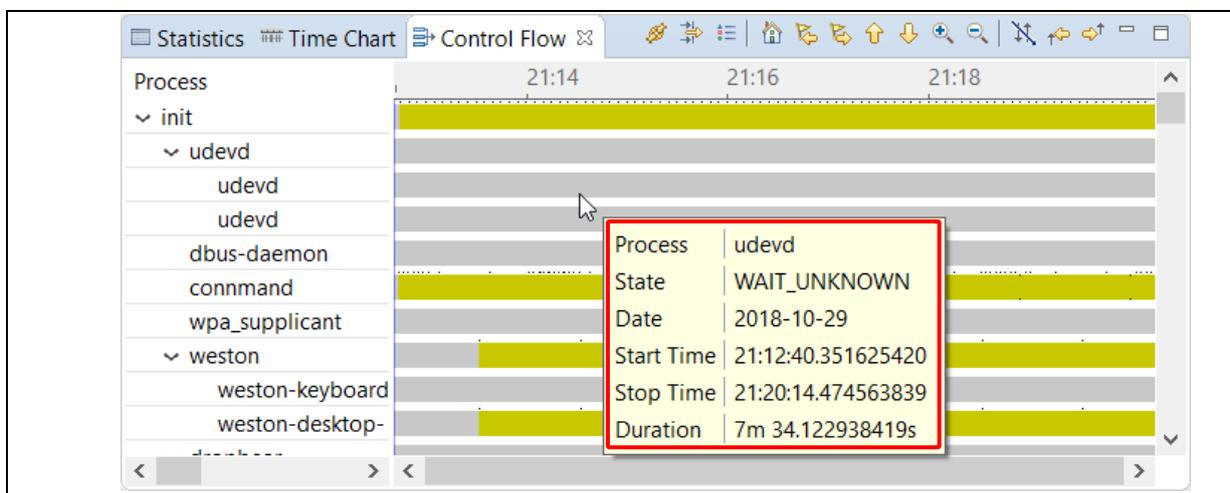


Figure 6-12 Control Flow view: Hover to pop up information

### 6.3 CPU Usage

The view is divided into the following important sections: Process Information and the CPU Usage Chart.

The time axis is aligned with other views that support automatic time axis alignment.

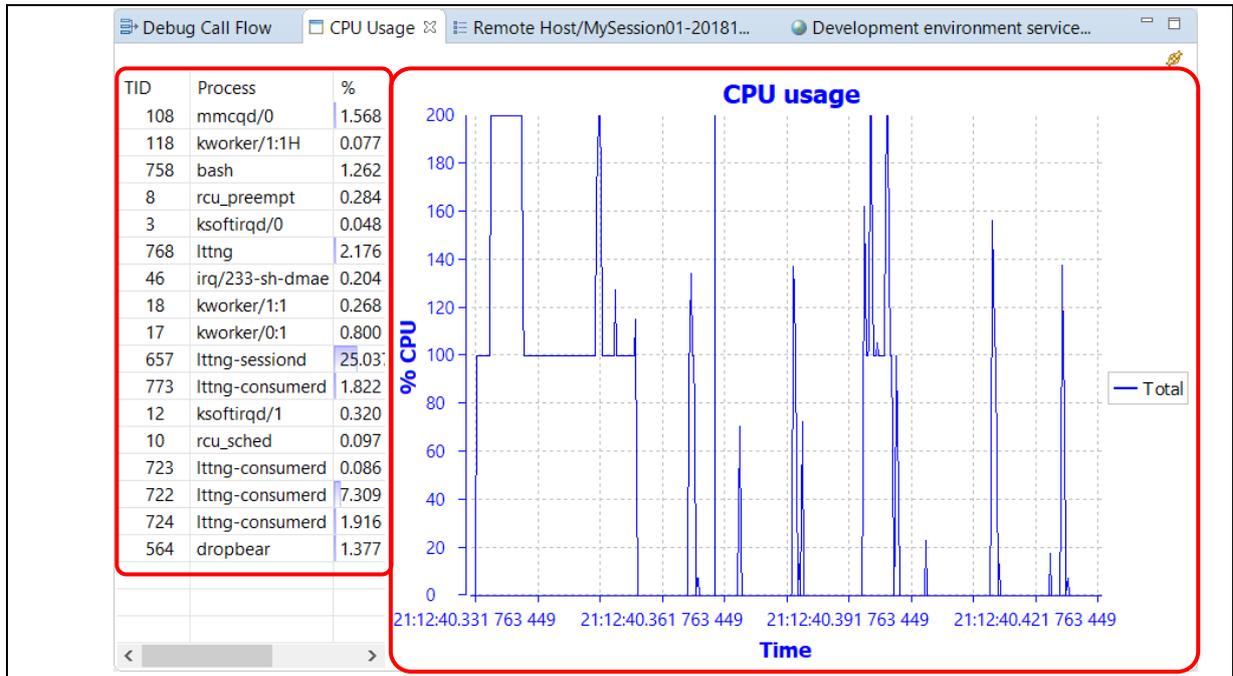


Figure 6-13 CPU Usage view

The CPU Usage Chart on the right side of the view plots the total time spent on all CPUs of all processes and the time of the selected process.

