# DLM3034HD, DLM3054HD
## High Definition Oscilloscope
# USER'S MANUAL

YOKOGAWA
Yokogawa Test & Measurement Corporation

IM DLM3054HD-02EN
2nd Edition

Thank you for purchasing the DLM3034HD or DLM3054HD high definition oscilloscope.
This User's Manual explains how to use the instrument. To ensure correct use, please read this manual thoroughly before operation.
After reading this manual, keep it in a safe place. The manuals for this instrument are listed on the next page. Please read all manuals.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

| Document No. | Description |
|---|---|
| PIM 113-01Z2 | List of worldwide contacts |

## Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functionality. Refer to our website to view our latest manuals.
- The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the contents of this manual without the permission of YOKOGAWA is strictly prohibited.
- The TCP/IP software of this product and the documents concerning it have been developed/created by YOKOGAWA based on the BSD Networking Software, Release 1 that has been licensed from the Regents of the University of California.

## Trademarks

- Microsoft, Windows, Windows 10, and Windows 11 are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Adobe and Acrobat are either registered trademarks or trademarks of Adobe Inc.
- DLM is a registered trademark of Yokogawa Electric Corporation.
- In this manual, the TM and ® symbols do not accompany their respective registered trademark or trademark names.
- Other company and product names are trademarks or registered trademarks of their respective holders.

## Revisions

- 1st Edition: October 2024
- 2nd Edition: October 2025

2nd Edition: October 2025 (YMI)
All Rights Reserved. Copyright © 2024 Yokogawa Test & Measurement Corporation

# Manuals

The following manuals, including this one, are provided as manuals for this instrument. Please read all manuals.

## Manuals Included with the Product

| Manual Title | Manual No. | Description |
|---|---|---|
| DLM3034HD, DLM3054HD High Definition Oscilloscope Getting Started Guide | IM DLM3054HD-03EN | This guide explains the handling precautions, common operations, troubleshooting measures, and specifications of this instrument. |
| DLM3034HD, DLM3054HD High Definition Oscilloscope Operation Guide | IM DLM3054HD-04EN | Explains the basic operations of this instrument. Operations are described in steps from “Preparation” to “Displaying Waveforms,” “Measuring Waveforms,” and “Saving Screen Captures.” |
| DLM3034HD, DLM3054HD High Definition Oscilloscope Request to Download Manuals | IM DLM3054HD-73Z2 | Describes the manuals provided on the website. |
| DLM3034HD, DLM3054HD High Definition Oscilloscope | IM DLM3054HD-92Z1 | Document for China |
| Safety Instruction Manual | IM 00C01C01-01Z1 | Safety manual (European languages) |

## Manuals Provided on the Website

Download the following manuals from the YOKOGAWA website.

| Manual Title | Manual No. | Description |
|---|---|---|
| DLM3034HD, DLM3054HD High Definition Oscilloscope Features Guide | IM DLM3054HD-01EN | This manual explains all the instrument’s features other than the communication interface features. |
| DLM3034HD, DLM3054HD High Definition Oscilloscope User’s Manual | IM DLM3054HD-02EN | This document. The manual explains how to operate this instrument. |
| DLM3034HD, DLM3054HD High Definition Oscilloscope Communication Interface User’s Manual | IM DLM3054HD-17EN | The manual explains the functions of this instrument’s communication interface, how to configure it, and the commands used to control this instrument from a PC through the interface. |

For details on downloading manuals, see Request to Download Manuals (IM DLM3054HD-73Z2). To view the PDF data, you need Adobe Acrobat Reader or a software application that can open PDF data.

The “EN”, “Z1”, and “Z2” in the manual numbers are the language codes.

## Online Help

The content similar to the *Features Guide*, IM DLM3054HD-01EN, is included in this instrument as a help file (some the content may be omitted). For instructions on how to use the help, see section 3.10 in the *Getting Started Guide*, IM DLM3054HD-03EN.

# DLM Models and Conventions Used in This Manual

## Prefixes k and K

Prefixes k and K used before units are distinguished as follows:

| | |
|---|---|
| k | Denotes 1000. Example: 100 kS/s (sample rate) |
| K | Denotes 1024. Example: 720 KB (file size) |

## Displayed Characters

Bold characters in procedural explanations are used to indicate panel keys and soft keys that are used in the procedure and menu items that appear on the screen.

## Notes

The notes and cautions in this manual are categorized using the following symbols.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

**WARNING** Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

**CAUTION** Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

**French**

**AVERTISSEMENT** Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

**ATTENTION** Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

***Note*** Calls attention to information that is important for the proper operation of the instrument.

# Contents

Manuals ..... ii
DLM Models and Conventions Used in This Manual ..... iii

## Chapter 1 Vertical and Horizontal Control

⚠ 1.1 Configuring Channels (Analog Signal) ..... 1-1
1.2 Setting the Logic (Logic Signal) ..... 1-6
1.3 Setting the Vertical Axis (Analog and Logic Signals) ..... 1-12
1.4 Setting the Horizontal Scale (Time Scale) ..... 1-14

## Chapter 2 Trigger

2.1 Setting the Trigger Mode and Trigger Hold-off Time ..... 2-1
2.2 Setting the Trigger Position and Trigger Delay ..... 2-3

### Edge Trigger

2.3 Triggering on an Edge Trigger ..... 2-5

### Enhanced Trigger

2.4 Triggering on the OR of Multiple Edge Triggers ..... 2-7
2.5 Triggering on Multiple Input Patterns ..... 2-8
2.6 Triggering on Pulse Width ..... 2-13
2.7 Triggering on Rise and Fall Times ..... 2-15
2.8 Triggering on Runt Signals ..... 2-17
2.9 Triggering on Timeout Period ..... 2-19
2.10 Triggering on a Window Trigger ..... 2-20
2.11 Triggering on the OR of Multiple Window Triggers ..... 2-22
2.12 Triggering on Edge Intervals ..... 2-23
2.13 Triggering on FlexRay Bus Signals (Option) ..... 2-25
2.14 Triggering on CAN Bus Signals (Option) ..... 2-28
2.15 Triggering on CAN FD Bus Signals (Option) ..... 2-33
2.16 Triggering on LIN Bus Signals (Option) ..... 2-39
2.17 Triggering on CXPI Bus Signals (Option) ..... 2-43
2.18 Triggering on SENT Signals (Option) ..... 2-48
2.19 Triggering on PSI5 Airbag Signals (Option) ..... 2-56
2.20 Triggering on UART Signals (Option) ..... 2-60
2.21 Triggering on $I^2C$ Bus Signals (Option) ..... 2-64
2.22 Triggering on SPI Bus Signals (Option) ..... 2-69
2.23 Triggering On User-Defined Serial Bus Signals ..... 2-73
2.24 Triggering on a TV Trigger ..... 2-76

### B Trigger

2.25 Triggering on Combination Triggers (B TRIG) ..... 2-78

### Forced Trigger

2.26 Forcing the Instrument to Trigger (FORCE TRIG) ..... 2-80

### Action, GO/NO-GO

2.27 Setting the Action-On-Trigger Function ..... 2-81
2.28 Performing GO/NO-GO Determination ..... 2-82

## Chapter 3 Waveform Acquisition

3.1 Setting Conditions for Waveform Acquisition ..... 3-1
3.2 Acquiring Waveforms ..... 3-3

## Chapter 4 Screen Display

4.1 Setting Display Conditions ..... 4-1
4.2 Using the Accumulate Feature ..... 4-3
4.3 Using the Snapshot and Clear Trace Features ..... 4-4
4.4 Adjusting the Backlight ..... 4-5

## Chapter 5 XY Display

5.1 Displaying XY Waveforms ..... 5-1
5.2 Performing Cursor Measurements and Area Calculations ..... 5-2

## Chapter 6 Computed and Reference Waveforms

6.1 Setting the Computation Mode ..... 6-1
6.2 Performing Addition, Subtraction, and Multiplication ..... 6-2
6.3 Performing Filter Functions ..... 6-3
6.4 Performing Integration ..... 6-5
6.5 Performing Count Computations ..... 6-6
6.6 Setting Labels, Units, and Scaling ..... 6-9
6.7 Loading Reference Waveforms ..... 6-10
6.8 Performing User-Defined Computations (Option) ..... 6-12

## Chapter 7 FFT

7.1 Displaying FFT Waveforms ..... 7-1
7.2 Measuring FFT Waveforms ..... 7-3

## Chapter 8 Cursor measurement

8.1 Measuring with ΔT Cursors ..... 8-1
8.2 Measuring with ΔV cursors ..... 8-2
8.3 Measuring with ΔT and ΔV Cursors ..... 8-3
8.4 Measuring with Marker Cursors (Marker) ..... 8-4
8.5 Measuring with Angle Cursors (Degree) ..... 8-5

## Chapter 9 Automated Measurement of Waveform Parameters

9.1 Automatically Measuring Waveform Parameters ..... 9-1
9.2 Processing Statistics on Automatically Measured Values ..... 9-6
9.3 Measuring Enhanced Parameters ..... 9-11

## Chapter 10 Zooming in or out of Waveforms

10.1 Zooming in or out of waveforms ..... 10-1
10.2 Zooming in or out of Waveforms in the Vertical Direction ..... 10-3

## Chapter 11 Searching Waveforms

11.1 Basic Waveform Search Operation ..... 11-1
11.2 Searching for Edges ..... 11-4
11.3 Searching with Multiple Input Patterns ..... 11-6
11.4 Searching for Pulse Width ..... 11-10
11.5 Searching for Timeout Periods ..... 11-13

## Chapter 12 Analyzing and Searching Serial Bus Signals

12.1 Analyzing and Searching FlexRay Bus Signals (Option) ..... 12-1
12.2 Analyzing and Searching CAN Bus Signals (Option) ..... 12-6
12.3 Analyzing and Searching CAN FD Bus Signals (Option) ..... 12-11
12.4 Analyzing and Searching LIN Bus Signals (Option) ..... 12-17
12.5 Analyzing and Searching CXPI Bus Signals (Option) ..... 12-22
12.6 Analyzing and Searching SENT Signals (Option) ..... 12-28
12.7 Analyzing and Searching PSI5 Airbag Signals (Option) ..... 12-36
12.8 Analyzing and Searching UART Signals (Option) ..... 12-44
12.9 Analyzing and Searching $I^2C$ Bus Signals (Option) ..... 12-51
12.10 Analyzing and Searching SPI Bus Signals (Option) ..... 12-58
12.11 Analyzing and Searching User-Defined Serial Bus Signals ..... 12-66
12.12 Displaying Multiple Lists ..... 12-71

## Chapter 13 Waveform Histogram Display

13.1 Displaying Waveform Histograms ..... 13-1
13.2 Measuring Histogram Parameters ..... 13-2

## Chapter 14 Power Supply Analysis (Power Analysis and Power Measurement, Option)

14.1 Power supply analysis type ..... 14-1
14.2 Analyzing Switching Loss ..... 14-2
14.3 Performing Safe Operating Area Analysis ..... 14-5
14.4 Performing Harmonic Analysis ..... 14-6
14.5 Measuring the Joule Integral ..... 14-9
14.6 Measuring Power ..... 14-11

## Chapter 15 Displaying and Searching History Waveforms

15.1 Displaying History Waveforms ..... 15-1
15.2 Searching History Waveforms ..... 15-4

## Chapter 16 Printing and Saving Screen Captures

⚠ 16.1 Loading Roll Paper Into the Built-In Printer (Option) ..... 16-1
16.2 Printing on the Built-in Printer (Option) ..... 16-3
16.3 Printing on a USB Printer ..... 16-4
16.4 Printing on a Network Printer ..... 16-5
16.5 Saving Screen Captures to Files ..... 16-6
16.6 Printing and Saving Screen Capture Data to Multiple Output Destinations at the Same Time ..... 16-9

## Chapter 17 Saving and Loading Data

17.1 Connecting USB Storage Device to the USB Ports ..... 17-1
17.2 Saving Waveform Data ..... 17-3
17.3 Saving Setup Data ..... 17-7
17.4 Saving Other Types of Data ..... 17-8
17.5 Loading Waveform Data ..... 17-11
17.6 Loading Setup Data ..... 17-13
17.7 Loading Other Types of Data ..... 17-14
17.8 Performing File Operations ..... 17-16

## Chapter 18 Ethernet Communication

18.1 Connecting the Instrument to a Network ..... 18-1
18.2 Configuring TCP/IP Settings ..... 18-3
18.3 Accessing the instrument from a PC (FTP Server) ..... 18-4
18.4 Monitoring the Instrument's Display from a PC (Web Server) ..... 18-5
18.5 Configuring Mail Transmission (SMTP Client Function) ..... 18-10
18.6 Connecting to a Network Drive ..... 18-11
18.7 Configuring a Network Printer ..... 18-12
18.8 Using SNTP to Set the Date and Time ..... 18-13

## Chapter 19 Performing Synchronized Operation (DLMsync, Option)

19.1 Starting and Stopping Synchronous Operation (DLMsync) ..... 19-1
19.2 Correcting the Sampling Skew between Units ..... 19-2

## Chapter 20 Other Operations

20.1 Changing the Menu, Message , and USB Keyboard Languages ..... 20-1
20.2 Setting the Click Sound, Measured Value Font Size, and Number of Rows for Displaying Measurement Values ..... 20-2
20.3 Viewing Setup Information (Overview) ..... 20-3
20.4 Using the Instrument as a USB Storage Device ..... 20-4
20.5 Synchronizing the Clock Using IEEE 1588 ..... 20-5

## Index

# 1.1 Configuring Channels (Analog Signal)

This section explains the following settings for the vertical axis for analog signals:

CH menu
- Turning the waveform display on and off
- Input coupling
- Probe
- Turning waveform display inversion on and off
- Linear scaling
- Label display
- Bandwidth limit
- Offset

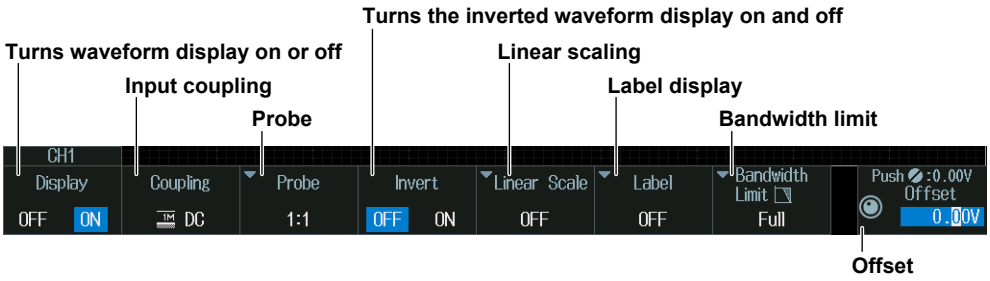
UTILITY menu
- Turning offset cancel on and off

► "Vertical Axis (Analog Signal)" in the Features Guide

## CH Menu

*1.* Press a key from **CH1** to **CH4**. The channel key illuminates brightly, and the following menu appears.

You can also tap **MENU** (MENU) in the upper left of the screen and select the CH menu from VERTICAL on the top menu that is displayed.




*2.* If you press a channel key different from step 1, that channel becomes configurable.
The channel key being configured illuminates brightly, and the channel key selected in Step 1 is dark.

### *Note*

- If you press the key when the channel key is not illuminated, the key illuminates, and the waveform display turns on.
- If you press the key when the channel key is illuminated brightly, the waveform display turns off.
- When the record length (Record Length) of the ACQUIRE menu is set to the maximum record length, the CH2 and CH4 waveforms cannot be used. For details on the ACQUIRE menu, see section 3.1.

## Input Coupling (Coupling)

**WARNING**

- If over-range is indicated, the instrument may be receiving a voltage higher than the observed waveform or measured waveform values. To prevent electric shock, change the vertical scale with the SCALE knob so that the entire amplitude of the waveform is displayed within the waveform display area, and check the input voltage level.



← Over-range indication

- If the input coupling is AC, in accordance with the frequency response, the input signal is attenuated more in lower frequencies. As such, even when a high voltage signal is received, the over-range indicator may not be displayed on the instrument's screen. As necessary, switch the input coupling to DC to check the input signal voltage.

**CAUTION**

- The maximum input voltage in the case of 1 MΩ input is 300 Vrms or 400 Vpeak when the frequency is 100 kHz or less. Applying a voltage greater than either of these limits may damage the input section. For frequencies above 100 kHz, damage may occur even if the voltage is below this value.
- The maximum input voltage for 50 Ω input is 5 Vrms or 10 Vpeak. Applying a voltage greater than either of these limits may damage the input section.
- If you change the input coupling setting while waveform acquisition is stopped, the input coupling on the instrument is actually changed when waveform acquisition is executed the next time. Be careful of the maximum input voltage.

**French**

**AVERTISSEMENT**

- En cas de dépassement de plage, l'instrument risque de recevoir une tension supérieure à la forme d'onde observée ou aux valeurs de forme d'onde mesurées. Pour éviter tout risque de choc électrique, modifier l'échelle de gain vertical à l'aide du bouton SCALE, de sorte que l'amplitude entière de la forme d'onde s'affiche sur l'afficheur, et vérifier le niveau de tension d'entrée.



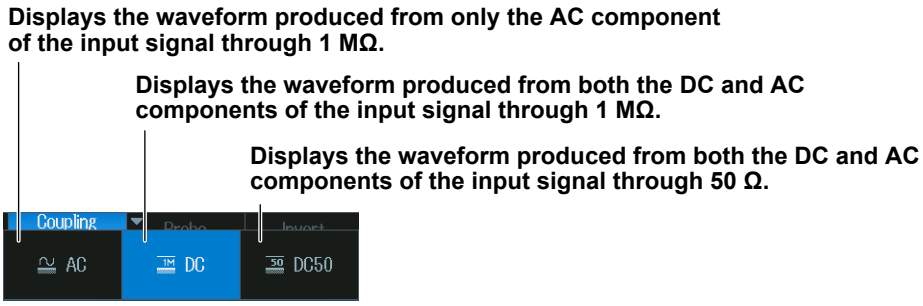
← Dépassement de plage

- Si le courant du couplage d'entrée est alternatif (CA), conforme à la réponse en fréquence, le signal d'entrée est plus atténué aux fréquences plus basses. Ainsi, même si un signal haute tension est reçu, le voyant de dépassement de plage risque de ne pas s'afficher à l'écran de l'instrument. Le cas échéant, basculez le couplage d'entrée sur CC (courant continu) afin de vérifier la tension du signal d'entrée.

## ATTENTION

- La tension d'entrée maximum pour une entrée de 1 MΩ est de 300 Vrms ou 400 V crête lorsque la fréquence est inférieure ou égale à 100 kHz. Le fait d'appliquer une tension dépassant l'une de ces limites risque d'endommager la section d'entrée. Si la fréquence est supérieure à 100 kHz, des dommages risquent de survenir même lorsque la tension est inférieure à cette valeur.
- La tension d'entrée maximale pour une entrée de 50 Ω est de 5 Vrms ou 10 Vcrête. L'application d'une tension supérieure à l'une de ces limites pourrait endommager la section d'entrée.
- Si vous modifiez le paramètre de couplage d'entrée alors que l'acquisition de forme d'onde est arrêtée, le couplage d'entrée sur l'instrument est en réalité modifié lorsque la prochaine acquisition de forme d'onde est exécutée. Faites attention à la tension d'entrée maximale.

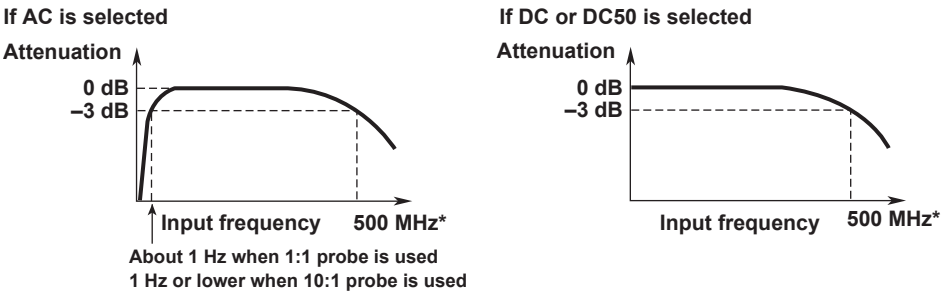
Press the **Coupling** soft key. The following menu items appear.




### Input Coupling

The frequency responses when the input coupling is set to AC, DC, and DC50 are shown below.

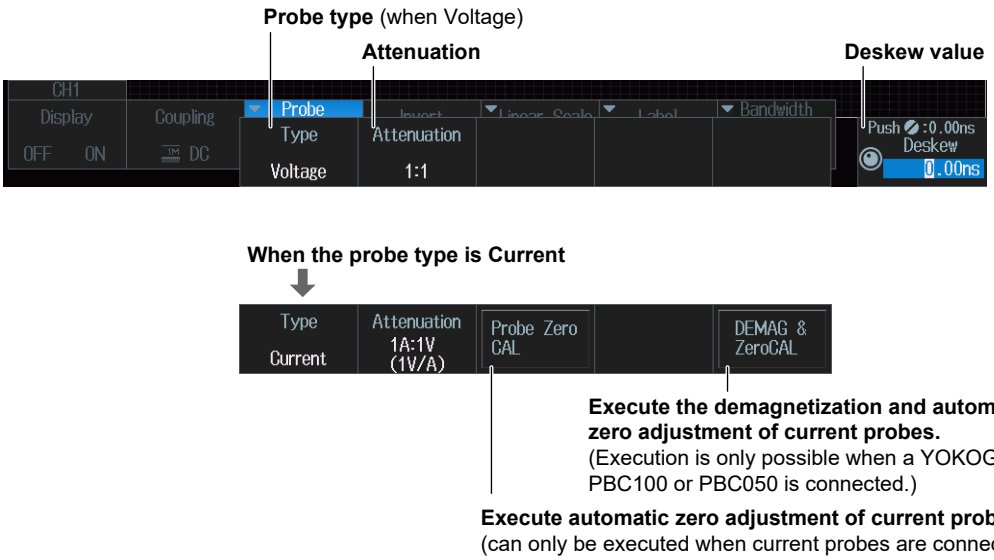
Note that if the input coupling is set to AC, the instrument does not acquire low-frequency signals or signal components as indicated in the figure below.




* The high-frequency –3 dB point differs according to the model and the voltage scale settings.

## Probe (Probe)

Press the **Probe** soft key. The following menu items appear.



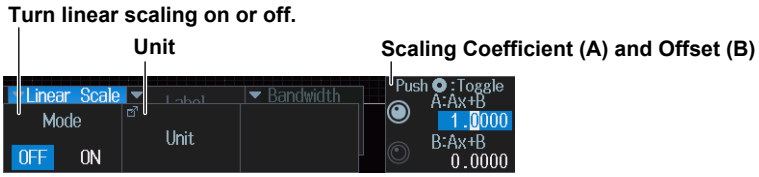

### *Note*

When a current probe with a YOKOGAWA probe interface (such as a the PBC100 or PBC050 probe) is connected to the instrument, you can execute demagnetization and automatic zero adjustment from the instrument.

When you demagnetize and perform automatic zero adjustment on a current probe, do not clamp the conductor. If you demagnetize a current probe while the conductor is clamped, the current that flows through the conductor as a result of demagnetization may damage components of the DUT circuitry.

## Linear Scaling (Linear Scale)

Press the **Linear Scale** soft key. The following menu items appear.



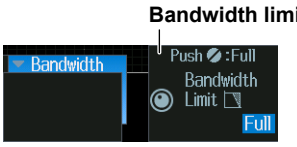

## Label Display (Label)

Press the **Label** soft key. The following menu items appear.



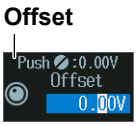
### Bandwidth Limit (Bandwidth Limit)

Press the **Bandwidth Limit** soft key. The jog shuttle controls Bandwidth Limit.




### Offset (Offset)

When the CH menu is displayed, the jog shuttle controls the offset.




***Note***

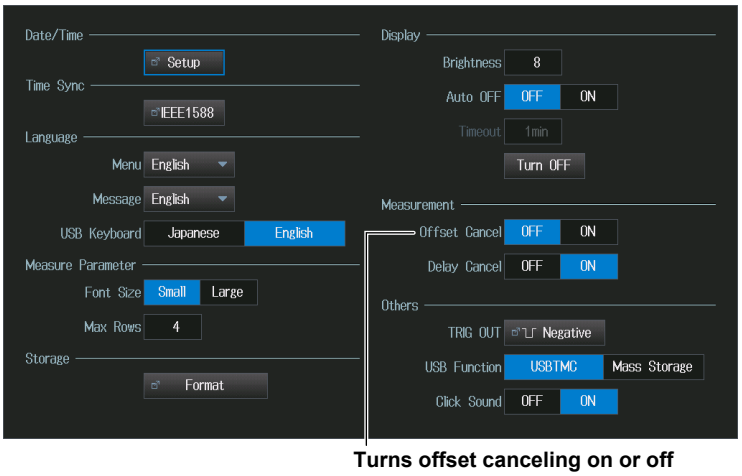
- The offset setting applies to all input coupling settings (AC, DC, DC50).
- If you change the probe attenuation, the vertical scale settings change the values that have been scaled with the new attenuation ratio.
- The offset value does not change even if you change the vertical scale. However, if the offset value goes outside the selectable range, the offset is set to the maximum or minimum value in the vertical scale range. If you do not change the offset and set the vertical scale back to its original value, the offset returns to its original value.

## UTILITY Menu

### UTILITY System Configuration Menu

Press **UTIL** and then the **System Configuration** soft key. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from UTILITY on the top menu that is displayed.



# 1.2 Setting the Logic (Logic Signal)

This section explains the following settings for the vertical axis for logic signals:

LOGIC menu

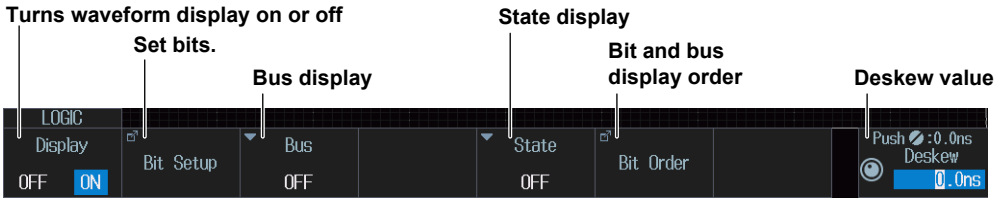
- Turning the waveform display on and off
- Bit settings
  Turning the bit display on and off
  Label name, threshold level, and noise rejection
- Bus display
  Turning the bus display on and off
  Bus bit assignment, label name, and format
- Bit and bus display order
- State display
  Turning the state display on and off
  Clock source; clock source polarity, detection level, and hysteresis; and state assignment
- Deskewing

► “Vertical Axis (Logic Signal)” in the Features Guide

## LOGIC Menu

Press **LOGIC**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the LOGIC menu from VERTICAL on the top menu that is displayed.



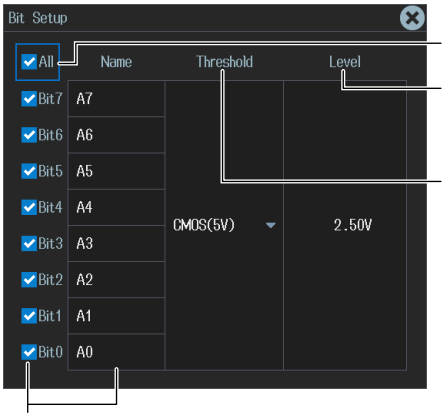

### *Note*

- If you press the L key when it is not illuminated, the key illuminates, and the LOGIC waveform display turns on. Logic signal waveforms are displayed in the CH4 waveform display area.
- If you press the LOGIC key when it is illuminated, the key turns off, and the LOGIC waveform display turns off.
- When the record length (Record Length) of the ACQUIRE menu is set to the maximum record length, LOGIC waveforms cannot be used. For details on the ACQUIRE menu, see section 3.1.

## Bit Settings (Bit Setup)

Press the **Bit Setup** soft key. The following screen appears.

### For Logic Probes Other Than the 701989




**Turns the display on or off for all bits**

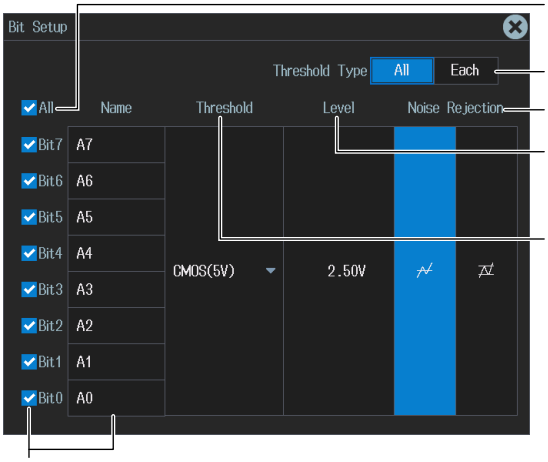
**Threshold level**
If you change the automatically specified value, the threshold value changes to “Userdef.”

**Threshold**
If you select a threshold value, the threshold level is set automatically.

**Display on/off state and label of each bit**

### For the 701989 Logic Probe

- **When the Threshold Type is All**




**Turns the display on or off for all bits**

**The threshold type is set to All.**

**Noise rejection**

**Threshold level**
If you change the automatically specified value, the threshold value changes to “Userdef.”

**Threshold**
If you select a threshold value, the threshold level is set automatically.

**Display on/off state and label of each bit**

- **When the Threshold Type is Each**




**Turns the display on or off for all bits**

**Threshold**
- If you select a threshold value, the threshold level is set automatically.
- When the threshold type is Each, set the threshold level for each bit.

**The threshold type is set to Each.**

**Threshold level**
- If you change the automatically specified value, the threshold value changes to "Userdef."
- When the threshold type is Each, set the threshold level for each bit.

**Noise rejection**

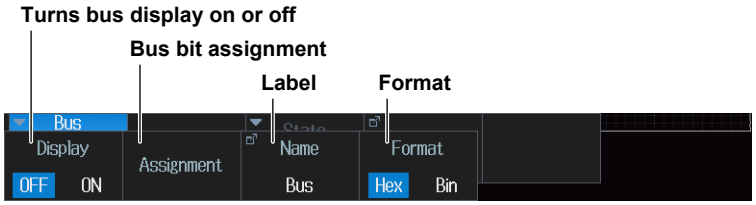
**Display on/off state and label of each bit**

## *Note*

- For logic probes other than the 701989, the threshold type is All. The setup menu does not appear.
- The Level and Noise Rejection* of Bit Setup are linked with the Level and Noise Rejection* settings when LOGIC is set as the source in the trigger settings.
  * You can set this when the logic probe is 701989.

# Bus Display (Bus)

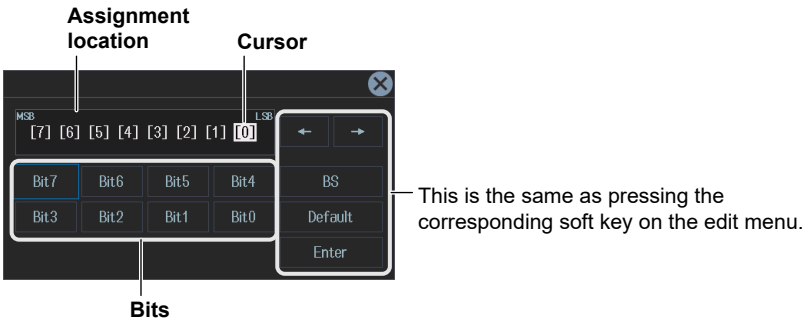
Press the **Bus** soft key. The following menu items appear.



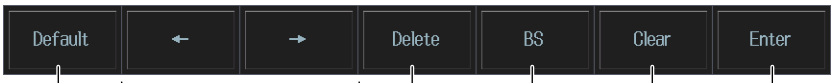

### Bus bit assignment

1. Press the **Assignment** soft key. The assignment edit screen appears.
2. Press the cursor movement soft key on the Edit menu to move the cursor to the right of the position where the bit is to be placed.
3. Turn the jog shuttle, or move the **SET** key up, down, left, or right to select the bit to be placed from the group of bits.
4. Press **SET**.

   The selected bit is placed to the left of the cursor position.
5. Press the **ENTER** soft key to confirm the setting.




**Edit Menu**




**Move the cursor**

**Restores the default settings**

**Delete all**

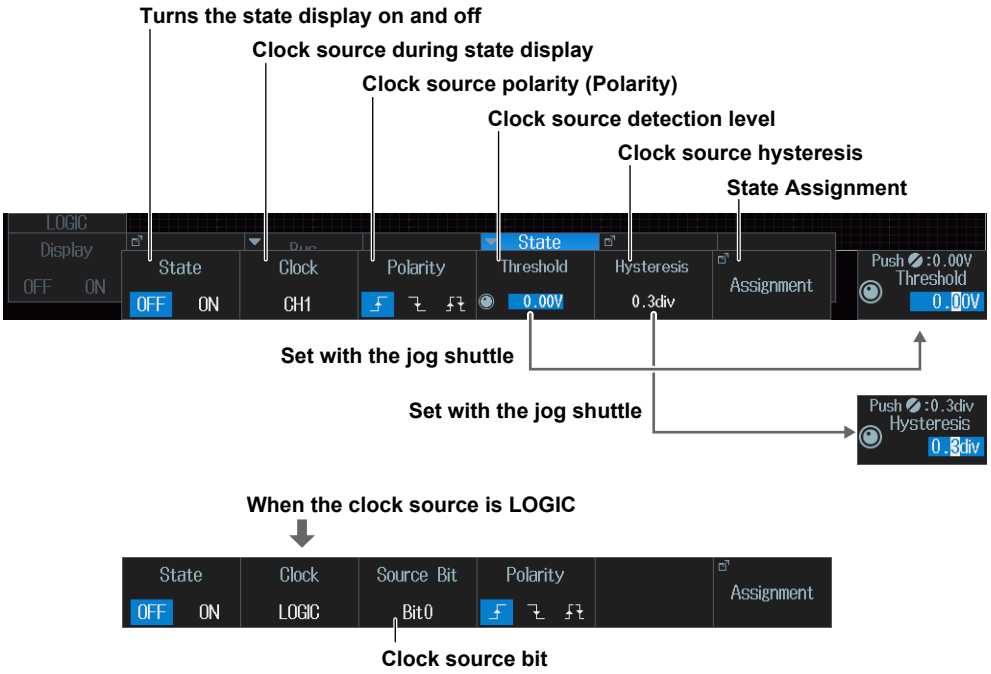
**Confirms the settings**

**Backspace**
Deletes the bit to the left of the cursor

**Delete**
Deletes the bit to the right of the cursor

## State Display (State)

Press the **State** soft key. The following menu items appear.

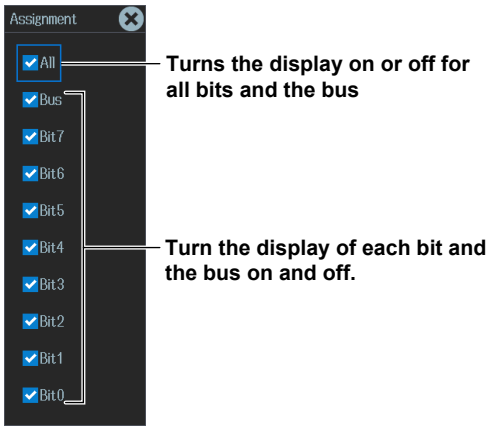






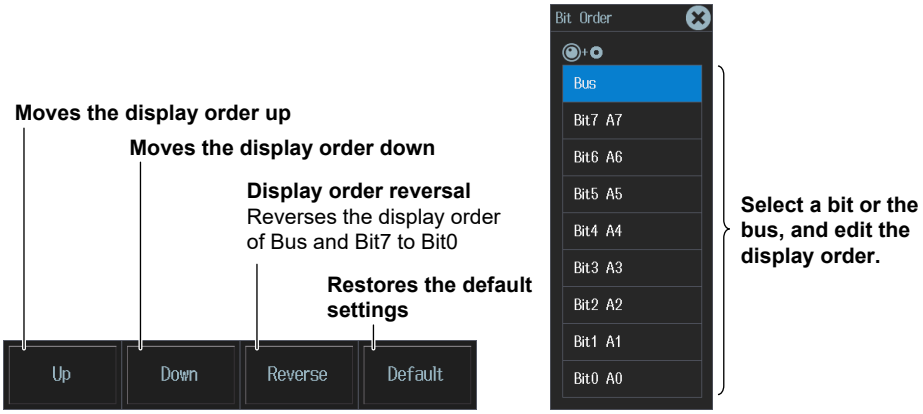
### State Assignment

Press the **Assignment** soft key. The following screen appears.

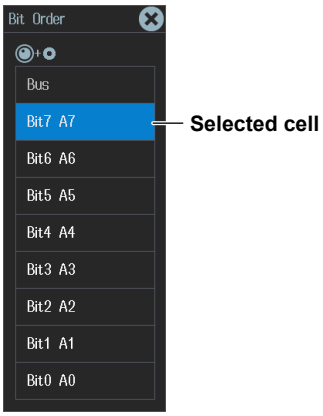


## Bit and Bus Display Order (Bit Order)

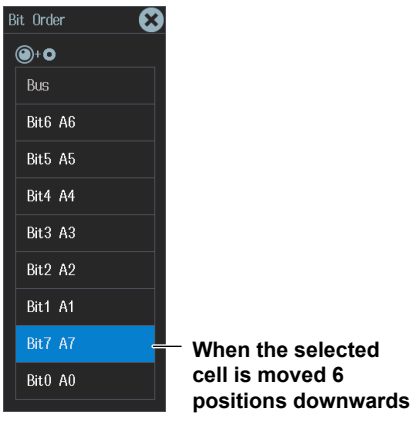
Press the **Bit Order** soft key. The following screen appears.

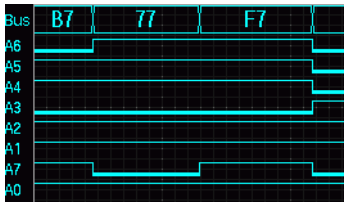



1. Turn the jog shuttle or move the **SET** key up and down to select the bit or bus to move.
   The selected bit or bus cell is highlighted.




2. Press the **Up** or **Down** soft key to move the selected bit or bus up or down.
   Every time the selected bit or bus moves up or down, the order of the upper and lower bits or bus is switched.




**The change affects the bit and bus display order along the vertical axis of the screen.**

## Deskew (Deskew)

Set the adjustment values for the time offsets (skew) between the logic signal and other signals, which are caused by the use of different types of probes. Deskewing is performed on all eight bits collectively.

# 1.3 Setting the Vertical Axis (Analog and Logic Signals)

This section explains the following settings for the vertical scale:

SCALE knob
- Vertical scale (analog signal)
- Display size (logic signal)

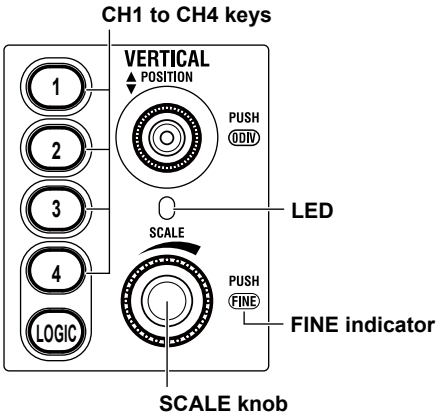
▲▼ POSITION knob
- Vertical position (analog and logic signals)

► **"Vertical Display Range (SCALE knob)," "Vertical Scale (SCALE knob)," "Waveform Vertical Position (POSITION knob)" in the Features Guide**

## Vertical Scale (SCALE knob)

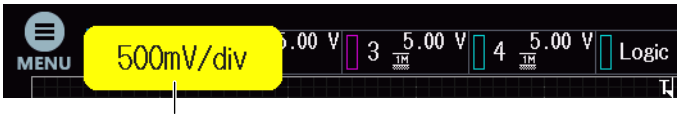
1. Press a key from **CH1** to **CH4** to select the channel that you want to set the vertical scale for.
   - The CH key that you press illuminates brightly.
   - The LED between the SCALE and ▲▼ POSITION knobs illuminates in the color assigned to the selected channel (the color around the CH key).

2. Turn the **SCALE** knob to set the vertical scale.
   If you push the SCALE knob, the FINE indicator illuminates, allowing you to set the vertical scale with higher resolution.







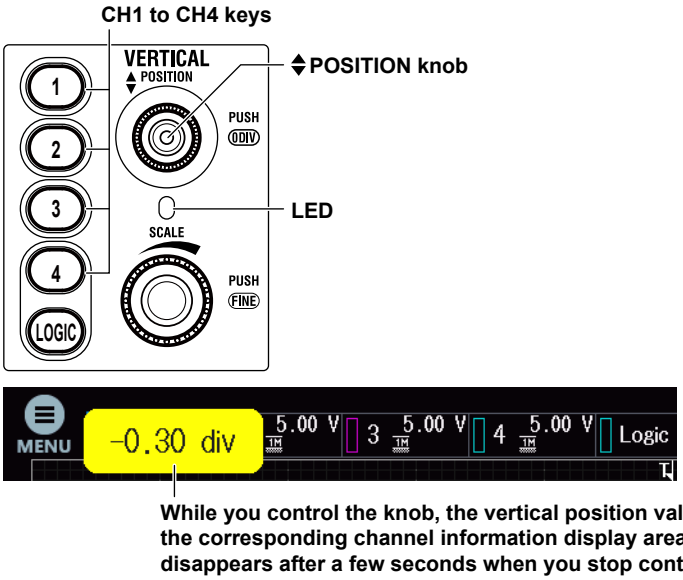


## Vertical Scale (SCALE knob)

1. Press a key from **CH1** to **CH4** to select the channel that you want to set the vertical scale for.
   - The CH key that you press illuminates brightly.
   - The LED between the SCALE and ▲▼ POSITION knobs illuminates in the color assigned to the selected channel (the color around the CH key).
2. Turn the **SCALE** knob to set the vertical scale.

## Waveform Vertical Position (POSITION knob)

1. Press a key from **CH1 to CH4** to select the channel that you want to set the vertical position for.
   - The CH key that you press illuminates brightly.
   - The LED between the SCALE and ▲▼ POSITION knobs illuminates in the color assigned to the selected channel (the color around the CH key).
2. Turn the ▲▼ **POSITION** knob to set the vertical position.
   You can set the vertical position to 0 V by pressing the POSITION knob.




**While you control the knob, the vertical position value is displayed in the corresponding channel information display area. The display disappears after a few seconds when you stop controlling the knob.**

### *Note*

**Preview**

- If you change the vertical scale when waveform acquisition is stopped, the waveform is displayed expanded or reduced vertically.
- If you change the vertical position when waveform acquisition is stopped, the waveform display position changes.

# 1.4 Setting the Horizontal Scale (Time Scale)

This section explains the following settings for the horizontal scale (time scale):

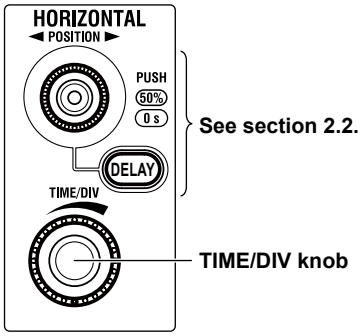
TIME/DIV Knob
- Horizontal scale (time scale) sensitivity

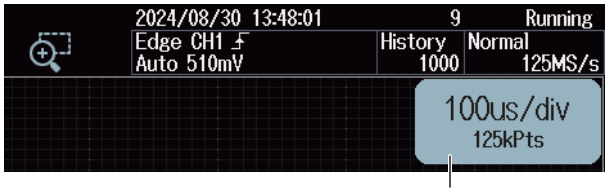
◄POSITION► knob
See section 2.2.

