User's Manual

Workbench V1.06.00

Integrated Development Environment for Renesas Capacitive Touch

User's Manual

Target Device
RX Family

Renesas Electronics
www.renesas.com

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How to Use This Manual

This manual describes the role of the Workbench6 integrated development environment for developing applications and systems and provides an outline of its features.

Readers	This manual is intended for users who wish to understand the functions of the CS+ and design software and hardware application systems.	
Purpose	This manual is intended to give users an understanding of the functions of the CS+ to use for reference in developing the hardware or software of systems using these devices.	
Organization	This manual can be broadly divided into the following units. 1. Summary 2. Window reference 3. Message 4. FAQ 5. Note 6. Appendix	
How to Read This Manual	It is assumed that the readers of this manual have general knowledge of electricity, logic circuits, and microcontrollers.	
Conventions	Data significance:	Higher digits on the left and lower digits on the right
	Active low representation:	XXX (overscore over pin or signal name)
	Note:	Footnote for item marked with Note in the text
	Caution:	Information requiring particular attention
	Remarks:	Supplementary information
	Numeric representation:	Decimal ... XXXX Hexadecimal ... 0xXXXX

Table of Contents

1. Summary

1.1 System Requirements

Supported OS for Workbench6 are as follows.

Table 1-1 Supported OS

OS	Remarks
Windows® 7 (32 bit, 64 bit)	
Windows® 8 (32 bit, 64 bit)	

1.2 Supported PDF Viewer

If a PDF viewer listed in the table below is installed, the selected page in the search results list will be opened by the viewer. If none of these viewers are installed, the document will be opened by the application associated to PDF files, but specifying the page to open is not available.

Table 1-2 Supported PDF Viewer

PDF Viewer	Version
Adobe Reader	V11.0.10 or later
Acrobat	V10.1.13 or later
Adobe Reader DC Adobe Acrobat DC	2015.010.20059 or later

1.3 Install

Execute Setup.msi.

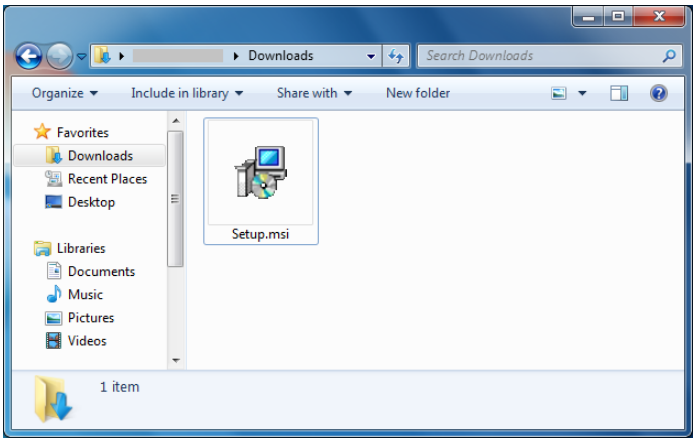


Figure 1-1 Workbench6 installer

Workbench6 installer waked up. Install Workbench6 according to instructions on the display.

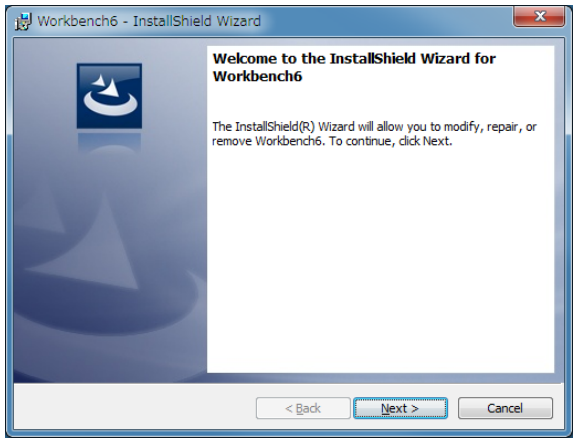


Figure 1-2 Workbench6 installation wizard

1.4 Other installation files

1.4.1 Supported Integrated Development Environment

Workbench6 supports Renesas electronics CS+ and e2 studio.

Table 1-3 Supported Integrated Development Environment

Integrated Development Environment	Version	Remarks
Renesas electronics CS+	V.3.00.00 or later	Workbench6 needs CS+ for CC, CS+ for CA,CX and CS+ Utility.
Renesas electronics e2 studio	V4.0.1.007 or later	Administrator right is necessary to enable Integration Service.

(1) CS+ installation

When you use Workbench6 with CS+, you must install the followings.

- CS+ for CC V3.00.00 or later
- CS+ for CC,CX V3.00.00 or later
- CS+ Utility V3.00.00 or later

Please install latest version of C/C++ Compiler Package and device information file and the others for Touch MCU you use. In addition, refer to [6.2 Supporting C/C++ Compiler Package] about C/C++ Compiler Package that Workbench6 has been supporting.

(2) e2 studio installation

When you use Workbench6 with e2 studio, you must install the followings.

- e2 studio V4.0.1.007 or later
- C/C++ Compiler Package

  Please install latest version of C/C++ Compiler Package and device information file and the others for Touch MCU you use. In addition, refer to [6.2 Supporting C/C++ Compiler Package] about C/C++ Compiler Package that Workbench6 has been supporting.

- Python 2

  Python™ by Python Software Foundation is released as Python 2 and Python 3. Install Python 2.7.11 or later on your PC before using Workbench6 because Workbench6 uses Python 2. When you already installed Python 3, you must install Python 2.7.11 or later. In addition, refer to the following web site about Python 2 installer.

  https://www.python.org/

Startup e2 studio after finish of e2 studio installation. When C/C++ Compiler Package is not registered automatically, it is necessary to register C/C++ Compiler Package on yourself. Refer to the Help file of e2 studio about the registration of C/C++ Compiler Package.

1.4.2 Run-time library

Workbench6 needs Visual C++ 2012 Run-time library (32 bit).

(1) Using Workbench6 without Visual C++ 2012 Run-time library (32 bit)

Following error message displays when you started Workbench6 without Visual C++ 2012 Run-time library (32 bit).

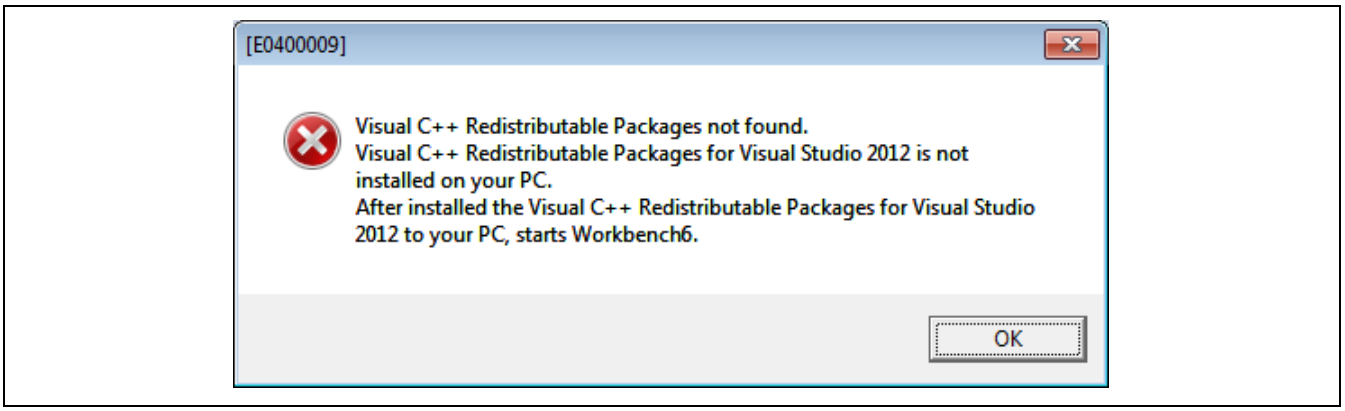


Figure 1-3 Error message that Workbench6 cannot find the Run-time library

When this error message displays at the start of Workbench6, you should install Visual C++ Run-time library to your PC.

(2) Install and considering of Visual C++ 2012 Run-time library (32 bit)

Workbench6 needs Visual C++ 2012 Run-time library (32 bit). Even if you use 64 bit OS (e.g. Windows® 7 64 bit), Workbench6 needs Visual C++ 2012 Run-time library for 32 bit.

Refer to the following web site about Visual C++ Run-time library (32 bit) installer.

https://www.microsoft.com/en-US/download/details.aspx?id=30679

When you asked choice of file name to download, choose “CSU_4¥vcredist_x86.exe” as file name to download.

In the case of Windows® 7, you can check the installation state of Visual C++ 2012 Run-time library in “Control panel” -“Programs and Features”.

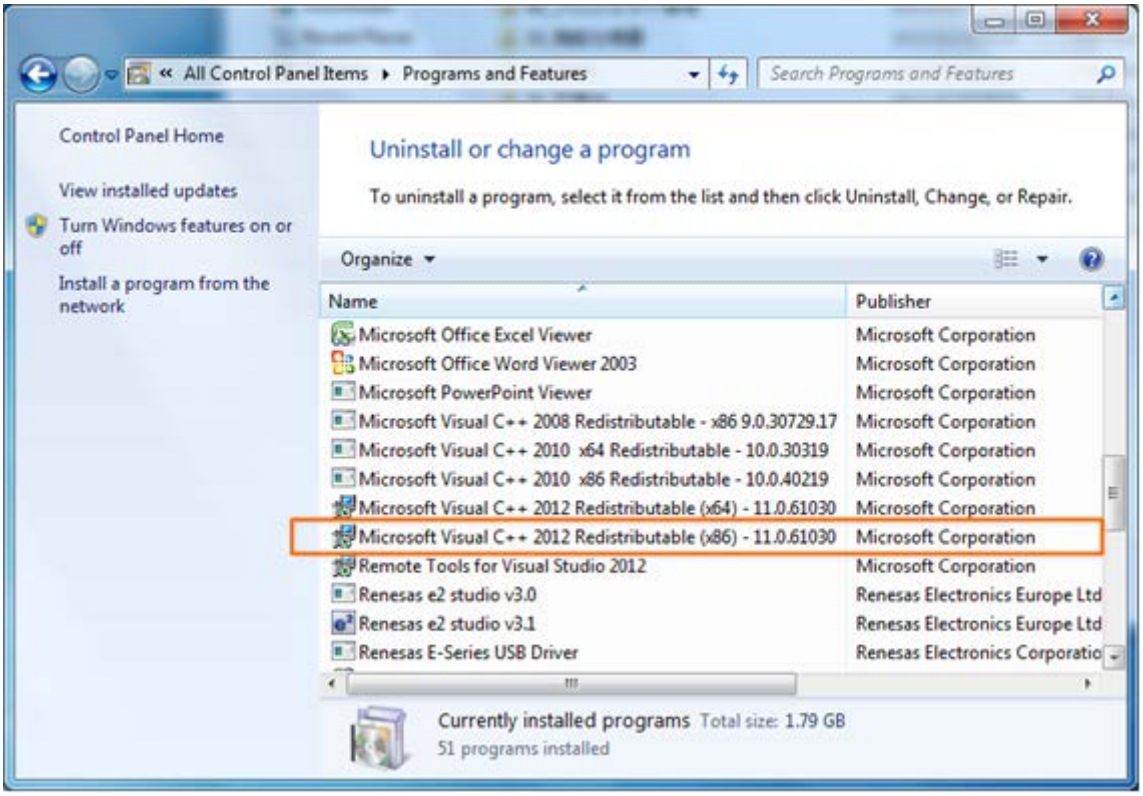


Figure 1-4 Confirmation of Run-time library

1.4.3 .NET Framework

Workbench6 needs Microsoft .NET framework 4.0 or later.

1.4.4 Enabling IronPython Console Plug-in

Press menu [Tool] – [Plug-in Setting] to start the Plug-in Manager and enable "IronPython Console Plug-in".

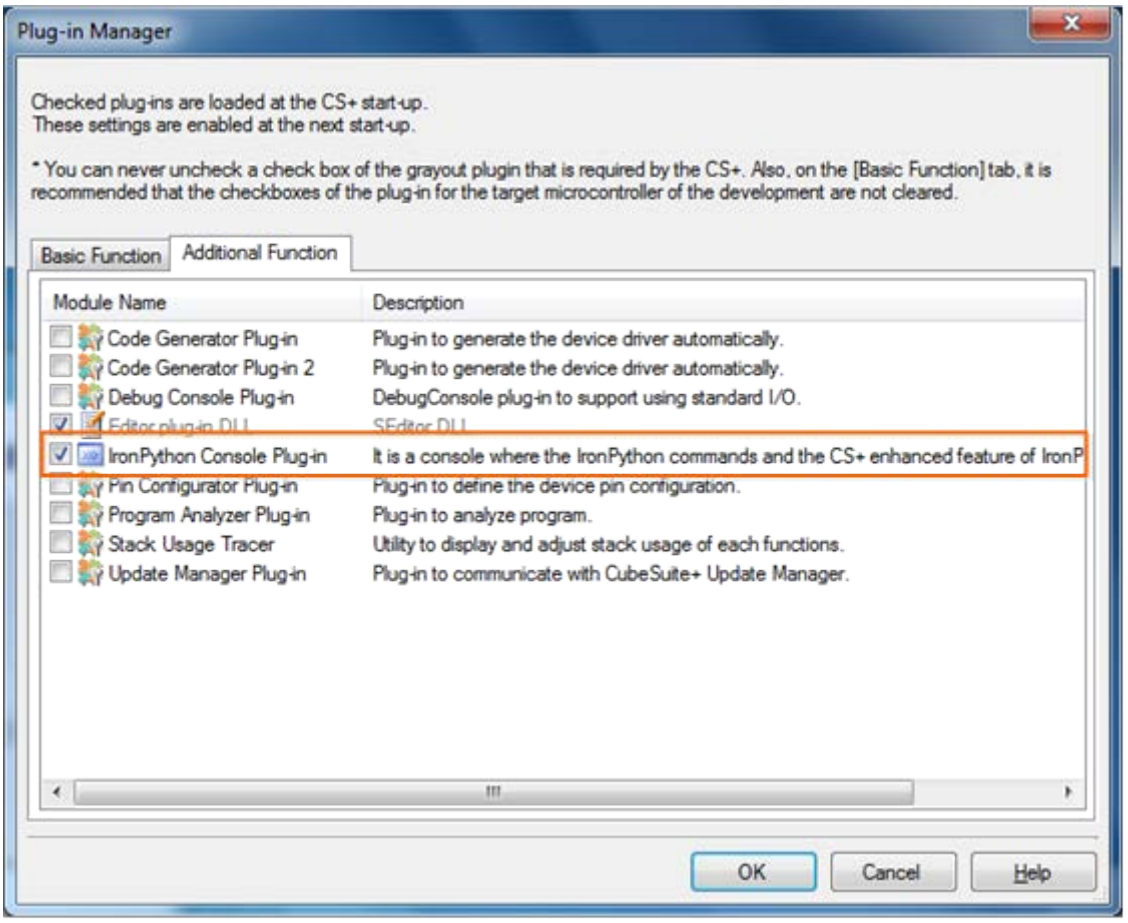


Figure 1-5 CS+ Plug-in Manager

2. Window reference

2.1 Main window

This is the start-up window that opens when Workbench6 is launched. In this window, you can start First step guide and touch sensor monitoring tools, touch sensor tuning tools.

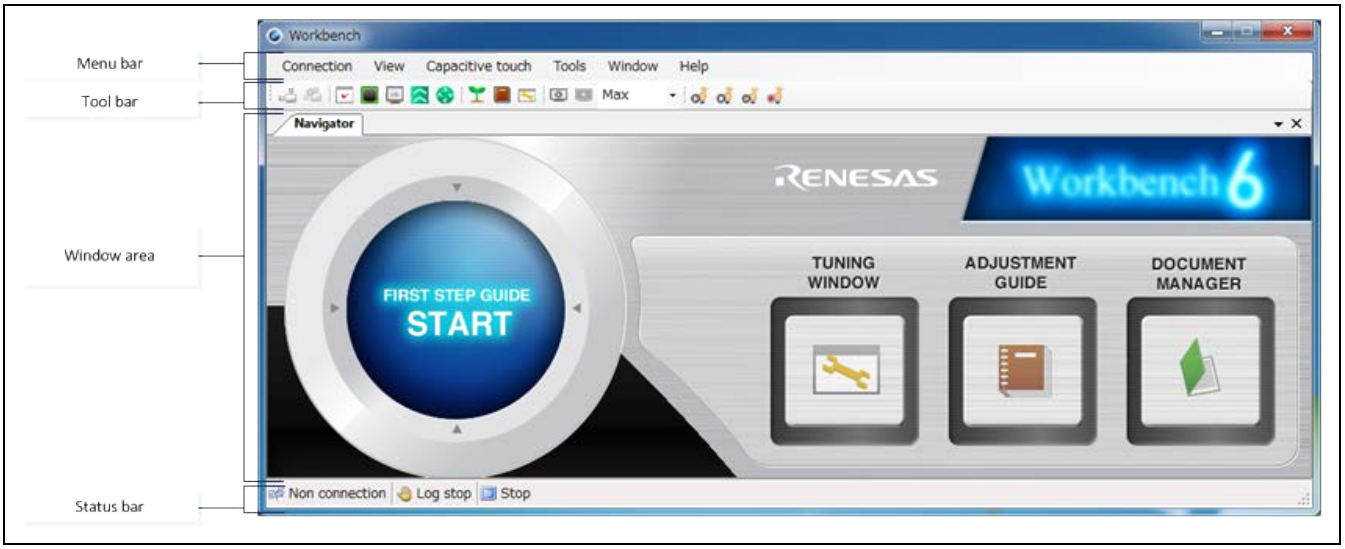


Figure 2-1 Main window

	Starts First step guide.
	Starts the Tuning window
	Starts the Adjustment guide. Workbench6 does not support this function now.
	Starts the Document manager.

2.1.1 Menu bar

The Menu bar displays following menu.

(1) Connection

(a) CS+ connection

Workbench6 starts connection with target board via CS+. Refer to [2.1.5 CS+ connection] for detail.

(b) e2 studio connection

Workbench6 starts connection with target board via e2 studio. Refer to [2.1.6 e2 studio connection] for detail.

(c) Serial port connection

Workbench6 starts connection with target board via serial port. Refer to [2.1.7 Serial port connection] for detail.

(d) Burst monitor connection

Workbench6 starts connection with target board via serial port for the Burst monitor. Refer to [2.7 Burst monitor] for detail.

(e) Disconnection

Workbench6 ends connection with target board.

(f) Close All

Workbench6 closes all tools in window area.

(g) Exit

Workbench6 exits.

(2) View

(a) Tool bar

Shows and hides tool bar.

(b) Status bar

Shows and hides status bar.

(c) Window style

Changes the Window style. Refer to [2.3.11 Window style] for detail.

(d) Layout

Changes the Layout. Refer to [2.3.12 Layout] for detail.

(3) Capacitive touch

(a) Status monitor

Starts Status monitor.

(b) Slider monitor

Starts Slider monitor.

(c) Wheel monitor

Starts Wheel monitor.

(d) Difference monitor

Starts Difference monitor.

(e) Locus monitor

Starts Locus monitor.

(f) Measurement

Starts Measurements.

(g) Radar

Starts Radar.

(h) Touch API Parameters

Starts Touch API Parameters

(i) CTSU Registers

Starts CTSU Registers.

(j) Start monitor

Starts the monitoring to touch sensor on target board.

(k) Stop monitor

Stops the monitoring to touch sensor on target board.

(4) Tools

(a) Navigator

Starts Navigator.

(b) First step guide

Starts the First step guide.

(c) Adjustment guide

Starts Adjustment guide. Workbench6 does not support this function now.

(d) Tuning window

Starts the Tuning window.

(e) Source gallery

Starts Source gallery. Workbench6 does not support this function now.

(f) Document manager

Starts Document manager.

(g) Burst monitor log viewer

Starts Log viewer.

(h) Log play

Starts the playing touch log file. If “Open” dialog is displayed, select a touch log file and press [OK] button.

(i) Log stop

Stops the playing or recoding touch log file.

(j) Log pause

Suspends the playing touch log file.

(k) Log record

Starts the recording touch log file. If “Save As” dialog is displayed, select a touch log file and press [OK] button.

(5) Window

(6) Help

(a) About Workbench6

Displays Workbench6 version information.

2.1.2 Tool bar

This toolbar shows command buttons.

	Workbench6 starts connection with target board via serial port. Refer to [2.1.5 CS+ connection] for detail.
	Workbench6 ends connection with target board.
	Starts Touch API Parameters.
	Starts CTSU Registers.
	Starts Status monitor.
	Starts Slider monitor.
	Starts Wheel monitor.
	Starts First step guide.
	Starts Adjustment guide.
	Starts Tuning window.
	Starts monitoring touch sensor on target board.
	Stops the monitoring touch sensor on target board.
	Starts the playing touch log file.
	Stops the playing touch log file.
	Suspends the playing touch log file.
	Starts the recording touch log file.

2.1.3 Window display area

Touch sensor monitoring tools and Touch sensor tuning tools are displayed in this area.

2.1.4 Status bar

This displays status of connection between Workbench6 and target board and status of touch log file, status of the monitoring.

Non connection	Displays status of connection between Workbench6 and target board. - Non connection: Workbench6 does not connect with target board. - Connected (CS+): Workbench6 connects with target board via CS+. - Connected (e2 studio): Workbench6 connects with target board via e2 studio. - Connected (Serial port): Workbench6 connects with target board via serial port. - Connected (Serial port#Burst): Workbench6 connects with target board via serial port for the Burst monitor.
Log stop	Displays status of touch log file. - Log stop: Workbench6 does not play or record touch log file. - Log play: Workbench6 is playing touch log file. - Log pause: Workbench6 is suspending the playing touch log file. - Log record: Workbench6 is recording touch log file.
Stop	Displays status of the monitoring. - Stop: Workbench6 does not monitor the measurement values of touch sensor. - Monitor: Workbench6 is monitoring the measurement values of touch sensor.

2.1.5 CS+ connection

Workbench6 starts connection with target board via CS+. This dialog is displayed by selecting the menu [Connection] – [CS+ connection] and Workbench6 automatically controls from CS+ startup to download program to target board and execution the program according to specified CS+ project file and Load module file.

Before CS+ connection make sure the followings.

- Connection between PC and emulator
- Connection between emulator and target board
- Power supply to target board

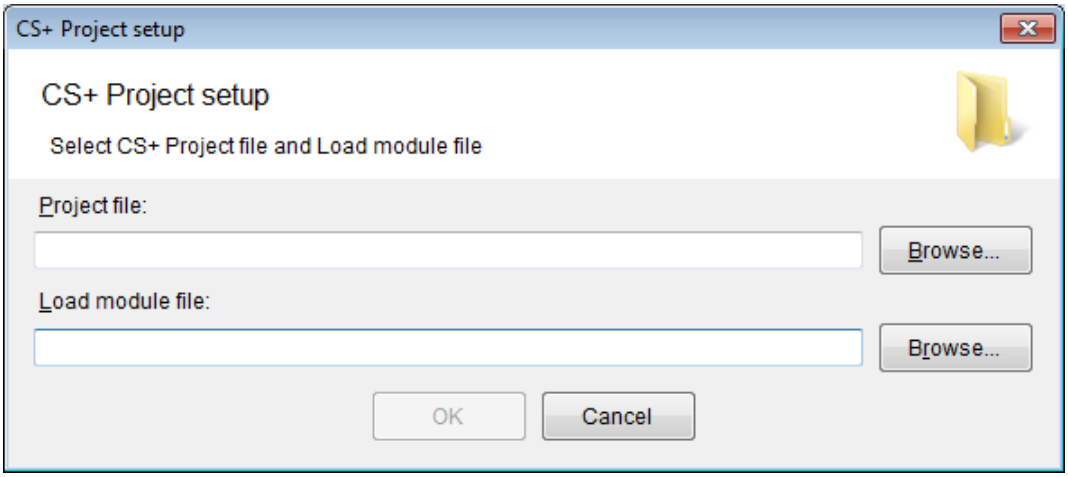


Figure 2-2 CS+ project setup

Project file: Browse...	Specifies CS+ project file.
Load module file: Browse...	Specifies Load module file.
OK	[OK] is enabled by selecting of CS+ project file and Load module file. Close this dialog and starts CS+ connection.
Cancel	Ignore current settings and close this dialog.

2.1.6 e2 studio connection

Workbench6 starts connection with target board via e2 studio. This dialog is displayed by selecting the menu [Connection] – [e2 studio connection] and Workbench6 automatically controls from e2 studio startup to download program to target board and execution the program according to specified e2 studio project folder and workspace folder.

Before e2 studio connection make sure the followings.

- Connection between PC and emulator
- Connection between emulator and target board
- Power supply to target board

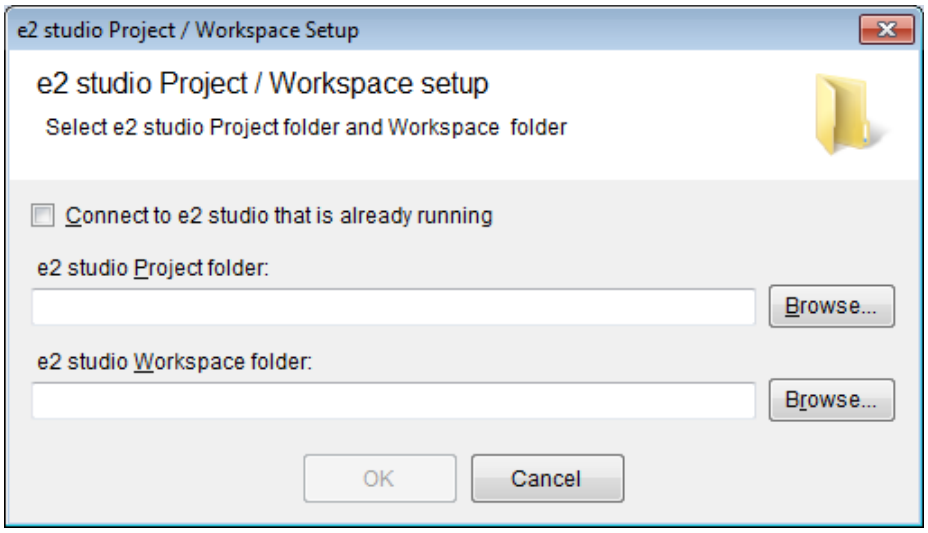


Figure 2-3 e2 studio Project / Workspace Setup

Connect to e2 studio...	Connect to e2 studio that is already started and is debugging target board.
e2 studio Project folder: Browse...	Specifies e2 studio project folder.
e2 studio Workspace folder: Browse...	Specifies e2 studio workspace folder.
OK	[OK] is enabled by selecting of e2 studio project folder and e2 studio Workspace folder. Close this dialog and starts e2 studio connection.
Cancel	Ignore current settings and close this dialog.

2.1.7 Serial port connection

Workbench6 starts connection with target board via serial port. This dialog is displayed by selecting the menu [Connection] – [Serial port connection] and Workbench6 starts connection with target board via serial port according to specified serial port and serial port baudrate.

Before CS+ connection make sure the followings.

- Connection between PC and target board
- Power supply to target board

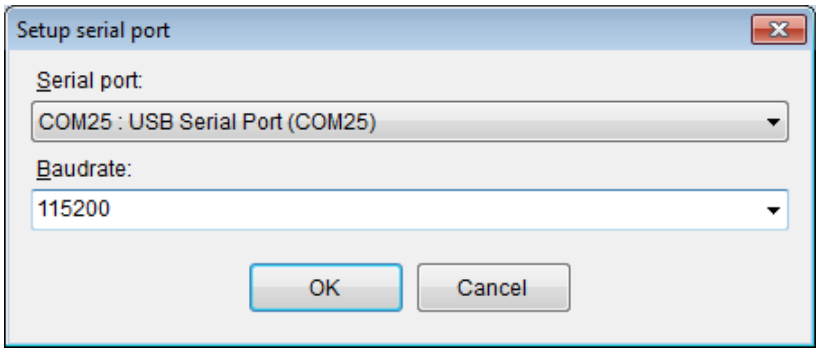


Figure 2-4 Setup serial port

Serial port: COM25 : USB Serial Port (COM25)	Selects serial port connecting to your target board.
Baudrate: 115200	Select serial port baudrate that your target board supports.
OK	Close this dialog and starts serial port connection.
Cancel	Cancels current settings and close this dialog.

2.2 First step guide

First step guide generates the best program for the user's touch sensor microcontroller and guides automatic tuning of touch sensor sensitivity.

2.2.1 Process of First step guide

You can tune your target board using First step guide according to following touch sensor detection methods.

- Self-capacitance
- Mutual capacitance
- Self-capacitance and Mutual capacitance

This section explains process of three touch sensor detection methods.

(1) Self-capacitance

This section explains process when you selected Self-capacitance as touch sensor detection method.

Table 2-1 Process of First step guide (Self-capacitance or Mutual capacitance) (1/2)

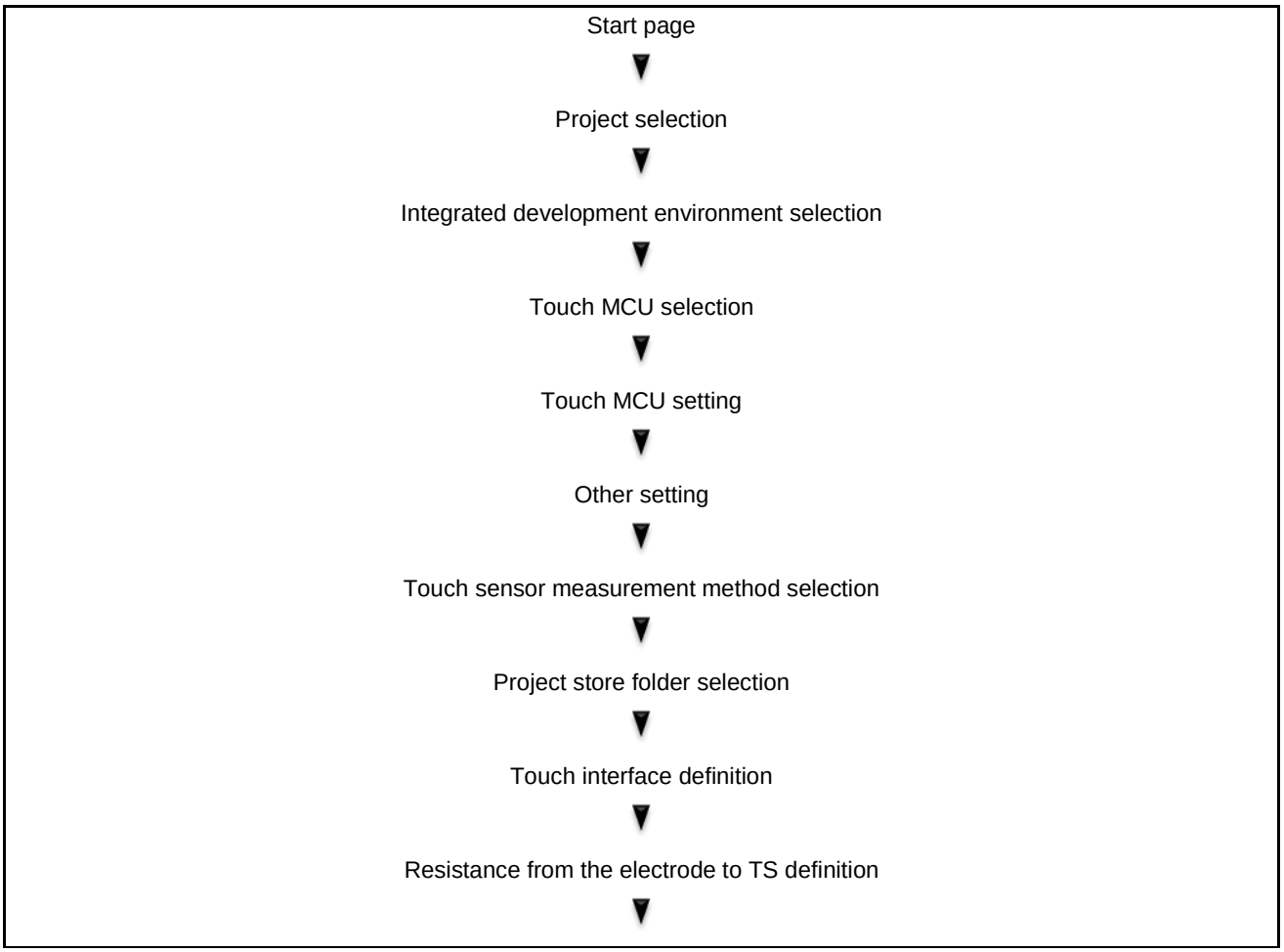
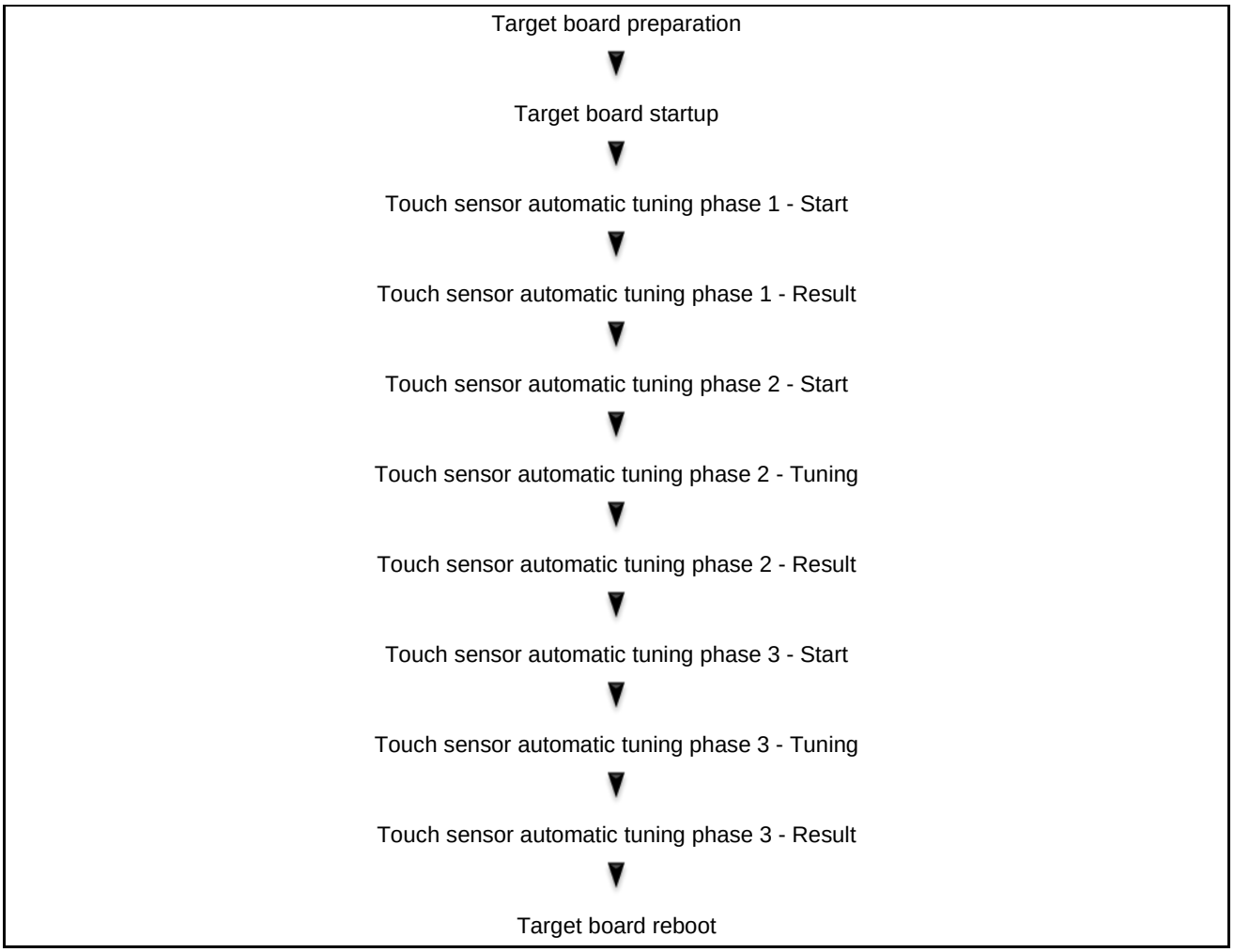


Table 2-2 Process of First step guide (Self-capacitance or Mutual capacitance) (2/2)



(2) **Self-capacitance and Mutual capacitance**

This section explains process when you selected both Self-capacitance and Mutual capacitance as touch sensor detection method.

