

Universal Probe

Software Users Manual

Logic Analyzer

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No. E090958-02

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NOTES

Thank you for purchasing the “Universal Probe” from Sohwa & Sophia Technologies. Correctly understand notes and other information in this document before using this product.

1. Permission from the Japanese government is required when exporting the product and technologies described in this document to which the “Foreign Exchange and Foreign Trade Act” applies or bringing them out of Japan.
2. The product described in this manual is intended to be used for general electronic equipment, such as office equipment, communication equipment, measuring instruments and home electric appliances. Do not use this product for automobile, railway, marine, aeronautical or space equipment, traffic equipment, combustion equipment, safety devices, medical devices, infrastructure equipment, nuclear power equipment or other types of equipment designed for a specific application that requires special quality and reliability and can directly threaten human life or cause damage to human body when it gets out of order or malfunctions. The customer should be responsible for using this product in such equipment.
3. It is strictly prohibited to reprint this document in whole or in part without our written permission.
4. The contents of this document are subject to change without notice.
5. The specifications in this document may lead to different results depending on your environment or measurement conditions.
6. Note that we bear no responsibility for consequence of operating this product.
7. “Operating Precautions” in this document are important notes to prevent damage on users and third parties as well as assets and to use the product safely and correctly. Be sure to read these precautions before using this product.
8. The product names and trade names in this document are trademarks or registered trademarks of respective owners.



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URL > <http://www.ss-technologies.co.jp/en/index.html>

Operating Precautions



Failure to observe the following precautions may lead to human death or severe injury.



Do

Avoid supplying voltage out of the range specified in the specifications of this product. Supplying the voltage out of the range may cause damage or fire.



Do

When using the target equipped with the ground terminal, ensure that the ground terminals of the target and peripheral equipment are connected. Failure to do so may cause an equipment failure or electric shock.
Avoid connecting the ground terminal to the gas pipe. This causes a fire or explosion.



Don't

Do not transport this product with equipment connected.
In particular, hold the plug when removing or inserting the cable. Failure to do so may damage the cable, causing a fire or electric shock.



Don't

Observe the following points when handling the cable. Do not damage, process, forcibly bend, twist, pull, putting any object on or heat the cable, moving the cable close to the heating device, or touch the cable with a wet hand.
Failure to observe these precautions may cause a fire or electric shock.
If the cable is damaged, stop using it.



Don't

When you hear thunders, do not touch the power plug. This causes an electric shock.
If the product seems to be damaged by lightning strike, stop using it.



Don't

Do not let a staple, clip or other metal item enter into the product. This may cause a fire or failure.



Don't

Do not use or leave the product in direct sunlight, near heating devices, in an extremely hot or cold environment, under hard vibrations, in dusty area with a large amount of metal dust or oily dust, or noisy area full of spike noise.
Do not give strong impact to the product.



**Do not
disassemble**

Do not disassemble, alter or repair the product. This may cause a fire or electric shock.



No wetting

Do not use the product at a place where there is liquid or at a humid place such as bathroom or in vicinity to glasses.
This may cause an electric shock.
If liquid enters into this product, immediately turn it off and stop using it.



Caution

Touching the energized product for a long time may cause low-temperature burns.
Do not use this product covering with comforter or other cloth.



**Pull out the
plug.**

Immediately turn the power off if unusual smell, noise, smoke or fire is detected or if the product is or may be damaged due to a fall or strong shock. Continuing to use it may lead to a serious accident. Stop using the product.

Abbreviations, Terms and Conventions

This section describes the abbreviations, terms and conventions used in this document.

- About numeric values ... All the numeric values are positive unless otherwise specified.
- K (capital letter) ... Represents $2^{10}=1024$. (Example: 16K=16384)
- k (small letter) ... Represents 1000. (Example: 1kHz=1000Hz)
- [xxxxx] ... Represents the window title, xxxxx.
- <xxxxx> ... Represents the item named xxxxx in the window.

The annotations and notes used in this document are as shown in Figure 1.

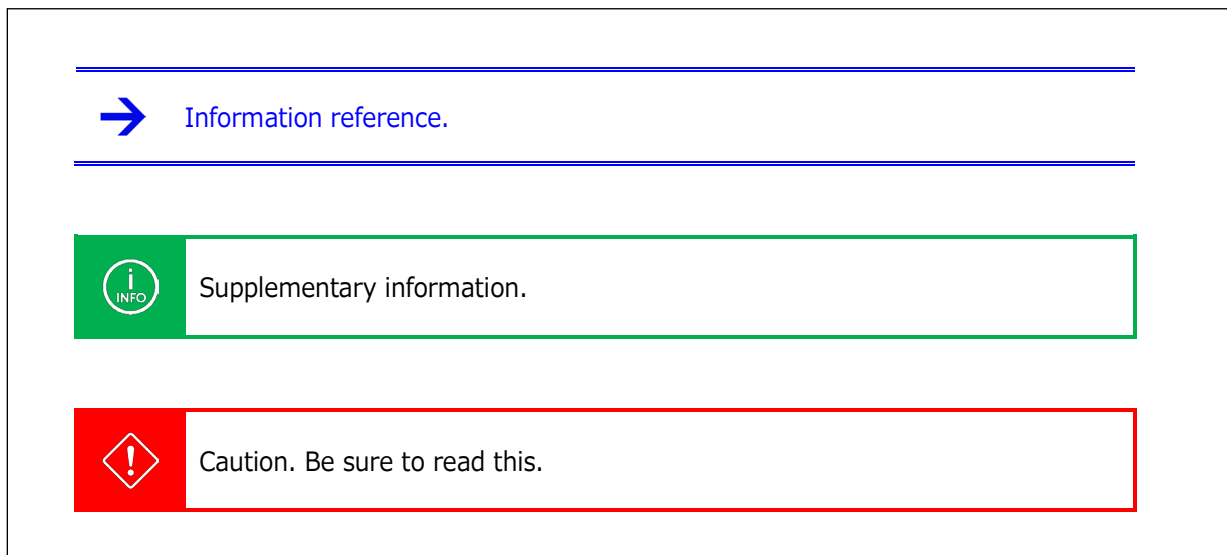


Figure 1

Abbreviations and terms are listed in Table 1.

Table 1

Abbreviations and terms	Description
This product	Universal Probe including accessories.
Probe	Universal Probe itself.
This software	Logic Analyzer.
Serial No.	Stands for the serial number.
License Code	License code for using this product.
Software Code	Code required to issue the License Code for each software.
Measurement	Acquiring signal information with the Logic Analyzer function by using the probe.
Waveform data	Signal information measured with the Logic Analyzer function.
Measurement settings	Setting information other than waveform data. (such as trigger settings, channel colors, and signal names)
Host PC	PC where this software runs.
Target	Object to be controlled or measured with the Universal Probe.
LASX	File format to save measurement settings designed for this software.
LAWX	File format to save waveform data and measurement settings designed for this software.
CSV	Comma-separated text file format.
Memory mode	Mode to acquire waveform data into the memory in the probe. This mode is enabled when 16 Kbit/channel to 100 Mbit/channel is specified as the memory capacity.
Logger mode	Mode to acquire waveform data into the HDD in the host PC. This mode is enabled when HDD is specified as the memory capacity.
Work folder	Folder in the HDD to store waveform data in the logger mode.
Work data	Waveform data file created in the work folder in the logger mode.

1. Overview of This Software

This chapter provides an overview of this software.

This software provides the Logic Analyzer function to take in and display signals input from the target to the probe and the Protocol Analyzer function to analyze specific standard protocols.

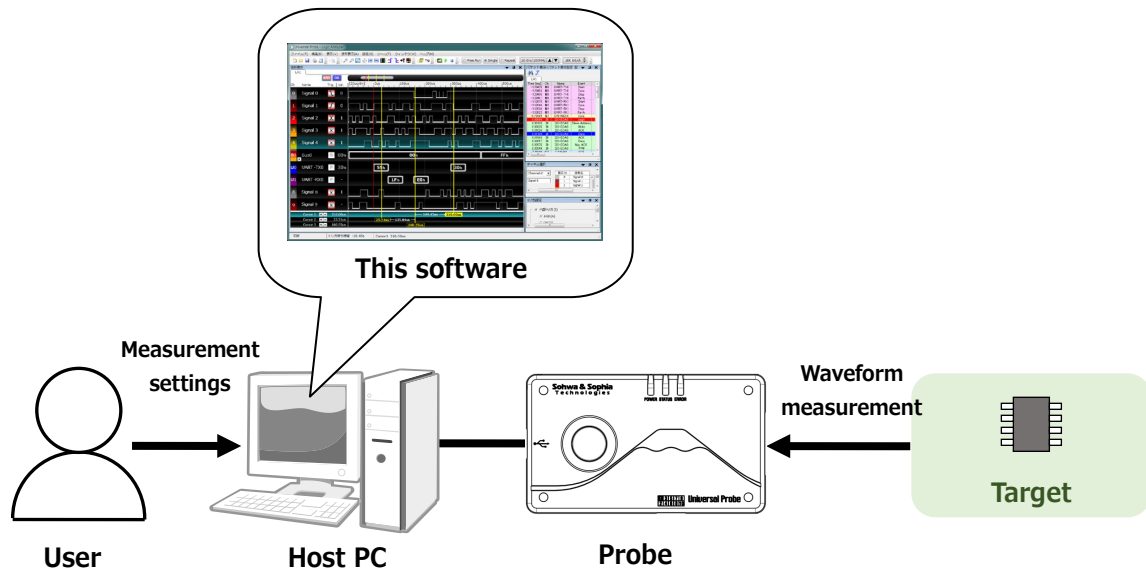


Figure 2

1.1. System Requirements

The following system is required to run this software.

- PC running Microsoft Windows 7 or later
- CPU: 1GHz or faster (depending on the requirements of the used OS)
- Memory: 1GB or larger (depending on the requirements of the used OS)
- HDD: 500 MB or more free space
- OS: Windows 7 (32-bit or 64-bit)/Windows 8 (32-bit or 64-bit)
- .NET Framework 4.5 or higher.
- One or more empty USB 2.0 ports

1.2. Specifications

Table 2

Function	Item	Specification
Logic Analyzer		
Maximum number of probes to be connected	4	
Number of channels	8ch, 16ch, 24ch, 32ch	
Memory capacity	High-speed memory	16 Kbit/Ch
	Large-capacity memory	100 Mbit/Ch
	HDD	Depends on the HDD in the PC.
Sampling frequency	When using a high-speed memory	1 kHz to 100 MHz
	When using a large-capacity memory	1 kHz to 25 MHz
	When using an HDD	1 kHz to 100 kHz
Maximum number of windows	Waveform display	10
	Packet display	10
Maximum number of cursors	20	
Protocol Analyzer		
Supported protocols	UART, I2C, SPI, CAN	



The upper limit of selectable sampling frequency is 100.0 ns/10 MHz when two or more probes are used in combination.

1.3. Turning on or off the Power

1.3.1. Connecting to the Target and Turning on the Power

Connect the probe and the target with the following procedure:

- 1) Confirm that the target is turned off.
- 2) Connect the USB cable of the probe.
- 3) Connect the target and the probe.
- 4) Turn on the target.
- 5) Start this software and measure or analyze waveform data.

1.3.2. Turning off the Power and Disconnecting from the Target

Disconnect the probe from the target with the following procedure:

- 1) Exit this software.
- 2) Turn off the target.
- 3) Remove the probe from the target.



For details on the hardware specifications of the probe, target restrictions, connection and other items, refer to the "Hardware Users Manual."

1.4. Screen Configuration

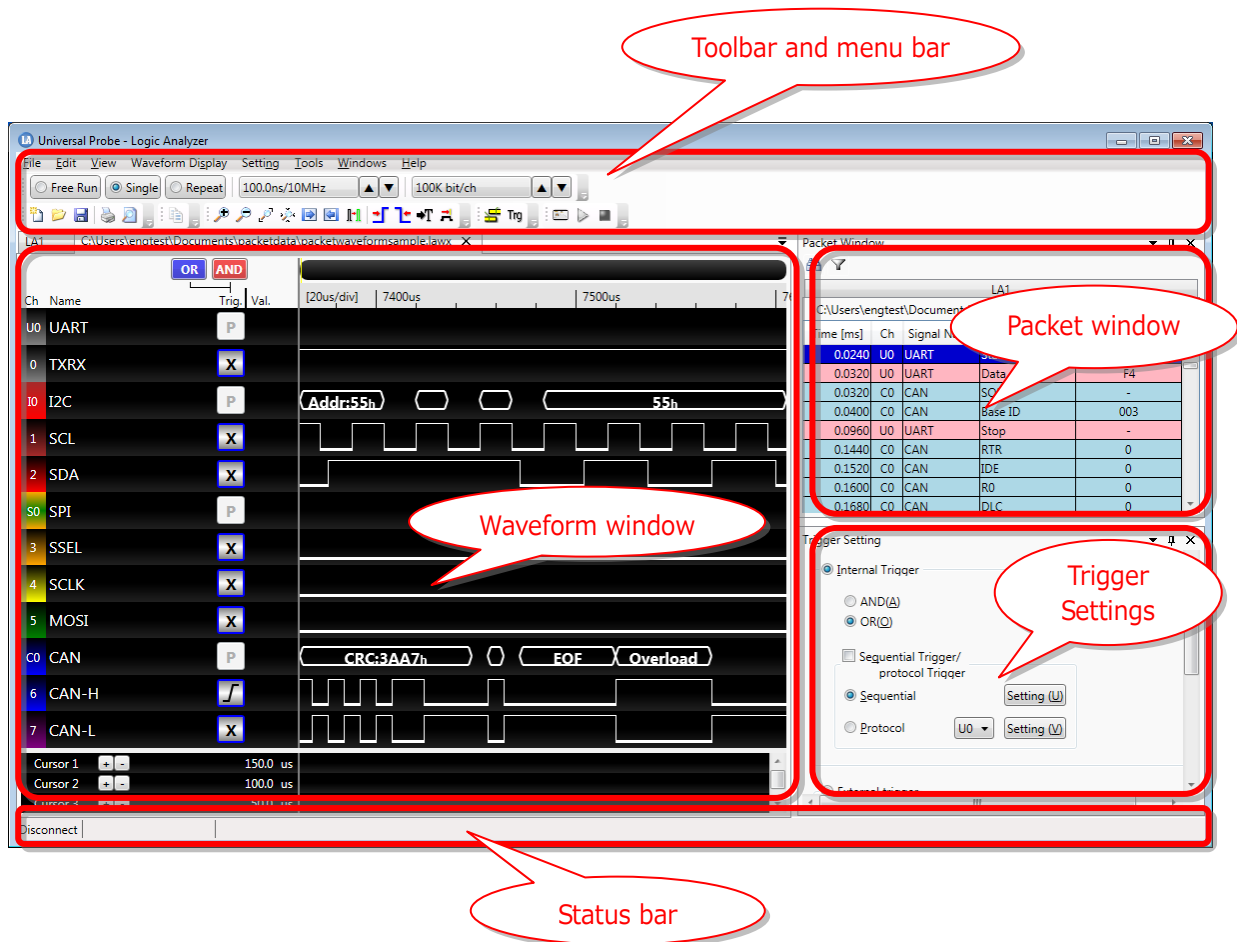


Figure 3

2. How to Operate

This chapter explains how to operate this software.

2.1. Workflow

The main processes from starting this software are shown in Figure 4. For the operations not described here, refer to "3. Menu Bar and Toolbar" or "4. Windows."

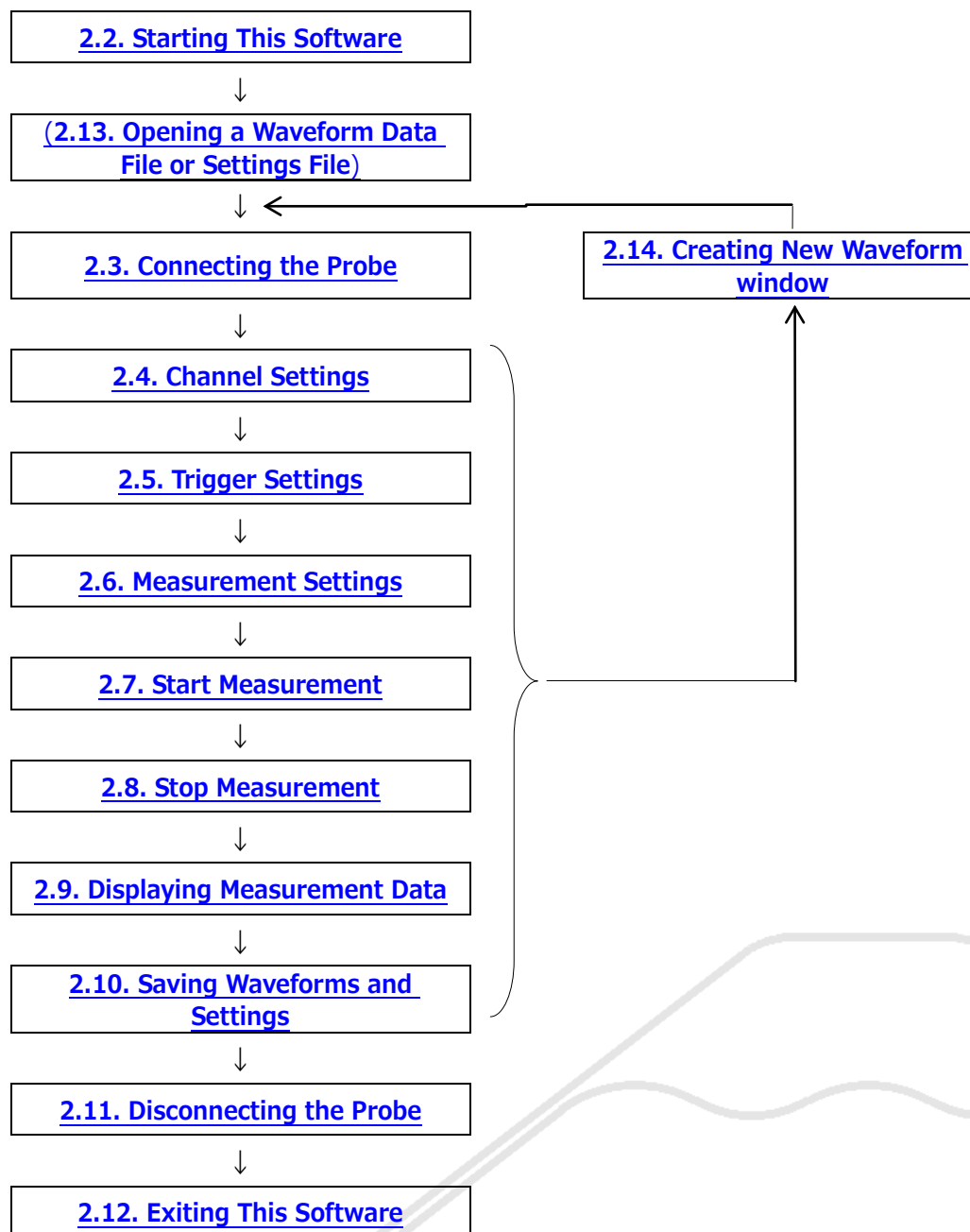


Figure 4

2.2. Starting This Software

Several operations are provided to start this software.

- **Starting operation 1**

Double-click the icon for this software on the desktop.

- **Starting operation 2**

Select "All Programs" → "Universal Probe" → "Logic Analyzer" from the "Start" menu.

The window as shown below will appear:

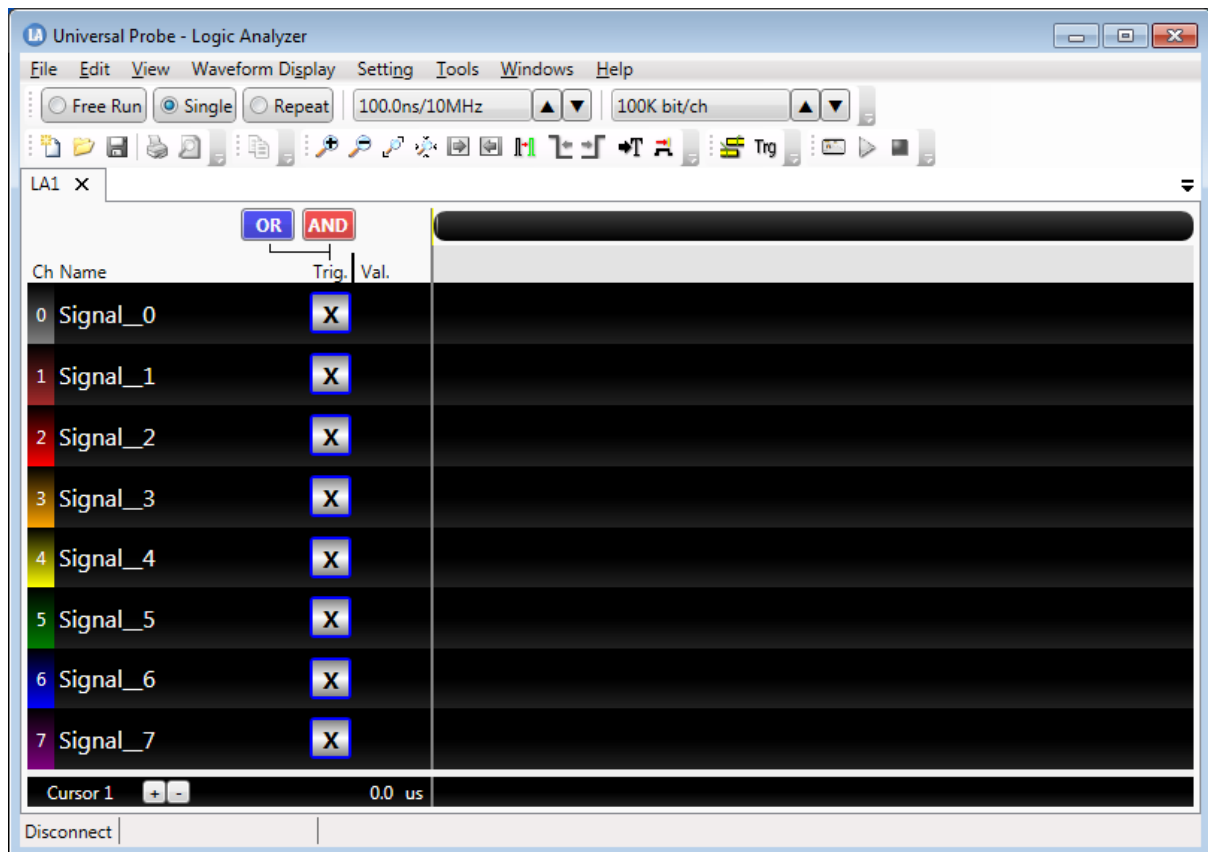



Figure 5

2.3. Connecting the Probe

To perform measurement, connect the probe.

Connect the probe to the host PC and perform the following operations:

Tool button	Operation on the menu bar	Shortcut key
	Tools → Connect (This menu item is enabled only when the probe is not connected.)	Ctrl + L


2.3.1. When Connecting a Probe for Which License Is Not Registered

When you connect a probe for which license is not registered, the [Select Unit] window is displayed as shown below.

It is required to register the license code for this software in the probe to use this software.

Select a probe for which "License not registered" is displayed and press  button.

When license registration is complete, the [Select Unit] window is displayed again. Select a probe for which "Connectable" is displayed and press  button.

Then, the [Set Channels and Threshold Voltages] window in Figure 7 is displayed. Specify the probe and threshold voltage to be assigned to the channel and press  button to complete connection.

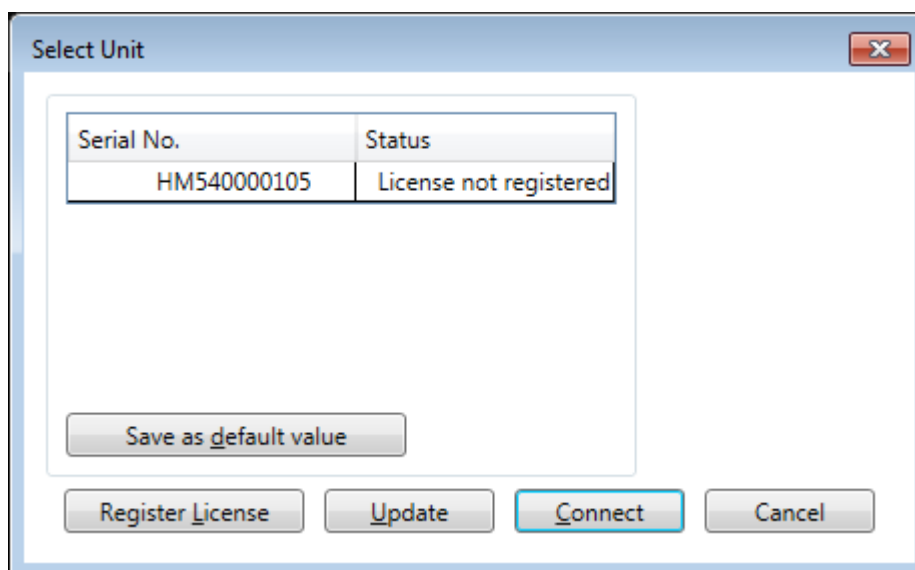


Figure 6

2.3.2. When Connecting a Probe for Which License Is Registered

When only one probe for which license is already registered is connected, the [Set Channels and Threshold Voltages] window is immediately displayed. The [Select Unit] window is not displayed. Specify the probe and threshold voltage to be assigned to the channel and press **OK** button to complete connection.

This setting window is displayed for each of all opened wave pattern windows.

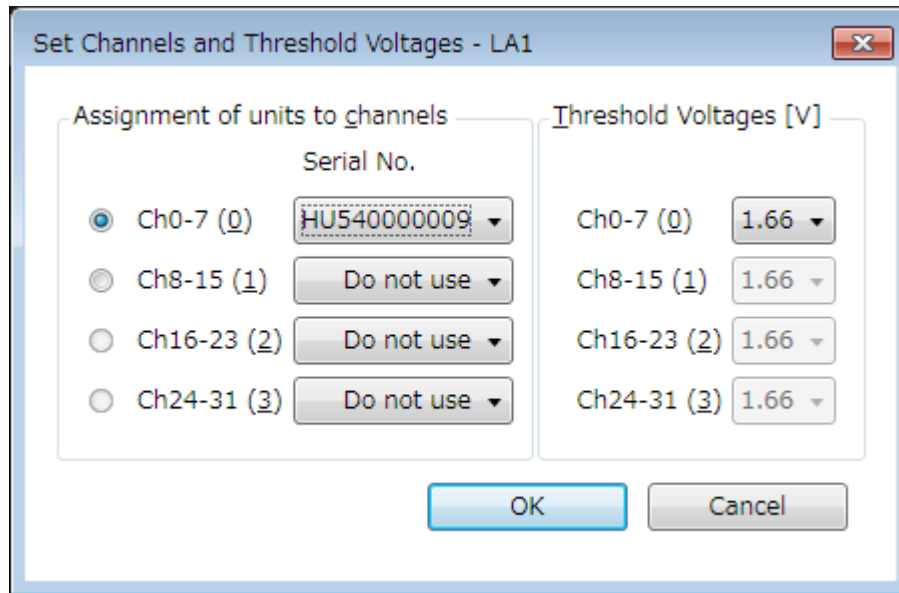


Figure 7



Tab name of the target waveform window is displayed in the title bar.

2.3.3. When Connecting Multiple Probes

When multiple probes are connected to the host PC, Figure 6 is displayed regardless of whether their licenses are registered or not.

Select the probe to be used in this software and press **Connect** button.

Then, the [Set Channels and Threshold Voltages] window in Figure 7 is displayed. Specify the probe and threshold voltage to be assigned to the channel and press **OK** button to complete connection.



For details, refer to "[3.6.1. Connect/Disconnect.](#)"

2.4. Channel Settings

To specify the settings for channels to be measured, perform the following operations.
Specify settings for buses, signals to be paired such as UART and signal label settings here.

Tool button	Operation on the menu bar	Shortcut key
	Settings → Select Channel	Ctrl + A

➔ For details, refer to "[4.4. Select Channel Dialog Box.](#)"

2.5. Trigger Settings

Specify waveform acquisition conditions.
Use the Waveform window to set the pattern edge trigger.
Set the protocol trigger and sequential trigger in the Trigger Settings window, which can be opened with the following operations.

Tool button	Operation on the menu bar	Shortcut key
Trg	Settings → Trigger Settings	Ctrl + T

Trigger types and their overview are shown in the figure below.