► "Time Scale (TIME/DIV knob)" in the Features Guide

## Horizontal Scale (Time Scale) Sensitivity (TIME/DIV knob)

Turn the **TIME/DIV** knob to set the horizontal scale sensitivity.




**While you control the knob, the time scale value and display record length are displayed in the upper right of the screen. The display disappears after a few seconds when you stop controlling the knob.**

### ◄POSITION► Knob

Turn the ◄ POSITION ► knob to move the waveforms displayed on the screen horizontally. The trigger position moves along with the waveform.
You can set the trigger position to 50% by pressing the knob.
When waveform acquisition (RUN/STOP) is running, you can turn the ◄ POSITION ► knob to move the waveforms horizontally the waveform display is being updated. For details on the trigger position, see section 2.2.

# 2.1 Setting the Trigger Mode and Trigger Hold-off Time

This section explains the following settings for updating the displayed waveform:

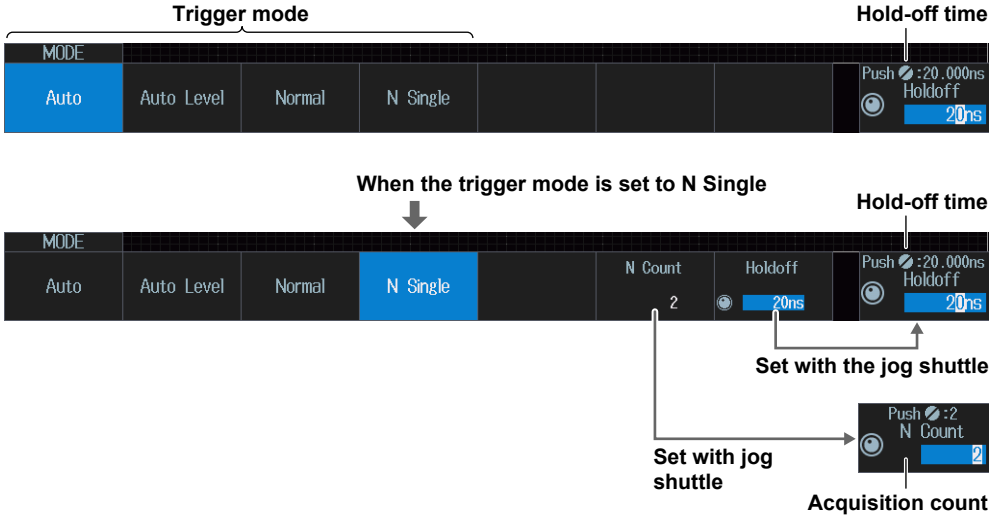
- Trigger mode, acquisition count
- Hold-off time

► "Trigger mode (Mode)" and
"Trigger Hold-off (Holdoff)" in the Features Guide

## MODE menu

Press **MODE**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the MODE menu from TRIGGER on the top menu that is displayed.




### Trigger mode (Mode)

| | | |
|---|---|---|
| Auto | : | If the trigger conditions are met within a timeout period,* the instrument updates the displayed waveforms on each trigger occurrence. If not, this instrument automatically updates the displayed waveforms. If the time axis is set to a value that would cause the display to switch to roll mode, roll mode display will be enabled. |
| Auto Level | : | If a trigger occurs before a timeout,* the instrument updates the waveform in the same way that it does in Auto mode. If a trigger does not occur before a timeout, the instrument automatically changes the trigger level to the center value of the trigger source amplitude, triggers on that value, and updates the displayed waveform. |
| Normal | : | The instrument updates the waveform display only when the trigger conditions are met. |
| N Single | : | The instrument acquires signals each time the trigger conditions are met until a specified number of signals have been acquired, and then displays all of the acquired signals. |

* The timeout period is 100 ms or the time corresponding to 10 divisions on the time axis, whichever is larger.

***Note***

Press any of the trigger mode soft keys to execute waveform acquisition in the selected trigger mode.

**Single mode**

There is also a Single trigger mode in which the instrument updates the displayed waveform once and stops signal acquisition when the trigger conditions are met. Press SINGLE on the front panel to execute Single Mode waveform acquisition.

## Hold-off time (Holdoff)

The trigger hold-off feature temporarily stops the detection of the next trigger once a trigger has occurred.

# 2.2 Setting the Trigger Position and Trigger Delay

This section explains the following settings for updating the displayed waveform:

- Trigger position
- Trigger delay
- Turning delay cancel on and off

► "Trigger Position (POSITION knob)," "Trigger Delay (DELAY)," and "Delay Cancel (Delay Cancel)," in the Features Guide

## Trigger Position (◄POSITION► knob)

1. Turn the ◄**POSITION**► knob to set the trigger position.
   The specified trigger position is displayed at the top of the screen while you control the knob. The display disappears after a few seconds when you stop controlling the knob.




* You can set the trigger position even when waveforms are not being acquired.

## Trigger Delay (DELAY)

1. Press **DELAY**.
   The DELAY key illuminates.
2. Turn the ◄**POSITION**► knob to set the trigger delay.
   The specified trigger delay is displayed at the top of the screen while you control the knob. The display disappears after a few seconds when you stop controlling the knob.




* You can set the trigger delay even when waveforms are not being acquired.

3. Press **DELAY** again.
   The DELAY key turns off, and you can set the trigger position.

## Turning Delay Cancel On or Off (Delay Cancel)

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU)in the upper left of the screen and select the UTILITY menu from UTILITY on the top menu that is displayed.
2. Press the **System Configuration** soft key. The following menu items appear.




**Turns delay canceling on or off**

You can select whether or not to apply the specified trigger delay to the time measurement values.

ON: Measures time with the trigger position set to 0 s (does not apply the delay to time measurement)

OFF: Measures time with the trigger point set to 0 s (applies the delay to time measurement)

# 2.3 Triggering on an Edge Trigger

This section explains the following settings for triggering on trigger source edges:

- Trigger source
  Trigger slope, HF rejection, noise rejection,
  level for detecting trigger source edges, source bit
- Probe attenuation
- Input range

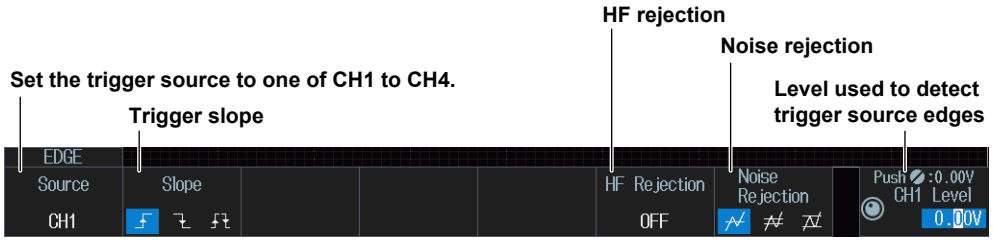
► “Edge Trigger (EDGE),” “Trigger Source (Source),” “Trigger Slope (Slope/Polarity),”
“Trigger Level (Level),” “HF Rejection (HF Rejection),”
“Noise Rejection (Noise Rejection)” in the Features Guide

## EDGE menu

Press **EDGE**. The menu that appears varies depending on the specified trigger source.

You can also tap **MENU** (MENU) in the upper left of the screen and select the EDGE menu from **TRIGGER** on the top menu that is displayed.

### When the Trigger Source Is from CH1 to CH4



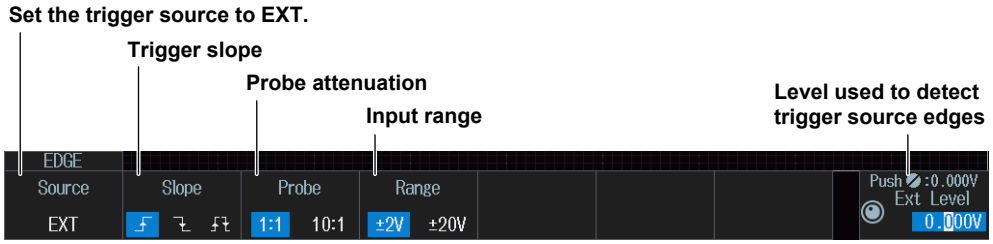

### When the Trigger Source Is LOGIC (On models with the logic signal input port)




For the 701989 Logic Probe




### When the Trigger Source Is EXT (External trigger signal)



### Input Range (Range)

When the trigger source is set to EXT, select the input range.

The selectable ranges vary depending on the probe attenuation setting.

1:1: ±2 V or ±20 V

10:1: ±20 V or ±200 V

### When the Trigger Source Is LINE

**Set the trigger source to LINE.**



# 2.4 Triggering on the OR of Multiple Edge Triggers

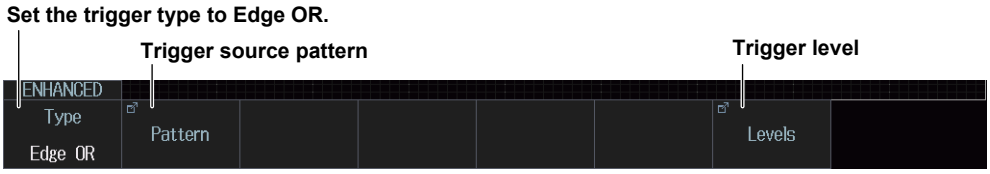
This section explains the following settings for triggering on the logical OR of multiple edge triggers:

- Trigger source pattern
  Trigger source, trigger slope
- Trigger level
  Level for detecting trigger source edges, HF rejection, noise rejection

► "Edge OR Trigger (ENHANCED)" in the Features Guide

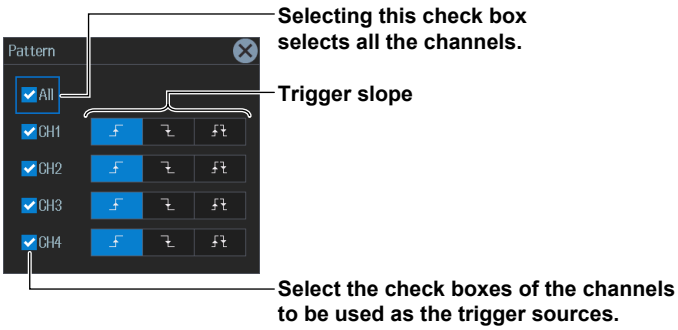
## ENHANCED Edge OR menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **Edge OR** from the setup menu that is displayed. The following menu items appear.



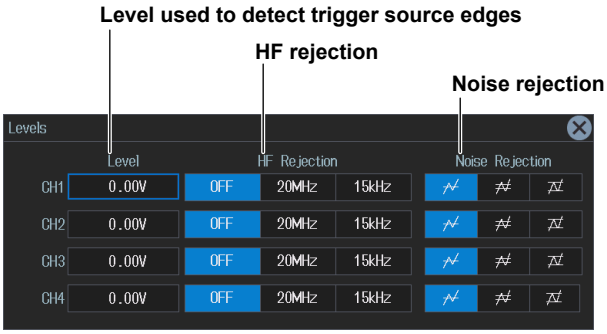

### Trigger Source Pattern (Pattern)

Press the **Pattern** soft key. The following menu items appear.




### Trigger Levels (Levels)

Press the **Levels** soft key. The following menu items appear.



# 2.5 Triggering on Multiple Input Patterns

This section explains the following settings for triggering on multiple input patterns:

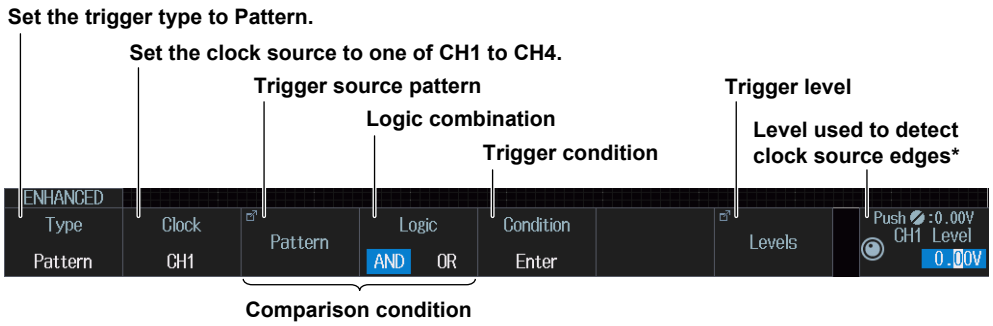
- Clock source
  Source bit
- Comparison condition
  Trigger source pattern, combination
- Trigger conditions
- Time conditions, reference times
- Trigger level
  Level for detecting trigger source edges, HF rejection, noise rejection
- Level for detecting clock source edges

► “Pattern Trigger (ENHANCED)” in the Features Guide

## ENHANCED Pattern Menu

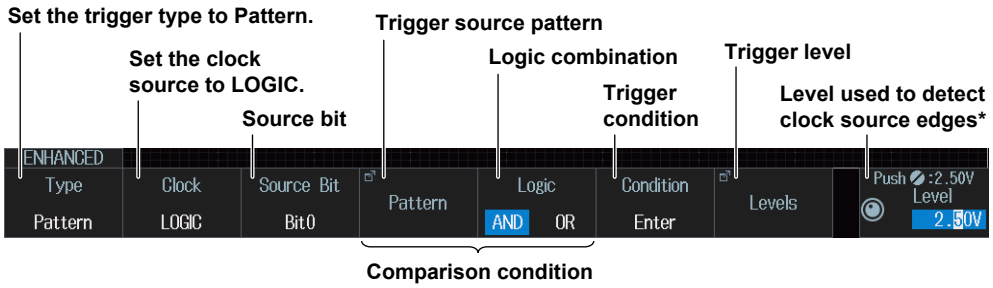
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **Pattern** from the setup menu that is displayed.

### When the Clock Source Is from CH1 to CH4



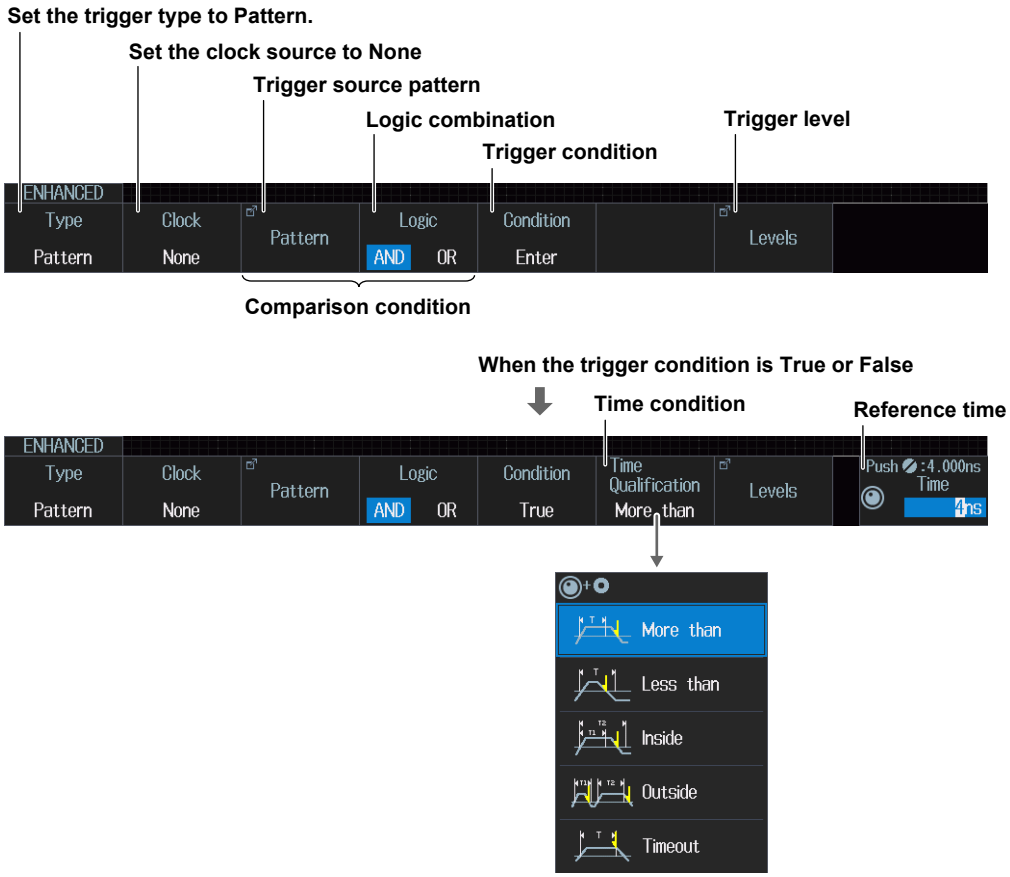

* You can also set the level for detecting clock source edges on the setup screen for trigger levels (Levels).

### When the Clock Source Is LOGIC (On models with the logic signal input port)




* You can also set the level for detecting clock source edges on the setup screen for trigger levels (Levels).

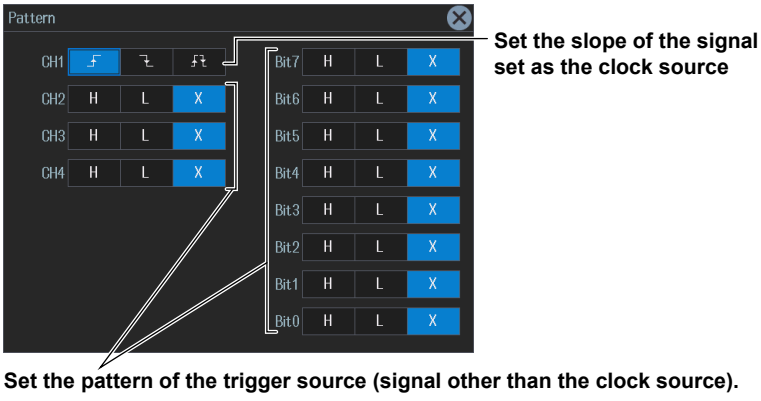
### No Clock Source




## Trigger Source Pattern (Pattern)

Press the **Pattern** soft key. The following menu items appear.

### When the Clock Source Is CH1 to CH4 or LOGIC (On models with the logic signal input port)




### No Clock Source

The same menu appears as that shown above for when the clock source is CH1 to CH4 or LOGIC (on models with the logic signal input port). Because there is no clock source, set the patterns of the trigger sources (all signals: CH1 to CH4, LOGIC).

## Time Condition (Time Qualification)

If no clock source (None) is set, the time condition is set if the trigger condition is True or False.

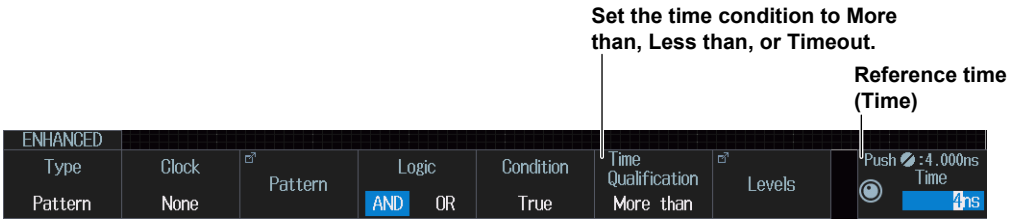
Set what kind of relationship must be established between the comparison condition achievement time and the specified reference time (Time or Time1 and Time2).

For details on the trigger points when the time condition is met, see chapter 4, “Triggering” in the Features Guide (IM DLM3054HD-01EN). When Timeout is selected, the instrument triggers when a timeout occurs.

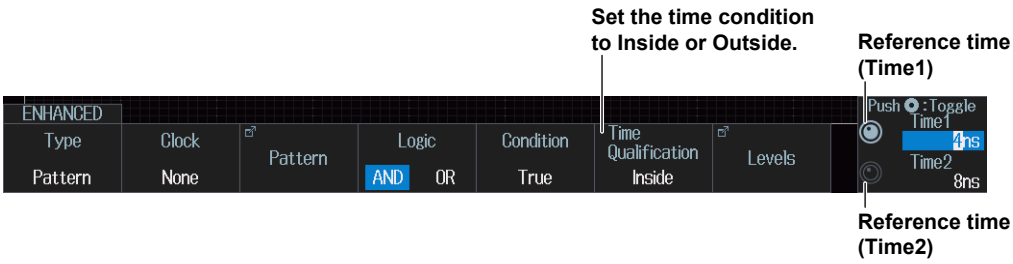
| | | |
|---|---|---|
| More than | : | When the comparison condition achievement time is longer than the specified reference time (Time) |
| Less than | : | When the comparison condition achievement time is shorter than the specified reference time (Time) |
| Inside | : | When the comparison condition achievement time is longer than reference time Time1 and shorter than reference time Time2. |
| Outside | : | When the comparison condition achievement time is shorter than reference time Time1 or longer than reference time Time2. |
| Timeout | : | When the comparison condition achievement time is longer than the specified reference time (Time) |

## Reference time (Time or Time1 and Time2)

### When the Time Condition is More than, Less than, or Timeout



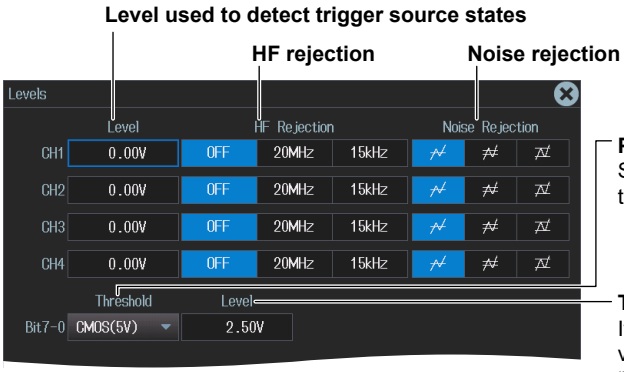

### When the Time Condition is Inside or Outside



## Trigger Levels (Levels)

Press the **Levels** soft key. The following menu items appear.

### For Logic Probes Other Than the 701989

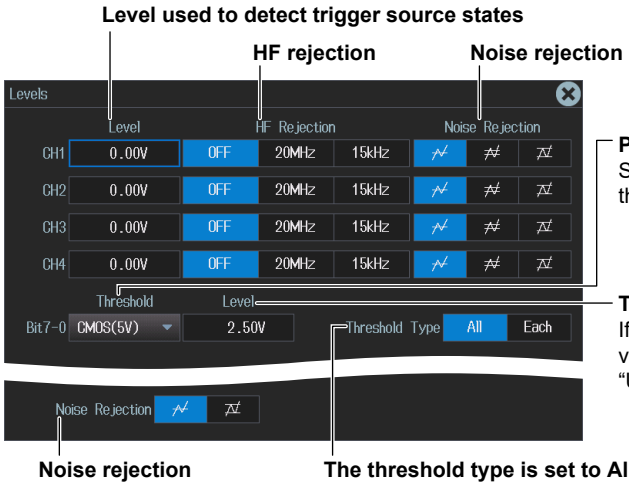



**Preset threshold levels**
Selecting a preset automatically sets the threshold level.

**Threshold level**
If you change the automatically specified value, the preset setting changes to "Userdef."

### For the 701989 Logic Probe

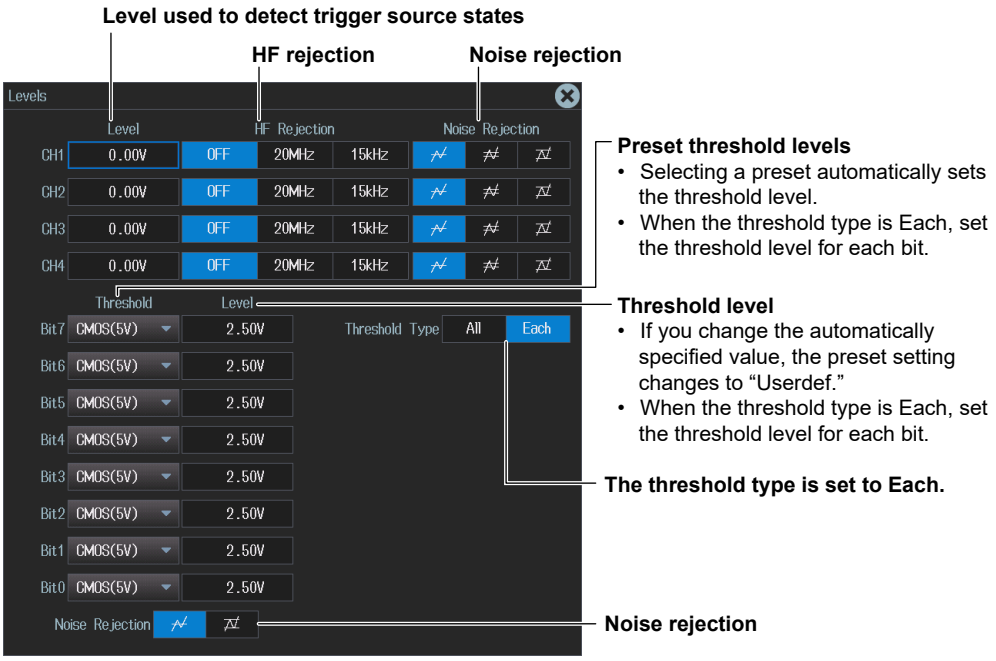
- **When the Threshold Type is All**




**Preset threshold levels**
Selecting a preset automatically sets the threshold level.

**Threshold level**
If you change the automatically specified value, the preset setting changes to "Userdef."

- **When the Threshold Type is Each**



# 2.6 Triggering on Pulse Width

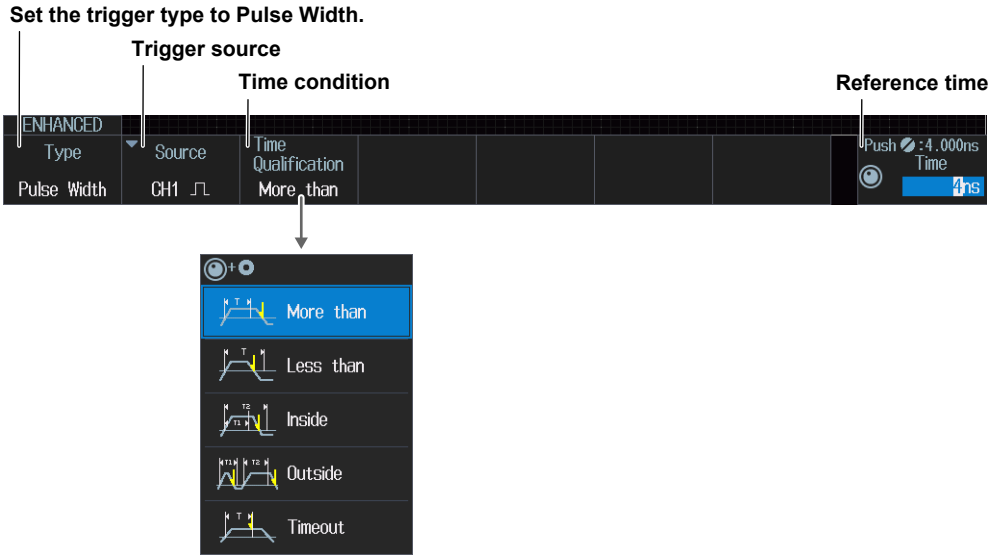
This section explains the following settings for triggering on pulse width:

- Trigger source
  Polarity, HF rejection, noise rejection, source bit,
  level for detecting trigger source edges
- Time conditions, reference times

► "Pulse Width Trigger (ENHANCED)" in the Features Guide

## ENHANCED Pulse Width menu

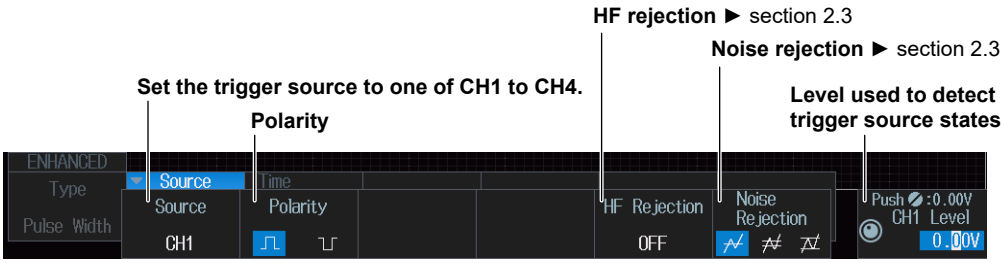
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **Pulse Width** from the setup menu that is displayed. The following menu items appear.



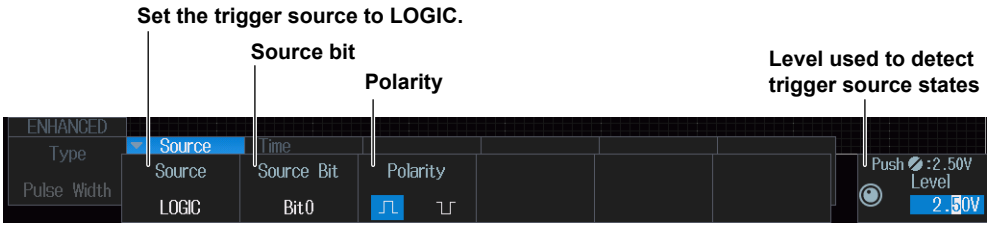

### Trigger Source (Source)

Press the **Source** soft key. The menu that appears varies depending on the specified trigger source.

#### When the Trigger Source Is from CH1 to CH4



### When the Trigger Source Is LOGIC (On models with the logic signal input port)







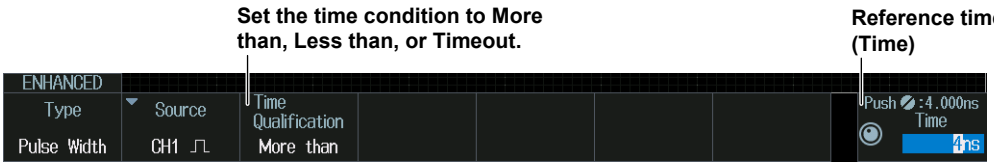
## Time Condition (Time Qualification)

Set what kind of relationship must be established between the trigger source's pulse width and the specified reference times (Time, Time1, and Time2) for the instrument to trigger.
For details on the trigger points when the time condition is met, see chapter 4, "Triggering" in the Features Guide (IM DLM3054HD-01EN). When Timeout is selected, the instrument triggers when a timeout occurs.

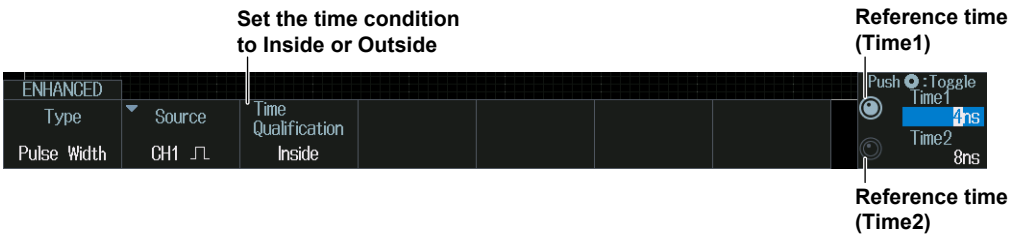
| | | |
|---|---|---|
| More than | : | When the pulse width is longer than the specified reference time (Time) |
| Less than | : | When the pulse width is shorter than the specified reference time (Time) |
| Inside | : | When the pulse width is longer than Time1 but shorter than Time2 |
| Outside | : | When the pulse width is shorter than Time1 or longer than Time2 |
| Timeout | : | When the pulse width is longer than the specified reference time (Time) |

## Reference time (Time or Time1 and Time2)

### When the Time Condition is More than, Less than, or Timeout




### When the Time Condition is Inside or Outside



# 2.7 Triggering on Rise and Fall Times

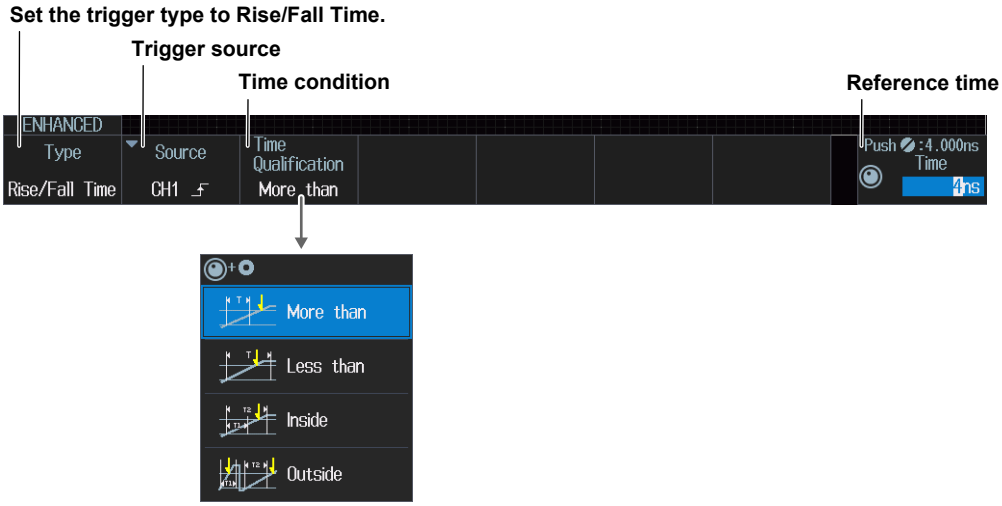
This section explains the following settings for triggering on rise times and fall times:

- Trigger source
  Trigger slope, HF rejection, level for detecting trigger source edges
- Time conditions, reference times

► “Rise/Fall Time Trigger (ENHANCED)” in the Features Guide

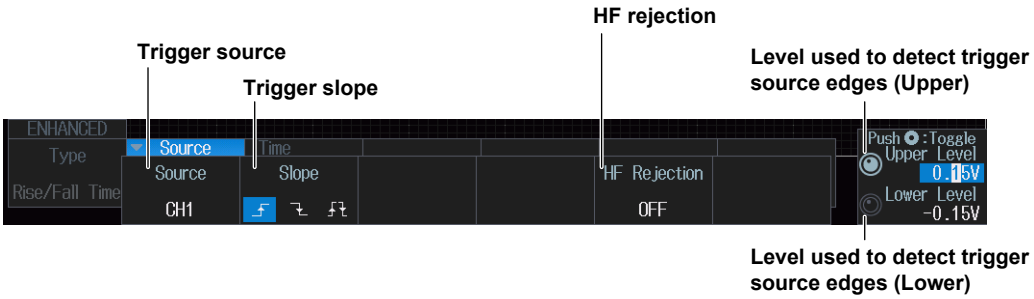
## ENHANCED Rise/Fall Time Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **Rise/Fall Time** from the setup menu that is displayed. The following menu items appear.




### Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.



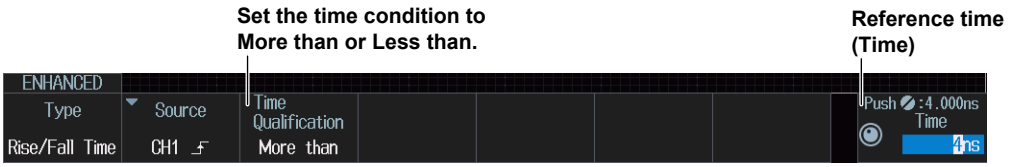
## Time Condition (Time Qualification)

Set what kind of relationship must be established between the trigger source's rise or fall times and the specified reference times (Time or Time1 and Time2) for the instrument to trigger.
For details on the trigger points when the time condition is met, see chapter 4, "Triggering" in the Features Guide (IM DLM3054HD-01EN).

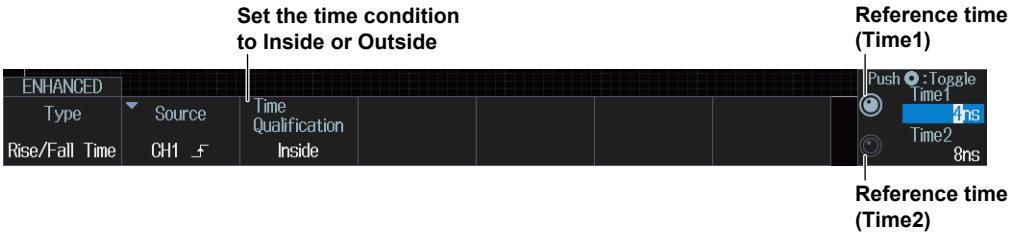
| | | |
|---|---|---|
| More than | : | When the rise time or fall time is longer than the specified reference time |
| Less than | : | When the rise time or fall time is shorter than the specified reference time |
| Inside | : | When the rise time or fall time is longer than reference time Time1 and shorter than reference time Time2 |
| Outside | : | When the rise time or fall time is shorter than reference time Time1 or longer than reference time Time2 |

## Reference time (Time or Time1 and Time2)

### When the Time Condition is More than or Less than




### When the Time Condition is Inside or Outside



# 2.8 Triggering on Runt Signals

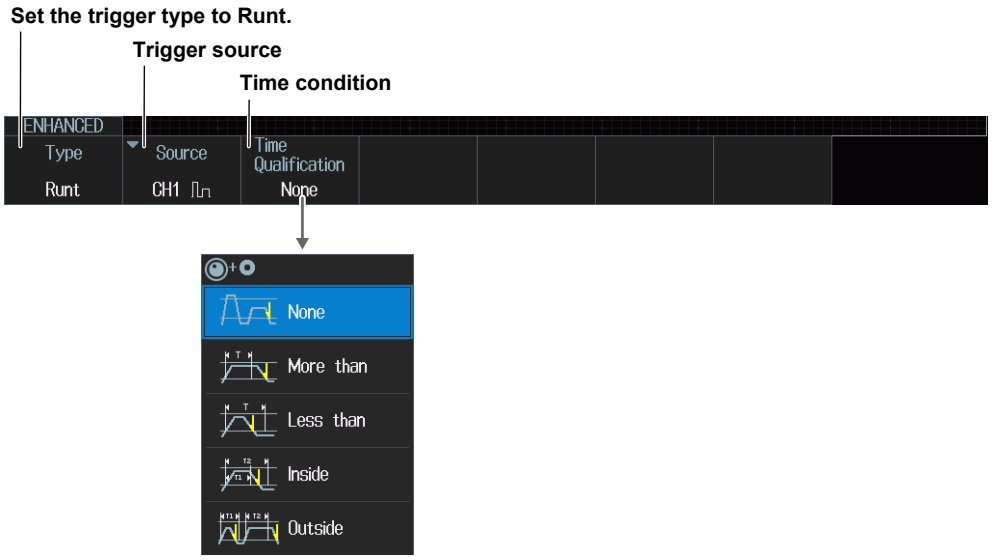
This section explains the following settings for triggering on runt signals:

- Trigger source
  Trigger source polarity, HF rejection, noise rejection,
  level for detecting trigger source edges
- Time conditions, reference times

► “Runt Trigger (ENHANCED)” in the Features Guide

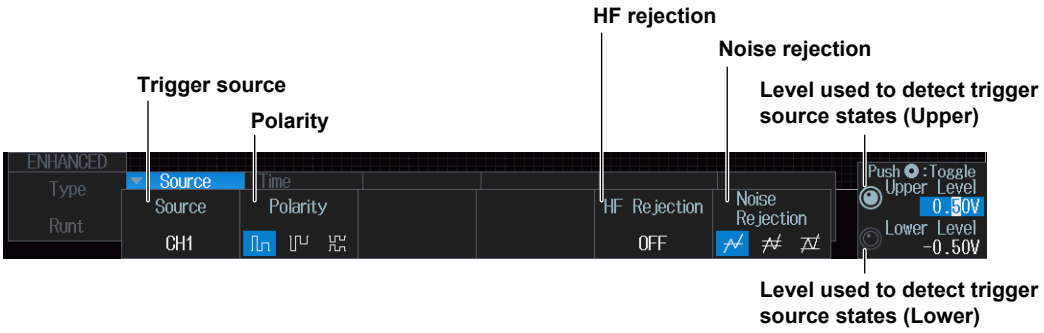
## ENHANCED Runt Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **Runt** from the setup menu that is displayed. The following menu items appear.




### Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.



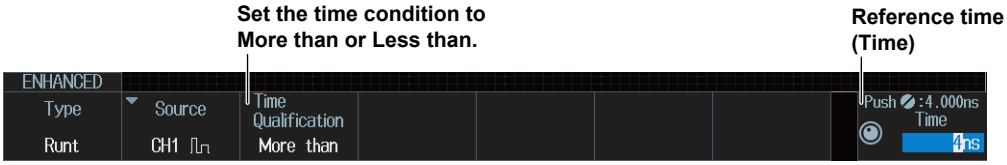
## Time Condition (Time Qualification)

Set what kind of relationship must be established between the Runt signal's pulse width and the specified reference times (Time, Time1, and Time2) for the instrument to trigger.
For details on the trigger points when the time condition is met, see chapter 4, "Triggering" in the Features Guide (IM DLM3054HD-01EN).

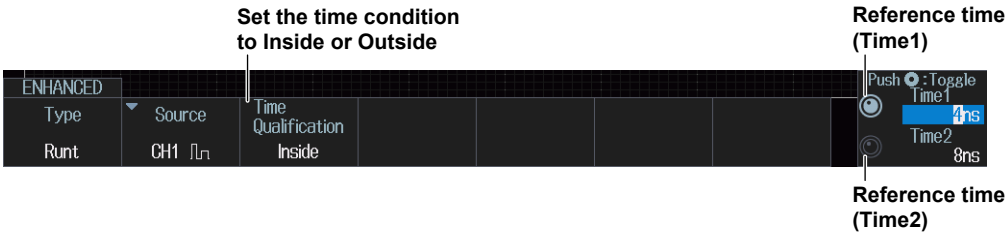
| | | |
|---|---|---|
| None | : | Without a time condition |
| More than | : | When the Runt signal's pulse width is longer than the specified reference time (Time) |
| Less than | : | When the Runt signal's pulse width is shorter than the specified reference time (Time) |
| Inside | : | When the Runt signal's pulse width is longer than Time1 but shorter than Time2 |
| Outside | : | When the Runt signal's pulse width is shorter than Time1 or longer than Time2 |

## Reference time (Time or Time1 and Time2)

### When the Time Condition is More than or Less than




### When the Time Condition is Inside or Outside



# 2.9 Triggering on Timeout Period

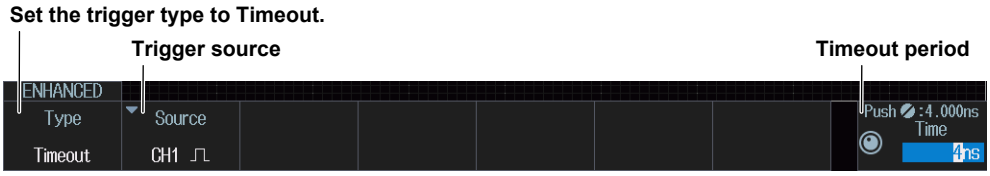
This section explains the following settings for triggering on a timeout period:

- Trigger source
  Trigger source polarity, HF rejection, noise rejection, and source bit
  Level used to detect trigger source edges
- Timeout Period

► “Timeout Trigger (ENHANCED)” in the Features Guide

## ENHANCED Timeout Menu

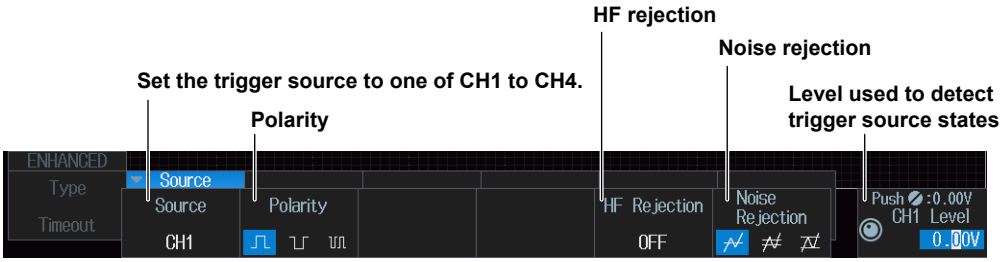
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **Timeout** from the setup menu that is displayed. The following menu items appear.