Table 2-3 Process of First step guide (Self-capacitance and Mutual capacitance) (1/2)

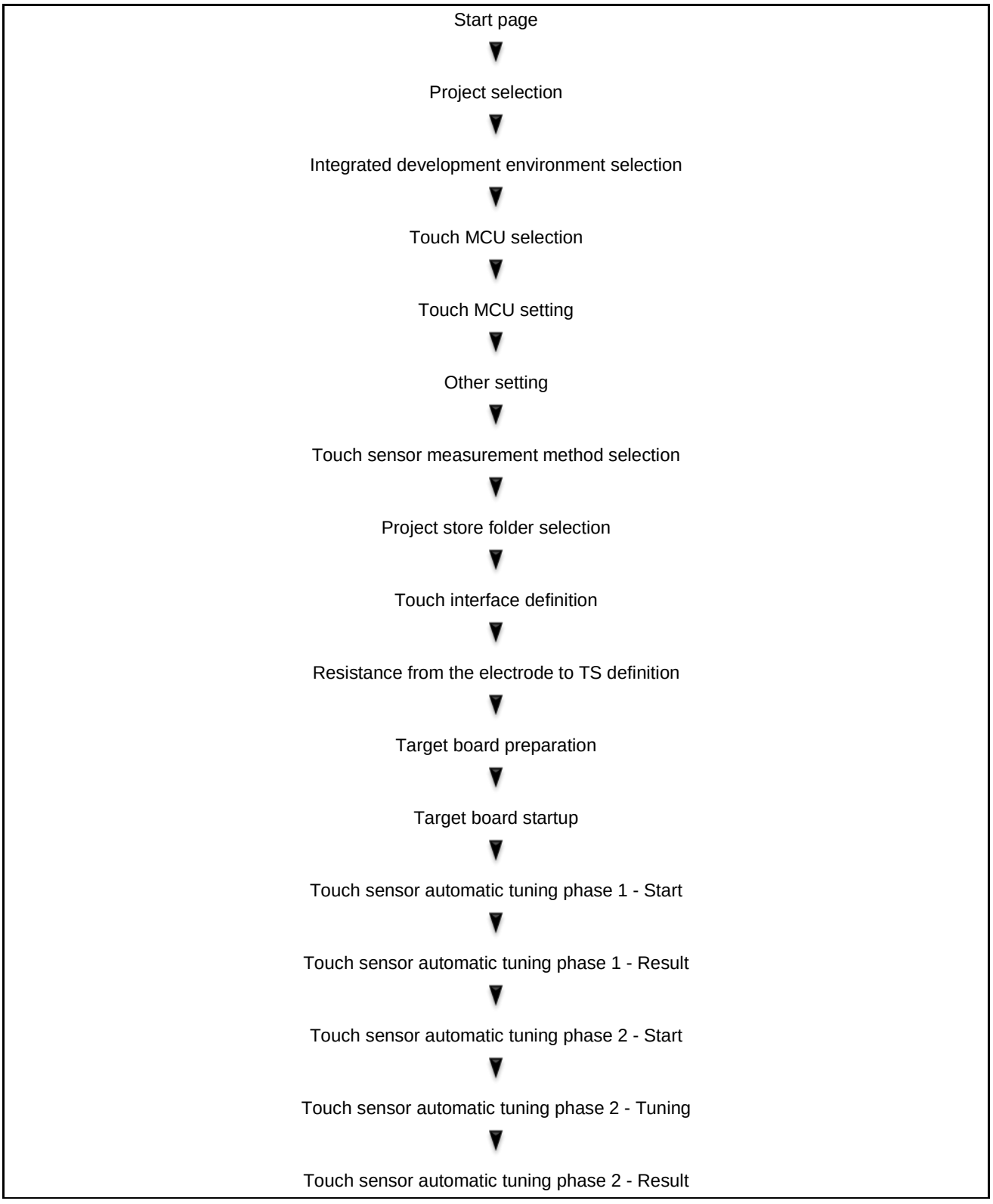
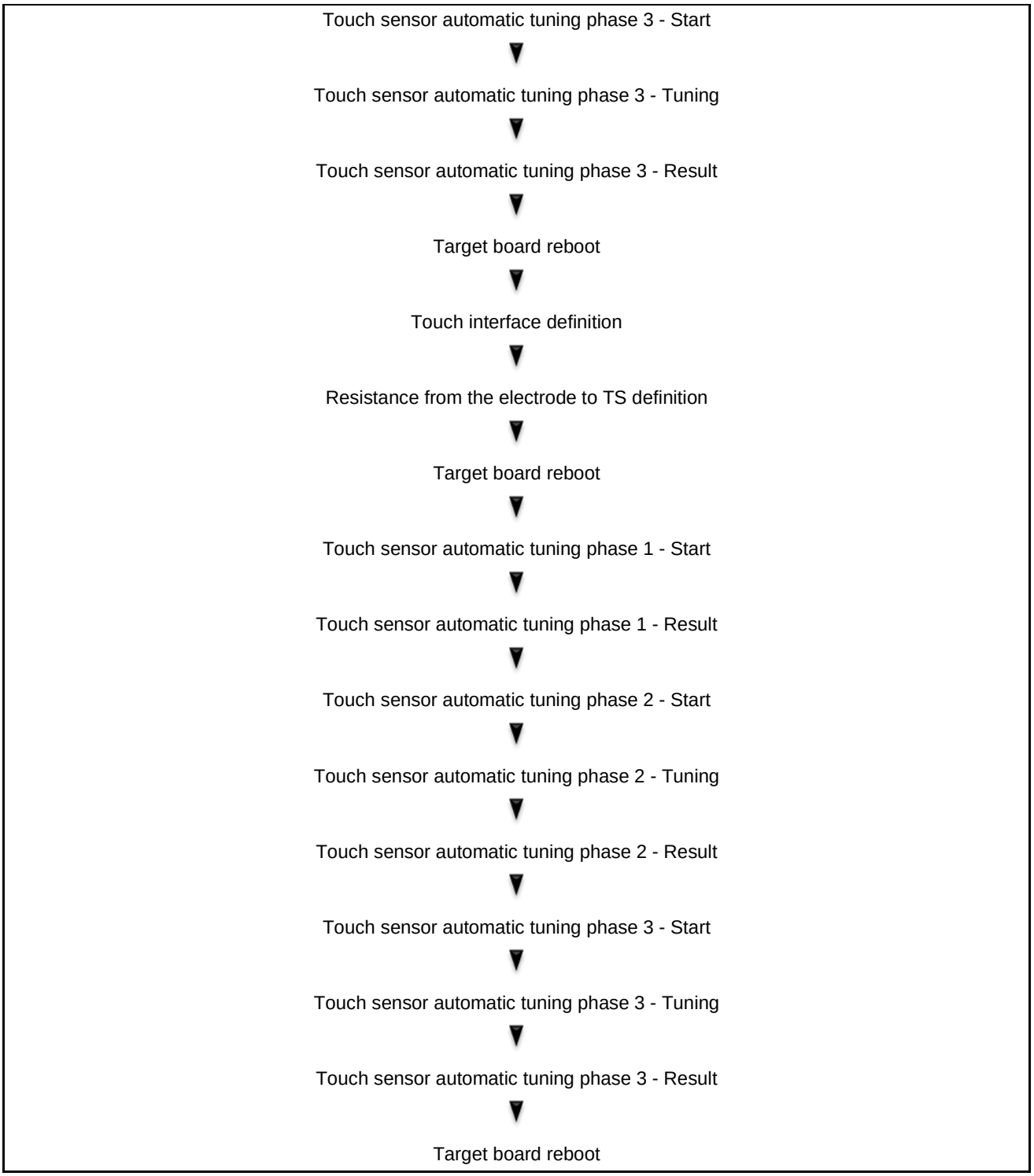


Table 2-4 Process of First step guide (Self-capacitance and Mutual capacitance) (2/2)



2.2.2 Start page

This is the start page of the First step guide. Press [Next] button.

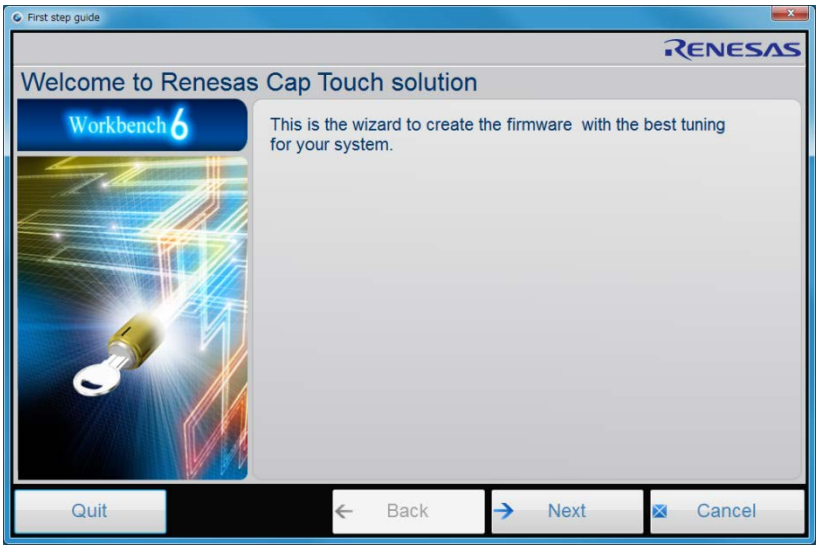


Figure 2-5 First step guide – Start page

Quit	Terminate the First step guide with saving.
Back	Cannot press this button.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.3 Project selection

Select a new project or an existing project.

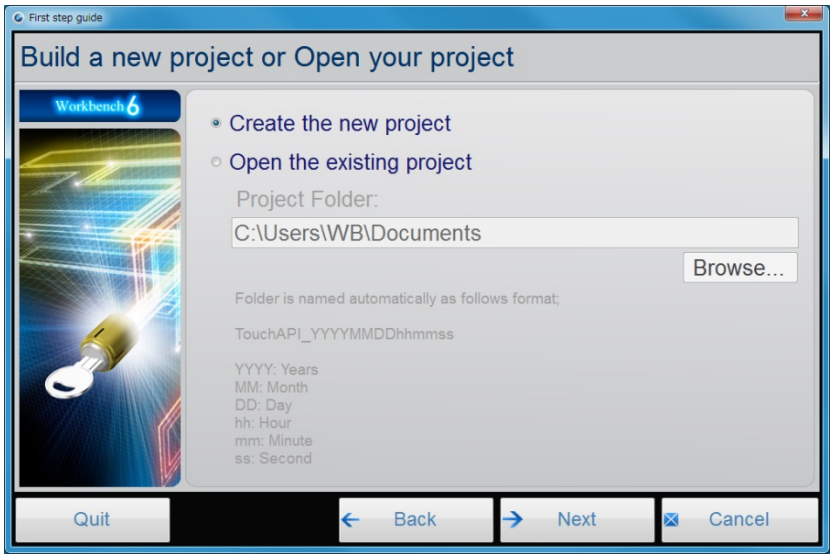


Figure 2-6 First step guide – project selection

Create the new project	Create a new project.
Open the existing project	Resume an existing project.
Project Folder: C:\Users\WB\Documents	Displays an absolute path of the folder.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.4 Process selection

Select a process to resume.

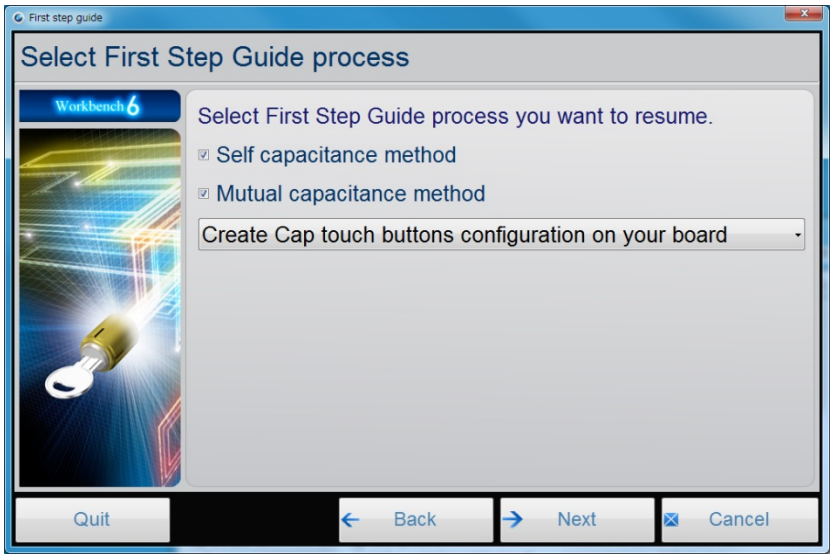


Figure 2-7 First step guide – Process selection

Self capacitance method	Resume Self-capacitance process.
Mutual capacitance method	Resume Mutual capacitance process.
Parasitic capacitance measurement	Select a process to resume.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

The details of the interface of “Process to resume” is as follows.

Self capacitance method	Mutual capacitance method	Process
Checked	No checked	Resume process of Self-capacitance.
No checked	Checked	Resume process of Mutual capacitance.
Checked	Checked	Resume process of Self-capacitance and Mutual capacitance. The first order of process is Self-capacitance and specified process to resume is process for Self-capacitance. In addition, all processes of Mutual capacitance are executed after process of Self-capacitance.
No checked	No checked	Error

2.2.5 Integrated development environment selection

Select the Integrated development environment (hereinafter called IDE) and whether to use emulator or not.

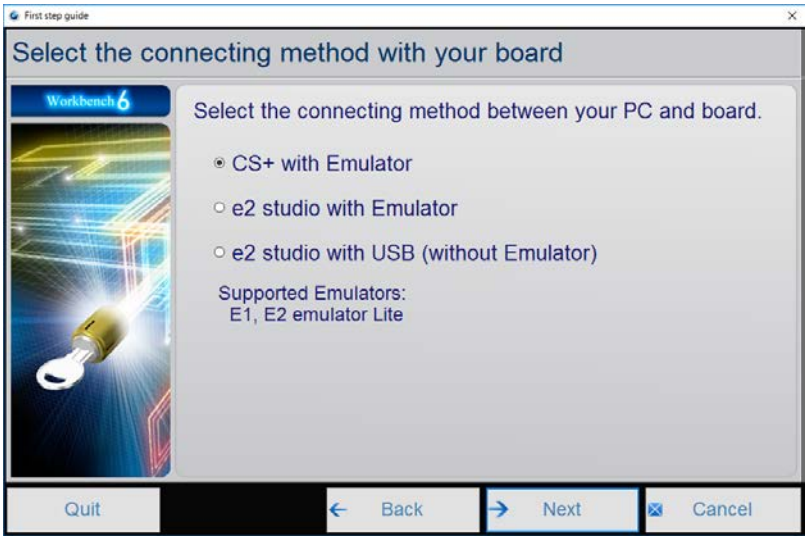


Figure 2-8 First step guide – Integrated development environment selection

CS+ with Emulator	Use CS+ with emulator.
e2 studio with Emulator	Use e2 studio with emulator
e2 studio with USB (without Emulator)	Use e2 studio without emulator.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.6 Touch MCU selection

This page is for selecting a touch sensor microcontroller to be used.

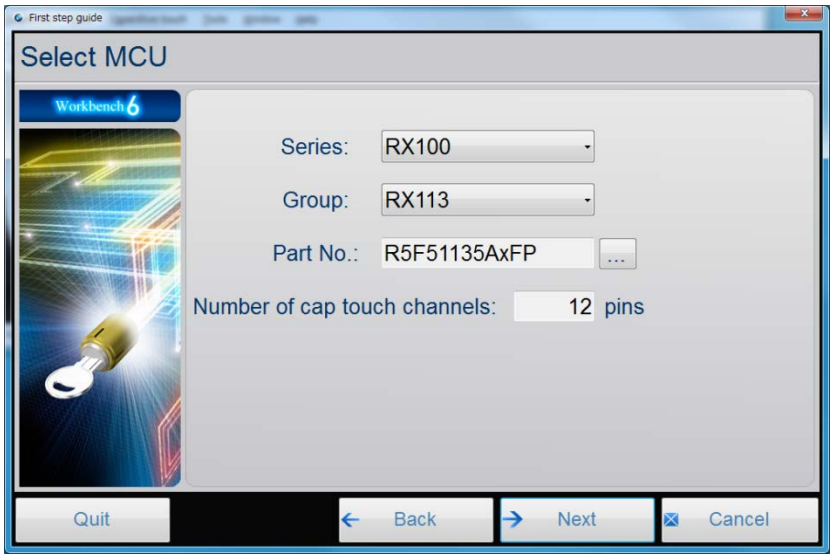


Figure 2-9 First step guide – Touch MCU selection

Series: RX100	A series of touch sensor microcontroller can be selected.
Group: RX113	A group of touch sensor microcontroller can be selected.
Part No.: R5F51135AxFP	A part number of touch sensor microcontroller can be selected. ... Press this button and selects the part number of touch sensor microcontroller in displayed context menu.
12 pins	Displays the number of touch sensors of the touch sensor microcontroller selected at Series, Group, and Part No.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.7 Touch MCU setting

This page is for selecting operating frequencies of the touch sensor microcontroller and touch sensors.

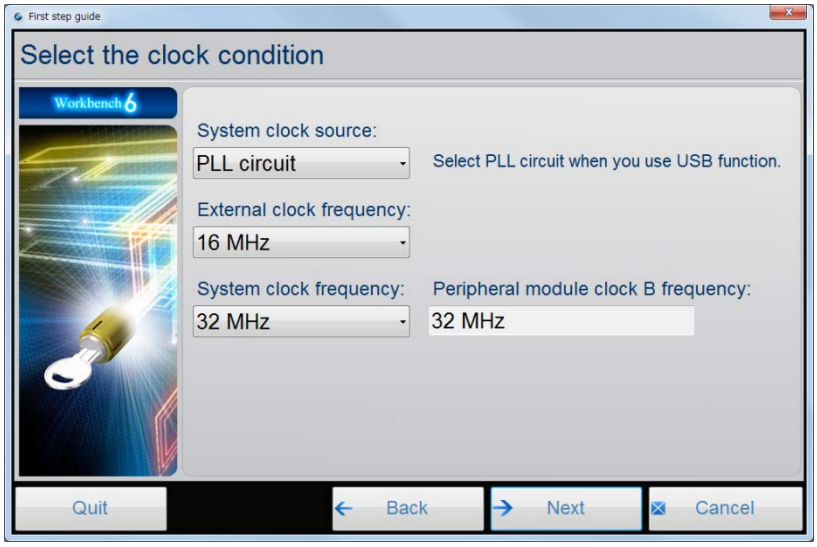


Figure 2-10 First step guide – Touch MCU setting

System clock source: PLL circuit	Select count source of system clock.
External clock frequency: 16 MHz High speed OCO frequency: 32 MHz	Select main clock frequency.
System clock frequency: 32 MHz	Select system clock frequency.
Peripheral module clock B frequency: 32 MHz	Display peripheral clock.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.8 Other setting

This page is for selecting operating voltage of the touch sensor microcontrollers, and USB-Serial port setting.

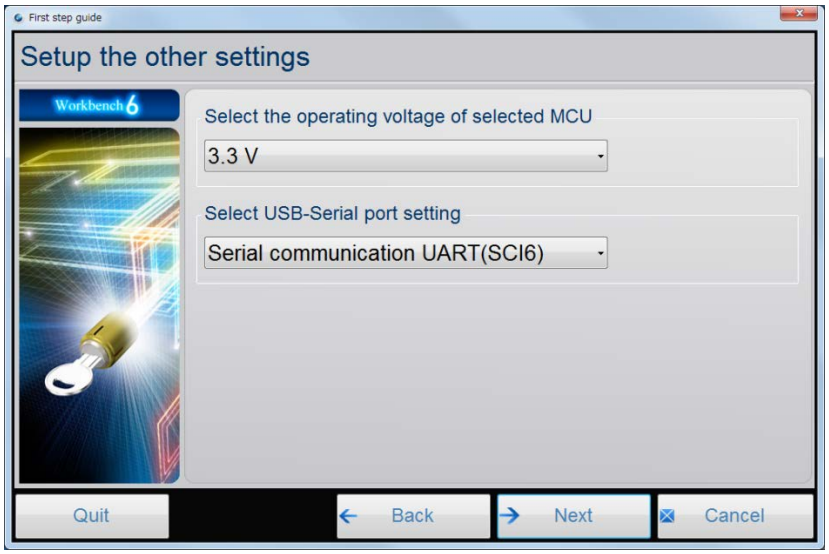


Figure 2-11 First step guide – Other setting

Select the operating voltage of selected MCU 3.3 V	Select the operating voltage of selected touch sensor microcontroller.
Select USB-Serial port setting Serial communication UART(SCI6)	Select the USB-Serial port setting.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.9 Touch sensor measurement method selection

This page is for selecting touch detection method of the touch sensors.

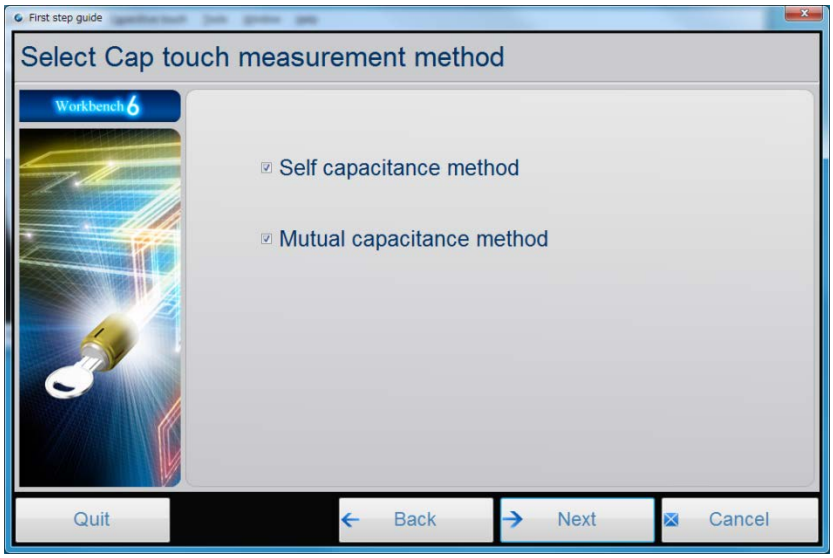


Figure 2-12 First step guide – Touch sensor measurement method selection

Self capacitance method	Self-capacitance is selected as touch detection method.
Mutual capacitance method	Mutual capacitance is selected as touch detection method.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.10 Project store folder selection

This page is for selecting a folder to store a set of software for the touch sensor microcontroller corresponding to the selected IDE.

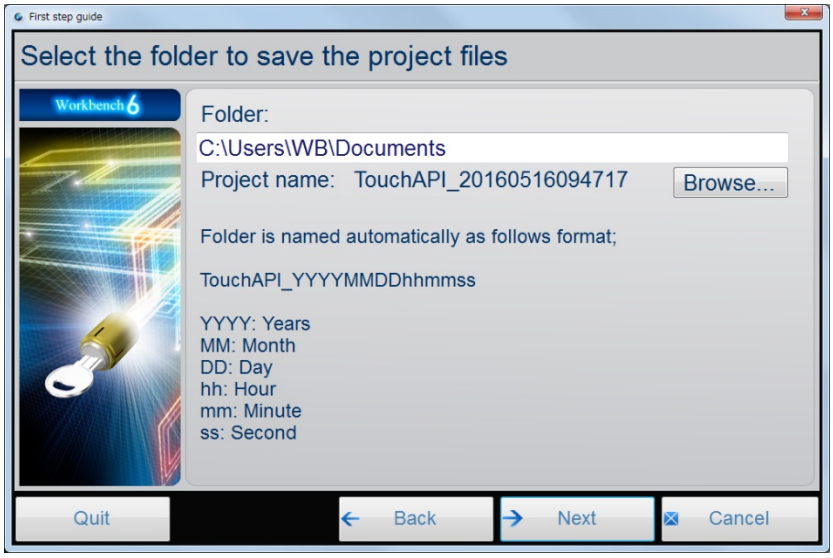


Figure 2-13 First step guide – Project store folder selection

Folder: C:\Users\WB\Documents	Displays an absolute path of the folder.
Browse...	Starts “Folder browser dialogue.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.11 Touch interface definition

Lays out touch interfaces according to touch interfaces on your target board.

(1) Touch interface definition – Self-capacitance

Touch interface definition that you selected self-capacitance as touch sensor detection method is as follows.

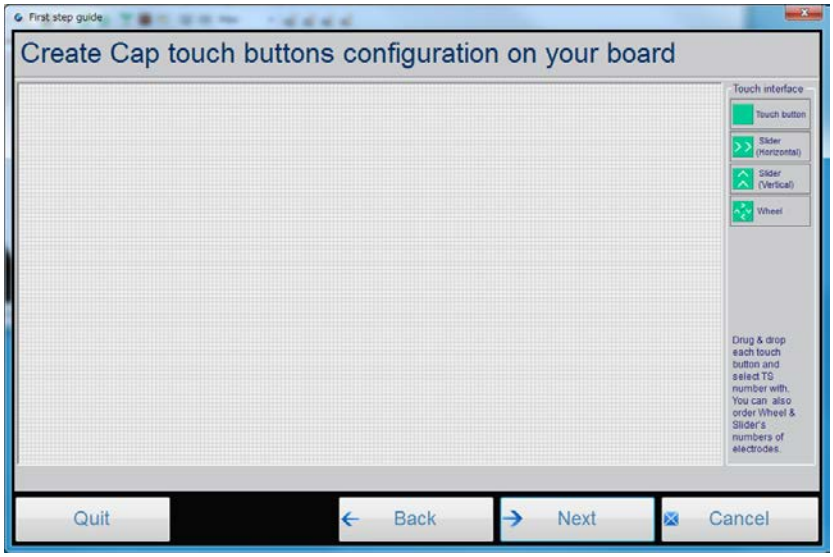


Figure 2-14 First step guide - Touch interface definition - Self-capacitance

	This is canvas that touch buttons, sliders and wheels are laid out.
	Lays out a touch button on the canvas.
	Lays out a slider (horizontal) on the canvas.
	Lays out a slider (vertical) on the canvas.
	Lays out a wheel on the canvas.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(2) Touch interface definition – Self-capacitance – Context menu

- Touch button

  Context menu for Touch button on Canvas is as follows.

Channel	Allocate a Touch button to TS. When you selects [Release], release the Touch button from TS.
Label	Edit label of a Touch button. You can use this context menu after allocating a Touch button.
Delete	Delete a Touch button from Canvas.

- Slider

  Context menu for Slider on Canvas is as follows.

Setup	Starts Slider setup dialog. Refer to [(4) Touch interface definition – Self-capacitance – Slider setup] for detail.
Reverse direction	Reverse allocating order of TS. You can use this context menu after slider setup.
Image	When you select [Right to left], Workbench6 changes image of a Slider as follows. 
	When you select [Left to right], Workbench6 changes image of a Slider as follows. 
Label	Edit label of a Slider. You can use this context menu after slider setup.
Delete	Delete a Slider from Canvas.

- Wheel

  Context menu for Wheel on Canvas is as follows.

Setup	Starts Wheel setup dialog. Refer to [(5) Touch interface definition – Self-capacitance – Wheel setup] for detail.
Rotate	Rotate allocating order of TS. You can use this context menu after Wheel setup.
Reverse direction	Reverse allocating order of TS. You can use this context menu after allocating wheel sensors.
Image	When you select [Clockwise], Workbench6 changes image of a Wheel as follows. 
	When you select [Counterclockwise], Workbench6 changes image of a Wheel as follows. 
Label	Edit label of a Wheel. You can use this context menu after wheel setup.
Delete	Delete a Wheel from Canvas.

(3) Touch interface definition – Self-capacitance – Touch button

Allocates TS to a touch button from context menu [Channel].

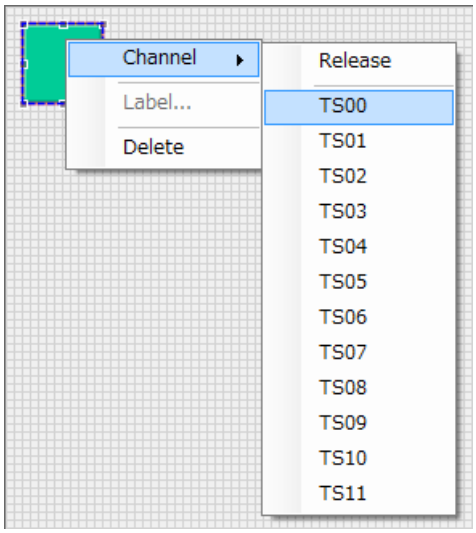


Figure 2-15 First step guide – Touch button allocation

(4) Touch interface definition – Self-capacitance – Slider setup

Slider setup is started by selecting [Setup] in Context menu of Slider and setup Slider TS considering the Slider.

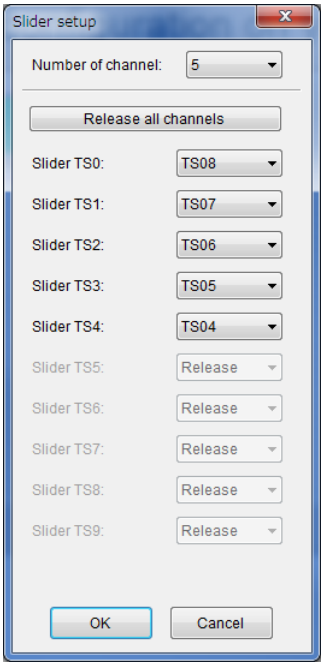


Figure 2-16 First step guide - Slider setup

Number of channel: 5	Select the number of TS allocating a Slider from three to ten.
Release all channels	Initialize the setting of Slider TS.
Slider TS0: TS08	Allocate TS to Slider TS considering a Slider.
OK	Enable settings and close Slider setup dialog.
Cancel	Disable settings and close Slider setup dialog.

(5) Touch interface definition – Self-capacitance – Wheel setup

Wheel setup is started by selecting [Setup] in Context menu of Wheel and setup Wheel TS considering the Wheel.

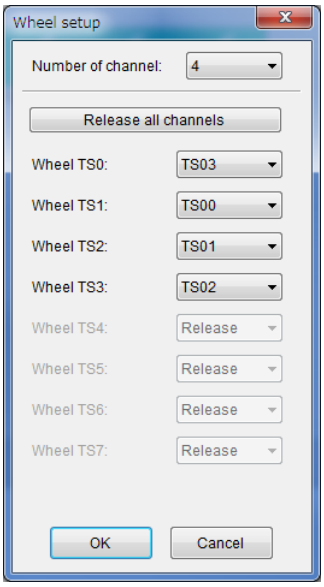


Figure 2-17 First step guide - Wheel setup

Number of channel: 4	Select the number of TS allocating a Wheel from four or eight.
Release all channels	Initialize the setting of Wheel TS.
Wheel TS0: TS03	Allocate TS to Wheel TS considering a Wheel.
OK	Enable settings and close Wheel setup dialog.
Cancel	Disable settings and close Wheel setup dialog.

(6) Touch interface definition – Mutual capacitance

Touch interface definition that you selected Mutual capacitance as touch sensor detection method is as follows.

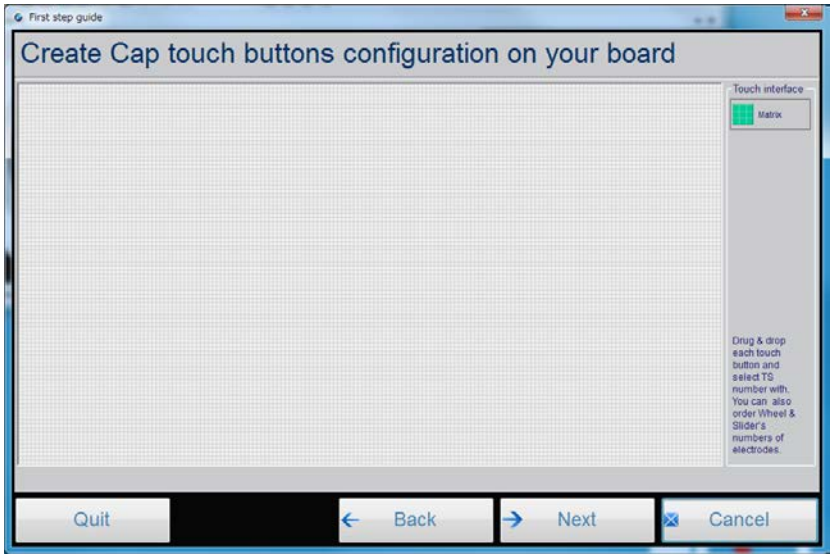


Figure 2-18 First step guide – Touch interface definition – Mutual capacitance

	This is canvas that matrixes are laid out.
	Lays out a matrix key on the canvas.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(7) Touch interface definition – Mutual capacitance – Context menu

- Matrix

  Context menu for Matrix on Canvas is as follows.

Setup	Starts Matrix setup dialog. Refer to [(8) Touch interface definition – Matrix key setup] for detail.
Key config	Disable specified Matrix key on Matrix.
Label	Edit label of a Matrix key. You can use this context menu after matrix setup.
Delete	Delete a Matrix from Canvas.

(8) Touch interface definition – Matrix key setup

Matrix setup is started by selecting [Setup] in Context menu of Matrix and setup reception and transmission to TS of Matrix.