Table 3

Type	Description
Pattern edge trigger	Applies a trigger to each signal at Low, High, rising/falling edges or other timing.
Protocol trigger	You can set UART, I2C or other bus to apply a trigger to their protocol analysis result. (Example: Apply a trigger if a UART parity error occurs.) This trigger cannot be used at the same time as a sequential trigger.
Sequential trigger	Sets a trigger pattern to eight channels in the unit selected as the master. Sequentially compares if the measurement result matches the set trigger pattern in the sampling unit and applies the trigger when the signal pattern acquired from measurement matches the set trigger pattern at all aspects. This trigger cannot be used at the same time as a protocol trigger.
External trigger	Uses an external trigger input from the expansion connector of the probe.

➔ For details about the pattern edge trigger refer to "[4.2.2. Signal Name, Trigger, and Cursor Value Display Area.](#)" For details about other triggers refer to "[4.5. Trigger Settings Window.](#)"



Trigger settings are disabled during measurement in the Free Run mode.

2.6. Measurement Settings

Specify a variety of settings for measurement.

- Operation mode ... Specify the data measurement method.
- Sampling frequency ... Select the sampling frequency.
- Memory capacity ... Select the sampling count per channel.

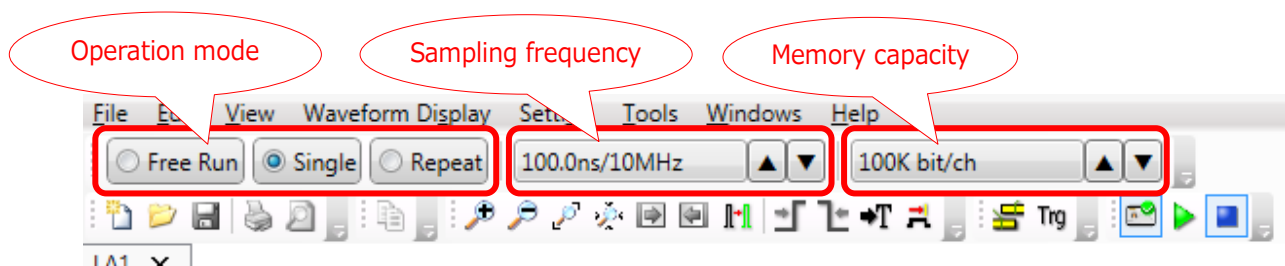


Figure 8

➔ For details, refer to "[3.9. Measurement Settings.](#)"



The memory capacity that can be selected varies depending on the sampling frequency. For details, refer to "[3.9.2. Sampling Frequency.](#)"

2.7. Start Measurement

To start measurement, perform the following operations.

Tool button	Operation on the menu bar	Shortcut key
	Tools → Start Measurement	F5

➔ For details, refer to "[3.6.2. Start Measurement.](#)"

2.8. Stop Measurement

To forcibly stop measurement, perform the following operations.

Tool button	Operation on the menu bar	Shortcut key
	Tools → Stop Measurement	Shift + F5

If the measurement result matches the conditions specified in "2.5. Trigger Settings," a trigger is applied. When the trigger is applied and the data in the specified memory capacity is completely measured in the Single mode, measurement data is acquired from the probe and measurement automatically stops.

In the Repeat mode, it is necessary to stop measurement with the measurement stop operation because measurement is automatically performed again after measurement data is acquired.

In the Free Run mode, the measurement is started immediately and is stopped when measurement data reached memory capacity because trigger settings are disabled.

→ For details, refer to "[3.6.3. Stop Measurement.](#)"

2.9. Displaying Measurement Data

When measurement is stopped or a measurement result for the specified memory capacity is acquired, measurement data is displayed in the Waveform and Packet windows. However, the Waveform window is updated as needed in the logger mode even when measurement is not stopped.

→ For details, refer to "[4.2. Waveform Window](#)" and "[4.3. Display Packet Window.](#)"


2.10. Saving Waveforms and Settings

2.10.1. Saving Waveform Data

To save waveform data, perform the following operations.
Data is saved in one of the two types of formats.

Table 4

Format	Description
LAWX (*.lawx)	Format to save waveform data and all the measurement settings. The waveform data is in the binary format.
CSV (*.csv)	Saves waveform data in the CSV format. Measurement settings are not saved in the case of the CSV format. Separately perform the operations described in "2.10.2. Saving Measurement Settings."

Tool button	Operation on the menu bar	Shortcut key
	File → Save Waveform	Ctrl + S
---	File → Save Waveform As	---

➔ For details, refer to "[3.1.3. Save Waveform](#)" and "[3.1.4. Save Waveform As.](#)"

2.10.2. Saving Measurement Settings

To save measurement settings, perform the following operations.
Channel settings, signal names, cursor settings, and other data are saved here. Waveform data is not saved.

Tool button	Operation on the menu bar	Shortcut key
---	File → Save Settings	---

➔ For details, refer to "[3.1.9. Save Settings.](#)"

2.11. Disconnecting the Probe

To disconnect a probe, perform the following operations.

While measurement is being performed, the measurement is stopped and waveform data until that point is acquired and displayed in the Waveform window.

Tool button	Operation on the menu bar	Shortcut key
	Tools → Connect	Ctrl + L

2.12. Exiting This Software

To exit this software, select "Exit Application" from the menu bar or click the X button at the right top of the window.


A confirmation dialog box is displayed depending on the state of the software at that time.

Tool button	Operation on the menu bar	Shortcut key
---	File → Exit Application	---

➔ For details, refer to "[3.1.14. Exit Application.](#)"

2.13. Opening a Waveform Data File or Settings File

To open an existing waveform data file or measurement settings file, perform the following operations:


Tool button	Operation on the menu bar	Shortcut key
	File → Open Waveform	Ctrl + O
---	File → Open Settings	---

➔ For details, refer to "[3.1.2. Open Waveform](#)" and "[3.1.8. Open Settings.](#)"

2.14. Creating New Waveform window

To create a new Waveform window, perform the following operations:
Up to 10 windows can be displayed.

Tool button	Operation on the menu bar	Shortcut key
	File → New	Ctrl + N

 For details, refer to "[3.1.1. Create New Waveform.](#)"



You can display long waveform data in multiple windows by saving the waveform in a file and open it in multiple windows. This makes it easier to compare or verify waveforms.

3. Menu Bar and Toolbar

This chapter explains the different groups of the menu bar and the toolbar of this software.

3.1. File

3.1.1. Create New Waveform

Open a new window in Waveform window.

Tabs in the newly opened window are automatically named in order beginning from LA1. (e.g. LA1, LA2, LA3...)

Up to 10 windows can be opened.

If 10 windows are already open, the error message shown in Table 5 is displayed.

Tool button	Operation on the menu bar	Shortcut key
	File → New	Ctrl + N

Table 5

Message	Description
Any more waveform windows cannot be opened.	Appears when 10 windows are already open. Any new window cannot be opened. Creation of Waveform window is cancelled.

3.1.2. Open Waveform

Opens a waveform data file in the new window.

The current waveform settings are retained.

Select a desired file on the file dialog box displayed.

Files in LAWX or CSV formats can be opened.

Up to 10 windows can be opened.

If 10 windows are already open, the error message shown in Table 5 is displayed.

Tool button	Operation on the menu bar	Shortcut key
	File → Open Waveform	Ctrl + O

3.1.3. Save Waveform

Overwrites the current file with the current waveform data.

When you are creating new waveform data, specify a file name on the file dialog box displayed.

Waveform data is saved in LAWX or CSV format.

Tool button	Operation on the menu bar	Shortcut key
	File → Save Waveform	Ctrl + S



These operations do not save the measurement settings but only save the waveform data. Save the measurement settings according to "[3.1.9. Save Settings.](#)"

3.1.4. Save Waveform As

Names and saves waveform data in a file.

Waveform data is saved in LAWX or CSV format.

The waveform settings can also be saved by checking <Save settings file too> in the file dialog box. The waveform settings file is saved under the name of "**specified file name.lasx**" (LASX format) (refer to Figure 9).

Tool button	Operation on the menu bar	Shortcut key
---	File → Save Waveform As	---

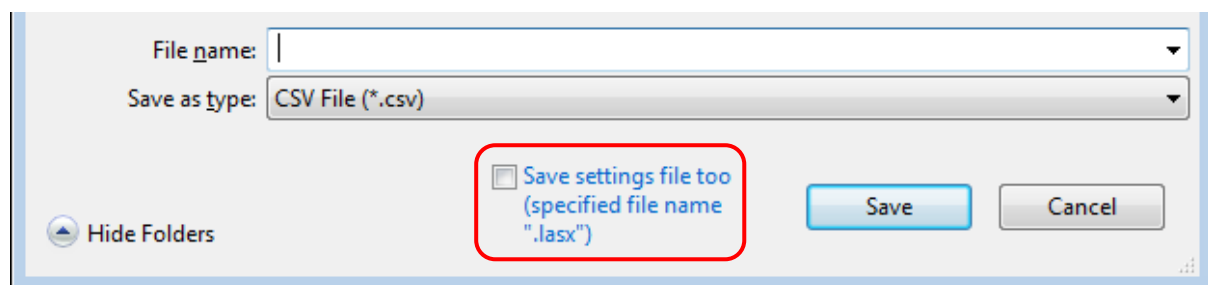


Figure 9




These operations do not save the waveform settings but only save the waveform data. Save the waveform settings according to "[3.1.9. Save Settings.](#)"

3.1.5. Save All Waveforms As

Saves waveform data in all the waveform windows in a file.
Specify a file name in the file dialog box displayed for each Waveform window.
The Waveform window to be saved is automatically activated at that time.

Tool button	Operation on the menu bar	Shortcut key
---	File → Save All Waveforms As	---



These operations do not save the waveform settings but only save the waveform data.
Save the waveform settings according to "[3.1.9. Save Settings.](#)"

3.1.6. Save Waveform in Image File

Saves the current Waveform window in a PNG image file. (refer to Figure 10).
Specify a file name on the file dialog box displayed.

Tool button	Operation on the menu bar	Shortcut key
---	File → Save Waveform in Image File	---

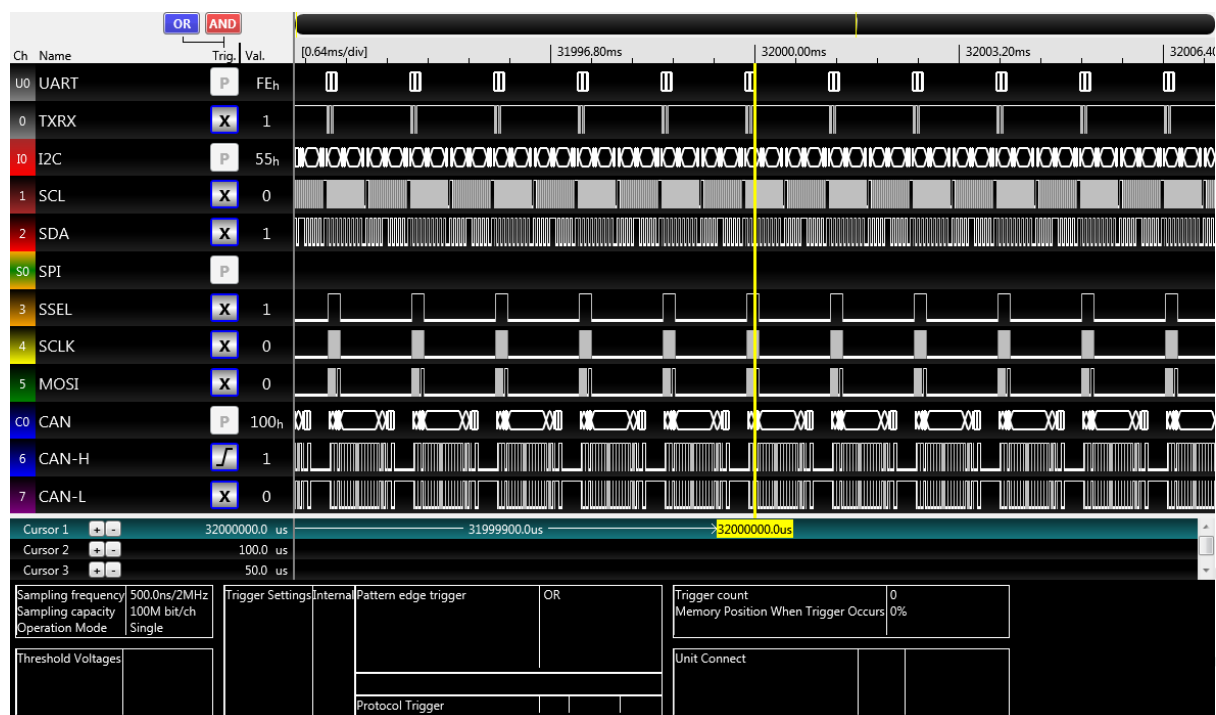


Figure 10

3.1.7. Open Waveform in Work Folder

Opens waveform data saved in the work folder.

Specify a folder name on the folder specification dialog box displayed. Note that you do not specify a file name.

If 10 windows are already open, the error message shown in Table 5 is displayed.

Tool button	Operation on the menu bar	Shortcut key
---	File → Open Waveform in Work Folder	---

3.1.8. Open Settings

Loads the measurement settings file.

Select a desired LASX file on the file dialog box displayed.

When the measurement settings file is opened, signal names, channel colors and other data are replaced with the data in the measurement settings file though waveform data is retained.

Tool button	Operation on the menu bar	Shortcut key
---	File → Open Settings	---

3.1.9. Save Settings

Saves measurement settings.

Specify a file name to be saved on the file dialog box displayed.


The file is saved in LASX format.

Tool button	Operation on the menu bar	Shortcut key
---	File → Save Settings	---



These operations do not save the waveform data but only save the measurement settings. Save the waveform data according to "[3.1.3. Save Waveform](#)" or "[3.1.4. Save Waveform As.](#)"

3.1.10. Print

Prints waveform data, packet data, and measurement settings in the currently active Waveform window. Make print settings in the Print dialog box opened and click the  button.

Tool button	Operation on the menu bar	Shortcut key
	File → Print	Ctrl + P

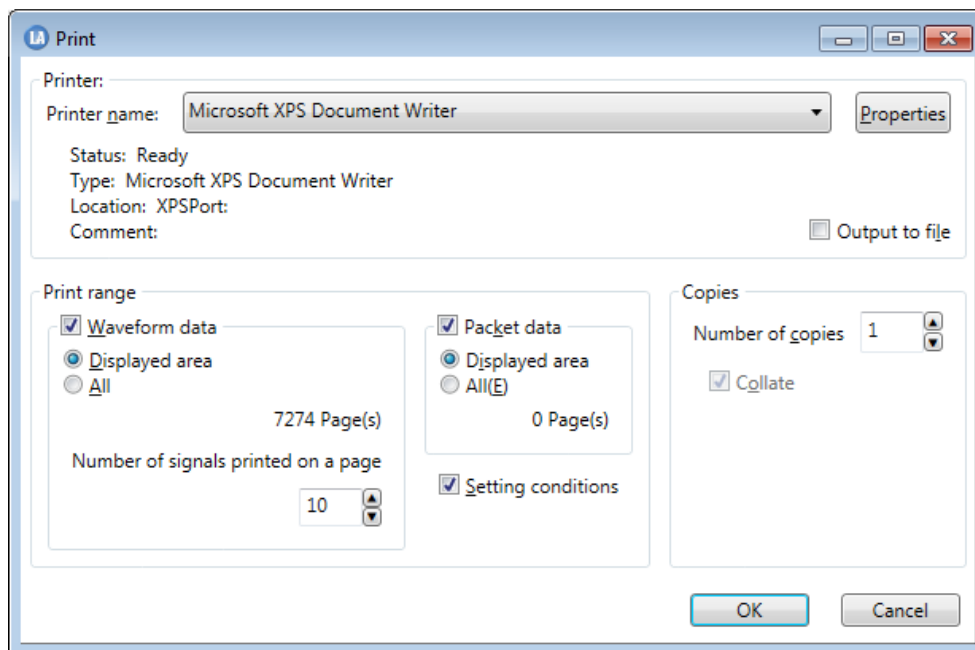


Figure 11

Table 6

Printer name		Select a printer.
Properties		Shows the printer properties.
Waveform data		Select this checkbox to print waveform data.
Packet data		Select this checkbox to print packet data.
Print range	Displayed area	Prints the waveform data in the range displayed in the Waveform window.
	All	Prints all the waveform data at the current enlargement/reduction ratio . The number of pages to be printed is displayed in the right portion of the section.
	Number of signals printed on a page	Specify the number of signals printed on a page when waveform data is printed.
Setting conditions		Select this checkbox to print setting conditions.
Number of copies		Set the number of copies to be printed.



When "All" of "Print range" is chosen, "memory shortage" may be caused depend on the state of the host PC.
In that case, please print after having chosen "Displayed area" of "Print range" or having reduced "the current enlargement/reduction ratio", to reduce pages.

3.1.11. Preview Print

Displays a print preview.

Tool button	Operation on the menu bar	Shortcut key
	File → Preview Print	---

3.1.12. Set Printer

Shows the settings of the printer to be used. This command has the same function as the Properties button in "[3.1.10. Print.](#)"

Tool button	Operation on the menu bar	Shortcut key
---	File → Set Printer	---

3.1.13. Showing File History

Show up to 4 waveform data files recently opened.

3.1.14. Exit Application

Exit this software.

Checks whether or not the waveform data and measurement settings have been saved and whether or not measurement is being performed, and shows a message dialog box accordingly.

The same operation can be performed by clicking the X button at the right top of the main window.

Tool button	Operation on the menu bar	Shortcut key
---	File → Exit Application	---

Table 7

Message	Description
Measurement is being performed. Do you want to stop it?	<p>Appears when measurement is being performed.</p> <p><input type="button" value="Yes"/> Stops measurement.</p> <p><input type="button" value="No"/> Cancels the operation of exiting the software.</p>
Do you want to save waveform data?	<p>Appears when the waveform data has not been saved.</p> <p><input type="button" value="Yes"/> Perform the operation described in "3.1.4. Save Waveform As."</p> <p><input type="button" value="No"/> Exits the software without saving the waveform data.</p> <p><input type="button" value="Cancel"/> Cancels the operation of exiting the software.</p>
Do you want to save waveform measurement settings?	<p>Appears when measurement settings have not been saved.</p> <p><input type="button" value="Yes"/> Perform the operation described in "3.1.9. Save Settings."</p> <p><input type="button" value="No"/> Exits the software without saving the settings.</p> <p><input type="button" value="Cancel"/> Cancels the operation of exiting the software.</p>

3.2. Edit

3.2.1. Copy to Clipboard

Copies the current waveform data and measurement settings to the clipboard as an image. (refer to Figure 12).

Tool button	Operation on the menu bar	Shortcut key
	Edit → Copy to Clipboard	Ctrl + C

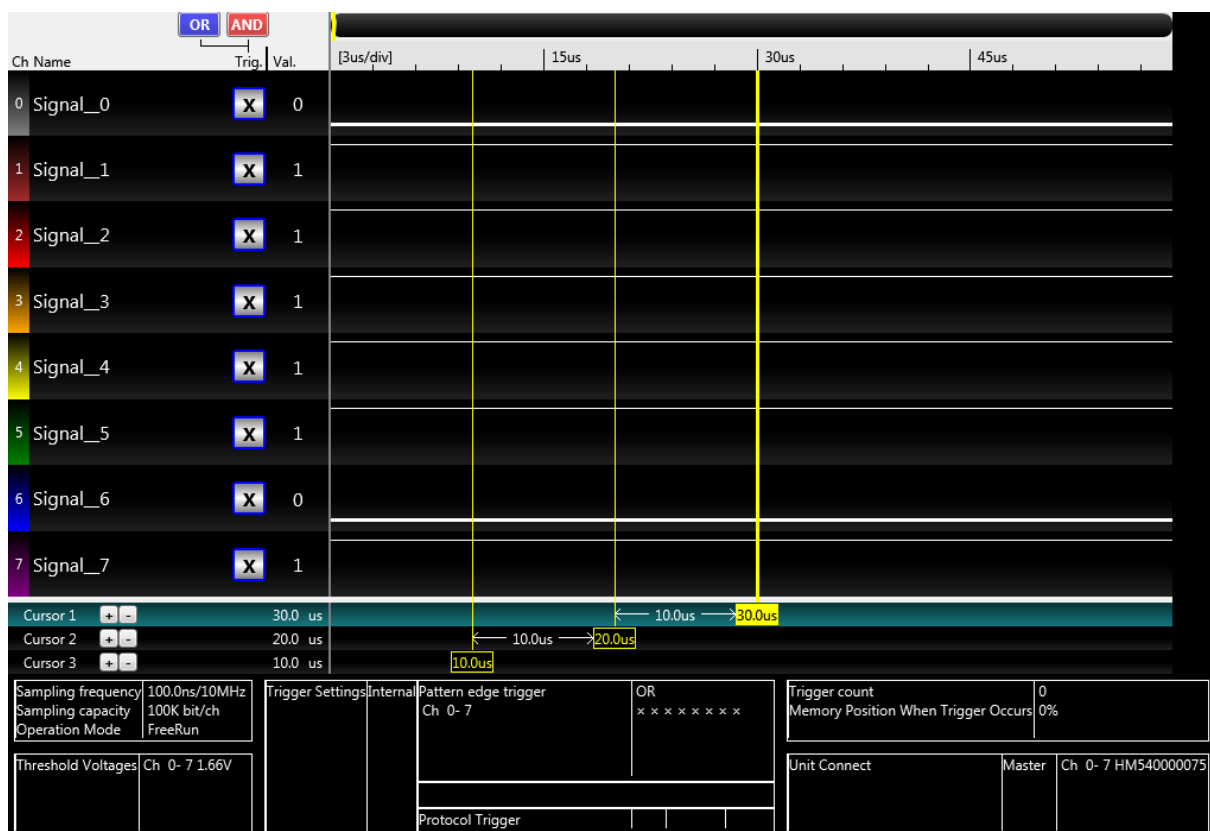


Figure 12

3.2.2. Copy Only Waveform to Clipboard

Copies only the current waveform data to the clipboard as an image. (refer to Figure 13).

Tool button	Operation on the menu bar	Shortcut key
---	Edit → Copy Only Waveform to Clipboard	---

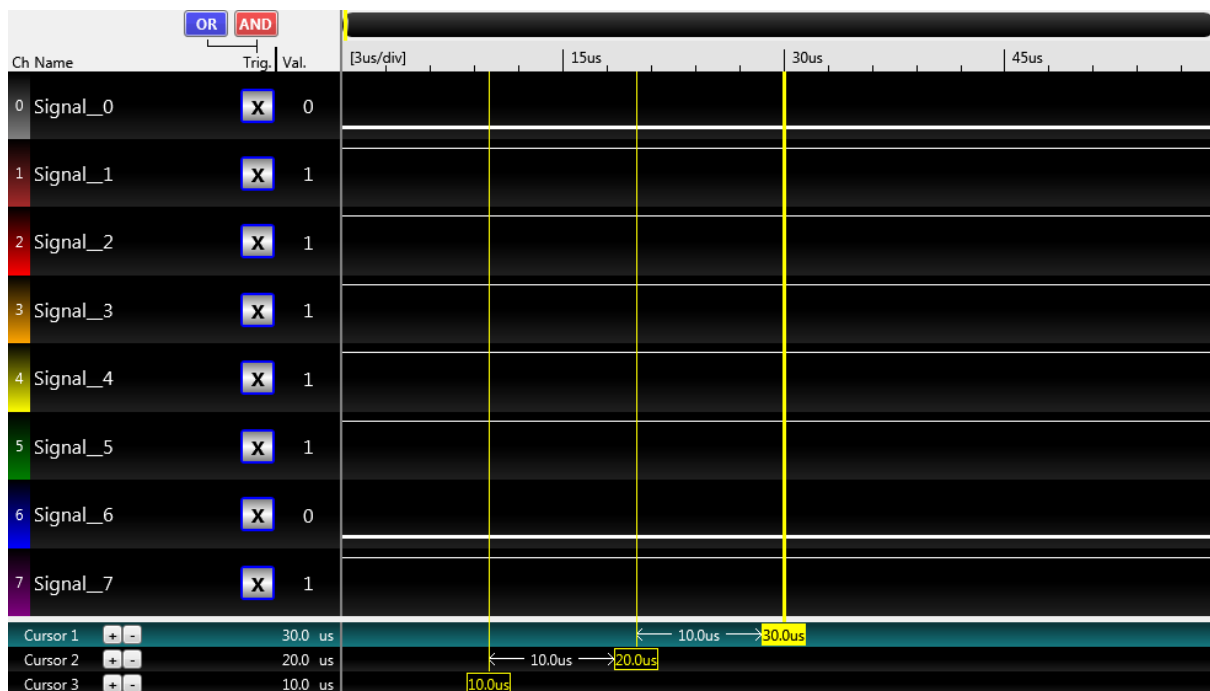


Figure 13

3.3. View

3.3.1. Showing/Hiding the Toolbar Items

Shows/hides the toolbar items.

A check (☒) at the head of a menu indicates that the corresponding menu items are shown.

Tool button	Operation on the menu bar	Shortcut key
---	View → Toolbar → File	---
---	View → Toolbar → Edit	---
---	View → Toolbar → Display Waveform	---
---	View → Toolbar → Settings	---
---	View → Toolbar → Tools	---
---	View → Toolbar → Measurement Settings	---

3.3.2. Customize

Sets the way in which to show the toolbar and keyboard shortcuts.

Tool button	Operation on the menu bar	Shortcut key
---	View → Toolbar → Customize	---

(1) Keyboard tab

Use this tab to set keyboard shortcuts.

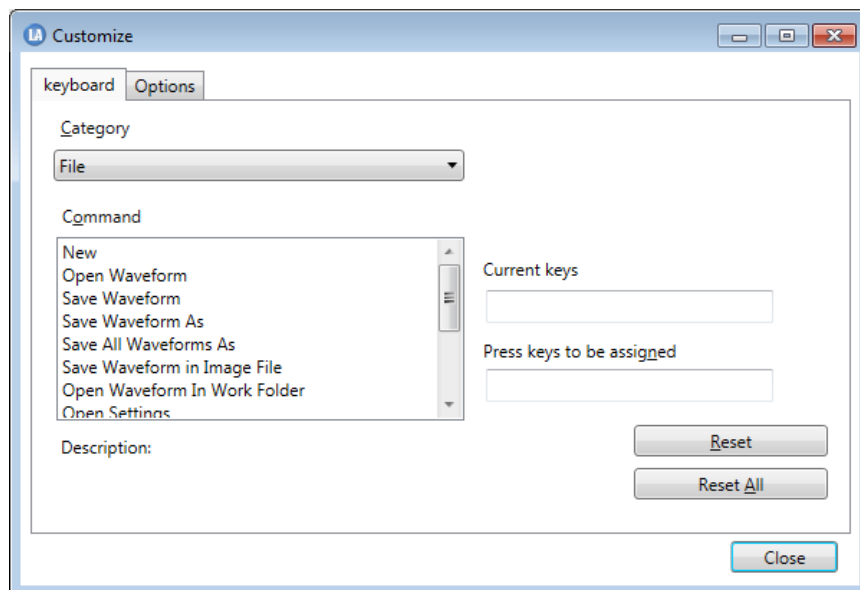


Figure 14

Table 8

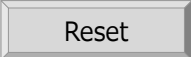

Category	Select a command category. Commands listed in the Command field are changed depending on the category selected.
Command	Lists commands classified into the category selected.
Current keys	Shows the keys currently assigned to the command selected in [Command].
Press keys to be assigned.	Enter keys to be assigned to the command selected in the Command field. Enter keys directly from the keyboard to apply the setting. If the same keys have already been assigned, a message dialog box (Table 9) appears.
	Resets changes made after the Customize dialog box is opened. Before they are reset, a message dialog box (Table 10) appears to ask you to confirm the operation.
	Resets all the key settings to the initial setting. Before they are reset, a message dialog box (Table 11) appears to ask you to confirm the operation.

Table 9

Message	Description
The keys have already been used as shortcut keys. Enter other keys.	Appears when the same keys have been assigned to another command. Assign other keys or change the assignment of the keys to that command.

Table 10

Message	Description
All the changes will be lost. Do you want to reset?	Appears when you click the Reset button. <input type="button" value="Yes"/> Executes Reset. <input type="button" value="No"/> Does not execute Reset.

Table 11

Message	Description
Key settings will be reset to the initial setting. Do you want to reset?	Appears when you click the Reset All button. <input type="button" value="Yes"/> Executes Reset All. <input type="button" value="No"/> Does not execute Reset All.

(2) Options tab

Set the way in which to show the toolbar.