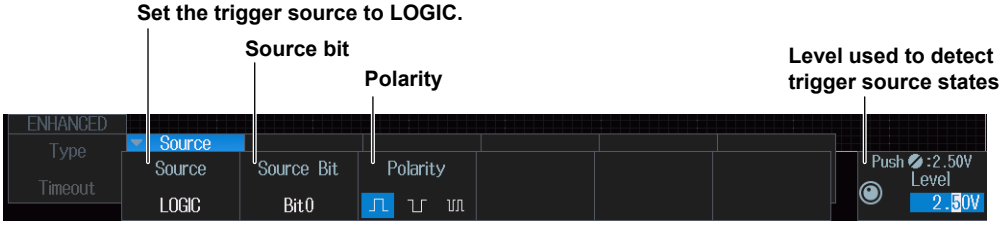

### Trigger Source (Source)

Press the **Source** soft key. The menu that appears varies depending on the specified trigger source.

#### When the Trigger Source Is from CH1 to CH4




#### When the Trigger Source Is LOGIC (On models with the logic signal input port)






# 2.10 Triggering on a Window Trigger

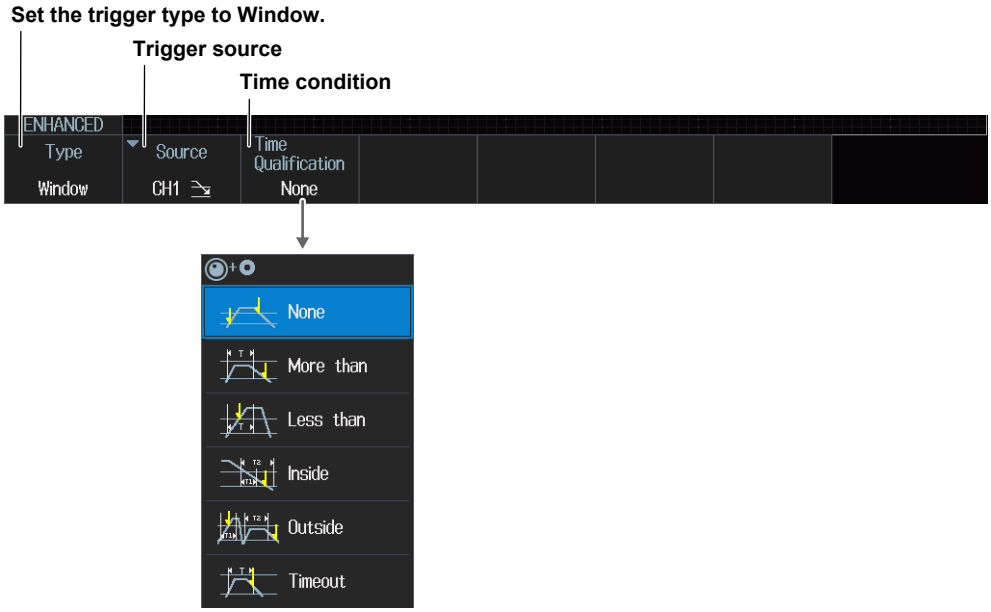
This section explains the following settings for triggering on a window (level range):

- Trigger source
  Trigger source polarity, HF rejection, noise rejection, and level range window
- Time conditions, reference times

► “Window Trigger (ENHANCED)” in the Features Guide

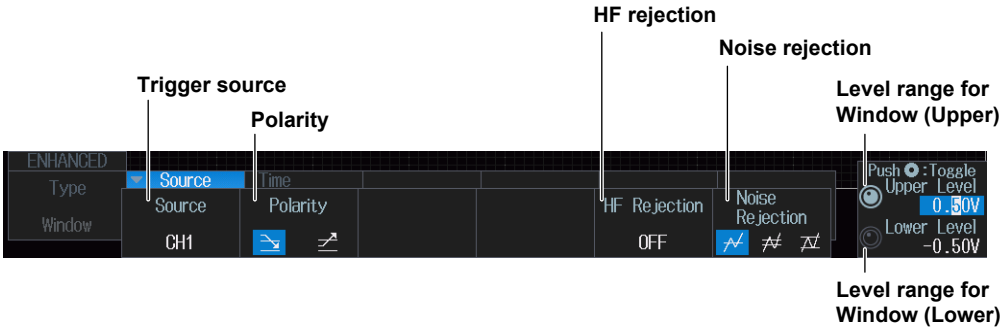
## ENHANCED Window Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **Window** from the setup menu that is displayed. The following menu items appear.




### Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.



## Time Condition (Time Qualification)

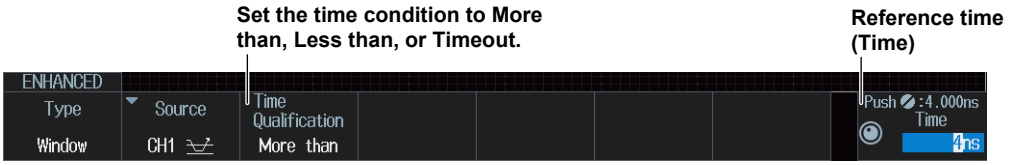
Set what kind of relationship must be established between the time that the waveform stays inside or outside the window and the specified reference times (Time or Time1 and Time2) for the instrument to trigger.

For details on the trigger points when the time condition is met, see chapter 4, “Triggering” in the Features Guide (IM DLM3054HD-01EN). When Timeout is selected, the instrument triggers when a timeout occurs.

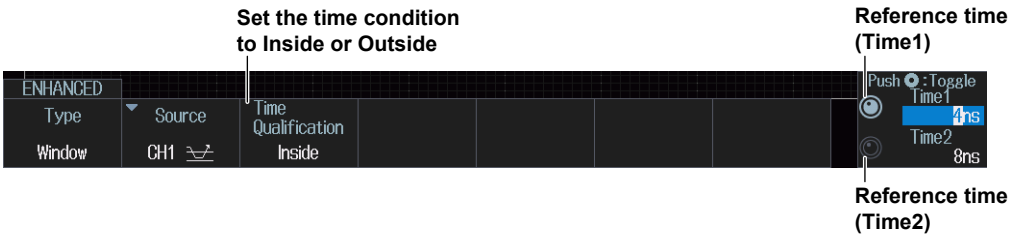
| | | |
|---|---|---|
| None | : | Without a time condition (when the waveform moves from inside the window to outside, or from outside the window to inside) |
| More than | : | When the time that the waveform stays inside or outside the window is longer than the specified reference time (Time) |
| Less than | : | When the time that the waveform stays inside or outside the window is shorter than the specified reference time (Time) |
| Inside | : | When the time that the waveform stays inside or outside the window is longer than reference time Time1 and shorter than reference time Time2. |
| Outside | : | When the time that the waveform stays inside or outside the window is shorter than reference time Time1 or longer than reference time Time2. |
| Timeout | : | When the time that the waveform stays inside or outside the window is longer than the specified reference time (Time) |

## Reference time (Time or Time1 and Time2)

### When the Time Condition is More than, Less than, or Timeout




### When the Time Condition is Inside or Outside



# 2.11 Triggering on the OR of Multiple Window Triggers

This section explains the following settings for triggering on the logical OR of multiple window triggers (without a time condition):

- Trigger source pattern
  Trigger source, trigger source polarity
- Trigger level
  Level range window, HF rejection, noise rejection

► “Window OR Trigger (ENHANCED)” in the Features Guide

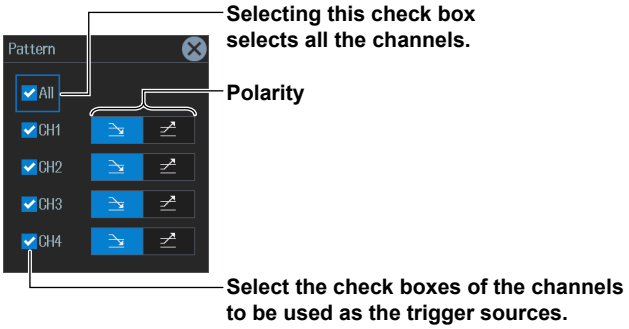
## ENHANCED Window OR Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **Window OR** from the setup menu that is displayed. The following menu items appear.



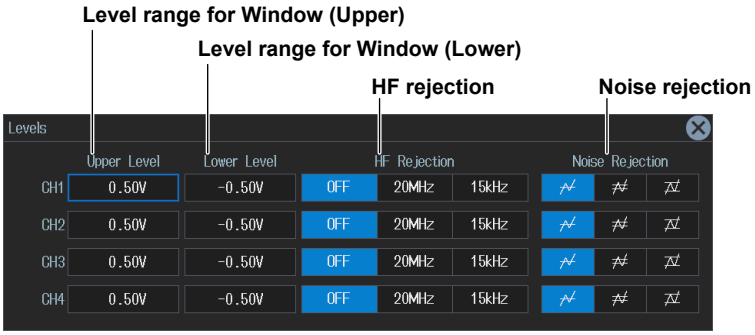

### Trigger Source Pattern (Pattern)

Press the **Pattern** soft key. The following menu items appear.




### Trigger Levels (Levels)

Press the **Levels** soft key. The following menu items appear.



# 2.12 Triggering on Edge Intervals

This section explains the following settings for triggering on edge intervals:

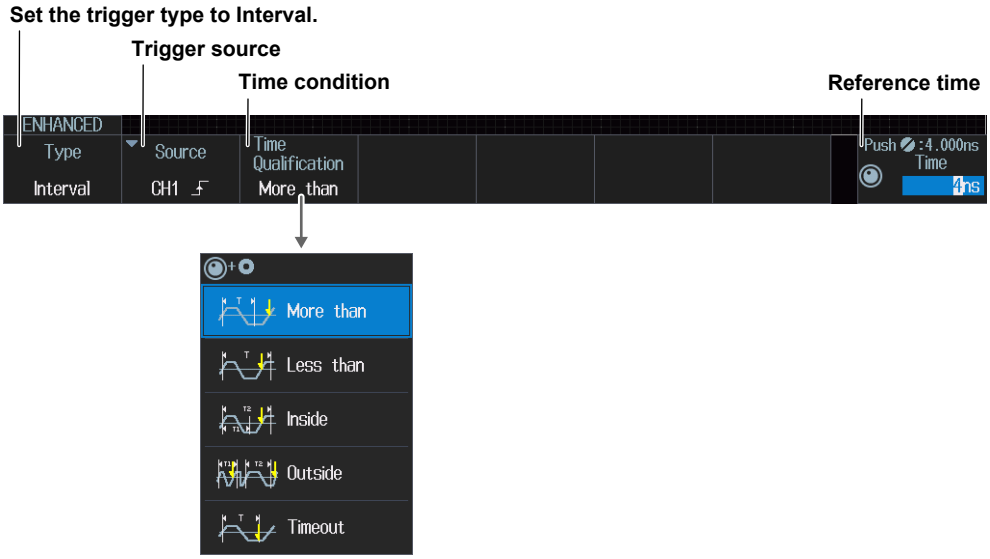
- Trigger source
  Trigger slope, HF rejection, noise rejection, source bit,
  level for detecting trigger source edges

- Time conditions, reference times

► “Interval Trigger (ENHANCED)” in the Features Guide

## ENHANCED Interval Menu

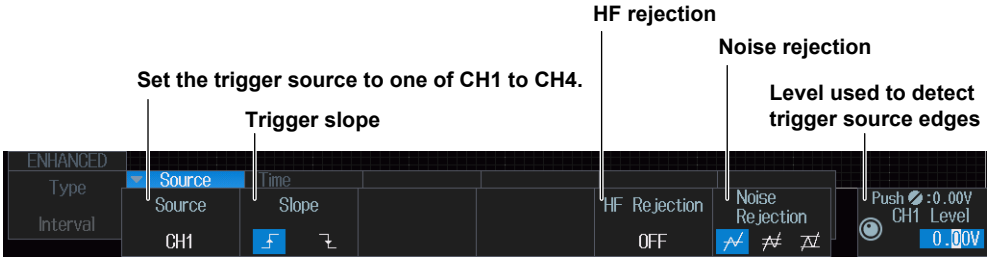
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **Interval** from the setup menu that is displayed. The following menu items appear.



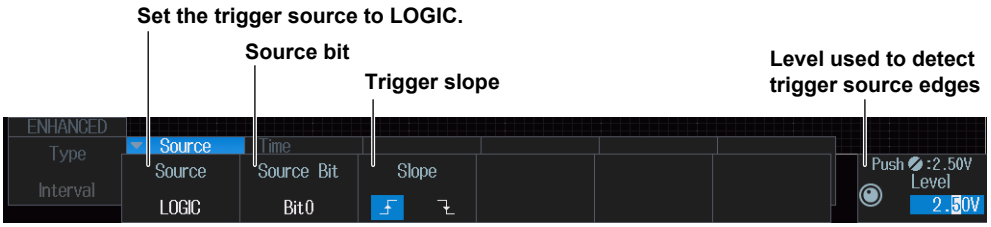

### Trigger Source (Source)

Press the **Source** soft key. The menu that appears varies depending on the specified trigger source.

#### When the Trigger Source Is from CH1 to CH4



### When the Trigger Source Is LOGIC (On models with the logic signal input port)







## Time Condition (Time Qualification)

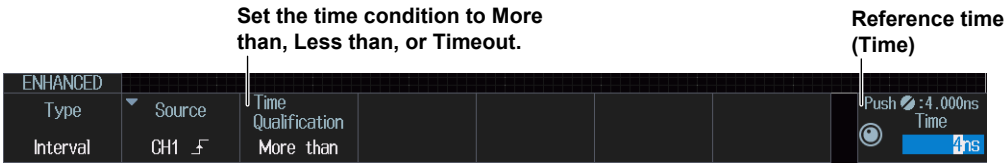
Set what kind of relationship must be established between the interval between two consecutive edges (rising or falling) and the specified reference times (Time or Time1 and Time2) for the instrument to trigger.

For details on the trigger points when the time condition is met, see chapter 4, “Triggering” in the Features Guide (IM DLM3054HD-01EN). When Timeout is selected, the instrument triggers when a timeout occurs.

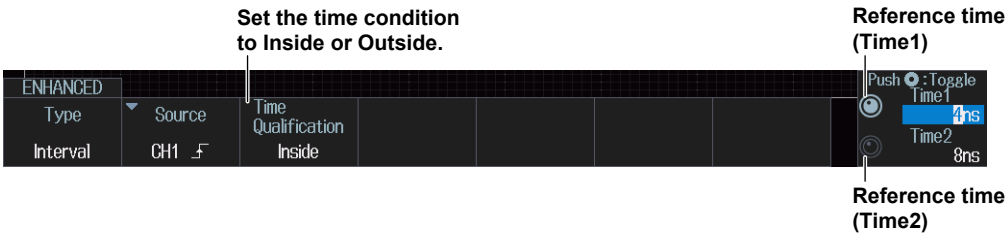
| | | |
|---|---|---|
| More than | : | When the edge interval is longer than the specified reference time (Time) |
| Less than | : | When the edge interval is shorter than the specified reference time (Time) |
| Inside | : | When the edge interval is longer than Time1 but shorter than Time2 |
| Outside | : | When the edge interval is shorter than Time1 or longer than Time2 |
| Timeout | : | When the edge interval is longer than the specified reference time (Time) |

## Reference time (Time or Time1 and Time2)

### When the Time Condition is More than, Less than, or Timeout




### When the Time Condition is Inside or Outside



# 2.13 Triggering on FlexRay Bus Signals (Option)

This section explains the following settings for triggering on FlexRay bus signals:

- Trigger source
  Bit rate, bus channel assignment, HF rejection
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions

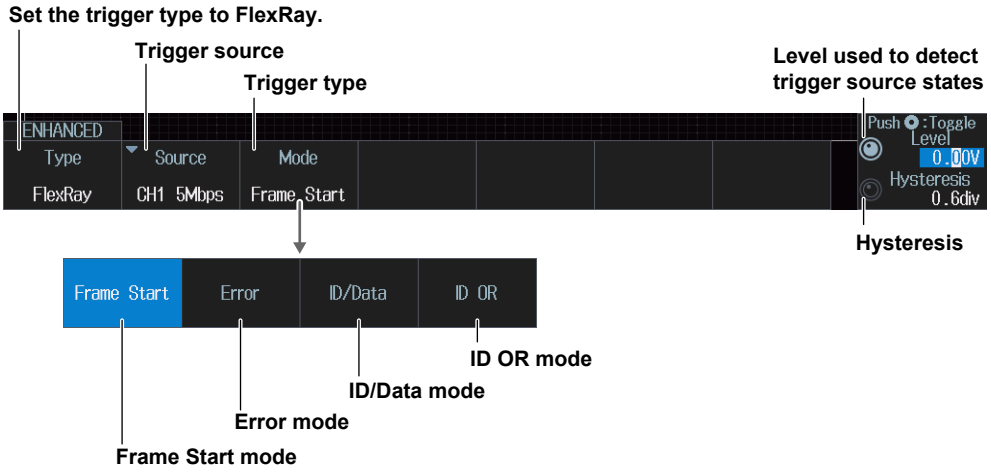
► “FlexRay Bus Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source level and bit rate from the received FlexRay bus signal and trigger on them. For details, see section 12.1.

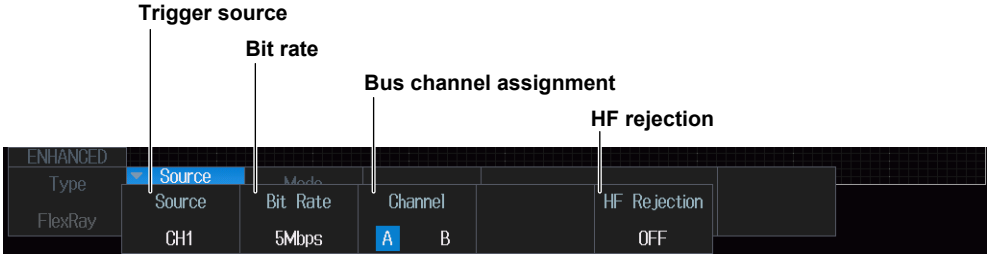
## ENHANCED FlexRay Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **FlexRay** from the setup menu that is displayed. The following menu items appear.




### Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.



## Trigger Mode (Mode)

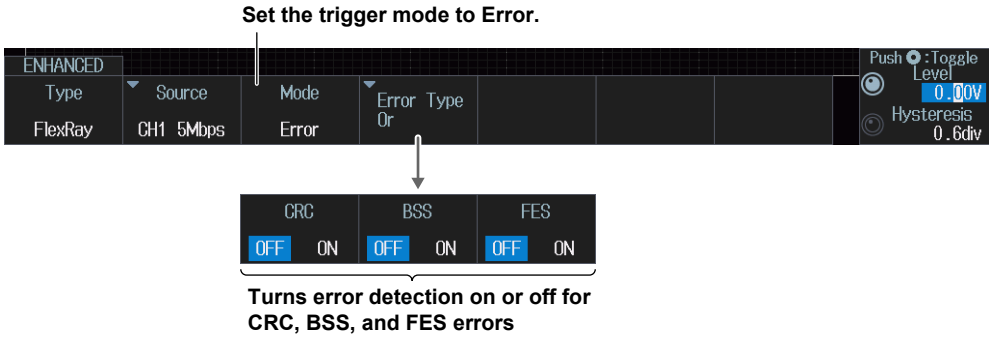
### Frame Start Mode (Frame Start)

Press the **Mode** soft key and then the **Frame Start** soft key.

The instrument triggers on the start of FlexRay bus signal frames.

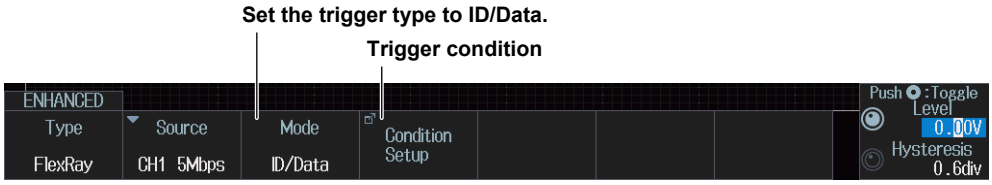
### Error Mode (Error)

Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.




### ID/Data Mode (ID/Data)

Press the **Mode** soft key and then the **ID/Data** soft key. The following menu items appear.

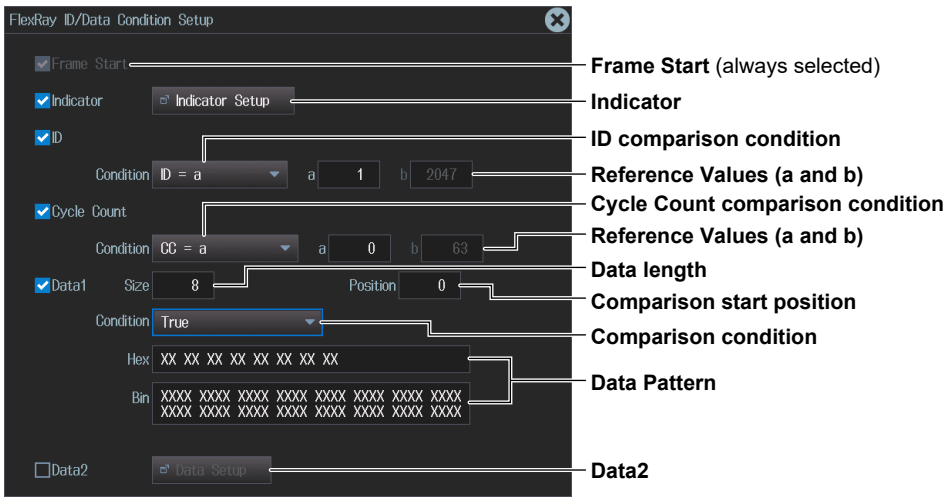



#### Trigger Condition (Condition Setup)

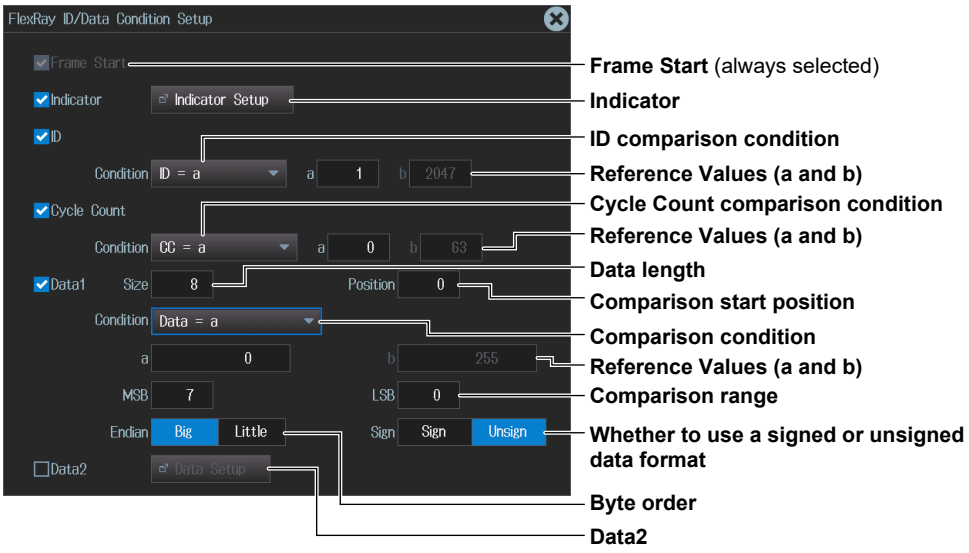
Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of Frame Start, Indicator, ID, Cycle Count, Data1, and Data2. Items whose check boxes are selected are used as trigger conditions.

- **When the Comparison Condition of Data1 Is True or False**

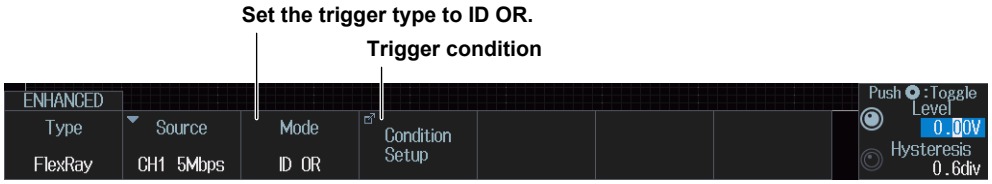


- **When the Comparison Condition of Data1 Is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**




## ID OR Mode (ID OR)

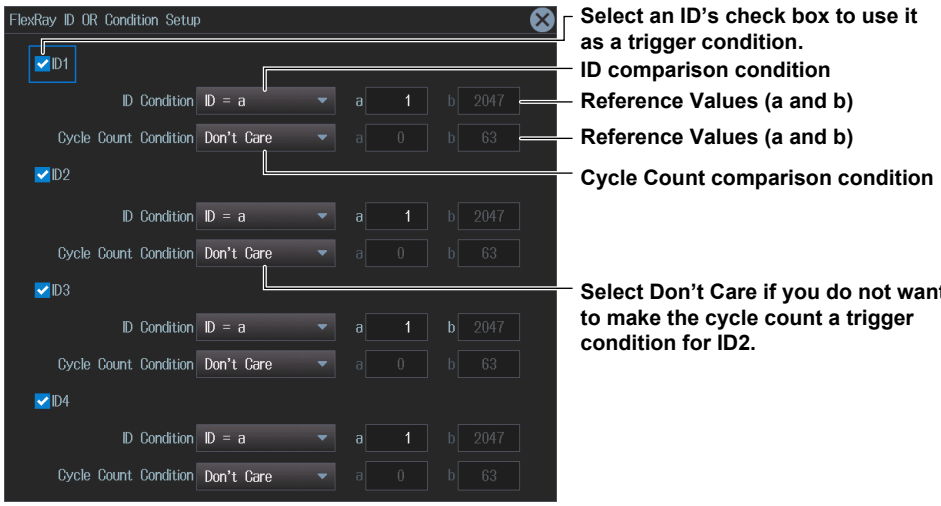
Press the **Mode** soft key and then the **ID OR** soft key. The following menu items appear.




### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers when the condition of one of the four IDs is met. Items whose check boxes are selected are used as trigger conditions.



# 2.14 Triggering on CAN Bus Signals (Option)

This section explains the following settings for triggering on CAN bus signals:

- Trigger source
  Bit rate, recessive level, HF rejection, sample point
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions

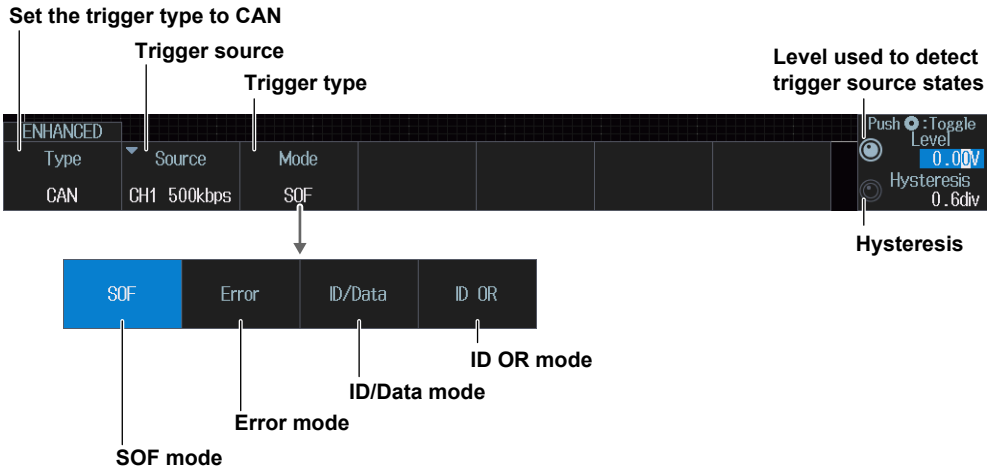
► “CAN Bus Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source level and bit rate from the received CAN bus signal and trigger on them. For details, see section 12.2.

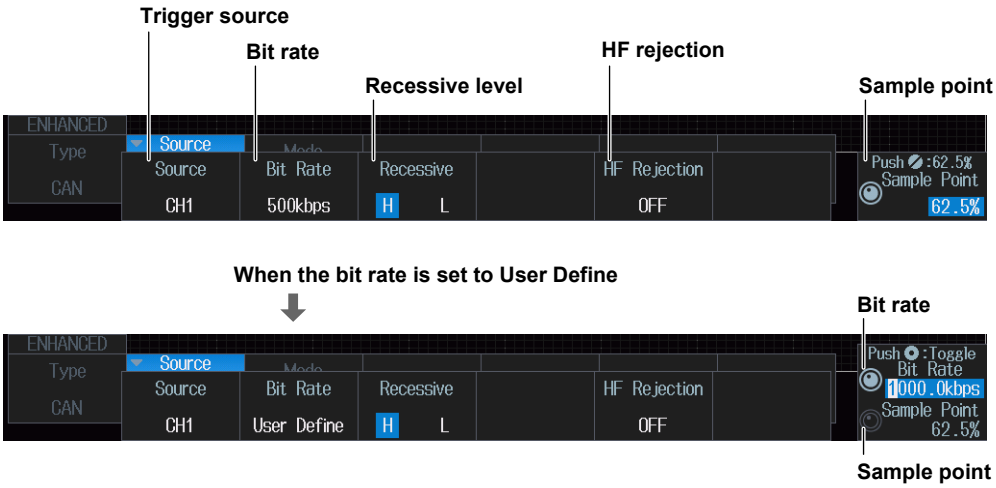
## ENHANCED CAN Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **CAN** from the setup menu that is displayed. The following menu items appear.



## Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.




## Trigger Mode (Mode)

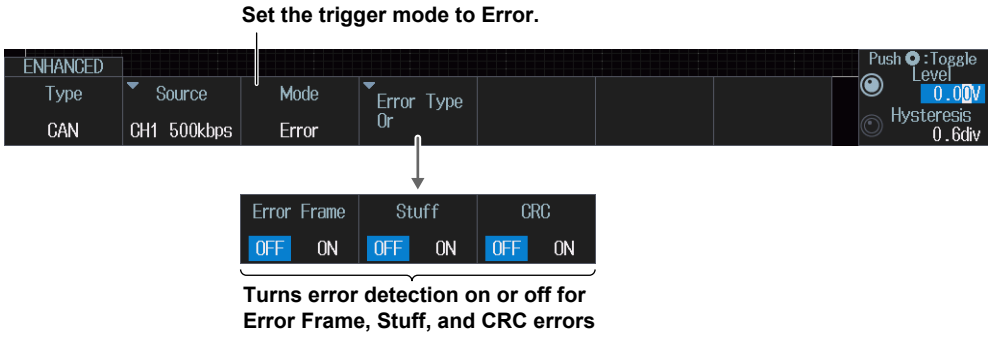
### SOF (Start of Frame) Mode

Press the **Mode** soft key and then the **SOF** soft key.

The instrument triggers on the start of CAN bus signal frames.

### Error Mode (Error)

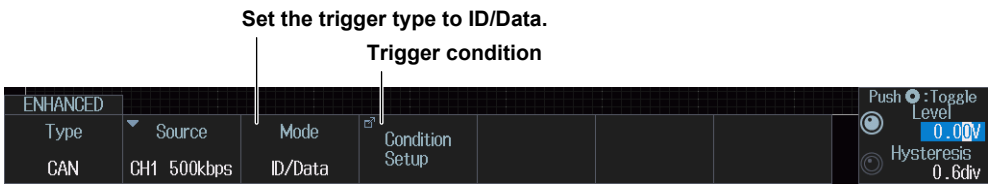
Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.




The instrument triggers on error frames (when the error flag is active) or when it detects any of various errors.

### ID/Data Mode (ID/Data)

Press the **Mode** soft key and then the **ID/Data** soft key. The following menu items appear.



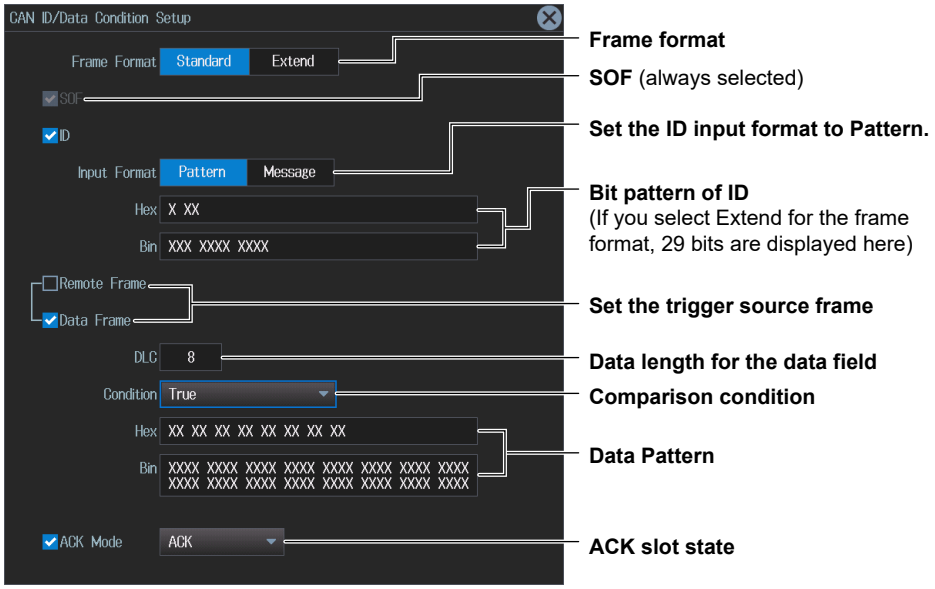
### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

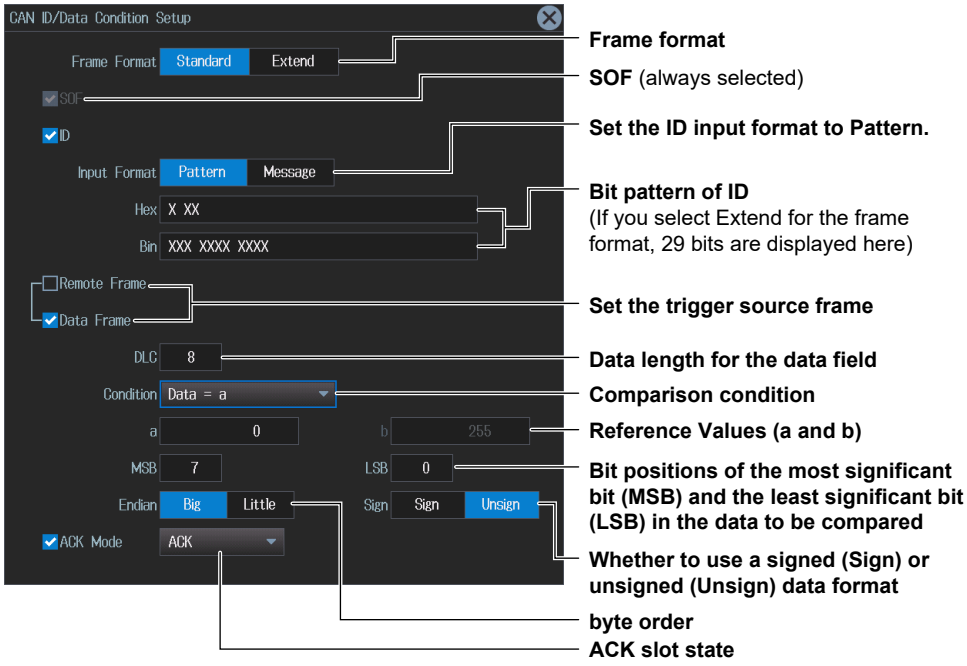
The instrument triggers on the AND of the SOF, ID, frame type (Remote Frame or Data Frame), Data, and ACK Mode conditions. Items whose check boxes are selected are used as trigger conditions.

- **When ID Input Format Is Pattern**

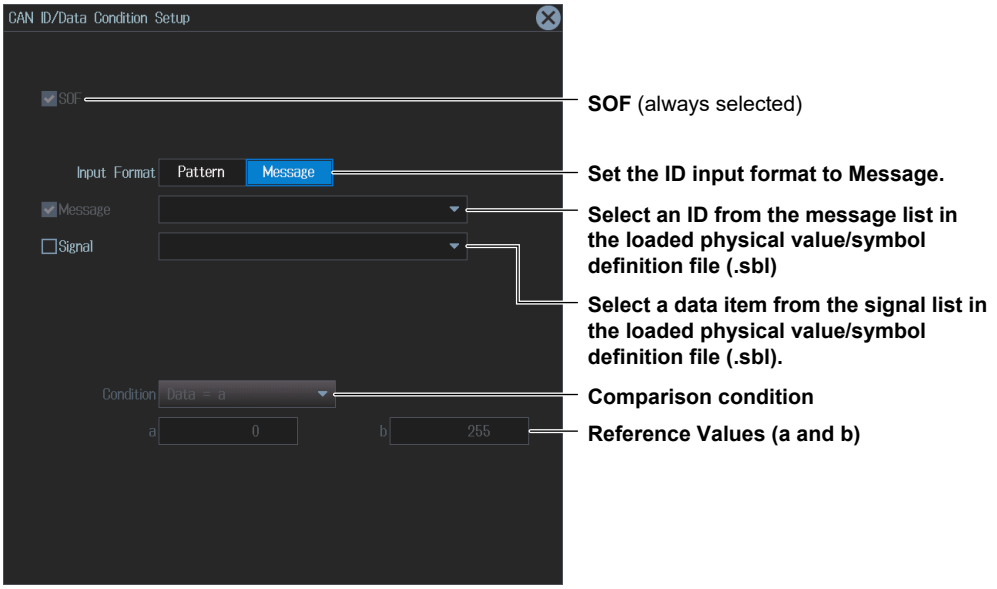
**When the Comparison Condition Is True or False**




**When the comparison condition is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**

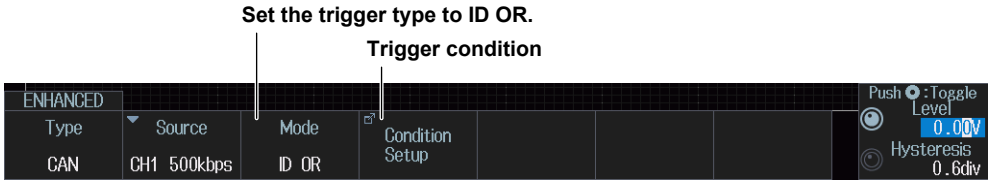


- **When ID Input Format Is Message**




## ID OR Mode (ID OR)

Press the **Mode** soft key and then the **ID OR** soft key. The following menu items appear.

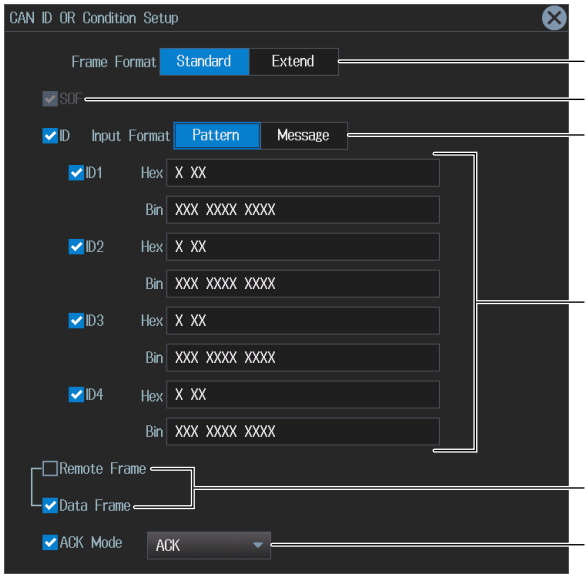



### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of the SOF, any of the four IDs, frame type (Remote Frame or Data Frame), and ACK Mode conditions. Items whose check boxes are selected are used as trigger conditions.

- **When ID Input Format Is Pattern**




**Frame format**

**SOF** (always selected)

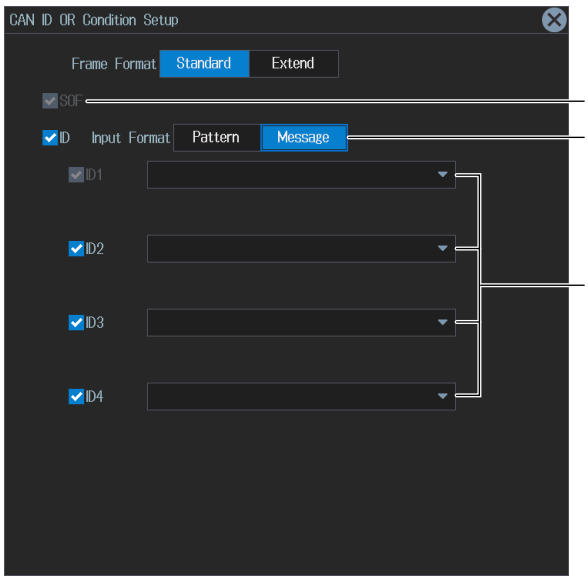
**Set the ID input format to Pattern.**

**Bit pattern of ID**
(If you select Extend for the frame format, 29 bits are displayed here)

**Set the trigger source frame**

**ACK slot state**

- **When ID Input Format Is Message**




**SOF** (always selected)

**Set the ID input format to Message.**

**Select IDs from the list of messages loaded from the physical value/symbol definition file (.sbl)**

# 2.15 Triggering on CAN FD Bus Signals (Option)

This section explains the following settings for triggering on CAN FD signals:

- Trigger source
  Bit rate, sample point, data phase bit rate,
  data phase sample point, recessive level, HF rejection
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions
- CAN FD standard

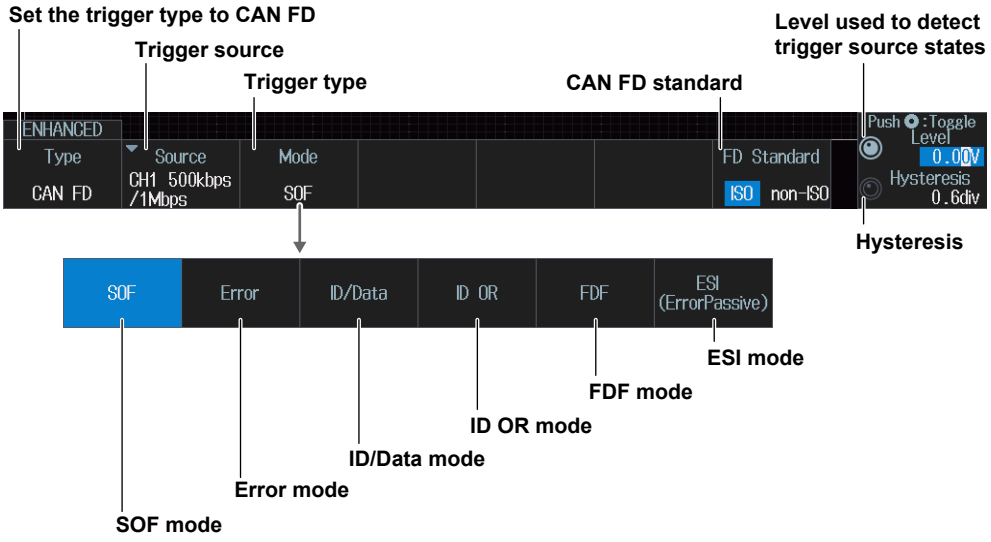
► "CAN FD Bus Trigger (ENHANCED)(Option)" in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source level and bit rate from the received CAN FD bus signal and trigger on them. For details, see section 12.3.