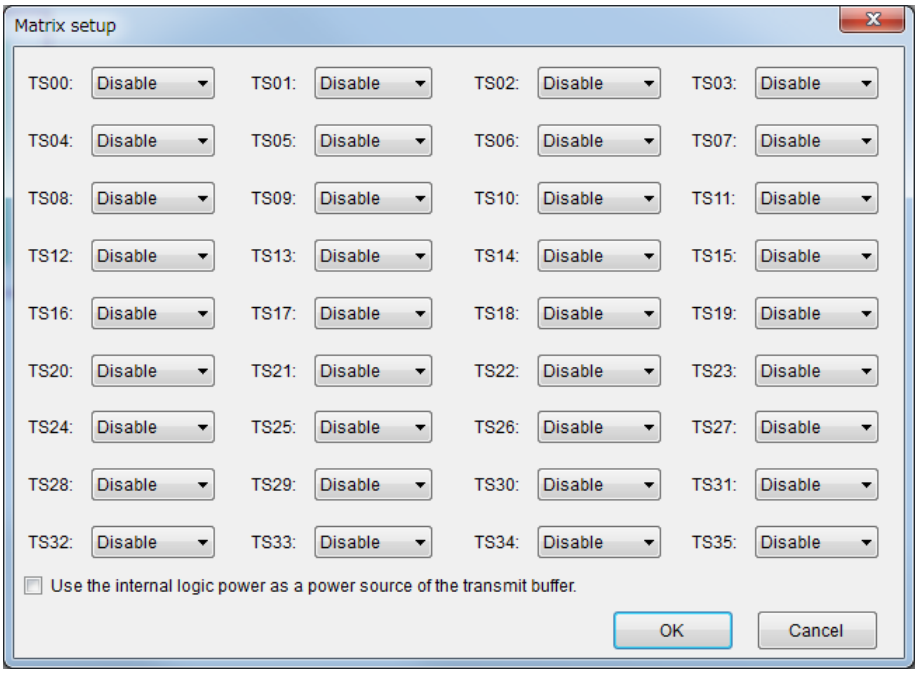


Figure 2-19 First step guide - Matrix key setup

Tx	Set specified TS to transmission.
Rx	Set specified TS to reception.
Disable	Disable specified TS.
Use the internal logic power…	Switches the power supply for the touch sensor as transmit channel. - Unchecked VCC selected - Checked Internal logic power supply selected In addition, Touch MCU that does not support CTSUTXVSEL bit is selected, this checkbox is not displayed.
OK	Enable settings and close Matrix setup dialog.
Cancel	Disable settings and close Matrix setup dialog.

2.2.12 Resistance from the electrode to TS definition

This page is for setting resistance values of the electrode to TS.

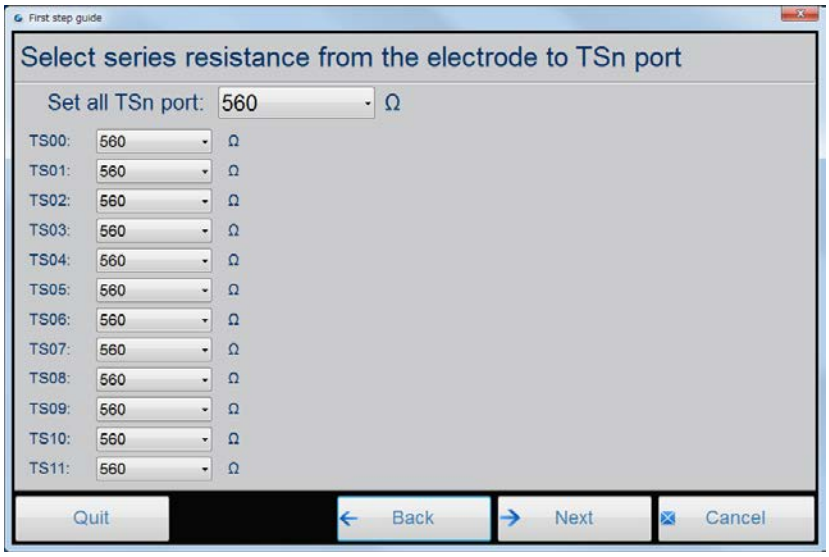


Figure 2-20 First step guide – Resistance from the electrode selection

Set all TSn port: 560 Ω	Select resistance value for all TS.
TS00: 560 Ω	Select a resistance value for specified TS.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.13 Target board preparation

This page is provided for guiding setup of the board with the touch sensor microcontroller.

(1) Connection between PC and emulator

Check connection between your PC and emulator. This guide is not displayed when Workbench6 recognized connection between PC and emulator.

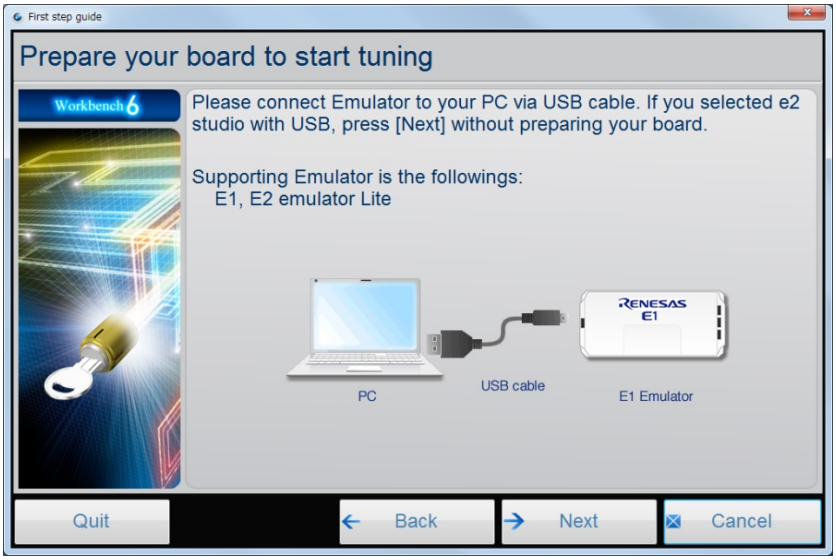


Figure 2-21 First step guide – Connection between PC and emulator

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(2) **Connection between emulator and target board**

Check connection between emulator and your target board.

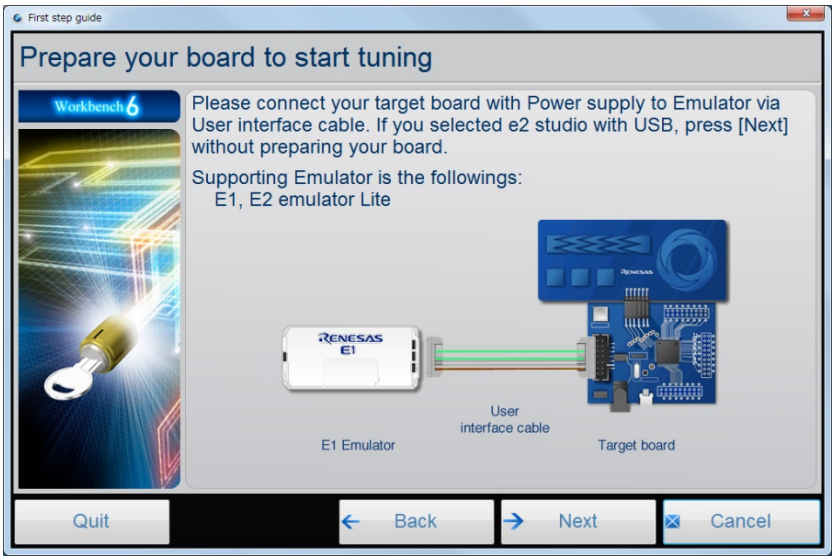


Figure 2-22 First step guide – Connection between emulator and target board

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.14 Target board startup

This page is provided for guiding startup of the board with the touch sensor microcontroller.

(1) **IDE with emulator**

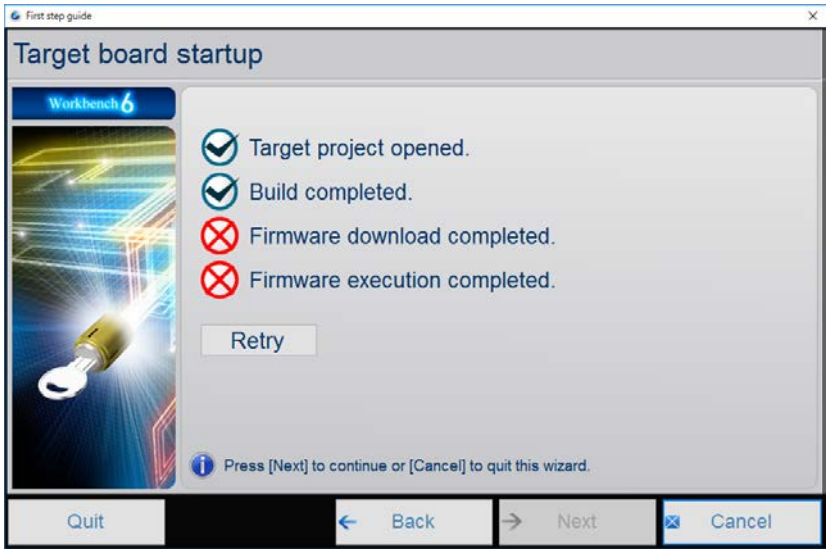
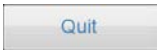
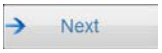
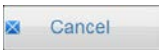


Figure 2-23 First step guide – Target board startup

	Shows a process on the right side of this icon was completed.
	Shows a process on the right side of this icon was not completed.
	Restart Target board startup. You can use Retry when Target board startup failed.
	Terminate the First step guide with saving.
	To the previous page.
	To the next page.
	Terminate the First step guide without saving.

When you select e2 studio is selected in “Integrated development environment selection”, Workbench6 displays following message dialog. If e2 studio comes to be accepted your operation after e2 studio startup, push [OK] button.

When error message “Failed to invoke e2 studio” is displayed, Workbench6 closes automatically. After closing e2 studio, Restart Workbench6.

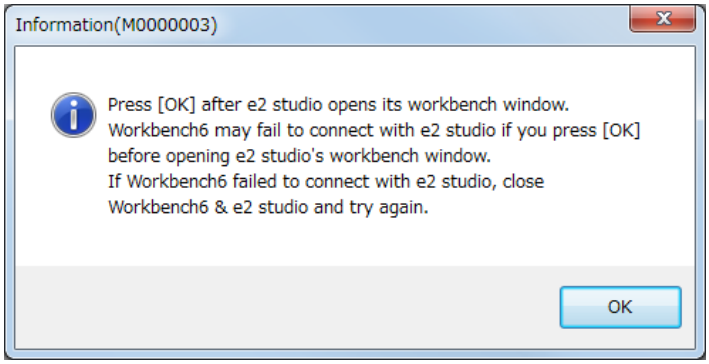


Figure 2-24 First step guide – e2 studio startup confirmation

(2) **IDE without emulator**

This page displays the following when you selected “e2 studio with USB (without Emulator)” in “Integrated Development Environment selection”.

Figure 2-25 First step guide - IDE without emulator

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

User must generate a program and starts your target board. The procedures are as follows.

1. **Start e2 studio.**
2. **Import a project output in folder which you choose in “Project store folder selection” to workspace of e2 studio.**
3. **Build the project.**

4 **Start debug with your target board according to your emulator.**

- **E1**

  Use “TouchApiBase DefaultBuild-E1.launch”.

- **E2 emulator Lite**

  Use “TouchApiBase DefaultBuild-E2Lite.launch”.

5 **Download program that is made by the build to your target board.**

2.2.15 Touch sensor automatic tuning phase 1 - Start

Starts touch sensor automatic tuning phase 1. Press [Next] button.

Figure 2-26 First step guide – Touch sensor automatic tuning phase 1

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.16 Touch sensor automatic tuning phase 1 - Result

Show result of touch sensor automatic tuning phase 1.

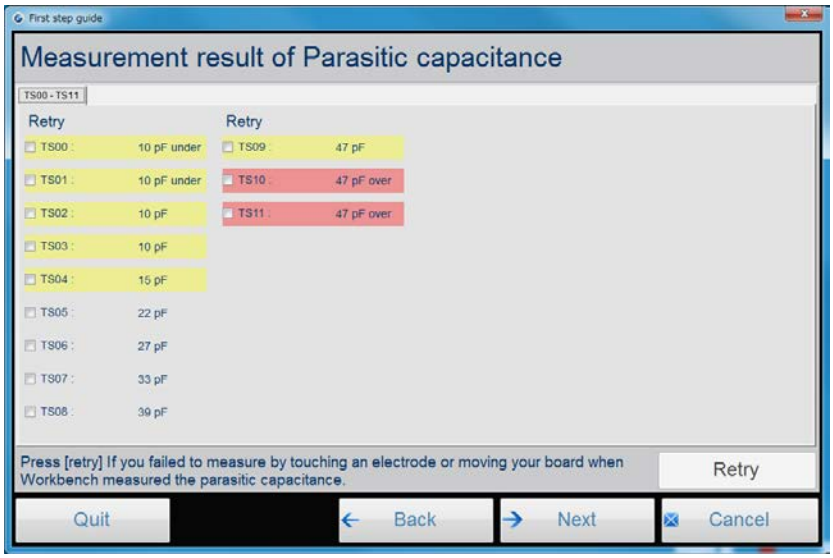


Figure 2-27 First step guide – Touch sensor automatic tuning phase1 - Result

TS05 : 22 pF	Parasitic capacitance of TS is normal.
TS02 : 10 pF	This is Warning to the Parasitic capacitance of TS.
TS10 : 47 pF over	This is Error to the Parasitic capacitance of TS.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.17 Touch sensor automatic tuning phase 2 - Start

Starts touch sensor automatic tuning phase 2. Press [Next] button.

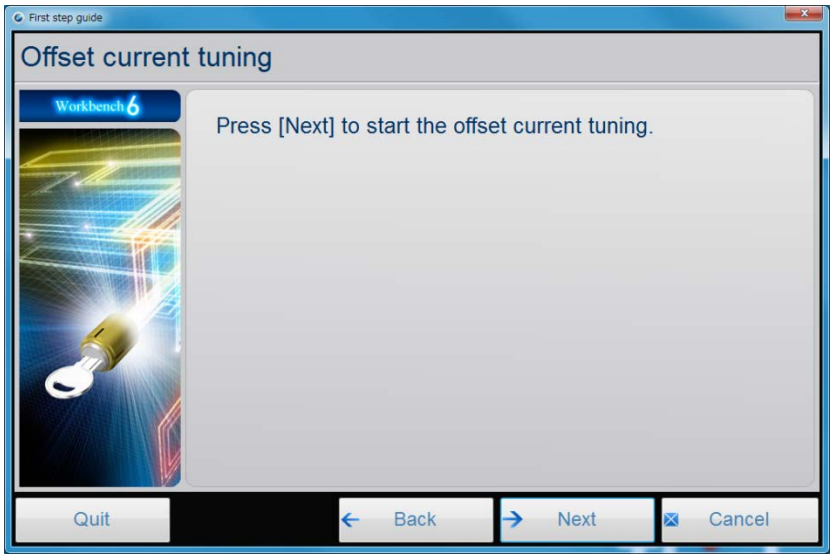


Figure 2-28 First step guide – Touch sensor automatic tuning phase 2 - Start

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.18 Touch sensor automatic tuning phase 2 - Tuning

Touch sensor automatic tuning phase 2 is in progress. When touch sensor automatic tuning phase 2 is finished, this page change to "Touch sensor automatic tuning phase 2 – Result" automatically.

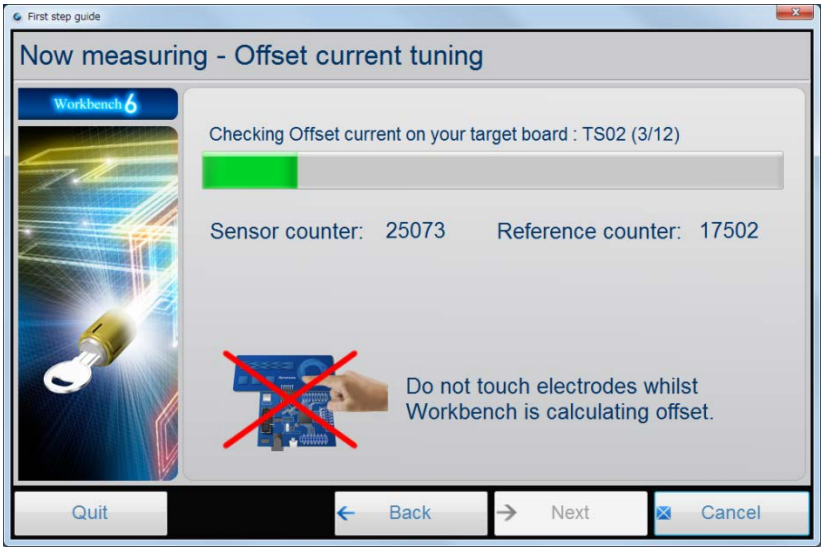


Figure 2-29 First step guide – Touch sensor automatic tuning phase 2 - Tuning

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.19 Touch sensor automatic tuning phase 2 - Result

Display result of touch sensor automatic tuning phase 2

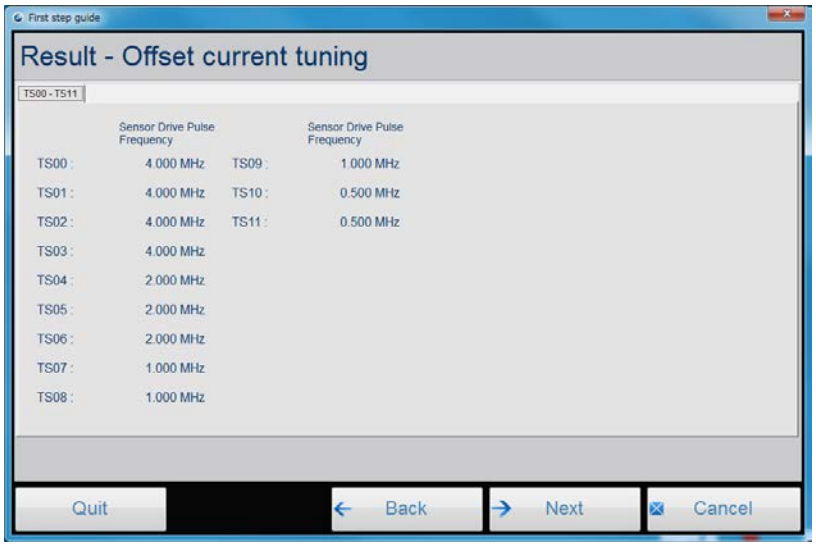


Figure 2-30 First step guide – Touch sensor automatic tuning phase 2 - Result

Sensor Drive Pulse Frequency 4.000 MHz	Show sensor drive pulse frequency.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.20 Touch sensor automatic tuning phase 3 - Start

Starts touch sensor automatic tuning phase 3. Press [Next] button.

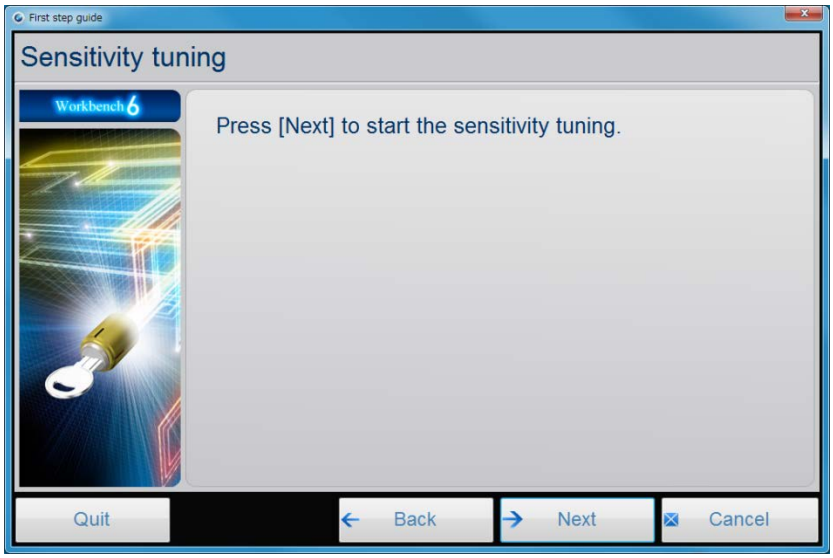


Figure 2-31 First step guide – Touch sensor automatic tuning phase 3 - Start

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.21 Touch sensor automatic tuning phase 3 - Tuning

(1) Self-capacitance

(a) Touch sensor automatic tuning phase 3 – Touch button tuning

Touch button with TS number is surrounded by red frame is an object of sensitivity tuning. At first, push “Y” key on keyboard of your PC while touching the touch button with a finger well or with an iron stick. Afterwards repeat three times that “Y” key on keyboard of your PC while touching the touch button with a finger commonly.

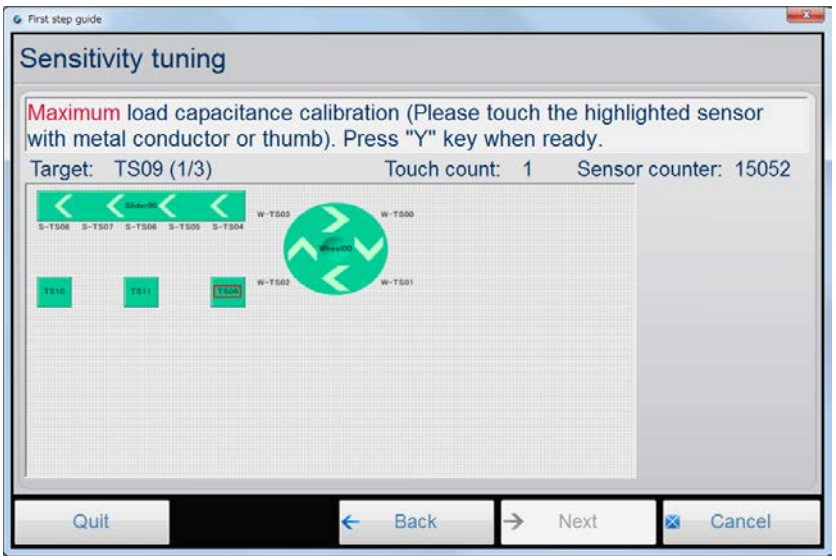


Figure 2-32 First step guide – Touch sensor automatic tuning phase 3- Touch button tuning

TS9	Shows Touch button for tuning.
Target: TS09 (1/3)	Shows the touch sensor number that is tuned currently.
Touch count: 1	Shows the number to touch the Touch button.
Sensor counter:17481	Shows the count value of the touch sensor that is tuned currently. When you touch the target Touch button, the count value is changed. If the count value is not changed, you may touch the other Touch button. In that case, check your target board.
Quit	Terminate the First step guide with saving.
← Back	To the previous page.
→ Next	To the next page.
Cancel	Terminate the First step guide without saving.

(b) Touch sensor automatic tuning – Slider and Wheel checking

Before sensitive tuning of slider and wheel, Workbench6 checks the status of all sliders and wheels. This check starts by press “Y” key on keyboard of your PC. In addition, you must not touch sliders and wheels during this check.

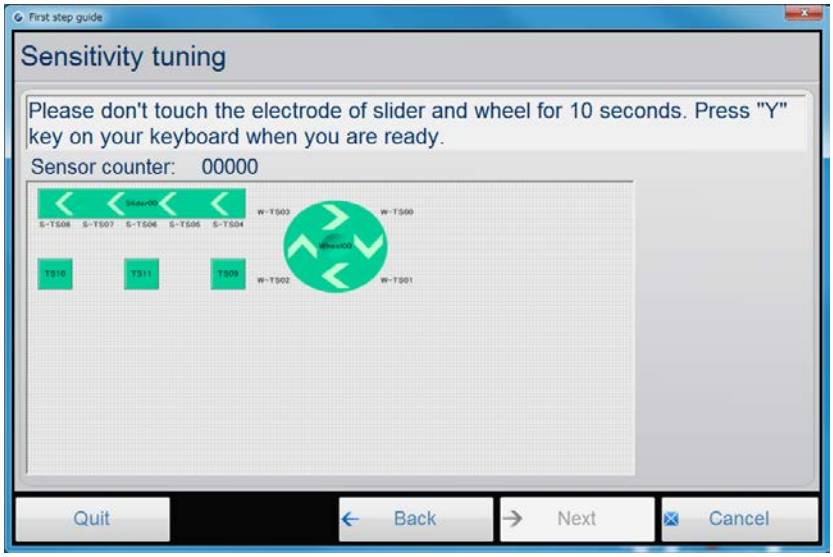


Figure 2-33 First step guide – Touch sensor automatic tuning – Slider and Wheel checking

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(c) Touch sensor automatic tuning phase 3 – Slider tuning

After the check of sliders and wheels, Workbench6 starts sensitivity tuning of the sliders by pushing “Y” key on keyboard of your PC.

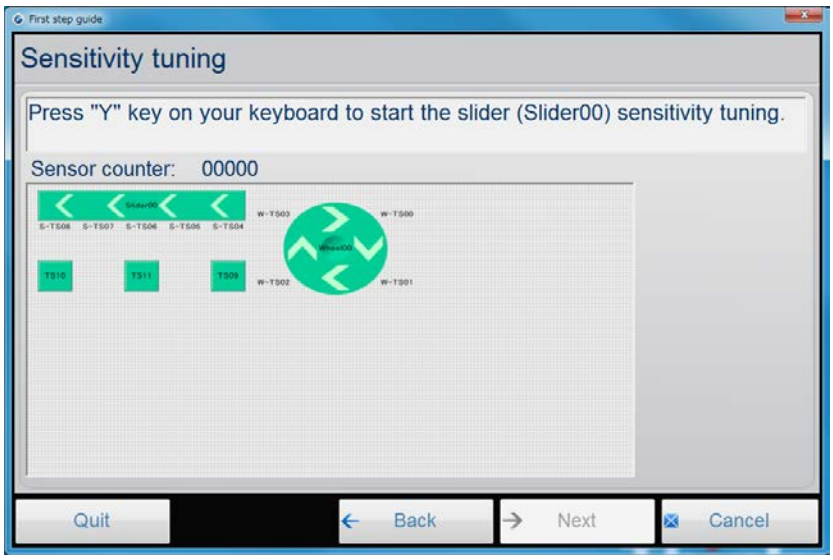


Figure 2-34 First step guide – Touch sensor automatic tuning phase 3 – Slider tuning start

Quit	Terminate the First step guide with saving.
← Back	To the previous page.
→ Next	To the next page.
Cancel	Terminate the First step guide without saving.

A slider composed of TS surrounded with red frame is an object of slider sensitivity tuning. After sliding the slider on your target board three or four times, press “Y” key on keyboard of your PC.

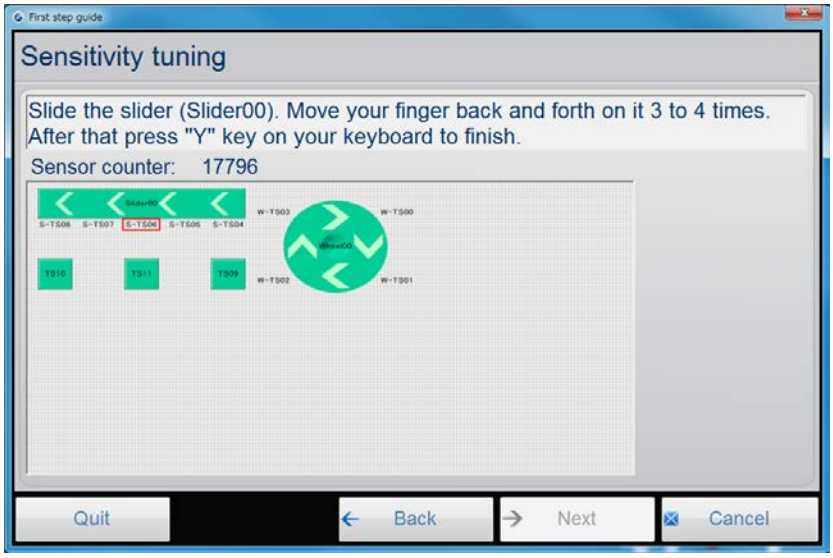


Figure 2-35 First step guide – Touch sensor automatic tuning phase 3 –slider tuning

	Shows a slider for tuning.
Sensor counter:17481	Shows the average value of the count value of the Slider that is tuned currently. When you touch the target Slider, the count value is changed. If the count value is not changed, you may touch the other Slider. In that case, check your target board.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(d) Touch sensor automatic tuning phase 3 – Wheel tuning

After the check of sliders and wheels or sensitivity tuning of slider, Workbench6 starts sensitivity tuning of the wheels by pushing “Y” key on keyboard of your PC.

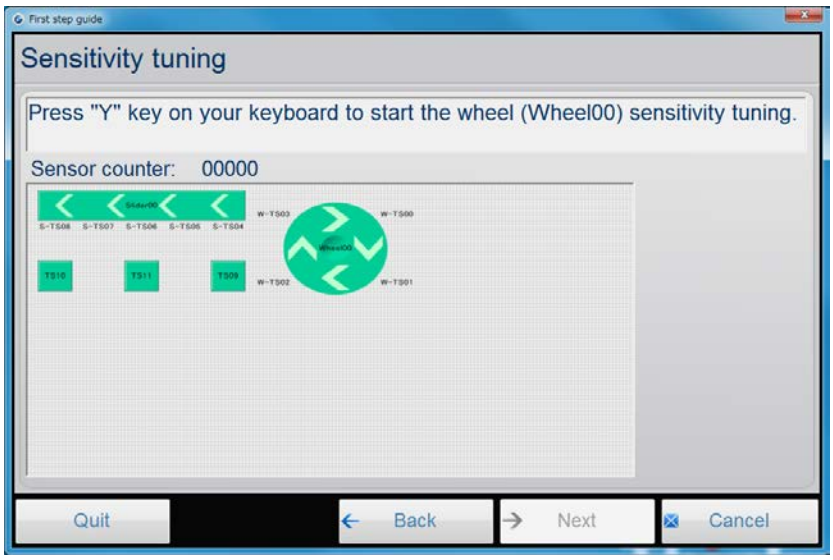


Figure 2-36 First step guide – Touch sensor automatic tuning phase 3 – Wheel tuning start

Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

A wheel composed of TS surrounded with red frame is an object of wheel sensitivity tuning. After spin the wheel on your target board three or four times, press “Y” key on keyboard of your PC.

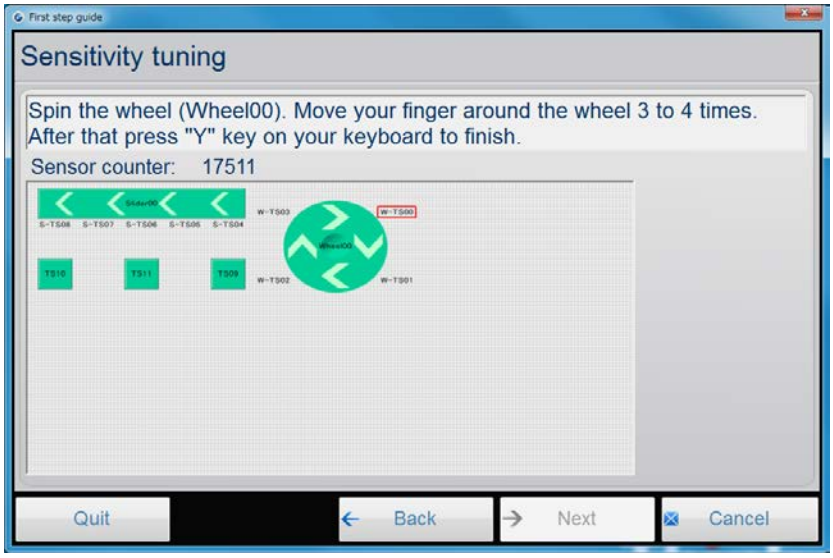
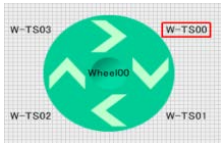


Figure 2-37 First step guide – Touch sensor automatic tuning phase 3 – Wheel tuning

	Shows a wheel for tuning.
Sensor counter:17481	Shows the average value of the count value of the Wheel that is tuned currently. When you touch the target Wheel, the count value is changed. If the count value is not changed, you may touch the other Wheel. In that case, check your target board.
Quit	Terminate the First step guide with saving.
← Back	To the previous page.
→ Next	To the next page.
Cancel	Terminate the First step guide without saving.

(2) Mutual capacitance

(a) Touch sensor automatic tuning phase 3 – Matrix key sensitivity tuning

Matrix key with TS number surrounded by red frame is an object of sensitivity tuning. At first, push "Y" key on keyboard of your PC while touching the matrix key with a finger well or with an iron stick. Afterwards repeat three times that "Y" key on keyboard of your PC while touching the matrix key with a finger commonly.

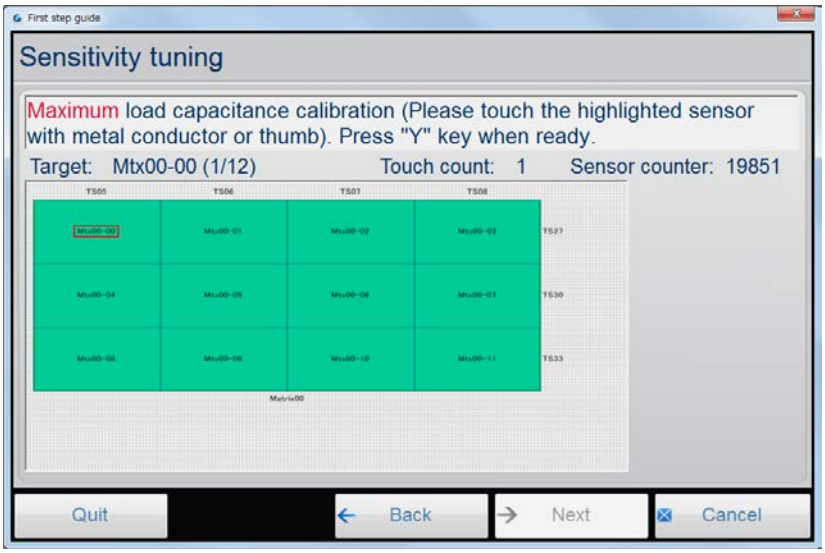


Figure 2-38 First step guide – Touch sensor automatic tuning phase 3 – Matrix key tuning

	Shows the Matrix key for tuning.
Target: Mtx00-00 (1/12)	Shows the Matrix key number that is tuned currently.
Touch count: 1	Shows the number to touch the Matrix key.
Sensor counter:17481	Shows the count value of the touch sensor that is tuned currently. When you touch the target Matrix key, the count value is changed. If the count value is not changed, you may touch the other Matrix key. In that case, check your target board.
Quit	Terminate the First step guide with saving.
← Back	To the previous page.
→ Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.22 Touch sensor automatic tuning phase 3 - Result

Shows result of touch sensor automatic tuning phase 3. Press [Next] button to output the result of touch sensor automatic tuning to source files.

(1) Self-capacitance

Display the result of touch sensor automatic tuning phase 3 with following five kinds when touch sensor detection method is self-capacitance.