Hover the cursor over a line of the chart and a tooltip will pop up with the following information:

time: current time of mouse position

Total: The total CPU usage

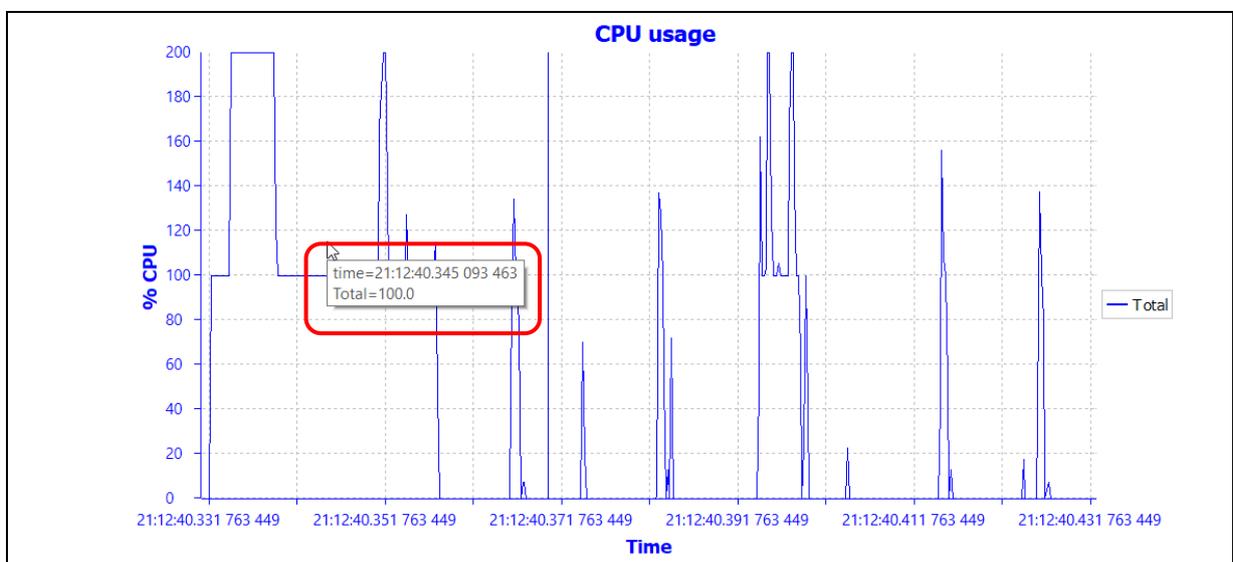


Figure 6-14 Hover to pop up information

### 6.4 Resources

This view shows the state of system resources.

The left side of the view presents a list of resources that are affected by at least one event of the trace. The right side illustrates the state in which each resource is at some point in time.