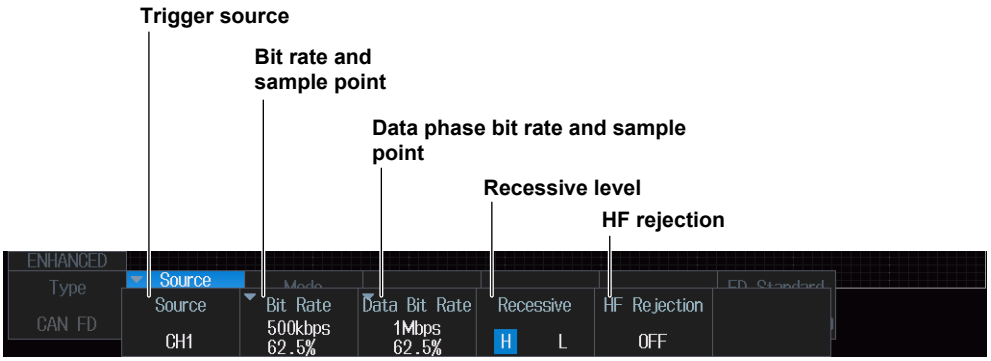
## ENHANCED CAN FD Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **CAN FD** from the setup menu that is displayed. The following menu items appear.



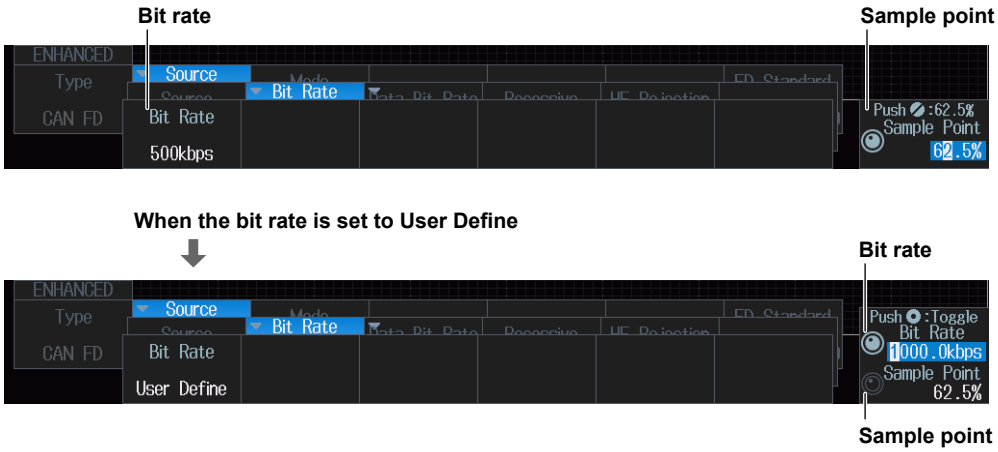
## Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.



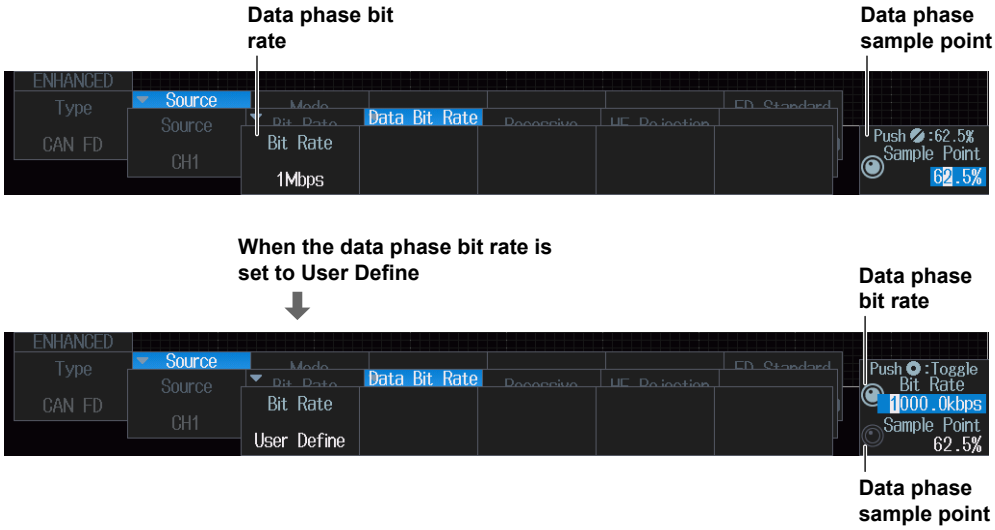

### Bit Rate (Bit Rate) and Sample Point (Sample Point)

Press the **Bit Rate** soft key. The following menu items appear.




### Data Phase Bit Rate (Data Bit Rate) and Sample Point (Sample Point)

Press the **Data Bit Rate** soft key. The following menu items appear.



## Trigger Mode (Mode)

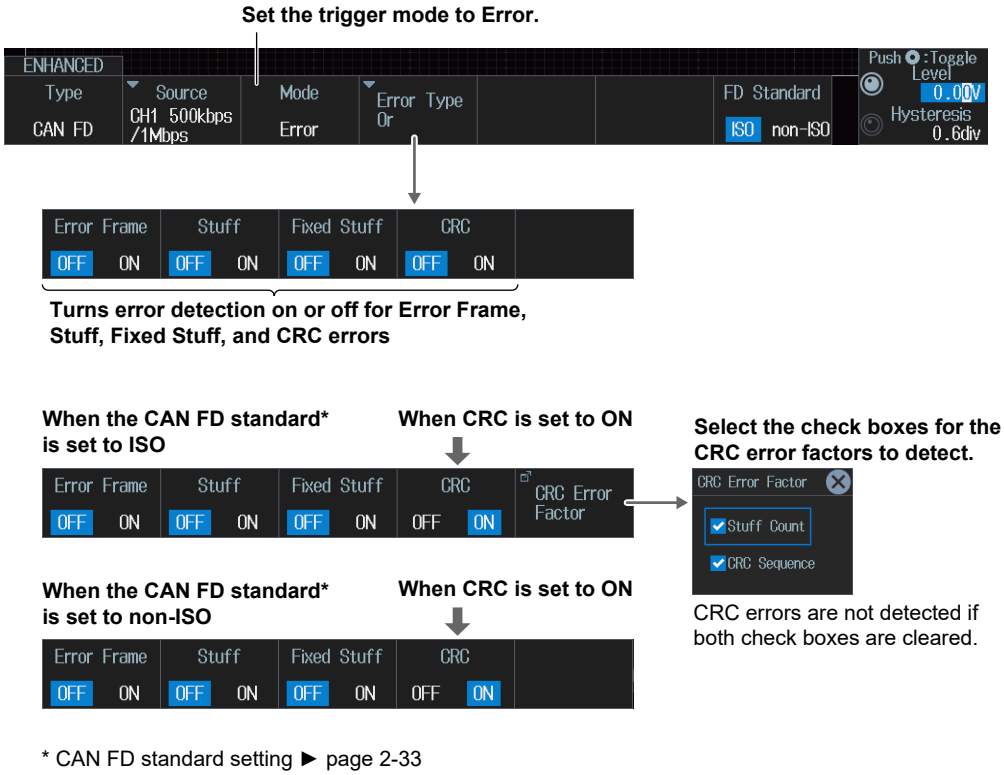
### SOF (Start of Frame) Mode

Press the **Mode** soft key and then the **SOF** soft key.

The instrument triggers on the start of CAN FD bus signal frames.

### Error Mode (Error)

Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.

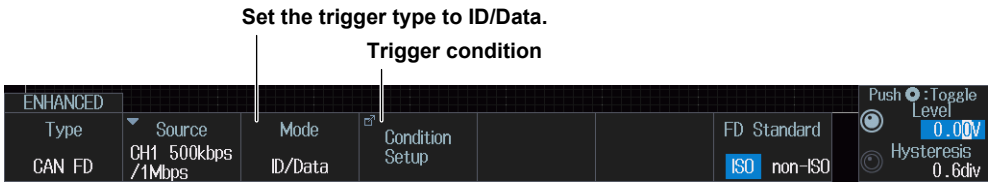



* CAN FD standard setting ► page 2-33

The instrument triggers on error frames (when the error flag is active) or when it detects various errors.

### ID/Data Mode (ID/Data)

Press the **Mode** soft key and then the **ID/Data** soft key. The following menu items appear.



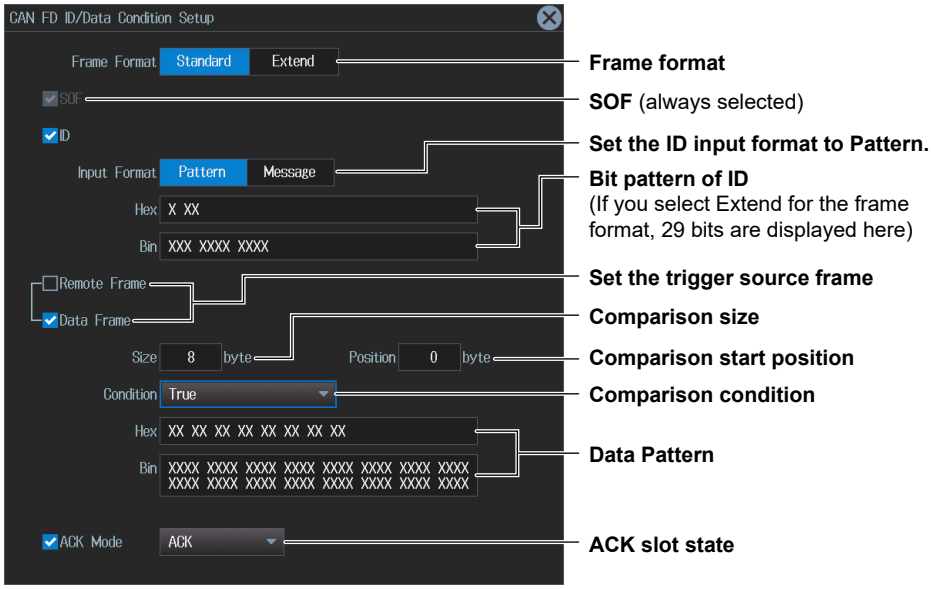
### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

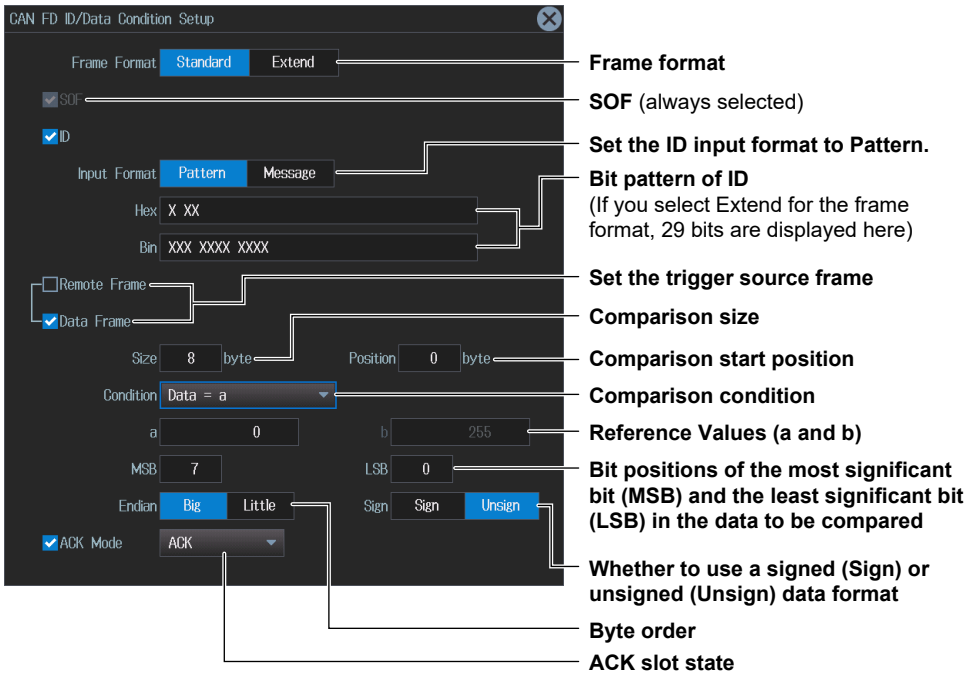
The instrument triggers on the AND of the SOF, ID, frame type (Remote Frame or Data Frame), Data, and ACK Mode conditions. Items whose check boxes are selected are used as trigger conditions.

- **When ID Input Format Is Pattern**

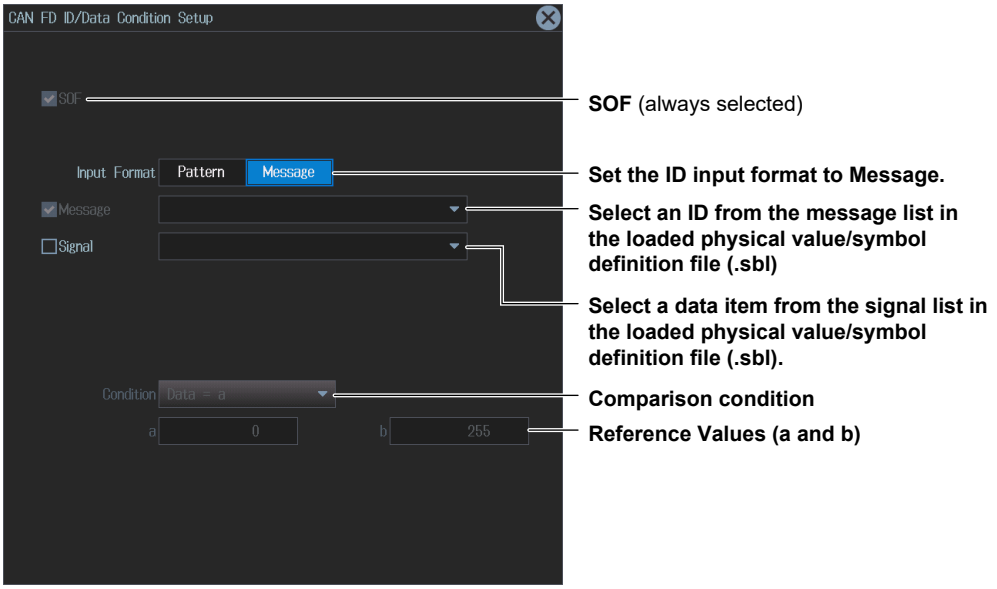
**When the Comparison Condition Is True or False**




**When the comparison condition is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**

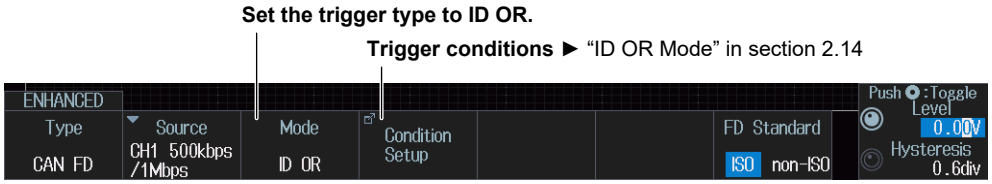


- **When ID Input Format Is Message**



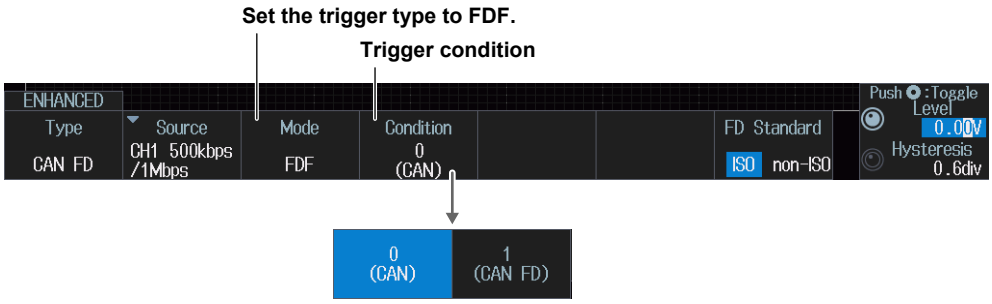

## ID OR Mode (ID OR)

Press the **Mode** soft key and then the **ID OR** soft key. The following menu items appear.



## FDF Mode (FDF)

Press the **Mode** soft key and then the **FDF** soft key. The following menu items appear.




**Trigger Condition (Condition)**

Set the FDF bit state as a trigger condition.

0 (CAN):When the FDF bit is dominant, the instrument assumes that the frame is a CAN bus signal frame and triggers.

1 (CAN FD):When the FDF bit is recessive, the instrument assumes that the frame is a CAN FD bus signal frame and triggers on it.

## ESI Mode (ESI (ErrorPassive))

Press the **Mode** soft key and then the **ESI (ErrorPassive)** soft key.

The instrument triggers when the ESI bit is recessive (error passive).

# 2.16 Triggering on LIN Bus Signals (Option)

This section explains the following settings for triggering on LIN bus signals:

- Trigger source
  Bit rate, HF rejection, sample point
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions

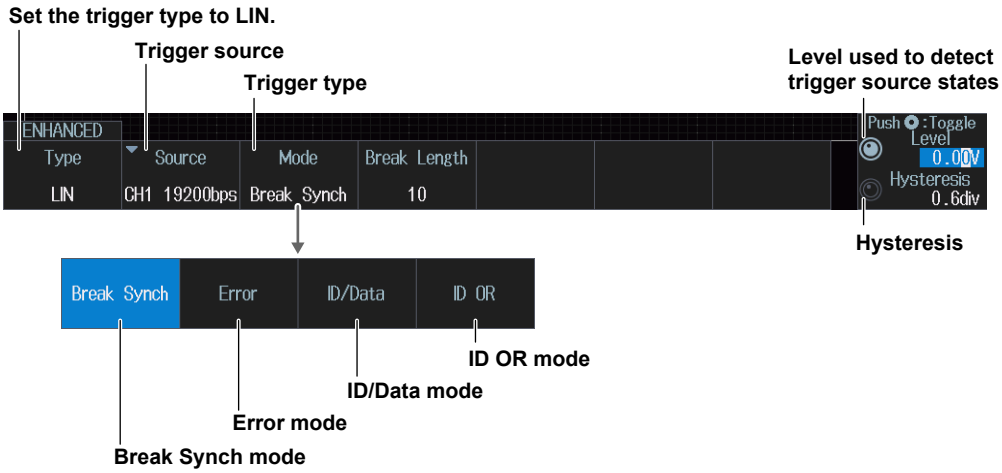
► “LIN Bus Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source level and bit rate from the received LIN bus signal and trigger on them. For details, see section 12.4.

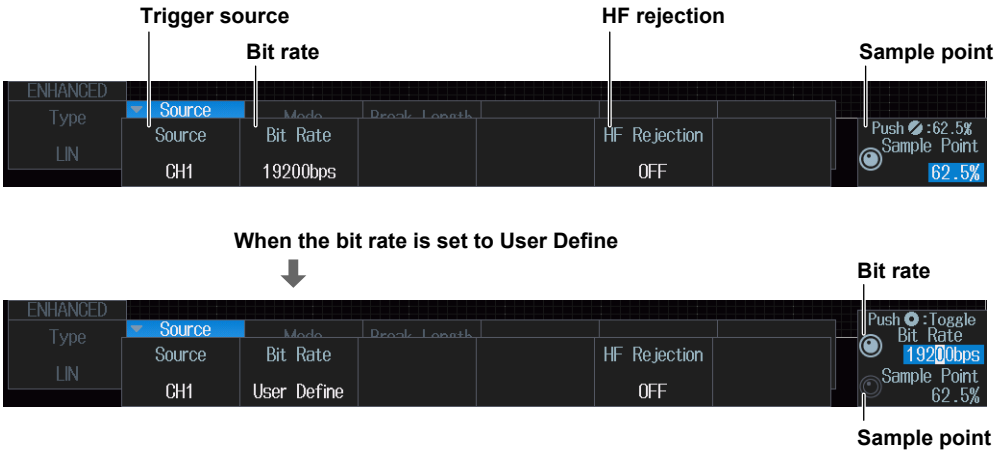
## ENHANCED LIN Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** ( ) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **LIN** from the setup menu that is displayed. The following menu items appear.



## Trigger Source (Source)

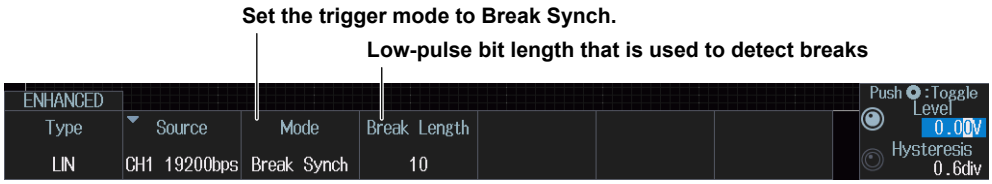
Press the **Source** soft key. The following menu items appear.




## Trigger Mode (Mode)

### Break Synch Mode

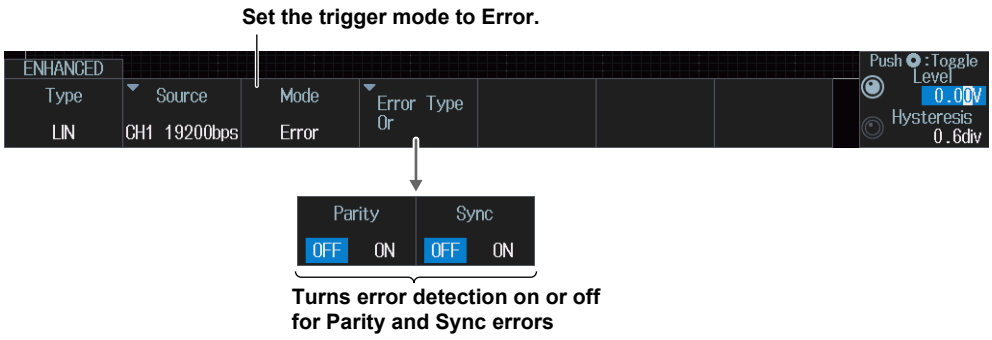
Press the **Mode** soft key and then the **Break Synch** soft key. The following menu items appear.




The instrument triggers when it detects a break field and then a synch field (Break Field + Synch Field).

### Error Mode

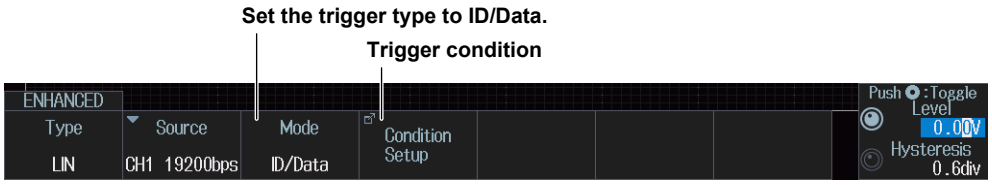
Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.




The instrument triggers when it detects an error.

## ID/Data Mode

Press the **Mode** soft key and then the **ID/Data** soft key. The following menu items appear.

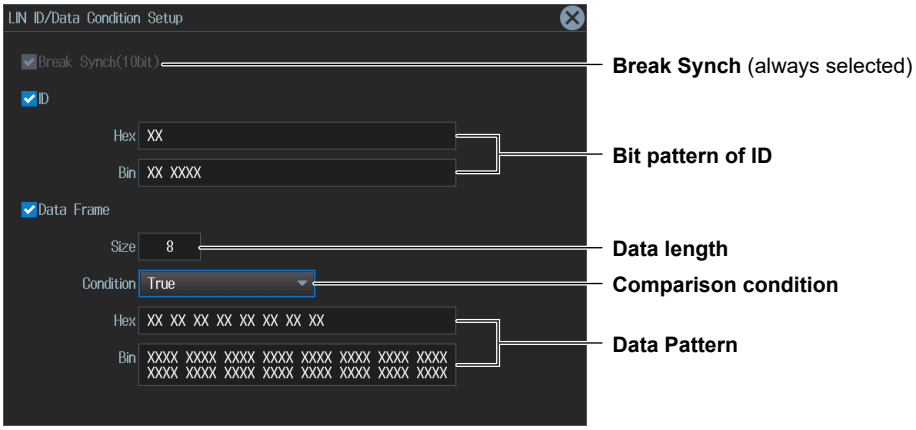



### Trigger Condition (Condition Setup)

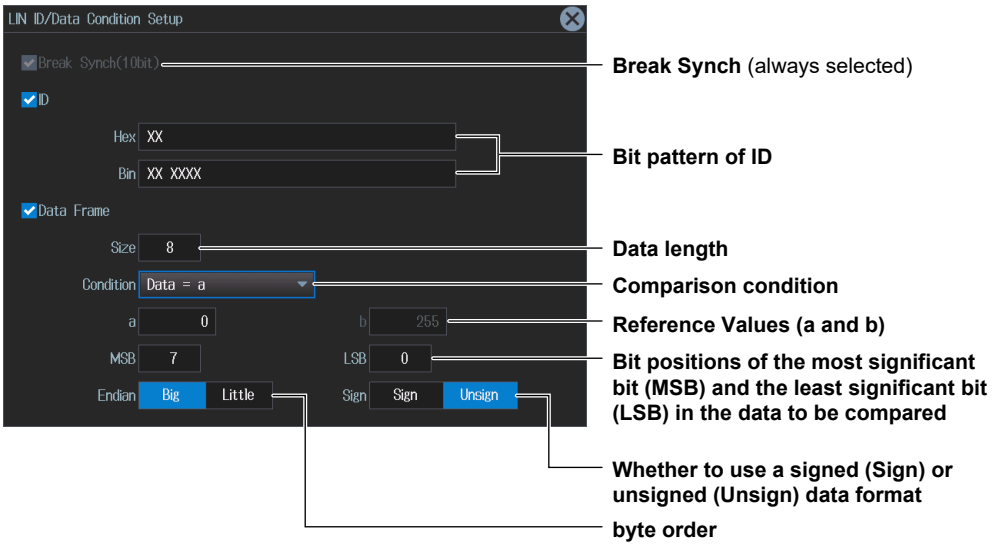
Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of the Break Synch, ID, and Data Frame conditions. Items whose check boxes are selected are used as trigger conditions.

- **When the Comparison Condition Is True or False**

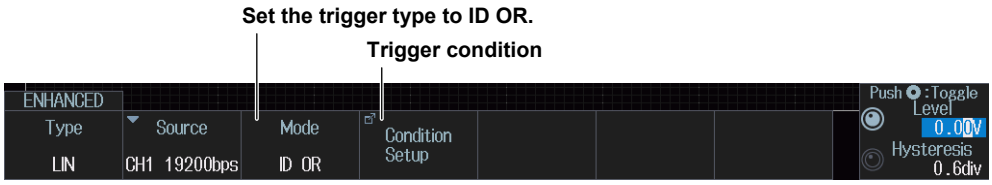



- **When the Comparison Condition Is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**



## ID OR Mode

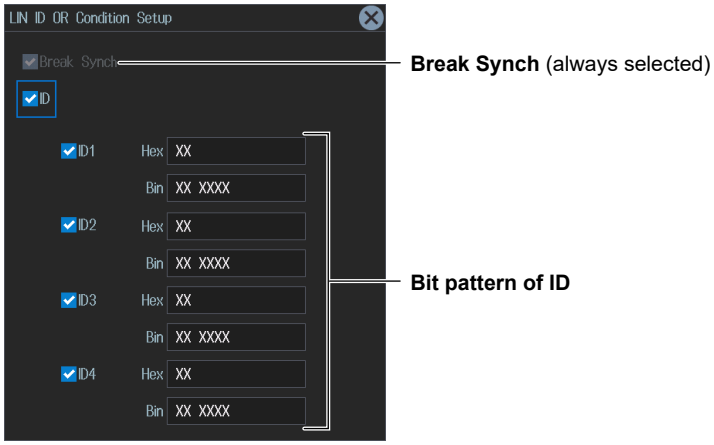
Press the **Mode** soft key and then the **ID OR** soft key. The following menu items appear.




### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of the Break Synch condition and the condition of one of the four IDs. Items whose check boxes are selected are used as trigger conditions.



# 2.17 Triggering on CXPI Bus Signals (Option)

This section explains the following settings for triggering on CXPI bus signals:

- Trigger source
  Bit Rate, T Sample, Clock Tolerance, HF Rejection
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions

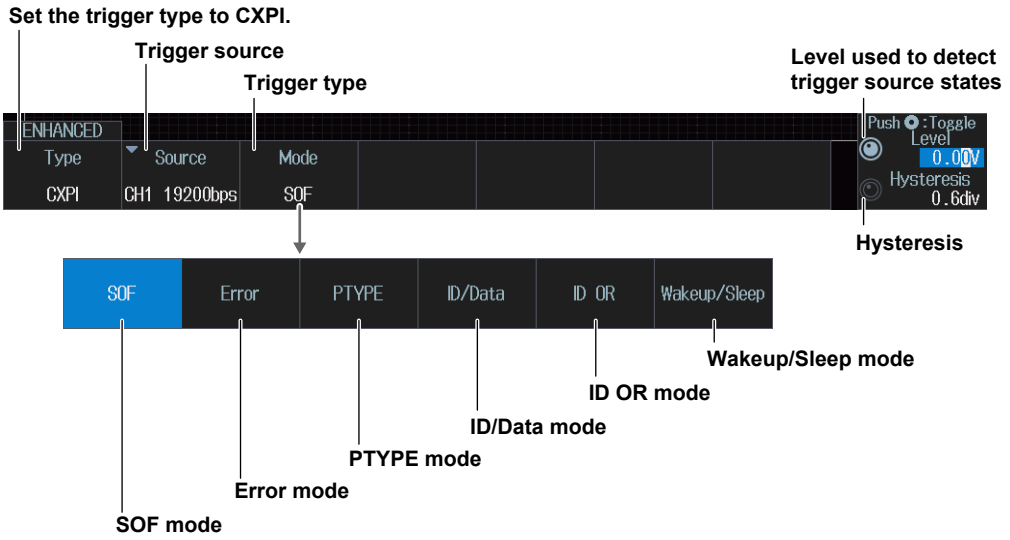
► “CXPI Bus Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source level and bit rate from the received CXPI bus signal and trigger on them. For details, see section 12.5.

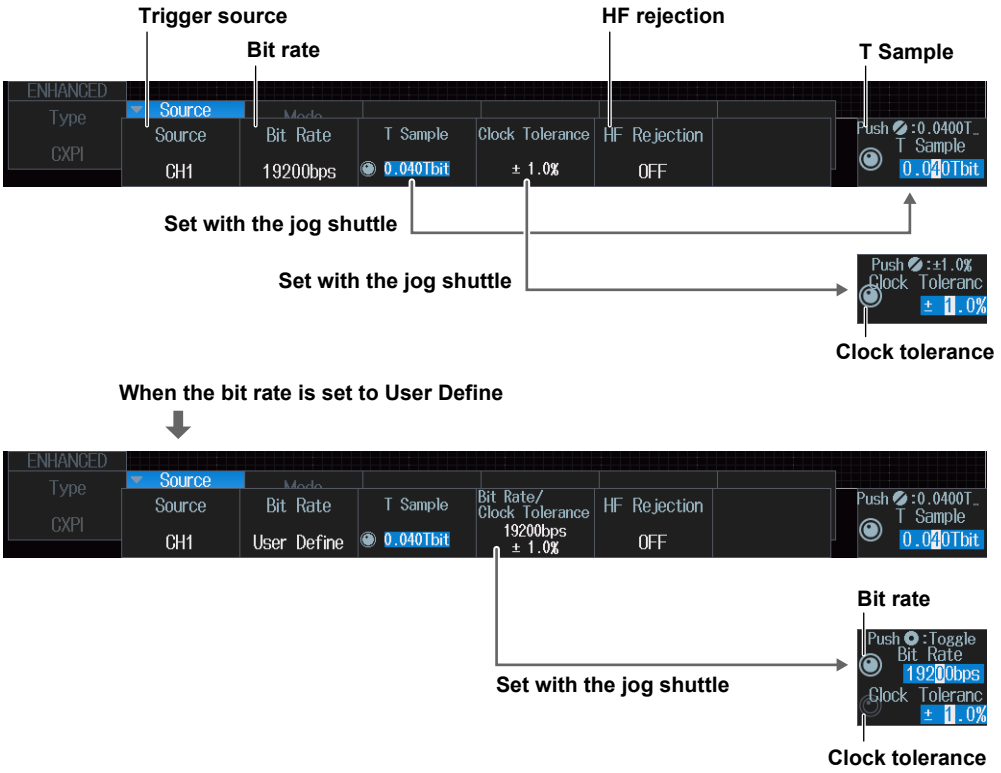
## ENHANCED CXPI Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **CXPI** from the setup menu that is displayed. The following menu items appear.



## Trigger Source (Source)

Press the **Source** soft key. The following menu items appear.




## Trigger Mode (Mode)

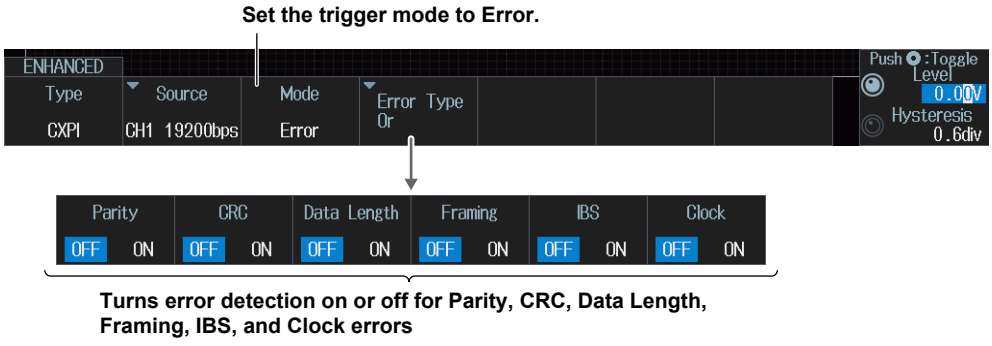
### SOF (Start of Frame) Mode

Press the **Mode** soft key and then the **SOF** soft key.

The instrument triggers on the start of CXPI bus signal frames.

### Error Mode

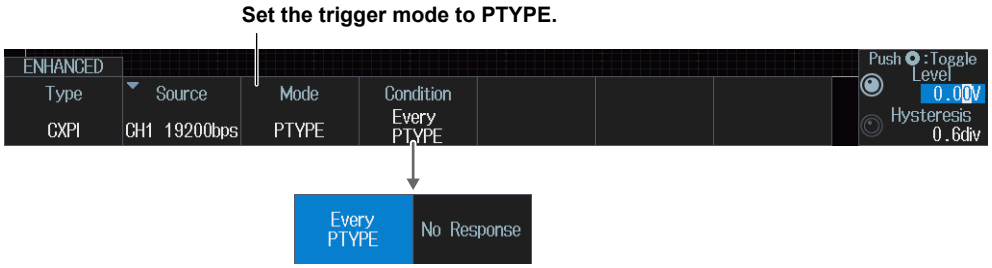
Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.




The instrument triggers when it detects any of various types of errors.

## PTYPE mode

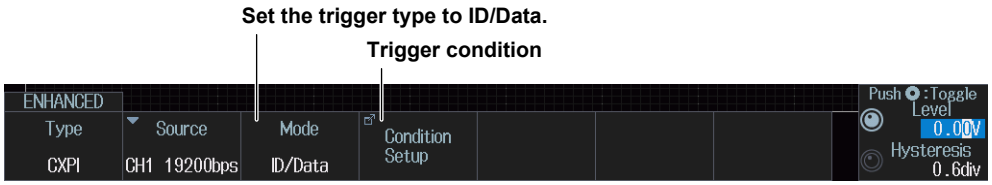
Press the **Mode** soft key and then the **PTYPE** soft key. The following menu items appear.




The instrument triggers when it detects the PTYPE of the CXPI bus signal.

## ID/Data Mode

Press the **Mode** soft key and then the **ID/Data** soft key. The following menu items appear.




### Trigger Condition (Condition Setup)

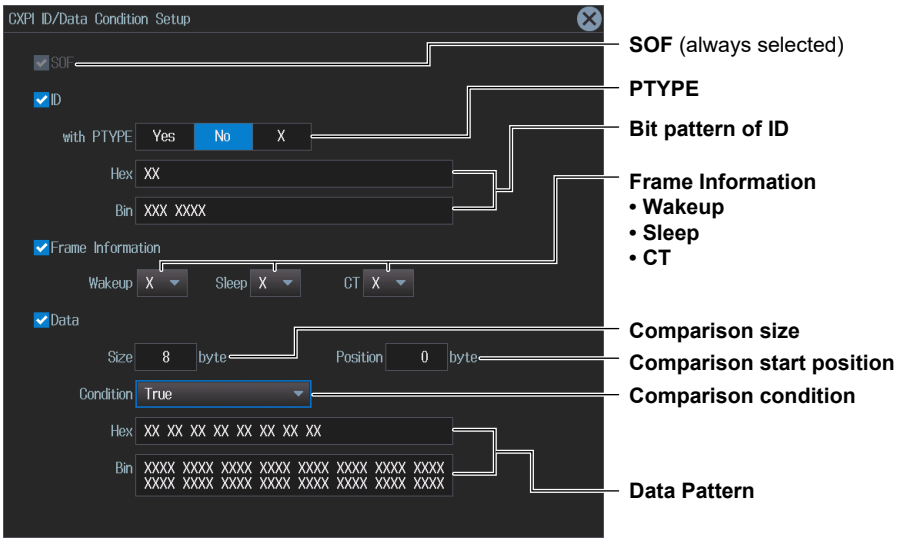
Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of SOF, ID, frame information, and Data conditions.

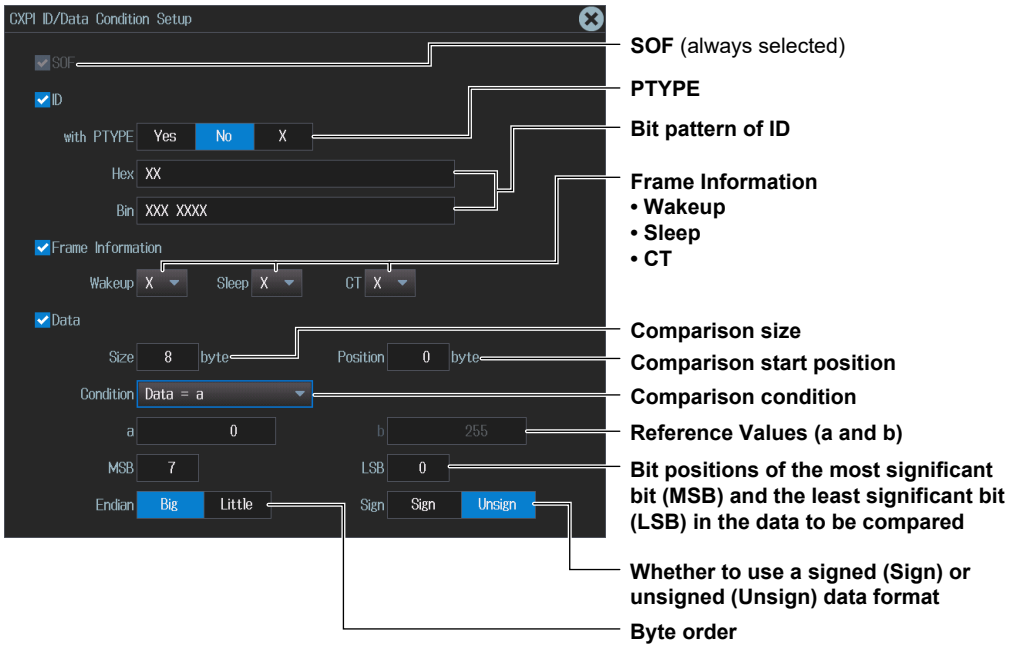
Items whose check boxes are selected are used as trigger conditions.

When PTYPE is set to No, the ID bit pattern cannot be set to 0.

- **When the Comparison Condition Is True or False**

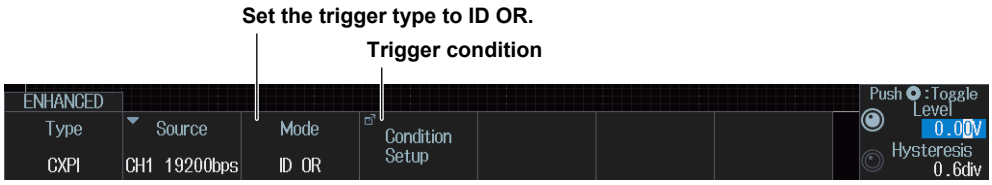


- **When the Comparison Condition Is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**




## ID OR Mode (ID OR)

Press the **Mode** soft key and then the **ID OR** soft key. The following menu items appear.




### Trigger Condition (Condition Setup)

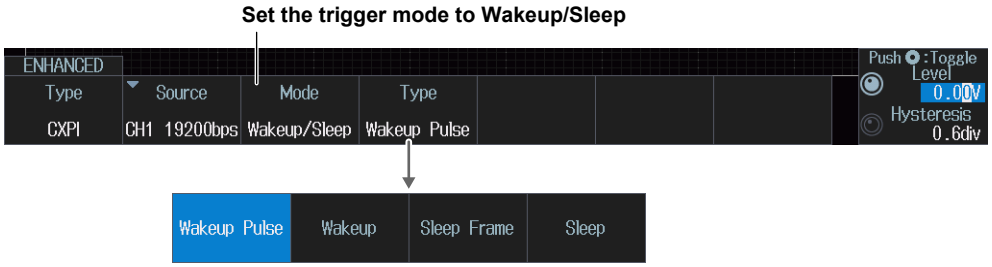
Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of the SOF condition and the condition of one of the four IDs. Items whose check boxes are selected are used as trigger conditions.



## Wakeup/Sleep Mode

Press the **Mode** soft key and then the **Wakeup/Sleep** soft key. The following menu items appear. The instrument triggers upon detection of the type you have set.