(a) Sensor counter value (without the sum number of the measurement)

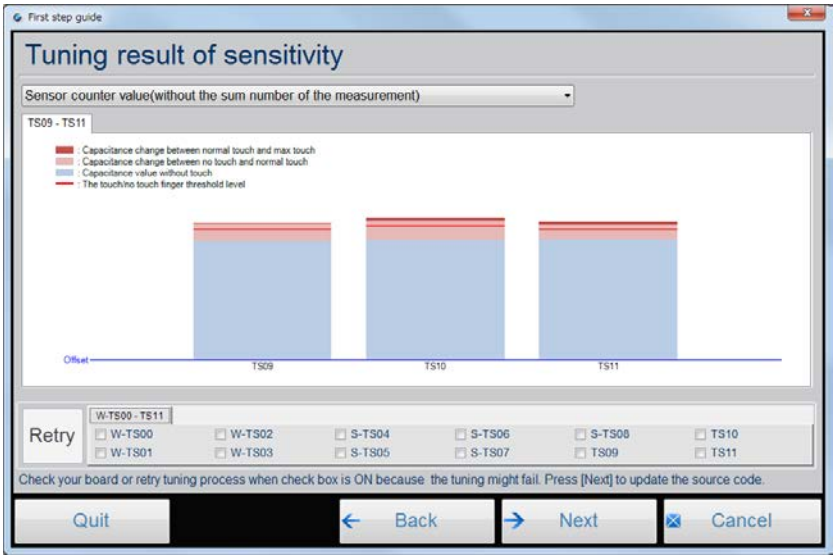


Figure 2-39 First step guide - Touch sensor automatic tuning phase 3 - Sensor counter value (without the sum number of the measurement)

Caution: If you did not place a touch button at the touch interface definition, this screen is not displayed.

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
	Show Capacitance of the maximum sensitive.
	Show Capacitance of Touch.
	Show Capacitance of Non-touch.
	Show Touch determination threshold value.
TS09	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(b) Sensor counter value (with the sum number of the measurement)

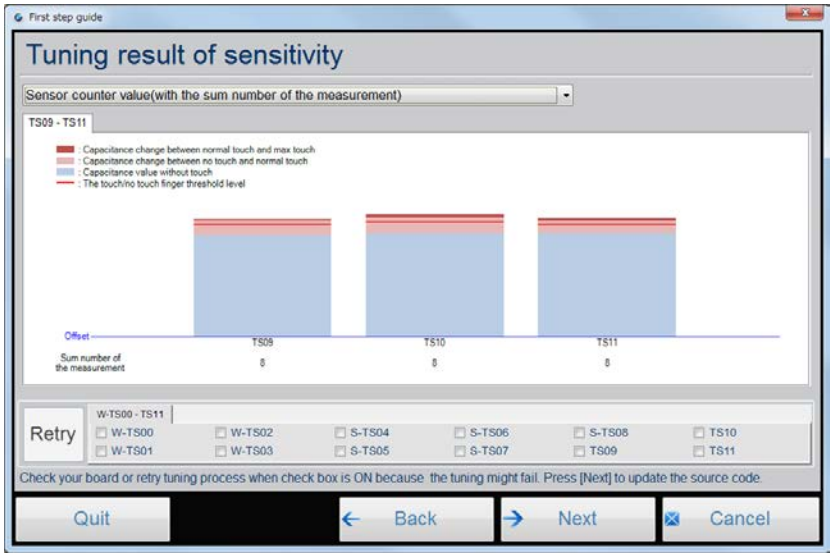


Figure 2-40 First step guide - Touch sensor automatic tuning phase 3 - Sensor counter value (with the sum number of the measurement)

Caution: If you did not place a touch button at the touch interface definition, this screen is not displayed.

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
	Show Capacitance of the maximum sensitive.
	Show Capacitance of Touch.
	Show Capacitance of Non-touch.
	Show Touch determination threshold value.
TS09	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(c) Sensor counter value (with the sum number of the measurement) Magnification view

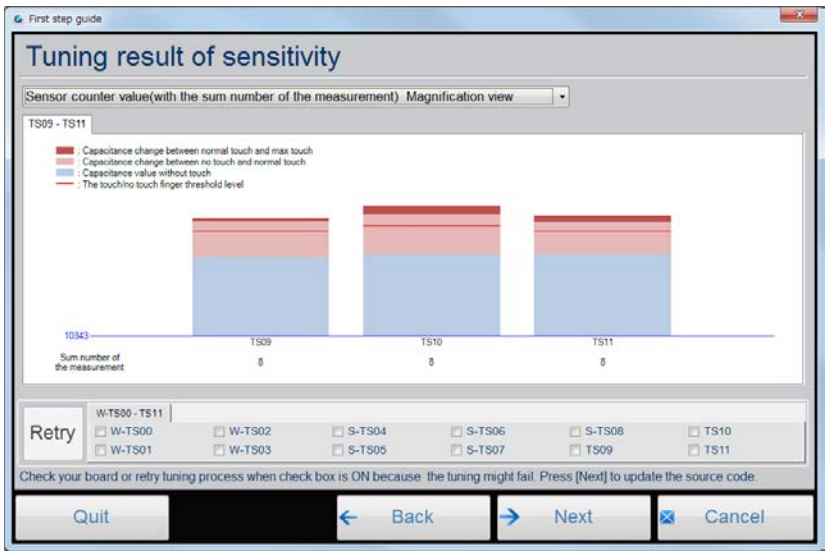


Figure 2-41 First step guide - Touch sensor automatic tuning phase 3 - Sensor counter value (with the sum number of the measurement) Magnification view

Caution: If you did not place a touch button at the touch interface definition, this screen is not displayed.

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
	Show Capacitance of the maximum sensitive.
	Show Capacitance of Touch.
	Show Capacitance of Non-touch.
	Show Touch determination threshold value.
TS09	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(d) Measurement time

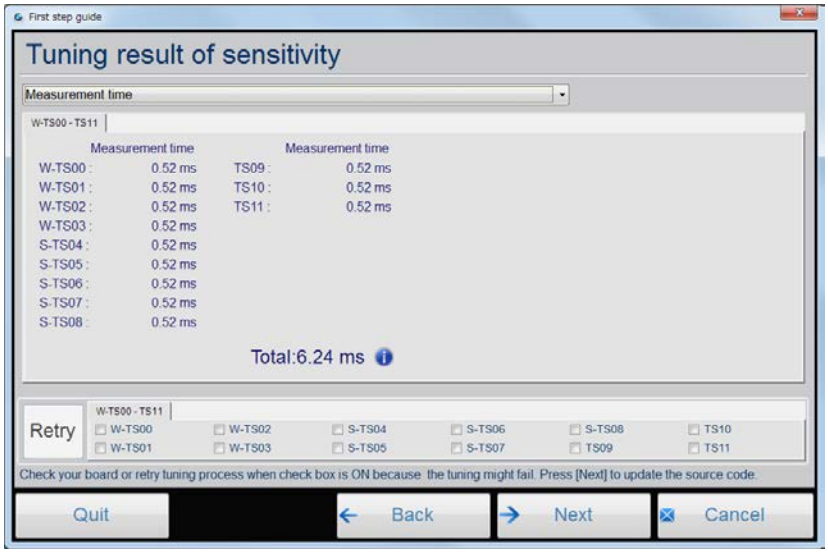


Figure 2-42 First step guide - Touch sensor automatic tuning phase 3 - Measurement time

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
Measurement time 0.52 ms	Show Measurement time.
Total: 6.24 ms	Show total time of Measurement time.
TS09	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(e) Slider / Wheel threshold

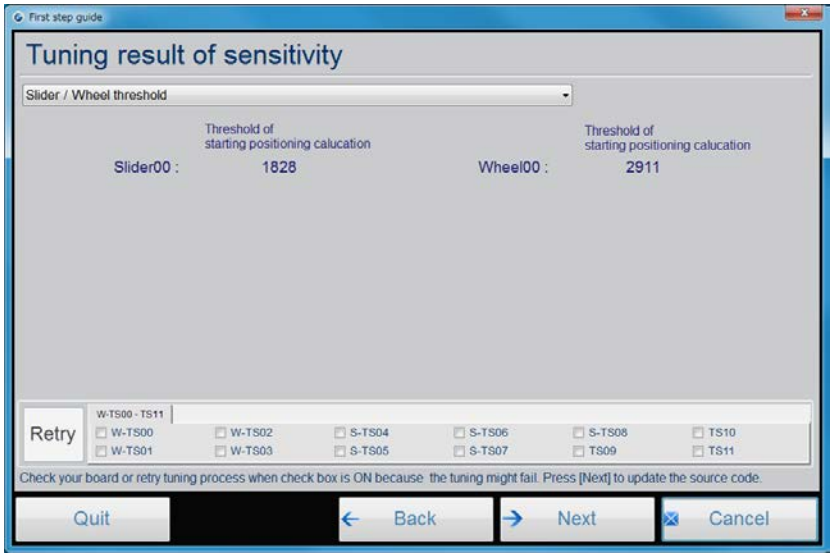


Figure 2-43 First step guide - Touch sensor automatic tuning phase 3 – Slider / Wheel threshold

Caution: If you did not place a slider or wheel at the touch interface definition, this screen is not displayed.

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
Threshold of starting positioning calucation Slider00 : 1828	Show Threshold of the Slider.
Threshold of starting positioning calucation Wheel00 : 2911	Show Threshold of the Wheel.
TS09	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(2) Mutual capacitance

Display the result of touch sensor automatic tuning phase 3 with following four kinds when touch sensor detection method is mutual capacitance.

(a) Sensor counter value (without the sum number of the measurement)

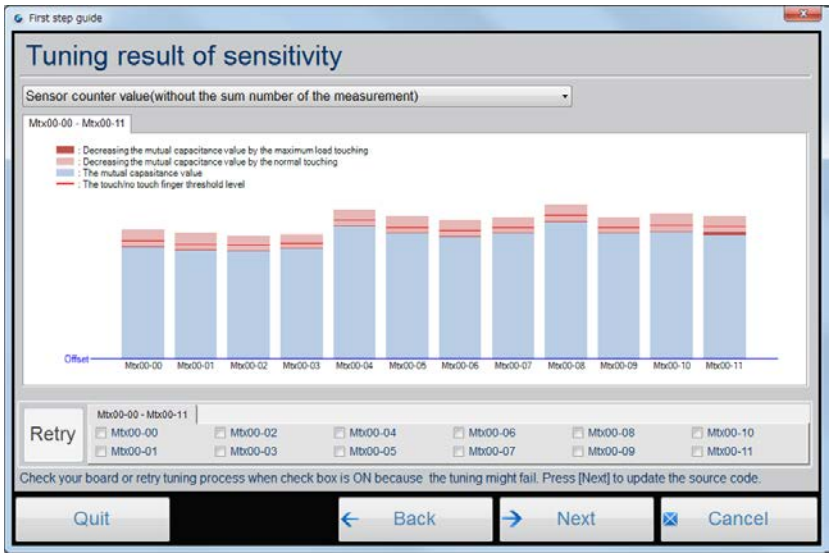


Figure 2-44 First step guide - Touch sensor automatic tuning phase 3 - Sensor counter value (without the sum number of the measurement)

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
	Show the inter electrode capacitance decrease value in the max load touch.
	Show the inter-electrode capacitance decrease value in the normal touch.
	Show Inter-electrode capacitance.
	Show Touch determination threshold value.
Mtx00-00	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(b) Sensor Counter value (with the sum number of the measurement)

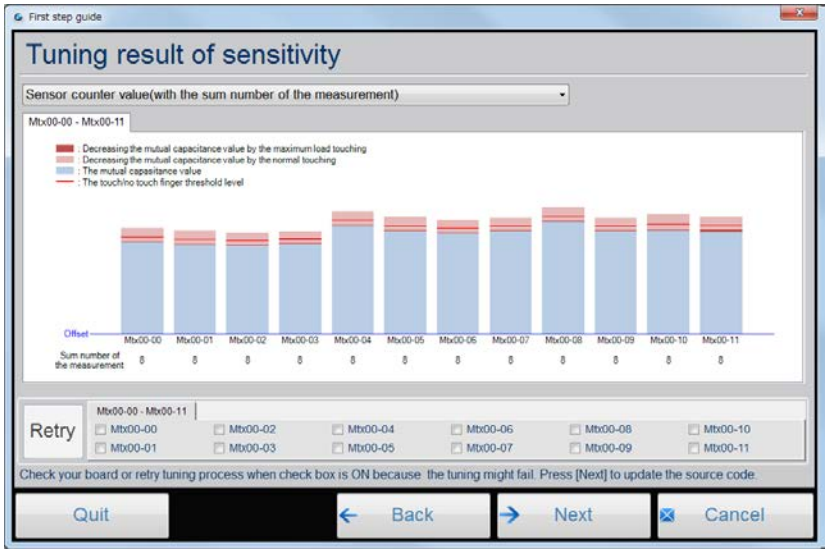


Figure 2-45 First step guide - Touch sensor automatic tuning phase 3 - Sensor Counter value (with the sum number of the measurement)

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
	Show the inter electrode capacitance decrease value in the max load touch.
	Show the inter-electrode capacitance decrease value in the normal touch.
	Show Inter-electrode capacitance.
	Show Touch determination threshold value.
Mtx00-00	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(c) Sensor counter value (with the sum number of the measurement) Magnification view

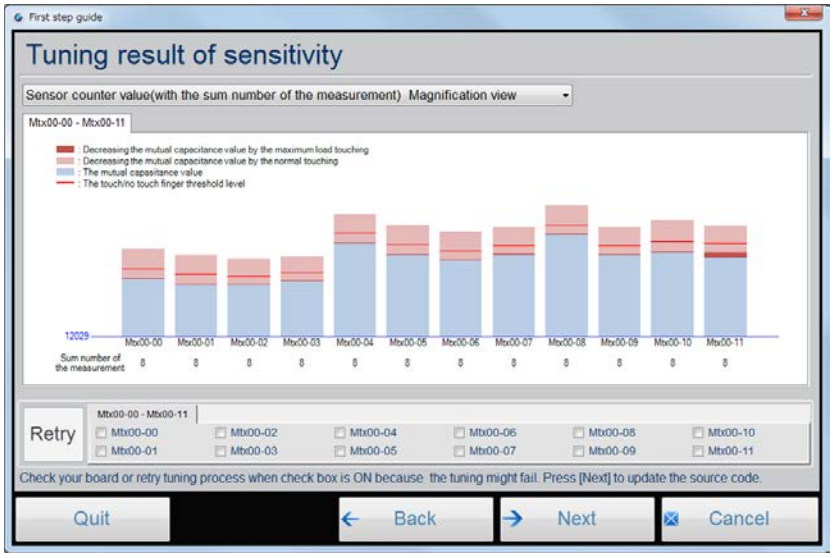


Figure 2-46 First step guide - Touch sensor automatic tuning phase 3 - Sensor counter value (with the sum number of the measurement) Magnification view

Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
	Show the inter electrode capacitance decrease value in the max load touch.
	Show the inter-electrode capacitance decrease value in the normal touch.
	Show Inter-electrode capacitance.
	Show Touch determination threshold value.
Mtx00-00	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

(d) Measurement time

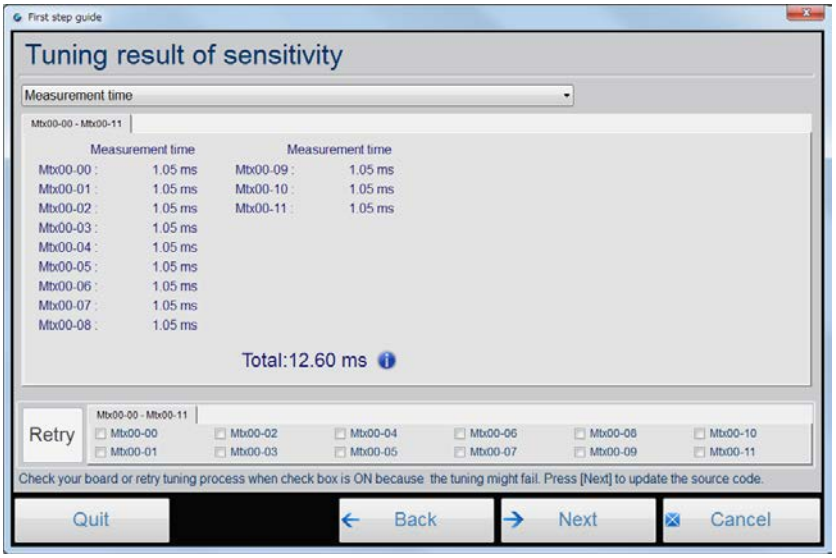


Figure 2-47 First step guide – Touch sensor automatic tuning phase 3 - Measurement time

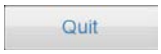
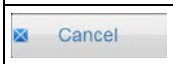
Sensor counter value(...)	Change the result of touch sensor automatic tuning phase 3.
Measurement time 0.52 ms	Show Measurement time.
Total: 6.24 ms	Show total time of Measurement time.
Mtx00-00	Select TS to retry touch sensor automatic tuning phase 3.
Retry	Press [Retry] to execute touch sensor automatic tuning phase 3 if TS to retry is set.
Quit	Terminate the First step guide with saving.
Back	To the previous page.
Next	To the next page.
Cancel	Terminate the First step guide without saving.

2.2.23 Target board reboot

This page builds source file that is updated by the result of touch sensor automatic tuning and reboot your target board.

(1) IDE with Emulator

Figure 2-48 First step guide – Target board reboot

	Shows a process on the right side of this icon was completed.
	Shows a process on the right side of this icon was not completed.
	Cannot press this button.
	To the previous page.
	Terminate the First step guide with saving.
	Terminate the First step guide without saving.

(2) IDE without Emulator

This page displays the following when you selected “e2 studio with USB (without Emulator)” in “Integrated Development Environment selection”.

Figure 2-49 First step guide – IDE without emulator

Quit	Cannot press this button.
Back	To the previous page.
Finish	Terminate the First step guide with saving.
Cancel	Terminate the First step guide without saving.

User must generate a program and starts your target board. The procedures are as follows.

(a) Start e2 studio.

(b) Import the project to workspace on e2 studio.

(c) Build the project

(d) Download program that is made by the build to your target board.

(3) FIT Compliant (firmware for touch detection)

First step guide outputs FIT Compliant (firmware for touch detection) by push of [Finish] or [Quit] when user selected “e2 studio with E1 Emulator” or “e2 studio with USB (without Emulator)” in “Integrated development environment selection”.

FIT Compliant (firmware for touch detection) is outputted to folder that you selected in [2.2.10 Project store folder selection], and the folder name is decided according to Touch MCU group name that you selected in [2.2.6 Touch MCU selection]. The naming rule is as follows. For example, when you selected RX113 as Touch MCU, the folder name is “Base_Project_RX113”.

Use the FIT Compliant (firmware for touch detection) after you imported the FIT Compliant (firmware for touch detection) to e2 studio and implemented your application program to FIT Compliant (firmware for touch detection).

“Base_Project_” + Touch MCU group name

There is a great difference between FIT Compliant (firmware for touch detection) and TouchAPI project. TouchAPI project is saved in TouchAPI_YYYYMMDDhhmmss (YYYY: four-digit century, MM: two-digit month, DD: two-digit day, hh: two-digit hour, mm: two-digit minute, ss: two-digit second) folder. Refer to documents in “doc” folder under FIT Compliant (firmware for touch detection) folder for detail.

Part of FIT Compliant (firmware for touch detection) is outputted when user selected resume of automatic tuning process in “Project selection”. Overwrite the part of FIT Compliant (firmware for touch detection) to the FIT Compliant (firmware for touch detection) that you implemented your application program. In addition, refer to [**Figure 2-50 FIT Compliant (firmware for touch detection)**] about the part of FIT Compliant (firmware for touch detection).

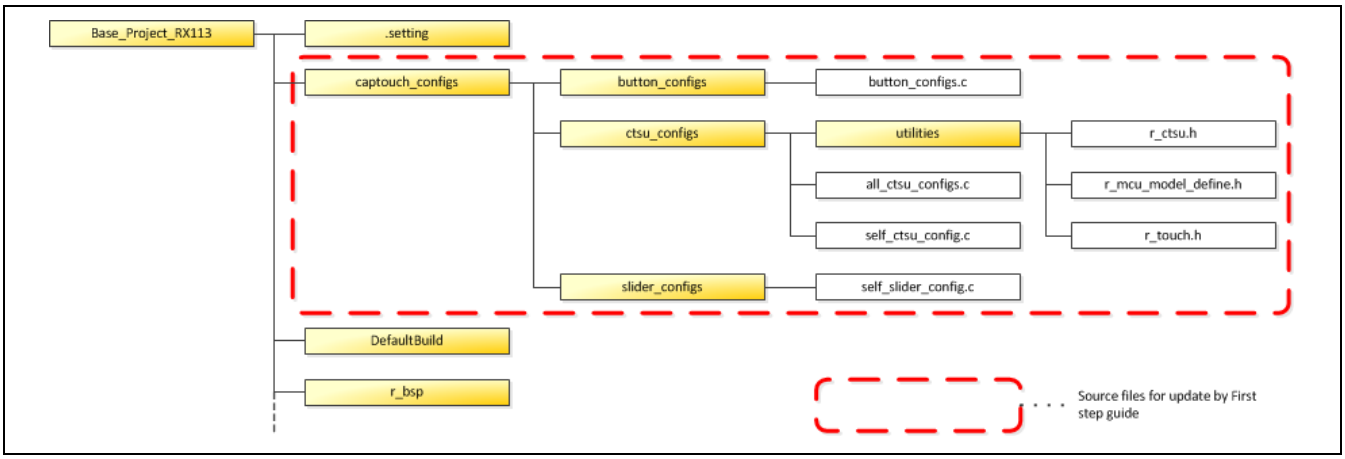


Figure 2-50 FIT Compliant (firmware for touch detection)

2.3 Tuning window

2.3.1 Status monitor

Status monitor displays touch sensor sensitivity in real time.

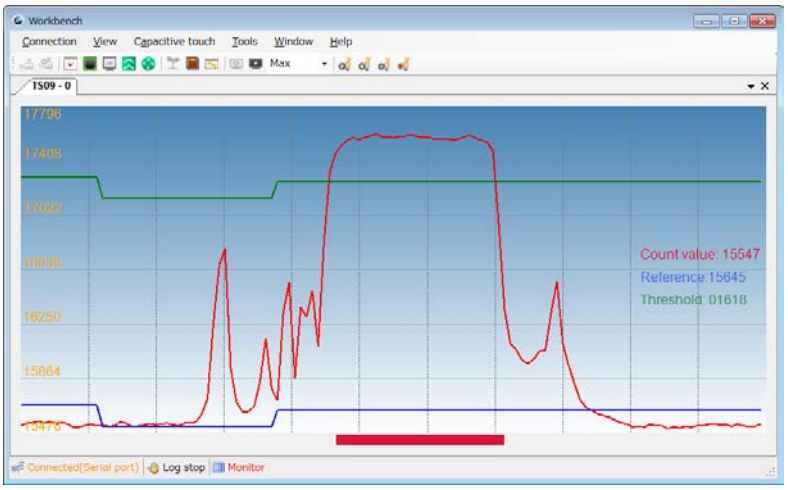
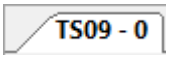
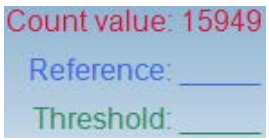


Figure 2-51 Status monitor

	Shows target TS and the measurement method number.
	Shows Count value. When TS is not used as touch sensor or matrix, Status monitor does not display the Count value.
	Show Reference value. When TS is not used as touch sensor or matrix key and is a part of slider or wheel, Status monitor does not display the Reference value.
	Shows Touch determination threshold value for judgment of touch or not. Hereinafter the “Touch determination threshold value for judgment of touch no not” is called “Touch determination threshold value”. When TS is not used as touch sensor or matrix key and is a part of slider or wheel, Status monitor does not display Touch determination threshold value.
	Show result of Judgment process for touch or not. Hereinafter the “Judgment process for touch or not” is called “Judgment touch or not”. When TS is not used as touch sensor or matrix key and is a part of slider or wheel, Status monitor does not display judgment touch or not.
	Show numerical value of Count value and Reference count value, Touch determination threshold value. If TS is not used as touch senor or matrix key, Status monitor displays “_____” as numerical value. If TS is a part of slider or wheel, Status monitor displays “_____” as the Reference value and the Touch determination threshold value.
	Show grid line.
	Show the value of the Count value on grid line.

(1) Context menu

(a) TS select

Select a TS number to monitor in Status monitor.

(b) Display

- Numerical value

  Show and hide numerical value of count value and reference value, Touch determination threshold value.
- Zoom in

  Enlarge view area.
- Zoom out

  Reduce view area.
- Up

  Push upward view area.
- Down

  Push downward view area.
- One shot auto scaling

  Execute auto scaling.

(c) Label

Edit a label of the Touch button or Matrix key. When you selected the Slider TS or Wheel TS, you cannot edit the label.

(d) Setup

Display Setup Status monitor dialog. Refer to [(4) Setup Status monitor] for detail.

(e) Auto scaling

Enables or disables “Auto scaling”.

(f) Close

Exit Status monitor.

(2) Shortcut key

Some function of context menu is same as the shortcut key.

(a) Ctrl + “Up“

Enlarge view area.

(b) Ctrl + “Down“

Reduce view area.

(c) Ctrl + “Up”, Ctrl + “Page Up”

Push upward view area.

(d) Ctrl + “Down”, Ctrl + “Page Down”

Push downward view area.

(e) Ctrl + “Return”

Execute auto scaling.

(3) Pointing device action

(a) Double click

Execute auto scaling by double click display area.

(4) Setup Status monitor dialog

Setup the grid and scale of view area.

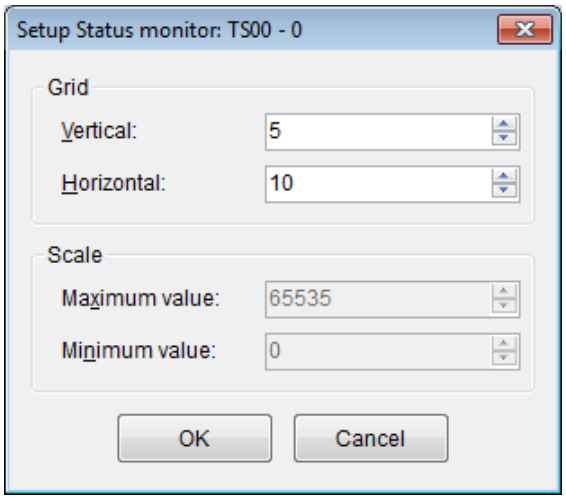


Figure 2-52 Setup Status monitor

Vertical: 5	Changes the number of the vertical grid line. Range of the number of the vertical grid line is 0 to 32. When the number of vertical grid line is zero, the vertical grid line is not displayed. Default value of the vertical grid line is 5.
Horizontal: 10	Change the number of the horizontal grid line. Range of the number of the horizontal grid line is 0 to 128. When the number of horizontal grid line is zero, the horizontal grid line is not displayed. Default value of the horizontal gird line is 10.
Maximum value: 65535	Changes the maximum count value that displays in view area. When “Auto scaling” is enabled, you cannot change this value.
Minimum value: 0	Changes the minimum count value that displays in view area. When “Auto scaling” is enabled, you cannot change this value.
OK	Enable settings and close Setup Status monitor dialog.
Cancel	Disable settings and close Setup Status monitor dialog.

(5) Cursor display

When the graph is displayed in view area, the cursor is displayed in view area at the stop of monitoring. The cursor is moved according to a pointer of a pointing device. The count value and the reference value and threshold value on the cursor is displayed in numeric value. When the pointer of the pointing device is out of view area, the cursor is not displayed.

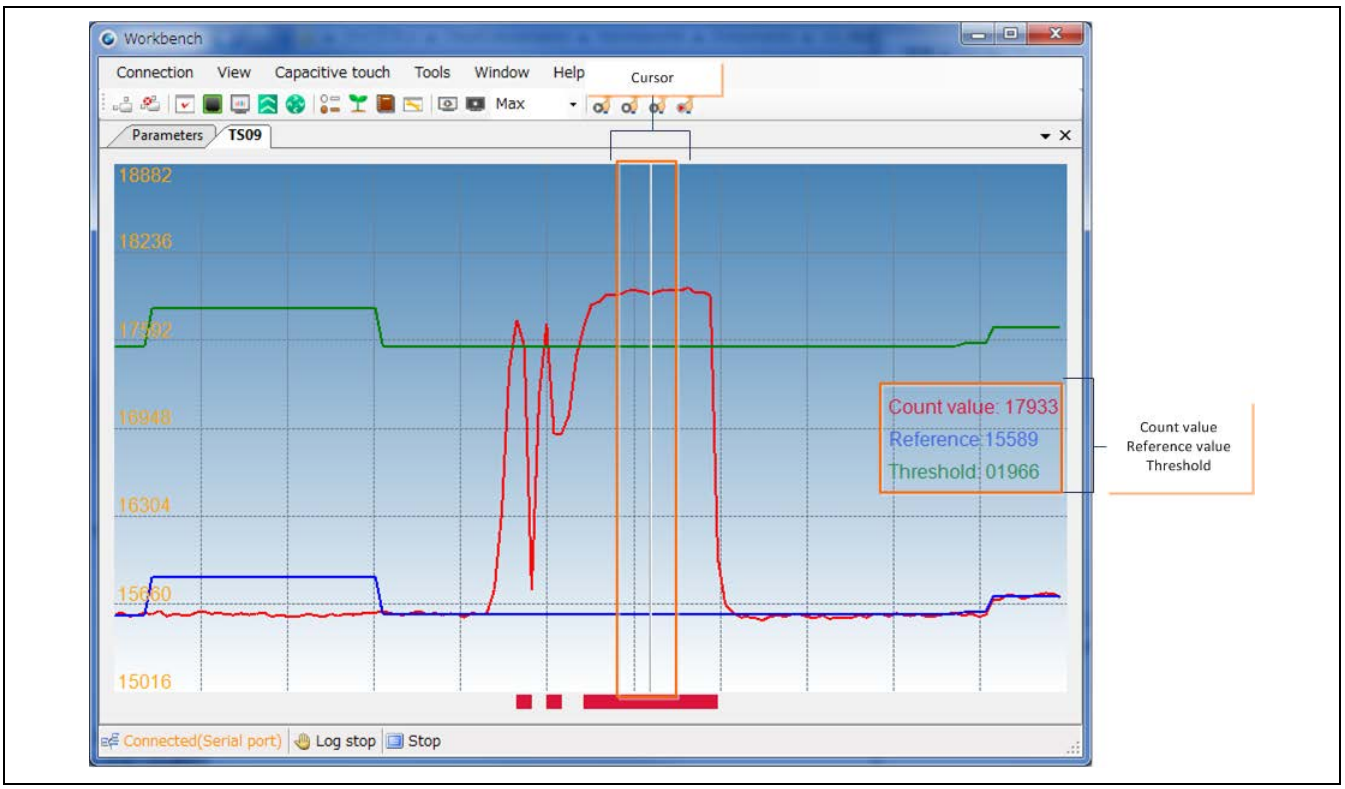


Figure 2-53 Status monitor – Cursor display

2.3.2 Slider monitor

Slider monitor displays slider touch position in real time.

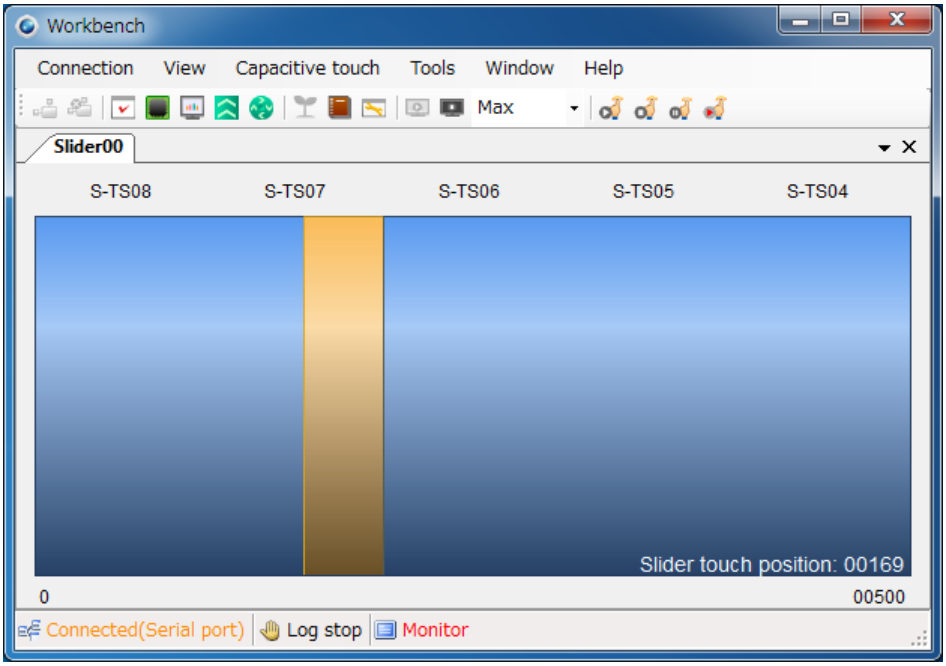
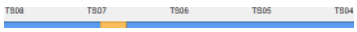


Figure 2-54 Slider monitor

	Shows slider touch position.
	Shows numerical value of slider touch position.
	Shows TS number composing a slider.
	Shows slider resolution.

(1) Context menu

(a) Slider select

Select a slider to monitor in Slider monitor.

(b) Display

- Touch position

  Shows and hides numerical value of slider touch position.

- Resolution

  Shows and hides slider resolution.

- TS number

  Shows and hides TS number composing a slider.

(c) Setup

- Horizontal

  When “Horizontal” is checked, Slider monitor changes horizontal Slider image. When “Horizontal” is not checked, Slider monitor changes vertical Slider image.

- Forward order

  Change the slider layout order of Slider TS. When “Forward order” is checked, Slider monitor changes the slider layout order forward. When “Forward order” is not checked, Wheel slider changes the layout slider layout order backward.

(d) Label

Edit a label of the slider.

(e) Close

Exit Slider monitor.

2.3.3 Wheel monitor

Wheel monitor displays wheel touch position in real time.