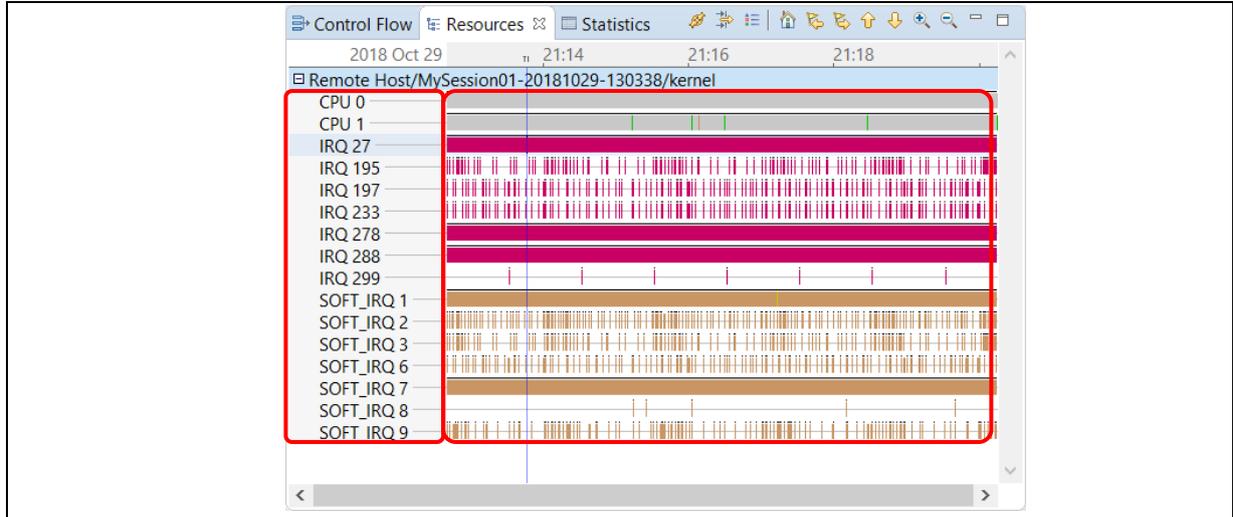


Figure 6-105 Resource view

(1) Click following button to go to each process:

Button	Description	Button	Description
	select previous event		select next event
	select previous resource		select next resource

Figure 6-16 Resource view toolbar

(2) Hover the cursor over a colored bar and a tooltip will pop up:

Trace, state, date, start time, stop time, duration

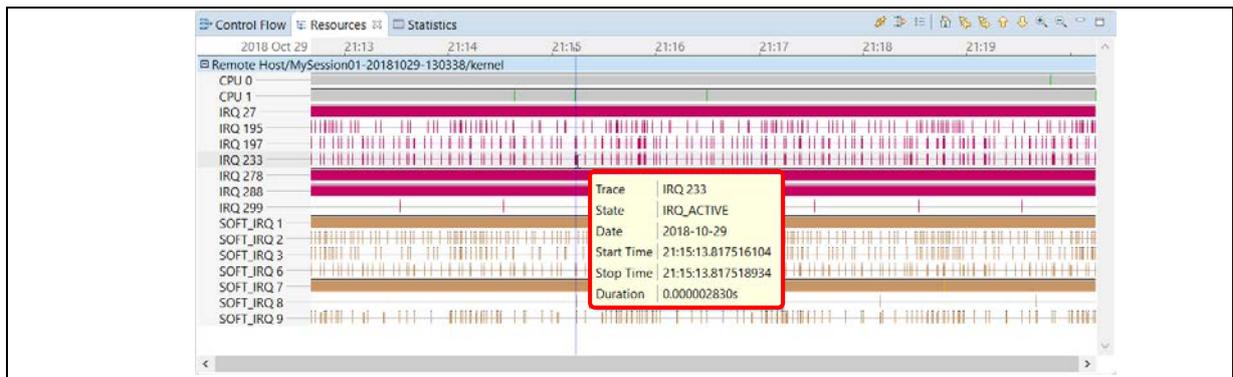


Figure 6-11 Resource view

## Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	Dec 21, 2018	-	First Edition issued

---

Trace Compass with LTTng  
User's Manual: Getting Started Guide

Publication Date: Rev.1.00 Dec 21, 2018

Published by: Renesas Electronics Corporation

---



## Renesas Electronics Corporation

<http://www.renesas.com>

### SALES OFFICES

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

#### **Renesas Electronics Corporation**

TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

#### **Renesas Electronics America Inc.**

1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.

Tel: +1-408-432-8888, Fax: +1-408-434-5351

#### **Renesas Electronics Canada Limited**

9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3

Tel: +1-905-237-2004

#### **Renesas Electronics Europe Limited**

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K

Tel: +44-1628-651-700

#### **Renesas Electronics Europe GmbH**

Arcadiastrasse 10, 40472 Düsseldorf, Germany

Tel: +49-211-6503-0, Fax: +49-211-6503-1327

#### **Renesas Electronics (China) Co., Ltd.**

Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China

Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

#### **Renesas Electronics (Shanghai) Co., Ltd.**

Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China

Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

#### **Renesas Electronics Hong Kong Limited**

Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong

Tel: +852-2265-6688, Fax: +852 2886-9022

#### **Renesas Electronics Taiwan Co., Ltd.**

13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan

Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

#### **Renesas Electronics Singapore Pte. Ltd.**

80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949

Tel: +65-6213-0200, Fax: +65-6213-0300

#### **Renesas Electronics Malaysia Sdn.Bhd.**

Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan,

#### **Malaysia**

Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

#### **Renesas Electronics India Pvt. Ltd.**

No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India

Tel: +91-80-67208700, Fax: +91-80-67208777

#### **Renesas Electronics Korea Co., Ltd.**

17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea

Tel: +82-2-558-3737, Fax: +82-2-558-5338

---

# Trace Compass with LTTng