# 2.18 Triggering on SENT Signals (Option)

This section explains the following settings for triggering on SENT signals:

- Trigger source
  HF rejection, source bit
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions
- Format

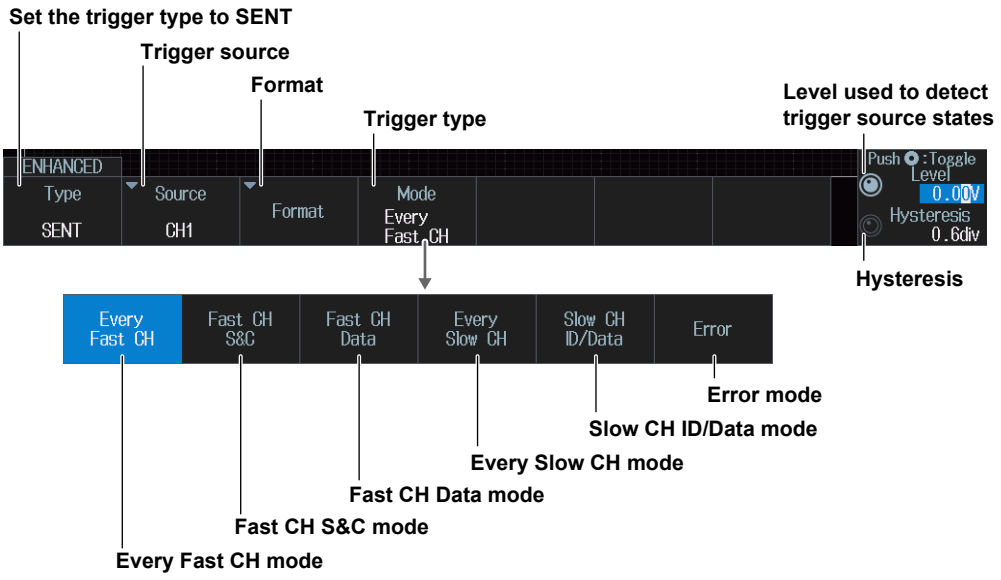
► “SENT Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source format, level, and hysteresis from the received SENT signal and trigger on them. For details, see section 12.6.

## ENHANCED SENT Menu

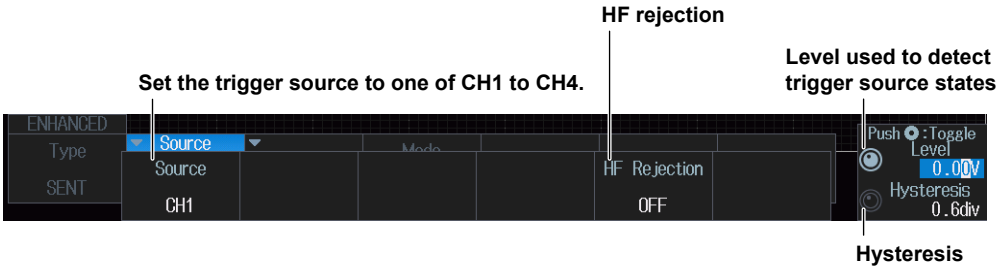
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **SENT** from the setup menu that is displayed. The following menu items appear.



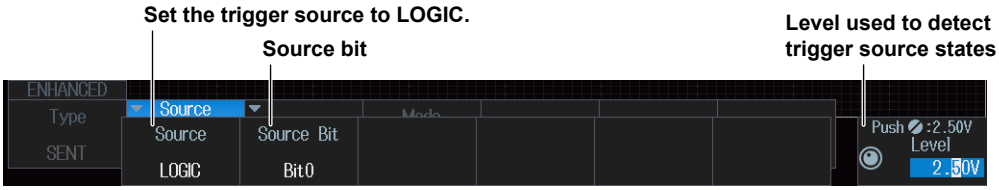
## Trigger Source (Source)

Press the **Source** soft key. The menu that appears varies depending on the specified trigger source.

### When the Trigger Source Is from CH1 to CH4




### When the Trigger Source Is LOGIC (On models with the logic signal input port)

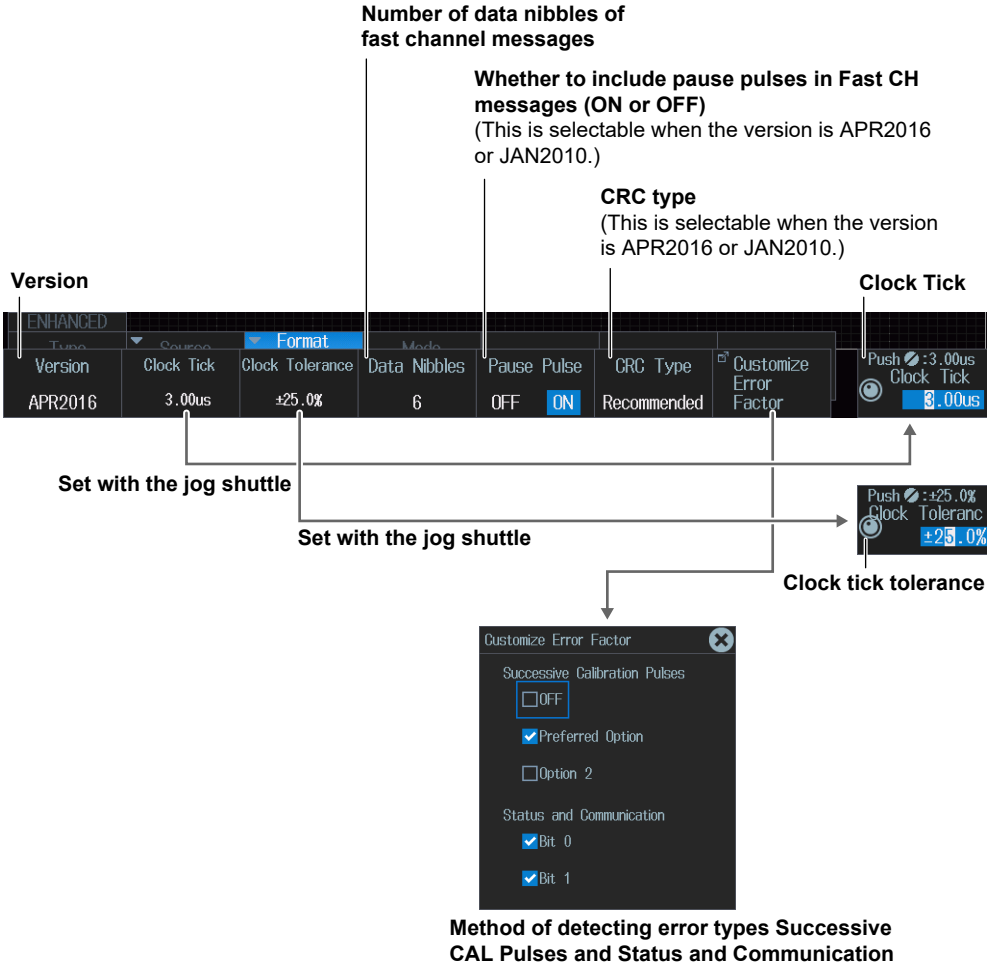



For the 701989 Logic Probe



## Format (Format)

Press the **Format** soft key. The following menu items appear.




## Trigger Mode (Mode)

### Every Fast CH Mode

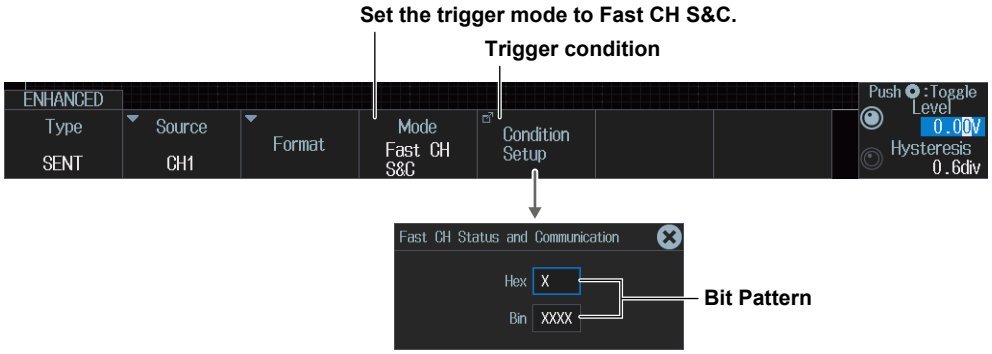
Press the **Mode** soft key and then the **Every Fast CH** soft key.

The instrument triggers when it detects a fast channel message.

## Fast CH S&C Mode

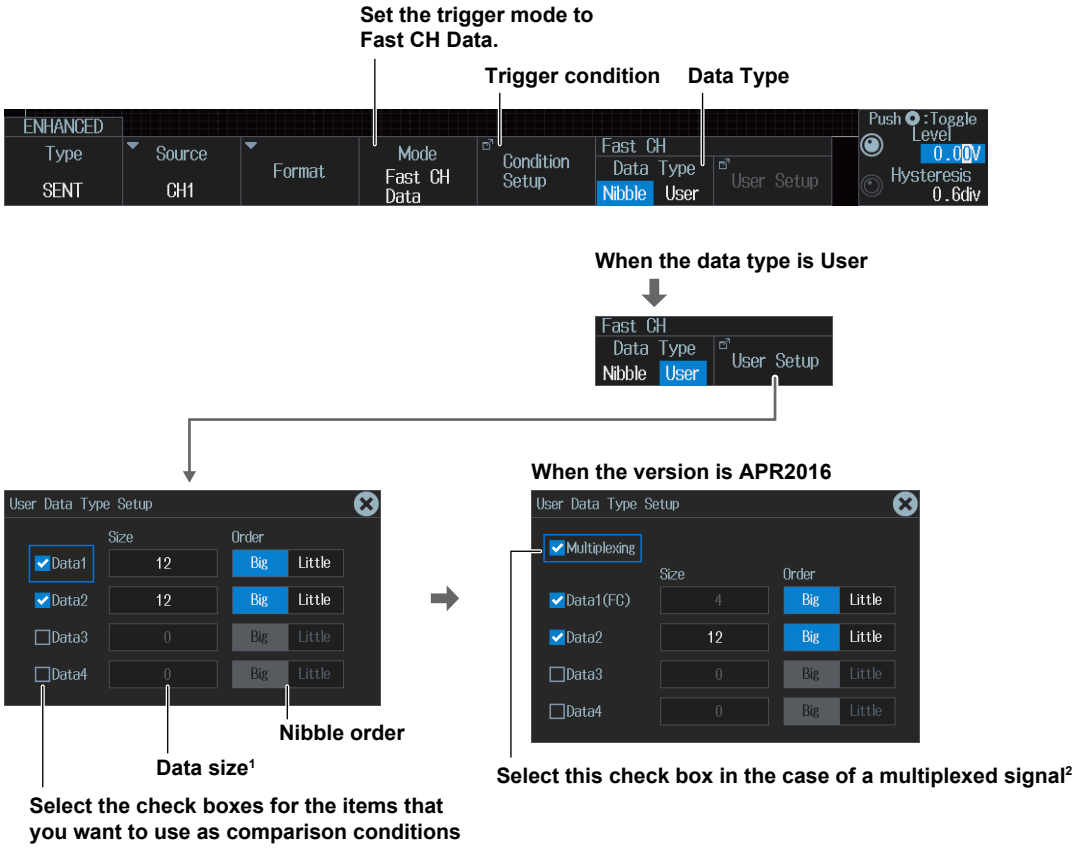
Press the **Mode** soft key and then the **Fast CH S&C** soft key. The following screen appears.

The instrument triggers on the status and communication bit pattern.




## Fast CH Data Mode

Press the **Mode** soft key and then the **Fast CH Data** soft key. The following menu items appear.




1 The total number of bits for Data1 to Data4 is up to 24. If you try to exceed the total number of bits, the data size of other pieces of Data is reduced.

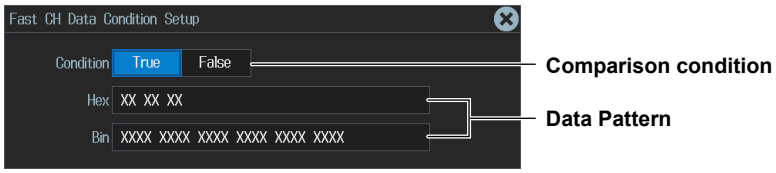
2 When the check box for Multiplexing is selected, the Size of Data1 is fixed to 4 to correspond to FC.

### Trigger Condition (Condition Setup)

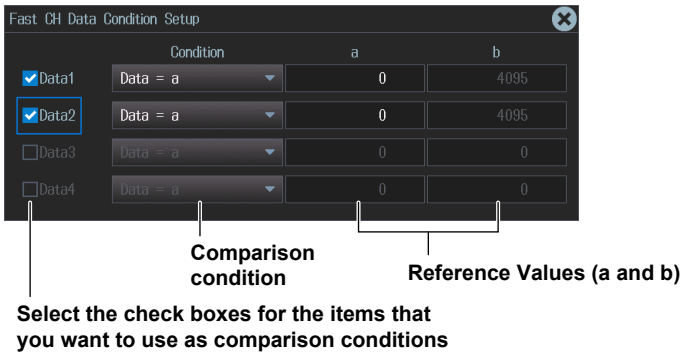
Press the **Condition Setup** soft key. The screen that appears varies depending on the specified fast channel data type.

The instrument triggers on the AND of the fast channel Data conditions. Items whose check boxes are selected are used as trigger conditions.

- **When the Data Type is Nibble**



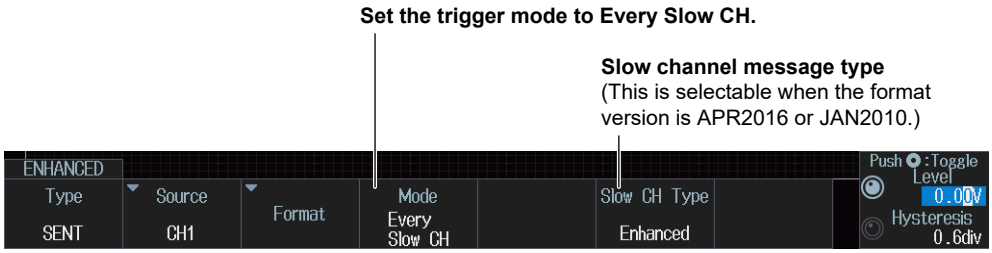

- **When the Data Type Is User**




## Every Slow CH Mode

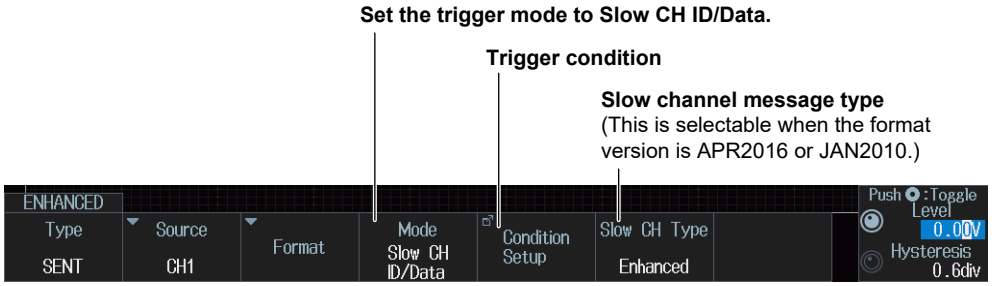
Press the **Mode** soft key and then the **Every Slow CH** soft key. The following menu items appear.

The instrument triggers when it detects an “Every Slow CH” message.



## Slow CH ID/Data Mode

Press the **Mode** soft key and then the **Slow CH ID/Data** soft key. The following menu items appear.



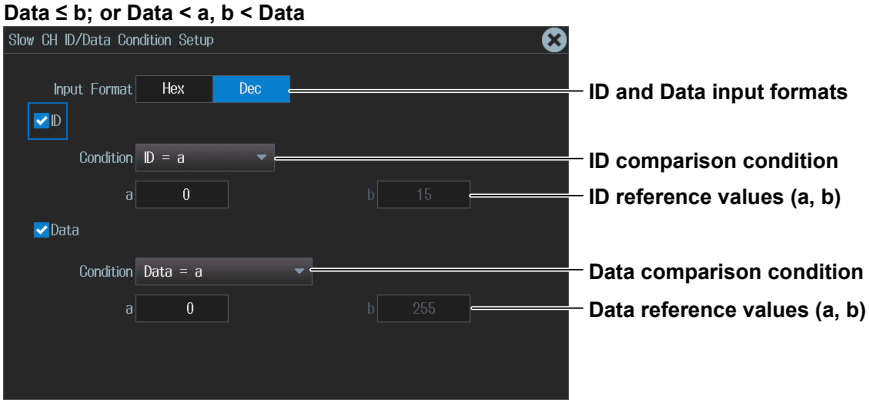

### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The screen that appears varies depending on the specified slow channel message type.

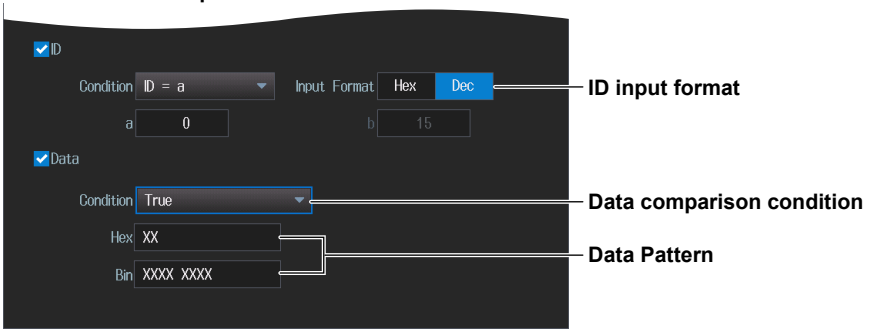
The instrument triggers on the AND of the slow channel ID and Data conditions. Items whose check boxes are selected are used as trigger conditions. Set ID and data reference values a and b in Hex (hexadecimal) or Dec (decimal) according to the input format setting.

- **When the Message Type is Short**

**When the data comparison condition is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**




**When the data comparison condition is True or False**

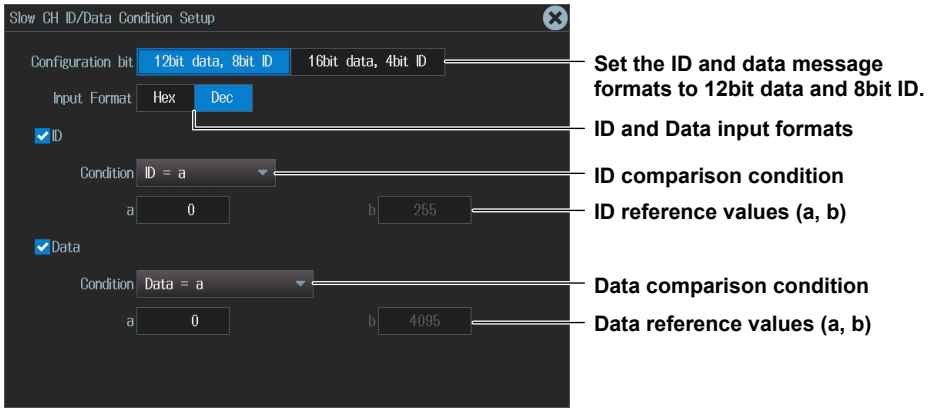



### Setting ID/Data Reference Values a and b

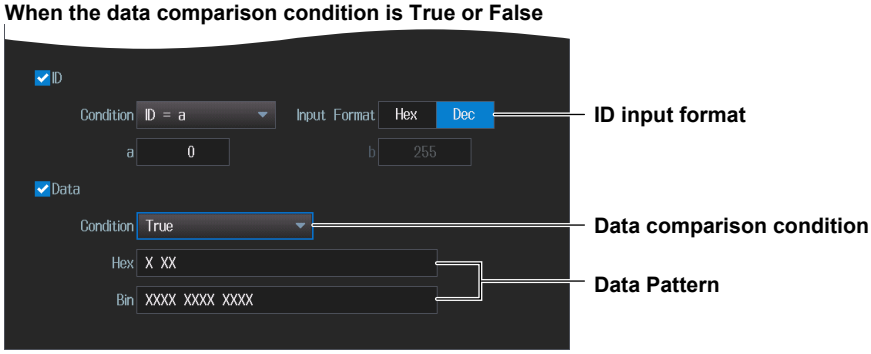
| Input format setting | | Hex | Dec |
|---|---|---|---|
| Selectable range for reference values a and b | ID | 0 to F | 0 to 15 |
| | Data | 00 to FF | 0 to 255 |

- **When the Message Type Is Enhanced**
  **When the ID and Data Message Formats Are Set to “12bit data, 8bit ID”**

**When the data comparison condition is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**




**When the data comparison condition is True or False**

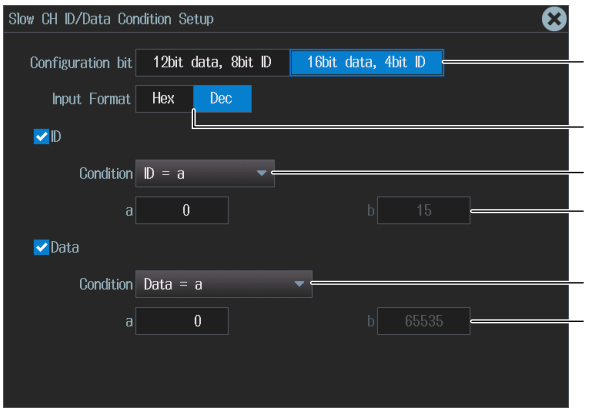



## Setting ID/Data Reference Values a and b

| Input format setting | | Hex | Dec |
|---|---|---|---|
| Selectable range for reference values a and b | ID | 00 to FF | 0 to 255 |
| | Data | 000 to FFF | 0 to 4095 |

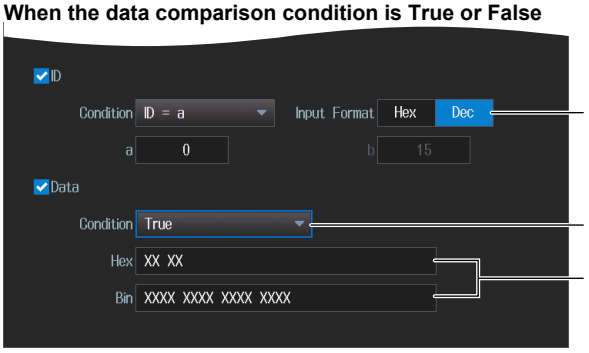
- **When the ID and Data Message Formats Are Set to "16bit data, 4bit ID"**

**When the data comparison condition is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**




**Set the ID and data message formats to 16bit data and 4bit ID.**
**ID and Data input formats**
**ID comparison condition**
**ID reference values (a, b)**
**Data comparison condition**
**Data reference values (a, b)**

**When the data comparison condition is True or False**




**ID input format**
**Data comparison condition**
**Data Pattern**

### Setting ID/Data Reference Values a and b

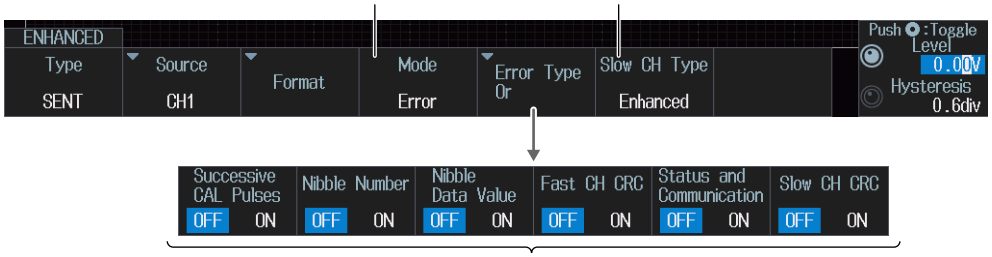
| Input format setting | | Hex | Dec |
|---|---|---|---|
| Selectable range for reference values a and b | ID | 0 to F | 0 to 15 |
| | Data | 0000 to FFFF | 0 to 65535 |

## Error Mode

Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.

**Set the trigger mode to Error.**

**Slow channel message type**
(This is selectable when the format version is APR2016 or JAN2010.)




**Turns on or off the detection of Successive CAL Pulses[1], Nibble Number, Nibble Data Value, Fast CH CRC, Status and Communication[2], and Slow CH CRC errors**

1 Not selectable when Successive Calibration Pulses is set to OFF for Customize Error Factor in "Setting the Format (Format)" (page 2-50)
2 Selectable when the Bit 0 or Bit 1 check box is selected under Status and Communication for Customize Error Factor in "Setting the Format (Format)" (page 2-50)

The instrument triggers when it detects any of various types of errors.

# 2.19 Triggering on PSI5 Airbag Signals (Option)

This section explains the following settings for triggering on PSI5 Airbag signals:

- Trigger source (sync signal, data frame source)
  Bit rate, data length, error detection method, clock tolerance, HF rejection, sync signal noise rejection
- Time range of each slot
  Start position of each slot and the end position of the last slot
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions

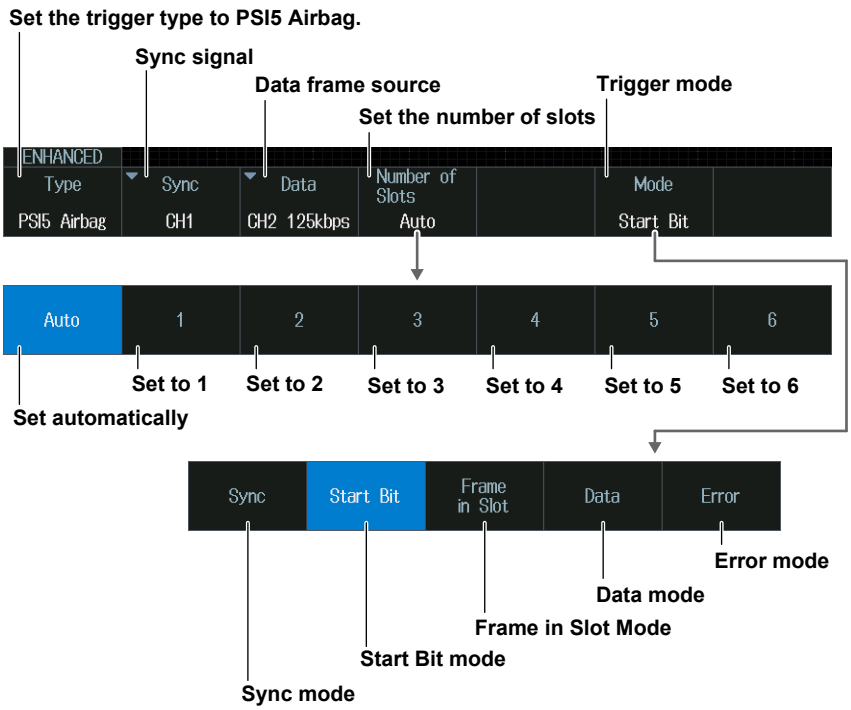
► “PSI5 Airbag Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

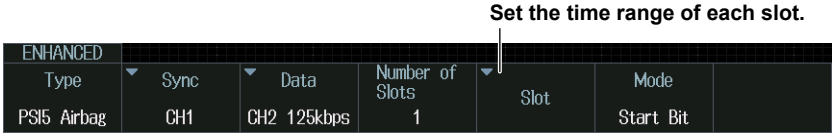
The instrument can automatically set the bit rate, data length, error detection method, level, and hysteresis of the trigger source from the received PSI5 Airbag signal and trigger on them. For details, see section 12.7.

## ENHANCED_PSI5 Airbag Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **PSI5 Airbag** from the setup menu that is displayed. The following menu items appear.

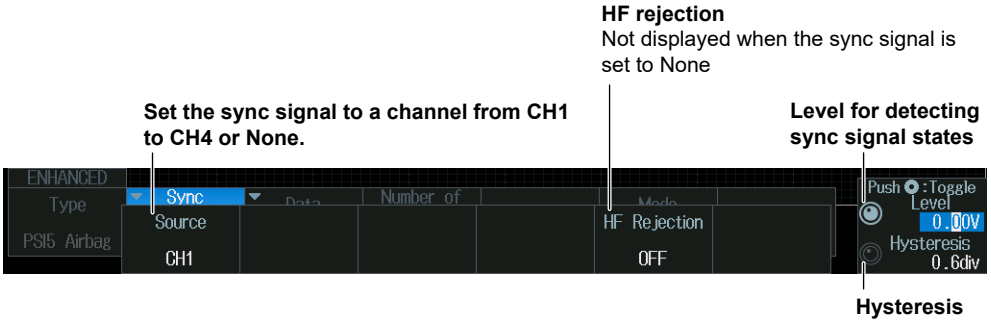



**When the number of slots is set between 1 and 6**



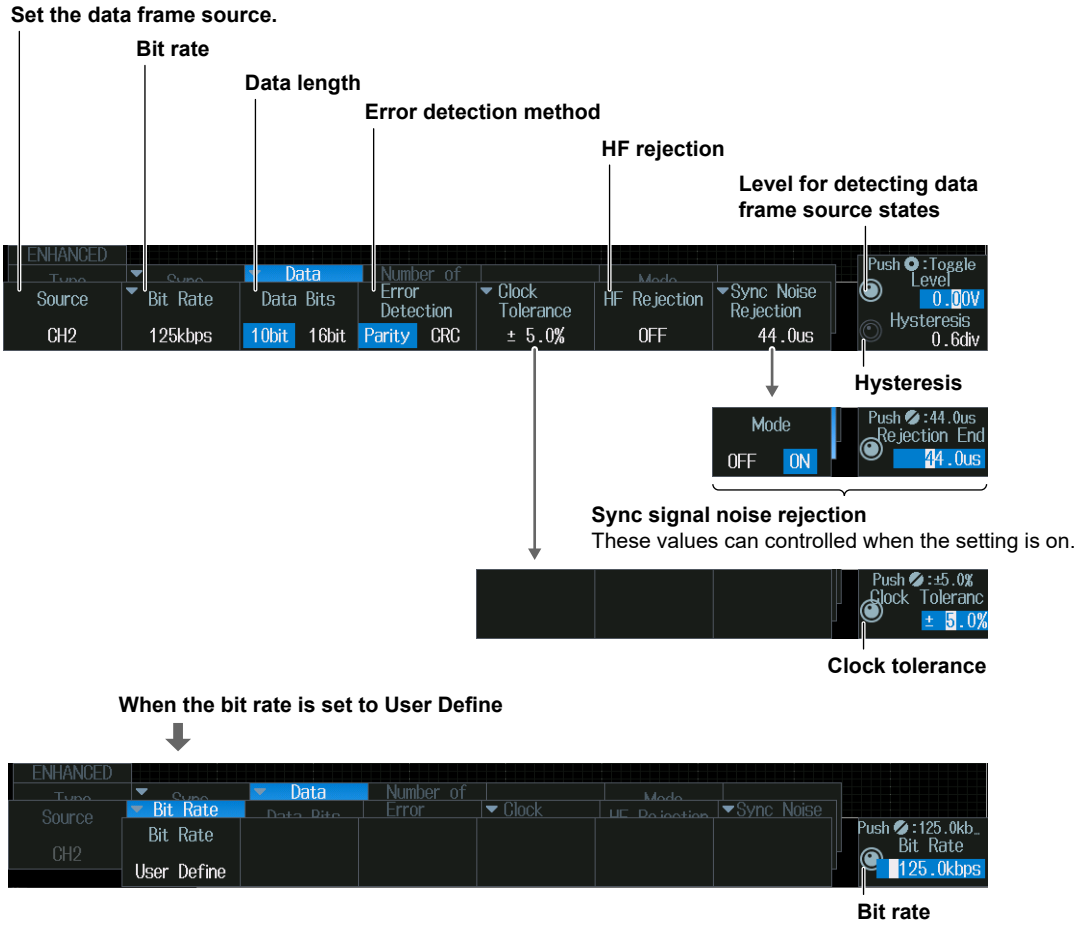
## Sync Signal (Sync)

Press the **Sync** soft key. The following menu appears.




## Data Frame Source (Data)

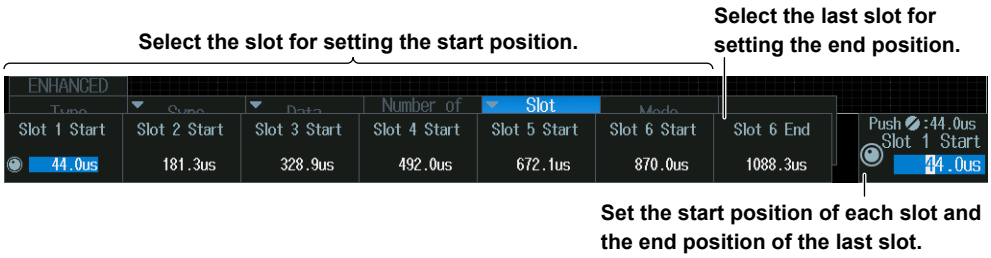
Press the **Data** soft key to display the following menu.



## Setting the Time Range of Each Slot (Slot)

Press the **Slot** soft key to display the following menu.

**Example when the number of slots is set to 6**




### *Note*

- The slot start position that can be set varies depending on the number of slots (Number of Slots), which specifies the trigger source frame pattern.
- The slot end position that can be set is the largest number specified by Number of Slots.

## Trigger Mode (Mode)

### Sync Mode

Press the **Mode** soft key and then the **Sync** soft key.

The instrument triggers on the rising edge of sync pulses.

### Start Bit Mode

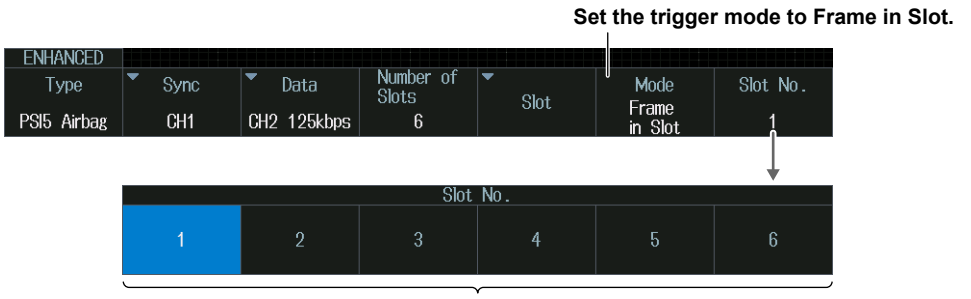
Press the **Mode** soft key and then the **Start Bit** soft key.

The instrument triggers on start bits.

### Frame in Slot Mode

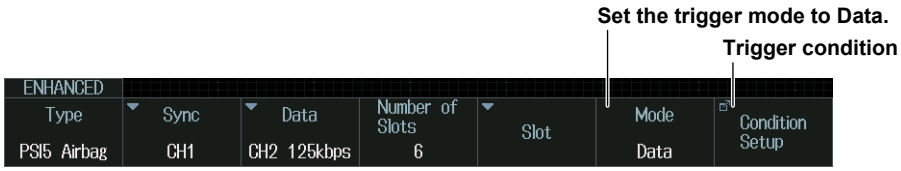
Press the **Mode** soft key and then the **Frame in Slot** soft key to display the following menu.

The instrument triggers on data frames included in the selected slot. Frame in Slot mode will not be available if the sync signal (Sync) is set to None.



## Data Mode

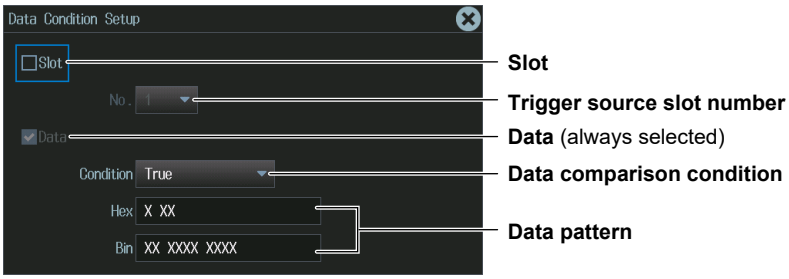
Press the **Mode** soft key and then the **Data** soft key to display the following menu.



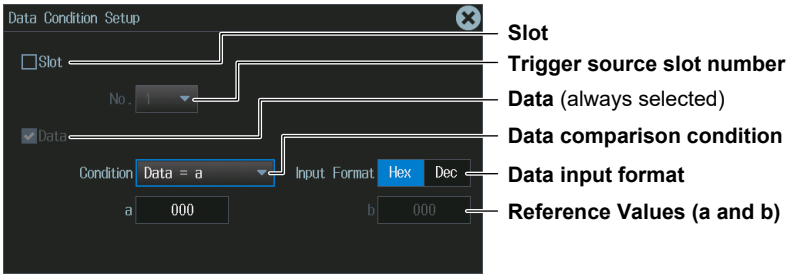

### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.
The instrument triggers on data frames included in the selected slot.

- **When the Comparison Condition Is True or False**

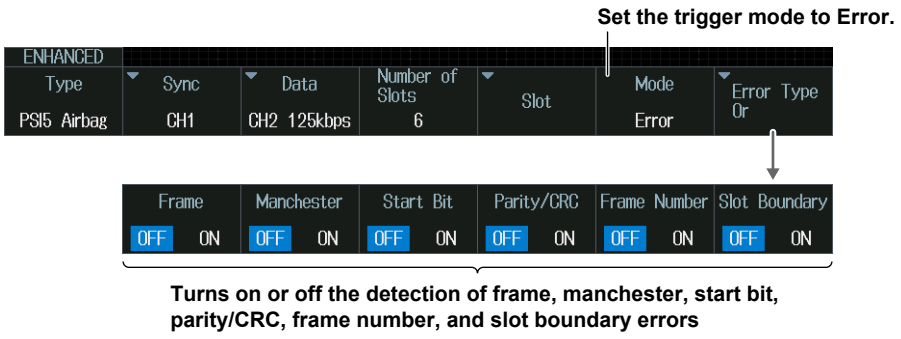



- **When the Comparison Condition Is Data = a; Data ≠ a; a ≤ Data; Data ≤ b; a ≤ Data ≤ b; or Data < a, b < Data**




## Error Mode

Press the **Mode** soft key and then the **Error** soft key to display the following menu.
The instrument triggers when it detects various types of errors.



# 2.20 Triggering on UART Signals (Option)

This section explains the following settings for triggering on UART signals:

- Trigger source
  Bit rate, bit order, polarity, HF rejection, source bit, sample point
- Format
- Level and hysteresis for detecting trigger source states
- Trigger type
  Trigger conditions

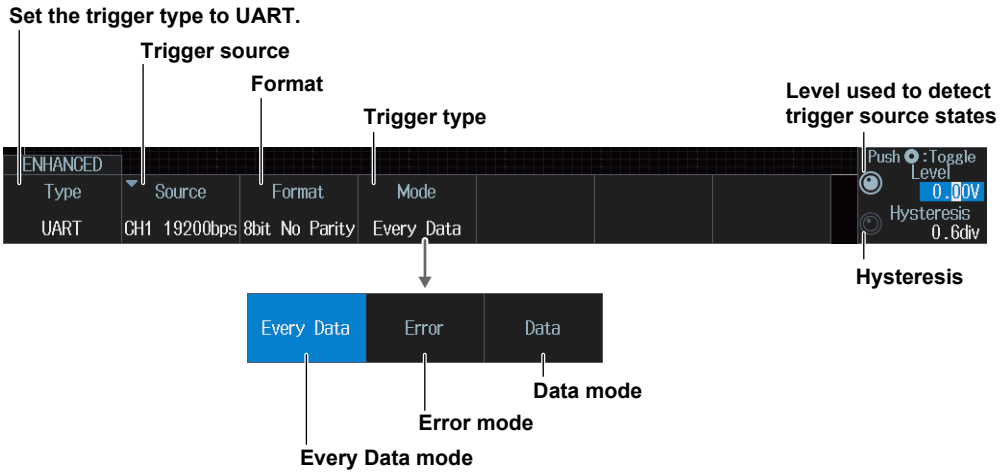
► “UART Trigger (ENHANCED)(Option)” in the Features Guide

**Auto Setup**

The instrument can automatically set the trigger source level and bit rate from the received UART signal and trigger on them. For details, see section 12.8.

## ENHANCED UART Menu

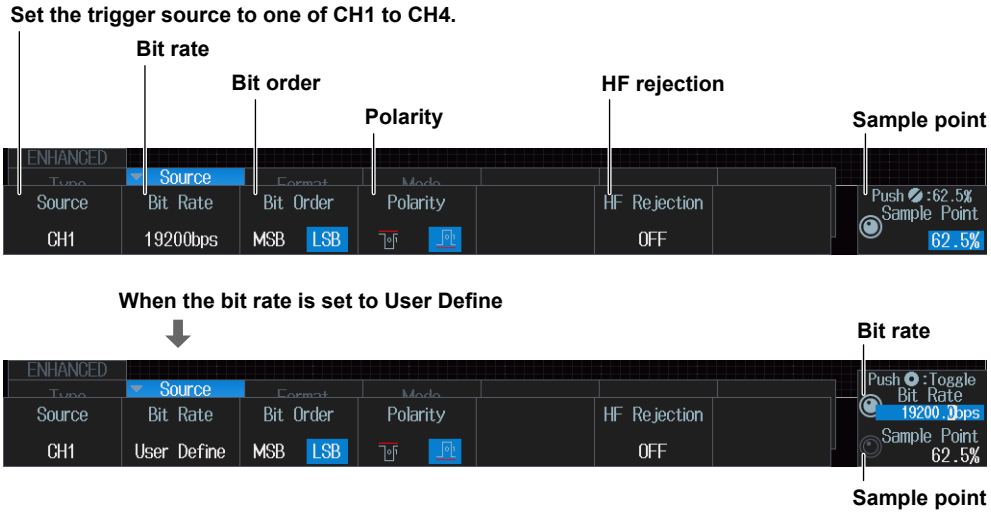
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **UART** from the setup menu that is displayed. The following menu items appear.



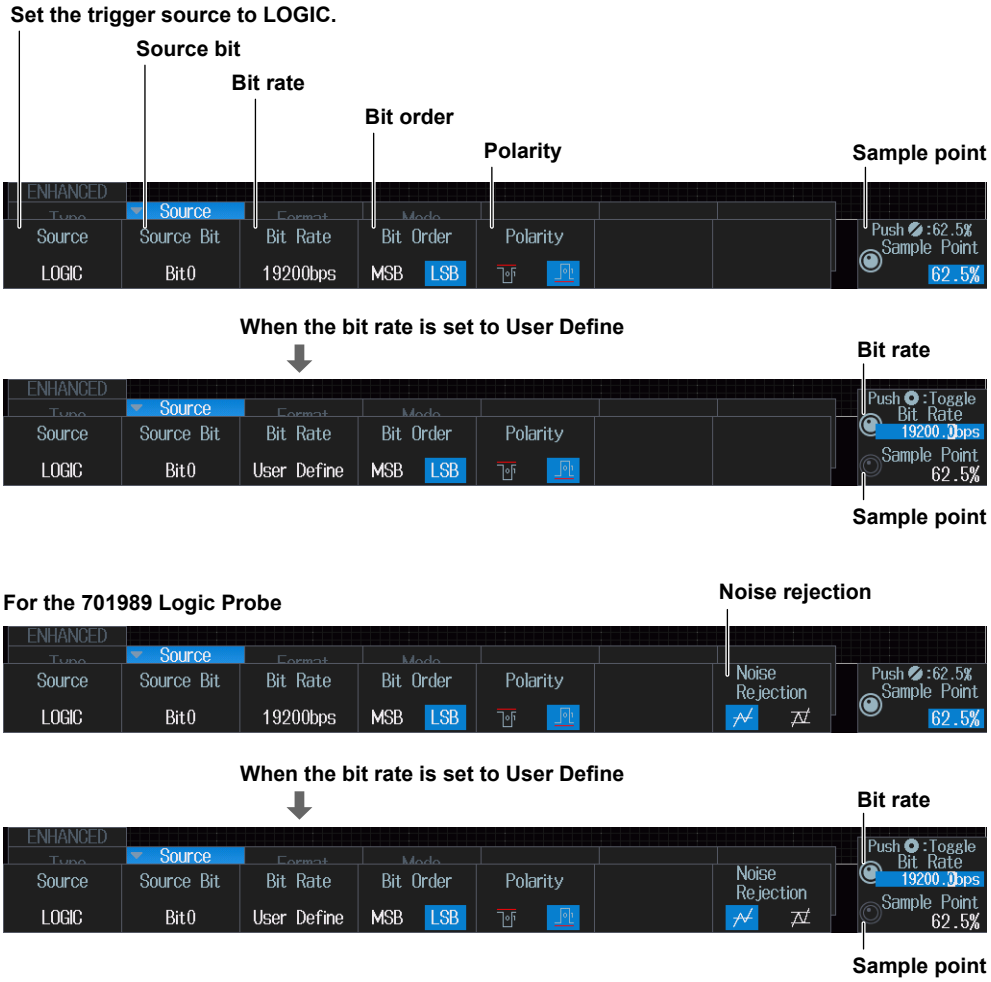
## Trigger Source (Source)

Press the **Source** soft key. The menu that appears varies depending on the specified trigger source.