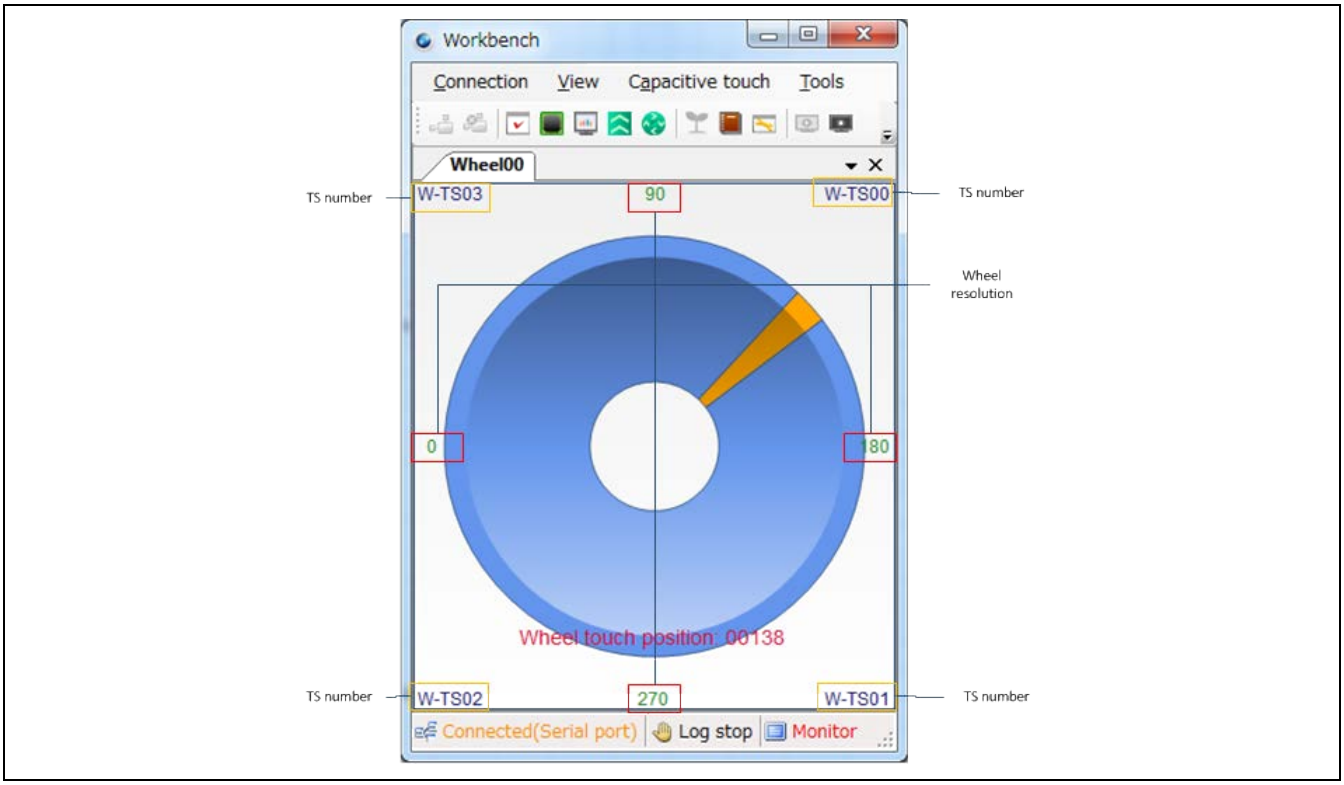
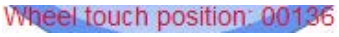


Figure 2-55 Wheel monitor

	Shows wheel touch position.
	Shows numerical value of wheel touch position.
	Shows TS number composing a wheel.
	Shows wheel resolution.

(1) Context menu

(a) Wheel select

Select a wheel to monitor in Wheel monitor.

(b) Display

- Touch position

  Shows and hides numerical value of wheel touch position.

- Resolution

  Shows and hides wheel resolution.

- TS number

  Shows and hides TS number composing a wheel.

(c) Setup

- Forward order

  Change the wheel layout order of wheel TS. When “Forward order” is checked, Wheel monitor changes the wheel layout order forward. When “Forward order” is not checked, Wheel monitor changes the layout wheel layout order backward.

- Rotate clockwise

  Rotate the start position of wheel TS clockwise

- Rotate counter-clockwise

  Rotate wheel TS start position counter-clockwise.

(d) Label

Edit a label of the wheel.

(e) Close

Exit Wheel monitor.

2.3.4 Difference monitor

Difference monitor displays count value difference in real time.

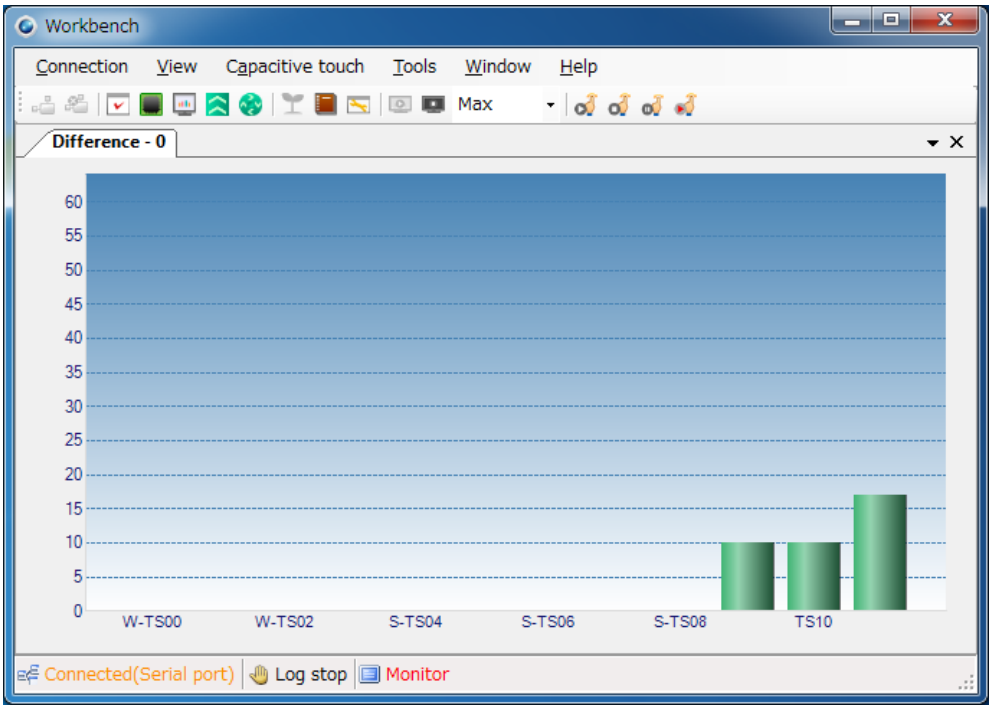
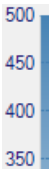
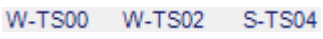


Figure 2-56 Difference monitor

	Shows count value difference. When TS is a part of slider or wheel, Difference monitor does not display count value difference.
	Shows Y-axis value.
	Shows TS number.

(1) Context menu

(a) TS select

- Group0 [TS00 – TS11]

  Change TS number to monitor from TS00 – TS11.
- Group1 [TS12 - TS23]

  Change TS number to monitor from TS12 – TS23.
- Group 2[TS24 - TS35]

  Change TS number to monitor from TS24 – TS35.
- Group 3 [TS36 - TS47]

  Change TS number to monitor from TS36 – TS47.
- Group 4 [TS48 - TS59]

  Change TS number to monitor from TS48 – TS59.
- Group 5 [TS60 - TS63]

  Change TS number to monitor from TS60 – TS63.

(b) Display

- TS number

  Shows and hides TS number.
- Y-Axis

  Shows and hides Y-Axis.

(c) Select method

Change the measurement method number.

(d) Setup

Display Setup Difference monitor dialog. Refer to [(2) Setup Difference monitor dialog] for detail.

(e) Close

Exit Difference monitor.

(2) Setup Difference monitor dialog

Setup the Y-axis maximum value in Difference monitor.

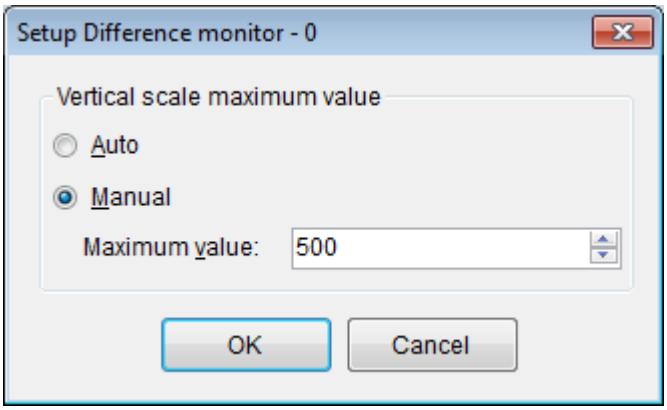


Figure 2-57 Setup Difference monitor

Auto	Automatic tuning the maximum value of Y-axis. “Auto” is default setting.
Manual	Enable the maximum value of Y-axis.
Maximum value: 500	Change the maximum value of Y-axis.
OK	Enable settings and close this dialog.
Cancel	Disable settings and close this dialog.

2.3.5 Locus monitor

Locus monitor displays slider touch position and wheel touch position in the form of line graph in real time.

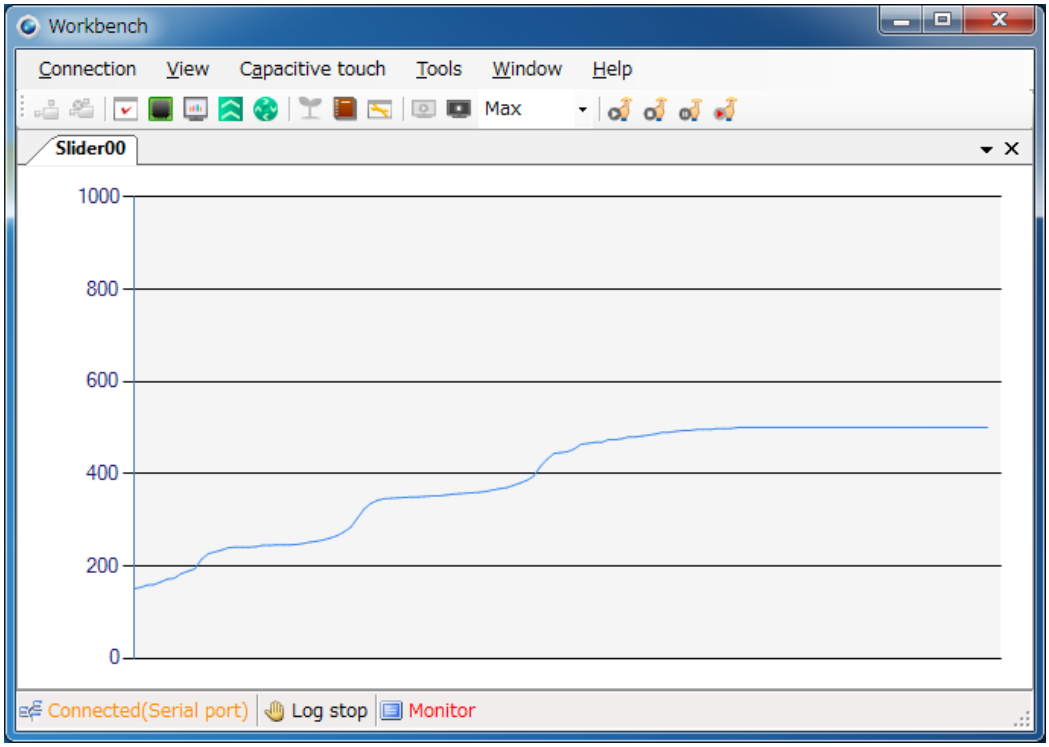
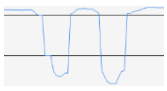


Figure 2-58 Locus monitor

	Shows slider touch position or wheel touch position.
	Shows the value of vertical axis of a slider touch position or wheel touch position

(1) Context menu

(a) Interface select

- Slider

  Select a slider to monitor in Locus monitor.

- Wheel

  Select a wheel to monitor in Locus monitor.

(b) Close

Exit Locus monitor.

2.3.6 Measurements

Measurements displays count value and reference value, Touch determination threshold value, result of judgment in real time.

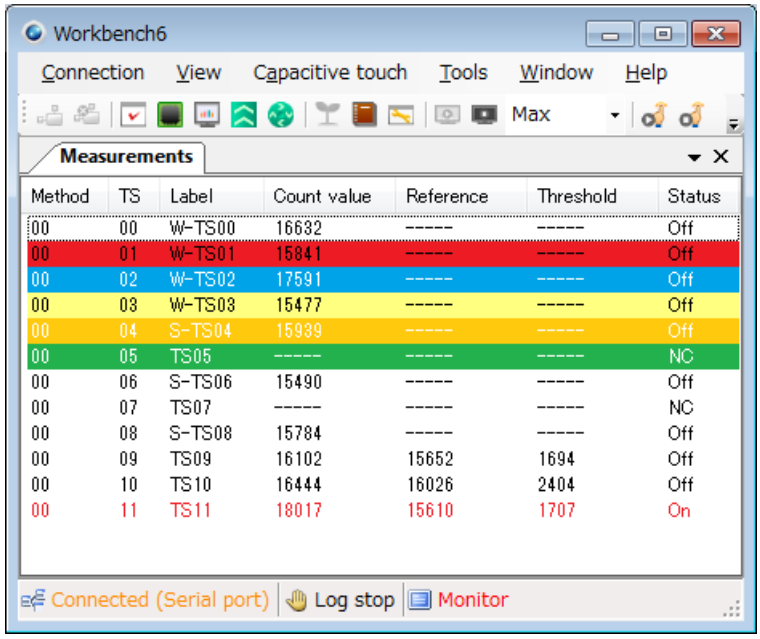


Figure 2-59 Measurements

Method 00	Shows the measurement method number.
TS 00	Shows TS number.
Count value 35082	Shows Count value. If TS is not used as touch sensor or matrix key, Measurements displays “-----“ as the Count value.
Reference 65535	Shows Reference count value. If TS is not used as touch sensor or matrix key and is a part of slider or wheel, Measurements displays “-----“ as the Reference value.
Threshold 65535	Show Touch determination threshold value. If TS is not used as touch sensor or matrix key and is a part of slider or wheel, Measurements displays “-----“ as the Touch determination threshold value.
Status Off	Shows “Judgment touch or not” as follows. Touch: On, Non-touch: Off If TS is not used as touch sensor or matrix key, Measurements displays “NC” as result of the “Judgement touch or not”.

(1) Context menu

(a) Status monitor

Start Status monitor with TS number selected in Measurements.

(b) Mark

- Red

  Mark the selected with red color.

- Blue

  Mark the selected with blue color.

- Yellow

  Mark the selected with yellow color.

- Orange

  Mark the selected with orange color.

- Green

  Mark the selected with green color.

- Default

  Cancel marking of the selected.

(c) Label

Edit a label of the Touch button or Matrix key. When you selected the Slider TS or Wheel TS, you cannot edit the label.

(d) Close

Exit the Measurements.

(2) Drag and drop

You can change TS number which the Status monitor is monitoring by drag and drop TS number selecting in the Measurements into the Status monitor.

Drag a TS from Measurements and the pointer of pointing device changes to .

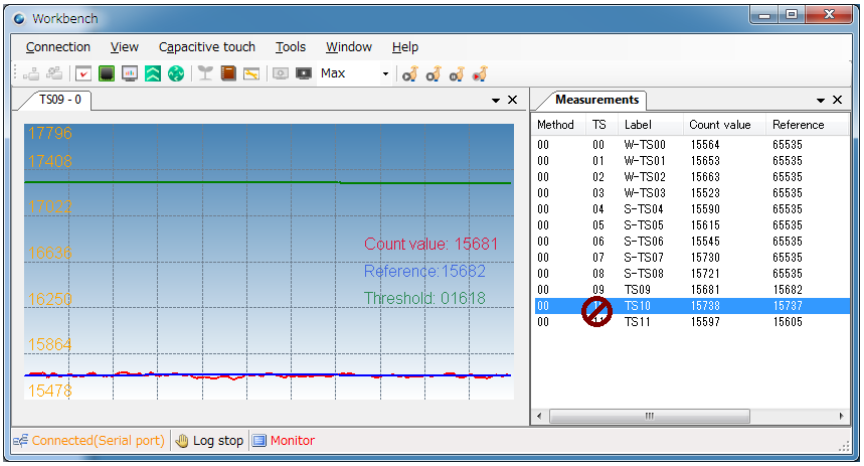


Figure 2-60 Dragging a TS in Measurements

You can drop the TS after changing the pointer of pointing device to . Drop the TS into any Status monitor.

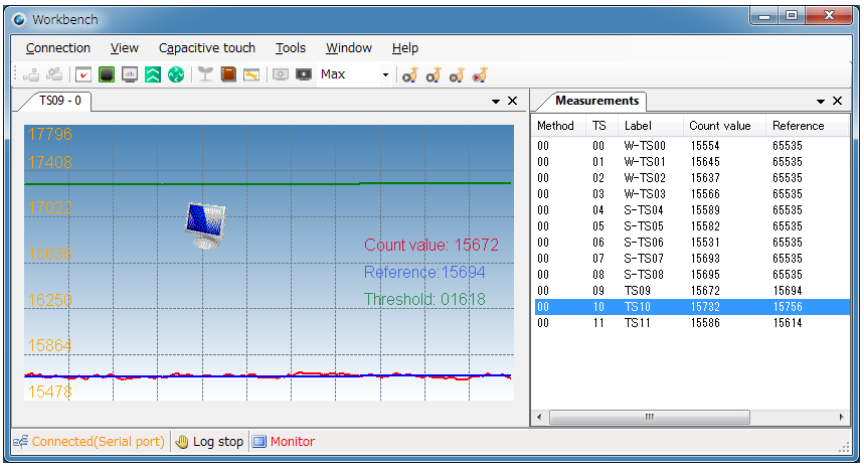


Figure 2-61 Drag the TS to Status monitor

2.3.7 Radar

Radar displays a result of judgment touch or not in real time.

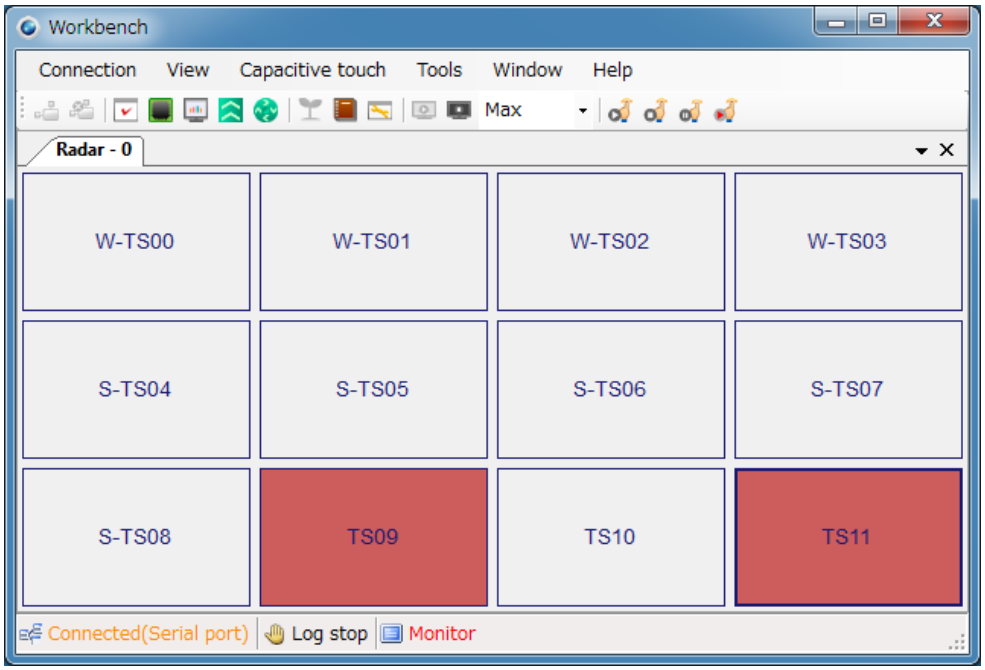


Figure 2-62 Radar

TS00	Shows result of judgment touch or not is non-touch.
TS11	Shows result of judgment touch or not is touch.

(1) Context menu

(a) Status monitor

Select a TS number to monitor in Status monitor.

(b) Mark

- Red

  Mark the selected with red color.
- Blue

  Mark the selected with blue color.
- Yellow

  Mark the selected with yellow color.
- Orange

  Mark the selected with orange color.

- Green

  Mark the selected with green color.

- Default

  Cancel marking of the selected.

(c) Setup

- Group0

  Change TS number to monitor from TS00 – TS11.

- Group1

  Change TS number to monitor from TS12 – TS23.

- Group 2

  Change TS number to monitor from TS24 – TS35.

- Group 3

  Change TS number to monitor from TS36 – TS47.

- Group 4

  Change TS number to monitor from TS48 – TS59.

- Group 5

  Change TS number to monitor from TS60 – TS63.

(d) Select method

Change the measurement method number.

(e) Label

Edit a label of the Touch button or Matrix key. When you selected the Slider TS or Wheel TS, you cannot edit the label.

(f) Close

Exit Radar.

(2) Drag and drop

You can change TS number which the Status monitor is monitoring by drag and drop TS number selecting in the Radar into the Status monitor.

Drag a TS from Radar and the pointer of pointing device changes to  .

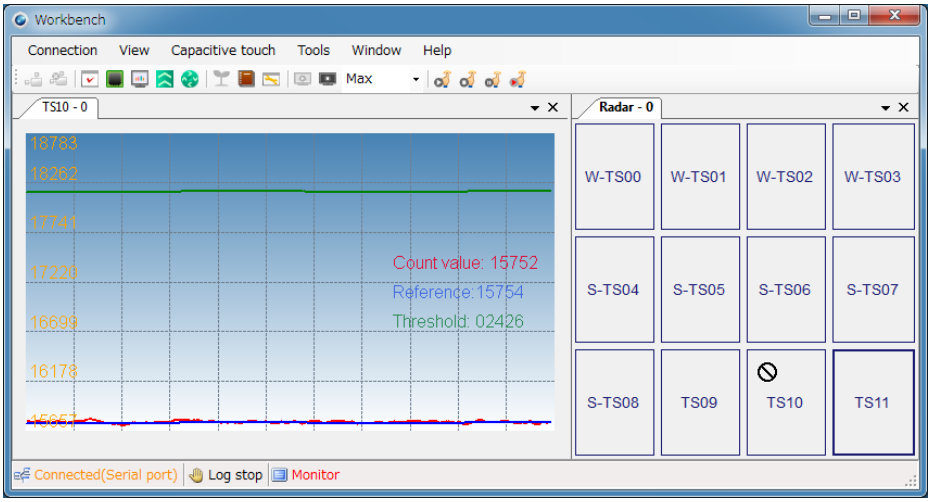


Figure 2-63 Dragging a TS in Radar

You can drop the TS after changing the pointer of pointing device to  . Drop the TS into any Status monitor.

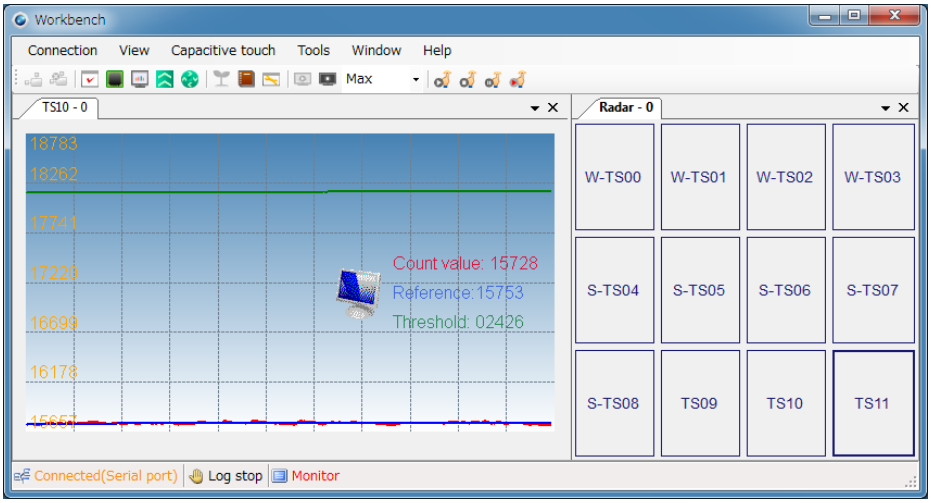


Figure 2-64 Drag the TS to Status monitor

2.3.8 Parameters

Parameters can read and edit TouchAPI parameters.

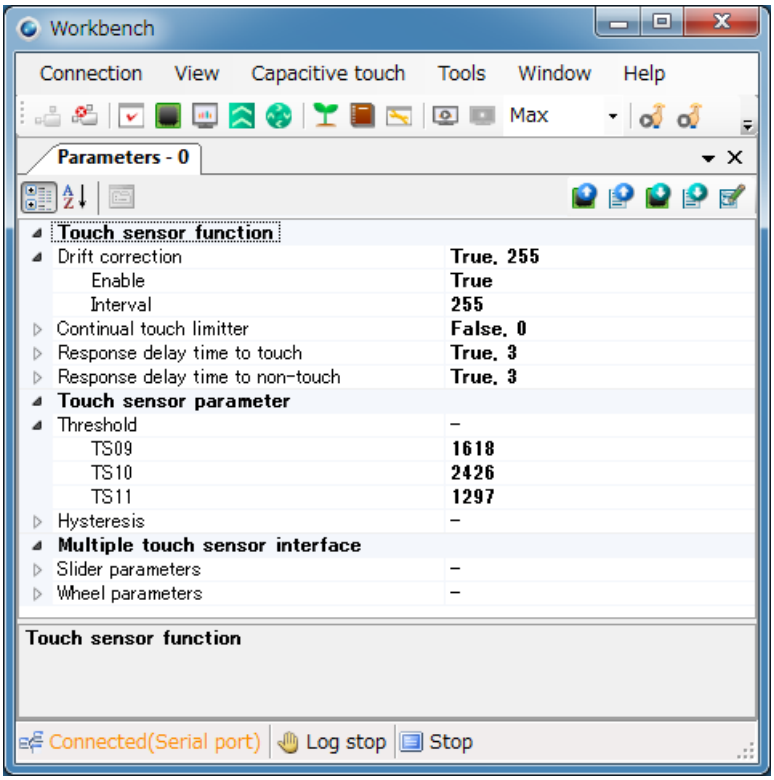


Figure 2-65 Parameters

	Reads TouchAPI parameters from target board.
	Reads TouchAPI parameters from parameter file. Select parameter file in “Open file” dialog that is displayed by press of this button.
	Writes TouchAPI parameters to target board.
	Writes TouchAPI parameters to parameter file. Select parameter file in “Save file” dialog that is displayed by press of this button.
	Writes TouchAPI parameters to TouchAPI source files. Refer to [2.3.10 Output TouchAPI] for detail about the writing TouchAPI and Refer to [6.3 Contents of update TouchAPI] for detail about contents of updating TouchAPI.
	Shows “Description area” that explains about a selected Touch API parameter.

(1) TouchAPI parameters

(a) Drift correction

- Enable

  Enabling and disabling the Drift correction.

True: enable, False: disable

- Interval

  Set interval time for the Drift correction.

(b) Continual touch limiter

- Enable

  Enabling and disabling the “Successive touch cancel”.

  True: enable, False: disable

- Value

  Set the “execution interval time” for the “Successive touch cancel”.

(c) Response delay time to touch

- Enable

  Enabling and disabling the “Continuous agreement touch determination”.

  True: enable, False: disable

- Non-touch -> Touch

  Set a value of “Continuous agreement touch determination”.

(d) Response delay time to non-touch

- Enable

  Enabling and disabling the “Continuous agreement non-touch determination”.

  True: enable, False: disable

- Touch -> Non-touch

  Set a value of “Continuous agreement non-touch determination”

(e) Threshold

Set the “Touch determination threshold value”.

(f) Hysteresis

Set the “Hysteresis value”.

(g) Slider parameter

- Resolution

  Set the “Slider resolution”.

- Threshold

  Set the “Slider threshold”.

(h) Wheel parameter

- Resolution
- Set the “Wheel resolution”.
- Threshold

  Set the “Wheel threshold”.

(2) Context menu

(a) Read

- Read from target system

  Read TouchAPI parameters from target board.

- Read from parameter file

  Read TouchAPI parameters from parameter file. Select a parameter file in “Open file” dialog that is displayed by selection of this menu.

(b) Write

- Write to target system

  Write TouchAPI parameters to target board.

- Write to parameter file

  Write TouchAPI parameters to parameter file. Select a parameter file in “Save file” dialog that is displayed by selection of this menu.

- Write to Touch API

  Writes TouchAPI parameters to TouchAPI source files. Refer to [2.3.10 Output TouchAPI] for detail about the writing TouchAPI and Refer to [6.3 Contents of update TouchAPI] for detail about contents of updating TouchAPI.

(c) Initialize

Initialize TouchAPI parameters.

(d) Select method

Changes the measurement method number.

(e) Auto update

Enabling and disabling automatic update of Touch API parameters.

(f) Display description

Shows and hides the “Description area”.

(g) Close

Exit Parameters.

2.3.9 Registers

Registers can read and edit CTSU registers.

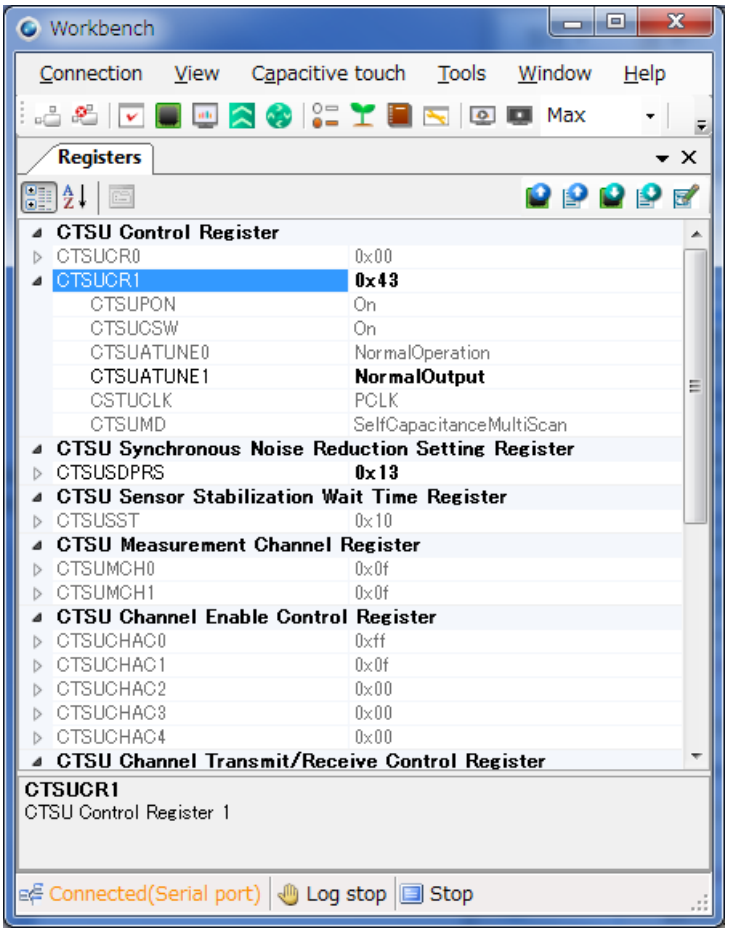
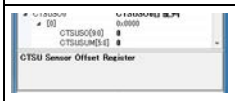


Figure 2-66 Registers

	Reads CTSU registers from target board.
	Reads CTSU registers from parameter file. Select register file in “Open file” dialog that is displayed by press of this button.
	Writes CTSU registers to target board.
	Writes CTSU registers to register file. Select register file in “Save file” dialog that is displayed by press of this button.
	Writes CTSU registers to TouchAPI source files. Refer to [2.3.10 Output TouchAPI] for detail about the writing TouchAPI and Refer to [6.3 Contents of update TouchAPI] for detail about contents of updating TouchAPI.
	Shows “Description area” that explains about a selected CTSU register.

(1) CTSU registers

(a) CTSUCR0

- CTSUSNZ

  Show “CTSU Wait State Power-Saving Enable”.

  Disable: Power-saving function during wait state is disabled

  Enable: Power-saving function during wait state is enabled

- CTSUTXVSEL

  Show “CTSU Transmission Power Supply Select”.

  VCC: VCC selected

  InternalLogicPower: Internal logic power is selected

(b) CTSUCR1

- CTSUPON

  Show “CTSU Power Supply Enable”.

  Off: Powered off

  On: Powered on

- CTSUSCW

  Show “CTSU LPF Capacitance Charging Control”.

  Off: Capacitance switch turned off

  On: Capacitance switch turned on

- CTSUATUNE0

  Show “CTSU LPF Capacitance Charging Control”.

  NormalOperation: Normal operating mode

  LowVoltage: Low-voltage operating mode

- CTSUATUNE1

  Show “CTSU Power Supply Capacity Adjustment”.

  NormalOutput: Normal output, HighCurrentOutput: High-current output

- CTSUCLK

  Show “CTSU Operating Clock Select”.

  PCLK: PCLK, PCLKdividedBy2: PCLK/2, PCLKdividedBy4: PCLK/4

- CTSUMD

  Show “CTSU Measurement Mode Select“.

  SelfCapacitanceSingleScan: Self-capacitance single scan mode

  SelfCapacitanceMultiScan: Self-capacitance multi-scan mode

  MutualCapcitanceFullScan: Mutual capacitance full scan mode

(c) CTSUSDPRS

- CTSUPRRATIO

  Show “CTSU Measurement Time and Pulse Count Adjustment”.

- CTSUPRMODE

Show “CTSU Base Period and Pulse Count Setting”.

Pulse510: 510 pulses, Pulse126: 126 pulses, Pulse62: 62 pulses

- CTSUSOFF

Show “CTSU High-Pass Noise Reduction Function Off Setting”.

Off: High-pass noise reduction function turned on

Off: High-pass noise reduction function turned off

(d) CTSUSST

- CTSUSST

Show “CTSU Sensor Stabilization Wait Control”.

(e) CTSUCHAC0

- CTSUCHAC00 – CTSUCHAC07

Show “CTSU Channel Enable Control 0”.

GPIO: Not measurement target, CapacitiveTouch: Measurement target

(f) CTSUCHAC1

- CTSUCHAC10 – CTSUCHAC17

Show “CTSU Channel Enable Control 1”.

GPIO: Not measurement target, CapacitiveTouch: Measurement target

(g) CTSUCHAC2

- CTSUCHAC20 – CTSUCHAC27

Show “CTSU Channel Enable Control 2”.

GPIO: Not measurement target, CapacitiveTouch: Measurement target

(h) CTSUCHAC3

- CTSUCHAC30 – CTSUCHAC37

Show “CTSU Channel Enable Control 3”.

GPIO: Not measurement target, CapacitiveTouch: Measurement target

(i) CTSUCHAC4

- CTSUCHAC40 – CTSUCHAC43

Show “CTSU Channel Enable Control 4”.

GPIO: Not measurement target, CapacitiveTouch: Measurement target

(j) CTSUCHTRC0

- CTSUCHTRC00 - CTSUCHTRC07

Show “CTSU Channel Transmit/Receive Control 0”.

Receive: Reception, Transmit: Transmission

(k) CTSUCHTRC1

- CTSUCHTRC10 – CTSUCHTRC17

Show “CTSU Channel Transmit/Receive Control 1”.

Receive: Reception, Transmit: Transmission

(l) CTSUCHTRC2

- CTSUCHTRC20 – CTSUCHTRC27

  Show “CTSU Channel Transmit/Receive Control 2”.

  Receive: Reception, Transmit: Transmission

(m) CTSUCHTRC3

- CTSUCHTRC30 – CTSUCHTRC37

  Show “CTSU Channel Transmit/Receive Control 3”.

  Receive: Reception, Transmit: Transmission

(n) CTSUCHTRC4

- CTSUCHTRC40 – CTSUCHTRC43

  Show “CTSU Channel Transmit/Receive Control 4”.

  Receive: Reception, Transmit: Transmission

(o) CTSUDCLKC

- CTSUSSMOD

  Show “CTSU Diffusion Clock Mode Select”.

- CTSUCCCNT

  Show “CTSU Diffusion Clock Control”.

(p) CTSUST

- CTSUSOVF

  Show “CTSU Sensor Counter Overflow Flag”.