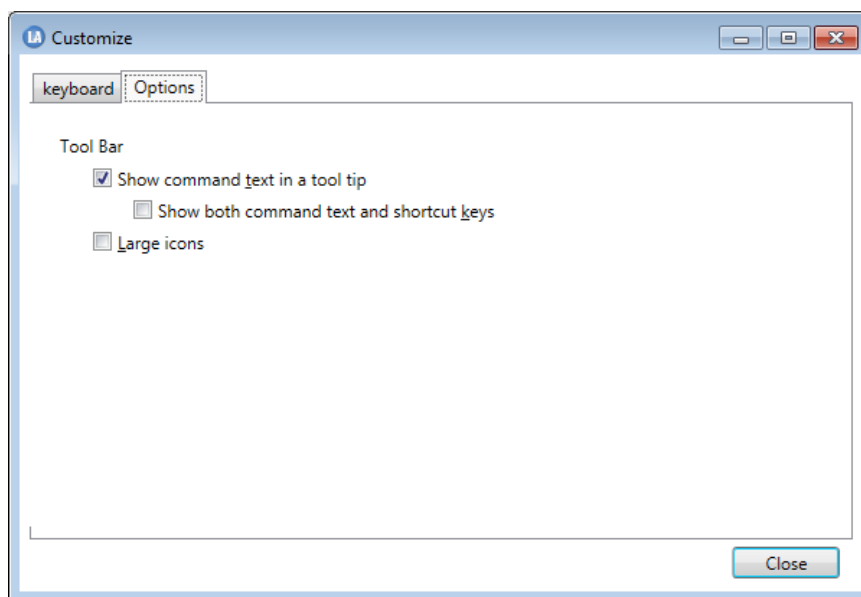


Figure 15

Table 12

Show command text in a tool tip	Selecting this checkbox shows the command text when you place the mouse cursor on an icon on the toolbar (See Figure 16.)
Show both command text and shortcut keys	Selecting this checkbox shows both the command text and the shortcut keys in a tool tip.
Large icons	Selecting this checkbox enlarges the icons on the toolbar.

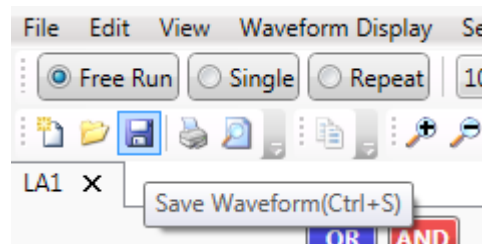


Figure 16

3.3.3. Display Packet


Shows/hides the Packet window.

A check (☒) at the head of a menu indicates that the corresponding menu items are shown.


Tool button	Operation on the menu bar	Shortcut key
---	View → Display Packet	---

3.3.4. Trigger Settings

Shows/hides the Trigger Settings window.


A check () at the head of a menu indicates that the corresponding menu items are shown.

Tool button	Operation on the menu bar	Shortcut key
---	View → Trigger Settings	---

 For details, refer to "[4.5. Trigger Settings Window.](#)"

3.3.5. Status Bar

Shows/hides the status bar.

A check () at the head of a menu indicates that the corresponding menu items are shown.

Tool button	Operation on the menu bar	Shortcut key
---	View → Status Bar	---

3.4. Waveform Display


3.4.1. Zoom In

Zooms in the waveforms on the Waveform window.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Zoom In	Ctrl + Page Down

3.4.2. Zoom Out

Zooms out the waveforms on the Waveform window.


Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Zoom Out	Ctrl + Page Up

3.4.3. Enlarge Selected Area

Enables/disables the enlarge selected area mode (toggle).

In the enlarge selected area mode, a portion in the waveform area can be enlarged by selecting the portion (range) by the mouse.

The enlarge selected area mode can be cancelled by pressing the **ESC** key.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Enlarge Selected Area	---

3.4.4. Show Whole

Shows the entire waveform data.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Show Whole	---

3.4.5. Move to Later Packet

Displays the first packet in the right section from the center of the Waveform window for the selected protocol at the center of the window.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Move to Later Packet	---

3.4.6. Move to Previous Packet

Displays the first packet in the left section from the center of the Waveform window for the selected protocol at the center of the window.


Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Move to Previous Packet	---

3.4.7. Channel Color Mode

Switches the waveform display color (toggle).

When this mode is disabled, waveforms of all channels are displayed in white.

When this mode is enabled, waveforms are displayed in colors set for the respective channels.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Channel Color Mode	---



Buses are displayed in white regardless of whether this mode is enabled or disabled.

3.4.8. Cursor → Move to Left Edge

Moves the selected cursor to the next left change point of the selected signal.

If no signal is selected, the selected cursor is moved to the next right change point of a signal that comes first.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Cursor → Move to Left Edge	---



For a bus, the cursor is moved to the point where a value change occurs.
For a protocol, the cursor is moved to the beginning or end of packet.

3.4.9. Cursor → Move to Right Edge

Moves the selected cursor to the next right change point of the selected signal.
If no signal is selected, the selected cursor is moved to the next right change point of a signal that comes first.


Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Cursor → Move to Right Edge	---



For a bus, the cursor is moved to the point where a value change occurs.
For a protocol, the cursor is moved to the beginning or end of packet.


3.4.10. Move Cursor to Trigger

Moves the selected cursor to the trigger position.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Move Cursor to Trigger	---

3.4.11. Move to Edge

Switches whether to move the cursor to an edge in the Waveform window (toggle).
When this mode is enabled, the cursor is moved to the change point that comes first in the direction in which it is moved.
If a signal is selected, the cursor is moved to the next change point of that signal.
If no signal is selected, the cursor is moved to the change point that comes first of all signals.

Tool button	Operation on the menu bar	Shortcut key
	Display Waveform → Move to Edge	---



For a bus, the cursor is moved to the point where a value change occurs.
For a protocol, the cursor is moved to the beginning or end of packet.

3.5. Setting

3.5.1. Select Channel

→ For details, refer to "[4.4. Select Channel.](#)"

3.5.2. Trigger Settings

→ For details, refer to "[4.5. Trigger Settings Window.](#)"

3.5.3. Set Environment

→ For details, refer to "[4.6. Environment Setting Dialog Box.](#)"

3.5.4. Initialize Settings

Initializes all of the current settings and resets the initial setting file to the settings when the software was installed.

Before the settings are initialized, a message dialog box appears (refer to Table 13).

Tool button	Operation on the menu bar	Shortcut key
---	Setting → Initialize Settings	---

Table 13

Message	Description
Do you want to initialize the current settings?	<input type="button" value="Yes"/> Initializes the settings.
Do you want to initialize the default settings?	<input type="button" value="No"/> Cancels the operation of initializing the settings.



3.6. Tools

3.6.1. Connect/Disconnect

Connects between this software and the probe or disconnects them. (toggle).

In a disconnected state, pressing this tool button displays the [Select Unit] dialog box (Figure 17), where you can select the unit to connect to.

From the [Select Unit] dialog box, you can also register the license.

Tool button	Operation on the menu bar	Shortcut key
	Tools → Connect (When connecting from a disconnect state)	Ctrl + L
	Tools → Connect (When disconnecting from a connect state)	Ctrl + L

→ Contents displayed at connection change depending on the status and number of connected probes. Refer to "[2.3. Connecting the Probe.](#)"

(1) [Select Unit] dialog box

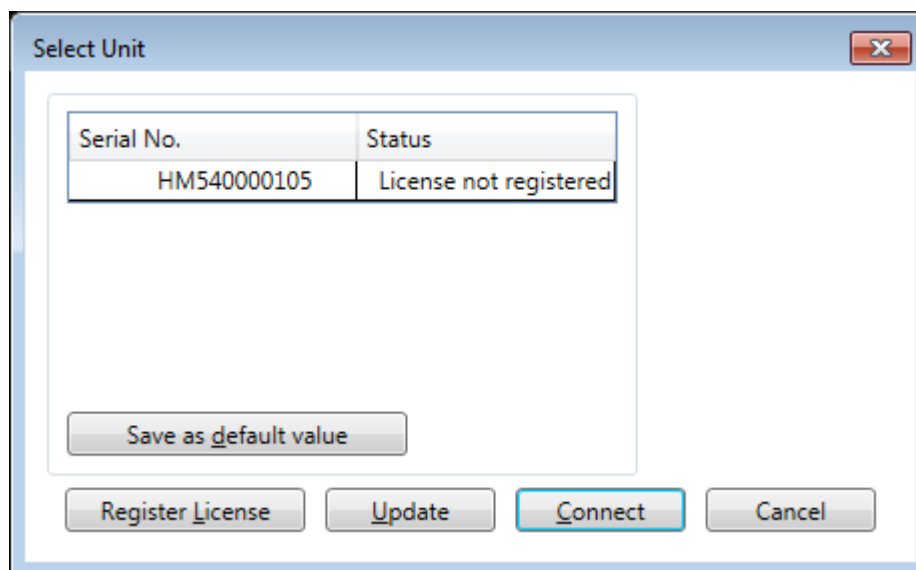


Figure 17

Table 14

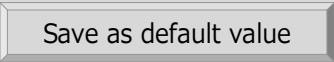
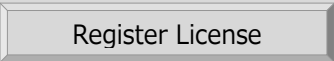
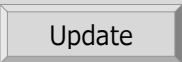
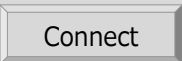
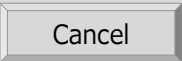
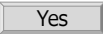
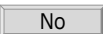
Serial No.	<p>Displays serial numbers of all probes that are connected to the host PC.</p> <p>For each probe that can be connected, a checkbox is displayed. Check the checkbox for the desired probe. With this software, you can select up to four probes.</p> <p>If a probe cannot be connected because, for example, the license is not registered or the probe is being used for other function, the corresponding serial number and the checkbox are grayed out.</p>
Status	<p>Displays the status of the probe.</p> <p>Available : the probe can be connected.</p> <p>Used : the probe is used for other function.</p> <p>License not registered : The license is not registered.</p>
	<p>Saves the current probe selection status as the default value. When the PC is started up next time, this setting is restored as the default value.</p> <p>Before saving the setting, a message dialog (Table 15) prompts you to confirm the setting.</p>
	Registers the license for the selected probe.
	Searches again for probes that are connected to the host PC.
	<p>Connects to the probe with a checked checkbox.</p> <p>When an error occurs during connection process, a message dialog is displayed. (Table 15)</p>
	Cancels probe connection process.

Table 15

Message	Description
Do you want to save the current settings as the default?	<p> Saves the current settings as the default.</p> <p> Cancels the operation of saving the current settings.</p>
Could not find unit to connect to.	This message is displayed when the desired probe cannot be found. Check if the probe is connected properly.
Failed to connect. (XXX)	<p>This message is displayed when connection has failed. In the place of XXX, the cause of the failure is displayed.</p> <p>For the content of "XXX" (cause), refer to "A.1. HW Connection Errors."</p>



If the connection status of probe different from the default value is detected, the "[4.4.2. Setting Channels and Threshold Voltages](#)" dialog box opens before connection.

3.6.2. Start Measurement

Starts waveform measurement.

This function cannot be selected if the PC is not connected to a probe.

When measurement start fails, a dialog message is displayed. (refer to Table 16).

The dialog messages in Table 17 may be displayed during measurement.

Tool button	Operation on the menu bar	Shortcut key
	Tools → Start Measurement	F5

Table 16

Message	Description
Invalid measurement setting conditions. Review the sampling frequency and capacity.	Appears when the specified operation mode, sampling frequency or memory capacity is invalid.
The capacity in the HDD is less than the specified capacity. Check the capacity and then start measurement.	Appears when the "Display a warning and stop measurement if the HDD drops below the specified capacity" check box is selected as described in " 4.6. Environment Setting " and the remaining capacity in the HDD is less than the specified capacity.
Measurement was stopped because work data volume exceeded specified volume.	Appears when the "Display a warning and stop measurement if work data exceeds the specified volume" checkbox is selected as described in " 4.6. Environment Setting " and the work data is more than the specified volume.
Measurement was stopped because the HDD capacity drops below the specified capacity.	Appears when the "Display a warning and stop measurement if the HDD drops below the specified capacity" check box is selected as described in " 4.6. Environment Setting " and the remaining capacity in the HDD is less than the specified capacity.
The I2C protocol trigger cannot be used if an external sampling clock is selected. Check the setting and then start measurement.	Appears when an external sampling clock is selected and the I2C protocol trigger is set.
The UART protocol trigger cannot be used if an external sampling clock is selected. Check the setting and then start measurement.	Appears when an external sampling clock is selected and the UART protocol trigger is set.
The CAN protocol trigger cannot be used if an external sampling clock is selected. Check the setting and then start measurement.	Appears when an external sampling clock is selected and the CAN protocol trigger is set.
Any external sampling clock channel is not assigned to SCLK of SPI protocol (Sx). Check the setting and then start measurement.	Appears when an external sampling clock is selected, the SPI protocol trigger is set, and different channels are assigned to the external sampling clock and SPI interface clock (SCLK). ("x" in Sx represents the SPI protocol number.)
Protocol trigger couldn't be setting. Start measurment after check the channel and assignment the master unit setting.	Appears when trigger is set to the protocol for non-master unit channels.

External sampling clock
settings is not correct.
Start measurement after check
the channel and assignment
the master unit setting.

Measurement failed.
(XXX)

Appears when measurement start has failed. In the place of XXX,
the cause of the failure is displayed.
For the content of "XXX" (cause), refer to "[A.1. HW Connection
Errors.](#)"





Table 17

Message	Description
Measurement was stopped because work data volume exceeded specified volume.	Appears when the "Display a warning and stop measurement if work data exceeds the specified volume" checkbox is selected as described in " 4.6. Environment Setting " and the work data is more than the specified volume, stopping measurement.
Measurement was stopped because the HDD capacity drops below the specified capacity.	Appears when the "Display a warning and stop measurement if the HDD drops below the specified capacity" check box is selected as described in " 4.6. Environment Setting " and the remaining capacity in the HDD is less than the specified capacity, stopping measurement.
Measurement failed. (XXX)	Appears when measurement start has failed. In the place of XXX, the cause of the failure is displayed. For the content of "XXX" (cause), refer to " A.1. HW Connection Errors ."

● Indications on tool bar

The indication on the Start Measurement button on the toolbar changes depending on the connection and trigger statuses. (Table 18)
During measurement, the button is disabled.

Table 18

Display	Description
	Connected to a probe and ready for measurement.
	Waiting for trigger.
	During measurement.
	Not connected to a probe.

3.6.3. Stop Measurement

Stops measurement.

This is disabled and cannot be selected if measurement is not being performed.




Tool button	Operation on the menu bar	Shortcut key
	Tools → Stop Measurement	Shift + F5

● Indications on tool bar

The indication on the Stop Measurement button on the toolbar changes depending on the connection and measurement statuses. (refer to Table 19).

During measurement stop, the button is disabled.

Table 19

Display	Description
	Measurement can be stopped in the waiting for trigger state or during measurement.
	Measurement is stopped.
	Not connected to a probe.

3.6.4. Control by Probe RUN Button

Switch to enable or disable control using RUN button on the probe.

If a checkmark (✓) is shown at the head of the menu, control using Run button is enabled.

[3.6.2. Start Measurement](#) and [3.6.3. Stop Measurement](#) can be performed by using the RUN button if this is enabled.

Tool button	Operation on the menu bar	Shortcut key
---	Tools → Control by RUN Button on Probe	---



Even when this function is enabled, it is possible to start/stop measurement from the menu bar or the toolbar.

3.7. Windows

3.7.1. Open New Window

Newly opens the same window as the active Waveform window.

If it takes time to display the new window, the dialog box is displayed to show the progress.

Tool button	Operation on the menu bar	Shortcut key
---	Window → Open New Window	---

Table 20

Message	Description
xx% completed	If it takes time to display waveforms, the dialog box is displayed to show the progress.

3.7.2. Display Active Window

Displays currently active waveform windows.

If a checkmark (✓) is shown at the head of the menu, that window is active. (Figure 18)

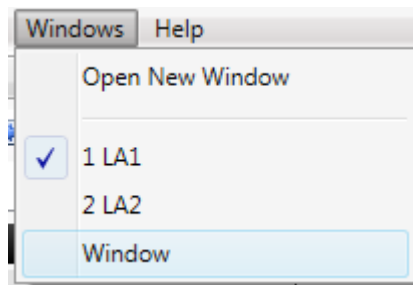


Figure 18

3.7.3. Windows

Lists open windows enabling the user to perform a variety of operations for the selected window.

Tool button	Operation on the menu bar	Shortcut key
---	Window → Window	---

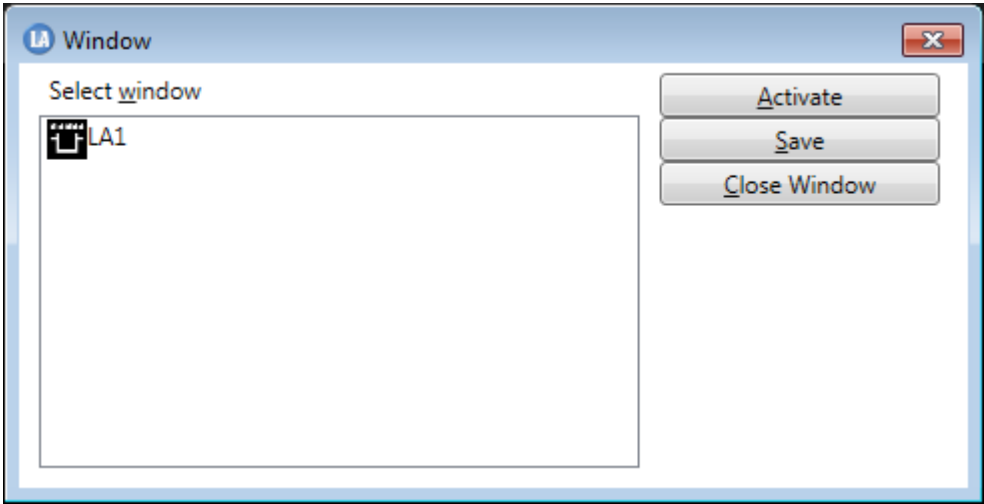
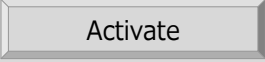
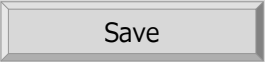



Figure 19

Table 21

	Displays the selected window in front.
	Saves waveform data in the selected window. This is the same operation as " 3.1.3. Save Waveform. "
	Closes the selected window.

3.8. Help

3.8.1. Help Display

Display the Universal Probe product page on our web site.
Please download the instruction manual from there.

Tool button	Operation on the menu bar	Shortcut key
---	Help → Help	---

3.8.2. Version Information

Display the version of this software and the information of the connected hardware.
These pieces of information can be copied.

Tool button	Operation on the menu bar	Shortcut key
---	Help → About	---

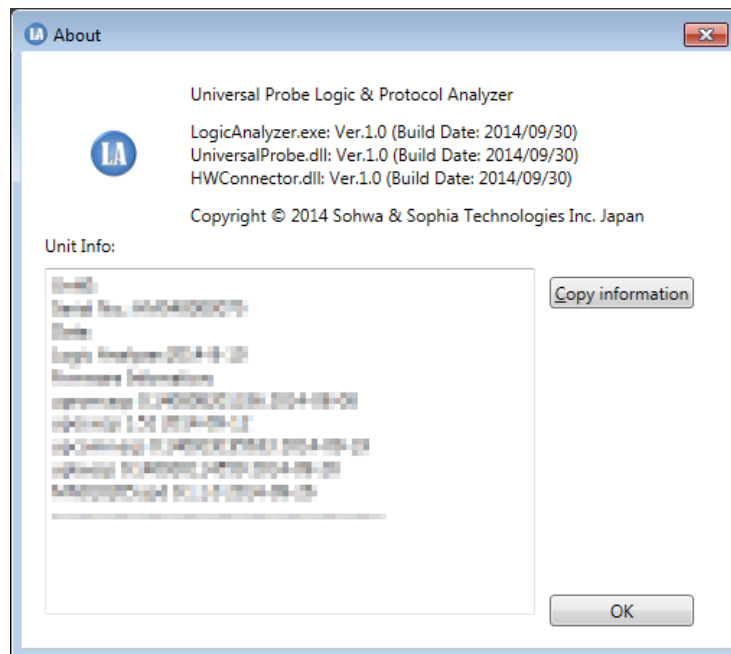


Figure 20

Table 22

Version information	Displays the version information of this software.
Unit information	Displays the unit information (serial number, registration date, and firmware information) for each connected unit.
Copy information	Copies the information on connected units to the clipboard in the text format.

3.8.3. Demo Mode

Opens the new Waveform window and displays waveform data for demonstration.
If 10 windows are already open, the error message shown in Table 5 is displayed.

Tool button	Operation on the menu bar	Shortcut key
---	Help → Demo Mode	---

Selecting this menu item displays "Demo Mode" on the title bar and toolbar as shown in Figure 21 and displays waveform data for demonstration.

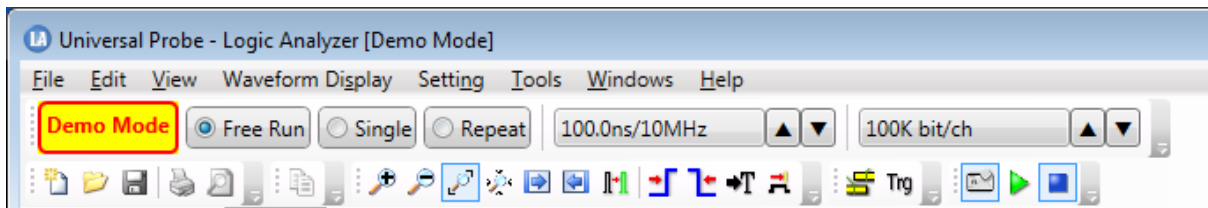



Figure 21


 INFO

In Demo mode, you cannot save data to a file or perform waveform measurement operations in the Waveform window.

3.9. Measurement Settings

3.9.1. Operation Mode

The “Operation Mode” toolbar can be used to specify the operation mode for measurement.


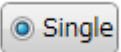


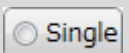



Toolbar	Shortcut key
  	Shift + F1

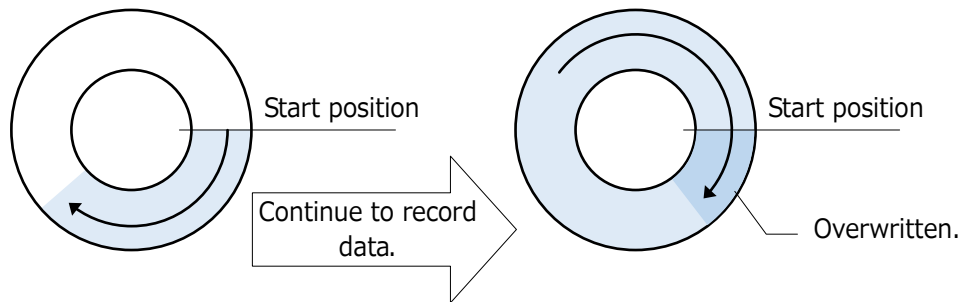
Table 23

<p>Free Run</p> 	<p>Disables trigger settings and performs measurement immediately after measurement is started.</p> <p>Measurement is stopped when measurement data reached specified memory capacity.</p> <p>When using a high-speed memory:</p> <p>When the high-speed memory becomes full, the whole waveform data is acquired from the probe and displayed in the waveform display window. After the data is displayed, measurement automatically starts again. This same operation is repeated until measurement is stopped.</p> <p>When using a large-capacity memory and HDD:</p> <p>Waveform data is successively acquired from the probe and displayed in the Waveform window.</p> <p>Details of the each memory specification, refer to Table 2.</p>
<p>Single</p> 	<p>Measurement is always performed and waveform data is recorded in the memory in the probe. However, no waveform is displayed until trigger conditions are satisfied. For details, refer to Figure 22.</p> <p>If measurement is stopped even though trigger conditions are not satisfied, the waveform until that point is displayed.</p>
<p>Repeat</p> 	<p>Mode to repeat the Single mode. The waveform is displayed when an operation is completed in the Single mode.</p>

 Every time you press the corresponding shortcut key, the mode switches to Free Run → Single → Repeat.

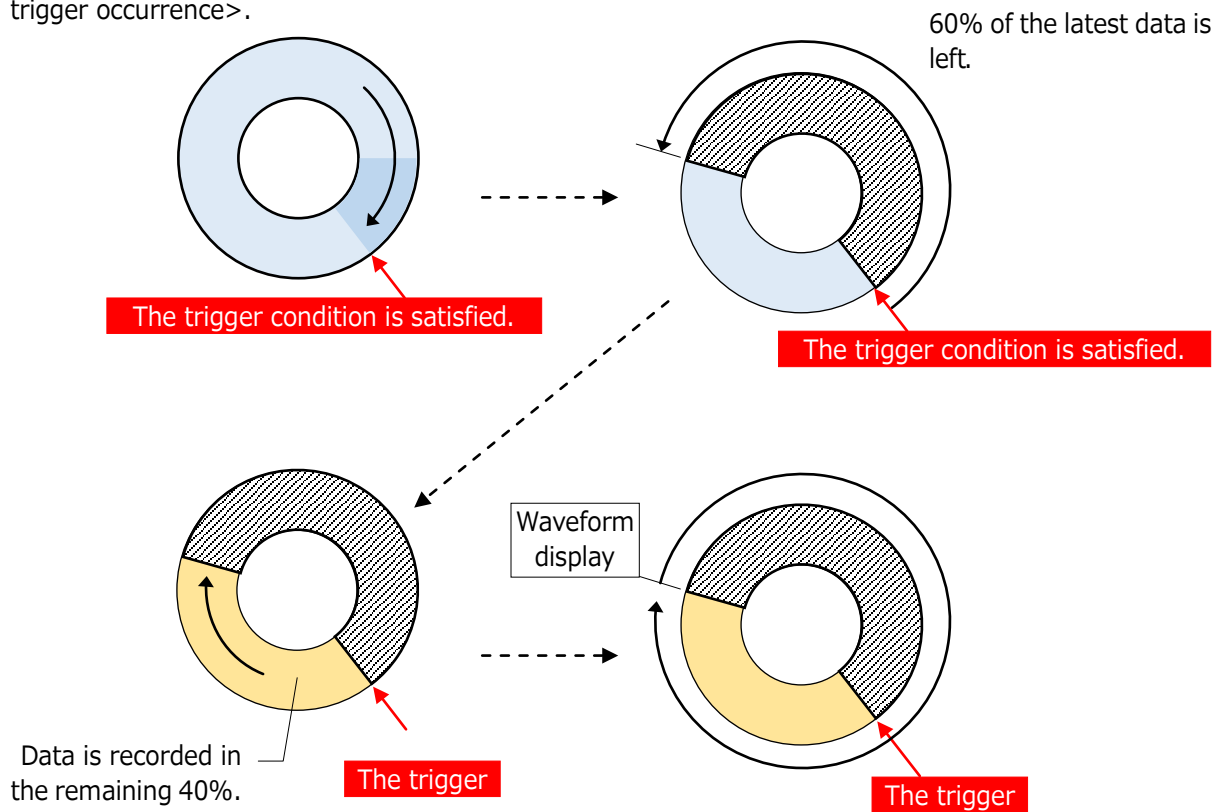
 Measure the same FreeRun mode when measured in the Single or Repeat mode without setting the trigger, when two or more probes are used in combination.

In the Logic Analyzer, the probe memory has a ring configuration. Waveform data is always recorded. When the memory becomes full, old data is overwritten to continue to record new data.



When the trigger condition is satisfied, waveform data is recorded until the memory becomes full leaving the ratio specified with <Memory position at trigger occurrence> in "4.5.1. Trigger Settings."

For example, the following operation is performed when 60% is specified with <Memory position at trigger occurrence>.



After data is recorded in the remaining 40%, waveform data is displayed from the oldest data position (= start position of waveform display).

Figure 22

3.9.2. Sampling Frequency

Select a sampling frequency from the drop-down menu.

The slower the sampling frequency (i.e., the longer the sampling interval), the longer the time to acquire waveform data.

Toolbar	Shortcut key
	Shift + F2

Table 24

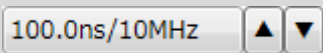
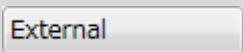
<p>Internal clock</p> 	<p>Samples signals using the internal clock.</p> <p>For the possible setting range, refer to Table 25.</p>
<p>External clock</p> 	<p>Samples signals using the external clock.</p> <p>The external clock cannot be selected when the operation mode is Free Run.</p> <p>The external clock cannot be selected either when HDD is selected as the memory capacity (logger mode).</p> <p>External is displayed in gray but can be selected.</p> <p>However, selecting this displays an error when measurement starts, making measurement impossible.</p>

Table 25

Operation mode	Sampling frequency	Memory capacity
Free Run	10.0 ns/100 MHz	16 Kbit/Ch
	20.0 ns/50 MHz	16 Kbit/Ch
	40.0 ns/25 MHz	100 Kbit/Ch
	to	1 Mbit/Ch
	5.0 us/200 kHz	10 Mbit/Ch
		100 Mbit/Ch
Single or Repeat	10 us/100 kHz	16 Kbit/Ch
	to	100 Kbit/Ch
	1.0 ms/1 kHz	1 Mbit/Ch
		10 Mbit/Ch
		100 Mbit/Ch
		HDD
Single or Repeat	10.0 ns/100 MHz	16 Kbit/Ch
	20.0 ns/50 MHz	16 Kbit/Ch
	40.0 ns/25 MHz	100 Kbit/Ch
	to	1 Mbit/Ch
	1.0 ms/1 kHz	10 Mbit/Ch
		100 Mbit/Ch



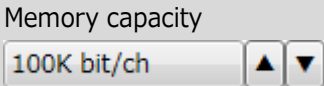
The upper limit of selectable sampling frequency is 100.0 ns/10 MHz when two or more probes are used in combination.