### When the Trigger Source Is from CH1 to CH4




### When the Trigger Source Is LOGIC (On models with the logic signal input port)



## Trigger Mode (Mode)

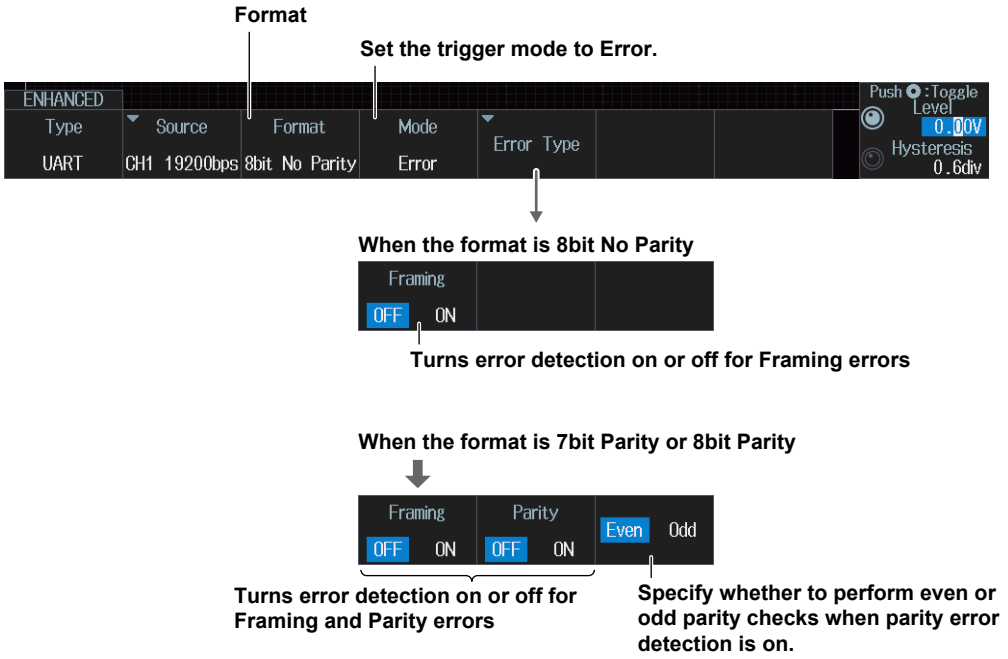
### Every Data Mode

Press the **Mode** soft key and then the **Every Data** soft key.

The instrument triggers on all data.

### Error Mode

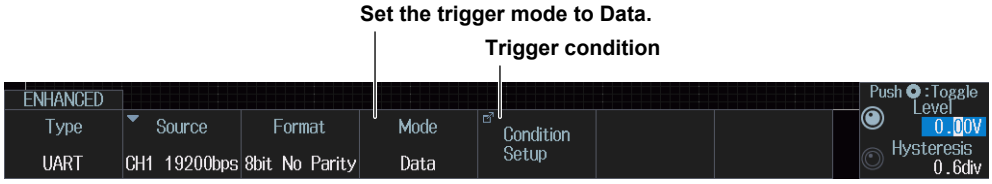
Press the **Mode** soft key and then the **Error** soft key. The following menu items appear.




The instrument triggers when it detects an error.

### Data Mode

Press the **Mode** soft key and then the **Data** soft key. The following menu items appear.

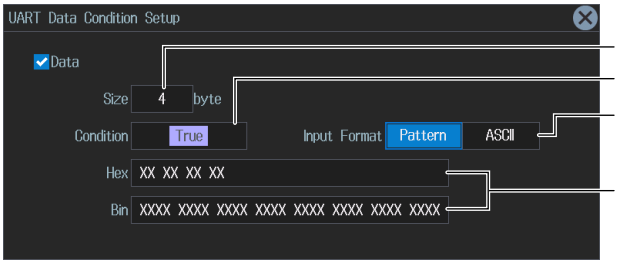



#### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

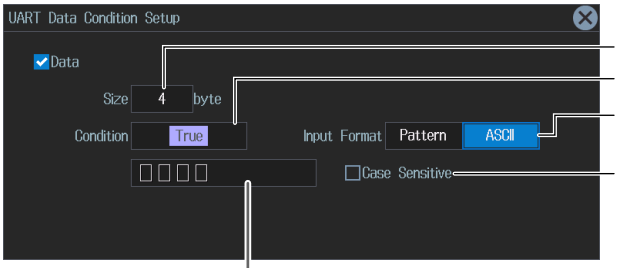
The instrument triggers when the data pattern is matched.

- **When the Data Pattern Input Format is Pattern**




**Data length**
**Comparison condition** (always True)
**Set the data pattern input format to Pattern.**
**Data Pattern**

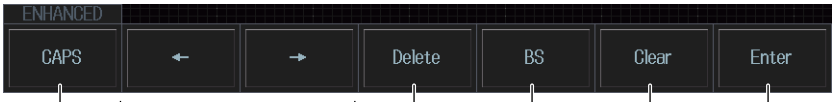
- **When the Data Pattern Input Format is ASCII**




**Data length**
**Comparison condition** (always True)
**Set the data pattern input format to ASCII.**
**Case-sensitive setting**
Select the check box to enable the setting.

**Data Pattern**
Use the keyboard that appears on the screen.




**Moves the cursor**
**Switches between uppercase and lowercase**
**Deletes the character at the cursor position**
**Deletes the previous character**
**Deletes all the characters you have entered**
**Confirms the characters that have been entered**

### Data Pattern

You can enter up to 4 characters.

- You can switch between uppercase and lowercase to enter alphabet characters. However, case is distinguished only when the **Case Sensitive** check box is selected.
- The special characters CR, LF, SP, and NUL are shown in single quotation marks. These special characters are counted as one character including the single quotation marks.
  Example:**AB**'**CR**'**D** (4 characters), **XY**'**SP**' (3 characters), **P**'**NUL**'**WU** (4 characters)
- The entered string, including the character codes for the case, is retained even if the input format is changed to Bin or Hex. It is also retained when the format is changed from Bin or Hex to ASCII.
- If a character code that does not exist on the keyboard is entered when the input format is Bin or Hex and then the input format is changed to ASCII, a white square is displayed in the corresponding position.

# 2.21 Triggering on I²C Bus Signals (Option)

This section explains the following settings for triggering on I²C bus signals:

- SCL source and SDA source
  HF rejection, source bit, level and hysteresis for detecting SCL and SDA source states
- Trigger type
  Trigger conditions

► "I²C Bus Trigger (ENHANCED)(Option)" in the Features Guide

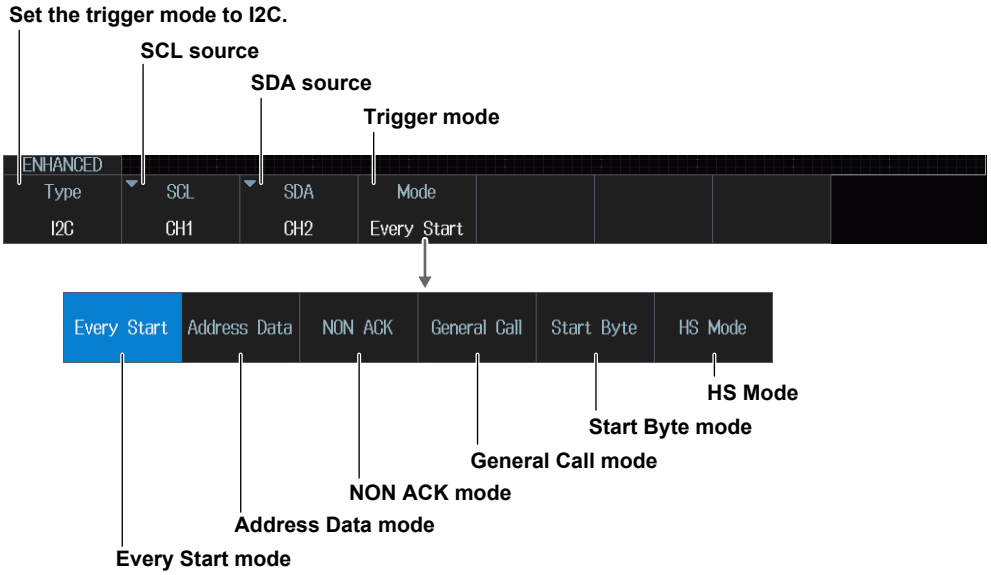
**Auto Setup**

The instrument can automatically set the source level from the received I²C bus signal and trigger on it. For details, see section 12.9.

## ENHANCED I²C Menu

***1.*** Press **ENHANCED**. The ENHANCED menu appears.
You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.

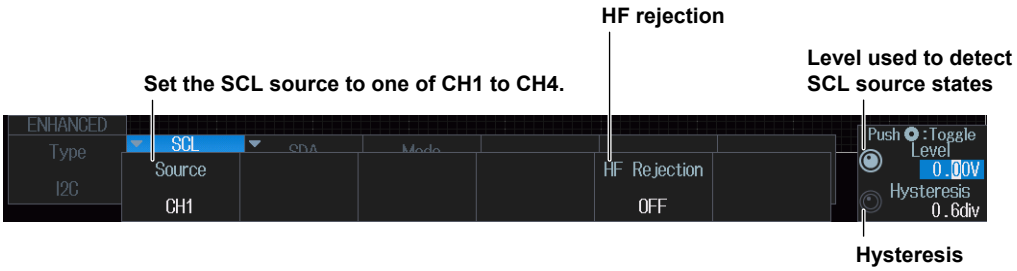
**2** Press the **Type** soft key**.** Select **I2C** from the setup menu that is displayed. The following menu items appear.



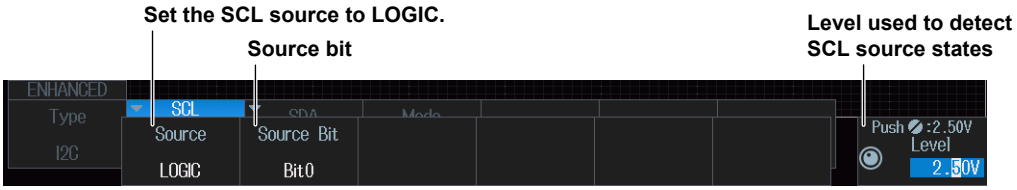
## SCL Source (SCL), SDA Source (SDA)

Press the **SCL** or **SDA** soft key. The menu that appears varies depending on the specified source. This section explains how to set the SCL source. The SCL source is set in the same way as the SDA source.

### When the SCL Source Is a Channel from CH1 to CH4




### When the SCL Source Is LOGIC (On models with the logic signal input port)




For the 701989 Logic Probe



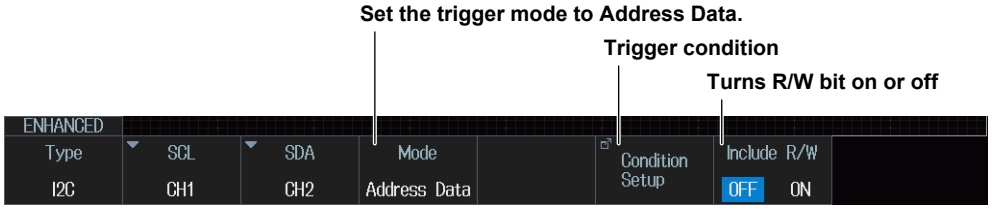

## Trigger Mode (Mode)

### Every Start Mode

Press the **Mode** soft key and then the **Every Start** soft key.
The instrument triggers when it detects a start condition.

### Address Data Mode

Press the **Mode** soft key and then the **Address Data** soft key. The following menu items appear.




#### R/W Bit Inclusion (Include R/W)

Specify whether to include the R/W bit (ON) or omit it (OFF) when setting the address pattern.

***Note***

R/W bit inclusion (Include R/W) can also be set by using Analyzing and Searching I²C Bus Signals and then Bus Setup (Setup). The settings are synced. For details about I²C bus signal Analysis, see section 12.9.

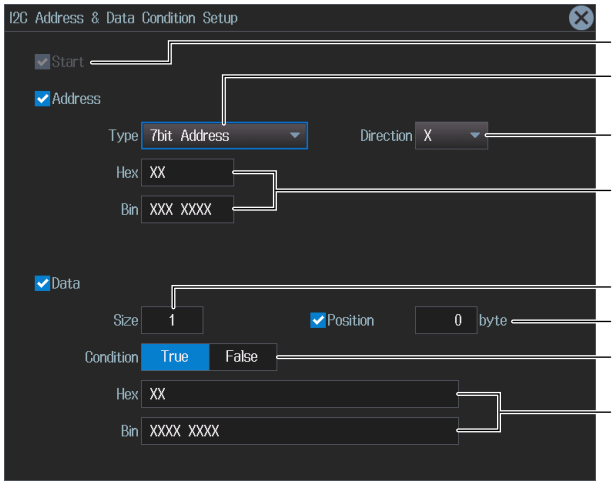
### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

The instrument triggers on the AND of the start, address pattern, data pattern, and comparison start position conditions. Items whose check boxes are selected are used as trigger conditions.

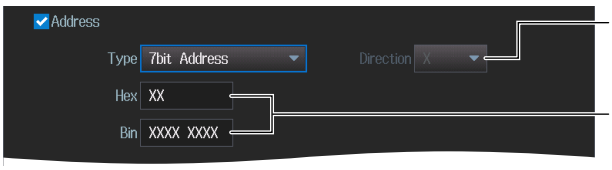
- **When Address Type Is 7bit Address**

**When the R/W bit is not included (OFF)**




**Start** (always selected)
**Set the address type to 7bit Address.**
**R/W bit**
**Address pattern**
**Data length**
**Comparison start position**
**Comparison condition**
**Data Pattern**

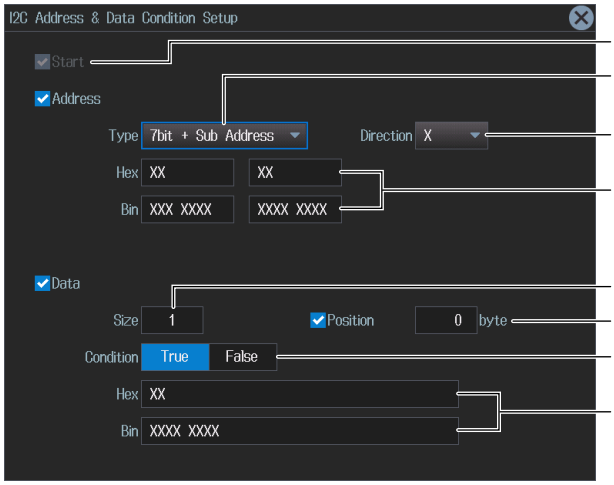
**When the R/W bit is included (ON)**




**R/W bit**
(grayed out)
**Address pattern**
(Set this including R/W bit.)

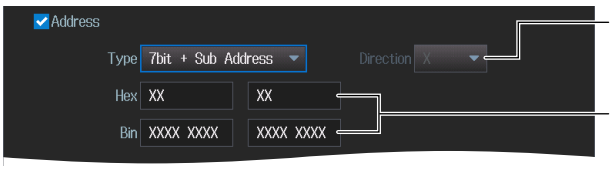
- **When Address Type Is 7bit + Sub Address**

**When the R/W bit is not included (OFF)**




**Start** (always selected)
**Set the address type to 7bit + Sub Address.**
**R/W bit**
**Address pattern**
**Data length**
**Comparison start position**
**Comparison condition**
**Data Pattern**

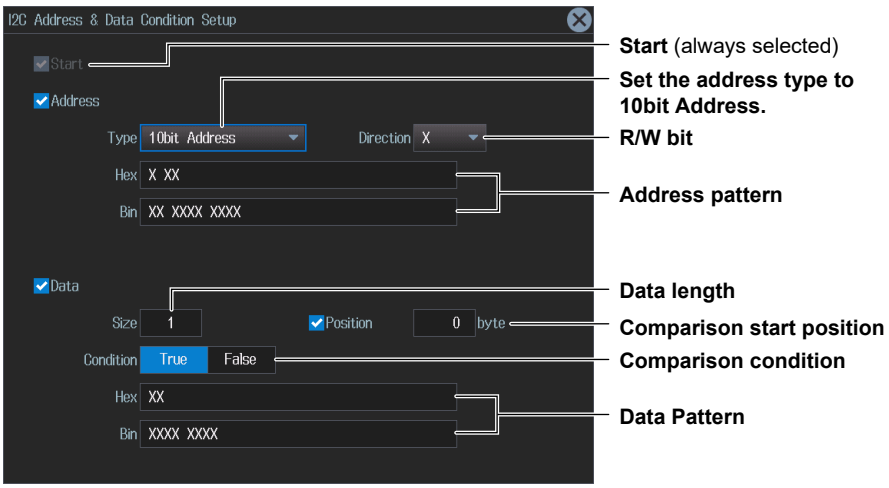
**When the R/W bit is included (ON)**



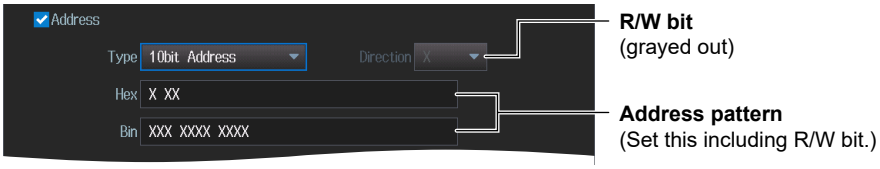

**R/W bit**
(grayed out)
**Address pattern**
(Set this including R/W bit.)

- **When Address Type Is 10bit Address**

**When the R/W bit is not included (OFF)**

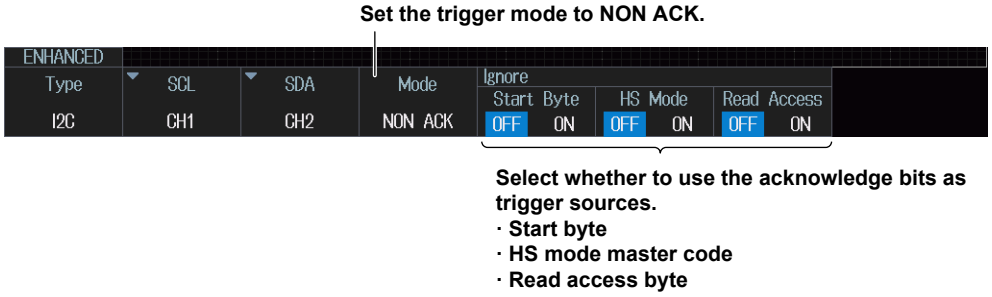



**When the R/W bit is included (ON)**




## NON ACK Mode

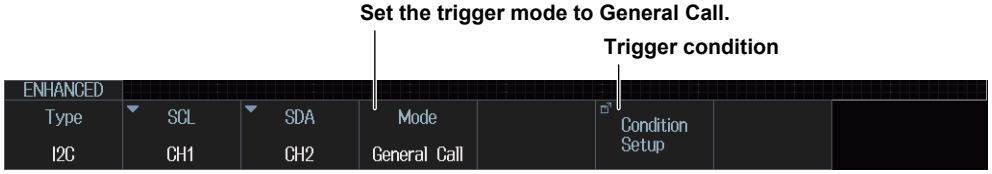
Press the **Mode** soft key and then the **NON ACK** soft key. The following menu items appear.




The instrument triggers when the acknowledgment bit is Nack.

## General Call Mode

Press the **Mode** soft key and then the **General Call** soft key. The following menu items appear.



### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.
When Second Byte is set to Master Address, the instrument triggers on the AND of the general call address (0000 0000), second byte address pattern, data pattern, and comparison start position conditions. When other than Master Address is set, the instrument triggers on the AND of the general call address (0000 0000) and the second byte address pattern conditions. Items whose check boxes are selected are used as trigger conditions.

- **When Address Type is "0000 0100" "0000 0110"**




- **When Address Type Is Master Address**




## Start Byte Mode

Press the **Mode** soft key and then the **Start Byte** soft key.
The instrument triggers when it detects the start byte master code.

## HS Mode

Press the **Mode** soft key and then the **HS Mode** soft key.
The instrument triggers when it detects the high speed mode master code.

# 2.22 Triggering on SPI Bus Signals (Option)

This section explains the following settings for triggering on SPI bus signals:

- Wiring system (Mode)
- Clock source
  Polarity, HF rejection, source bit, level and hysteresis for detecting clock source edges
- Data source
  HF rejection, source bit, level and hysteresis for detecting data source states
- Chip select source
  Active state, source bit, level and hysteresis for detecting chip select source states
- Trigger conditions

► "SPI Bus Trigger (ENHANCED)(Option)" in the Features Guide

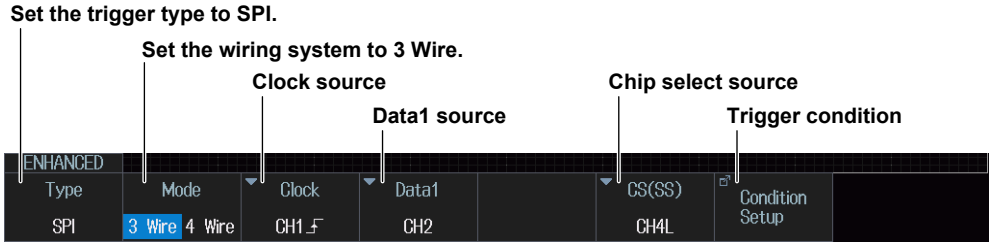
**Auto Setup**

The instrument can automatically set the source level from the received SPI bus signal and trigger on it. For details, see section 12.10.

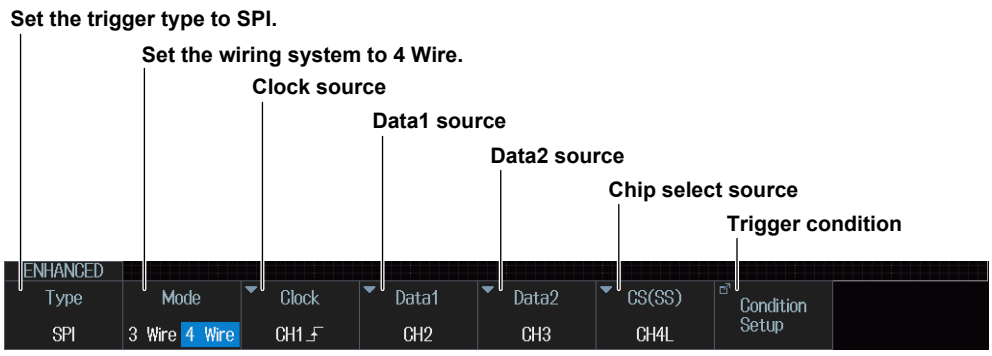
## ENHANCED SPI Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **SPI** from the setup menu that is displayed. The following menu items appear.

### When Wiring System Is 3 Wire



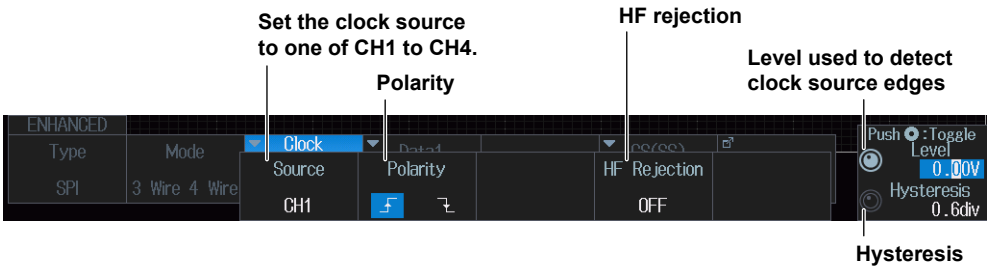

### When Wiring System Is 4 Wire



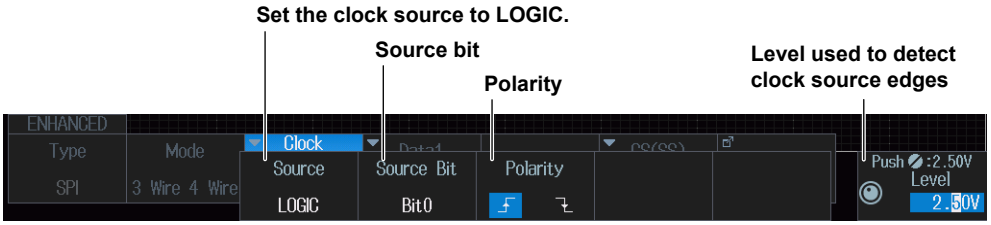
## Clock Source (Clock)

Press the **Clock** soft key. The menu that appears varies depending on the specified clock source.

### When the Clock Source Is from CH1 to CH4




### When the Clock Source Is LOGIC (On models with the logic signal input port)



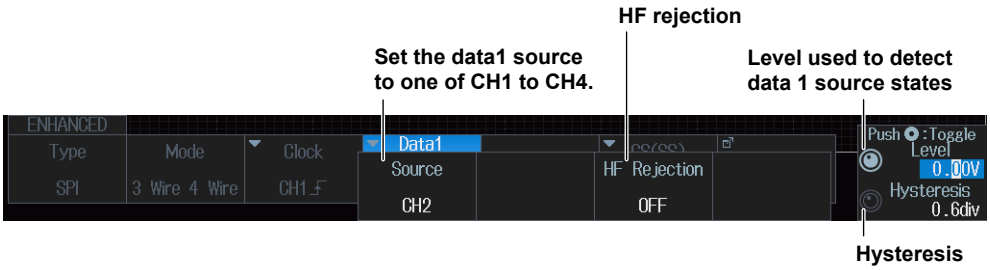

For the 701989 Logic Probe



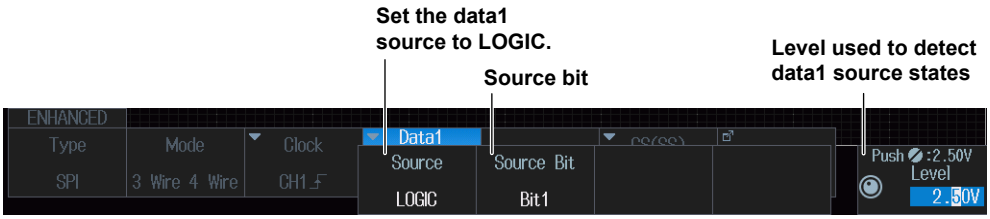
## Data1 Source (Data1), Data 2 Source (Data2)

Press the **Data1** or **Data2** soft key. The menu that appears varies depending on the specified data source. This section explains how to set the Data 1 source. The Data 2 source can be set in the same way. Set the Data2 source when the wiring system is 4 Wire.

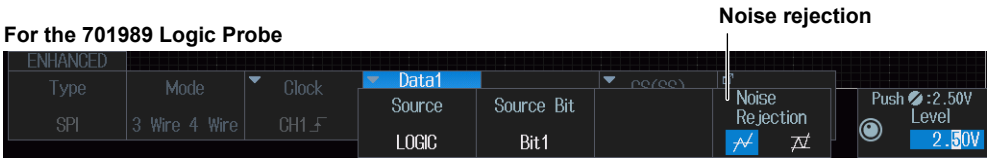
### When the Data1 Source Is from CH1 to CH4




### When the Data1 Source Is LOGIC (On models with the logic signal input port)



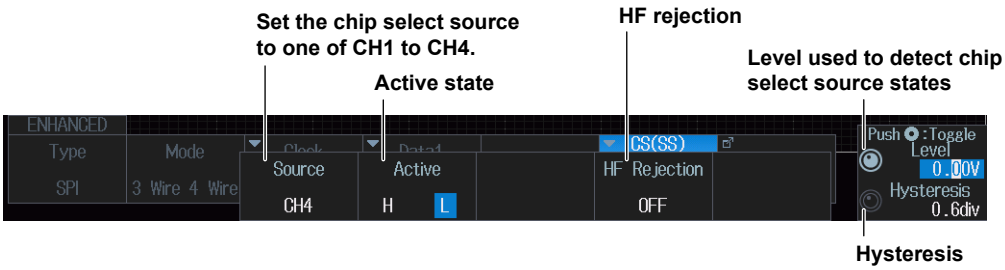

For the 701989 Logic Probe



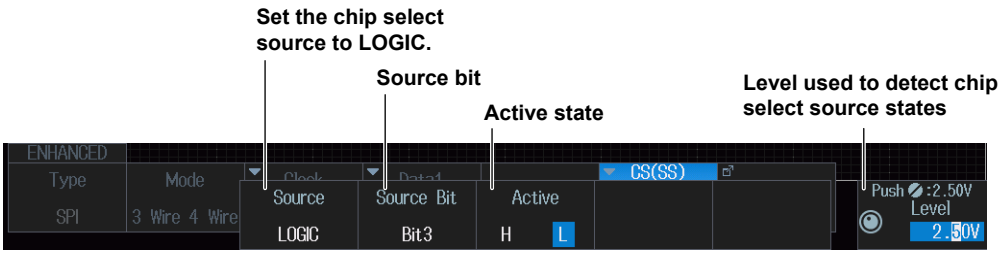
## Chip Select Source (CS (SS))

Press the **CS(SS)** soft key. The menu that appears varies depending on the specified data source.

### When the Chip Select Source Is from CH1 to CH4




### When the Chip Select Source Is LOGIC (On models with the logic signal input port)



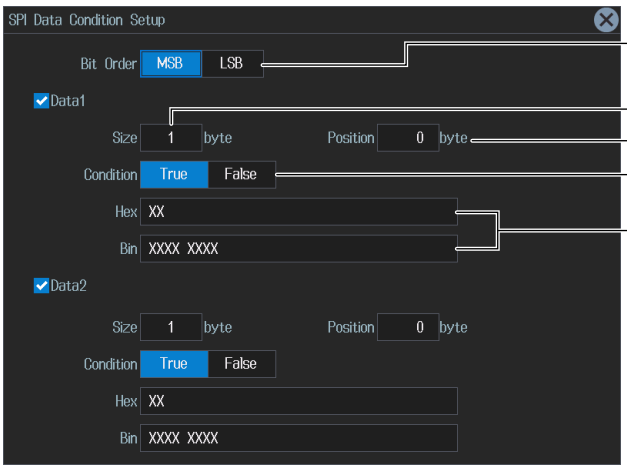

For the 701989 Logic Probe




## Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

### When Wiring System Is 4 Wire




**Bit order**

**Data1**

- **Data length**
- **Comparison start position**
- **Comparison condition**
- **Data Pattern**

**Data2**
Configure Data2 in the same manner that you configure Data1.
This section only appears when mode is set to 4 wire.

### When Wiring System Is 3 Wire

Only set the trigger condition for Data1.

# 2.23 Triggering On User-Defined Serial Bus Signals

This section explains the following settings for triggering on user-defined serial bus signals:

- Bit rate
- Data source
  Data source state, HF rejection, level and hysteresis for detecting data source states
- Turning the clock on and off
  - Clock source
    HF rejection, level and hysteresis for detecting clock source states
  - Enable source
    HF rejection, level and hysteresis for detecting enable source states
  - Latch source
    HF rejection, level and hysteresis for detecting latch source states
- Trigger conditions

► “User-Defined Serial Bus Trigger (ENHANCED)” in the Features Guide

## ENHANCED User Define Menu

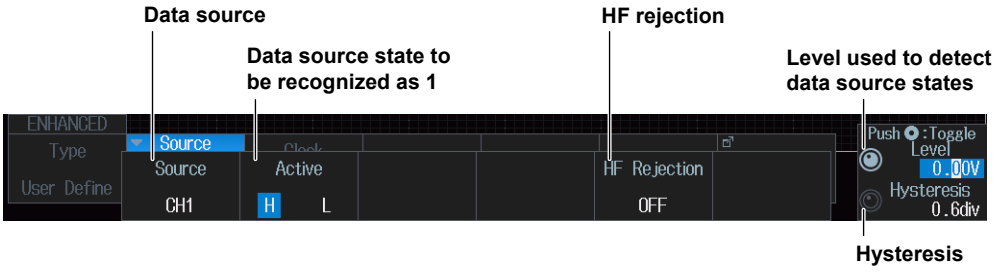
1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key. Select **User Define** from the setup menu that is displayed. The menu that appears varies depending on whether the clock is set on or off.

### When the Clock Is Off




#### Data Source (Source)

Press the **Source** soft key. The following menu items appear.

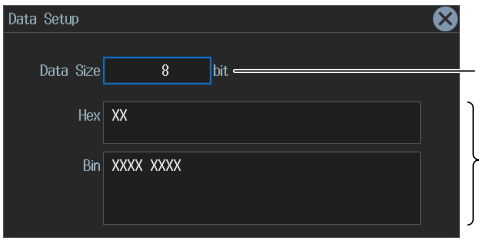



Set the data source to compare with the pattern specified as a trigger condition.

### Trigger Condition (Condition Setup)

Press the **Condition Setup** soft key. The following screen appears.

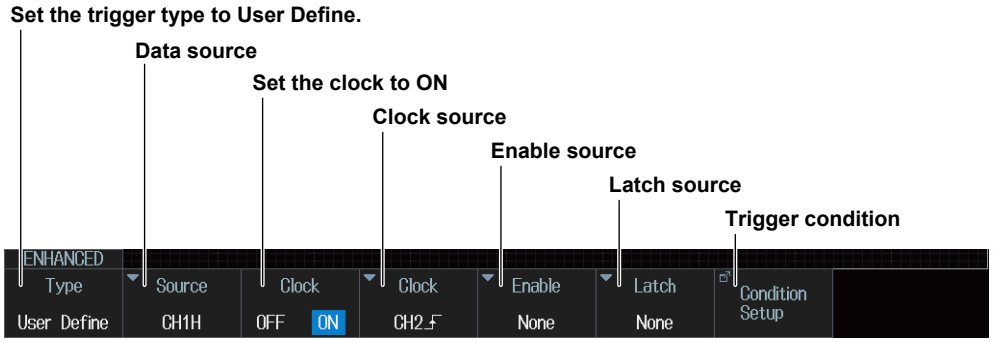
You can use data patterns as trigger conditions. The data pattern trigger condition is met when the sampled data source pattern matches the specified pattern.




**Data length**

**Data Pattern**
The length of the data pattern you can enter is determined by the Data Size setting. The maximum data pattern length you can specify is 128 bits.

## When the Clock Is On

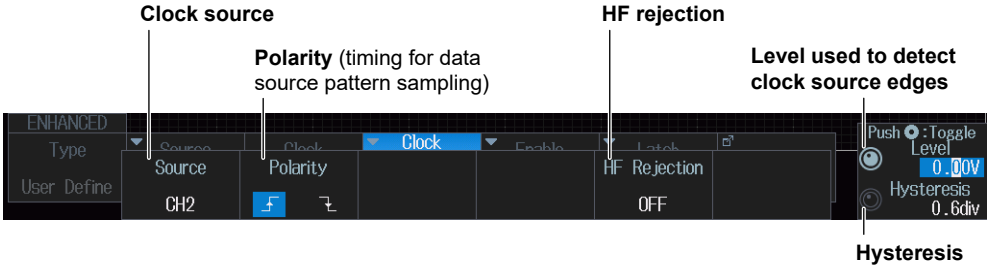



### Data Source (Source)

The menu is the same as the one shown on the previous page for when the clock is off.

### Clock Source (Clock)

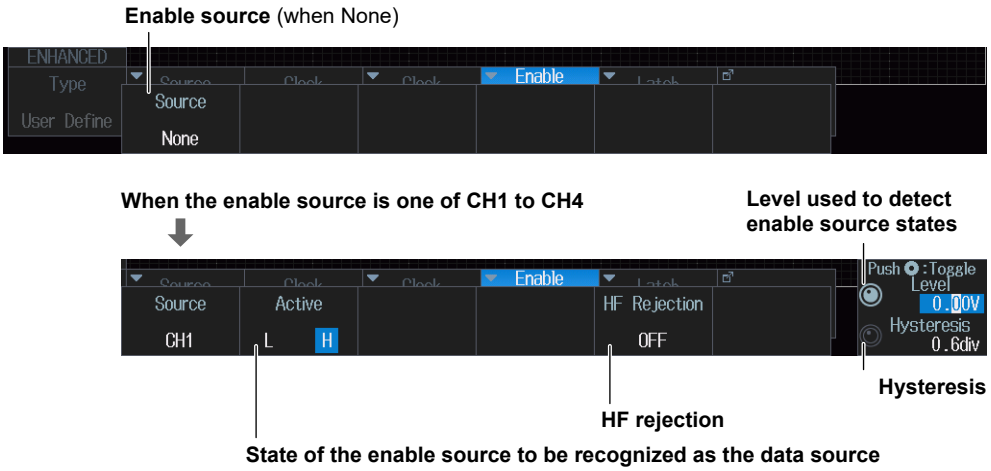
Press the **Clock** soft key. The following menu items appear.




Specify which clock source edge causes the data source to be sampled.

### Enable Source(Enable)

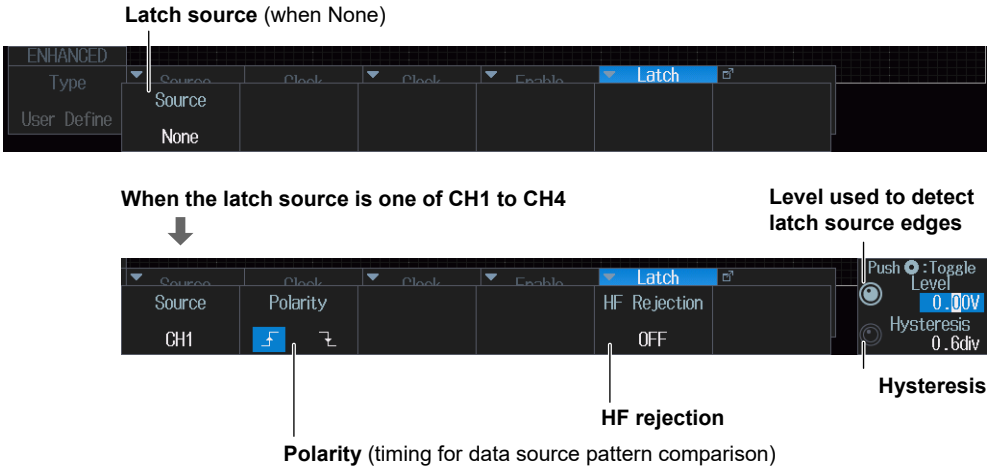
Press the **Enable** soft key. The following menu items appear.




When the data source is sampled in sync with the clock source, the enable source can be used to control the period for which the instrument tests the data source.

### Latch Source (Latch)

Press the **Latch** soft key. The following menu items appear.




You can specify the timing at which the data source pattern sampled in sync with the clock source is compared with the specified pattern.

### Trigger Condition (Condition Setup)

The menu is the same as the one shown on the previous page for when the clock is off.

# 2.24 Triggering on a TV Trigger

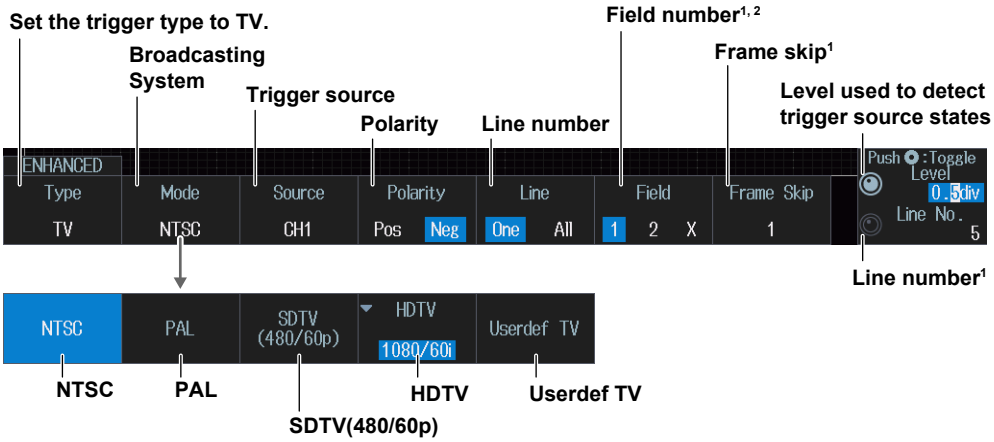
This section explains the following settings for triggering on a TV trigger:

- Broadcasting system
- Trigger source
  Polarity, line number, field number, frame skip, resolution
- Level for detecting trigger source states
- Channel source (Userdef TV)
  Polarity, HF rejection, horizontal sync frequency, sync guard frequency

► “TV Trigger (ENHANCED)” in the Features Guide

## ENHANCED TV Menu

1. Press **ENHANCED**. The ENHANCED menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ENHANCED menu from **TRIGGER** on the top menu that is displayed.
2. Press the **Type** soft key**.** Select **TV** from the setup menu that is displayed. The following menu items appear.




1 You can set this when the line number is set to One.
2 You can set these only when the broadcasting system is set to NTSC, PAL, HDTV (1080/60i, 1080/50i, 1080/24sF), or Userdef TV. For details on Userdef TV, see “Userdef TV” on the next page.

### Broadcasting System (Mode)

#### NTSC

Press the **Mode** soft key and then the **NTSC** soft key. The instrument triggers using the specified field and line of the NTSC signal as trigger conditions.

#### PAL

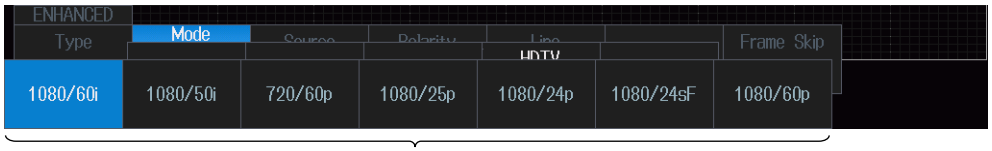
Press the **Mode** soft key and then the **PAL** soft key. The instrument triggers using the specified field and line of the PAL signal as trigger conditions.