  True: No overflow, False: An overflow

- CTSUROVF

  Show “CTSU Reference Counter Overflow Flag”.

  True: No overflow, False: An overflow

(q) CTSUSSC

- CTSUSSDIV

  Show “CTSU Spectrum Diffusion Frequency Division Setting”.

  DivideBy1: Divided by 1, DivideBy2: Divided by 2, DivideBy3: Divided by 3, - - - , DiviceBy16: Divided by 16

(r) CTSUSO0

- CTSUSO

  Show “CTSU Sensor Offset Adjustment”.

- CTSUSNUM

  Show “CTSU Measurement Count Setting”

(s) CTSUSO1

- CTSURICOA

  Show “CTSU Reference ICO Current Adjustment”.

- CTSUSDPA

Show “CTSU Base Clock Setting”.

DivideBy2: Operating clock divided by 2, DivideBy4: Operating clock divided by 4, DivideBy6: Operating clock divided by 6, - - - DiviceBy64: Operating clock divided by 64

- CTSUICOG

Show “CTSU ICO Gain Adjustment”.

Gain100: 100% gain, Gain66: 66% gain, Gain50: 50% gain, Gain40: 40% gain

(t) CTSUERRS

- CTSUICOMP

Shows “TSCAP Voltage Error Monitor”

Normal: Normal TSCAP voltage, Abnormal: Abnormal TSCAP voltage,

(2) Context menu

(a) Read

- Read from target system

Read CTSU registers from target board.

- Read from register file

Read CTSU registers from register file. Select a register file in “Open file” dialog that is displayed by selection of this menu.

(b) Write

- Write to target system

Write CTSU registers to target board.

- Write to register file

Write CTSU registers to register file. Select a register file in “Save file” dialog that is displayed by selection of this menu.

- Write to Touch API

Writes CTSU registers to TouchAPI source files. Refer to [2.3.10 Output TouchAPI] for detail about the writing TouchAPI and Refer to [6.3 Contents of update TouchAPI] for detail about contents of updating TouchAPI.

(c) Initialize

Initialize CTSU registers.

(d) Select method

Changes the measurement method number.

(e) Auto update

Enabling and disabling automatic update of CTSU registers.

(f) Display description

Shows and hides the “Description area”

(g) Close

Exit Registers.

2.3.10 Output TouchAPI

This section explains about output the changes of TouchAPI parameters and CTSU registers to TouchAPI source files.

(1) IDE connection

The following TouchAPI update setup dialog is displayed in connection with TouchAPI via IDE when you selected the output TouchAPI.

You can choose two methods. One is a method to update a source file of TouchAPI opening in connected IDE. Other one is a method to output TouchAPI source file in your specified folder. We recommended that the method to output TouchAPI source file in your specified folder if you customize source file in TouchAPI. After checking the update contents of the TouchAPI source file, merge it into your TouchAPI source file opening in IDE. In addition, refer to [6.3 Contents of update TouchAPI] about the update contents of the TouchAPI source file.

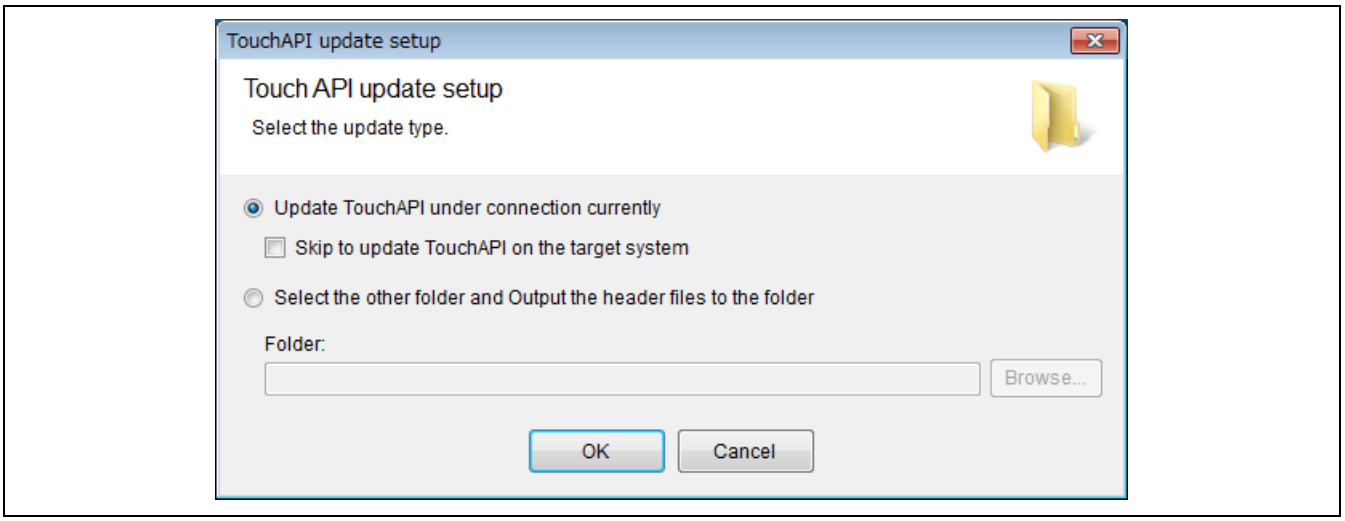


Figure 2-67 Output TouchAPI in IDE connection

Update TouchAPI under ...	Update TouchAPI source file opening in connected IDE. In this case, it is not necessary to specify folder to output TouchAPI source file.
Skip the build...	Skip the build of updated source files.
Select the other folder...	Output TouchAPI source file in your specified folder.
Folder: Browse...	Specifies folder to output TouchAPI source file.
OK	Updates or outputs TouchAPI source file.
Cancel	Stops output of TouchAPI source file.

(2) Serial port connection

The following TouchAPI update setup dialog is displayed in connection with TouchAPI via serial port when you selected the output TouchAPI.

You can choose two methods. One is a method to update a source file of TouchAPI that you specified as source folder. Other one is a method to copy TouchAPI source file specified and update the TouchAPI source file. We recommended that the method to copy and update TouchAPI source file if you customize source file in TouchAPI. After checking the update contents of the TouchAPI source file, merge it into your TouchAPI source file. In addition, refer to [6.3 Contents of update TouchAPI] about the update contents of the TouchAPI source file.

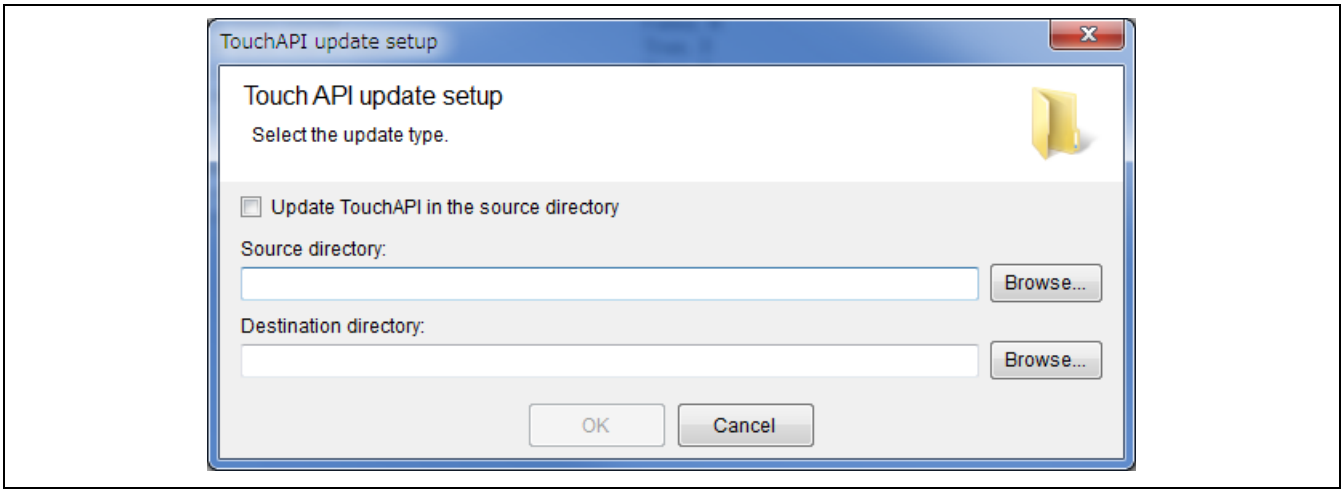


Figure 2-68 Output TouchAPI in Serial port connection

Update TouchAPI...	Update TouchAPI source file in Source folder. In this case, it is not necessary to specify folder to output TouchAPI source file.
Source folder: Browse...	Specifies folder your TouchAPI project exists.
Destination folder: Browse...	Specifies folder to output TouchAPI source file.
OK	Updates or outputs TouchAPI source file.
Cancel	Stops output of TouchAPI source file.

2.3.11 Window style

You can choose Window style in the Tuning window from Tab window style and Float window style. The window style you choose is enabled in next time of the use of Wokbench6. Changed window style is enabled from the next action.

(1) Tab window style

Tab window style is default window style. Functions in the Tuning window (e.g. Status monitor) is placed in window of Workbench6.

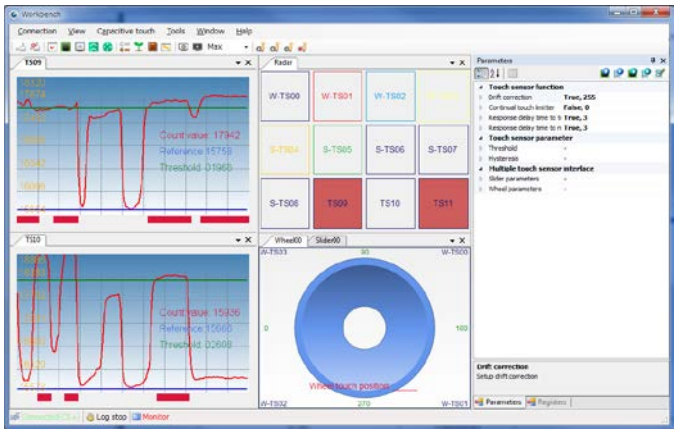


Figure 2-69 Tab window style

(2) Floating window style

You can place the function in the Tuning window (e.g. Status monitor) in any place in the Desktop.

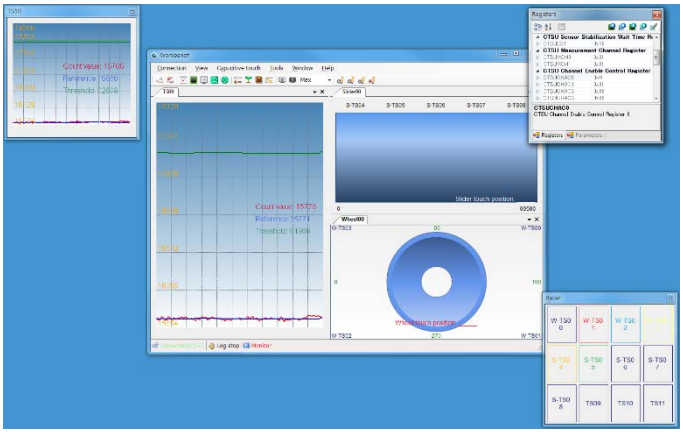


Figure 2-70 Floating window style

2.3.12 Layout

You can store layouts of Tuning window and various setting situation and load the layout information that you saved optionally. The last layout information is loaded when you started Workbench6 next time. In addition, you can name the layout information. You can apply the layout information efficiently by the naming.

This section explains method to load and store the layout information.

(1) Load the Layout information

You can load the Layout information by selection of the Menu bar on the Main window. The Menu is [View] – [Layout] – [Load layout n] (n shows from "1" to "4" in default settings). When there is no Layout information in selected Layout information, Workbench6 loads default Layout information.

(2) Save the Layout information

You can store the Layout information by selection of the Menu bar on the Main window. The Menu is [View] – [Layout] – [Save layout n] (n shows from "1" to "4" in default settings).

(3) Labeling the Layout information

Edit layout label dialog is displayed by selection of the Menu bar on the Main window [View] – [Layout] – [Edit layout label]. You can change string of the Menu bar on the Main window [View] – [Layout] – [Load layout n] and [View] – [Layout] – [Save layout n].

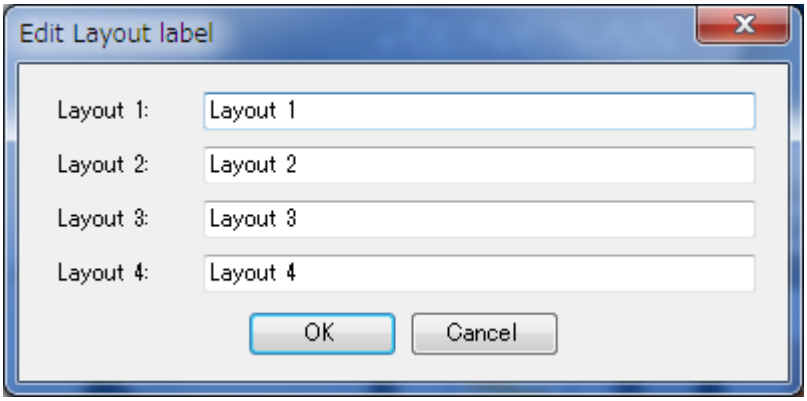


Figure 2-71 Edit layout label

Layout 1: Layout 1	Changes the Menu bar on the Main window [View] – [Layout] – [Load layout 1] and [View] – [Layout] – [Save layout 1].
Layout 2: Layout 2	Changes the Menu bar on the Main window [View] – [Layout] – [Load layout 2] and [View] – [Layout] – [Save layout 2].
Layout 3: Layout 3	Changes the Menu bar on the Main window [View] – [Layout] – [Load layout 3] and [View] – [Layout] – [Save layout 3].
Layout 4: Layout 4	Changes the Menu bar on the Main window [View] – [Layout] – [Load layout 4] and [View] – [Layout] – [Save layout 4].
OK	Enable settings and close Setup Status monitor dialog.
Cancel	Disable settings and close Setup Status monitor dialog.

(4) Initialize the Layout information

You can initialize the current Layout information by selection of the Menu bar on the Main window. The Menu is [View] – [Layout] – [Reset Layout].

2.4 Adjustment guide

Workbench6 does not support this function now.

2.5 Source code gallery

Workbench6 does not support this function now.

2.6 Document manager

Document manager can read and search documents about touch sensor.

2.6.1 Main window

The main window is shown if Document manager is started.

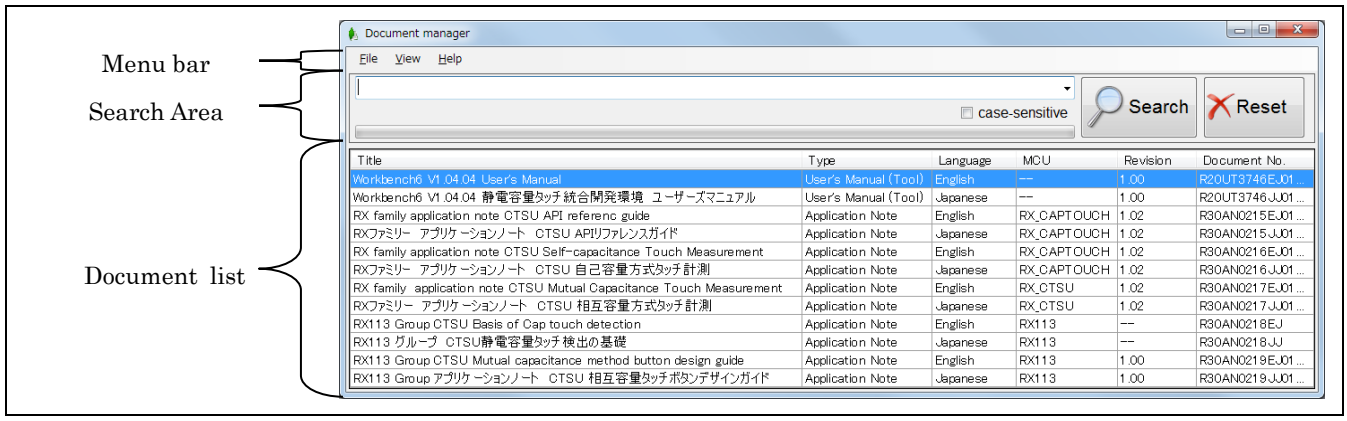


Figure 2-72 Main window

(1) Menu bar

Shows the functions for each group.

(a) File

Shows the menu items associated to files.

Exit	Exits the application.

(b) View

Shows the menu items associated to displaying the document list.

Exit	Exits the application.
Type	Shows and hides the Type pane in the document list.
Language	Shows and hides the Language pane in the document list.
MCU	Shows and hides the MCU (microcomputer unit) pane in the document list.
Revision	Shows and hides the Revision pane in the document list.
Document No.	Shows and hides the document number in the document list.

(c) Help

Shows the menu items associated to product information.

About Document Manager	Shows the version of Document manager.

(2) Search area

Searches the documents which includes the specified keywords.

(3) Document list

Shows the document list. If filtering or keyword search function is used, the documents matching the criteria are included in the list.

2.6.2 Display of documents

All the documents are listed when the Document manager is started. Filtering function is available to display the filtered documents only.

Title	Type	Language	MCU	Revision	Document No.
Workbench6 V1.04.04 User's Manual	User's Manual (Tool)	English	--	1.00	R20UT3746EJ01 ...
Workbench6 V1.04.04 静電容量タッチ統合開発環境 ユーザーズマニュアル	User's Manual (Tool)	Japanese	--	1.00	R20UT3746JJ01 ...
RX family application note CTSU API referenc guide	Application Note	English	RX_CAPTOUCH	1.02	R30AN0215EJ01 ...
RXファミリー アプリケーションノート CTSU APIリファレンスガイド	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0215JJ01 ...
RX family application note CTSU Self-capacitance Touch Measurement	Application Note	English	RX_CAPTOUCH	1.02	R30AN0216EJ01 ...
RXファミリー アプリケーションノート CTSU 自己容量方式タッチ計測	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0216JJ01 ...
RX family application note CTSU Mutual Capacitance Touch Measurement	Application Note	English	RX_CTSU	1.02	R30AN0217EJ01 ...
RXファミリー アプリケーションノート CTSU 相互容量方式タッチ計測	Application Note	Japanese	RX_CTSU	1.02	R30AN0217JJ01 ...
RX113 Group CTSU Basis of Cap touch detection	Application Note	English	RX113	--	R30AN0218EJ
RX113 グループ CTSU静電容量タッチ検出の基礎	Application Note	Japanese	RX113	--	R30AN0218JJ
RX113 Group CTSU Mutual capacitance method button design guide	Application Note	English	RX113	1.00	R30AN0219EJ01 ...
RX113 Group アプリケーションノート CTSU 相互容量タッチボタンデザインガイド	Application Note	Japanese	RX113	1.00	R30AN0219JJ01 ...

Figure 2-73 document list

(1) Opening a document

If any cell in the document list is double-clicked, the selected document is opened by an application.

If Acrobat Reader or Acrobat is installed, the selected page will be opened by the viewer. If none of these are installed, the document will be opened by the application associated to PDF files, but selection of page to open is not available.

(2) Shown Items

The following items are shown for each document in the list. If no information is provided to an item, -- (two hyphens) is shown.

Table 2-5 Display items in Display list

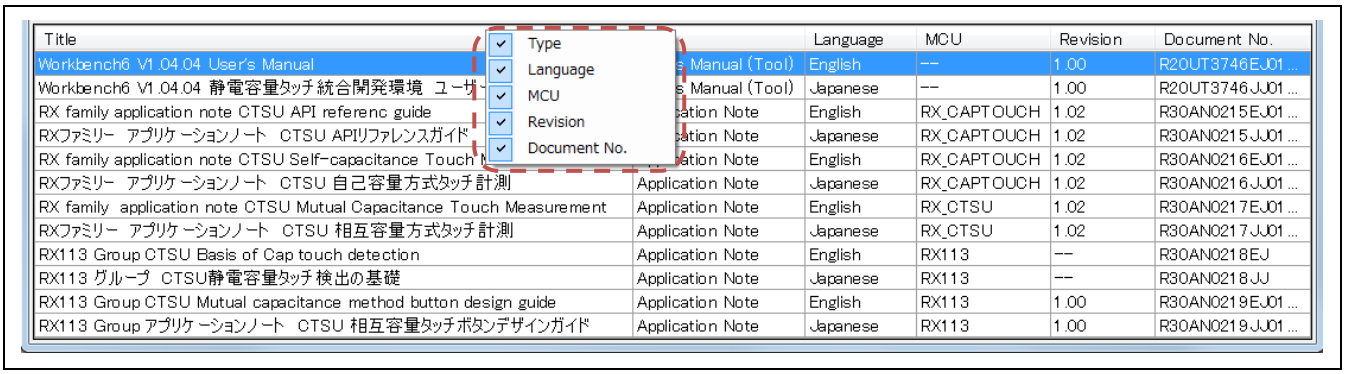
Title	Shows the title.
Type	Shows the document type. - Application Note - User's Manual (Tool) - User's Manual (Hardware)
Language	Shows the language.
MCU	Shows the target microcomputer group.
Revision	Shows the revision.
Document No.	Shows the Renesas document number.

(3) Show and Hide items

You can show and hide displayed items by either way of the following:

(a) Select from [View] in the menu bar.

(b) Select from the menu shown by double-clicking the document list header.



Title		Language	MCU	Revision	Document No.
Workbench6 V1.04.04 User's Manual	s Manual (Tool)	English	--	1.00	R20UT3746EJ01 ...
Workbench6 V1.04.04 静電容量タッチ統合開発環境 ユーザ	s Manual (Tool)	Japanese	--	1.00	R20UT3746JJ01 ...
RX family application note CTSU API referenc guide	ation Note	English	RX_CAPTOUCH	1.02	R30AN0215EJ01 ...
RXファミリー アプリケーションノート CTSU APIリファレンスガイド	ation Note	Japanese	RX_CAPTOUCH	1.02	R30AN0215JJ01 ...
RX family application note CTSU Self-capacitance Touch M	ation Note	English	RX_CAPTOUCH	1.02	R30AN0216EJ01 ...
RXファミリー アプリケーションノート CTSU 自己容量方式タッチ計測	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0216JJ01 ...
RX family application note CTSU Mutual Capacitance Touch Measurement	Application Note	English	RX_CTSU	1.02	R30AN0217EJ01 ...
RXファミリー アプリケーションノート CTSU 相互容量方式タッチ計測	Application Note	Japanese	RX_CTSU	1.02	R30AN0217JJ01 ...
RX113 Group CTSU Basis of Cap touch detection	Application Note	English	RX113	--	R30AN0218EJ
RX113 グループ CTSU静電容量タッチ検出の基礎	Application Note	Japanese	RX113	--	R30AN0218JJ
RX113 Group CTSU Mutual capacitance method button design guide	Application Note	English	RX113	1.00	R30AN0219EJ01 ...
RX113 Group アプリケーションノート CTSU 相互容量タッチボタンデザインガイド	Application Note	Japanese	RX113	1.00	R30AN0219JJ01 ...

Figure 2-74 Context menu of the document list header

Items checked in the menu are displayed, and unchecked items are not displayed. The status between checked and unchecked is toggled every time the menu is selected.

The Title column is always displayed and cannot be hidden.

The status of displayed items is saved when the Document Manager is closed. The status is reflected when the Document Manager is started next time.

(4) Sort

If the document list header is left-clicked, the “Sort and Filtering” dialogue is open. The document list can be sorted by this dialogue.

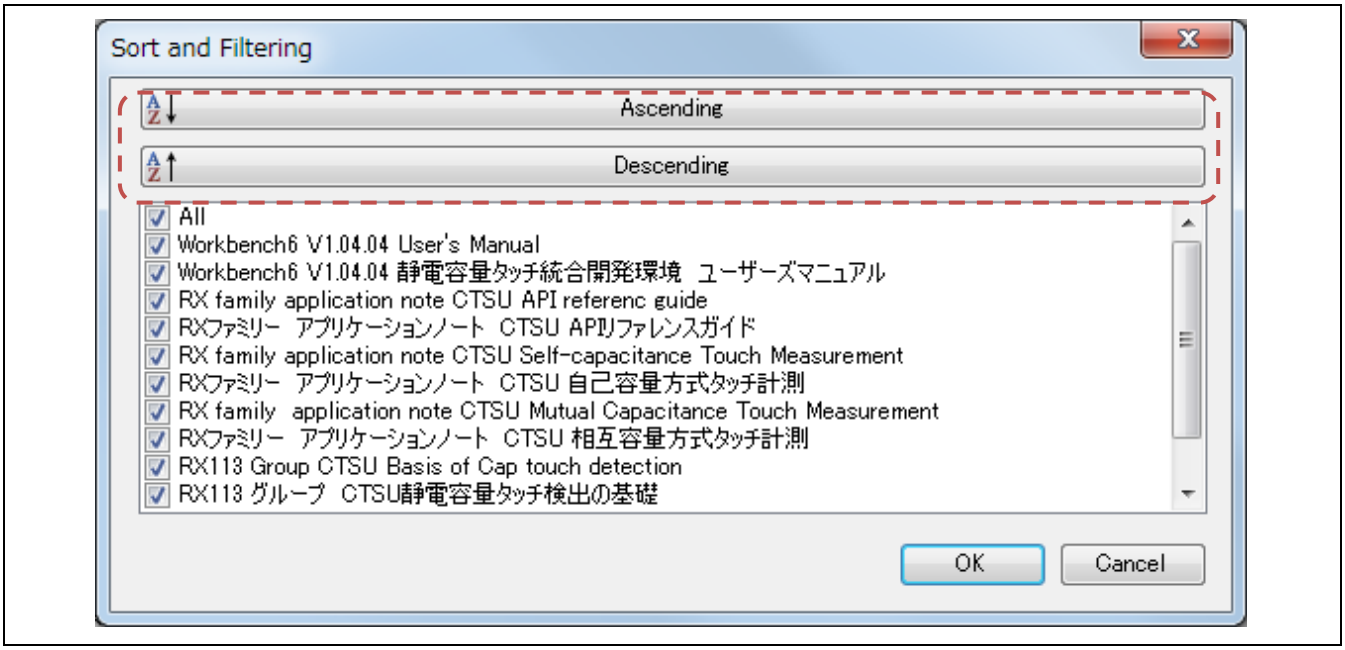
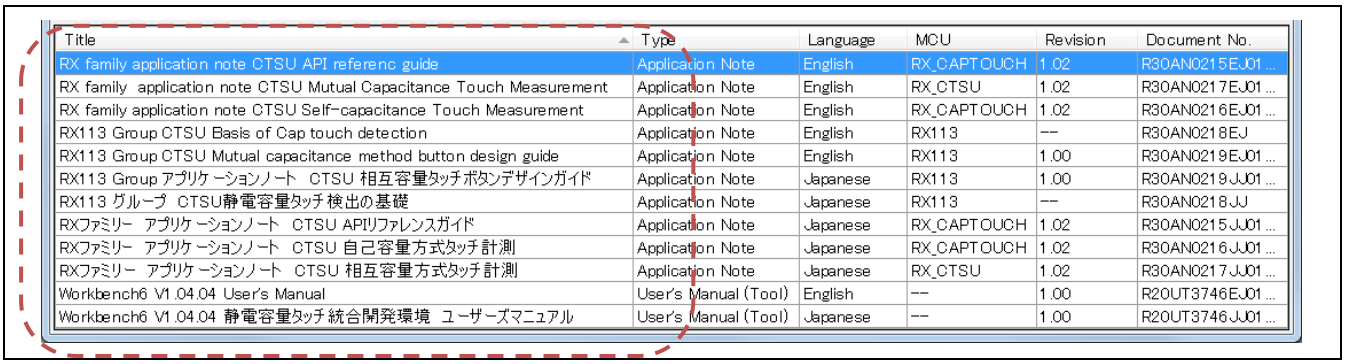


Figure 2-75 Sort and Filtering Dialogue – Sort

Ascending
The document list is sorted in ascending order according to the clicked item in the document header. Arrow button (▲) appears in the item of the header to which sorting is done.

Descending
The document list is sorted in descending order according to the clicked item in the document header. Arrow button (▼) appears in the item of the header to which sorting is done.



Title	Type	Language	MCU	Revision	Document No.
RX family application note CTSU API referenc guide	Application Note	English	RX_CAPTOUCH	1.02	R30AN0215EJ01 ...
RX family application note CTSU Mutual Capacitance Touch Measurement	Application Note	English	RX_CTSU	1.02	R30AN0217EJ01 ...
RX family application note CTSU Self-capacitance Touch Measurement	Application Note	English	RX_CAPTOUCH	1.02	R30AN0216EJ01 ...
RX113 Group CTSU Basis of Cap touch detection	Application Note	English	RX113	--	R30AN0218EJ
RX113 Group CTSU Mutual capacitance method button design guide	Application Note	English	RX113	1.00	R30AN0219EJ01 ...
RX113 Group アプリケーションノート CTSU 相互容量タッチボタンデザインガイド	Application Note	Japanese	RX113	1.00	R30AN0219JJ01 ...
RX113 グループ CTSU静電容量タッチ検出の基礎	Application Note	Japanese	RX113	--	R30AN0218JJ
RXファミリー アプリケーションノート CTSU APIリファレンスガイド	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0215JJ01 ...
RXファミリー アプリケーションノート CTSU 自己容量方式タッチ計測	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0216JJ01 ...
RXファミリー アプリケーションノート CTSU 相互容量方式タッチ計測	Application Note	Japanese	RX_CTSU	1.02	R30AN0217JJ01 ...
Workbench6 V1.04.04 User's Manual	User's Manual (Tool)	English	--	1.00	R20UT3746EJ01 ...
Workbench6 V1.04.04 静電容量タッチ統合開発環境 ユーザーズマニュアル	User's Manual (Tool)	Japanese	--	1.00	R20UT3746JJ01 ...

Figure 2-76 Sort Result

(5) Filtering

By the filtering setting in the “Sort and Filtering” dialogue, only the documents that meet the specified conditions are displayed.

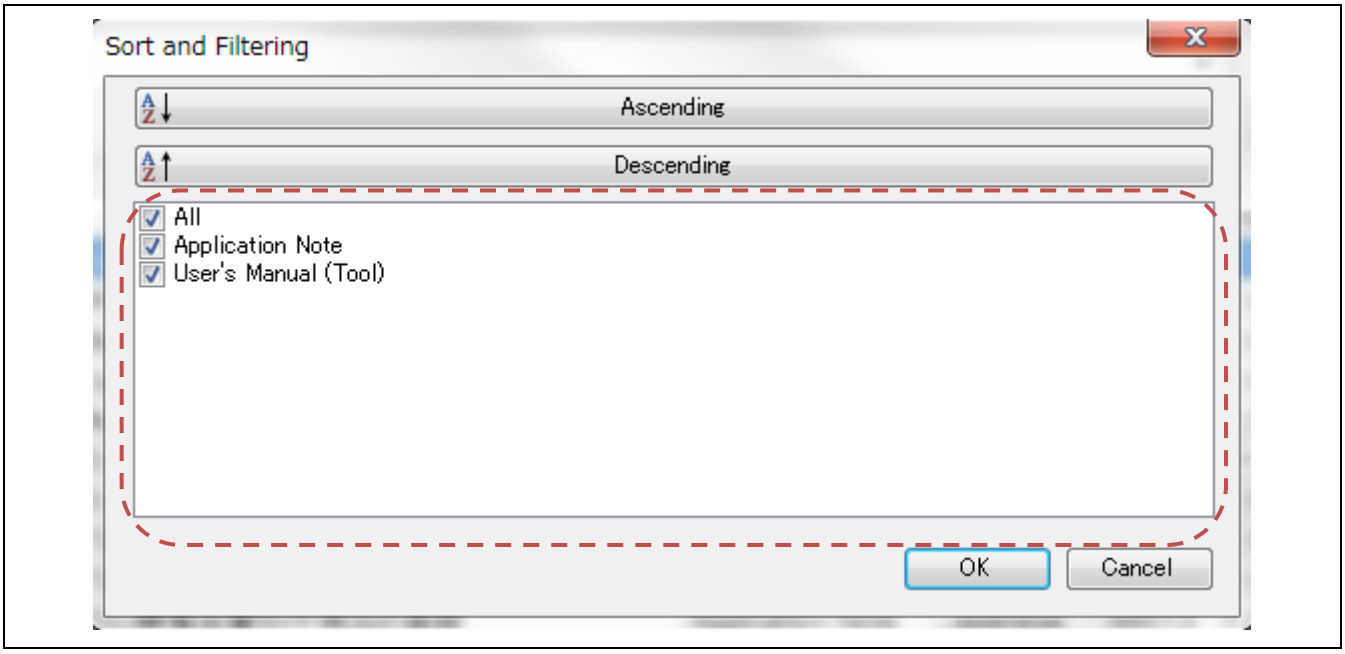


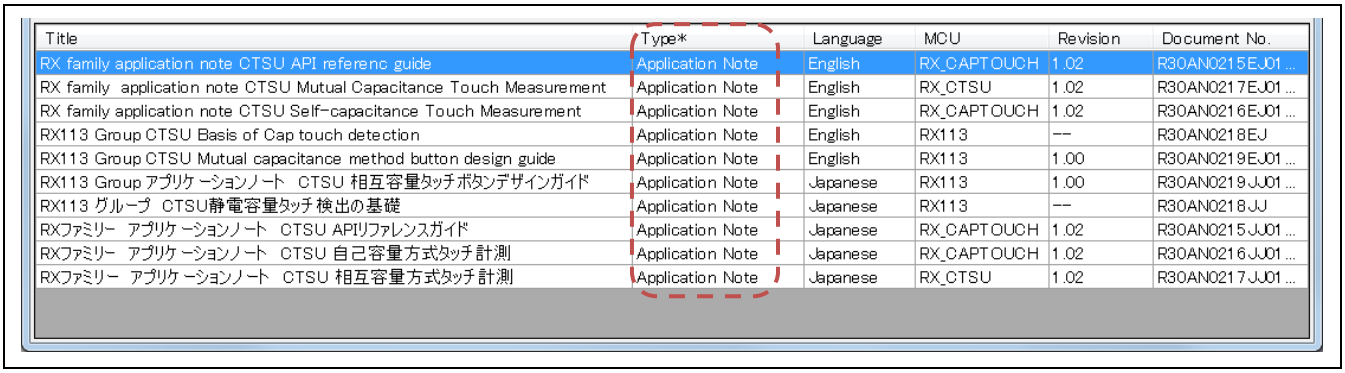
Figure 2-77 Sort and Filtering Dialogue - Filtering

(a) Filtering Setting

Items checked in the Filtering column in the “Sort and Filtering” dialogue are displayed, and unchecked items are not displayed. The status between checked and unchecked is toggled every time the item is selected. The filtering setting is reflected when the “OK” button is clicked.

All	Check or uncheck all items.
(item name)	The documents that include checked items are displayed, and the documents that include unchecked items are not displayed.
OK	Close the “Sort and Filtering” dialogue after reflecting the filtering setting. If no item is checked, “OK” button is disabled and cannot be clicked.
Cancel	Discard the filtering setting and close the “Sort and Filtering” dialogue.

Filtering can be set to multiple items. In the items with filtering setting, "*" appears after the item name in the document list header.