3.9.3. Memory Capacity

Select a memory capacity from the drop-down menu.

Toolbar	Shortcut key
	Shift + F3

Table 26

	<p>Specify the sampling capacity.</p> <p>For the possible setting range, refer to Table 25.</p> <p>If conditions are not satisfied, options are displayed in gray but can be selected.</p> <p>However, selecting this displays an error when measurement starts, making measurement impossible.</p>
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4. Windows

4.1. Main Window

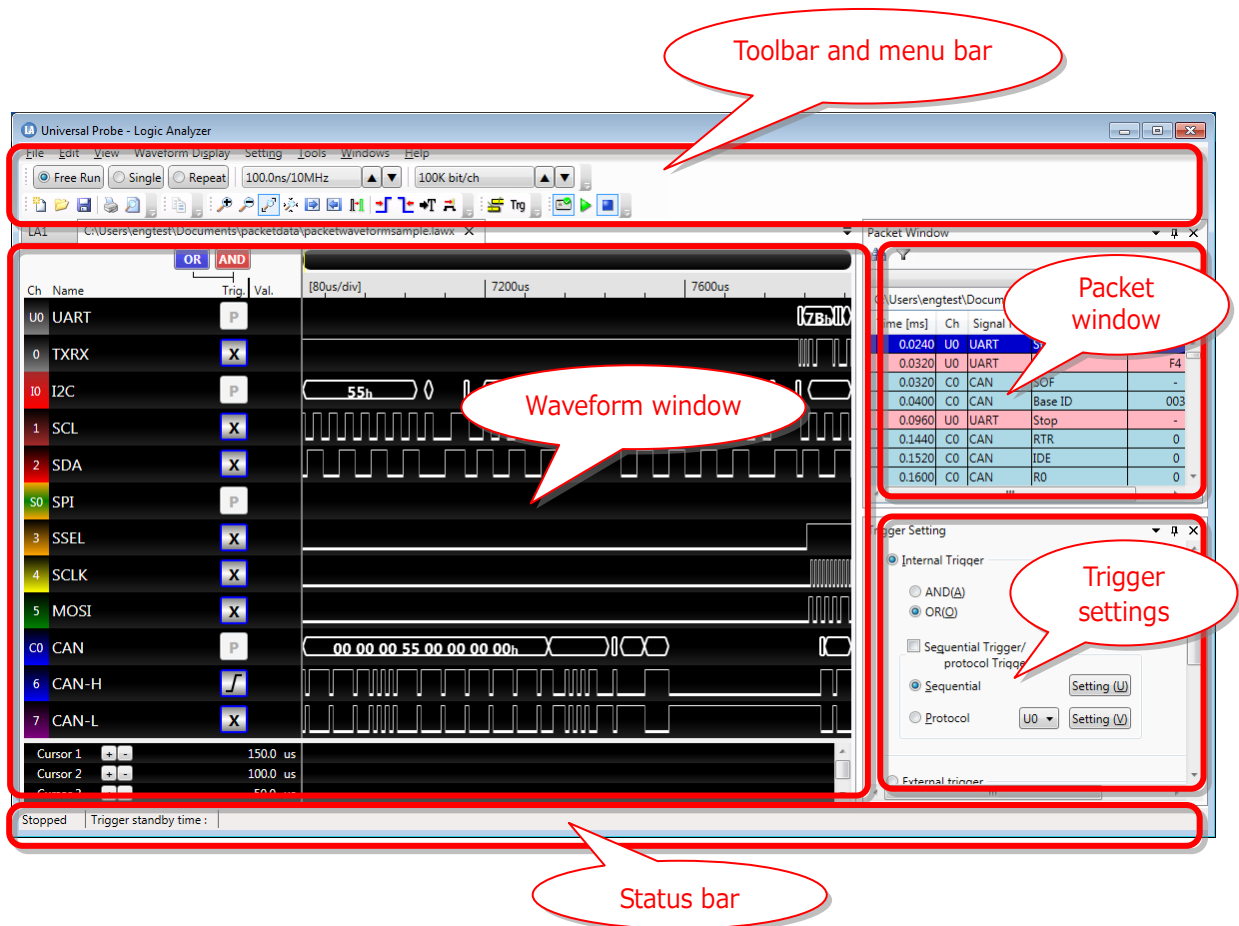


Figure 23

4.1.1. Basic Window Operations

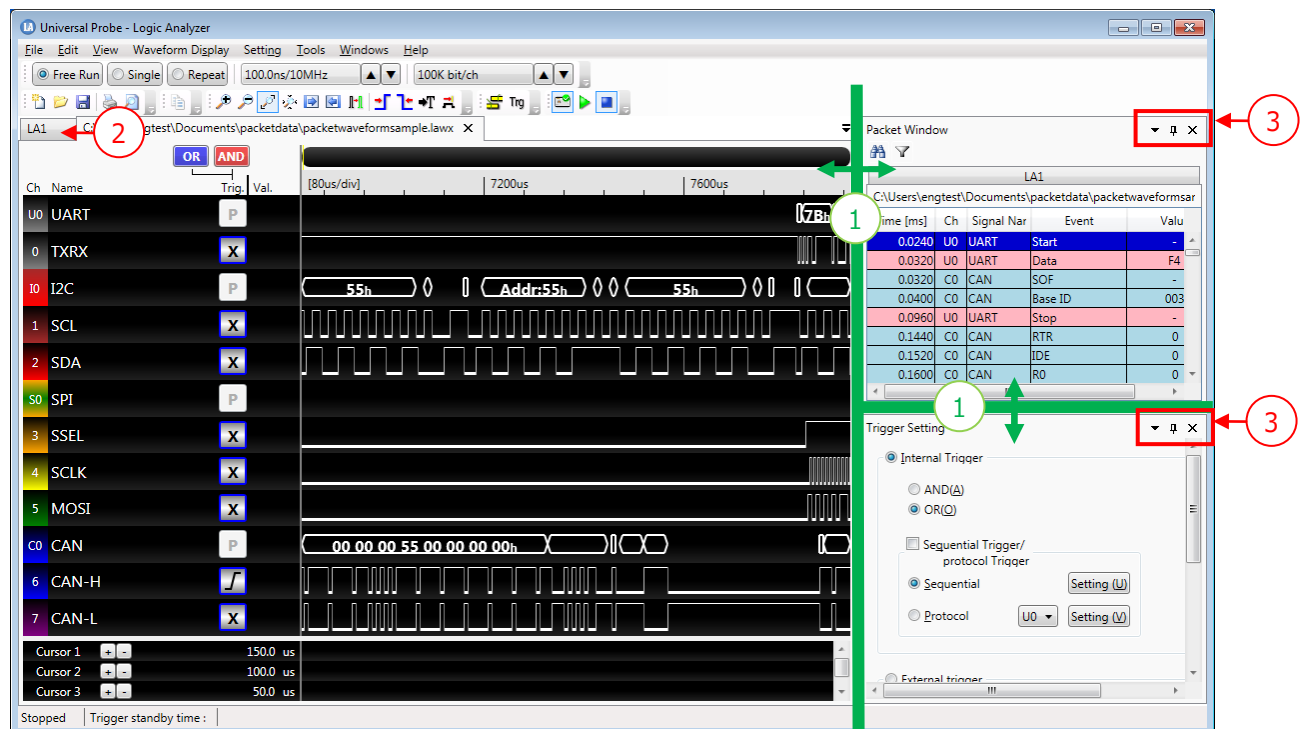


Figure 24

Table 27

(1) Moving the window display area	The ratio of the window display area can be changed by dragging the boundary line of each window.
(2) Closing the Waveform window	Use the X button on the tab in the Waveform window to close the Waveform window. If waveform data is not saved, a confirmation message appears.
(3) Controlling the docking window	Relocates, automatically hides, or closes each window.

4.1.2. Moving Windows

The Display Packet window and the Trigger Settings window can be relocated.

Drag the title part at the top of each window and select the moving destination from "(a) Four corners of main window," "(b) Four corners of the window where the mouse is displayed," or "(c) Make the window a tabbed document by placing it over the window where the mouse is displayed." (Or, drop the window to one of these.)

The Display Packet window and the Trigger Settings window cannot be tabbed like the Waveform window.

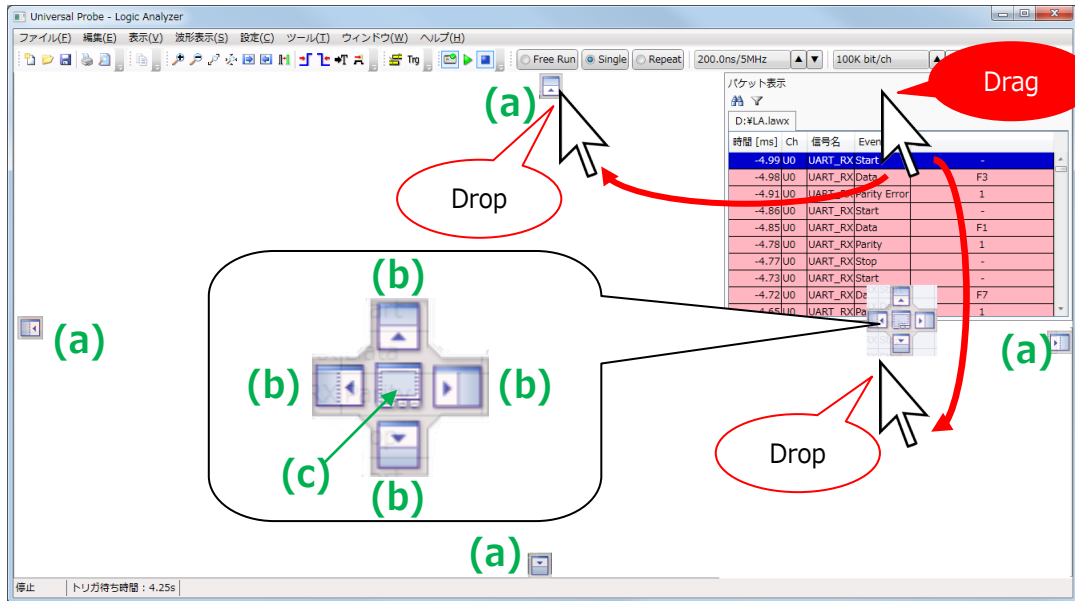


Figure 25

4.1.3. Window Display Settings

The settings for the Display Packet window and the Trigger Settings window can be specified on the menu displayed by clicking ① in Figure 26.

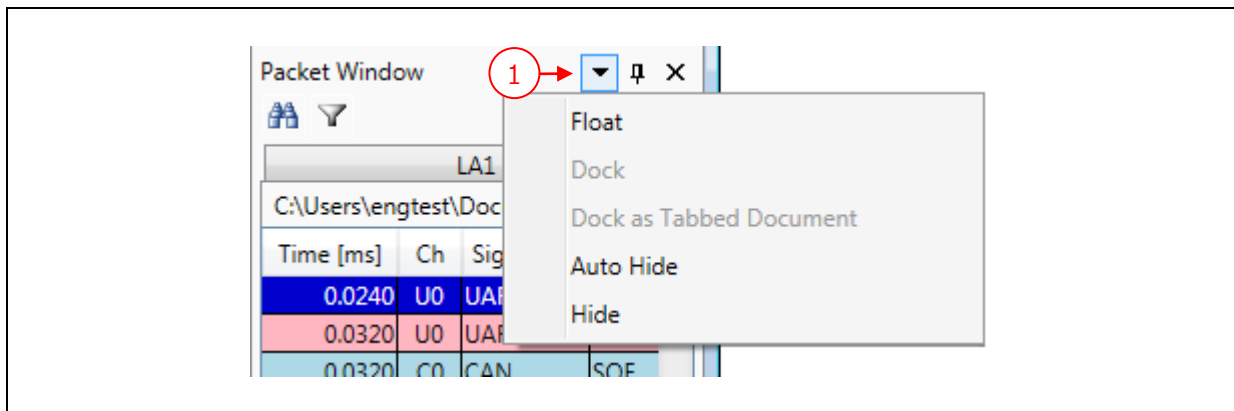


Figure 26

Table 28

Float	Makes the window the floating state.
Dock	Makes the window the docked state.
Dock as Tabbed Document	Makes the window a tabbed document.
Auto Hide	Automatically hides the window.
Hide	Hides the window.

4.2. Waveform Window

4.2.1. Overview of Waveform Window

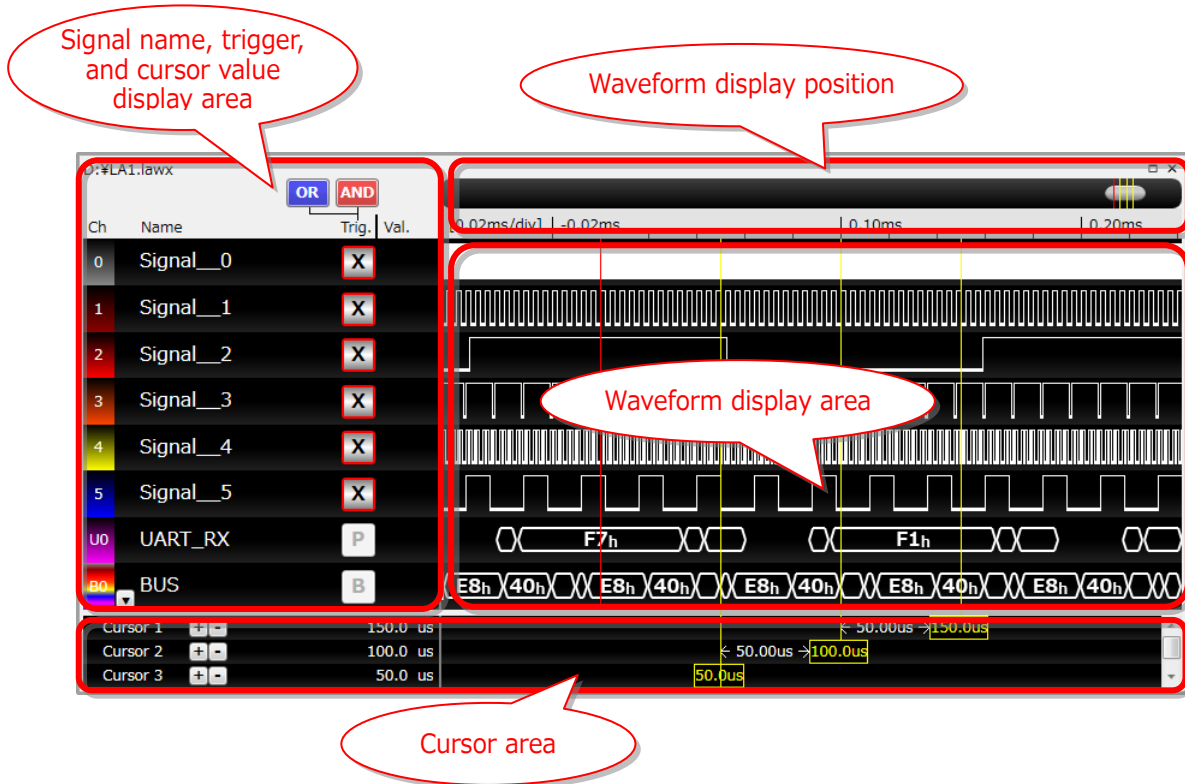


Figure 27

4.2.2. Signal Name, Trigger, and Cursor Value Display Area

The signal name, trigger, and cursor value display area displays channel No., signal names, trigger settings for each signal, and cursor position values. The Select Channel dialog box can be used to specify the number of channels, channel list protocol, and signal names.

Figure 28 shows an example of the signal name, trigger, and cursor value display area

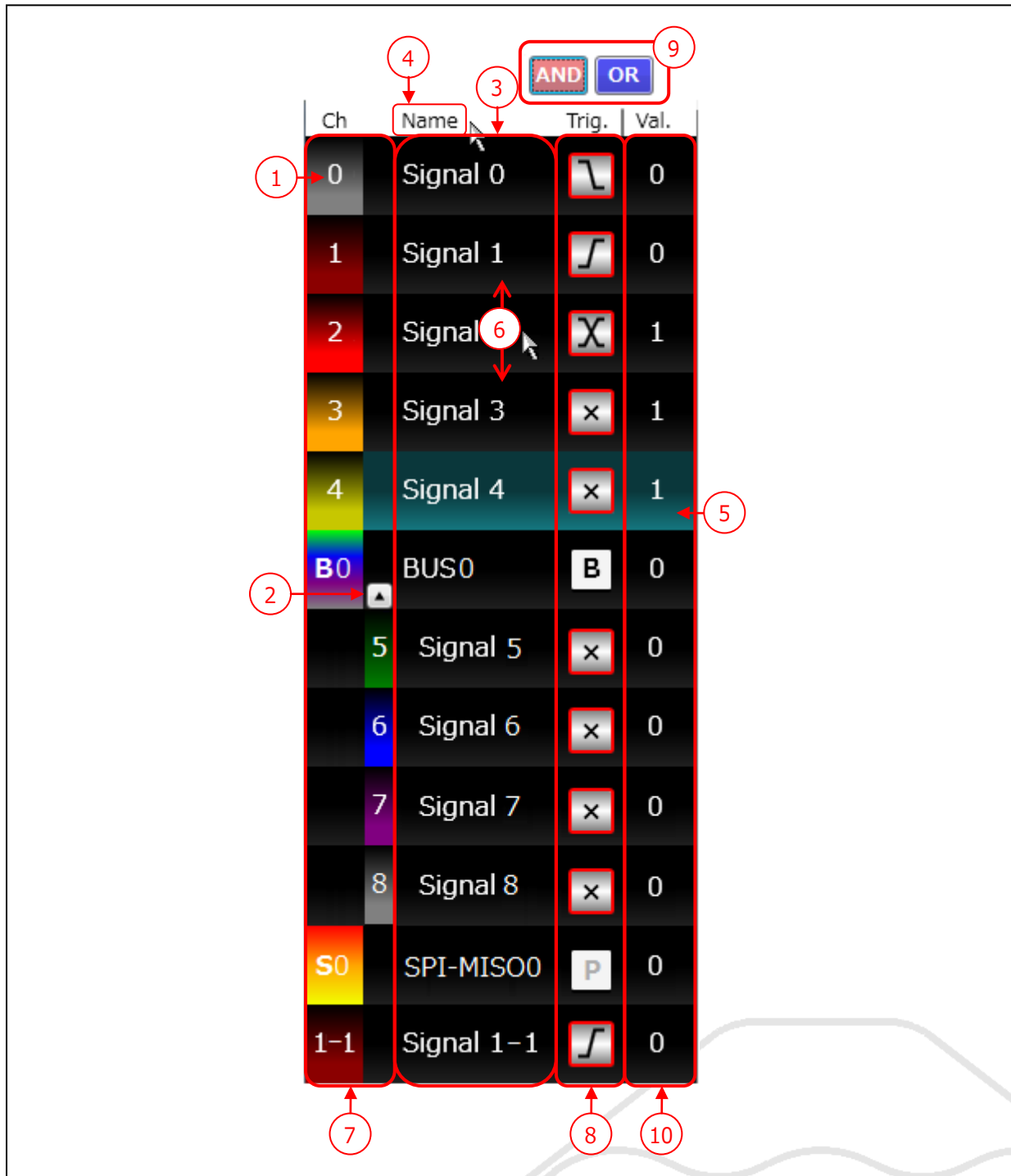











Figure 28

Table 29

(1) Channel No. (Ch column)	<p>Number only : Displays the channel No. for single signal.</p> <p>B + number : Shows the bus number.</p> <p>U + number : Shows the UART protocol number.</p> <p>I + number : Shows the I2C protocol number.</p> <p>S + number : Shows the SPI protocol number.</p> <p>C + number : Shows the CAN protocol number.</p>
(2) Expanding signal	<p>The bus can be expanded and displayed for each single signal.</p> <p>The protocol cannot be expanded.</p> <p>Use  button to expand a bus element (single signal).</p> <p>Use  button to collapse a bus element (single signal).</p>
(3) Signal name (Name column)	<p>Displays the signal name specified under channel settings.</p> <p>The signal name can be edited by clicking it.</p>
(4) Signal display/hide setting	<p>Click the <Name> section of the display guide line (header) to display the dialog box to specify whether to display or hide signals. (refer to 4.7. Signal Show/Hide Setting Window).</p>
(5) Selecting signal	<p>Click the Ch, Name, or Val column for a signal to highlight the background and select the signal. Clicking the selected signal deselects it. Multiple signals can be selected by clicking them pressing the Ctrl key.</p>
(6) Moving signal	<p>Signals can be repositioned by dragging and dropping the Ch or Name column of the signal.</p>
(7) Changing channel color	<p>Double-click the Ch column to change the channel color.</p> <p>Select a channel color on the color setting dialog box displayed.</p>
(8) Specifying trigger conditions	<p>Specify the trigger conditions for single signal.</p> <p>For channels used as sequential or protocol trigger, "B" or "P" is displayed as the trigger condition and setting cannot be performed.</p> <p>The trigger condition changes every time the button part is pressed.</p> <p>For the selectable designs and their meanings, refer to Table 30.</p>
(9) Selecting AND or OR condition	<p>Specifies whether to AND or OR the trigger conditions for each signal and the sequential or protocol trigger conditions.</p> <p>AND setting : Check if all the trigger conditions are met.</p> <p>OR setting : Check if any of the trigger conditions is met.</p> <p>This setting is the same as ② in 4.5.1. Trigger Settings.</p> <p>The trigger setting value frame is displayed in red when the AND condition is used. The trigger setting value frame is displayed in blue when the OR condition is used.</p> <div style="border: 2px solid red; padding: 5px; margin-top: 10px;">  OR can be selected only for the master unit specified in "4.4.2. Setting Channels and Threshold Voltages." </div>

(10) Cursor value (Val column)	<p>Displays the values of signals at the position selected by the cursor. The bus and protocol values are displayed in the format specified in the Select Channel window.</p> <p>When the Hex display is set : "h" is added at the end of the number.</p> <p>When the binary display is set : "b" is added at the end of the number.</p> <p>When the decimal display is set : Only a numerical value is displayed.</p> <p>When the ASCII display is set : Enclosed between double quotations ("x").</p> <p>When the number of digits is too large to fit in the display area, "#" is displayed.</p>
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Table 30

Display	Description
	Uses the high level as the trigger condition.
	Uses the low level as the trigger condition.
	Uses the rising edge as the trigger condition.
	Uses the falling edge as the trigger condition.
	Uses the rising and falling edges as the trigger conditions.
	Not uses as the trigger conditions. (=Don't care)

● Adding, moving, or canceling the bus

The bus can be added and moved by operating the mouse.
Figure 29 shows how to add or move the bus.

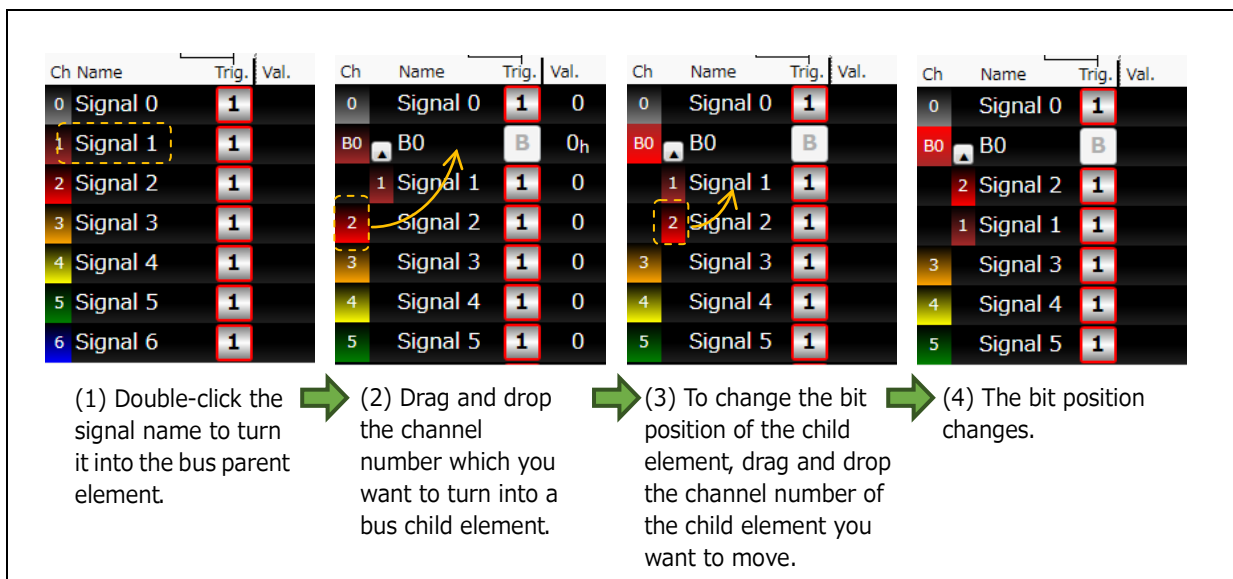


Figure 29



The bus can be also set from "[4.4.4. Setting Channels for Buses.](#)"

● Canceling the bus

The bus can be cancelled by operating the mouse.

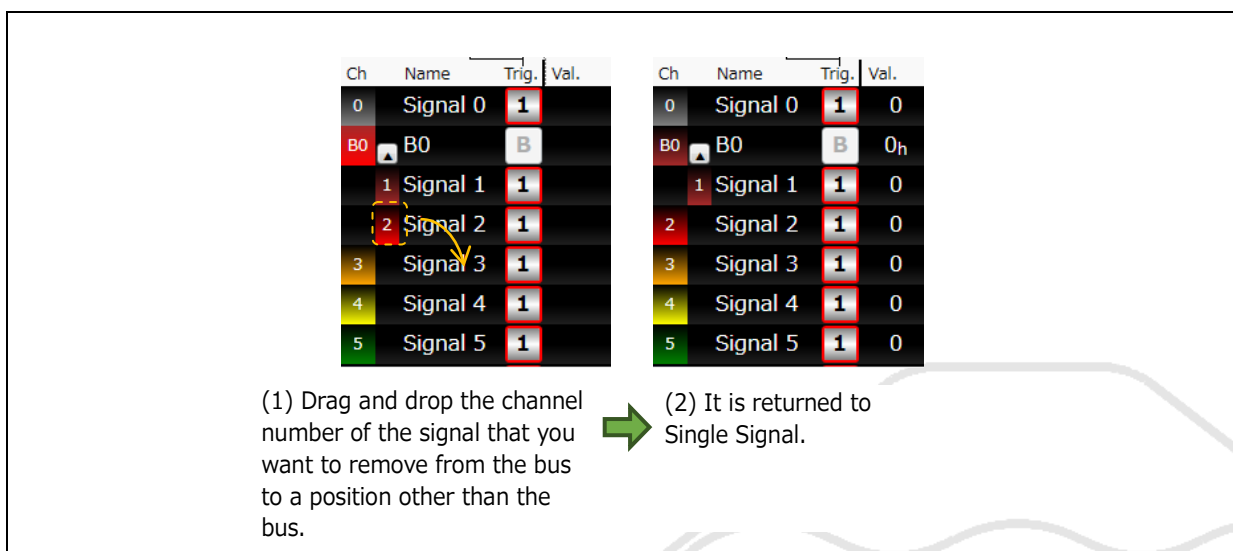


Figure 30



You can also cancel the bus state from the context menu that is displayed by right-clicking the signal name.

● Context menu

Right-clicking in a section other than the signal name displays a context menu.