## SDTV(480/60p)

Press the **Mode** soft key and then the **SDTV(480/60p)** soft key. The instrument triggers using the specified line of the SDTV signal as trigger conditions.

## HDTV

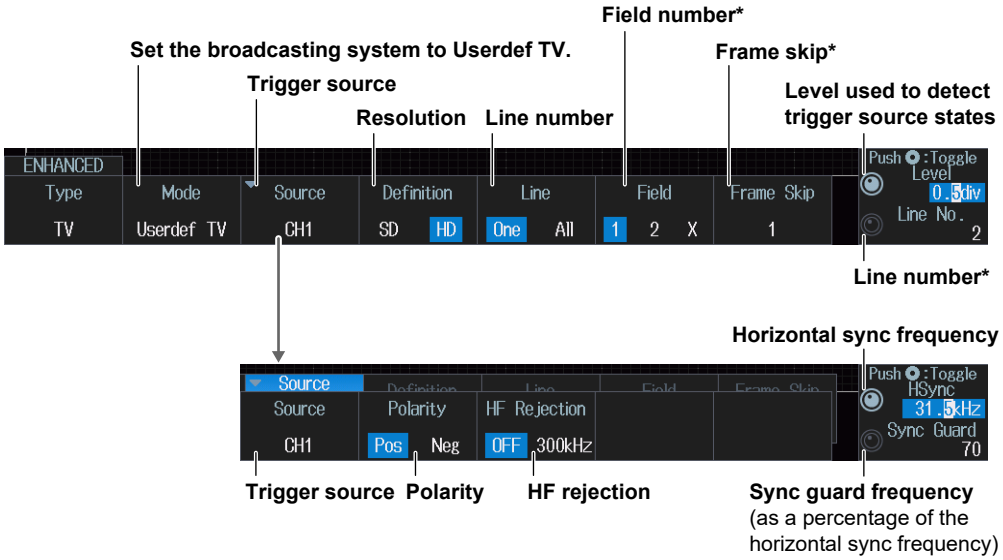
Press the **Mode** soft key and then the **HDTV** soft key. The following menu appears. Select the video format. The instrument triggers using the specified field and line of the HDTV signal as trigger conditions.




**Video format (effective number of scan lines/frame rate)**

## Userdef TV

Press the **Mode** soft key and then the **Userdef TV** soft key. The following menu items appear. The instrument triggers using the user-defined field and line as trigger conditions.




* You can set this when the line number is set to One.

# 2.25 Triggering on Combination Triggers (B TRIG)

This section explains the following settings for triggering on a combination trigger:

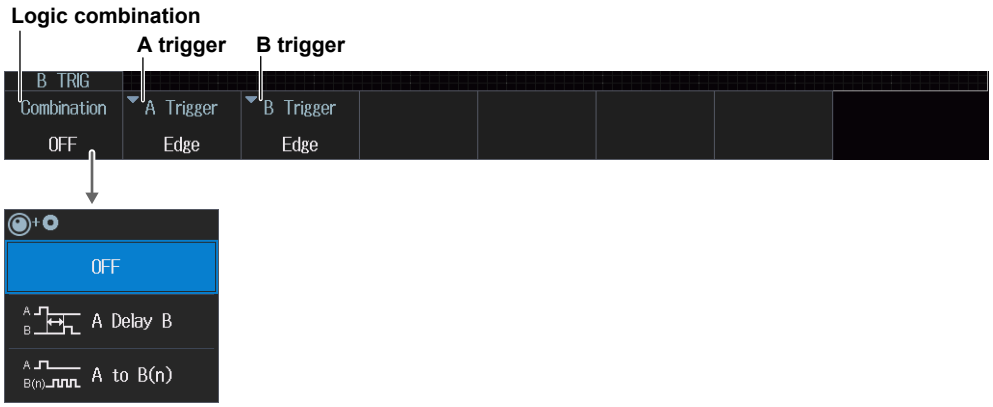
- Combination
  Delay time for condition B, number of times condition B must be met
- Trigger A: Condition A
- Trigger B: Condition B

► “Trigger B (B TRIG)” in the Features Guide

## B TRIG menu

Press **B TRIG**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the B TRIG menu from **TRIGGER** on the top menu that is displayed.




### Logic Combination (Combination)

#### OFF

Press the **Combination** soft key and then the **OFF** soft key. The instrument triggers when the trigger A conditions are met.

#### A Delay B

Press the **Combination** soft key and then the **A Delay B** soft key. The following menu items appear.




After the trigger A conditions are met and the specified amount of time (the delay time) elapses, the instrument triggers when the trigger B conditions are met.

#### A to B(n)

Press the **Combination** soft key and then the **A to B(n)** soft key. The following menu items appear.



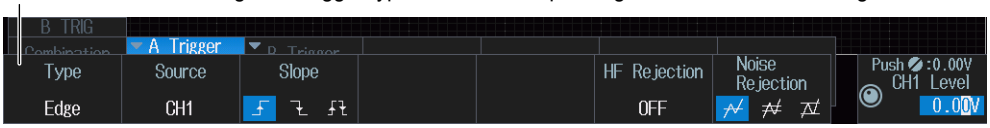

After the trigger A conditions are met, the instrument triggers when the trigger B conditions are met N times.

## Trigger A (A Trigger)

Press the **A Trigger** soft key. The following menu items appear.

Trigger condition A is set to the trigger condition that has been set with the EDGE key or the ENHANCED key, whichever one is illuminated. You can also set trigger condition A from the following menu.

**Trigger type**
The specified trigger type menu appears.
For information on setting each trigger type, see its corresponding reference in the following table.




| Trigger type | Reference Section | Trigger Type | Reference Section | Trigger Type | Reference Section |
|---|---|---|---|---|---|
| Edge | Section 2.3 | Window OR | Section 2.11 | PSI5 Airbag | Section 2.19 |
| Edge OR | Section 2.4 | Interval | Section 2.12 | UART | Section 2.20 |
| Pattern | Section 2.5 | FlexRay | Section 2.13 | $I^2C$ | Section 2.21 |
| Pulse Width | Section 2.6 | CAN | Section 2.14 | SPI | Section 2.22 |
| Rise/Fall Time | Section 2.7 | CAN FD | Section 2.15 | User-defined serial bus | Section 2.23 |
| Runt | Section 2.8 | LIN | Section 2.16 | | |
| Timeout | Section 2.9 | CXPI | Section 2.17 | TV | Section 2.24 |
| Window | Section 2.10 | SENT | Section 2.18 | | |

### *Note*

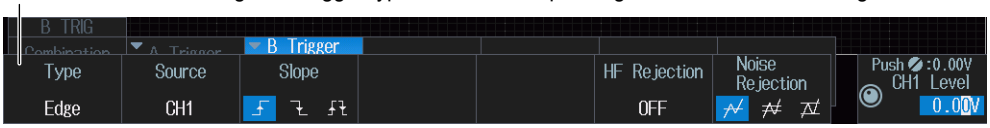
Only one of either condition A or condition B can be set for serial bus trigger.

## Trigger B (B Trigger)

Press the **B Trigger** soft key. The following menu items appear.

Set trigger B to one of the trigger types shown in the following table.

**Trigger type**
The specified trigger type menu appears.
For information on setting each trigger type, see its corresponding reference in the following table.




| Trigger Type | Reference Section | Trigger Type | Reference Section | Trigger Type | Reference Section |
|---|---|---|---|---|---|
| Edge | Section 2.3 | CAN | Section 2.14 | UART | Section 2.20 |
| Edge OR | Section 2.4 | CAN FD | Section 2.15 | $I^2C$ | Section 2.21 |
| Pattern | Section 2.5 | LIN | Section 2.16 | SPI | Section 2.22 |
| Window | Section 2.10 | CXPI | Section 2.17 | User-defined serial bus | Section 2.23 |
| Window OR | Section 2.11 | SENT | Section 2.18 | | |
| FlexRay | Section 2.13 | PSI5 Airbag | Section 2.19 | | |

### *Note*

- Only one of either condition A or condition B can be set for serial bus trigger.
- If you set condition B as the Window trigger, Time Qualification is fixed to None.
- If you set condition B as the Pattern trigger, True and False cannot be selected as the trigger condition when the clock source has been set to None.

# 2.26 Forcing the Instrument to Trigger (FORCE TRIG)

► “Trigger Types (Type)” in the Features Guide

## Forced Trigger [FORCE TRIG]

Press **SHIFT+B TRIG (FORCE TRIG)**. The instrument triggers even when the trigger conditions are not met.

You can also tap **MENU** (MENU) in the upper left of the screen and select the **FORCE TRIG** menu from **TRIGGER** on the top menu that is displayed.

# 2.27 Setting the Action-On-Trigger Function

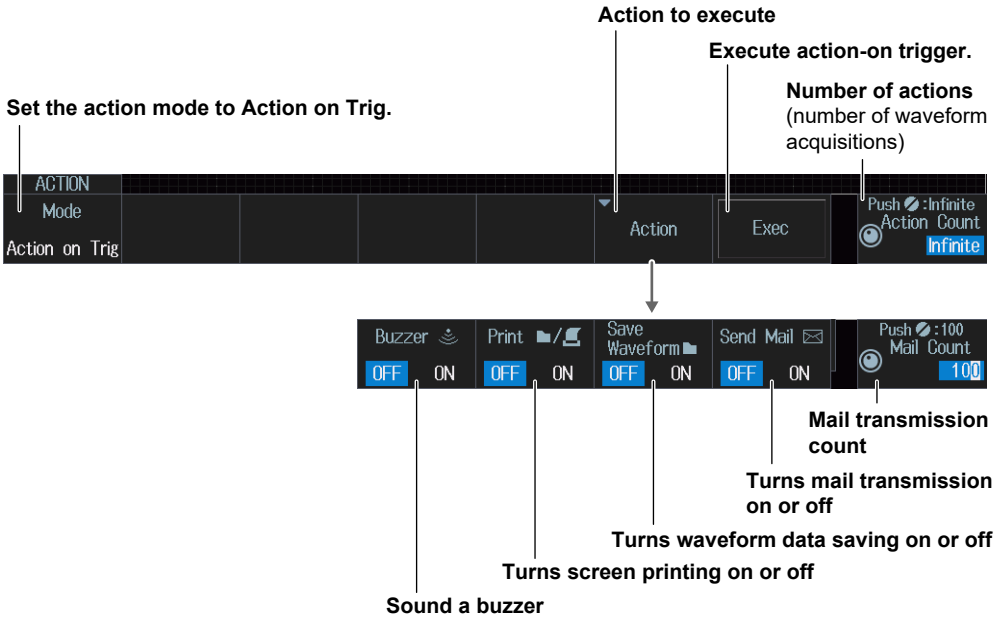
This section explains the following settings for executing the action-on-trigger function:

- Action mode
- Action to execute
- The number of actions
- Execute action-on trigger.

► "Executing Actions" in the Features Guide

## ACTION Action on Trig Menu

1. Press **SHIFT+MODE** (ACTION GO/NO-GO). The ACTION menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ACTION menu (ACTION GO/NO-GO) from **TRIGGER** on the top menu that is displayed.
2. Press the **Mode** soft key and then the **Action on Trig** soft key. The following menu items appear.




### Executing Action-on Trigger (Exec)

After specifying the action mode, the action to execute, and the number of actions, press the **Exec** soft key. The instrument executes the action each time it triggers until the specified number of actions has been reached.

While action-on-trigger is being executed, Exec changes to Abort. If you want to stop serial bus configuration, press the **Abort** soft key.

***Note***

- You cannot execute action-on-trigger if Print To is set to Multi when Print is set to ON on the PRINT menu. ► section 16.6
- When the action to execute is e-mail transmission, the instrument sends the number of messages specified by either Action Count or Mail Count, whichever is lower.

# 2.28 Performing GO/NO-GO Determination

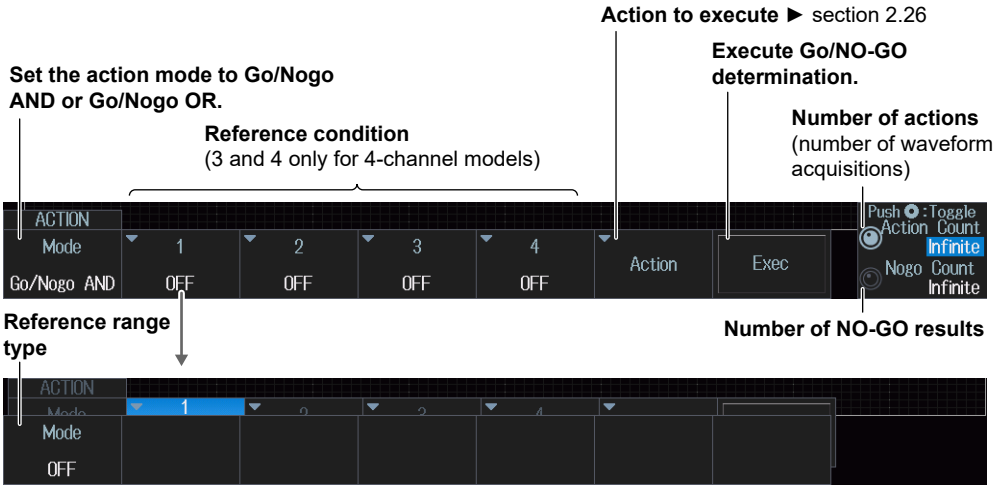
This section explains the following settings for performing GO/NO-GO determination:

- Action mode
- Number of actions, number of NO-GO determinations
- Reference condition
  Reference range type, determination source waveform, reference condition, determination source window, and zone settings
- Executing GO/NO-GO Determination

► "Executing Actions" in the Features Guide

## ACTION Go/Nogo Menu

1. Press **SHIFT+MODE** (ACTION GO/NO-GO). The ACTION menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ACTION menu (ACTION GO/NO-GO) from **TRIGGER** on the top menu that is displayed.
2. Press the **Mode** soft key, then the **Go/Nogo AND** or **Go/Nogo OR** soft key. The following menu items appear.




### Executing Go/NO-GO Determination (Exec)

After specifying the action mode, the action to execute, the number of actions, the number of NO-GO determinations, and the reference conditions, press the **Exec** soft key. The instrument executes actions until either the specified number of actions or the number of NO-GO determinations is reached.

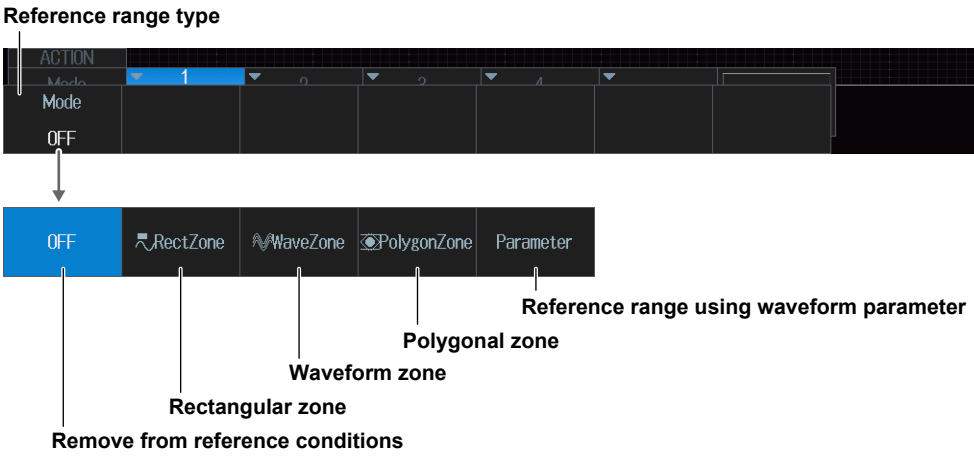
While GO/NO-GO determination is being executed, Exec changes to Abort. If you want to stop serial bus configuration, press the **Abort** soft key.

***Note***

- You cannot execute GO/NO-GO determination if Print To is set to Multi when Print is set to ON on the PRINT menu. ► section 16.6
- When the action to execute is e-mail transmission, the instrument sends the number of messages specified by either Action Count or Mail Count, whichever is lower.

## Reference Conditions (1 to 4) Reference Range Type (Mode)

Press any one of the Reference Condition **1** to **4** soft keys. The following menu items appear.




Under the following circumstances, there are reference range types that you cannot specify.

When the judgment target waveform is LOGIC, XY1, XY2, FFT1, or FFT2

| Source Waveform | Reference range type | | | |
|---|---|---|---|---|
| | Rectangular zone | Waveform zone | polygonal zone | Reference range using waveform parameter |
| CH1 to CH4 | Yes | Yes | Yes | Yes |
| LOGIC | No | No | No | Yes |
| Math1 to Math4 | Yes | Yes | Yes | Yes |
| XY1, XY2 | Yes | No | Yes | Yes |
| FFT1, FFT2 | No | No | No | Yes |

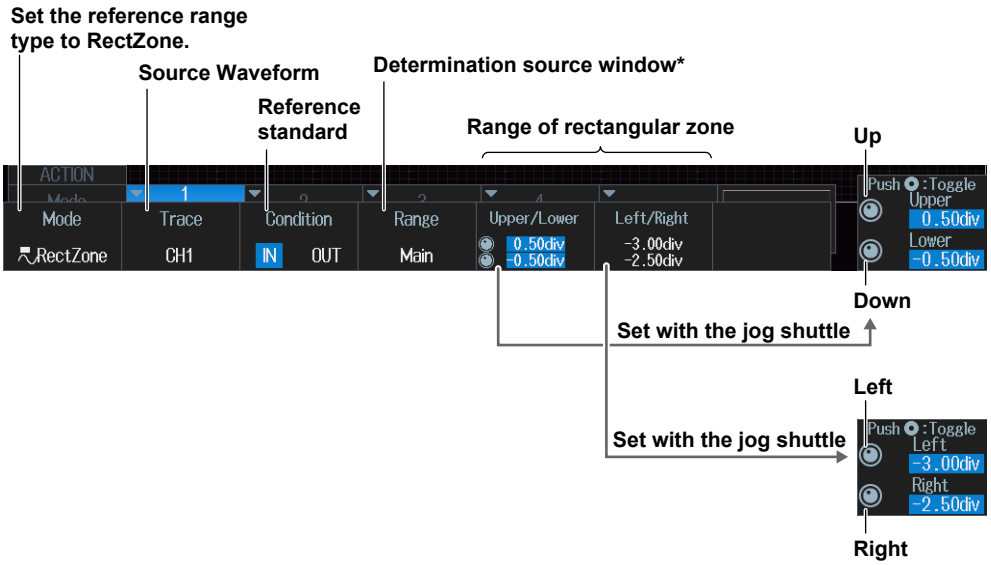
### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

When you perform GO/NO-GO determination, you cannot use the CH4 terminal and logic signal input ports as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

## Rectangular Zone (RectZone)

Press the **Mode** soft key and then the **RectZone** soft key. The following menu items appear.



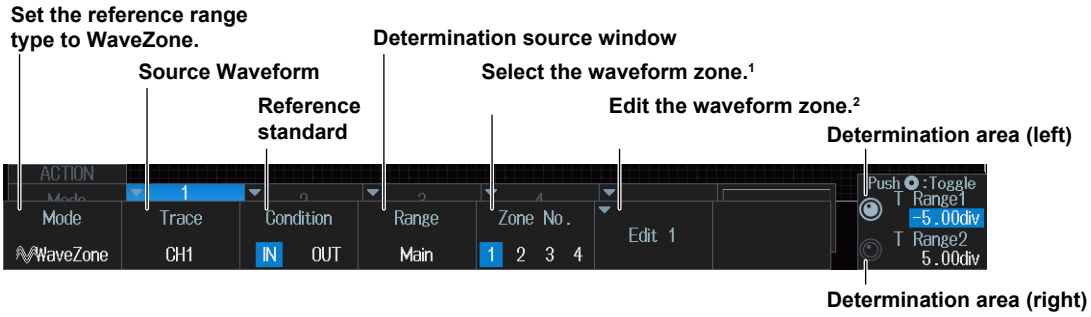

* Set this when the source waveform is CH1 to CH4 or Math1 to Math4.

### *Note*

- To move the rectangular zone up and down, press the Upper or Lower soft key or the SET key several times, and rotate the jog shuttle with both the up and down cursor selected.
- To move the rectangular zone left and right, press the Left or Right soft key or the SET key several times, and rotate the jog shuttle with both the left and right cursors selected.

## Waveform Zone (WaveZone)

Press the **Mode** soft key and then the **WaveZone** soft key. The following menu items appear.




1 Select the waveform zone to be used for reference and the waveform zone to edit.

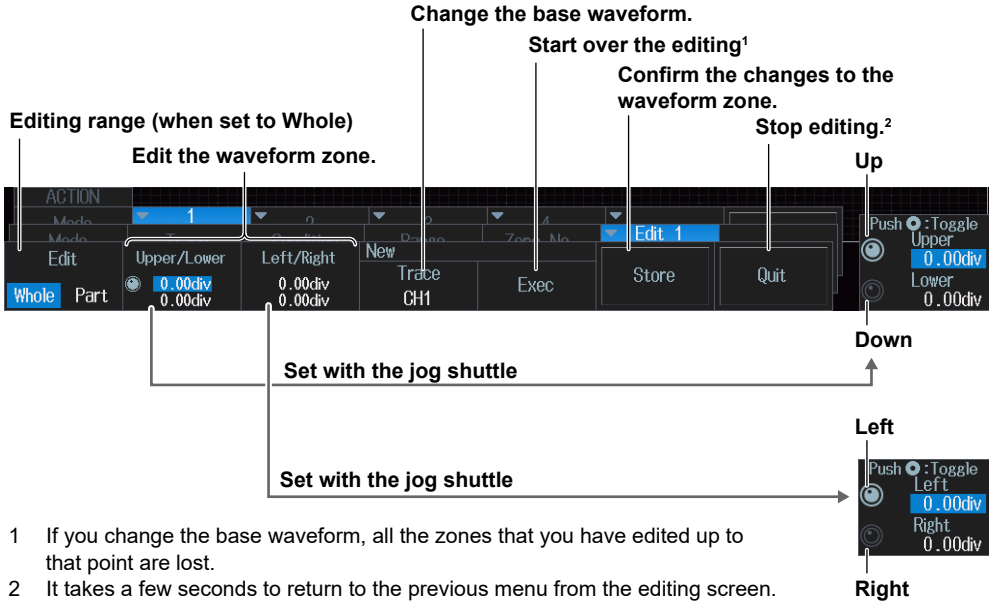
2 It takes a few seconds to switch to the editing screen.

### Editing a Waveform Zone (Edit1 to 4)

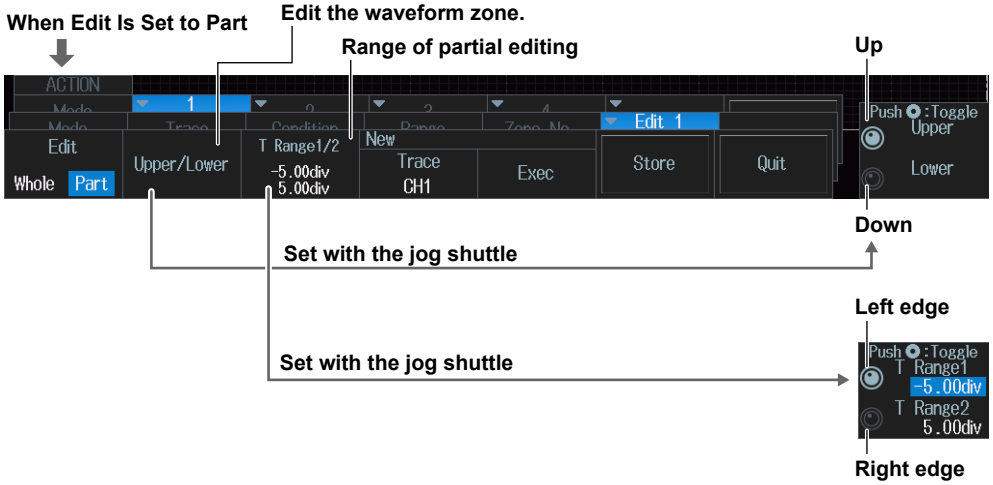
1. Press the **Zone No.** soft key, and select the number of the waveform zone that you want to edit.

   The soft key for editing the waveform zone will change (to Edit 1, 2, 3, or 4) according to the selected number.

2. Of **Edit 1 to Edit 4**, press the soft key that appears on the menu. The waveform zone editing menu for the number that you selected will be displayed.




1 If you change the base waveform, all the zones that you have edited up to that point are lost.
2 It takes a few seconds to return to the previous menu from the editing screen.




- **Changing the Base Waveform**

  To perform editing without changing the base waveform, proceed to Step 5.

3. Press the **Trace** (New) soft key and select the waveform to serve as the base waveform from the menu that is displayed.

4. Press the **Exec** (New) soft key. A waveform zone will be created.

- **Editing the Entire Waveform Zone**

5. Press the **Edit** soft key and select **Whole**.

6. Press the **Upper/Lower** soft key or the **Left/Right** soft key to select the direction to edit.
7. Turn the jog shuttle to edit the waveform zone.

- **Editing a Part of the Waveform Zone**

5. Press the **Edit** soft key and select **Part**.
6. Using the **T Range1/2** soft key and the jog shuttle, set the waveform zone range you want to edit.
   - T Range1/2 soft key: Select the target you want to set: the left edge of the edit range, the right edge, or both.
   - Jog shuttle: Set the left edge of the edit range, the right edge, or both.
7. Press the **Upper/Lower** soft key to select the direction to edit.
8. Turn the jog shuttle to edit the waveform zone.
9. Repeat steps 6 to 8.

- **Confirming the Waveform Zone**

Press the **Store** soft key.
Confirm the edited waveform zone and store it in internal memory.

- **Finishing Editing**

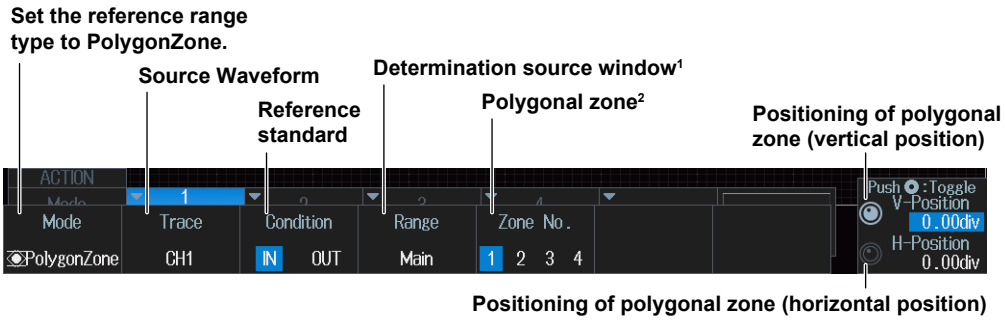
Press the **Quit** soft key.
Return to the previous menu from the editing screen. If you do not confirm the edited waveform zone by pressing the **Store** soft key, the changes that you made will be lost.

### *Note*

- If you change the base waveform, all the zones that you have edited up to that point will be lost.
- If you want to move from the editing menu to a different menu, you have to press the Quit soft key to finish editing.

## Polygonal Zone (PolygonZone)

Press the **Mode** soft key and then the **PolygonZone** soft key. The following menu items appear.




1 Set this when the source waveform is CH1 to CH4 or Math1 to Math4.
2 GO/NO-GO determination is performed using the polygonal zone that you specify here.

Use the Mask Editor software on a PC in advance to create the polygonal images that you will use as polygonal zones. After loading the file (see section 17.7) and loading the polygonal image into the specified zone number (Zone No. 1 to 4), configure the polygonal zone GO/NO-GO determination.

## Setting a Reference Range Using Waveform Parameters (Parameter)

### *Note*

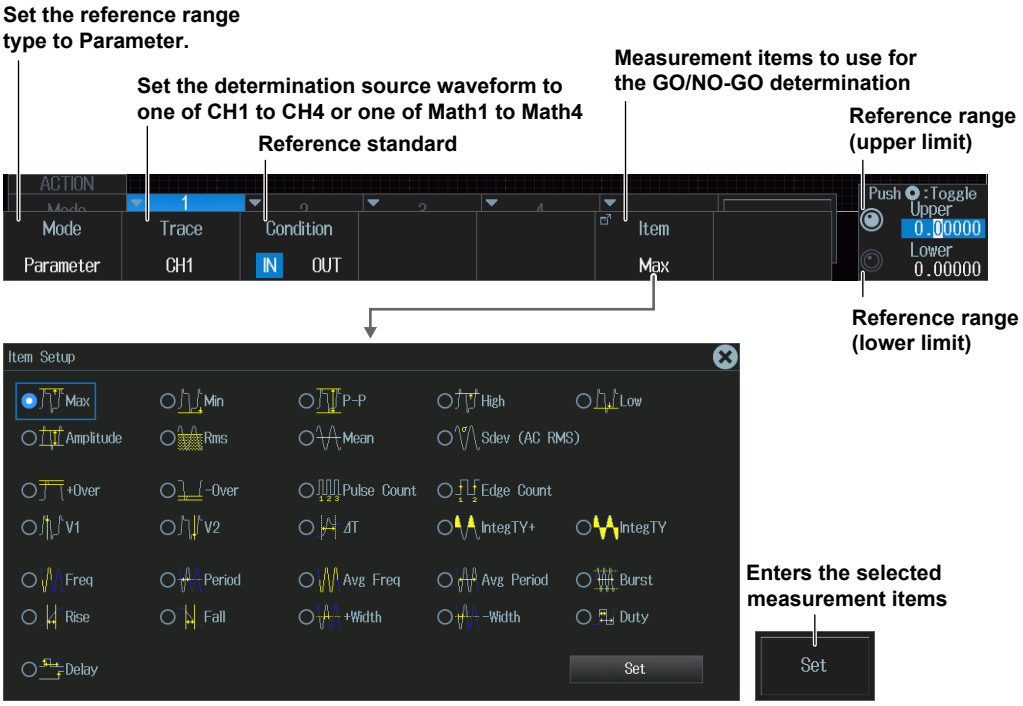
**Using the CH4 Terminal and Logic Signal Input Port**

When you perform GO/NO-GO determination, you cannot use the CH4 terminal and logic signal input ports as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Mode** soft key and then the **Parameter** soft key. A menu appears according to the specified determination source waveform.

**When CH1 to CH4 or Math1 to Math4 Is the Determination Source Waveform**

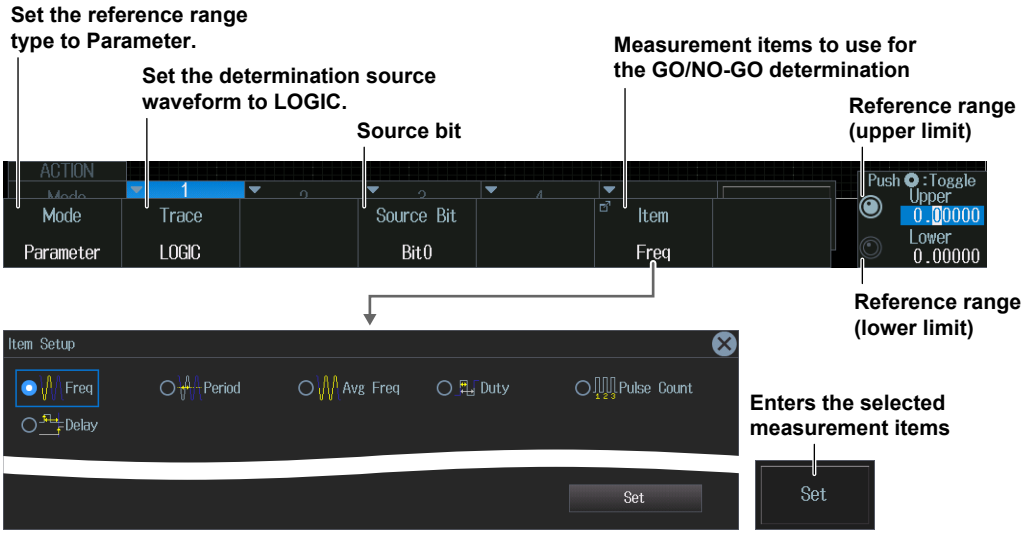
You can select the measurement item to use in the GO/NO-GO determination from the automatically measured waveform parameters. For information on setting automated measurement of waveform parameters, see section 9.1.



### When the Determination Source Waveform Is LOGIC (On models with the logic signal input port)

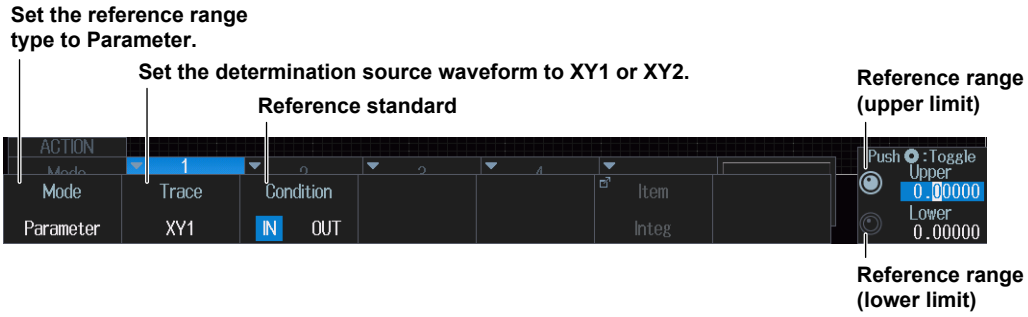
You can select the measurement item to use in the GO/NO-GO determination from the items used for time axis measurement of waveform parameters shown below. For information on setting automated measurement of waveform parameters, see section 9.1.

Freq, Period, Avg Freq, Duty, Pulse Count, Delay



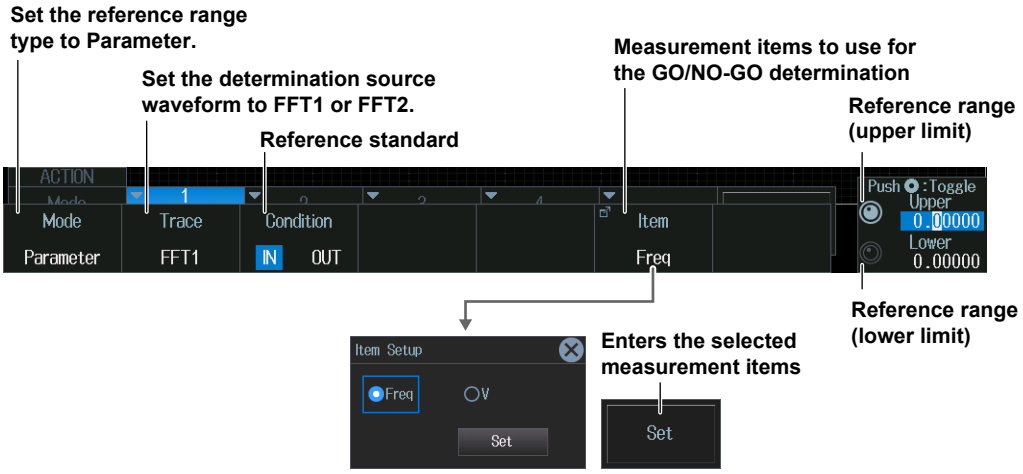

### When XY1 or XY2 Is the Source Waveform

The measurement item to use in the GO/NO-GO determination is the area of XY1 or XY2. For information on setting how the XY waveform is displayed and how its area is determined, see Chapter 5 of this manual and appendix 1 of the Features Guide, IM DLM3054HD-01EN.



### When FFT1 or FFT2 Is the Source Waveform

You can select the measurement item to use in the GO/NO-GO determination from the peak cursor measurement items (Freq, V) for FFT. For details on peak cursor measurement, see section 7.2.



# 3.1 Setting Conditions for Waveform Acquisition

This section explains the following settings for acquiring waveforms:

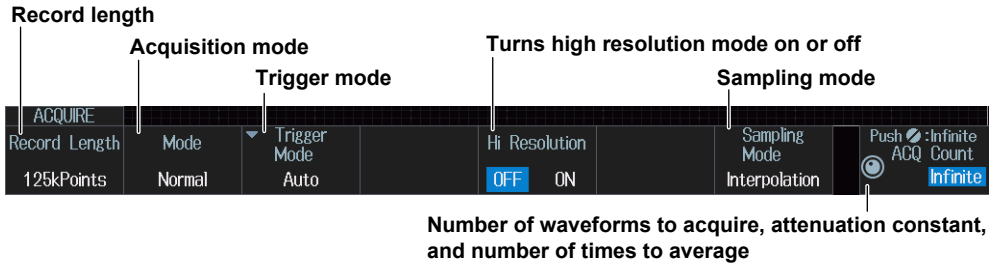
- Record length
- Acquisition mode
- Trigger mode
- Turning high resolution mode on or off
- Sampling mode
- Number of waveforms to acquire, attenuation constant, and number of times to average

► "Waveform Acquisition" in the Features Guide

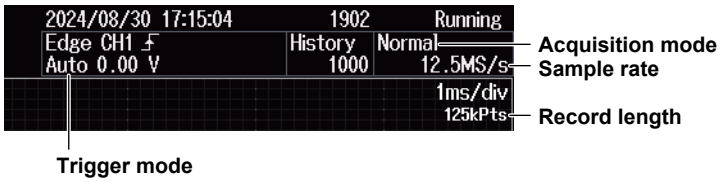
## ACQUIRE Menu

Press **ACQUIRE**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the **ACQUIRE** menu from ACQ/DISP on the top menu that is displayed.




**Display at the Top of the Screen**




### Acquisition Mode (Mode)

| | | |
|---|---|---|
| Normal | : | Displays waveforms without processing the sampled data. You can set the number of waveforms to acquire with the jog shuttle. |
| Envelope | : | Displays waveforms in envelope mode. You can set the number of waveforms to acquire with the jog shuttle. |
| Average | : | Displays averaged waveforms. You can set the attenuation constant and the number of times to average with the jog shuttle. |

### *Note*

- If you set the acquisition mode to Envelope when the sample rate is set to 1.25 GS/s or higher, the instrument actually operates in Normal mode. In envelope mode, [Envelope] appears in the upper right of the screen. If envelope is in use in high resolution mode, [Env:Hi-Res] appears.
- To average waveforms that have been acquired in N Single mode, set the acquisition mode to Normal, and turn on history feature's averaging.

## Trigger Mode (Trigger Mode)

The trigger mode determines the conditions for updating the displayed waveforms. You can also set the trigger mode by pressing the MODE key. ► section 2.1

## Sampling Mode (Sampling Mode)

| | | |
|---|---|---|
| Realtime | : | Samples data in real-time sampling mode. |
| Interpolation | : | Samples data in interpolation mode. |
| Repetitive | : | Samples data in repetitive sampling mode. |

### *Note*

You cannot use repetitive sampling mode (Repetitive) under the following circumstances.

- When the trigger source is LOGIC
- When the record length is 2.5 M points or more

# 3.2 Acquiring Waveforms

► “Waveform Acquisition (RUN/STOP)” and
“Acquiring the Waveform Once (SINGLE)”
in the Features Guide

## Starting and Stopping Waveform Acquisition (RUN/STOP)

1. Press **RUN/STOP**.
   - The RUN/STOP key illuminates, and waveform acquisition starts. The acquired waveform is displayed.
   - If you set the record length to a value that allows only one waveform to be acquired, pressing the RUN/STOP key will produce the same result as pressing the SINGLE key.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the RUN/STOP menu from the top menu that is displayed.
2. Press **RUN/STOP** again.
   The RUN/STOP key light turns off, and waveform acquisition stops.

## Acquiring a Waveform Once (SINGLE)

1. Press **SINGLE**.
   - The SINGLE key illuminates, and waveform acquisition starts. The acquired waveform is displayed. The trigger mode is set to single mode. When the instrument triggers, it acquires and displays only one waveform and then stops waveform acquisition. When waveform acquisition stops, the SINGLE key turns off.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SINGLE menu from the top menu that is displayed.
   - To stop waveform acquisition, press the RUN/STOP key.

# 4.1 Setting Display Conditions

This section explains the following settings for viewing the display:

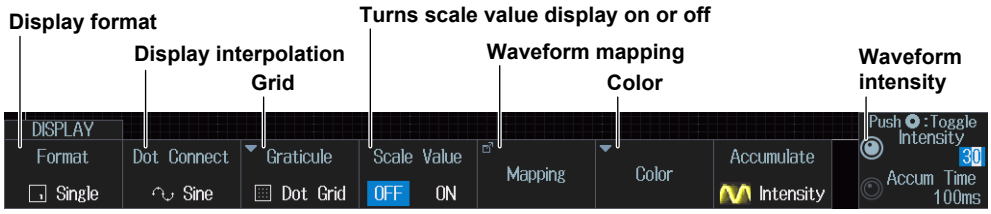
- Display format
- Display interpolation
- Grid
- Turning scale value display on or off
- Waveform mapping
- Color
- Waveform intensity

► “Display” in the Features Guide

## DISPLAY Menu

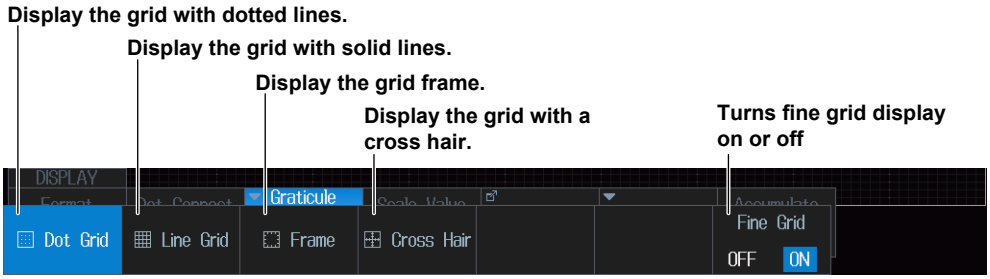
Press **DISPLAY**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the DISPLAY menu from **ACQ/DISP** on the top menu that is displayed.



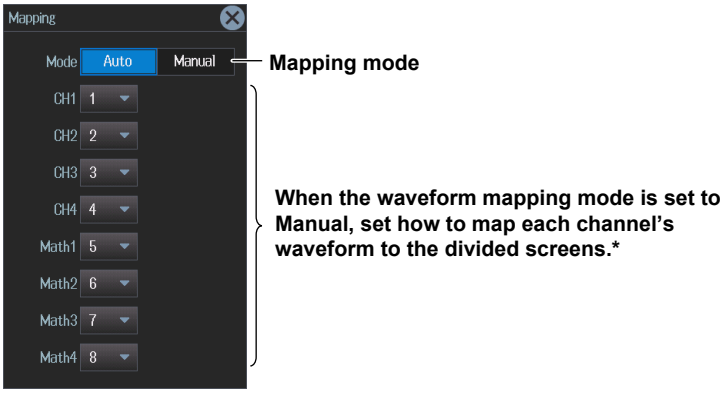

### Grid (Graticule)

Press the **Graticule** soft key. The following menu items appear.