Title	Type*	Language	MCU	Revision	Document No.
RX family application note CTSU API referenc guide	Application Note	English	RX_CAPTOUCH	1.02	R30AN0215EJ01 ...
RX family application note CTSU Mutual Capacitance Touch Measurement	Application Note	English	RX_CTSU	1.02	R30AN0217EJ01 ...
RX family application note CTSU Self-capacitance Touch Measurement	Application Note	English	RX_CAPTOUCH	1.02	R30AN0216EJ01 ...
RX113 Group CTSU Basis of Cap touch detection	Application Note	English	RX113	--	R30AN0218EJ
RX113 Group CTSU Mutual capacitance method button design guide	Application Note	English	RX113	1.00	R30AN0219EJ01 ...
RX113 Group アプリケーションノート CTSU 相互容量タッチボタンデザインガイド	Application Note	Japanese	RX113	1.00	R30AN0219JJ01 ...
RX113 グループ CTSU静電容量タッチ検出の基礎	Application Note	Japanese	RX113	--	R30AN0218JJ
RXファミリー アプリケーションノート CTSU APIリファレンスガイド	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0215JJ01 ...
RXファミリー アプリケーションノート CTSU 自己容量方式タッチ計測	Application Note	Japanese	RX_CAPTOUCH	1.02	R30AN0216JJ01 ...
RXファミリー アプリケーションノート CTSU 相互容量方式タッチ計測	Application Note	Japanese	RX_CTSU	1.02	R30AN0217JJ01 ...

Figure 2-78 Filtering Result

(b) Cancel of Filtering

When [Reset] button in the search area is clicked, filtering setting is canceled and all the documents are shown on the document list.

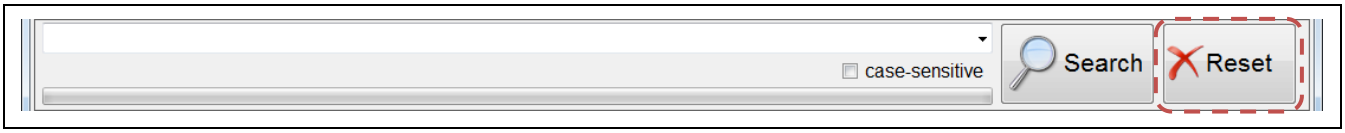


Figure 2-79 Reset button

2.6.3 Keyword Search

(1) Search procedure

When a keyword is entered and [Search] button is clicked, the search for the documents that include the keyword is done and the result is shown in the document list. Searching is also started by pressing the “Enter” key with the cursor in the search field.

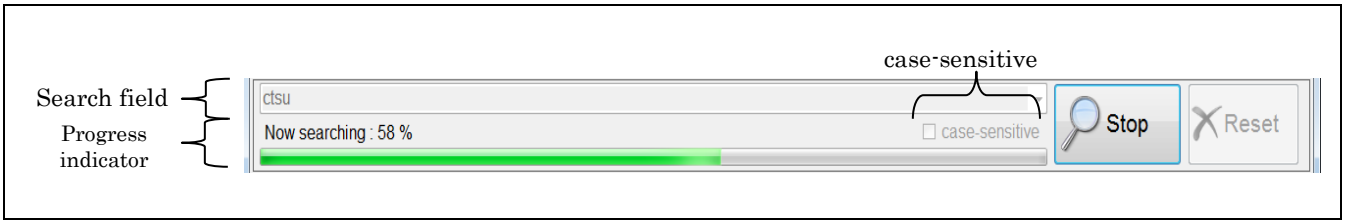


Figure 2-80 Search Area - Searching

Search field	Enter keywords to search. Maximum number of letters accepted in the field is 1000. When the “Enter” key is pressed with the cursor in the search field before searching is started, the behavior is the same as pressing the “Search” button. When the “Enter” key is pressed during searching, the behavior is the same as pressing the “Stop” button.
Search	Start the keyword search. This button turns to the “Stop” button during search.
Stop	Stop the keyword search. This button turns to the “Search” button after searching is completed.
Reset	Discard the keyword entered in the search field and all the documents are presented in the list. This button is disabled during search.
case-sensitive	When unchecked, search is done with case ignored, and when checked, case matters.
Progress	Shows the search progress with texts and indicator.

(a) Enter keywords from the history

When arrow button ( ) located in the right of the search field is clicked, the keyword shown is presented in a list. When an entry is selected from the list, the selected one is entered to the search field. The latest thirty entries are included in the list.

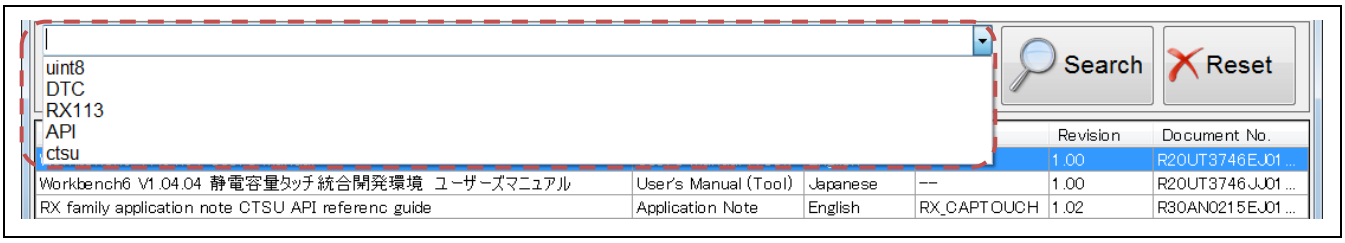


Figure 2-81 Enter keywords from the history

(2) Search Target

Regardless of the displayed document list, all the documents are searched. However, the documents not displayed by filtering, are excluded from the search.

(3) Detailed Search

Special characters such as spaces and operators are supported for more detailed search. Available search condition and characters are as shown in Table 2-6 Search Condition and Special Characters.

Table 2-6 Search Condition and Special Characters

Search condition	Special characters
AND search	Spaces, &
OR Search	|
NOT search	-

Search conditions can be combined. The priority of the conditions are NOT search > AND search > OR search from the highest. If you want to change the priority, bracket the words. The words in a bracket have the highest priority.

(a) AND Search

In AND search, documents that include all the input keywords are searched and the result is shown in the document list. Add spaced or “&” between keywords for AND search.

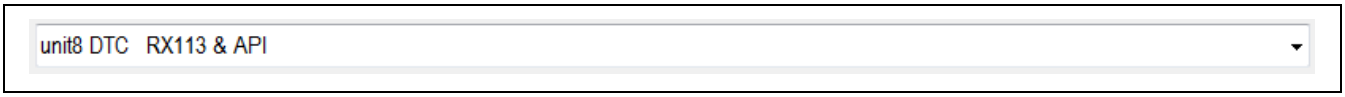


Figure 2-82 AND search example

(b) OR Search

In OR search, documents that include one of the input keywords are searched and the result is shown in the document list. Add "|" between keywords for OR search.

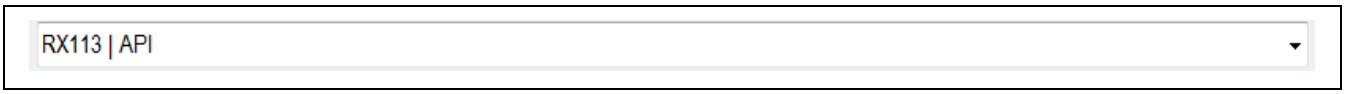


Figure 2-83 OR search example

(c) NOT Search

In NOT search, documents that include the input keywords are excluded from the search result and shown in the document list. Add "-" before keywords to be excluded for NOT search. All the keywords in the search field are with "-", an error message is displayed and no search is executed.

Figure 2-84 NOT search example

(4) Search Result

After completion of document search, the documents that include the specified keyword are shown in the document list. When no document matches the search, nothing is shown in the document list.

After completion search, if Adobe Reader or Acrobat is installed, the first page that includes the keyword is opened by double-clicking any cell in the document list. If Adobe Reader or Acrobat is not installed, the document will be opened by the application associated to PDF files, but specifying the page to open is not available.

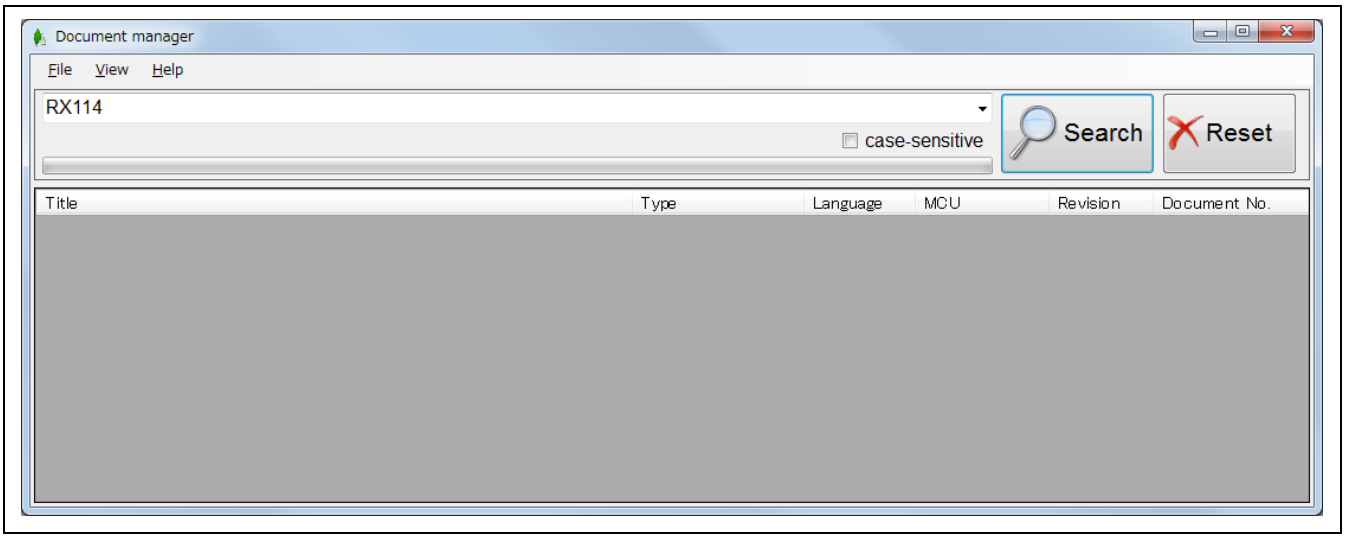


Figure 2-85 Search result – Case when no document matches the search

(5) Detailed Search Result

After completion search, Preview window appears by right click.

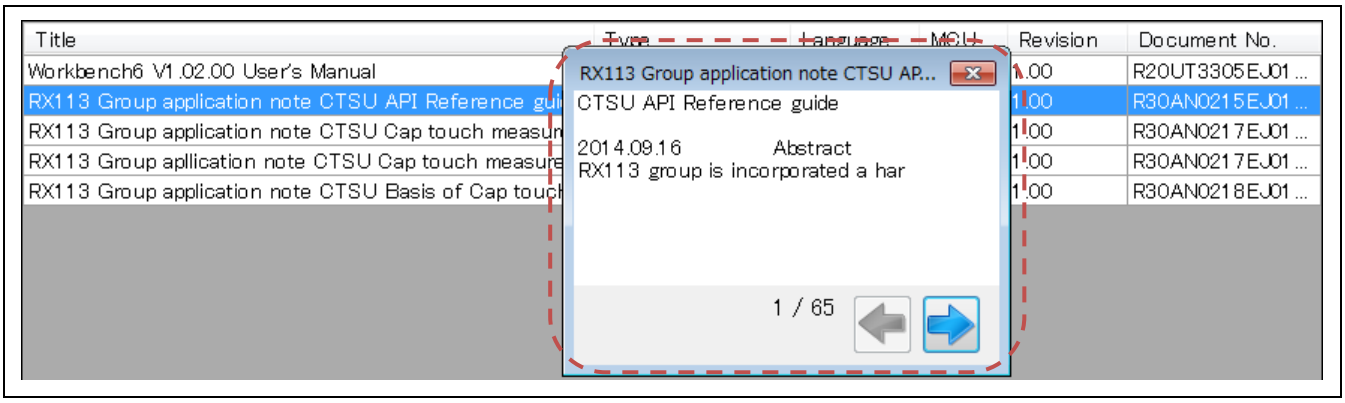


Figure 2-86 Detailed search result

CTSU API Reference guide 2014.09.16 Abstract RX113 group is incorporated a har	Shows text searched by keyword. When you clicked the text, Document manger starts PDF reader and PDF reader opens selected PDF file. If Adobe Reader or Adobe Acrobat is installed, the page that the keyword exits is displayed.
1 / 65	Shows page number that displaying text exists in searched document.
	To the next preview. When the preview is last, you cannot click.
	To the previous preview. When the preview is first, you cannot click,

(6) Initialization of Document List

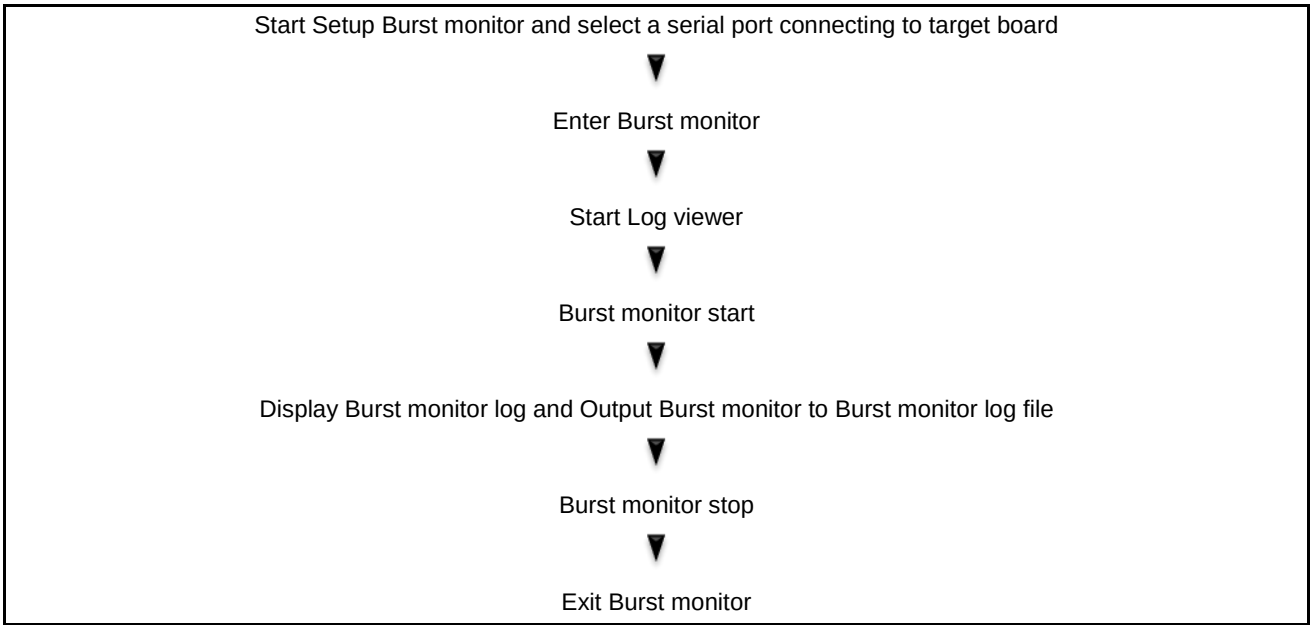
When [Reset] button is clicked, all the keywords entered in the search field are removed and all the documents are shown in the document list.

2.7 Burst monitor

Burst monitor is the function to monitor the sensor counter value and reference counter value measured at measurement cycle. You can monitor these value by Log viewer, Status monitor and Measurements.

2.7.1 Burst monitor operation sequence

This section explains the operation sequence of Burst monitor.



2.7.2 Setup Burst monitor

Select a serial port connecting to your target board using Setup Burst monitor dialog to start Burst monitor.

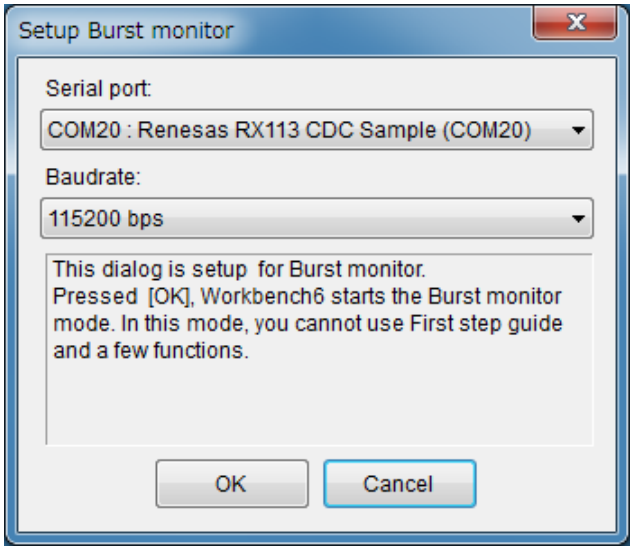


Figure 2-87 Setup Burst monitor

Serial port: COM25 : USB Serial Port (COM25)	Selects serial port connecting to your target board.
Baudrate: 115200	Selects serial port baudrate that your target board supports. The number of TS to be able to monitor is changed according to serial port baudrate. 19200bps : 11 38400bps : 23 57600 bps : 35 115200 bps : 64 If TouchAPI created from Workbench6 V1.5.0 and earlier version is downloaded to your target board, selects 115200 bps.
OK	Starts Burst monitor with current settings.
Cancel	Cancels Burst monitor.

You cannot use following functions in Burst monitor.

- Parameters
- Registers
- Log play、Log stop、Log pause、Log record

You can use these function after end of Burst monitor.

2.7.3 Log viewer

Log viewer displays sensor counter value and reference counter value with text format.

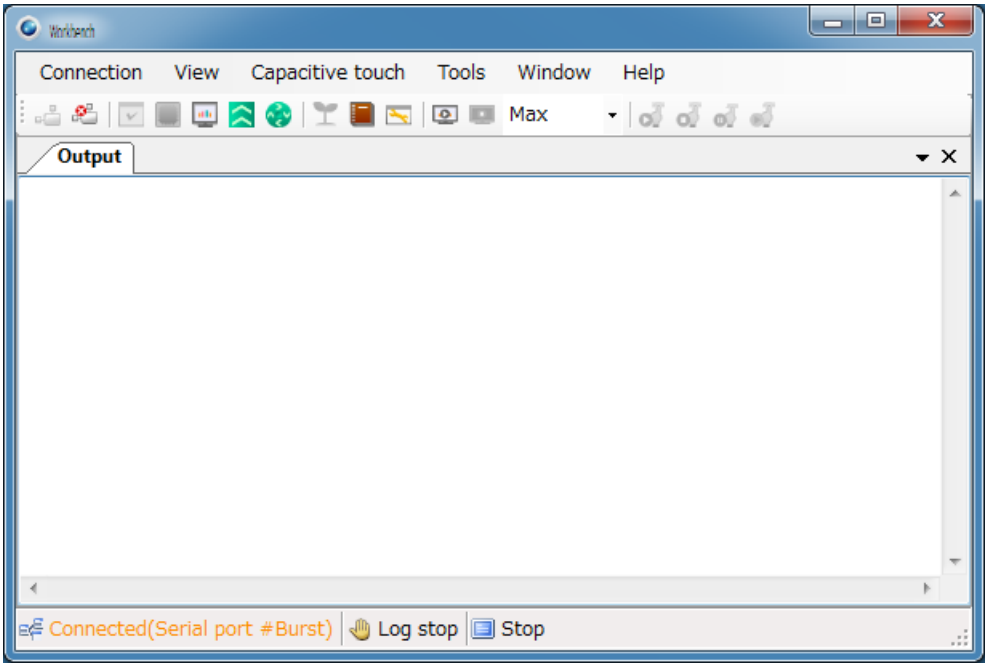


Figure 2-88 Log viewer

(1) Context menu

(a) Copy

Copies selected text in Log viewer to the clipboard.

(b) Select All

Selects all of the text in Log viewer.

(c) Clear All

Clear all of the text in Log viewer.

(d) Close

Exits Log viewer.

2.7.4 Start Burst monitor

Workbench6 starts Burst monitor by selection of the menu bar [Capacitive Touch] – [Start monitor] or the toolbar button ().

Workbench6 asks user TS number to monitor and saving log file of Burst monitor (Burst monitor log file) according to version of Touch API downloaded to your target board.

(1) Burst monitor option dialog

When TouchAPI in target board is created by Workbench6 V1.5.0 and earlier version, Burst monitor option dialog is displayed. Setup TS to monitor and the Burst monitor log file and press [OK] to start Burst monitor.

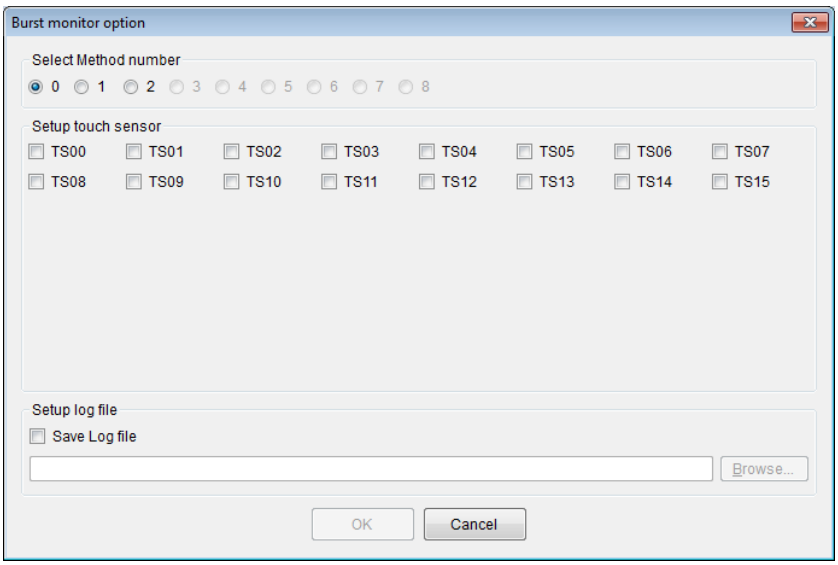


Figure 2-89 Burst monitor option dialog

Select Method number 0 1 2 3	Select the measurement method number to monitor.
Setup touch sensor TS00 TS01 TS02	Select TS or Matrix key to monitor. The number of TS to be able to monitor is changed according to serial port baudrate. 19200bps : 11 38400bps : 23 57600 bps : 35 115200 bps : 64
Save Log file	[Save log file] is checked, [Browse] is enabled and Workbench6 outputs Burst monitor log file.
Browse...	Display [Save As] dialog. When you do not select file, Workbench6 executes Burst monitor without output of Burst monitor log file.
OK	Starts Burst monitor.
Cancel	Close this dialog and cancels Burst monitor.

(2) Question of saving burst monitor log file

When you select [Yes], “Save as” dialog is displayed. After selecting a file and press [OK], Workbench6 starts Burst monitor.

If you select [No], Workbench6 starts Burst monitor immediately.

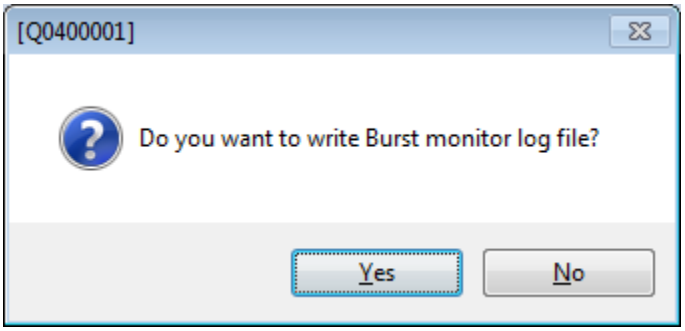


Figure 2-90 Check for save of Burst monitor log file

Yes	When you press [Yes], [Save As] dialog is displayed. Select file and press [Save]. When you press [No]. Workbench6 starts Burst monitor without saving Burst monitor log file.
No	Workbench6 starts Burst monitor without saving Burst monitor log file.

You can monitor the sensor counter value and the reference counter value by Log viewer, Status monitor and Measurements. Status monitor and Measurements does not display all of these value because of concerning the overhead by display all these value.

On the other hand, Log viewer displays all these value from Burst monitor and the burst monitor log file records all these value from Burst monitor. Use Status monitor and Measurements to confirm general tendency of the sensor counter value and the reference counter value.

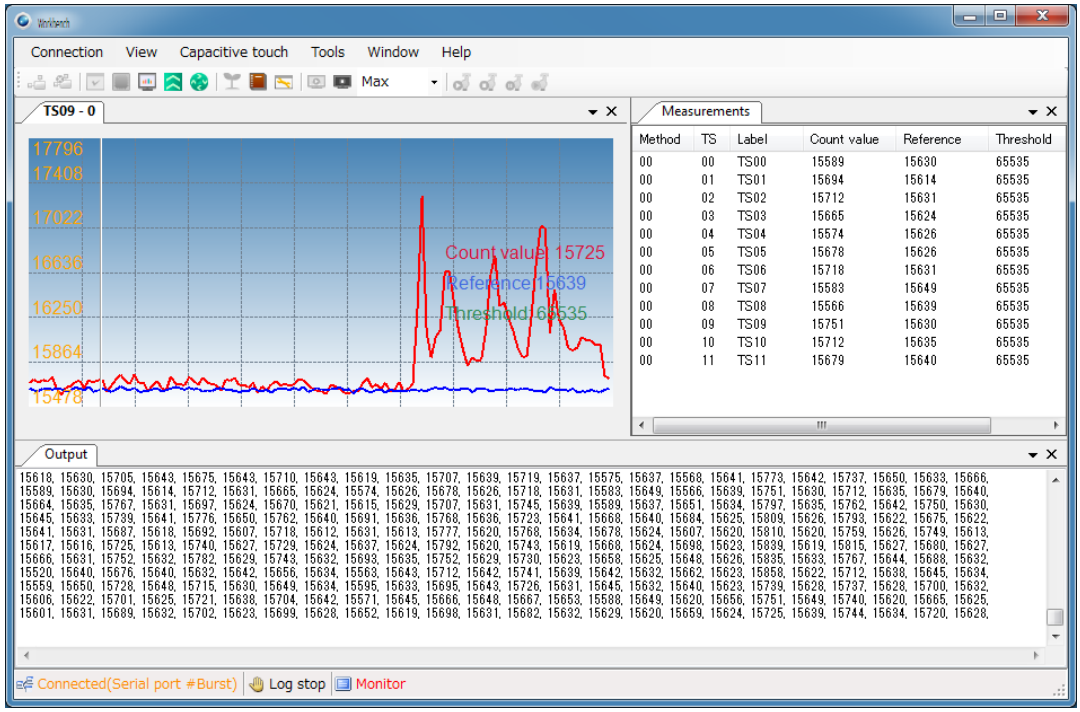


Figure 2-91 Result of Burst monitor

2.7.5 Stop Burst monitor

Workbench6 stops Burst monitor by selection of the menu bar [Capacitive Touch] – [Stop monitor] or the toolbar button ( ).

2.7.6 Exit Burst monitor

Workbench6 exits Burst monitor by selection of the menu bar [Connection] – [Disconnection] or the toolbar button ( ).

2.8 Version information

About Workbench dialog displays version information about Workbench6 and TouchAPI on your target board.

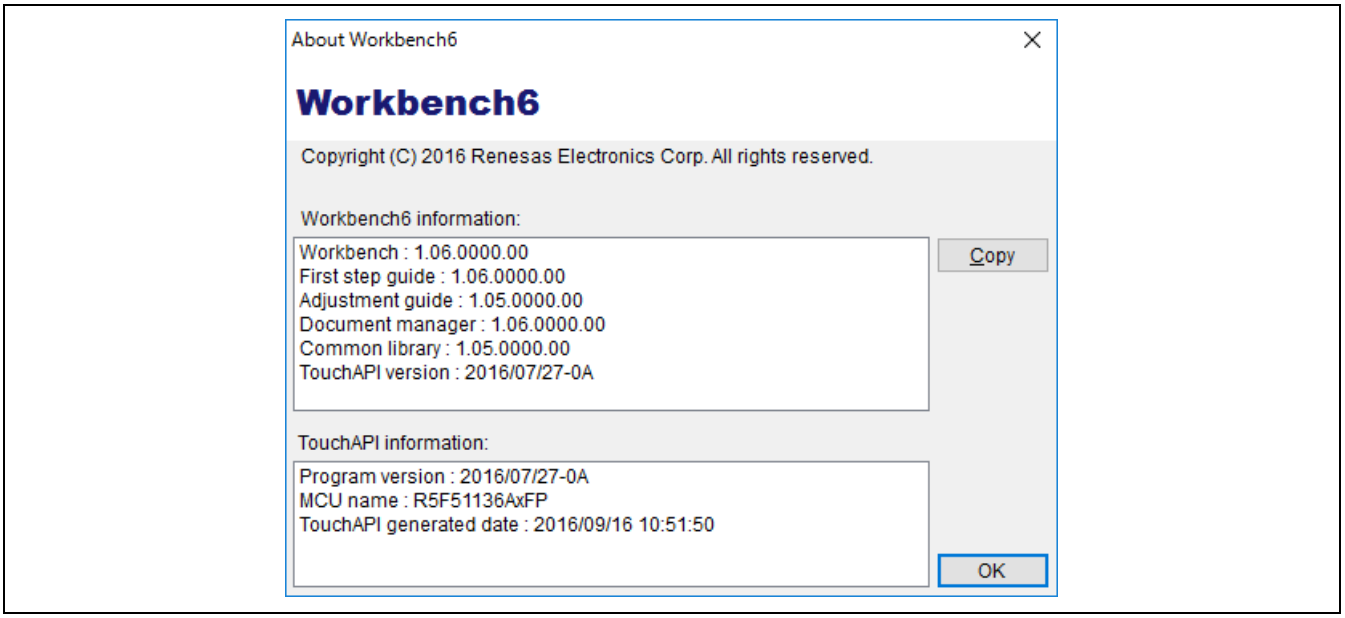


Figure 2-92 About Workbench6 dialog

Workbench6 information: Workbench : 1.06.0000.00 First step guide : 1.06.0000.00 Adjustment guide : 1.05.0000.00 Document manager : 1.06.0000.00 Common library : 1.05.0000.00 TouchAPI version : 2016/07/27-0A	Shows version information of modules of Workbench6. Refer to the followings for detail. Workbench : Version of Workbench6 First step guide : Version of the First step guide Adjustment guide : Version of the Adjustment guide Source code gallery : Version of the Source code gallery Document manager : Version of the Document manager Common library : Version of the Common library TouchAPI version : Version of TouchAPI
TouchAPI information: Program version : 2016/07/27-0A MCU name : R5F51136AxFP TouchAPI generated date : 2016/09/16 10:51:50	Shows information of TouchAPI on your target board. Refer to the following for detail. Program version : Program Version on your target board MCU name : MCU name on your target board TouchAPI generated date : Generated date of source file for your program with TouchAPI on your target board
Copy	Copies version information of Workbench6 and your target board to the clipboard.
OK	Exits the About Workbench6.

3. Message

This chapter describes the messages displayed by Workbench6.

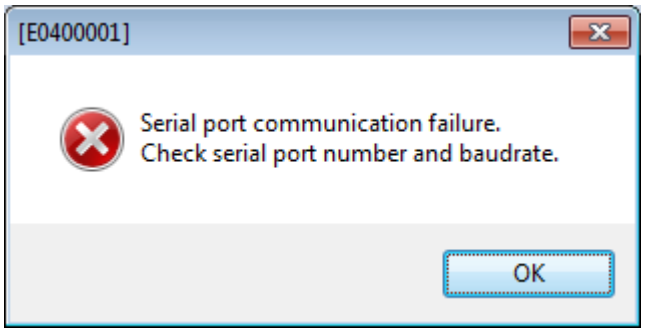


Figure 3-1 Message dialog

[E0400001]	Shows message number. Confirm following message according to the message number. First character of message number shows message type and the message type is as follows. C : Internal errors Processing terminated (suspended) due to internal error. E : Fatal errors Processing terminated (suspended) due to fatal error. M : Information Informational message. Check the message and continue the process. Q : Choices This type of message is displayed when a choice is necessary in order to carry on with the next operation. It performs the selected action. W : Warning Warning message. Check the message and continue the process.
OK	Close Message dialog.

3.1 Internal Errors

Table 3-1 Internal Errors

C0000001	[Message]	Failed to generate the source code.
	[Explanation]	Workbench could not make TouchAPI project or resistance information file.
	[Action by User]	Confirm specified folder.
C0000002	[Message]	Enter the absolute pathname to a folder.
	[Explanation]	Specified pathname is not an absolute pathname.
	[Action by User]	Specify an absolute pathname.
C0000003	[Message]	Could not find the folder.
	[Explanation]	There is no folder that you specified.
	[Action by User]	Confirm specified folder.
C0000004	[Message]	Could not find the first step guide setting file.
	[Explanation]	Information files for First step guide does not exist in specified folder.
	[Action by User]	Confirm TouchAPI project in specified folder whether First step guide outputs. Confirm whether the TouchAPI project in specified folder is made by First step guide.
C0000005	[Message]	Could not load the first step guide setting file.
	[Explanation]	First step guide could not read information files for resume Touch sensor automatic tuning.
	[Action by User]	Confirm specified folder.
C0000006	[Message]	Specify the project folder that created in Version 1.3.0 or later and Version <x.x.x> or lower.
	[Explanation]	Resume information file in specified folder is not supported.
	[Action by User]	Confirm Version of Workbench6 that you used when specified folder is made.
C0000007	[Message]	Could not find the project files of Touch API.
	[Explanation]	TouchAPI project does not exist in specified folder.
	[Action by User]	Confirm whether TouchAPI project in specified folder.
C0000008	[Message]	The specified project can not be resumed.
	[Explanation]	Impossible resumption phase is selected.
	[Action by User]	Select possible resumption phase.
C0000009	[Message]	Failed to generate the setting file.
	[Explanation]	Workbench could not make First step guide information files.
	[Action by User]	Confirm specified folder.
C0000010	[Message]	Path is not correctly set. Specify the folder to save files.
	[Explanation]	Illegal folder is specified.
	[Action by User]	Confirm specified folder.

C0300001	[Message]	System failure. File to open is not specified.
	[Explanation]	Since the path of the document is not specified, it failed to open.
	[Action by User]	This error should not occur.
C0400001	[Message]	Layout file load failure.
	[Explanation]	Workbench6 failed to read Layout files.
	[Action by User]	Make sure you have access privileges to the folder "C:\Users\Account name\AppData\Local\Renesas\Workbench6".
C0400002	[Message]	Layout file save failure.
	[Explanation]	Workbench6 failed to write Layout files.
	[Action by User]	Make sure you have access privileges to the folder "C:\Users\Account name\AppData\Local\Renesas\Workbench6".
C0400003	[Message]	<Additional message>\n ----------\n\n An error occurred in this application. Please let the developer know that error. Error information: \n <Exception message>\n\n Stack trace:\n Exception trace information>
	[Explanation]	Critical error occurred.
	[Action by User]	Update Workbench6.