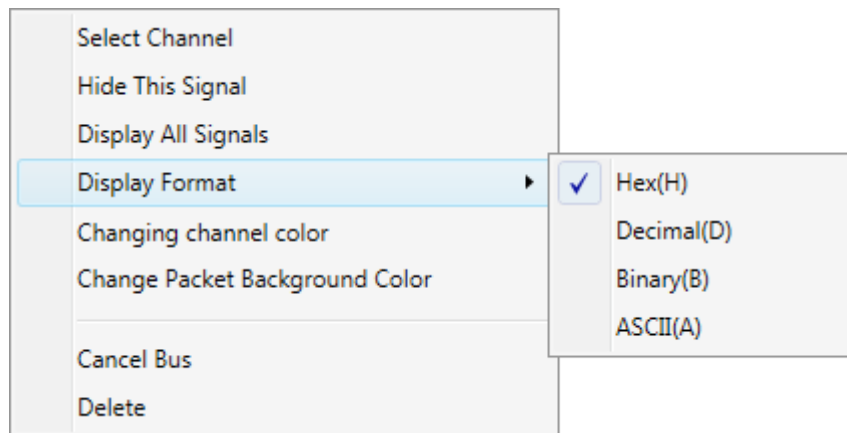



Figure 31

Table 31

Select Channel	<p>Opens the Select Channel dialog box.</p> <hr/> <p> For details, refer to "4.4. Select Channel Dialog Box."</p> <hr/>
Hide This Signal	Hides the selected signal.
Display All Signals	Displays all the signals.
Display Format	<p>Changes the bus display format.</p> <p>Hex : Displays the bus value in hexadecimal notation.</p> <p>Decimal : Displays the bus value in decimal notation.</p> <p>Binary : Displays the bus value in binary notation.</p> <p>ASCII : Displays the bus value in ASCII notation.</p>
Change Channel Color	<p>Select a channel color on the color setting dialog box displayed.</p> <p>This item cannot be specified for buses. Specify this item for the child element, Single Signal.</p>
Change Packet Background Color	<p>Select the background color for packet display.</p> <p>Select a packet display background color on the color setting dialog box displayed.</p> <p>This item can only be specified for protocols.</p>
Cancel Bus	Removes the selected bus child element from the bus. This function can be selected for bus child elements only.
Delete	Deletes the selected signal.

4.2.3. Waveform Display Area

The waveform display area displays measured waveform data based on the measurement settings. The whole acquired data is displayed immediately after waveform data is acquired.

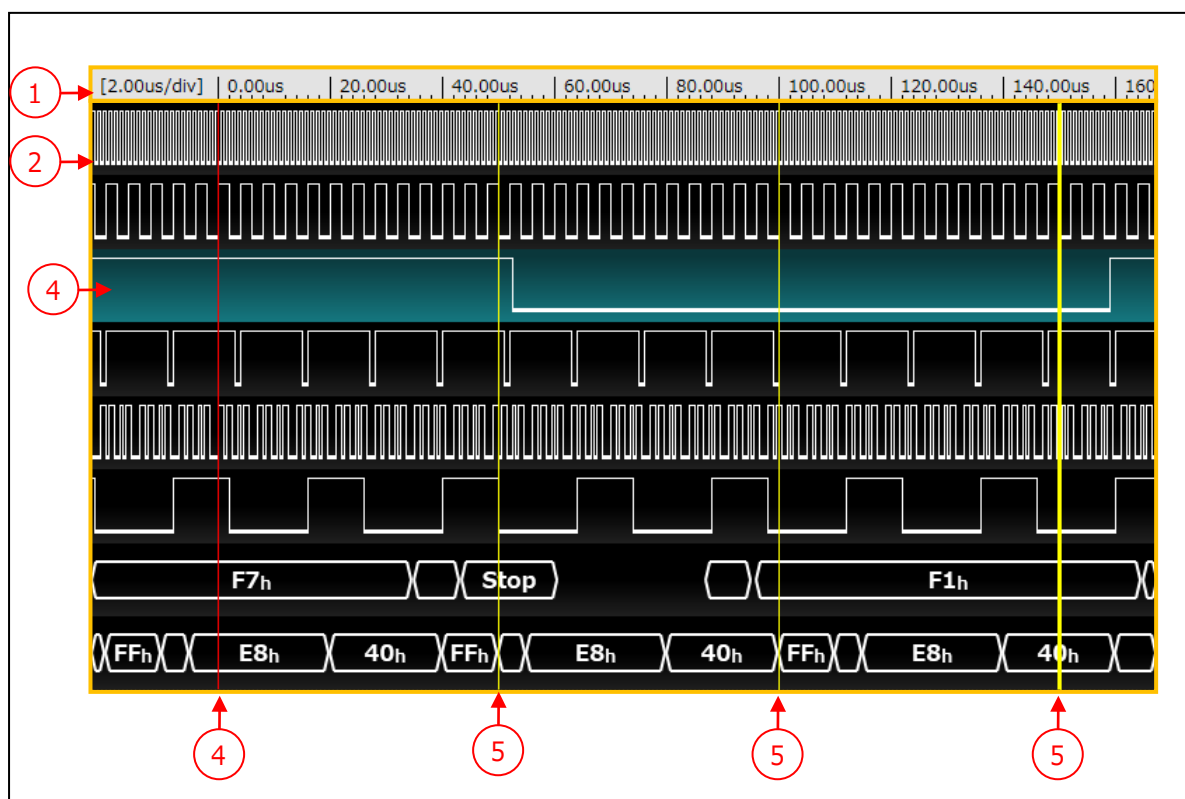


Figure 32

Table 32

(1) Scale display	Displays the measurement time on a scale. The trigger position is set to 0. Accordingly, the time before trigger is displayed as a negative value.
(2) Waveform area	Waveform area. The display position of the waveform area can be vertically or horizontally moved by clicking and pinching it.
(3) Selecting signal	When a signal is selected, the background is highlighted.
(4) Trigger position display	The trigger position (scale = "0") is displayed by a red line.
(5) Cursor display	Cursor. The currently selected cursor is displayed by a bold line.

● Signal display in waveform display area


(1) Single Signal

Figure 33 shows a display example.

The upper line indicates that the value is 1 (= High Level).

The lower line indicates that the value is 0 (= Low Level).

In a reduced display, when a single dot contains multiple data, the dot is displayed in the following color.

The rate of value 1 is 50% or below:  (light gray)


The rate of value 1 is 50% or above:  (dark gray)



Figure 33

(2) Bus

Figure 34 shows a display example.

For the bus, values are displayed in hexagons.



Figure 34

(3) Protocol

Figure 35 shows a display example.

For the protocol, analyzed events or values are displayed in hexagons.

Although Figure 35 shows an example of UART, the positions of START and STOP bits are displayed by analyzing waveform data.

If no data or event has occurred, nothing is displayed.

If an error occurs during protocol analysis, that error is displayed in the waveform display area. (refer to Table 33).



Figure 35

Table 33

Message	Description
Cannot analyze data because the sampling frequency is an external clock.	If an external clock is selected, a UART or CAN analysis error is displayed. Data cannot be analyzed when an external clock is selected because the number of bits per hour cannot be calculated.
Cannot analyze data because the sampling frequency is too low.	An error is displayed if the number of samples per bit calculated from the sampling frequency and the communication speed drops below 2 during UART or CAN analysis. Specify the sampling frequency (Hz) that is twice or larger than the communication speed (bps).



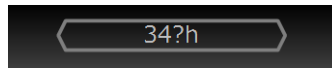
"?" is displayed if there is data that cannot be analyzed.

- The number of acquired bits is 8 or less during SPI analysis.
- The acquired bit data length is less than the specified number of data bits during SPI analysis.
- Invalid bit data is detected during CAN analysis.



↑ Data that cannot be analyzed

- The bit data length is a multiple of 8 bits but less than the specified number of data bits during SPI analysis.



↑ Hex display



The displayed waveform area is analyzed in the logger mode. If a part of waveform area is displayed, the start position of analysis changes depending on the display position, and therefore, the analysis result may be different from actual communication.



To display signal on waveform display area, a mount of acquired waveform data needs to be more than 1Kbit/Ch.

● Context menu

Right-clicking in the waveform display window displays a context menu.

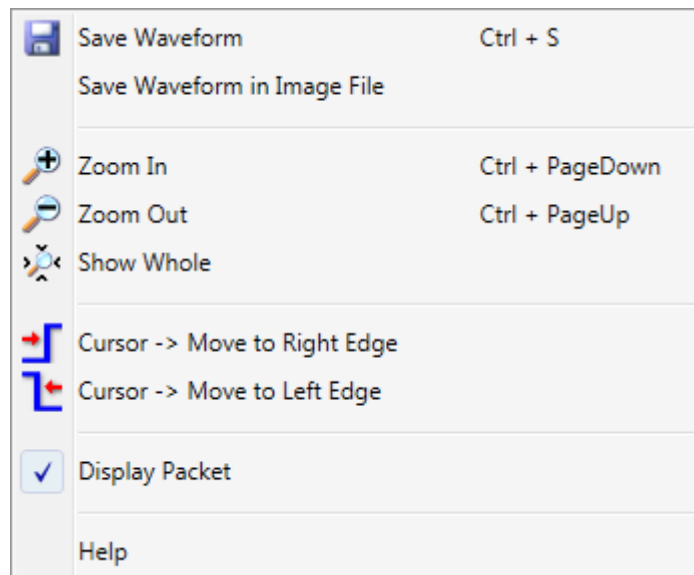


Figure 36

Table 34

Save Waveform	Saves the displayed waveform in the waveform file overwriting it. Refer to "3.1.3. Save Waveform."
Save Waveform in Image File	Saves the displayed waveform in an image file. Refer to "3.1.6. Save Waveform in Image File."
Zoom in	Zooms in the waveforms on the Waveform window. Refer to "3.4.1. Zoom In."
Zoom out	Zooms out the waveforms on the Waveform window. Refer to "3.4.2. Zoom Out."
Show Whole	Zooms in or out the waveforms on the Waveform window to display the whole waveforms. Refer to "3.4.4. Show Whole."
Cursor → Move to Right Edge	Moves the cursor in the Waveform window to the edge on the right. Refer to "3.4.9. Cursor → Move to Right Edge."
Cursor → Move to Left Edge	Moves the cursor in the Waveform window to the edge on the left. Refer to "3.4.8. Cursor → Move to Left Edge."
Display Packet	Shows/hides the Packet window. Refer to "3.3.3. Display Packet."
Help	Displays help. Refer to "3.8.1. Help Display."

4.2.5. Cursor Area

Operates the cursor in the Waveform window.

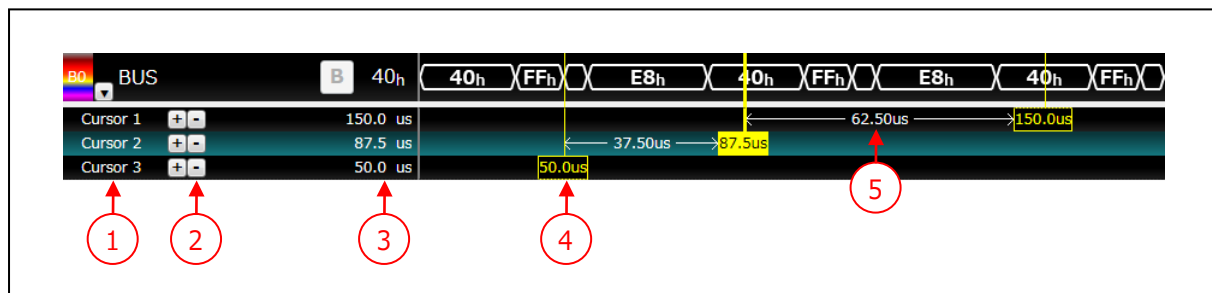




Figure 37

Table 35

(1) Cursor number	Displays cursor numbers. The numbers are automatically set. The cursor of the clicked line turns into a selected state. The background color of a line changes to green when it is selected. Also, the color of the cursor tag is inverted.
(2) Cursor addition/deletion	Clicking the  button adds a cursor to below the selected line. To the added cursor, the subsequent number is automatically assigned. The cursor numbers below the added line increases by 1. Clicking the  button deletes the selected cursor. The cursor numbers below the deleted line decreases by 1. The maximum number of cursors is 20.
(3) Cursor position	Displays the position of the cursor. If you click the cursor position, you will be able to enter a numeric value.
(4) Cursor	Clicking the rectangle portion turns the clicked cursor into a selected state. By dragging the cursor, its position can be changed.
(5) Cursor-to-cursor distance display	Displays the distance from the next cursor.

The cursor position can be moved by using the menu bar or tool bar.

Refer to "[3.4.5. Move to Later Packet](#)," "[3.4.6. Move to Previous Packet](#)," "[3.4.9. Cursor → Move to Right Edge](#)," "[3.4.8. Cursor → Move to Left Edge](#)," "[3.4.9. Cursor → Move to Right Edge](#)"



Moves the selected cursor to the next right change point of the selected signal.
If no signal is selected, the selected cursor is moved to the next right change point of a signal that comes first.

Tool button Operation on the menu bar

Short



Display Waveform → Cursor → Move to Right Edge



For a bus, the cursor is moved to the point where a value change occurs.
For a protocol, the cursor is moved to the beginning or end of packet.

3.4.10. Move Cursor to Trigger," and "3.4.11. Move to Edge."

4.2.4. Waveform Display Position

The waveform display position displays the position of the waveform area in the whole waveform, change of waveform area position, cursor position in the whole waveform, and other information.

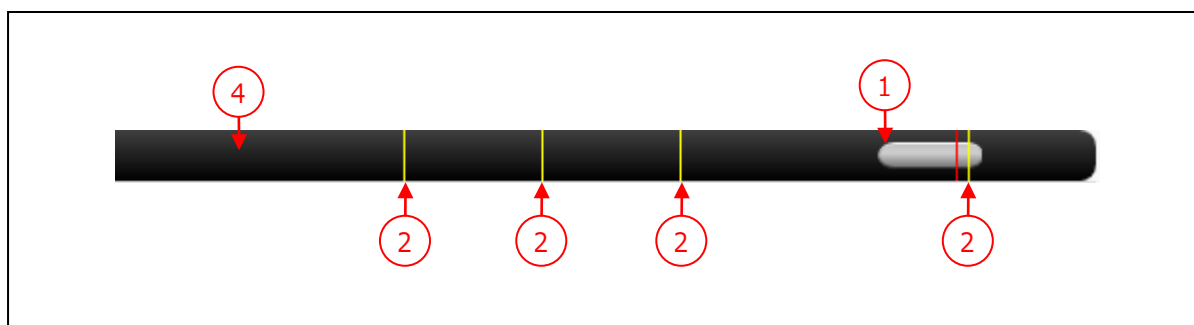


Figure 38

Table 36

(1) Waveform display position	Indicates the range displayed in the waveform display area and its rate to the whole waveform as a gray bar. By dragging the bar, you can move the waveform display position.
(2) Cursor position	The yellow line represents the cursor position in the whole waveform.
(3) Trigger position display	The red line displays the trigger position.
(4) Background	The black background represents the whole waveform. If you click a position other than the bar, the display position is moved to the position centering around the clicked position.

4.3. Display Packet Window

4.3.1. Overview of Display Packet Window

The packet data for each protocol is displayed in chronological order.

Displayed contents are different between the memory mode and the logger mode. (refer to Table 37).

Table 37

Memory mode	Analyzes all waveform data acquired from the probe and adds the analysis result to the Display Packet window.
Logger mode	Analyzes waveform data currently displayed in the waveform display area and adds the analysis result to the Display Packet window. Therefore, the contents in the Display Packet window are updated every time the contents displayed in the Waveform window change. (The analysis range starts before the "10% of display width" from the left of the waveform display.)

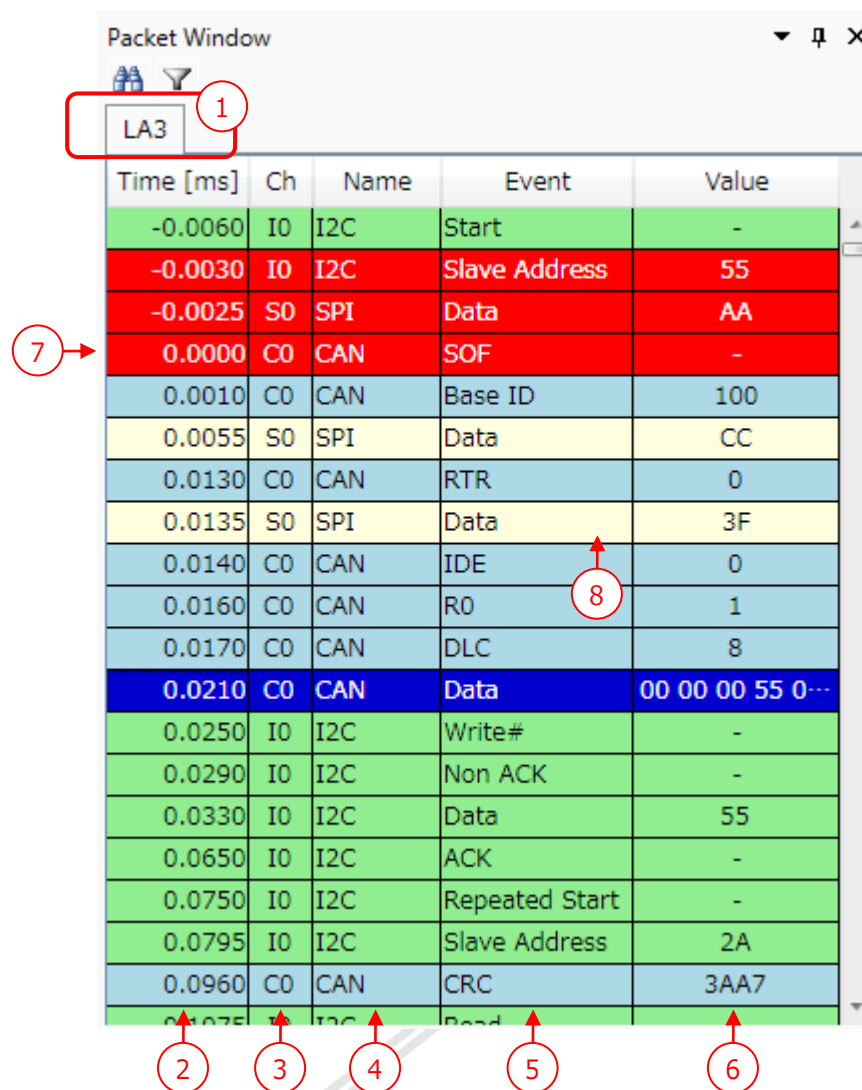


Figure 39

Table 38

(1) Tab name	Displays the same tab name as the tab name in the Waveform window.					
(2) Time	<p>Displays the time for packet data measurement in ms.</p> <p>The trigger position is 0 ms and the time before trigger is displayed as a negative value.</p> <p>If the “External clock” is selected as the sampling frequency, the sample number is displayed instead of the time.</p> <div><div><div>Time [ms]</div><div>-0.0060</div><div>-0.0030</div><div>-0.0025</div><div>0.0000</div></div><div>→</div><div><div>Time</div><div>-6</div><div>-3</div><div>-2</div><div>25</div></div></div>					
(3) Protocol number	Displays the protocol number ("U," "I," "S," or "C" + number").					
(4) Signal name	Displays specified signal names.					
(5) Event	Displays all the following events for each detected protocol. (Table 39)					
(6) Value	<p>Displays the analyzed packet values.</p> <p>The display method differs depending on the selected data format. (Figure 40)</p> <p>The upper display limit on a line is 256 bits in the Display Packet window. Data larger than this upper limit is divided before display.</p> <p>● Display example (when Data Format is Hex)</p> <table><tr><th>値</th></tr><tr><td>0102030405060708090A0B0C0D0E0F101112131415161718191A1B1C1D1E1F20</td></tr><tr><td>2122232425262728292A2B2C2D2E2F303132333435363738393A3B3C3D3E3F40</td></tr><tr><td>4142434445464748494A4B4C4D4E4F505152535455565758595A5B5C5D5E5F60</td></tr><tr><td>6162636465666768696A6B6C6D6E6F707172737475767778797A7B7C7D7E7F80</td></tr></table>	値	0102030405060708090A0B0C0D0E0F101112131415161718191A1B1C1D1E1F20	2122232425262728292A2B2C2D2E2F303132333435363738393A3B3C3D3E3F40	4142434445464748494A4B4C4D4E4F505152535455565758595A5B5C5D5E5F60	6162636465666768696A6B6C6D6E6F707172737475767778797A7B7C7D7E7F80
値						
0102030405060708090A0B0C0D0E0F101112131415161718191A1B1C1D1E1F20						
2122232425262728292A2B2C2D2E2F303132333435363738393A3B3C3D3E3F40						
4142434445464748494A4B4C4D4E4F505152535455565758595A5B5C5D5E5F60						
6162636465666768696A6B6C6D6E6F707172737475767778797A7B7C7D7E7F80						
(7) Trigger position display	The packet the closest to the trigger is displayed in red background.					
(8) Display of position in the Waveform window	Double-clicking a packet updates its display position in the Waveform window so that the double-clicked packet is displayed at the center.					

Table 39

Protocol	Event	Value
Common	[UnKnown]	?
UART	Start/Data/Stop/Parity/Parity error/Stop error	Data
I2C	Start/Slave Address/Read/Write#/ACK/Non ACK Data/Repeated Start/Stop	Data/Slave Address
SPI	Data	Data
CAN	SOF/Base ID/Ext ID/RTR/SRR/IDE/R1/R0 DLC/Data/CRC/ACK/EOF/Overload/Error CRC error/Non ACK	Data/Base ID/Ext ID DLC/CRC

		Value
Hex	{	30
		FF
Decimal	{	255
		19
Binary	{	1010
		1101110
ASCII	{	"A"
		"*"

Figure 40

● About data that cannot be analyzed

Data that cannot be analyzed is displayed as described below.

[SPI protocol analysis]

If the number of acquired bits is 8 or less

Time[ms]	Ch	Signal	Event	Value
-99.67	S0	SPI	Data	3031 3233
-99.03	S0	SPI	Data	3435 3637
-98.01	S0	SPI	[Unknown]	?

Displayed as the packet that cannot be analyzed (value: "?") on a different line.

If the number of acquired bits is a multiple of 8 but less than the specified number of data bits (number of data bits = 16 bits)

Time[ms]	Ch	Signal	Event	Value
-99.67	S0	SPI	Data	3031 3233
-99.03	S0	SPI	Data	34?

"?" is displayed after the numerical value (HEX).

Time[ms]	Ch	Signal	Event	Value
-99.67	S0	SPI	Data	"A B"
-99.03	S0	SPI	Data	"C"?

"?" is displayed after the character (ASCII).

[I2C protocol analysis]

If a stop condition is detected during acquisition of data (less than the specified length)

Time[ms]	Ch	Signal	Event	Value
-98.49	I0	SPI	ACK	-
-98.12	I0	SPI	[Unknown]	?
-98.03	I0	SPI	Stop	-

Displayed as the packet that cannot be analyzed (value: "?").

[CAN protocol analysis]

If an invalid value is detected

Time[ms]	Ch	Signal	Event	Value
-99.50	C0	CAN-H	SOF	-
-98.50	C0	CAN-H	Base ID	12
-87.50	C0	CAN-H	[Unknown]	?
-86.50	C0	CAN-H	IDE	0

Displayed as the packet that cannot be analyzed (value: "?").



The displayed waveform area is analyzed in the logger mode. If a part of waveform area is displayed, the start position of analysis changes depending on the display position, and therefore, the analysis result may be different from actual communication.

● Context menu of Packet Display

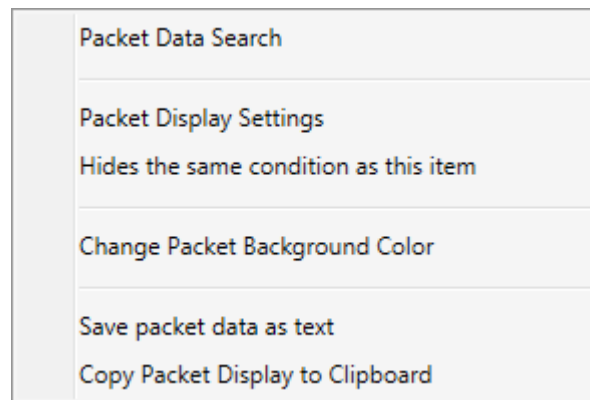


Figure 41

Table 40

Packet Data Search	<p>Searches packet data.</p> <p>→ For details, refer to "4.3.3. Packet Data Search."</p>
Packet Display Settings	<p>Specifies packet display settings.</p> <p>→ For details, refer to "4.3.2. Packet Display Settings."</p>
Hides the same condition as this item	<p>Protocol information at the mouse position when you right-click is added as the new packet display setting condition and "Hide specified packet" is automatically selected.</p> <p>This item is enabled only the currently packet display setting is "Display all packets" or "Hide specified packet."</p> <p>The hide setting is applied by pressing the OK or Apply button in the packet display setting dialog box displayed.</p> <p>→ For details, refer to "4.3.2. Packet Display Settings."</p>
Change Packet Background Color	<p>Changes the background color for the same protocol number as the selected packet.</p>
Save packet data as text	<p>Saves packet data in the .csv format.</p> <p>Figure 42 shows a saving example.</p>
Copy Packet Display to Clipboard	<p>Copies packet display to the clipboard as text.</p> <p>Figure 43 shows an example of copied text.</p>



Data saved as text or copied to the clipboard is filtered data.

```

Time[ms],Ch,Name,Event,Value
-1.23475,U0,UART-TX0,Start,-
-1.23453,U0,UART-TX0,Data,41
-1.23435,U0,UART-TX0,Stop,-
-1.23401,U0,UART-TX0,Parity,1
-1.12675,U1,UART-RX0,Start,-
-1.12648,U1,UART-RX0,Data,42
-1.12636,U1,UART-RX0,Stop,-
-1.12622,U1,UART-RX0,Parity,1
-0.86523,S0,SPI-MOSI0,Data,AA
-0.73999,S1,SPI-MISO0,Data,4E
0.00000,I0,I2C-SDA0,Start,-
0.00125,I0,I2C-SDA0,Slave Address,7F
0.00325,I0,I2C-SDA0,Write#,-
0.01026,I0,I2C-SDA0,ACK,-
0.01135,I0,I2C-SDA0,Data,0E
0.01948,I0,I2C-SDA0,ACK,-

```

Figure 42

時間 [ms]	Ch	信号名	Event	値
-4.99	U0	UART_RX	Start	-
-4.91	U0	UART_RX	Parity Error	1
-4.86	U0	UART_RX	Start	-
-4.78	U0	UART_RX	Parity	1
-4.77	U0	UART_RX	Stop	-
-4.73	U0	UART_RX	Start	-
-4.65	U0	UART_RX	Parity	1
-4.64	U0	UART_RX	Stop	-
-4.60	U0	UART_RX	Start	-
-4.52	U0	UART_RX	Parity	1
-4.51	U0	UART_RX	Stop	-

Figure 43

4.3.2. Packet Display Settings

Specifies conditions for displaying packet data.

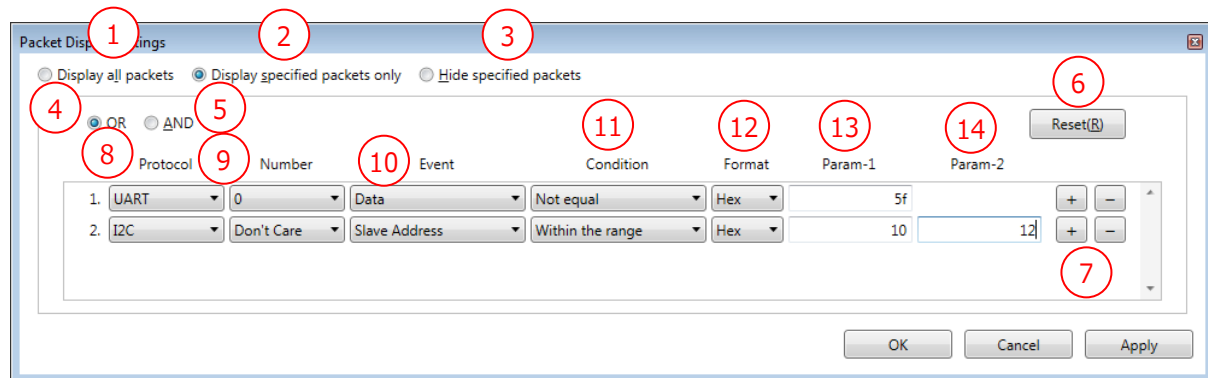




Figure 44

Table 41

(1) Display all packets	Displays all the packets in the Display Packet window.
(2) Display specified packets only	Displays packets that match the conditions in the condition setting list. All packets are displayed if no condition is specified in the condition setting list.
(3) Hide specified packets	Hides packets that match the conditions in the condition setting list. All packets are displayed if no condition is specified in the condition setting list.
(4) OR	Displays or hides packets that match any of the conditions in the condition setting list.
(5) AND	Displays or hides only the packets that match all the conditions in the condition setting list.
(6) Reset	Clears the conditions setting list (to the default state).
(7) Add and delete buttons	Use  button to add a new condition setting line under the current condition setting line. Use  button to delete the current condition setting line.
(8) Protocol	Selects the protocol as the condition.
(9) Number	Selects the number of the protocol selected as the condition in (8).
(10) Event	Selects the event condition for the protocol selected as the condition in (8). (refer to Table 42).
(11) Condition	Select a comparison condition.
(12) Format	Specify the format of values specified in (13) Param-1 and (14) Param-2 from the options below. Hex: Specifies the values in hexadecimal format. Dec: Specifies the values in decimal format. Bin: Specifies the values in binary format. ASCII: Specifies the values in ASCII format.