3.2 Fatal Errors

Table 3-2 Fatal Errors

E0000001	[Message]	Failed to register e2 studio integration service.
	[Explanation]	Workbench failed to register Integration service of e2 studio to Windows.
	[Action by User]	Confirm whether your account of PC has administrator.
E0000002	[Message]	Failed to invoke e2 studio. Exit Workbench. Workspace : <Workspace path>
	[Explanation]	Workbench failed to startup e2 studio or connect to Integration service of e2 studio.
	[Action by User]	When the following dialog is displayed, press [OK] button after opening e2 studio's workbench window.
E0000003	[Message]	Failed to import the project. Workspace : <Workspace path> Project : <Project name>
	[Explanation]	Workbench failed to import TouchAPI project.
	[Action by User]	Confirm folder of TouchAPI project.
E0000004	[Message]	Failed to open the project. Project : <Project name>
	[Explanation]	Workbench failed to open TouchAPI project.
	[Action by User]	Confirm folder of TouchAPI project.
E0000005	[Message]	Failed to refresh project. Project : <Project name>
	[Explanation]	Workbench failed to refresh TouchAPI project.
	[Action by User]	Confirm folder of TouchAPI project.
E0000006	[Message]	Failed to get build configurations. Project : <Project name>
	[Explanation]	Workbench failed to get information of TouchAPI build configuration.
	[Action by User]	Confirm folder of TouchAPI project.
E0000007	[Message]	Failed to get the information of the download module. Project : <Project name> Build configuration : <Build configuration name>
	[Explanation]	Workbench failed to get information of TouchAPI program's download module.
	[Action by User]	Confirm folder of TouchAPI project.
E0000008	[Message]	Failed to clean the project. Project: <Project name>
	[Explanation]	Workbench failed to clean TouchAPI project.
	[Action by User]	Confirm version number of C/C++ Compiler Package.
E0000009	[Message]	Failed to build the project. Project : <Project name> Build configuration : <Build configuration name>
	[Explanation]	Workbench failed to build TouchAPI project.
	[Action by User]	Confirm version number of C/C++ Compiler Package.

E0000010	[Message]	Failed to resume the debug session. Project : <Project name> Debug configuration : <Debug configuration name>
	[Explanation]	Workbench failed to execute program on your target system.
	[Action by User]	Confirm folder of TouchAPI project.
E0000011	[Message]	Can not find the COM port for the Touch API.
	[Explanation]	First step guide cannot find COM port connecting TouchAPI.
	[Action by User]	Make sure the COM port setting of TouchAPI.
E0000012	[Message]	The download module is currently suspending. Check the clock condition and the other settings.
	[Explanation]	The download program is suspending.
	[Action by User]	Check the clock condition and the other settings.
E0000013	[Message]	Failed to download firmware program. Make sure the followings. - Emulator is connected to PC. - Emulator is connected to target board. - Target board is powered up. - MCU on target board agrees with selected MCU.
	[Explanation]	Failed to connect to Emulator, or download firmware program.
	[Action by User]	Make sure the followings. - Emulator is connected to PC. - Emulator is connected to target board. - Target board is powered up. - MCU on target board agrees with selected MCU.
E0000014	[Message]	Make sure that the version of e2 studio is 3.0.0.22 or later.
	[Explanation]	Unsupported version of e2 studio has been started.
	[Action by User]	Confirm version number of e2 studio.
E0000015	[Message]	TouchAPI conversion failed.
	[Explanation]	TouchAPI conversion failed.
	[Action by User]	Make sure the followings. - Workbench6 installation folder contains widget_parse_RX_raw.py and FIT_Base_Projects. - Do not include full width characters in the path of Touch Api project.
E0000016	[Message]	Failed to communicate with your target board.
	[Explanation]	Workbench failed to communicate with your target board.
	[Action by User]	Make sure your target board and TouchAPI program.
E0000017	[Message]	Failed to invoke CS+.
	[Explanation]	Failed to invoke CS+.
	[Action by User]	-

E0300001	[Message]	File save failure. Failed to create the cache folder.
	[Explanation]	It failed to create a Document manager of start-up cash and search cache of the destination folder.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData
E0300002	[Message]	File save failure. Failed to save the cache file for startup.
	[Explanation]	It failed to save data of the Document manager boot cache.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData
E0300003	[Message]	File load failure. Failed to load the cache file for startup.
	[Explanation]	It failed to load data of the Document manager boot cache.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData
E0300004	[Message]	File save failure. Failed to save the date information.
	[Explanation]	It failed to save the update date and time of the search target document.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData
E0300005	[Message]	File load failure. Failed to load the date information.
	[Explanation]	It failed to load the update date and time of the search target document.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData
E0300006	[Message]	File save failure. Failed to save the cache file for searches.
	[Explanation]	It failed to save data of the Document manager search cache.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData

E0300007	[Message]	File load failure. Failed to load the cache file for searches.
	[Explanation]	It failed to load data of the Document manager search cache.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager\PDFTextData
E0300008	[Message]	Display failure. There is no document to display in the list.
	[Explanation]	Be displayed in the document list, no PDF file exists.
	[Action by User]	Confirm whether there are each PDF file.
E0300009	[Message]	File save failure. Failed to save the information file for display.
	[Explanation]	It failed to save data of the display state of the document list.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager
E0300010	[Message]	File load failure. Failed to create the system file folder.
	[Explanation]	It failed to create a destination folder of documents listed state.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6
E0300011	[Message]	File load failure. Failed to load the information file for display.
	[Explanation]	It failed to load data of the display state of the document list.
	[Action by User]	Confirm whether the following folder has access permission. C:\Users\(User account name)\AppData\Local\Renesas\Workbench6\DocumentManager
E0400001	[Message]	Serial port communication failure\r\n <Additional information>
	[Explanation]	Workbench6 failed to connect to target board via serial port.
	[Action by User]	Make sure the followings according to the additional information. (1) Check serial port number and baudrate. - Make sure serial port that target board is connecting. - Make sure serial port baudrate that target board supports. (2) Target board cannot support the Burst monitor. - TouchAPI that is downloaded to target board does not support Burst monitor.

E0400002	[Message]	Failed to connect CS+\r\n <Additional information>
	[Explanation]	Workbench6 failed to connect to target board via CS+.
	[Action by User]	Make sure the followings according to the additional information. (1) e2 studio is already starting. - Close e2 studio. (2) Project open failure. - Make sure CS+ project file. (3) Project clean failure. - Make sure message from CS+. (4) Project build failure. - Make sure message from CS+ (5) Python console is disabled. Enable python console plug-in. - Enable IronPython console Plug-in. (6) Illegal response from target system. - Make sure program on your target system. (7) Failed to download firmware program. - Emulator is connected to PC. - Emulator is connected to target board. - Target board is powered up. - MCU on target board agrees with selected MCU.
E0400003	[Message]	Failed to connect e2 studio\r\n <Additional information>
	[Explanation]	Workbench6 failed to connect to target board via e2 studio.
	[Action by User]	Make sure the followings according to the additional information. (1) Integration Server registration failure. - Make sure that your account has administrative privileges. (2) e2 studio version is illegal. - Install e2 studio v4.0 or later. (3) e2 studio is already starting. - Close e2 studio. (4) e2 studio connection failure. - Retry after finish of e2 studio and Workbench6. (5) Project import failure. - Make sure workspace folder. (6) Project open failure. - Make sure e2 studio project files. (7) Build configuration getting failure. - Make sure message from e2 studio. (8) Detail build configuration getting failure. - Make sure e2 studio project files. (9) Project build failure. - Make sure e2 studio project files. (10) Failed to download firmware program. - Emulator is connected to PC. - Emulator is connected to target board. - Target board is powered up. - MCU on target board agrees with selected MCU. (11) Program starting failure. - Retry after finish of e2 studio and Workbench6. (12) Integration Service exception occurred. - Retry after finish of e2 studio and Workbench6. (13) Close Workbench and e2 studio and restart Workbench. - Retry after finish of e2 studio and Workbench6. (14) Illegal response from target system. - Make sure program on your target system.

E0400004	[Message]	Failed to read target system
	[Explanation]	Workbench6 failed to read from your target board.
	[Action by User]	Make sure the followings. - Make sure status of target board. - Make sure status of program downloaded to your target board.
E0400005	[Message]	Touch log file format error. \r\n <Touch log file path>
	[Explanation]	Format of specified touch log file is illegal.
	[Action by User]	Make sure format of touch log file.
E0400006	[Message]	Connection with target system is failed
	[Explanation]	Workbench6 failed to connect to your target board.
	[Action by User]	Make sure the followings. - Make sure status of target board. - Make sure status of program downloaded to your target board.
E0400007	[Message]	File save failure\r\n <Additional information>
	[Explanation]	Workbench6 failed to write file.
	[Action by User]	Make sure you have access privileges to folder of the file.
E0400008	[Message]	File load failure\r\n <Additional information>
	[Explanation]	Workbench6 failed to load file.
	[Action by User]	Make sure you have access privileges to folder of the file.
E0400009	[Message]	Visual C++ Redistributable Packages not found. Visual C++ Redistributable Packages for Visual Studio 2012 is not installed on your PC. After installed the Visual C++ Redistributable Packages for Visual Studio 2012 to your PC, starts Workbench6.
	[Explanation]	Workbench6 cannot find Visual C++ Redistributable Packages for Visual Studio 2012 on your PC.
	[Action by User]	Install Visual C++ Redistributable Packages for Visual Studio 2012 on your PC.
E0400010	[Message]	Failed to read target system. <Additional information>
	[Explanation]	Workbench6 failed to read target system.
	[Action by User]	Make sure connection with target system.
E0400011	[Message]	Failed to write target system. <Additional information>
	[Explanation]	Workbench6 failed to write target system.
	[Action by User]	Make sure connection with target system.
E0400012	[Message]	Failed to write source file. <Additional information>
	[Explanation]	Workbench6 failed to write source file.
	[Action by User]	Stop real time monitor.
E0400013	[Message]	Failed to initialize target system. <Additional information>
	[Explanation]	Workbench6 failed to initialize target system.
	[Action by User]	Make sure connection with target system.

E0400014	[Message]	Failed to start the real time monitoring. Workbench6 detected TSCAP voltage failure on your target board. Make sure the followings. - Make sure power supply circuit on your target board. - Make sure CTSUSO0 resister setting in your firmware program.
	[Explanation]	Workbench6 failed to start the real time monitoring.
	[Action by User]	Make sure the followings. - Make sure power supply circuit on your target board. - Make sure CTSUSO0 resister setting in your firmware program.
E0400015	[Message]	Serial port baudrate is out of range. Sets serial port baudrate in the range from 1 to 2147483647.
	[Explanation]	Serial port baudrate is out of range.
	[Action by User]	Sets serial port baudrate in the range from 1 to 2147483647.

3.3 Information

Table 3-3 Information

M0000001	[Message]	One or more e2 studio are already running. Close all.
	[Explanation]	e2 studio already starts.
	[Action by User]	Close e2 studio.
M0000002	[Message]	The dialog (child window) is opens in CS+. Close all dialogs in CS+.
	[Explanation]	Dialog window displays on CS+. The dialog is, for example, One-point-dialog or message dialog.
	[Action by User]	Close all dialog on CS+.
M0000003	[Message]	Press [OK] after e2 studio opens its workbench window. Workbench6 may fail to connect with e2 studio if you press [OK] before opening e2 studio's workbench window. If Workbench6 failed to connect with e2 studio, close Workbench6 & e2 studio and try again.
	[Explanation]	These are notes when connecting workbench and e2 studio.
	[Action by User]	Follow the guide.
M0000004	[Message]	First step guide modified your project by following your operation
	[Explanation]	Save changes.
	[Action by User]	-
M0000005	[Message]	This project cannot be resumed in Workbench6. Path : <Project path>
	[Explanation]	Specify the project that cannot be resume.
	[Action by User]	-
M0000006	[Message]	This project settings is returned to original state. Press [OK] after close e2studio.
	[Explanation]	Discard changes.
	[Action by User]	Close e2 studio and press [OK] button.
M0000007	[Message]	The measurement cycle of all cap touch buttons, the wheels and/or the sliders depends on the sum measurement periods by CTSU. When the sum of measurement periods is less than 20mSEC, the measurement cycle becomes about 20mSEC. The measurement cycle is added 2mSEC each if the sum of measurement periods is more than 20mSEC. For example, the sum is 21mSEC, the cycle becomes 22mSEC. The sum is 43mSEC, the cycle becomes 44mSEC.
	[Explanation]	This is the description about the measurement time.
	[Action by User]	-
M0000008	[Message]	Number of characters is 8.
	[Explanation]	A label component is a string of up to 8 characters.
	[Action by User]	-
M0000009	[Message]	Select PLL circuit when you use USB function.
	[Explanation]	This is the note when using USB function.
	[Action by User]	Follow the guide.

M0000010	[Message]	Supporting Emulator is the followings: E1, E2 emulator Lite
	[Explanation]	This is the description about the supporting Emulator.
	[Action by User]	Use these supporting Emulator.
M0000011	[Message]	Drug & drop each touch button and select TS number with. You can also order Wheel & Slider's numbers of electrodes.
	[Explanation]	This is the description how to set touch interface.
	[Action by User]	Follow the guide.
M0000012	[Message]	Folder is named automatically as follows format; TouchAPI_YYYYMMDDhhmmss YYYY: Years MM: Month DD: Day hh: Hour mm: Minute ss: Second
	[Explanation]	This is the description about the project folder name.
	[Action by User]	-
M0000013	[Message]	Do not touch electrodes whilst Workbench is calculating offset.
	[Explanation]	Because Workbench cannot obtain a correct tuning result, do not touch electrodes.
	[Action by User]	Follow the guide.
M0000014	[Message]	Check your board or retry tuning process when check box is ON because the tuning might fail. Press [Next] to update the source code.
	[Explanation]	The result of touch sensor automatic tuning is reflected in the source code.
	[Action by User]	Follow the guide.
M0000015	[Message]	Press [Next] to continue or [Cancel] to quit this wizard.
	[Explanation]	-
	[Action by User]	Follow the guide.
M0000016	[Message]	Press [Finish] to quit this wizard.
	[Explanation]	This guide means the completion of the touch sensor automatic tuning.
	[Action by User]	Follow the guide.
M0000017	[Message]	Press [Retry] If you failed to measure by touching an electrode or moving your board when Workbench measured the parasitic capacitance.
	[Explanation]	This is the description about the retry.
	[Action by User]	Follow the guide.
M0000018	[Message]	First step guide cannot enable to USB-serial port on <Part No.> because SCI Pin Configuration and Touch Pin shares same pin. To use USB-serial port function on <Part No.> you must implement USB-serial port function to TouchAPI generated by First step guide, using "Project generated by Workbench6 Integration Guide" as reference.
	[Explanation]	-
	[Action by User]	Follow the guide.
M0400001	[Message]	This function is unavailable.
	[Explanation]	This function is unavailable.
	[Action by User]	-

M0400002	[Message]	Press [OK] after e2 studio opens its workbench window. Workbench6 may fail to connect with e2 studio if you press [OK] before opening e2 studio's workbench window. If Workbench6 failed to connect with e2 studio, close Workbench6 & e2 studio and try again.
	[Explanation]	These are notes when connecting workbench and e2 studio.
	[Action by User]	Follow the guide.
M0400003	[Message]	Please Terminate e2 studio.
	[Explanation]	Terminate e2 studio.
	[Action by User]	Follow the guide.

3.4 Choices

Table 3-4 Choices

Q0000001	[Message]	The touch detection method is changed. Do you want to remove created touch interfaces?
	[Explanation]	Confirmation message when the touch detection method changed.
	[Action by User]	If there is no problem, please continue with the process.
Q0000002	[Message]	The MCU select is changed. Do you want to remove created touch interfaces?
	[Explanation]	Confirmation message when the MCU select changed.
	[Action by User]	If there is no problem, please continue with the process.
Q0000003	[Message]	For switching the target project, close the project <current project name>. Do you want to save the project <current project name> ?
	[Explanation]	Confirmation message when the target project select changed.
	[Action by User]	If there is no problem, please continue with the process.
Q0000004	[Message]	Do you want to delete the touch interface?
	[Explanation]	Confirmation message when the touch interface deleted.
	[Action by User]	If there is no problem, please continue with the process.
Q0000005	[Message]	Do you want to exit First step guide?
	[Explanation]	Confirm messege when exit First step guide.
	[Action by User]	When you want to exit First step guide, select [Yes].
Q0400001	[Message]	Do you want to write Burst monitor log file ?
	[Explanation]	-
	[Action by User]	When you want to write Burst monitor log file, select [Yes].

3.5 Warnings

Table 3-5 Warnings

W0000001	[Message]	<XXX> is not installed. After you closed First step guide and Workbench, install <XXX>.
	[Explanation]	Supported IDE are not installed to your PC.
	[Action by User]	Exit First step guide and Workbench6 and install IDE to your PC.
W0000002	[Message]	First step guide does not recognize supported Emulator in your PC.
	[Explanation]	Emulator is not connected to your PC.
	[Action by User]	Connect Emulator to your PC via USB cable.
W0000003	[Message]	Specify at least one Tx.
	[Explanation]	There is no Tx in Matrix.
	[Action by User]	Setup Tx in Matrix more than one.
W0000004	[Message]	Specify at least one Rx.
	[Explanation]	There is no Rx in Matrix.
	[Action by User]	Setup Rx in Matrix more than one.
W0000005	[Message]	Assign the channel to all <[Slider/Wheel]> TS.
	[Explanation]	There is no TS in <[Slider/Wheel]>.
	[Action by User]	Setup TS in <[Slider/Wheel]> more than one.
W0000006	[Message]	Do not set the same channel to multiple <[Slider/Wheel]> TS.
	[Explanation]	There is same TS in <[Slider/Wheel]>.
	[Action by User]	Setup different TS in <[Slider/Wheel]>.
W0000007	[Message]	Create at least one touch interface.
	[Explanation]	There is no Touch interface.
	[Action by User]	Setup Touch interface more than one.
W0000008	[Message]	More than 8 sliders have been created. Create 8 or less sliders.
	[Explanation]	Sliders in Canvas is more than eight.
	[Action by User]	Supporting the number of Slider is eight.
W0000009	[Message]	More than 8 wheels have been created. Create 8 or less wheels.
	[Explanation]	Wheel in Canvas is more than eight.
	[Action by User]	Supporting the number of Wheel is eight.
W0000010	[Message]	There is one or more touch interfaces that channel is not assigned. Assign the channel to all touch interfaces.
	[Explanation]	There are Touch interfaces that is not allocated to TS in Canvas.
	[Action by User]	Allocate all Touch interfaces in Canvas to TS.
W0000011	[Message]	There is one or more channels that are assigned more than one touch interface. Resolve the conflict.
	[Explanation]	There is a TS that is allocated to Touch interfaces more than one.
	[Action by User]	Do not allocate a TS to Touch interfaces more than one.

W0000012	[Message]	More than N matrices has been created. Create N or less matrices.
	[Explanation]	Matrices in Canvas are more than N.
	[Action by User]	The maximum number of Matrices which you can place is N. N is the half of the number of touch sensors in touch MCU which you selected. If N is over eight, the maximum number of Matrices is eight.
W0000013	[Message]	Enable at least one touch button.
	[Explanation]	There is no Matrix in Canvas.
	[Action by User]	Setup Matrix more than one.
W0000014	[Message]	More than 64 touch buttons has been created. Create 64 or less touch buttons.
	[Explanation]	The number of matrix button is over 64.
	[Action by User]	Supporting number of Matrix button is 64.
W0000015	[Message]	Select at least one of Self capacitance method check box and Mutual capacitance method check box.
	[Explanation]	Touch sensor detection method is not selected.
	[Action by User]	Select “Self capacitance method” or “Mutual capacitance method” or the both.
W0000016	[Message]	Some <[TS / Key]> is not possible to auto tuning for reasons of TSCAP voltage error. Please check and review the design of the board.
	[Explanation]	Workbench detects TSCAP voltage failure from your target system.
	[Action by User]	Confirm your target system.
W0000017	[Message]	Some <[TS / Key]> is not possible to auto tuning for reasons of Sensor counter overflow error. Please check and review the design of the board.
	[Explanation]	Workbench detects Overflow of sensor counter from your target system.
	[Action by User]	Confirm your target system.
W0000018	[Message]	Some <[TS / Key]> is not possible to auto tuning for reasons of small parasitic capacitance. Please check and review the design of the board.
	[Explanation]	Workbench failed to tuning some TS for reason of little parasitic capacitance.
	[Action by User]	Confirm your target system.
W0000019	[Message]	Because the parasitic capacitance of the sensor that composes the <[slider / wheel]> is different, the measurement frequency is greatly different. Therefore, accuracy cannot be kept. Please reexamine the substrate design.
	[Explanation]	Parasitic capacitance of TS composing Slider or Wheel is very different.
	[Action by User]	Confirm your target system.
W0000020	[Message]	There is an Overflow flag.
	[Explanation]	Workbench detects Overflow of sensor counter from your target system.
	[Action by User]	Confirm your target system.
W0000021	[Message]	Can not expand
	[Explanation]	The result of touch sensor automatic tuning does not meet the magnification conditions.
	[Action by User]	Retry sensitivity tuning.

W0300001	[Message]	Searching failure. Keyword input field is blank.
	[Explanation]	String is not entered, started a keyword search.
	[Action by User]	Enter a keyword in the search when the keyword input field.
W0300002	[Message]	Searching failure. The number of "(" or ")" is wrong.
	[Explanation]	Not paired () is entered, started a keyword search.
	[Action by User]	Enter so that the keyword input field () is a pair.
W0300003	[Message]	Searching failure. Search keyword is not right.
	[Explanation]	NOT search keyword only been input, started a keyword search.
	[Action by User]	Enter the keyword other than NOT search.
W0300004	[Message]	Pdf viewer failure. Failed to open the pdf file with the use of "Acrobat/Adobe Reader".
	[Explanation]	Acrobat and Adobe Reader does not exist.
	[Action by User]	Install the Acrobat or Adobe Reader.
W0300005	[Message]	Pdf viewer failure. Failed to open the pdf file with the use of pdf viewer.
	[Explanation]	For opening a document, there is no application that supports pdf extension.
	[Action by User]	Install the Pdf viewer.
W0400001	[Message]	CS+ is not installed on your PC. Install following CS+-related tools. - CS+ for CC - CS+ for CA,CX - CS+ Utilities
	[Explanation]	Workbench6 cannot find CS+ on your PC.
	[Action by User]	Install following CS+-related tools on your PC. - CS+ for CC - CS+ for CA,CX - CS+ Utilities
W0400002	[Message]	e2 studio is not installed on your PC.
	[Explanation]	Workbench6 cannot find e2 studio on your PC.
	[Action by User]	Install e2 studio on your PC.
W0400003	[Message]	Workbench6 already connects to Touch API on your target board.
	[Explanation]	Workbench6 already connects to your target board.
	[Action by User]	Workbench6 is accessible with one target board. If you want to use another target board, disconnect the connected target board and connect another target board.
W0400004	[Message]	Stop the monitor before disconnection from target system.
	[Explanation]	Workbench6 cannot disconnect from your target board because of real time monitor.
	[Action by User]	Stop real time monitor and disconnect from target board.

W0400005	[Message]	Stop Touch log play before connecting to your target board.
	[Explanation]	Workbench6 cannot connect to your target board because of Touch log playing.
	[Action by User]	Stop Touch log playing.
W0400006	[Message]	Touch log play is in progress.\n Stop Touch log play.
	[Explanation]	Workbench6 cannot start real time monitor because of Touch log playing.
	[Action by User]	Stop Touch log playing.
W0400007	[Message]	Workbench6 is already running.
	[Explanation]	Workbench6 is already running.
	[Action by User]	You cannot start Workbench6 two or more.
W0400008	[Message]	Touch sensor not found. <Additional information>
	[Explanation]	Workbench6 cannot find specified touch sensor.
	[Action by User]	Make sure your target system and settings of TouchAPI.
W0400009	[Message]	Workbench6 does not load Touch interface label information file Retry after loading of Touch interface label information file
	[Explanation]	Workbench6 does not load touch interface label information.
	[Action by User]	Make sure touch label information file.
W0400010	[Message]	This touch sensor is not enable.\r\n Check your touch sensor board and the settings of TouchAPI.
	[Explanation]	Specified touch sensor is disabled.
	[Action by User]	Make sure your target system and settings of TouchAPI.
W0400011	[Message]	There is no slider which you choice.
	[Explanation]	Workbench6 cannot find specified slider.
	[Action by User]	Make sure your target system and settings of TouchAPI.
W0400012	[Message]	There is no wheel which you choice.
	[Explanation]	Workbench6 cannot find specified wheel.
	[Action by User]	Make sure your target system and settings of TouchAPI.
W0400013	[Message]	Cannot find folder
	[Explanation]	Workbench6 cannot find specified folder.
	[Action by User]	Make sure specified folder.
W0400014	[Message]	Cannot find file
	[Explanation]	Workbench6 cannot find specified file.
	[Action by User]	Make sure specified file.
W0400015	[Message]	Difference value exceeds the maximum limit.
	[Explanation]	Difference value displaying in graph exceeds the maximum limit.
	[Action by User]	Change the maximum limit of difference value.
W0400016	[Message]	Stop real time monitor before starting Touch log play.
	[Explanation]	Workbench6 cannot play Touch log because of real time monitor.
	[Action by User]	Stop real time monitor.

4. FAQ

4.1 Message “Could not load or assembly ‘ISWrapper.dll’ or one of its dependencies” is displayed

Install Visual C++ 2012 Run-time library for 32 bit to your PC. Even if you use 64 bit OS, you must install the Visual studio run-time library for 32 bit.

Refer to [1.4.2 Run-time library] about Visual C++ 2012 Run-time library for 32 bit for detail.

4.2 Status monitor does not display the Reference value and the Touch determination threshold value.

When TS is a part of slider or wheel, Status monitor does not display Touch determination threshold value.

4.3 First step guide – It is impossible to operate “Target board startup”

This occurs in cate of using e2 studio with E1 Emulator. The cause is as follows.

- Touch MCU does not match between TouchAPI and your target system.
- Power supply setting of your target system is not correct.

In this case, “Target board startup” of First step guide repeats blinking an icon that is side of “Firmware download completed” and it is impossible to operate “Target board startup”. Close e2 studio and you operate “Target board startup” of First step guide.

Retry First step guide after checking Touch MCU of TouchAPI and your target system and Power supply settings.

4.4 Workbench6 cannot start CS+

When CS+ is started by First step guide – Target board startup cannot start CS+ or the Menu bar on the Main window [Connection] – [CS+ connection], the cause is as follows.

Visual C++ 2012 Run-time library for 32 bit is not installed.

Refer to [1.4.2 Run-time library] about Visual C++ 2012 Run-time library for 32 bit for detail.

5. Note

5.1 Power supply setting of target system

Please use Workbench6 according to Power supply settings of your target system. Power supply settings of TouchAPI project made by First step guide is as follows.

- CS+

  Power target from the emulator. (MAX 200mA): No

- e2 studio

  Power Target From The Emulator (MAX 200mA): No

5.2 Touch MCU selection

Please select Touch MCU in “Select MCU” of First step guide according to the Touch MCU on your target system.

5.3 Caution in use of CS+

When “CS+ with E1 Emulator” is not displayed in “Select the connecting method with your board” of First step guide, it is regarded that CS+ is not installed corrector. Please refer to [1.4.1 Supported Integrated Development Environment] for detail.

5.4 Caution in use of e2 studio

5.4.1 Multiple installation of e2 studio

When e2 studio is installed more the one, Workbench6 starts e2 studio according to the order of install information in Window registry. Therefore, Workbench6 starts e2 studio that user intended. It is recommended that one e2 studio is installed on your PC.

5.4.2 Using e2 studio after First step guide is finished

When you select a menu [Connection] – [e2 studio connection] after the finish of First step guide using e2 studio, Workbench6 cannot connect e2 studio after closing e2 studio. Therefore, Workbench6 requests to user the closing e2 studio.

6. Appendix

6.1 Glossary

This section defines terms used in this document.

(1) TS

This refers capacitive touch detection pins (touch pins).

(2) Context menu

This refers to the menu that appears when you push the right button of the mouse or other pointing devices in a window, over an icon, or other object on the screen. The menu displays a list of operations currently available for the object you clicked.

The following is context menu on Status monitor.

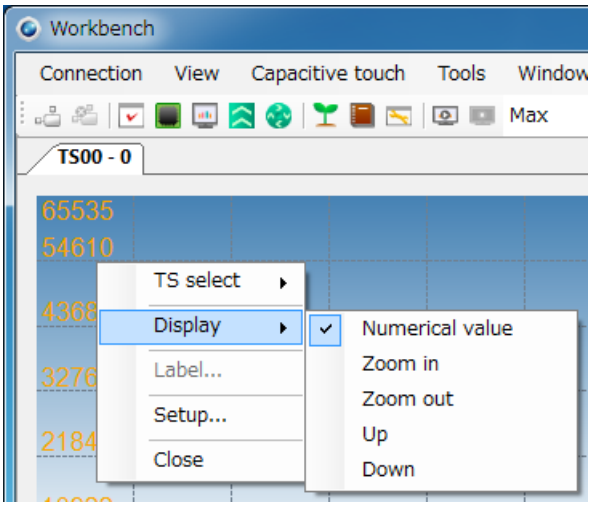


Figure 6-1 Context menu on Status monitor

(3) Shortcut key

This refers to function that operates by keyboard.

6.2 Supporting C/C++ Compiler Package

C/C++ compiler package that we checked operation with Workbench6 are as follows.

Table 6-1 Supporting C/C++ Compiler Package

MCU	Compiler	Remarks
RX113 Group RX130 Group RX231, RX230 Group	RX Family C/C++ Compiler Package V2.02.00	

This table is latest information as of Jan 18, 2017.

6.3 Contents of update TouchAPI

This section explains about the contents to update in TouchAPI from Parameters and Registers.

6.3.1 “r_touch.h”

“r_touch.h” is updated or outputted by Parameters. When TouchAPI project is existed in the folder “TouchAPI_YYYYMMDDhhmmss”, there is “r_touch.h” in the following.

TouchAPI_YYYYMMDDhhmss¥Include¥Touch

Workbench6 updates the value of macro definition, the name of the macro definition is changed according to touch sensor measurement method.

(1) Touch sensor measurement method is self-capacitance

Table 6-2 Macro definition to update in “r_touch.h” – Self capacitance

Macro definition	Contents
SELF_DRIFT_ENABLE	Defines the Drift correction is enabled or disabled.
SELF_DRIFT_FREQUENCY	Defines the interval time of the Drift correction.
SELF_MSA	Defines the Successive touch cancel is enabled or disabled.
SELF_TOUCH_ON	Defines the initial value of the Continuous agreement touch determination.
SELF_TOUCH_OFF	Defines the initial value of the Continuous agreement non-touch determination.
SELF_TSxx_THR	Defines the initial value of the Touch determination threshold value.
SELF_TSxx_HYS	Defines the initial value of the Hysteresis value.
SLIDERn_RESOLUTION	Defines the initial value of the Slider resolution.
SLIDERn_THRESHOLD	Defines the initial value of the Slider threshold.
WHEELn_RESOLUTION	Defines the initial value of the Wheel resolution.
WHEELn_THRESHOLD	Defines the initial value of the Wheel threshold.

- “xx” shows the number of TS.
- “n” shows the number of Slider and Wheel.

(2) Touch sensor measurement method is mutual capacitance

Table 6-3 Macro definition to update in "r_touch.h" – Mutual capacitance

Macro definition	Contents
MUTUALn_DRIFT_ENABLE	Defines the Drift correction is enabled or disabled.
MUTUALn_DRIFT_FREQUENCY	Defines the interval time of the Drift correction.
MUTUALn_MSA	Defines the Successive touch cancel is enabled or disabled.
MUTUALn_TOUCH_ON	Defines the initial value of the Continuous agreement touch determination.
MUTUALn_TOUCH_OFF	Defines the initial value of the Continuous agreement non-touch determination.
MUTUALn_KEYxx_THR	Defines the initial value of the Touch determination threshold value.
MUTUALn_KEYxx_HYS	Defines the initial value of the Hysteresis value.

- "xx" shows the number of TS.
- "n" shows the number of Slider and Wheel.

6.3.2 "r_ctsu.h"

"r_ctsu.h" is updated or outputted by Registers. When TouchAPI project is existed in the folder "TouchAPI_YYYYMMDDhhmmss", there is "r_ctsu.h" in the following.

TouchAPI_YYYYMMDDhhmss¥Include¥CTSU

Workbench6 updates the value of macro definition, the name of the macro definition is changed according to touch sensor measurement method.

(1) Touch sensor measurement method is self-capacitance

Table 6-4 Macro definition to update in "r_ctsu.h" – Self capacitance

Macro definition	Contents
SELF_CTSUATUNE1	Defines the initial value of CTSUCR1 - CTSUATUNE1.
SELF_CTSUPRRATIO	Defines the initial value of CTSUSDPRS – CTSUPRRATIO.
SELF_CTSUPRMODE	Defines the initial value of CTSUSDPRS – CTSUPRMODE.
SELF_CTSUSOFF	Defines the initial value of CTSUSDPRS – CTSUOSFF.
CTSUSSDIV_TSxx	Defines the initial value of CTSUSSC - CTSUSSDIV.
CTSUSO_TSxx	Defines the initial value of CTSUSO0 – CTSUSO.
CTSUSNUM_TSxx	Defines the initial value of CTSUSO0 – CTSUSNUM.
CTSURICOA_TSxx	Defines the initial value of CTSUSO1 – CTSURICOA.
CTSUSDPA_TSxx	Defines the initial value of CTSUSO1 – CTSUSDPA.
CTSUICOG_TSxx	Defines the initial value of CTSUSO1 – CTSUICOG.

- "xx" shows the number of Matrix key.
- "n" shows the number of Matrix.

(2) Touch sensor measurement method is mutual capacitance

Table 6-5 Macro definition to update in "r_ctsu.h" – Mutual capacitance

Macro definition	Contents
MUTUALn_CTSUATUNE1	Defines the initial value of CTSUCR1 - CTSUATUNE1.
MUTUALn_CTSUPRRATIO	Defines the initial value of CTSUSDPRS – CTSUPRRATIO.
MUTUALn_CTSUPRMODE	Defines the initial value of CTSUSDPRS – CTSUPRMODE.
MUTUALn_CTSUSOFF	Defines the initial value of CTSUSDPRS – CTSUOSFF.
CTSUSSDIV_MUTUALn_KEYxx	Defines the initial value of CTSUSSC - CTSUSSDIV.
CTSUSO_MUTUALn_KEYxx	Defines the initial value of CTSUSO0 – CTSUSO.
CTSUSNUM_MUTUALn_KEYxx	Defines the initial value of CTSUSO0 – CTSUSNUM.
CTSURICOA_MUTUALn_KEYxx	Defines the initial value of CTSUSO1 – CTSURICOA.
CTSUSDPA_MUTUALn_KEYxx	Defines the initial value of CTSUSO1 – CTSUSDPA.
CTSUICOG_MUTUALn_KEYxx	Defines the initial value of CTSUSO1 – CTSUICOG.

- "xx" shows the number of Matrix key.
- "n" shows the number of Matrix.

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