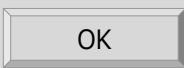
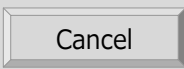
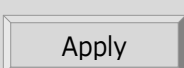
(13) Param-1	Specify Condition value 1. If the value within or out of the specification range is selected in Condition, specify the first value of the range.
(14) Param-2	Specify Condition value 2. This is enabled only when the value within or out of the specification range is selected in Condition. Specify the last value of the range. This item is not displayed if unnecessary.
	Updates the packet window display with specified display conditions. The dialog box is closed at the same time.
	Cancels the setting and closes the dialog box.
	Updates the Display Packet window with specified display conditions.

Table 42

Protocol	Event
UART	Start/Data/Stop/Parity/Parity error/Stop error
I2C	Start/Slave Address/Read/Write#/ACK/Non ACK/Data/Repeated Start/Stop
SPI	Data
CAN	SOF/Base ID/Ext ID/RTR/SRR/IDE/R1/R0/DLC/Data/CRC/ACK/ EOF/Overload/Error/CRC error/Non ACK

4.3.3. Packet Data Search

Searches displayed packet data.

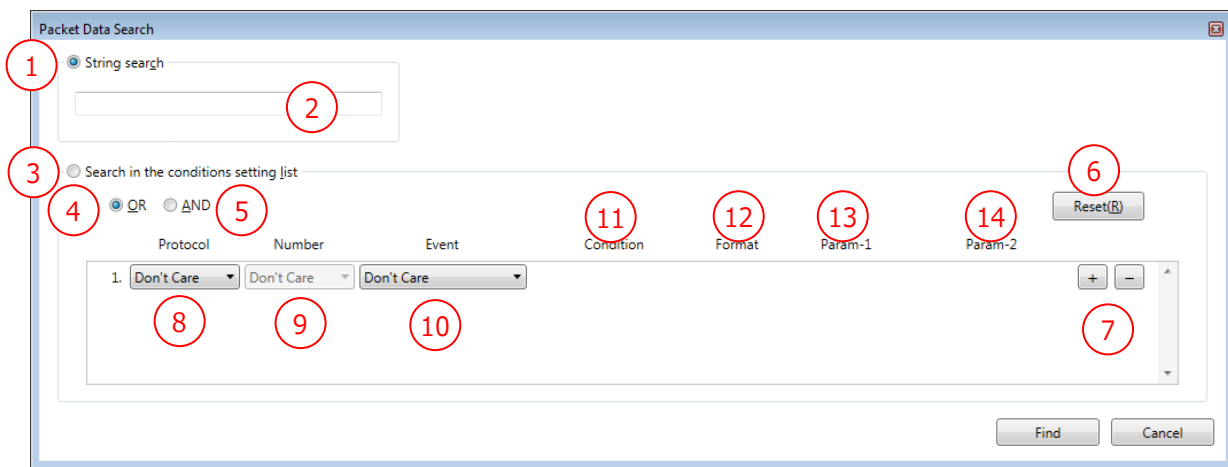


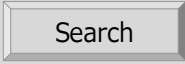
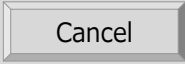


Figure 45

Table 43

(1) String search	Select this radio box to search for display items in the Display Packet window by specifying a character string.
(2) Text entry	Enter the character string to search for. Up to 96 characters can be entered.
(3) Search in the conditions setting list	Select this radio box to search the conditions setting list
(4) OR	Searches for the packets that match any of the conditions in the condition setting list.
(5) AND	Searches for the packets that match all of the conditions in the condition setting list.
(6) Reset	Clears the conditions setting list (to the default state).
(7) Add and delete buttons	Use  button to add a new condition setting line under the current condition setting line. Use  button to delete the current condition setting line.
(8) Protocol	Selects the protocol as the condition.
(9) Number	Selects the number of the protocol selected as the condition in (8).
(10) Event	Selects the event condition for the protocol selected as the condition in (8). (refer to Table 42).
(11) Condition	Select a comparison condition.
(12) Format	Specify the format of values specified in (13) Param-1 and (14) Param-2 from the options below. Hex: Specifies the values in hexadecimal format. Dec: Specifies the values in decimal format. Bin: Specifies the values in binary format. ASCII: Specifies the values in ASCII format.

(13) Param-1	Specify Condition value 1. If the value within or out of the specification range is selected in Condition, specify the first value of the range.
(14) Param-2	Specify Condition value 2. This is enabled only when the value within or out of the specification range is selected in Condition. Specify the last value of the range. This item is not displayed if unnecessary.
	Starts searching packet data. The dialog box is not closed after search.
	Cancels the search and closes the dialog box.

4.4. Select Channel Dialog Box

4.4.1. Overview of the Select Channel Dialog Box

In this dialog box, set channels or buses.

Closing this dialog box updates the Waveform window with the settings made in the dialog box.

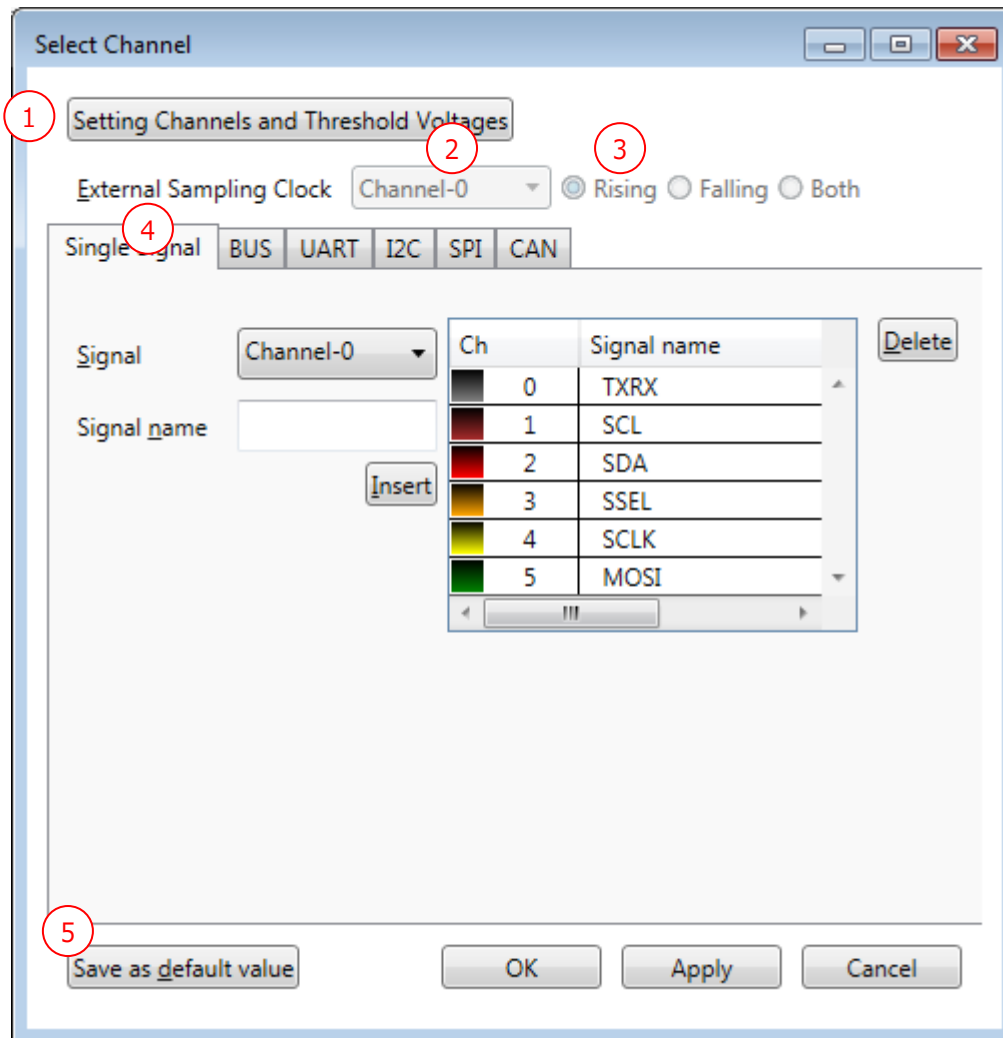


Figure 46

Table 44

(1) Set Channels and Threshold Voltages	<p>Set channel connection and threshold voltages.</p> <p>Clicking this button opens the Set Channels and Threshold Voltages dialog box.</p> <p>→ For details, refer to "4.4.2. Setting Channels and Threshold Voltages."</p>
(2) Field to select a channel for the external sampling clock	<p>Set a channel for the external sampling clock.</p> <p>Select a channel from the list.</p>
(3) Buttons to select a sampling edge for the external sampling clock.	<p>Set a sampling edge for the external sampling clock. Select from among Rising edge, Falling edge), and Both edges.</p>
(4) Channel selection tabs	<p>Select a desired tab and assign channels for a signal, bus, or protocol to be added.</p>
(5) Save as Default Value	<p>Saves the current settings as the default values in the initial setting file.</p> <p>When the software is started up next time, these values are set.</p>



Only channels assigned in the Set Channels and Threshold Voltages dialog box can be used for the external sampling clock or in the channel selection tabs.



Set the frequency of the external sampling clock at 25 MHz or lower.



When two or more probes are used and interfaced with each other, only the channels set for the master in the Set Channels and Threshold Voltages dialog box can be assigned for the external sampling clock.

For more details, refer to "[A.2. Restrictions on cooperative use of probes.](#)"

4.4.2. Setting Channels and Threshold Voltages

In this dialog box, assign probes to different channels and also set threshold voltages.

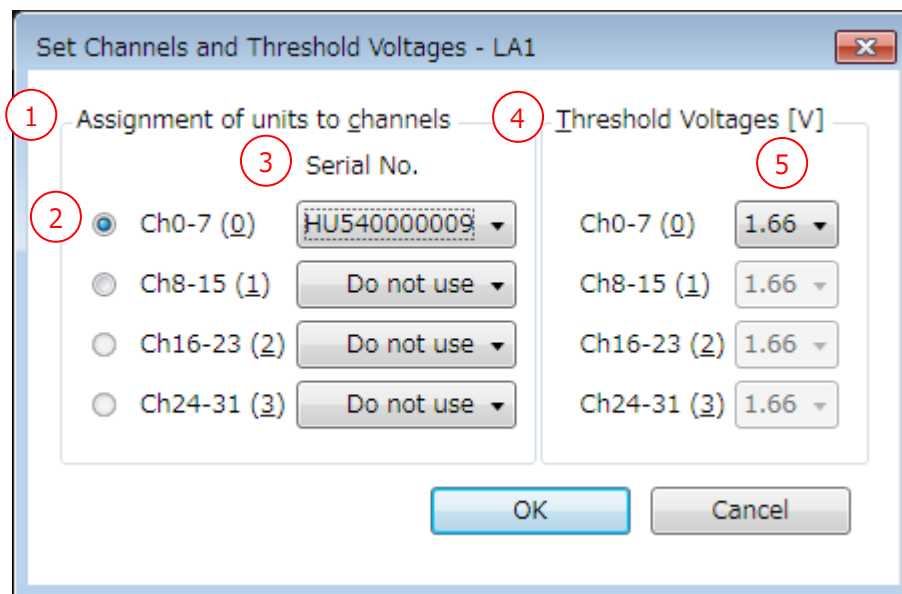


Figure 47

Table 45

(1) Assignment of units to channels	Assign the connected units (or probes) to channels.
(2) Master	Select a master probe. If only a single unit has been selected, this setting is disabled (hidden).
(3) Serial No.	Assign a single unit to 8 channels. Select a serial number from the list.
(4) Threshold voltages	Set a single threshold voltage for 8 channels.
(5) Fields to set threshold voltages	Select threshold voltages from the followings: (3.00/2.50/1.66/1.25/0.90/0.75/0.60) By default, 1.66 V is selected.
OK	Allows the settings to take effect and closes the dialog box.
Cancel	Cancels the setting and closes the dialog box. If this dialog box has been called during connection processing (3.6.1. Connect/Disconnect), you will be taken back to the Select Unit dialog box (Figure 6).



If there is a signal, bus, protocol, or trigger that uses a channel that was made unused by changes made in this dialog box (a channel to which no unit has been assigned), a confirmation message as shown in Table 46 appears. After your confirmation, those signals are hidden.

Table 46

Message	Description
<p>There is a xxx that uses a channel to which no unit has been assigned. The xxx will be hidden. OK?</p>	<input type="button" value="Yes"/> Hides the setting of the signal, bus, protocol, or trigger that uses an unused channel (a channel to which no unit has been assigned) and closes the dialog box.
	<input type="button" value="No"/> Takes you back to the Set Channels and Threshold Voltages dialog box (xxx represents "signal," "bus," "protocol," or "trigger").

4.4.3. Setting Channels for Single Signals

In this tab, set channels for single signals.

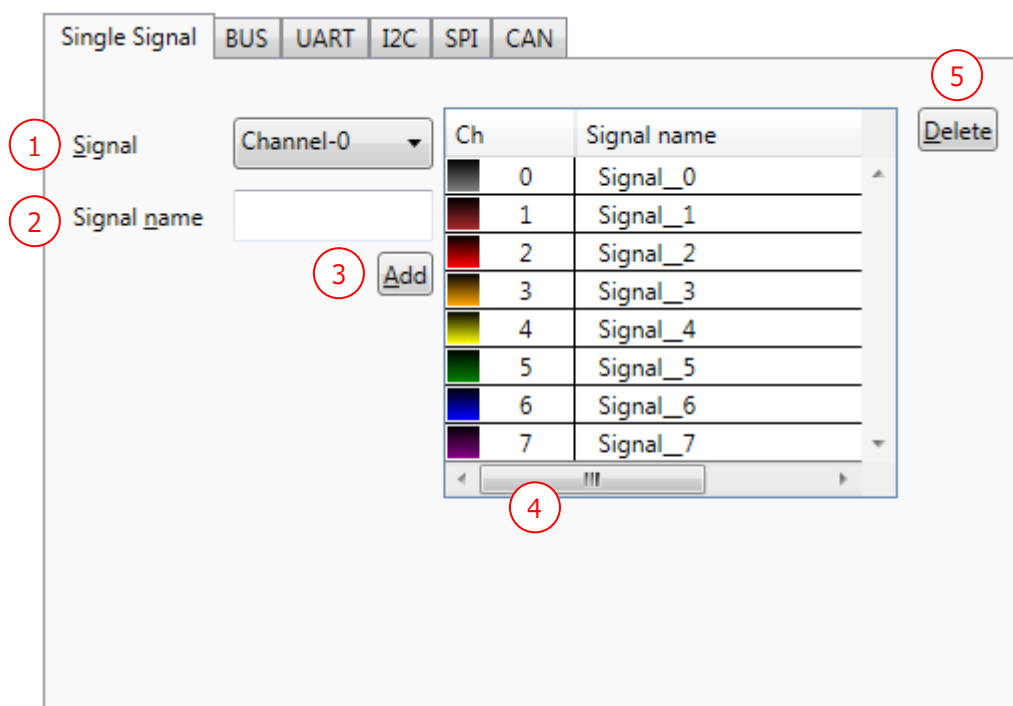


Figure 48

Table 47

(1) Signal	Channel numbers that can be selected are shown.
(2) Signal name	Enter a signal name. Up to 25 double-byte or single-byte alphanumeric characters can be used. A signal name entered here appears in the Name column of the Waveform window.
(3) Add	Clicking the Add button adds the signal set in (1) and (2) to the list (4). The same channel can be added more than once.
(4) Signal list	Shows registered single signals. Signals hidden in the Waveform window are also listed. Channel colors: By default, channels 0 to 7 are shown in gray, brown, red, orange, yellow, green, blue, and violet. This color pattern is repeated for channel 8 and subsequent channels. Ch: Channel numbers 0 to 31 are listed. If the same channel is created twice or more, the channel number is listed in the format of "○ – x." ○: Channel No. x: Figure starting from 1 Every time the same channel is created, this figure is incremented by 1. Signal name: Signal names set in (2) are listed.
(5) Delete	Clicking the Delete button with a signal selected on the list deletes the signal.

4.4.4. Setting Channels for Buses

In this tab, set channels for buses.

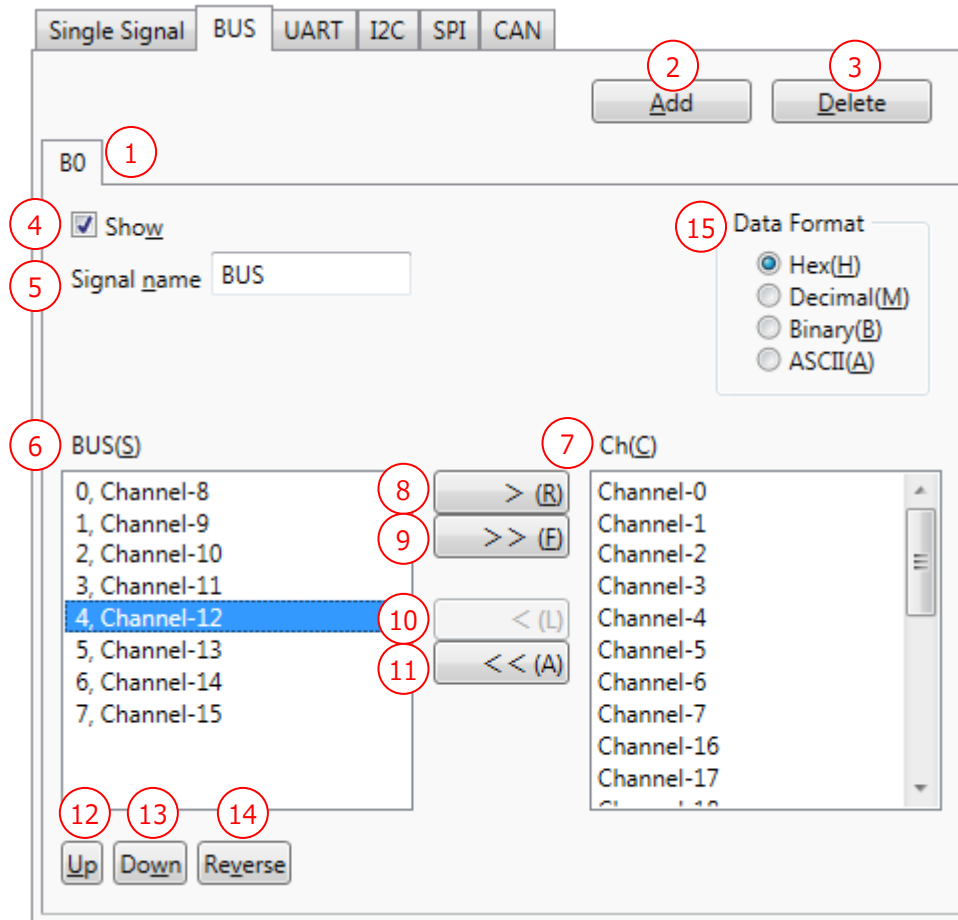


Figure 49

Table 48

(1) Bus No. (tab)	This is a tab for setting channels for a bus. This tab name ("B + figure") appears in the Ch column of the Waveform window.
(2) Add	Clicking the Add button adds a tab.
(3) Delete	Clicking the Delete button deletes the current tab.
(4) Show	Select whether to show or hide the signal on the Waveform window.
(5) Signal name	Enter a bus name. Up to 25 double-byte or single-byte alphanumeric characters can be used. A name entered here appears in the Name column of the Waveform window.
(6) BUS	Shows channels added to the bus (bus elements). Channels are listed in the format of "bit position, channel No." Channels are sorted by bit position in ascending order from 0.
(7) Ch	Channel numbers that can be selected are shown.
(8) >	Deletes a channel added to the bus.
(9) >>	Deletes all the channels added to the bus.

(10) <	Adds a channel selected in Ch to the bus. The channel is added to the bottom of the list.
(11) <<	Adds all the channels listed in Ch to the bus.
(12) Up	Moves up the selected channel.
(13) Down	Moves down the selected channel.
(14) Reverse	Reverses the bit positions of the bus (MSB/LSB).
(15) Data Format	<p>Select the display format on the Waveform window from the following:</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p>

4.4.5. Setting Channels for UART

In this tab, set channels for the UART protocol.

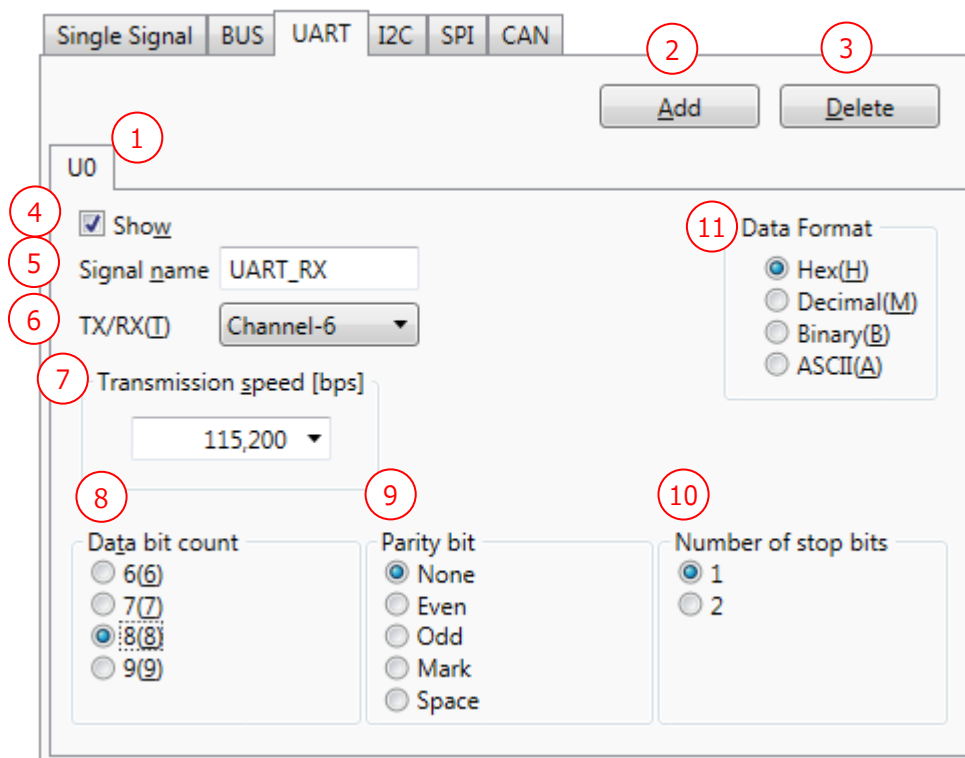


Figure 50

Table 49

(1) UART No. (tab)	<p>This is a tab for setting a channel for UART.</p> <p>This tab name ("U + figure") appears in the Ch column of the Waveform window.</p>
(2) Add	Clicking the Add button adds a new tab.
(3) Delete	Clicking the Delete button deletes the current tab.
(4) Show	Select whether to show or hide the signal on the Waveform window.
(5) Signal name	<p>Enter a UART name. Up to 25 double-byte or single-byte alphanumeric characters can be used.</p> <p>A name entered here appears in the Name column of the Waveform window.</p>
(6) TX/RX	<p>Set a channel for the TX or RX signal of UART.</p> <p>Channel numbers that can be selected are shown.</p> <p>This software does not distinguish between TX and RX. If you want to show the direction, give a signal name that indicates the direction.</p>

(7) Transmission speed	<p>Select a transmission speed in bps from among the following speeds or directly enter a transmission speed.</p> <p>A value in a range of 1 to 2,000,000 can be entered.</p> <p>110/300/600/1,200/2,400/4,800/9,600/14,400/19,200 38,400/57,600/115,200/230,400/460,800/921,600</p> <p>The default value is 115,200.</p>
(8) Data bit count	<p>Set the number of bits of data.</p> <p>Select from among 6 bits, 7 bits, 8 bits, and 9 bits.</p>
(9) Parity bit	<p>Set a parity bit.</p> <p>Select from among None, Even, Odd, Mark, and Space.</p>
(10) Number of stop bits	<p>Set the number of stop bits.</p> <p>Select from between 1 bit and 2 bits.</p>
(11) Data Format	<p>Select the display format on the Waveform window from the following:</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p>

4.4.6. Setting Channels for I2C

In this tab, set channels for the I2C protocol.

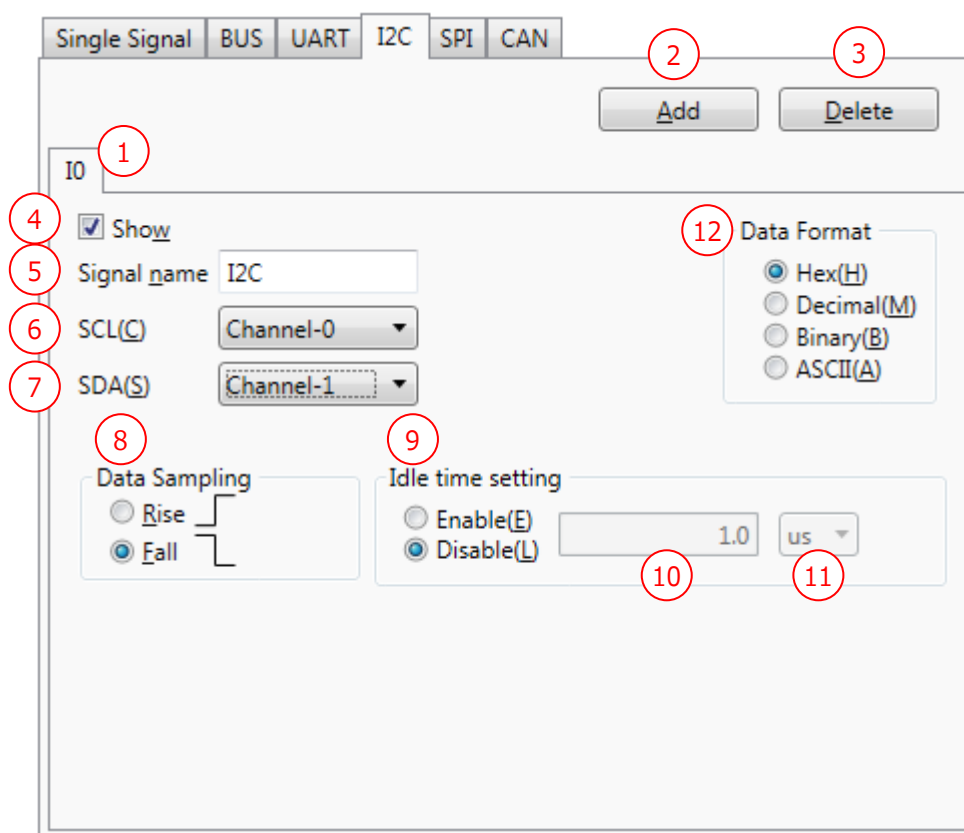


Figure 51

Table 50

(1) I2C No. (tab)	This is a tab for setting channels for I2C. This tab name ("I + figure") appears in the Ch column of the Waveform window.
(2) Add	Clicking the Add button adds a new tab.
(3) Delete	Clicking the Delete button deletes the current tab.
(4) Show	Select whether to show or hide the signal on the Waveform window.
(5) Signal name	Enter an I2C name. Up to 25 double-byte or single-byte alphanumeric characters can be used. A name entered here appears in the Name column of the Waveform window.
(6) SCL	Set a channel for the SCL signal of I2C. Channel numbers that can be selected are shown.
(7) SDA	Set a channel for the SDA signal of I2C. Channel numbers that can be selected are shown.
(8) Data sampling	Set whether to sample data at rising (↑) edges or falling (↓) edges of SCL.
(9) Idle time setting	Set whether to enable or disable the idle time to determine the end of a frame. The default value is "Disable."

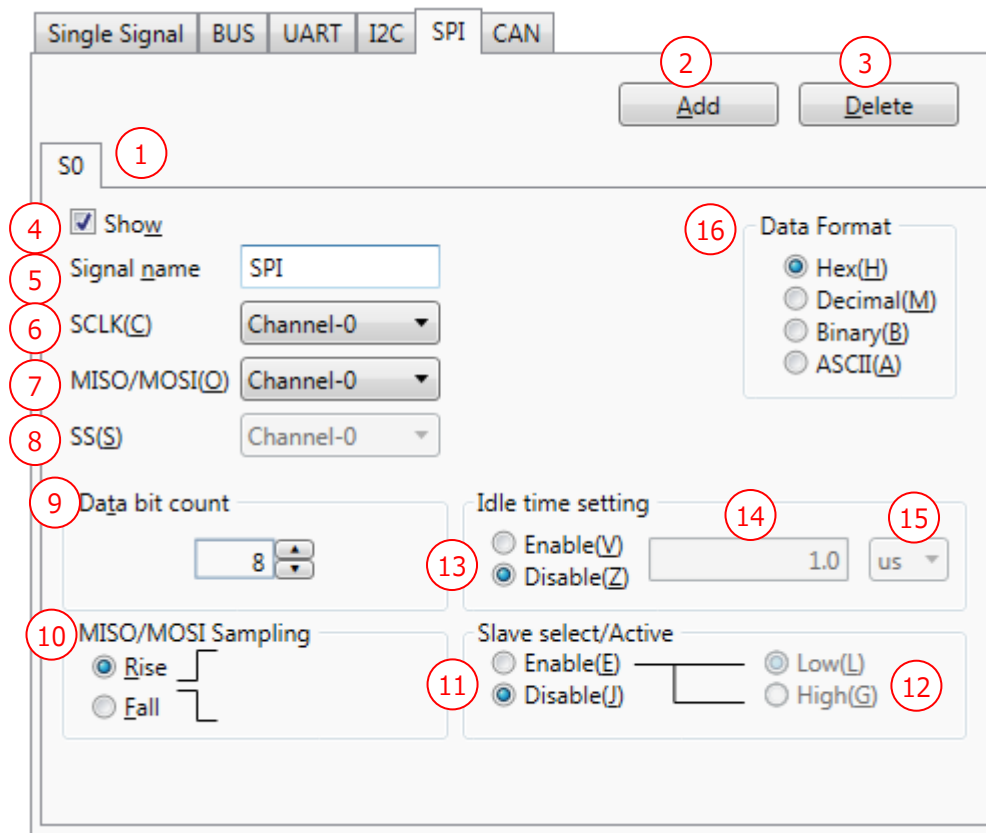
(10) Idle time	<p>Enter a duration of time before the software determines that the bus is in the idle state.</p> <p>The minimum unit of time that can be set is the sampling period.</p> <p>[Example] When the sampling frequency is 100 ns/10 MHz, the minimum unit of time that can be set is 100 ns.</p> <p>A duration of time in the following range can be set:</p> <p>(Minimum unit x 10) ≤ idle time ≤ (minimum unit x 16000)</p> <p>[Example] When the sampling frequency is 100 ns/10 MHz, the minimum and maximum values that can be set are as follows:</p> <p>Minimum value = 100 ns x 10 = 1 us</p> <p>Maximum value = 100 ns x 16000 = 1.6 ms</p>
(11) Unit of the idle time	<p>Select the unit of the idle time.</p> <p>Which unit can be set depends on the sampling frequency.</p> <p>100 MHz to 25 MHz: ns/us</p> <p>10 MHz to 2 MHz: ns/us/ms</p> <p>1 MHz to 20 kHz: us/ms</p> <p>1 kHz: ms/s</p>
(12) Data Format	<p>Select the display format on the Waveform window from the following:</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p>

● I2C analysis

- If there is data (shorter than the specified bit length) that has not been output when a timeout is caused by the elapse of the idle time or when a stop or restart condition is detected, that data is output as an unanalyzable event.
- If analysis is started during transmission (when both of SCL and SDA are not in the "H" state), data is thrown away until a start condition (or a stop condition) is detected.

4.4.7. Setting Channels for SPI

In this tab, set channels for the SPI protocol.



The screenshot shows the SPI configuration window with the following elements highlighted by red circles:

- 1: SPI tab
- 2: Add button
- 3: Delete button
- 4: Show checkbox
- 5: Signal name input field (SPI)
- 6: SCLK(C) dropdown menu (Channel-0)
- 7: MISO/MOSI(O) dropdown menu (Channel-0)
- 8: SS(S) dropdown menu (Channel-0)
- 9: Data bit count input field (8)
- 10: MISO/MOSI Sampling radio buttons (Rise selected)
- 11: Slave select/Active radio buttons (Disable(J) selected)
- 12: Low(L) radio button
- 13: Idle time setting radio buttons (Disable(Z) selected)
- 14: Idle time setting input field (1.0)
- 15: Idle time setting unit dropdown menu (us)
- 16: Data Format group box containing Hex(H), Decimal(M), Binary(B), and ASCII(A) radio buttons (Hex(H) selected)

Figure 52

Table 51

(1) SPI No. (tab)	<p>This is a tab for setting channels for SPI.</p> <p>This tab name ("S + figure") appears in the Ch column of the Waveform window.</p>
(2) Add	Clicking the Add button adds a new tab.
(3) Delete	Clicking the Delete button deletes the current tab.
(4) Show	Select whether to show or hide the signal on the Waveform window.
(5) Signal name	<p>Enter an SPI name. Up to 25 double-byte or single-byte alphanumeric characters can be used.</p> <p>A name entered here appears in the Name column of the Waveform window.</p>
(6) SCLK	<p>Set a channel for the SCLK signal of SPI.</p> <p>Channel numbers that can be selected are shown.</p>
(7) MISO/MOSI	<p>Set a channel for the MISO or MOSI signal of SPI.</p> <p>Channel numbers that can be selected are shown.</p> <p>This software requires you to make settings for the SPI protocol separately for each of MISO and MOSI to be analyzed.</p>
(8) SS	<p>Set a channel for the SS signal of SPI.</p> <p>Channel numbers that can be selected are shown.</p>
(9) Data bit count	<p>Set the number of bits of MISO/MOSI data.</p> <p>Set the number of bits in a range of 8 to 256 in units of 8 bits.</p> <p>The default value is 8.</p> <p>This can be set when the external sampling clock is enabled.</p>
(10) MISO/MOSI sampling	Set whether to sample MISO/MOSI data at rising (↑) edges or falling (↓) edges of SCLK.
(11) Slave select	<p>Set whether to enable or disable SS (slave select).</p> <p>Enable: Performs SPI protocol analysis when SS is active.</p> <p>Disable: Ignores SS when SPI protocol analysis is performed.</p>
(12) Active	<p>Select when the slave select signal in (11) is active from between Low and High.</p> <p>This can be set when slave select in (11) is enabled.</p>
(13) Idle time setting	<p>Set whether to enable or disable the idle time to determine the end of a frame.</p> <p>The default value is "Disable."</p> <p>This can be set when slave select in (11) is disabled.</p>

(14) Idle time	<p>Enter a duration of time before the software determines that the bus is in the idle state.</p> <p>The minimum unit of time that can be set is the sampling period.</p> <p>[Example] When the sampling frequency is 100 ns/10 MHz, the minimum unit of time that can be set is 100 ns.</p> <p>A duration of time in the following range can be set:</p> <p>(Minimum unit × 10) ≤ idle time ≤ (minimum unit × 16000)</p> <p>[Example] When the sampling frequency is 100 ns/10 MHz, the minimum and maximum values that can be set are as follows:</p> <p>Minimum value = 100 ns × 10 = 1 us</p> <p>Maximum value = 100 ns × 16000 = 1.6 ms</p>
(15) Unit of the idle time	<p>Select the unit of the idle time.</p> <p>Which unit can be set depends on the sampling frequency.</p> <p>100 MHz to 25 MHz: ns/us</p> <p>10 MHz to 2 MHz: ns/us/ms</p> <p>1 MHz to 20 kHz: us/ms</p> <p>10 kHz to 2 kHz: us/ms/s</p> <p>1 kHz: ms/s</p>
(16) Data Format	<p>Select the display format on the Waveform window from the following:</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p>

● SPI analysis

- If SS (slave select) is enabled and analysis is started when SS is already active (or during transmission), bit positions are unknown and data cannot be read.
Thus, if SS is active when analysis is started, analysis is not performed until it becomes inactive.
- If SS is disabled and analysis is started during transmission, data is read from the MSB since there is no means of synchronization.
This may result in bit position information deviating from actual transmission
(However, this is not the case with reset caused by the elapse of the idle time when the idle time setting is enabled).
- Basically, as a "Data" event, obtained data is output on a transmission-by-transmission (frame-by-frame) basis.
However, if SS and the idle time setting are disabled, frames cannot be recognized, and data is output in units of the set data bit count.

4.4.8. Setting Channels for CAN

In this tab, set channels for the CAN protocol.

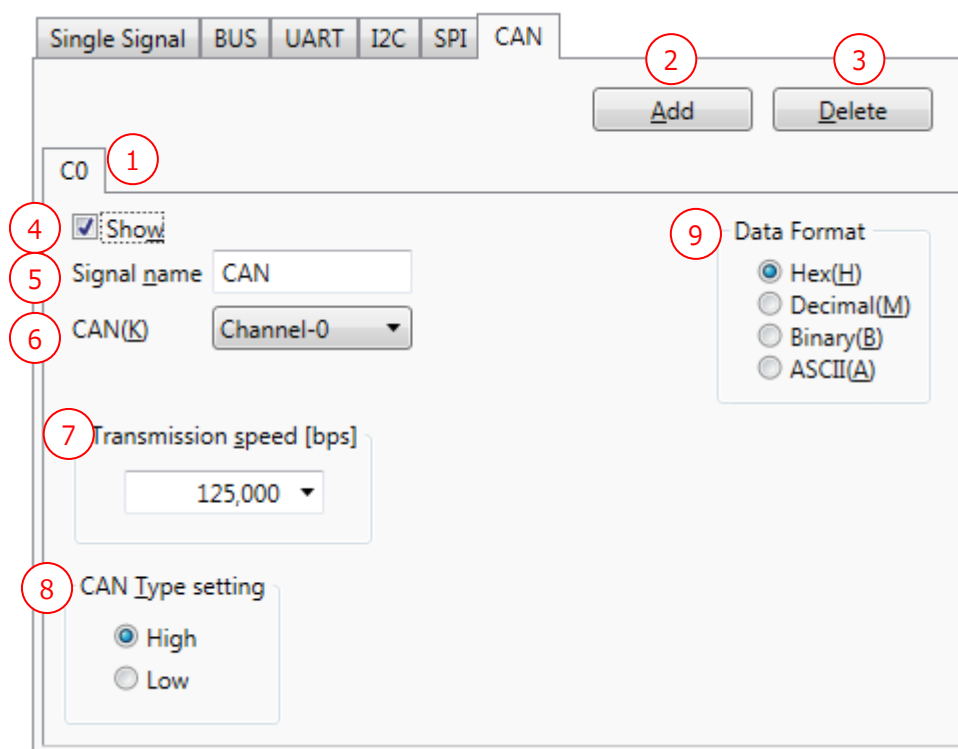


Figure 53

Table 52

(1) CAN No. (tab)	<p>This is a tab for setting a channel for CAN.</p> <p>This tab name ("C + figure") appears in the Ch column of the Waveform window.</p>
(2) Add	Clicking the Add button adds a new tab.
(3) Delete	Clicking the Delete button deletes the current tab.
(4) Show	Select whether to show or hide the signal on the Waveform window.
(5) Signal name	<p>Enter a CAN name. Up to 25 double-byte or single-byte alphanumeric characters can be used.</p> <p>A name entered here appears in the Name column of the Waveform window.</p>
(6) CAN	<p>Set a channel for the CAN signal.</p> <p>Channel numbers that can be selected are shown.</p>

(7) Transmission speed	<p>Select a transmission speed in bps from among the following speeds or directly enter a transmission speed.</p> <p>A value in a range of 1 to 1,000,000 can be entered.</p> <p>10,000/20,000/40,000/50,000/80,000/100,000/125,000/200,000/250,000/400,000/500,000/660,000/800,000/1,000,000</p> <p>The default value is 125,000.</p>
(8) CAN Type setting	<p>Select a type of the CAN signal.</p> <p>Select from between High and Low.</p>
(9) Data Format	<p>Select the display format on the Waveform window from the following:</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p>

● CAN analysis

- If a dominant or recessive state is detected in 6 consecutive bits during frame analysis, it is judged that an error frame caused interruption.
However, if the error flag has already been under analysis, or in the following analysis phases, that is not recognized as an error flag.
 - ✧ Outside the range of passive error (recessive) detection
 - EOF/overload delimiter/error delimiter analysis is underway.
 - ✧ Outside the range of active error (dominant) detection
 - Overload flag analysis is underway.
- The trigger position of a CRC error is the position of the CRC delimiter.
- The trigger position of an error frame is the position of the error delimiter.
- The trigger position of RTR or SRR is the position of IDE (This is because IDE serves as a bit to identify RTR or SRR).
- Until the value of IDE is obtained and the format is judged, whether the first bit is RTR in the standard format or SRR in the extended format cannot be determined. For this reason, these events are output when the value of IDE has been read.
- If it is found in data (field) analysis that a value greater than 8, the upper limit for DLC, is set in DLC, 8 is assumed.
- If a form error (an incorrect CRC/ACK delimiter value, etc.) is detected, the error flag is not analyzed after the detection of the incorrect value, but the next field is analyzed (For the incorrect value, an unanalyzable event is output).
Thus, even if a form error occurs in actual transmission and an error flag is sent, that data (the error flag) is analyzed as the following data until it is recognized as an error flag (or until 6 consecutive bits of the same level are received).
- The values of R1, R0, and SRR are not checked.

4.5. Trigger Settings Window

4.5.1. Trigger Settings

In the trigger settings, you can select between internal trigger and external trigger and set various settings for each trigger type.

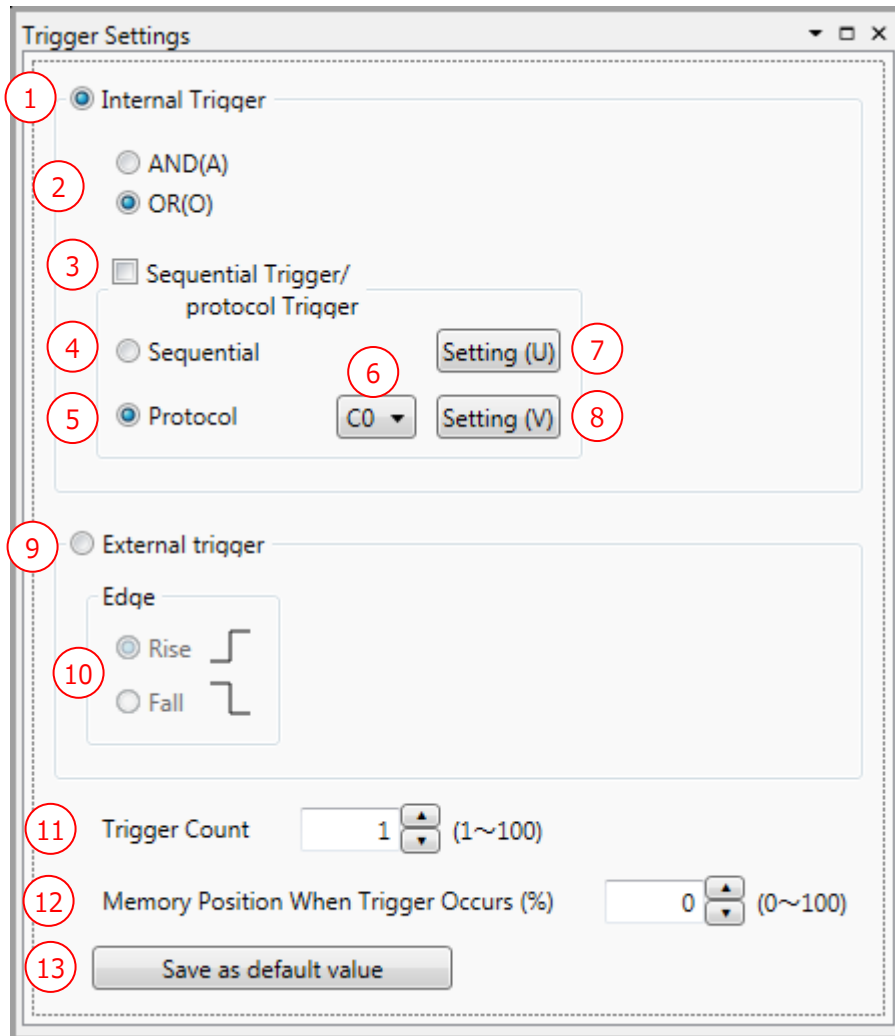




Figure 54

Table 53

(1) Internal Trigger	Select this when you use the internal pattern edge trigger, sequential trigger, and protocol trigger. It is not possible to set an external trigger at the same time.
(2) AND/OR	Specifies whether to AND or OR the trigger conditions for each signal and the sequential or protocol trigger conditions. AND : Verifies whether all trigger conditions are met. OR : Verifies whether any trigger condition is met
(3) Sequential Trigger / Protocol Trigger	Set this when you use the sequential trigger or the protocol trigger. The pattern edge trigger can be selected at the same time.
(4) Sequential	Select this when you set a sequential pattern of 8 Ch x 256 steps (maximum) as the trigger condition for the unit that is selected as the master. It is possible to set the pattern edge trigger at the same time, but it is not possible to set the protocol trigger at the same time.
(5) Protocol	Select this when you use the trigger for an event of UART/SPI/I2C/CAN protocol. It is possible to set the pattern edge trigger at the same time, but it is not possible to set the sequential trigger at the same time.
(6) Selection of protocol trigger	Select the protocol for which trigger is set. Protocol options that are set are displayed in the list.
(7) Setting (sequential trigger)	Clicking this button opens the sequential trigger setting dialog box and allows you to specify settings.  For details, refer to " 4.5.2. Sequential Trigger Settings. "
(8) Setting (protocol trigger)	Clicking this button opens the setting dialog box for the selected protocol and allows you to specify settings.  For details, refer to " 4.5.3. UART Trigger Settings " to " 4.5.6. CAN Trigger Settings. "
(9) External Trigger	Select this when you use an external trigger signal as the trigger. It is not possible to set an internal trigger at the same time. As the signal for external trigger, input a signal whose signal level after its rise and fall is retained for 20 ns or longer. If the signal level cannot be retained for 20 ns or longer, the trigger may not be detected.
(10) Edge	Select whether to set the rise (↑) or the fall (↓) of external trigger signal as the trigger.
(11) Trigger count	When the condition for internal trigger or external trigger is met for the number of times set here, trigger is applied. Set a value in the range of 1 to 100.

(12) Memory Position When Trigger Occurs	<p>Set the memory position when trigger occurs. Set a value in the range of 0 to 100%.</p> <p>For example, when the memory capacity is 16 Kbit and 60% is set here, 9.6 Kbit is sampled before trigger and 6.4 Kbit after trigger.</p> <p>→ Also refer to Figure 22.</p>
(13) Save as default value	<p>Saves the current settings as the default values in the initial setting file. When the software is started up next time, the value set here is set as the default value.</p> <p>Before execution of Save As Default Value, the message shown in Table 54 is displayed.</p> <p>After confirming the command, execute save.</p>

Table 54

Message	Description
Do you want to save the current settings as the default?	<p>Select whether to save the current setting as the default value.</p> <p><input type="button" value="Yes"/> Saves the setting.</p> <p><input type="button" value="No"/> Does not save the setting.</p>



When the external sampling clock is selected, the UART, I2C, and CAN protocol trigger cannot be used.



It takes 10 clocks to recognize a trigger after input of data.

When the external sampling clock is selected, if the input data contain a trigger data in the last 10 clocks, it is not recognized as a trigger and the measurement is interrupted.

By inputting a sufficient number of clocks or stopping the measurement, the data serving as trigger can be observed.

4.5.2. Sequential Trigger Settings

The sequential trigger settings set a sequential pattern of 8 Ch x 256 steps (maximum) to the unit that is set as the master.

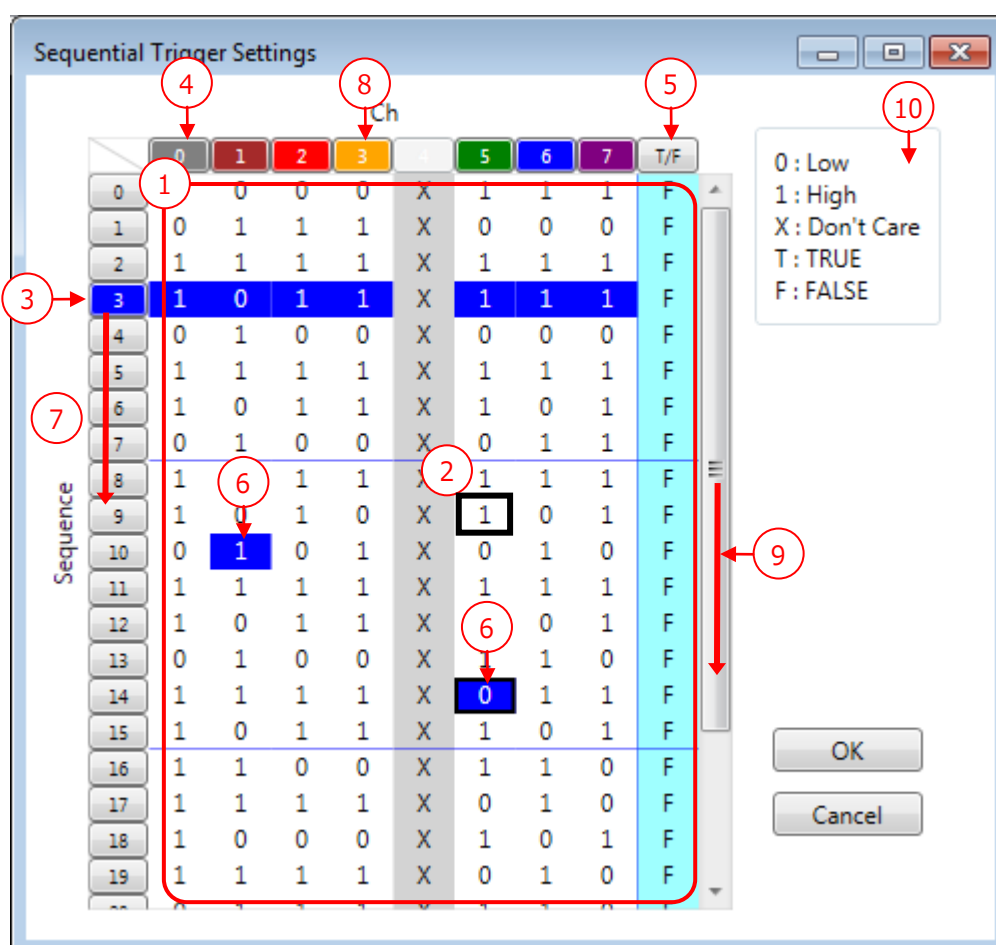



Figure 55

Table 55

(1) Trigger data input section	This is an area to which trigger data are input. For how to input data in the trigger data input section by using the keyboard, refer to Table 56.
(2) Cursor	The cursor is indicated by a rectangle with thick frame () For how to move the cursor using the keyboard, refer to Table 56.
(3) Selection of step number	If you left-click a step number in the sequence, all channels in the step are selected. Logical condition (T: coincidence/F: non-coincidence) is not selected.
(4) Selection of channel	If you click a channel number, all steps in the channel are selected.
(5) Selection of logical condition	If you click a "T/F" button, all logical conditions of the step are selected.

By using the "Ctrl" key and "Shift" key, you can select two or more desired channels and logical condition steps.

The selected steps are indicated in the reversed color.

You cannot select steps in a channel row and the logical condition row (T/F) at the same time.

[Example]

If you click a step in a desired channel (1) and then click another step (2) while holding down the Shift key, you can select the steps between (1) and (2).

The area encircled by the red frame in the figure below is the selected area.

● **Selection of multiple channels at a sample position**

9	0	0	(1)0	X	0	0	0	0	(2)T
10	0	0	1	X	0	0	X	1	T
11	0	1	0	X	0	X	1	0	F
12	1	0	0	X	X	0	1	1	T

(6) Selection of step

● **Selection of multiple sample positions of logical condition**

9	0	0	0	X	0	0	0	0	(1)T
10	0	0	1	X	0	0	X	1	T
11	0	1	0	X	0	X	1	0	F
12	1	0	0	X	X	0	1	1	T
13	1	1	1	X	0	1	0	0	F
14	1	0	1	X	0	1	0	0	F
15	0	0	0	X	0	0	0	0	T
16	0	0	1	X	0	0	X	0	(2)T

● **Selection of multiple steps of multiple channels**

9	0	0	(1)0	X	0	0	0	0	T
10	0	0	1	X	0	0	X	1	T
11	0	1	0	X	0	X	1	0	F
12	1	0	0	X	X	0	1	1	T
13	1	1	1	X	0	1	0	0	F
14	1	0	1	X	0	1	0	0	F
15	0	0	0	X	0	(2)0	0	0	T

(7) Move of step

By dragging and dropping a selected step number, you can move it to any desired position. You can also move multiple steps altogether.

(8) Don't Care state of used channel

If a channel is used for external sampling clock or set with pattern edge trigger, it is treated as Don't Care channel and its background color turns to gray.

(9) Move of display area

When all steps cannot be displayed, a scroll bar is displayed.

(10) Explanation of indications

This section briefly explains the displayed items ("0"/"1"/"X"/"T"/"F").

OK

Enables the set contents and closes the dialog box.

Cancel

Cancels the setting and closes the dialog box.



The sequential trigger can be set only to the probe set in the master by using the channel connection described in [4.4.2. Setting Channels and Threshold Voltages](#).



Steps whose channels are all set to Don't Care are automatically deleted.
For example, in the following setting state, if you change the value of channel 7 in (n-1) step from 1 to X, the (n-1) step will be automatically deleted.

	0	1	2	3	4	5	6	7	T/F
n-1	X	X	X	X	X	X	X	1	T
n	0	1	1	X	1	0	1	0	T

● Operation using cursor

Table 56

Move of cursor	<p>By using "↑," "↓," "→," and "←" keys, you can freely move the cursor in the channel and logical condition area. The channels set as Don't Care are skipped.</p> <p>If "↓" key is pressed in the last step position of the currently displayed sequence, steps containing channels all set with "X(Don't Care)" are added and setting is enabled.</p> <p>If nothing is set in the selected step and you move the cursor upward, the step will be deleted.</p>
Move of cursor to beginning	<p>When the "Home" key is pressed, the cursor moves to the leftmost channel of the selected step.</p> <p>When the "Ctrl" + "Home" keys are pressed, the cursor moves to the leftmost channel of step 0.</p>
Move of cursor to end	<p>When the "End" key is pressed, the cursor moves to the rightmost channel of the selected step.</p> <p>When the "Ctrl" + "End" keys are pressed, the cursor moves to the rightmost channel of the last step.</p>
Entry of numeric value	<p>By pressing "1," "0," and "X"/"x"/"*" keys with a channel row selected, you can set the trigger condition.</p> <p>1 : Sets High.</p> <p>0 : Sets Low.</p> <p>X/x/* : Sets Don't Care.</p> <p>After a numeric value is entered, the cursor moves downward (to next step).</p>
Entry of True/False	<p>By pressing "T"/"t" and "F"/"f" keys with the T/F row selected, you can set True/False (coincidence/non-coincidence).</p> <p>T/t : Sets to coincidence condition.</p> <p>F/f : Sets to non-coincidence condition.</p> <p>After a numeric value is entered, the cursor moves downward (to next step).</p> <p>In a False (non-coincidence) step, the background color of all channels is turned to light blue.</p>

● Context menu for sequential trigger setting

Right-clicking in the trigger data input section displays a context menu.

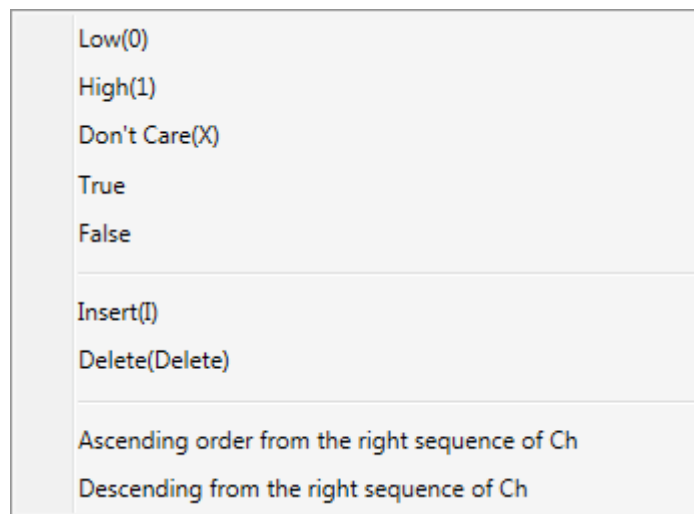


Figure 56

Table 57

Low	Sets the condition for the currently selected position to "0" (FALSE). This is effective only when a channel row is selected.
High	Sets the condition for the currently selected position to "1" (TRUE). This is effective only when a channel row is selected.
Don't Care	Sets the condition for the currently selected position to "X" (Don't Care). This is effective only when a channel row is selected.
True	Sets the condition for the currently selected position to "T" (True: coincidence). This is effective only when the T/F row is selected.
False	Sets the condition for the currently selected position to "F" (False: non-coincidence). This is effective only when the T/F row is selected.
Insert	Adds a new step line (all channels set to Don't Care) next to (below) the currently selected step. If 255 steps have been set already, the 255th step will be deleted.
Delete	Deletes the selected step.
Arrange Ch in Ascending Order from Left	Arranges the indication of channels in the order of 0, 1, 2, ... from left.
Arrange Ch in Descending Order from Left	Arranges the indication of channels in the order of 7, 6, 5, ... from left.

4.5.3. UART Trigger Settings

Set the trigger for UART protocol.

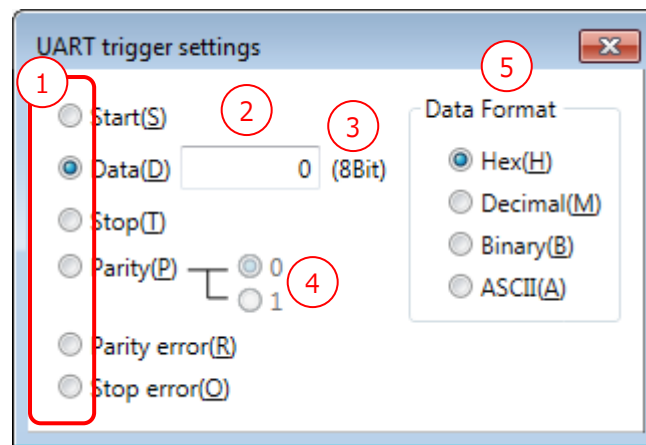


Figure 57

Table 58

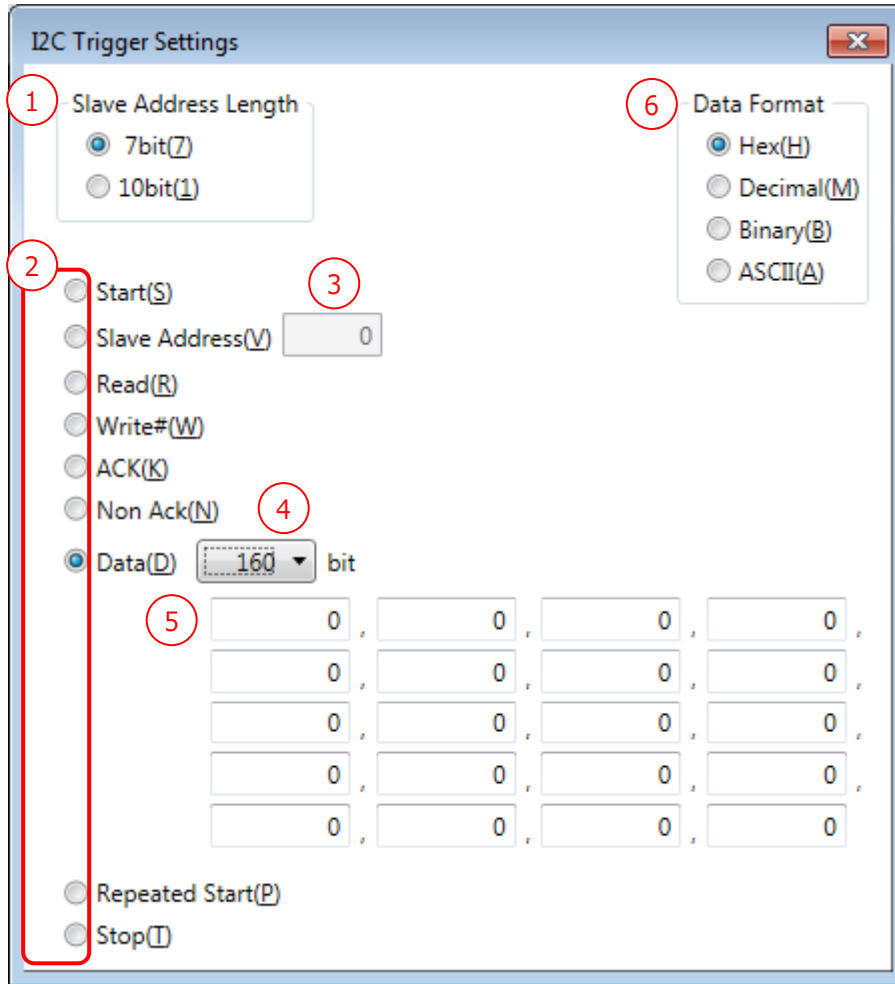
(1) Selection of trigger event	Selects the event to be set as the trigger condition.
(2) Data setting	Inputs a value of TX/RX data that is set as the trigger condition. The initial value is 0. Checks the input range according to the (8) Number of data bits explained in 4.4.5. Setting Channels for UART .
(3) Indication of data bit number	Indicates the data bit number explained in 4.4.5. Setting Channels for UART .
(4) Selection of parity data	Selects the trigger condition for parity bit.
(5) Data Format	Specifies the format of data to be entered. Hex: Displays in hexadecimal format. Decimal: Displays in decimal format. Binary: Displays in binary format. ASCII: Displays in ASCII format.



The UART protocol trigger cannot be used if an external sampling clock is selected.

4.5.4. I2C Trigger Settings

Set the trigger for I2C protocol.



The image shows the 'I2C Trigger Settings' dialog box with the following settings and annotations:

- 1** Slave Address Length: ☒ 7bit(7), ☐ 10bit(1)
- 2** (Grouped by a red bracket):
 - ☐ Start(S)
 - ☐ Slave Address(V) (**3**)
 - ☐ Read(R)
 - ☐ Write#(W)
 - ☐ ACK(K)
 - ☐ Non Ack(N)
 - ☒ Data(D) bit (**4**)
- 5** (Grouped by a red bracket):

<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
- ☐ Repeated Start(P)
- ☐ Stop(T)
- 6** Data Format: ☒ Hex(H), ☐ Decimal(M), ☐ Binary(B), ☐ ASCII(A)

Figure 58

Table 59

(1) Slave Address Length	Select the slave address length between 7 bit and 10 bit with which the trigger is applied.
(2) Selection of trigger event	Select the event to be set as the trigger condition using the radio button.
(3) Slave Address	Enter the value of the slave address. The initial value is 0. Checks the input range according to the number of bits specified in (1).
(4) Data (Length)	Specifies the data length of trigger data in units of 8 bits. It can be set in the range of 8 to 160. The initial value is 8 bits.
(5) Data (Data)	Sets trigger data in units of 8 bits. Entry fields in the number equivalent to one-eighths of the bit number specified in (4) are displayed. The initial value is 0. To the data positions where you do not set as trigger condition, enter "XX"/"xx"/"***". When entry of data that are specified in (6) Data Format is completed, the cursor automatically moves to the next entry position. However, when "XX"/"xx"/"***" are entered while ASCII is selected as Data Format, the cursor does not move. Checks the input range in units of 8 bits.
(6) Data Format	Specifies the format of data to be entered. When the format is changed, the data display is updated according to the format. Hex: Displays in hexadecimal format. Decimal: Displays in decimal format. Binary: Displays in binary format. ASCII: Displays in ASCII format. When an event with Slave Address is selected, entry of ASCII data is disabled.



The I2C protocol trigger cannot be used if an external sampling clock is selected.

4.5.5. SPI Trigger Settings

Set the trigger for SPI protocol.

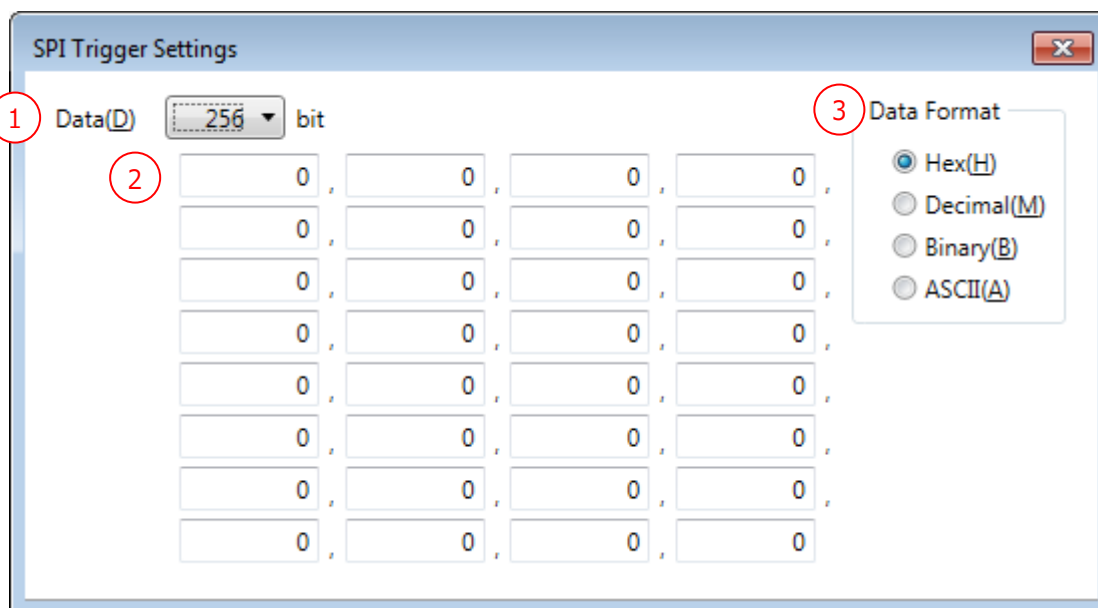


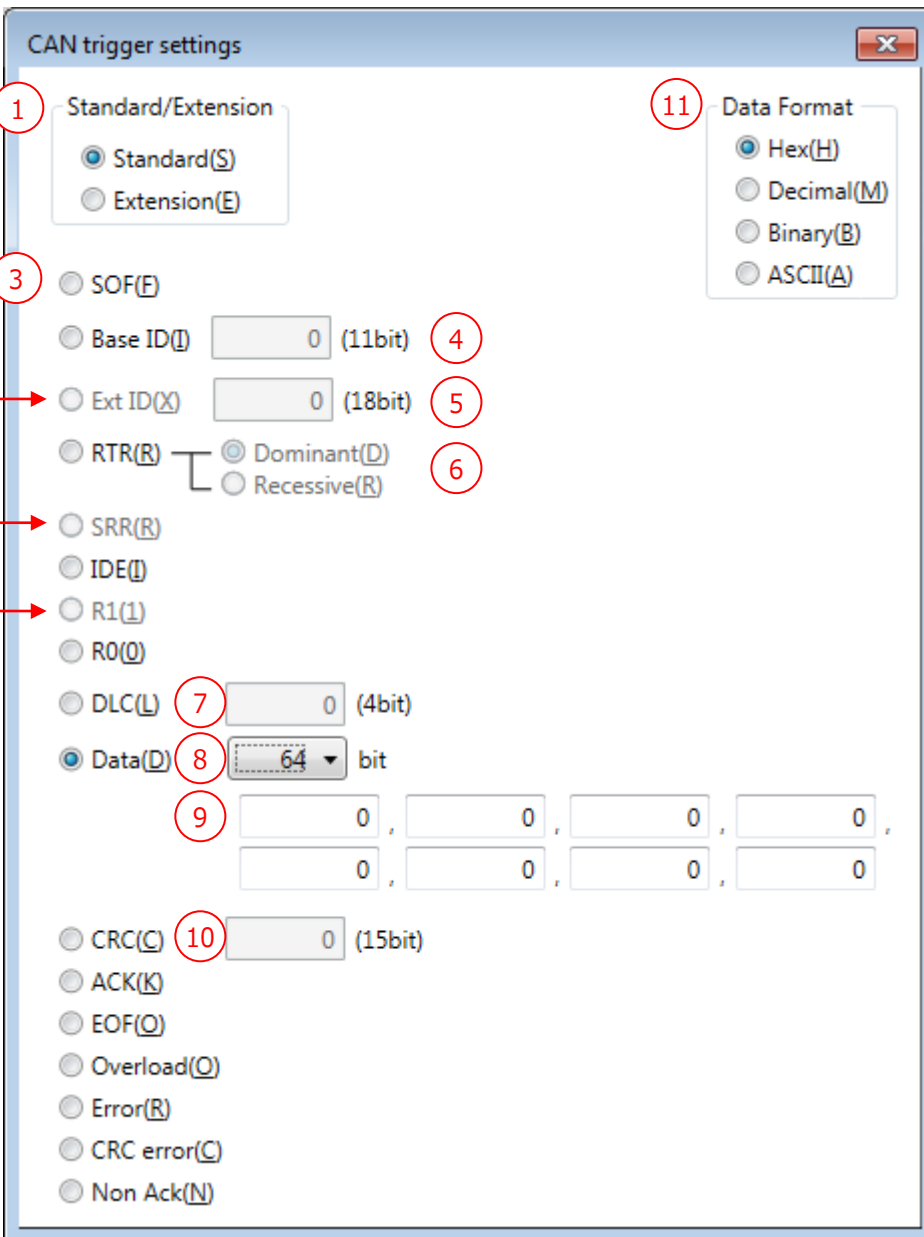
Figure 59

Table 60

(1) Data (Length)	Specifies the data length of trigger data in units of 8 bits. It can be set in the range of 8 to 256. The initial value is 8 bits.
(2) Data (Data)	<p>Enters trigger data in units of 8 bits.</p> <p>Entry fields in the number equivalent to one-eighths of the bit number specified in ① are displayed. The initial value is 0.</p> <p>To the data positions where you do not set as trigger condition, enter "XX"/"xx"/"***."</p> <p>When entry of data that are specified in (3) Data Format is completed, the cursor automatically moves to the next entry position.</p> <p>However, when "XX"/"xx"/"***" are entered while ASCII is selected as Data Format, the cursor does not move. Checks the input range in units of 8 bits.</p>
(3) Data Format	<p>Specifies the format of data to be entered.</p> <p>When the format is changed, the data display is updated according to the format.</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p>

4.5.6. CAN Trigger Settings

Set the trigger for CAN protocol.



CAN trigger settings

1 **Standard/Extension**
☒ Standard(S)
☐ Extension(E)

11 **Data Format**
☒ Hex(H)
☐ Decimal(M)
☐ Binary(B)
☐ ASCII(A)

3 ☐ SOF(E)

2 ☐ Base ID(I) 0 (11bit) 4

2 ☐ Ext ID(X) 0 (18bit) 5

☐ RTR(R) ☒ Dominant(D) 6
☐ Recessive(R)

2 ☐ SRR(R)

2 ☐ IDE(I)

2 ☐ R1(L)

☐ R0(Q)

☐ DLC(L) 7 0 (4bit)

☒ Data(D) 8 64 bit

9 0 , 0 , 0 , 0 ,
0 , 0 , 0 , 0

☐ CRC(C) 10 0 (15bit)

☐ ACK(K)

☐ EOF(Q)

☐ Overload(O)

☐ Error(R)

☐ CRC error(C)

☐ Non Ack(N)

Figure 60

Table 61

(1) Standard/Extension	Select the format between Standard and Extension in which trigger is applied.
(2) Event when Extension format is selected	Ext ID/SRR/R1 events are effective only when Extension is selected in (1).
(3) Selection of trigger event	Select the event to be set as the trigger condition using the radio button.
(4) Base ID	Enter the value of base ID. Checks the input range in units of 11 bits. The initial value is 0.
(5) Ext ID	Enter the value of extension ID. Checks the input range in units of 18 bits. The initial value is 0.
(6) RTR	Select between Dominant ("0") and Recessive("1").
(7) DLC	Enter the data length value. Checks the input range in units of 4 bits. The initial value is 0.
(8) Data setting of trigger data length	Specifies the data length of trigger data in units of 8 bits. It can be set in the range of 8 to 64. The initial value is 8 bits.
(9) Data setting of trigger data	<p>Enters trigger data in units of 8 bits.</p> <p>Entry fields in the number equivalent to one-eighths of the bit number specified in ⑧ are displayed. The initial value is 0.</p> <p>To the data positions where you do not set as trigger condition, enter "XX"/"xx"/"***."</p> <p>When entry of data that are specified in (11) Data Format is completed, the cursor automatically moves to the next entry position.</p> <p>However, when "XX"/"xx"/"***" are entered while ASCII is selected as Data Format, the cursor does not move. Checks the input range in units of 8 bits.</p>
(10) CRC	Enters CRC value. Checks the input range in units of 15 bits. The initial value is 0.
(11) Data Format	<p>Specifies the format of data to be entered.</p> <p>This setting is disabled when an event other than Base ID/Ext ID/DLC/Data/CRC is selected.</p> <p>When the format is changed, the data display is updated according to the format.</p> <p>Hex: Displays in hexadecimal format.</p> <p>Decimal: Displays in decimal format.</p> <p>Binary: Displays in binary format.</p> <p>ASCII: Displays in ASCII format.</p> <p>When any of Base ID/Ext ID/DLC/CRC events is selected, it is not possible to set ASCII.</p>



The CAN protocol trigger cannot be used if an external sampling clock is selected.

4.6. Environment Setting Dialog Box

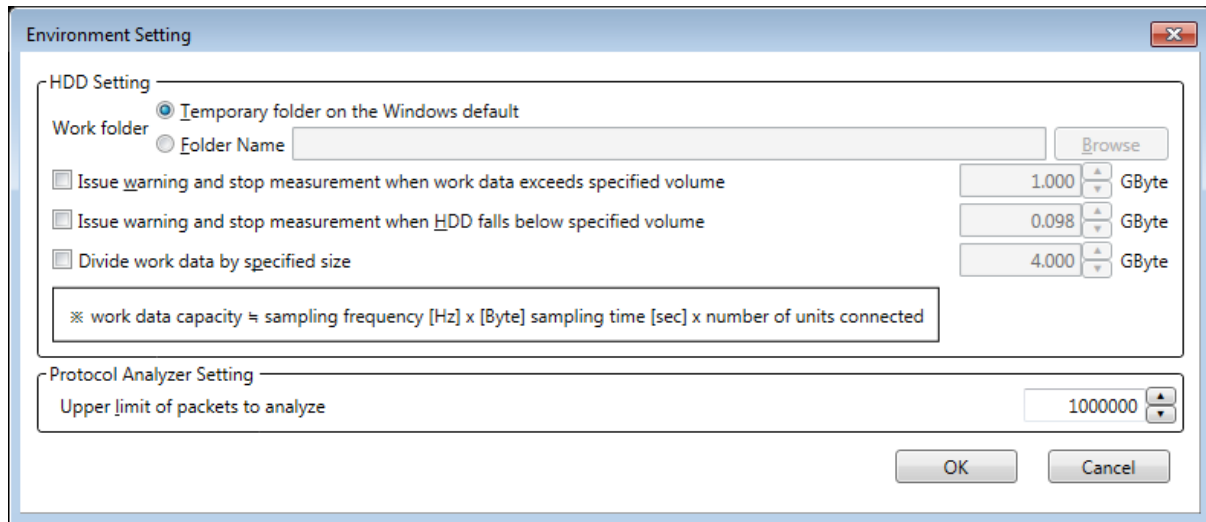



Figure 61

Table 62

Work folder	<p>Temporary folder on the Windows default:</p> <p>Select this when you use the Windows default temporary folder as the work folder.</p> <p>Folder Name:</p> <p>Select this when the folder specified by the user is used as the work folder.</p> <p>Specify the folder name in full path.</p> <p>Once the focus moves to another item or the  button is pressed, checks if the folder is valid.</p>
Browse	<p>This button is enabled when the work folder is specified by the user. Clicking this button displays a dialog box for folder selection.</p>
Issue warning and stop measurement when work data exceeds specified volume.	<p>Select this if you intend to stop measurement automatically when the volume of work data exceeds the specified volume.</p> <p>When the measurement stops, a warning message is displayed. As default, this is disabled (unchecked).</p> <p>The volume can be set in the range of 0.001 to 1,000 GByte. The default value is 1 GByte.</p>

Issue warning and stop measurement when HDD falls below specified volume.	<p>Select this if you intend to stop measurement automatically when the free space of the drive containing the work folder falls below the specified volume.</p> <p>When the measurement stops, a warning message is displayed.</p> <p>As default, this is enabled (checked).</p> <p>The volume can be set in the range of 0.001 to 1,000 GByte.</p> <p>The default value is 0.1GByte.</p>
Divide work data by specified size.	<p>Set whether to save work data by dividing it.</p> <p>The volume can be set in the range of 0.001 to 1,000 GByte.</p> <p>The default value is 4 GByte.</p>
Upper limit of packets to analyze	<p>Set the upper limit of the number of packets that go through protocol analysis, at which a warning is issued.</p> <p>It can be set in the range of 10,000 to 1,000,000.</p> <p>The default value is 1,000,000.</p>



As the work folder, specify a folder that can be exclusively used for this software.
* This is to avoid overlapping of created file.

4.7. Signal Show/Hide Setting Window

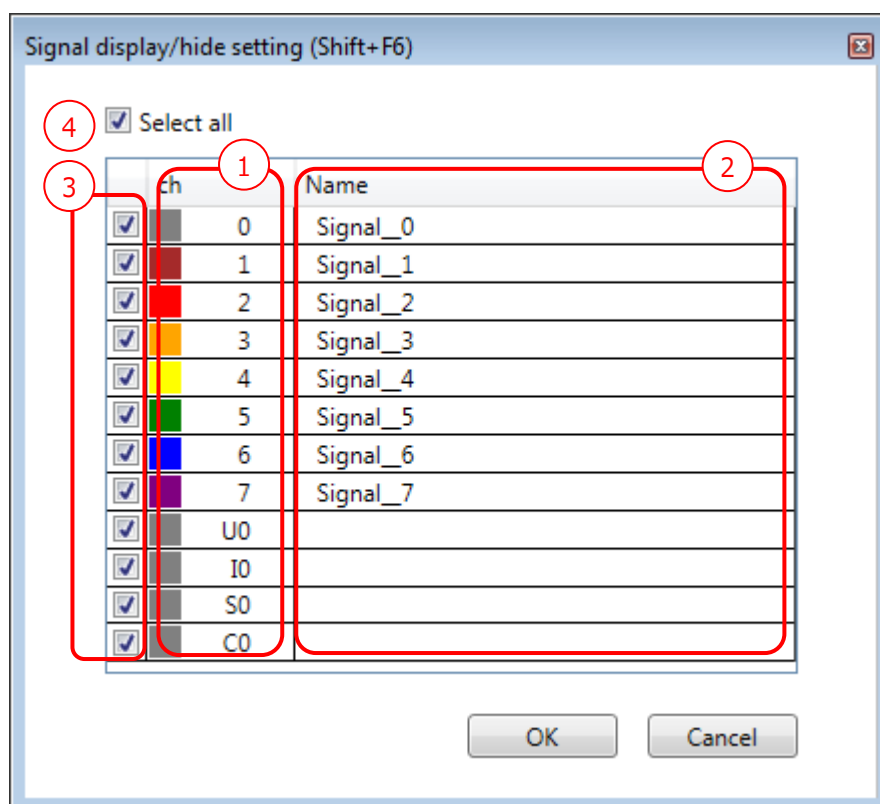


Figure 62

Table 63

(1) Ch	Displays channel numbers and colors.
(2) Name	Displays the signal name specified under channel settings.
(3) Show/hide selection	Check or uncheck the checkbox to select to show or hide the corresponding signal in the Waveform window.
(4) Select all	Select to show or hide all channels at once.
OK	Enables the settings and closes the dialog box.
Cancel	Discards the setting and closes the dialog box.



You cannot select to show/hide the bus element (Single Signal).



After connection process by [3.6.1. Connect/Disconnect](#) procedure, unused (not assign a unit) channel will not display.

4.8. Status Bar

The status bar displays the operation status.

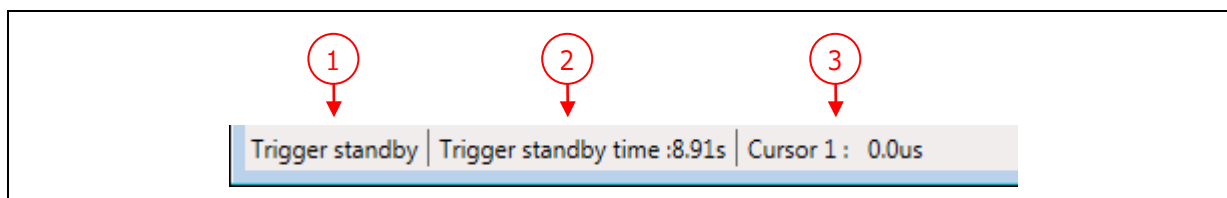


Figure 63

Table 64

(1) Operation status display	<p>Displays the operation status of the probe.</p> <p>Sampling : Indicates that sampling is being performed and waveform data is being recorded.</p> <p>Trigger standby : Indicates that measurement has started and the software is waiting for the trigger conditions to be met.</p> <p>Stopped : Indicates that measurement is not performed.</p> <p>Disconnected : Indicates the state in which the probe is disconnected.</p>
(2) Trigger standby time	<p>Displays the duration in which the software is waiting for the trigger conditions to be met since the start of measurement.</p> <p>During the trigger standby state, time is constantly updated.</p>
(3) Cursor position display	<p>Displays the position of the cursor that is currently selected.</p>

5. Other functions


5.1. Registration of License Code

This software employs the license system.

To acquire the License Code, the separately sold Software Code is necessary.

We will issue the License Code if you let us know the Software Code and the serial number of your probe.

(1) Entry of License Code

When this software starts, select a probe for which [Select Unit] dialog box shows “License not registered” and click  button. The License Code entry window is displayed. Enter the License Code received from us. This software becomes usable at the target probe.

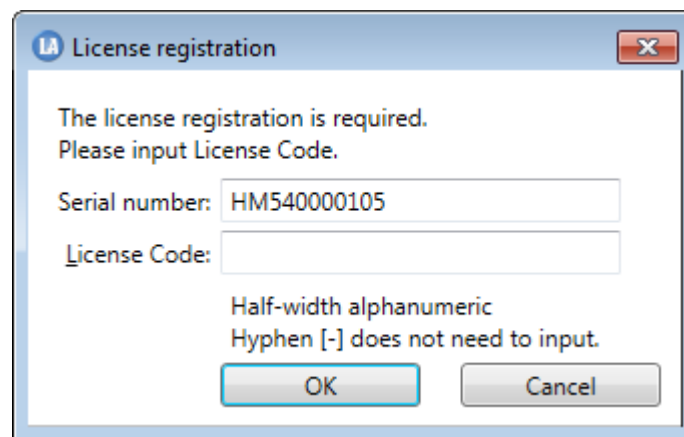


Figure 64

(2) Notes on entering License Code

Enter exactly the same license code as the received information.



If the license code is rejected even though it matches the code in the received email, please contact us.

A. Appendix

A.1. HW Connection Errors

These are errors that occur at the time of connection or when measurement is started.

Table 65

Message	Description
Internal Error	Internal error of this software.
Incorrect argument	Internal error of this software.
Interface is not initialized.	Internal error of this software.
Communication error	Failed to communicate with probe.
Invalid device ID	Internal error of this software.
Device is not initialized.	Internal error of this software.
Function is different.	Already initialized by another function.
Device is running.	Internal error of this software.
Canceled.	Internal error of this software.
No license.	License is unregistered or invalid. Register the license again.
Memory shortage	Memory is running short. Check the memory consumption status with Task Manager or the like.
Number of connected units does not match.	After connection, probe(s) may have been removed before starting measurement. Check the probe connection.
File input/output error	Failed to input/output file. Check if the HDD output destination is correct.

A.2. Restrictions on cooperative use of probes

This section describes restrictions that are imposed when two or more probes are used in a cooperative manner.

A.2.1. External Sampling Clock

The external sampling clock can be assigned only to the channel that is set to the master in the channel threshold voltage setting.

A.2.2. Trigger Settings

During cooperative use of probes, as the trigger condition between signals of pattern edge trigger as well as among pattern edge trigger, sequential trigger, and protocol trigger, only AND can be set. (It is not possible to set OR.)

The usable triggers differ depending on whether the target probe is set to the master in the channel threshold voltage setting.
(refer to Table 65).

Table 66

	Master	Slave (other than master)
Pattern edge trigger	Usable	Usable
Protocol trigger	Usable	Not usable
Sequential trigger	Usable	Not usable
External trigger	Usable	Not usable

Revision History

Ver. No.	Revision date	Content of revision
01	09/30/2014	Initial Release.
02	11/17/2014	Correction of typographical errors.

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