### Waveform Mapping (Mapping)

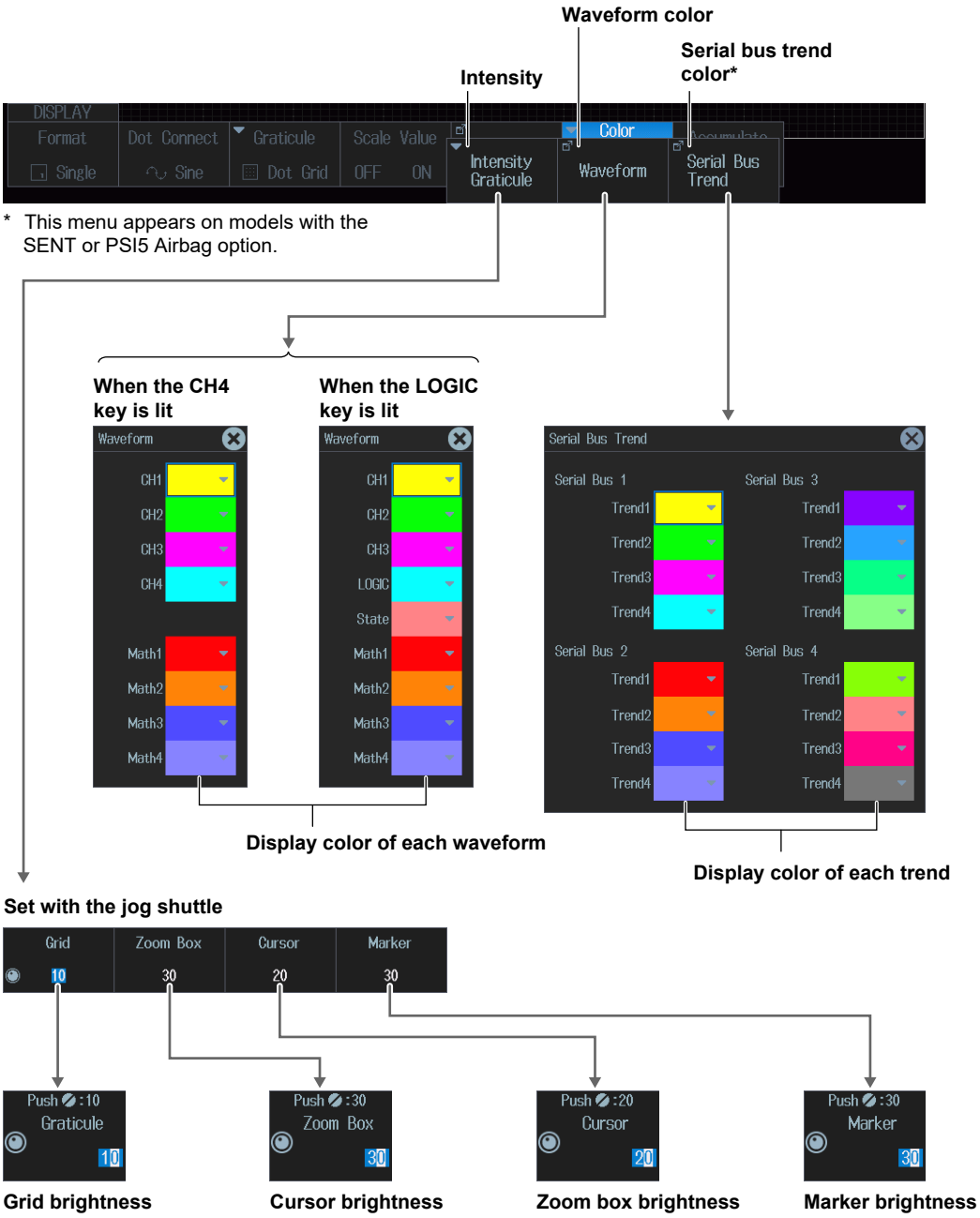
Press the **Mapping** soft key. The following menu items appear.




* CH4 or LOGIC, whichever the corresponding key is illuminated, can be selected.
Specify the channel that you want to set in advance by pressing either the CH4 key or the LOGIC key.

## Display Color (Color)

Press the **Color** soft key. The following menu items appear.



# 4.2 Using the Accumulate Feature

This section explains the following settings for using the accumulate feature:

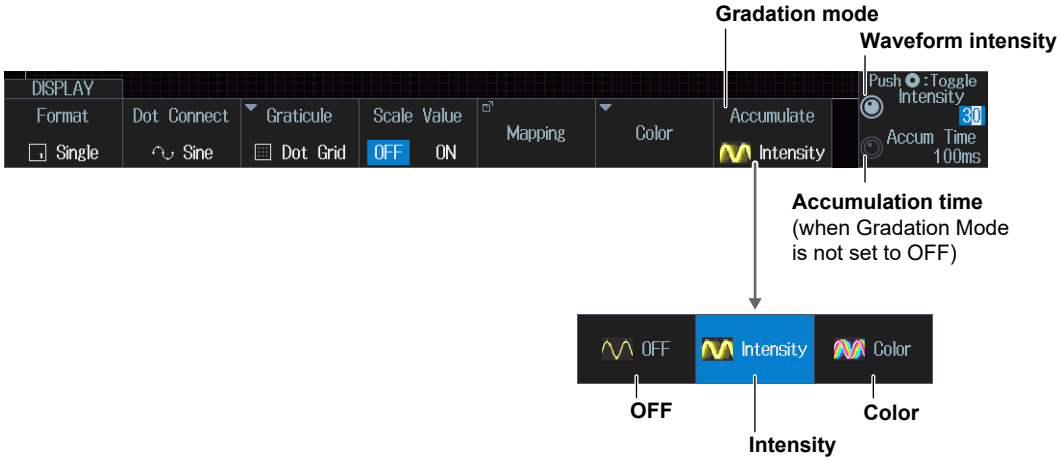
- Accumulation frequency
- Accumulation time

► “Accumulation (Accumulate)” in the Features Guide

## DISPLAY Menu

Press **DISPLAY**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the DISPLAY menu from **ACQ/DISP** on the top menu that is displayed.




### Gradation Mode (Accumulate)

Intensity: Indicates waveform frequency using different intensity levels.

Color: Indicates waveform frequency using different colors.

OFF: Does not accumulate waveforms.

# 4.3 Using the Snapshot and Clear Trace Features

This section explains how to clear snapshots (temporary storage during waveform acquisition) and the waveform display.

- Snapshot
- Clear trace

► “Snapshot (SNAP SHOT)” and
“Clear Trace (CLEAR TRACE)” in the Features Guide

## Snapshot (SNAP SHOT)

1. Press .
   - Press SNAPSHOT to retain the currently displayed waveform on the screen as a snapshot displayed in white. Snapshot waveforms remain on the screen until you execute a clear trace operation.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SNAP SHOT menu from the top menu that is displayed.

## Clear Trace (CLEAR TRACE)

2. Press **CLR**.
   - Clears all the waveforms that are displayed on the screen.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the CLEAR TRACE menu from the top menu that is displayed.

# 4.4 Adjusting the Backlight

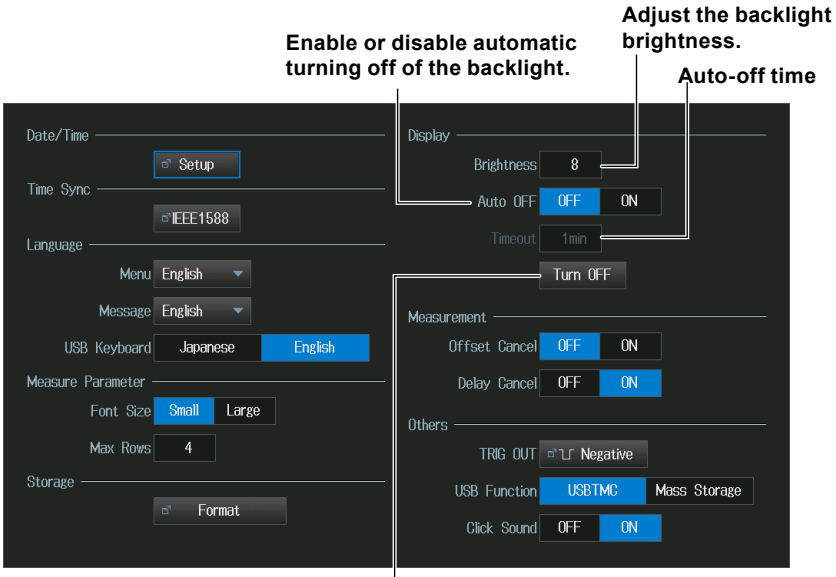
This section explains the following settings for adjusting the backlight:

- Brightness adjustment
- Turning auto power-off on or off
- Auto-off time
- Turning the backlight off

► "Adjusting the Backlight (Display)" in the Features Guide

## UTILITY System Configuration Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **System Configuration** soft key. The following menu items appear.



# 5.1 Displaying XY Waveforms

This section explains the following settings for displaying XY waveforms:

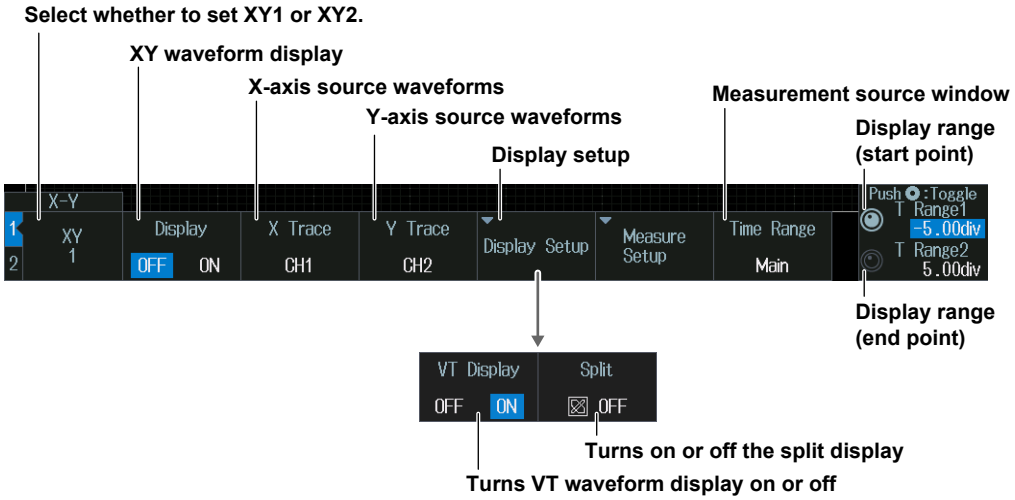
- XY waveform display
- X-axis and Y-axis source waveforms
- Display settings
- Measurement source window
- Display range
- Display settings
  Turning time-domain waveform on or off, turning split display on or off

► “Displaying XY Waveforms” in the Features Guide

## X-Y Menu

Press **SHIFT+DISPLAY**(X-Y). The following menu items appear.

- You can also tap **MENU** (MENU) in the upper left of the screen and select the X-Y menu from **ACQ/DISP** on the top menu that is displayed.
- Up to two XY waveforms can be displayed. To switch the setup menu, press the **XY** soft key.



# 5.2 Performing Cursor Measurements and Area Calculations

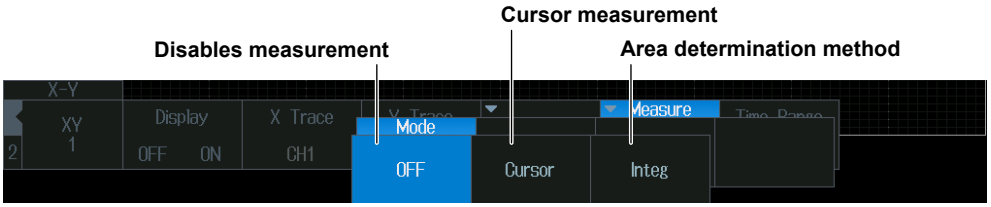
This section explains the following settings for determining cursor measurement values and the area of the displayed XY waveform:

- Cursor measurements on the XY waveform display
- How to calculate the area of XY waveforms

► "Measurement Setup (Measure Setup)" in the Features Guide

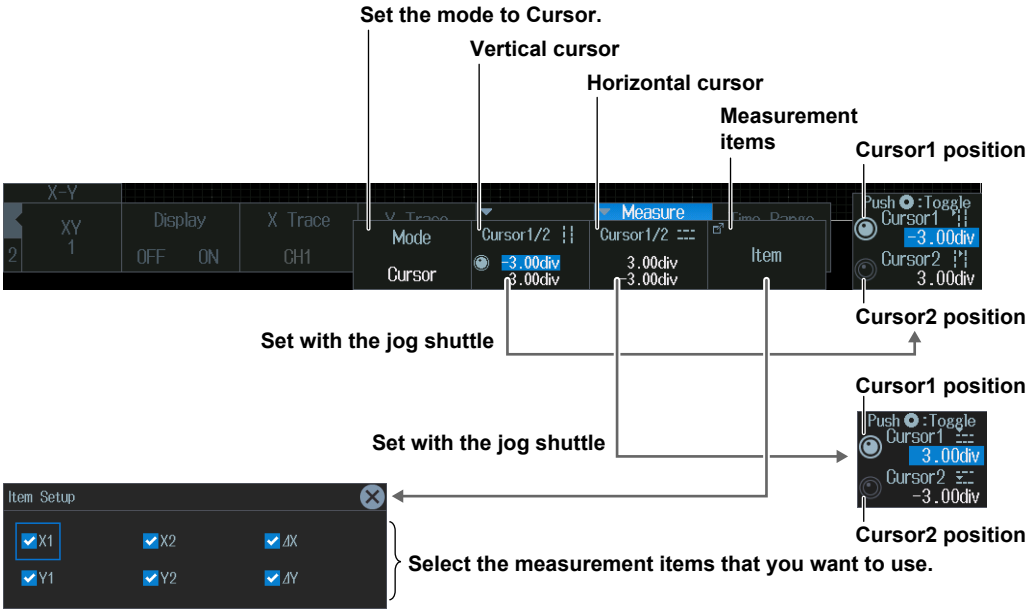
## XY Measure Setup menu

1. Press **SHIFT+DISPLAY**(X-Y). The X-Y menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the X-Y menu from **ACQ/DISP** on the top menu that is displayed.
2. Press the **Measure Setup** soft key and then the **Mode** soft key. The following menu items appear.




### Cursor Measurement (Cursor)

Press the **Cursor** soft key. The following menu items appear.



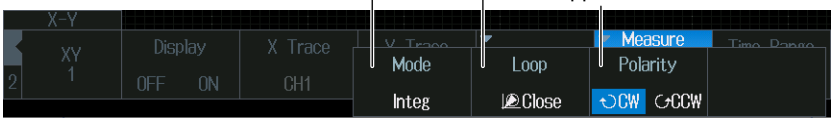
## Performing Area Calculations (Integ)

Press the **Integ** soft key. The following menu items appear.

**Set the mode to Integ.**

**Area determination method**

**Direction to be made positive**
Appears when the area determination method is Close



# 6.1 Setting the Computation Mode

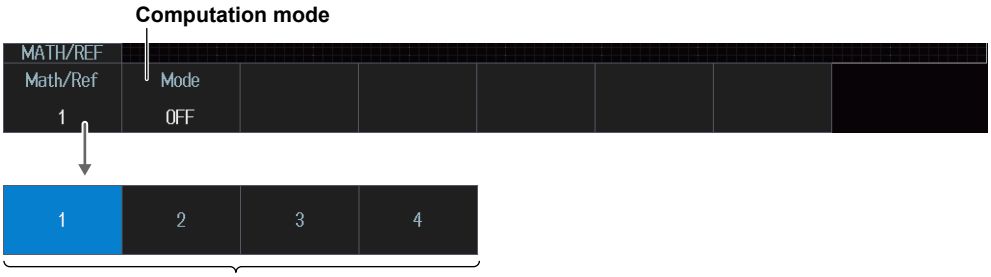
This section explains how to set the computation mode.

► “Computation Mode (Mode)” in the Features Guide

## MATH/REF Menu

Press **MATH/REF**. The following menu items appear.

- You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
- Up to four computed waveforms/reference waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.

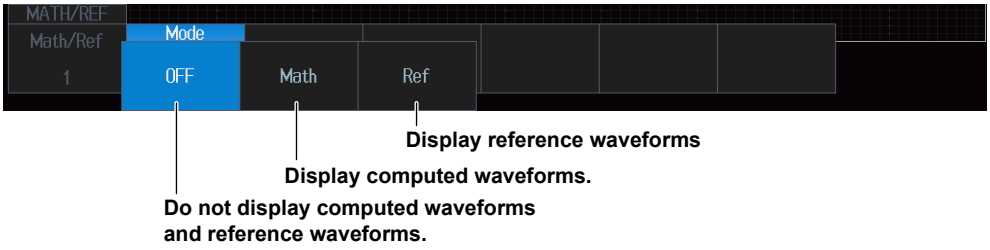



**Select the computed or reference waveform from Math/Ref1 to Math/Ref4*.**

* Math/Ref3 and Math/Ref4 can be set only for 4-channel models.

### Computation Mode (Mode)

Press the **Mode** soft key. The following menu items appear.




***Note***

- When the state display (State) of LOGIC is on, Math4/Ref4 cannot be used. ► section 1.2
- When the record length (Record Length) of the ACQUIRE menu is set to the maximum record length, Math/Ref2 and Math/Ref4 cannot be used. For details on the ACQUIRE menu, see section 3.1.

# 6.2 Performing Addition, Subtraction, and Multiplication

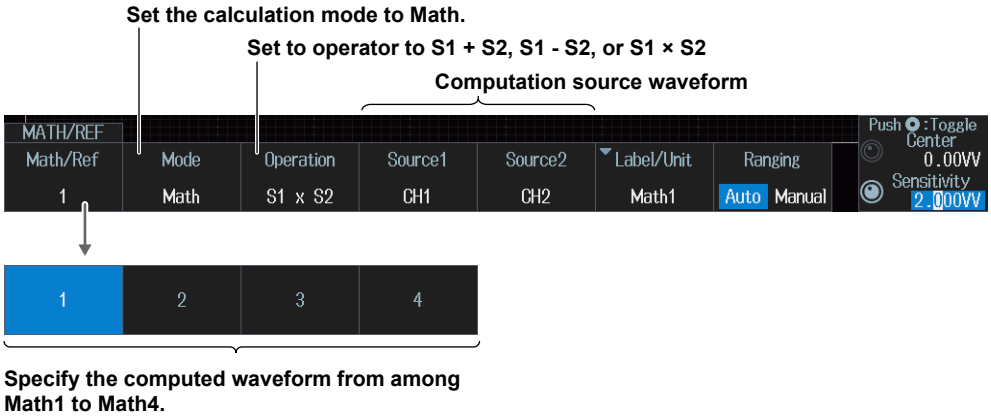
This section explains the following settings for performing addition, subtraction, and multiplication:

- Operators
- Computation source waveforms

► "Operators (Operation)" in the Features Guide

## MATH/REF Menu

1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four computed waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Math** soft key.
3. Press the **Operation** soft key, then the **S1 + S2**, **S1 - S2**, or **S1 × S2** soft key. The following menu items appear.




### Math Source Waveforms (Source1 and Source2)

The computation source waveforms that you can set for Source1 and Source2 are listed below.

| Computed Waveforms That Display Computation Results | Source1, Source2 |
|---|---|
| Math1 (Math/Ref1) | CH1 to CH4 |
| Math2 (Math/Ref2) | CH1 to CH4, Math1 |
| Math3 (Math/Ref3) | CH1 to CH4, Math1 to Math2 |
| Math4 (Math/Ref4) | CH1 to CH4, Math1 to Math3 |

# 6.3 Performing Filter Functions

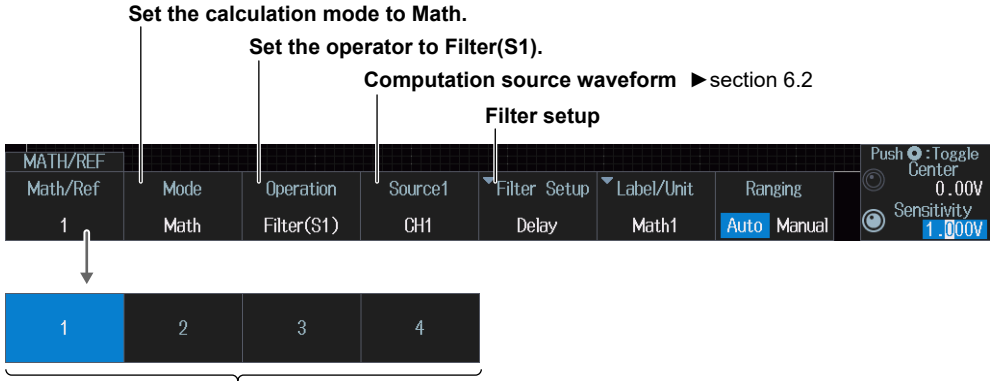
This section explains the following settings for applying filter functions (phase shift, moving average, IIR filter):

- Operators
- Computation source waveforms
- Filter

► “Operators (Operation)” in the Features Guide

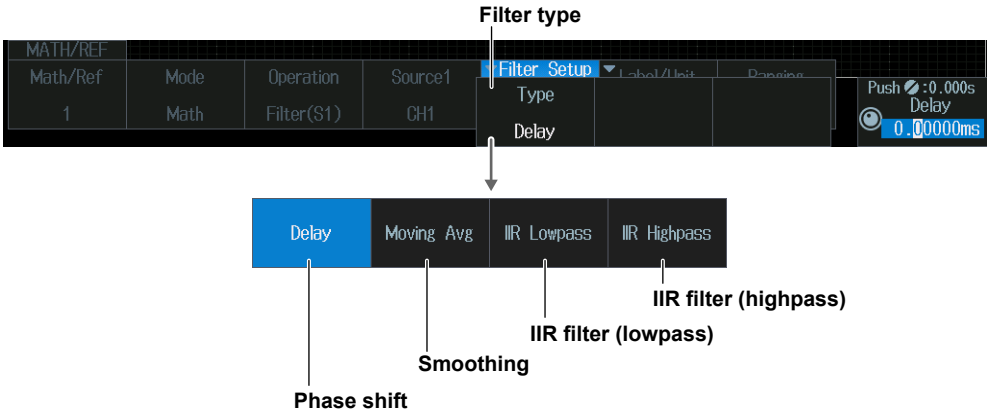
## MATH/REF Menu

1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four computed waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Math** soft key.
3. Press the **Operation** soft key and then the **Filter(S1)** soft key. The following menu items appear.



## Configuring Filters (Filter Setup)

Press the **Filter Setup** soft key. The following menu items appear.




### Phase Shift (Delay)

Press the **Type** soft key and then the **Delay** soft key. The following menu items appear.



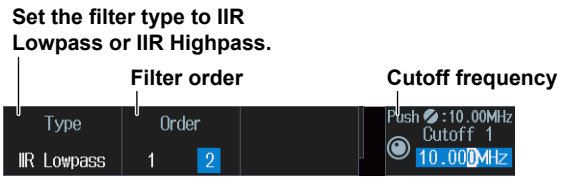

### Smoothing (Moving Avg)

Press the **Type** soft key and then the **Moving Avg** soft key. The following menu items appear.




### IIR Filter (IIR Lowpass/IIR Highpass)

Press the **Type** soft key and then the **IIR Lowpass** or **IIR Highpass** soft key. The following menu items appear.



# 6.4 Performing Integration

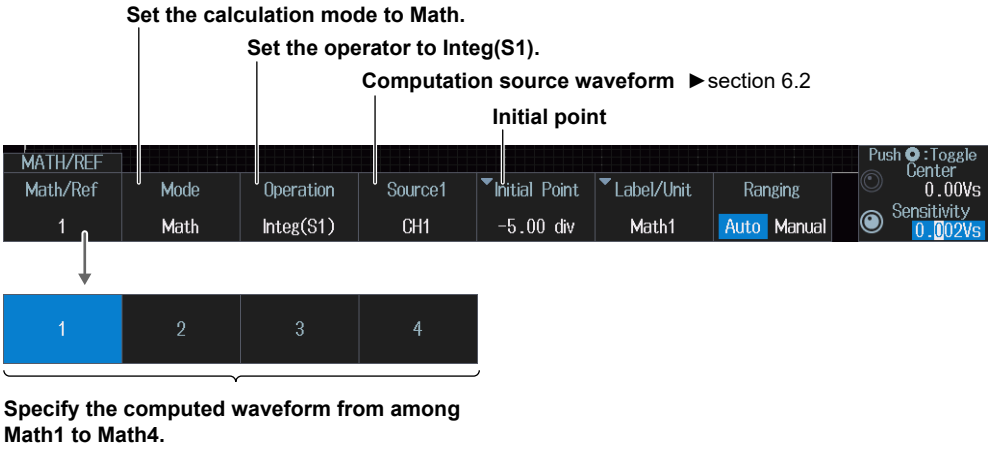
This section explains the following settings for performing integration:

- Operators
- Computation source waveforms
- Initial point

► "Operators (Operation)" in the Features Guide

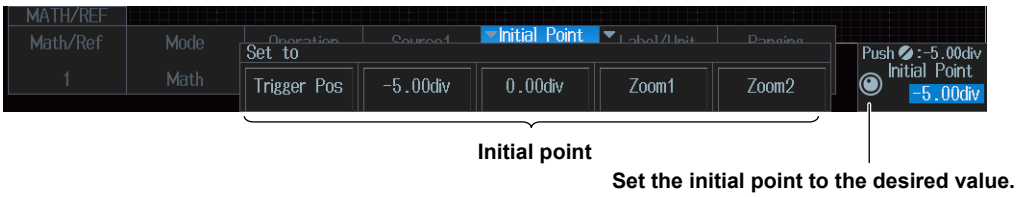
## MATH/REF Menu

1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four computed waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Math** soft key.
3. Press the **Operation** soft key and then the **Integ(S1)** soft key. The following menu items appear.




### Initial Point (Initial Point)

Press the **Initial Point** soft key. The following menu items appear.



# 6.5 Performing Count Computations

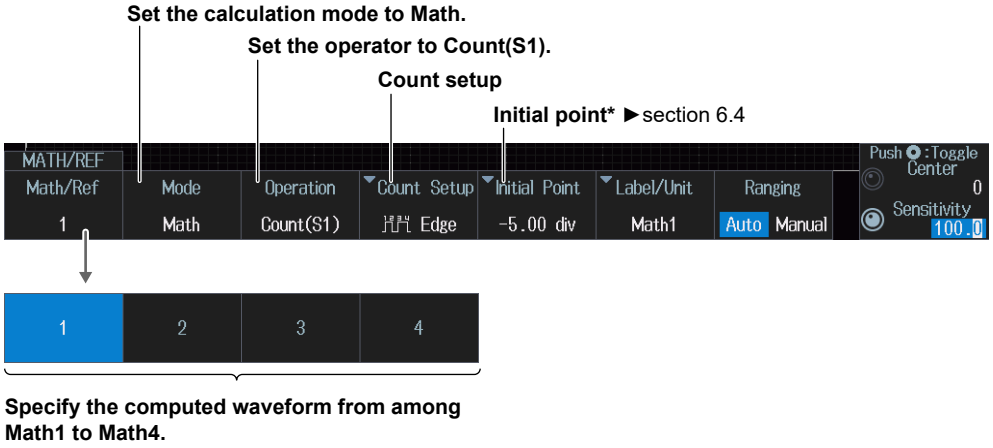
This section explains the following settings for performing edge count or rotary count:

- Operators
- Initial Point
- Count type
  Computation source waveform, polarity, level for detecting edges, rotary count threshold level, hysteresis

► "Operators (Operation)" and
"Edge Count or Rotary Count (Count(S1))" in the Features Guide

## MATH/REF Menu

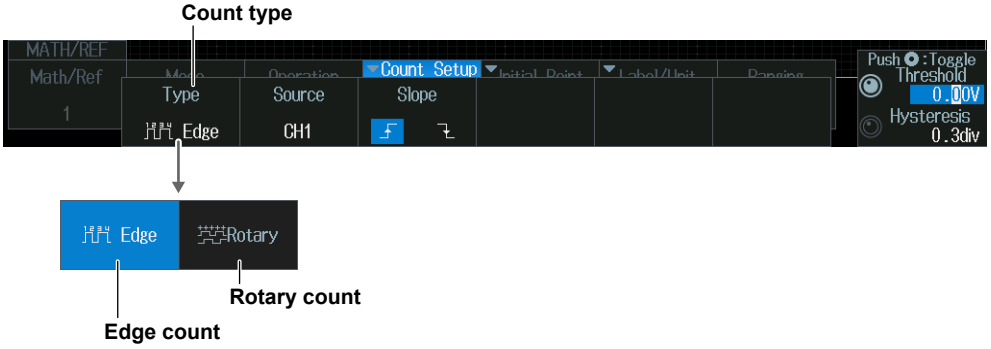
1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four computed waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Math** soft key.
3. Press the **Operation** soft key and then the **Count(S1)** soft key. The following menu items appear.




* If the count type (Type) is rotary count, the initial point can be set only when Source3(Z) is set to None.

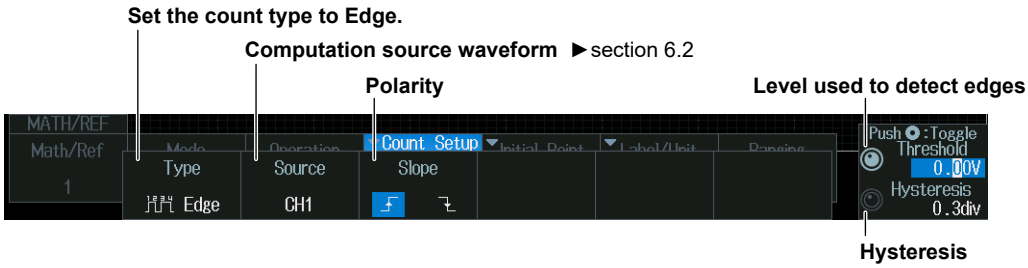
## Count Setup (Count Setup)

Press the **Count Setup** soft key. The following menu items appear.



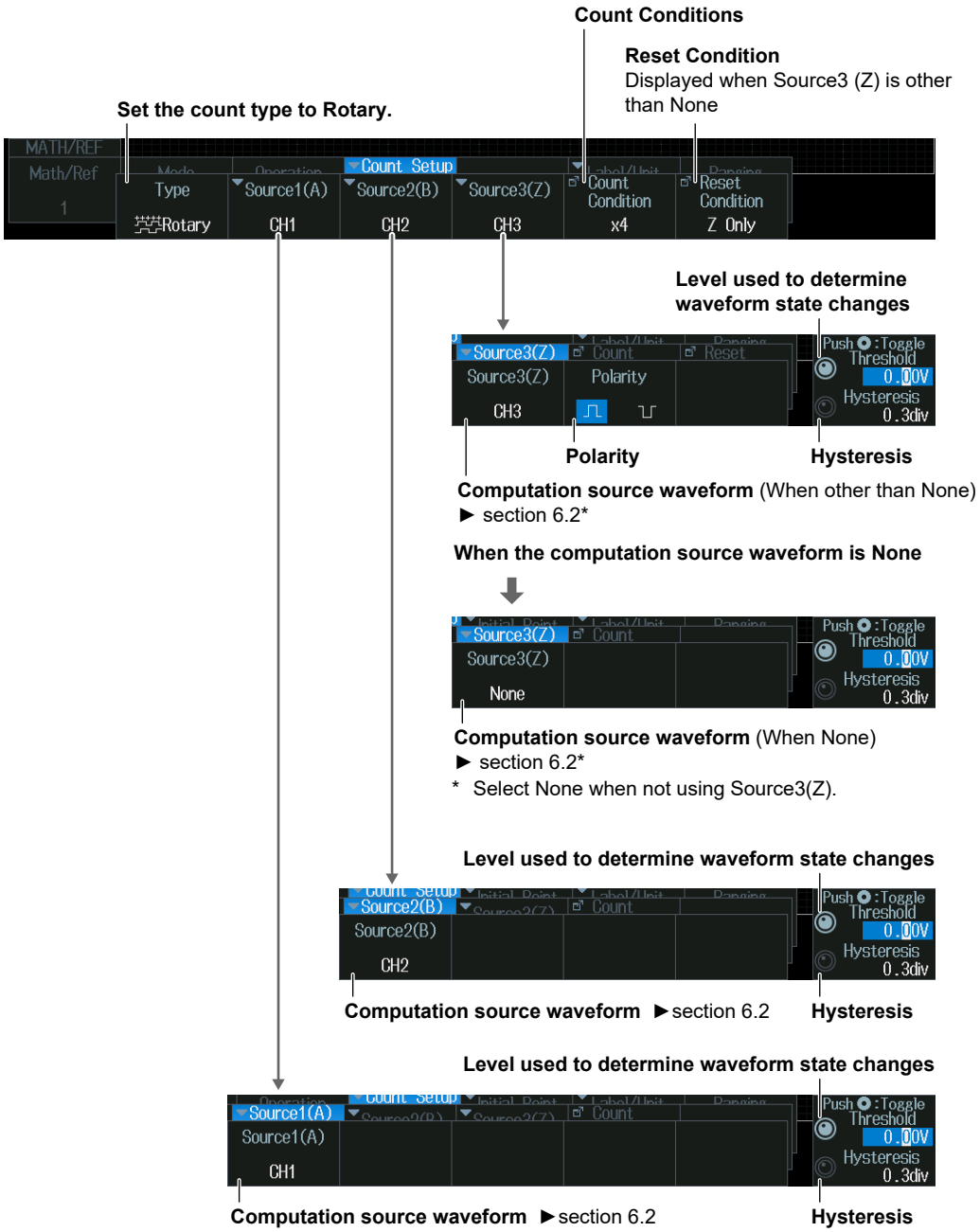
## Edge Count (Edge)

Press the **Type** soft key and then the **Edge** soft key. The following menu items appear.




## Rotary Count (Rotary)

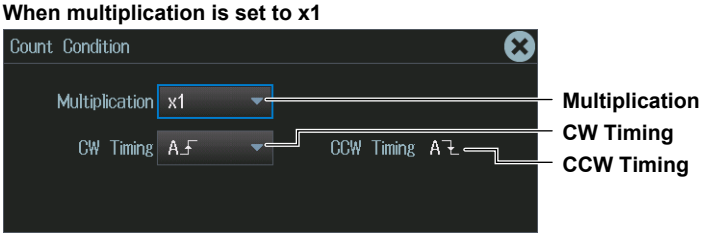
Press the **Type** soft key and then the **Rotary** soft key. The following menu items* appear.



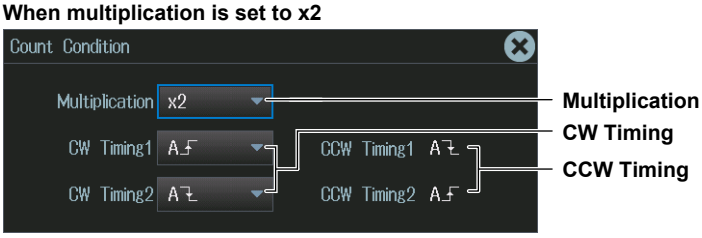
### Count Conditions (Count Condition)

Press the **Count Condition** soft key. The following menu items appear.

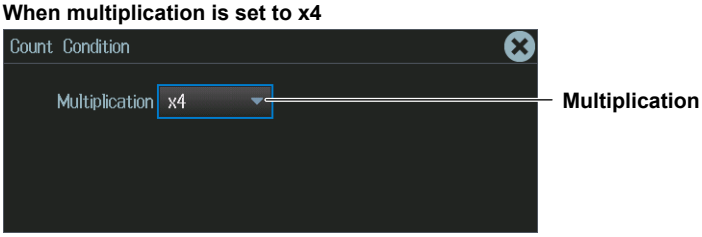
**When multiplication is set to x1**




**When multiplication is set to x2**



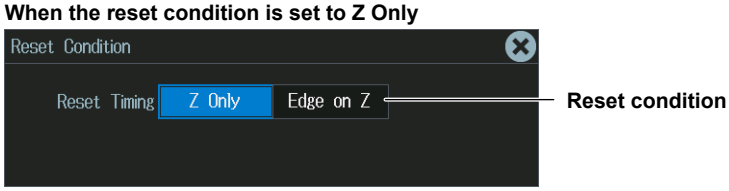

**When multiplication is set to x4**



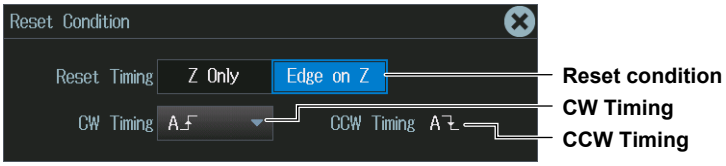

### Reset Condition (Reset Condition)

Press the **Reset Condition** soft key. The following menu items appear.

**When the reset condition is set to Z Only**




**When the reset condition is set to Edge on Z**



# 6.6 Setting Labels, Units, and Scaling

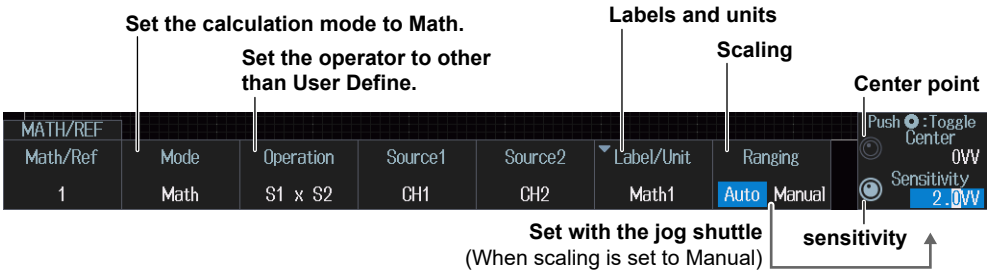
This section explains the following labels, units, and scaling settings:

- Labels and units
- Scaling

► "Setting Labels and Units (Label/Unit)" and "Scaling (Ranging)" in the Features Guide

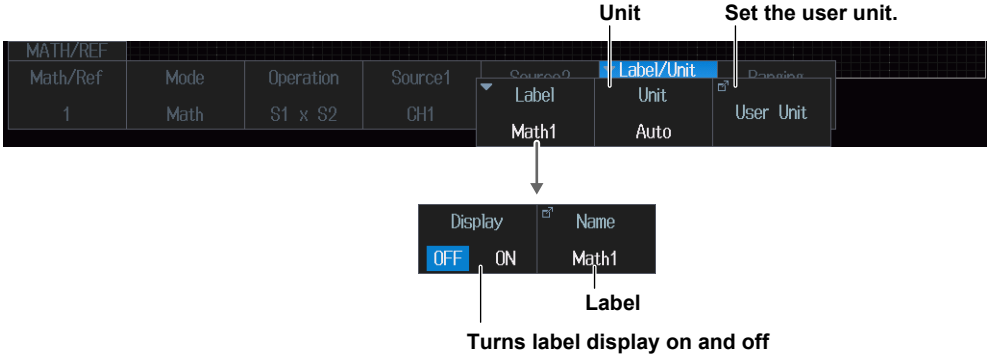
## MATH/REF Menu

1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four computed waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Math** soft key.
3. Press the **Operation** soft key and then the **User Define** soft key. The following menu items appear.




### Labels and Units (Label/Unit)

Press the **Label/Unit** soft key. The following menu items appear.




### Scaling (Ranging)

Auto: Automatically set the vertical display range of the computed waveform.

Manual: Manually set the sensitivity (Sensitivity) and the signal level at the vertical center (Center).

# 6.7 Loading Reference Waveforms

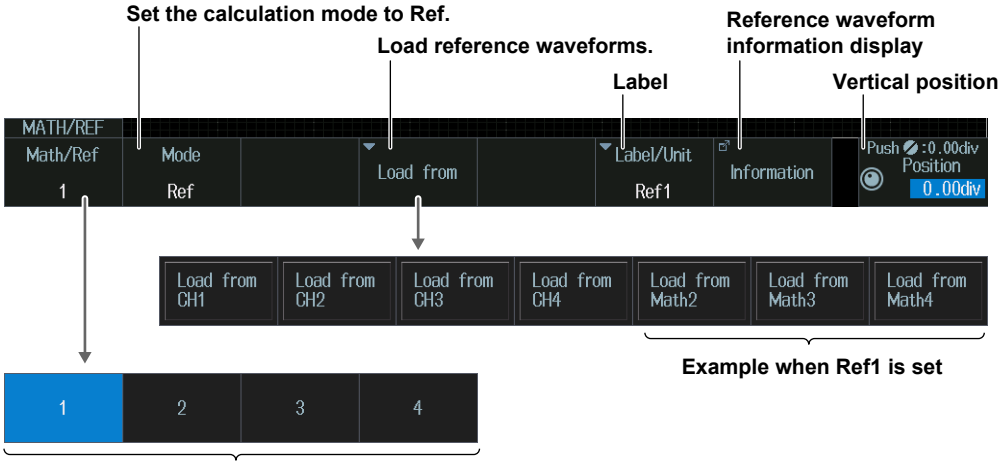
This section explains the following settings for loading reference waveforms:

- Loading reference waveforms
- Label
- Displaying the reference waveform information
- Vertical Position

► “Reference Waveforms” in the Features Guide

## MATH/REF Menu

1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four reference waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Ref** soft key. The following menu items appear.



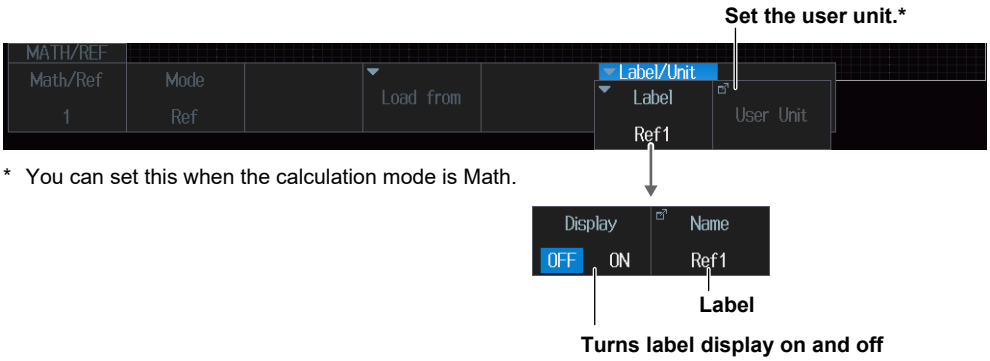

## Loading the Reference Waveform (Load from)

The waveforms that can be set for the reference waveform are as follows.

| Reference waveform | Load from |
|---|---|
| Ref1 (Math/Ref1) | CH1 to CH4, Math2, Math3, and Math4 |
| Ref2 (Math/Ref2) | CH1 to CH4, Math1, Math3, and Math4 |
| Ref3 (Math/Ref3) | CH1 to CH4, Math1, Math2, and Math4 |
| Ref4 (Math/Ref4) | CH1 to CH4, Math1, Math2, and Math3 |

## Labels (Label/Unit)

Press the **Label/Unit** soft key. The following menu items appear.

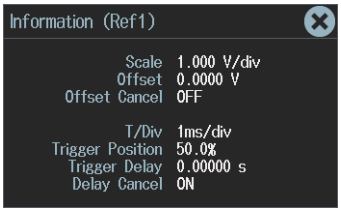



* You can set this when the calculation mode is Math.

## Reference Waveform Information Display (Information)

Press the **Information** soft key. Reference waveform information is displayed.

**Display Example**



# 6.8 Performing User-Defined Computations (Option)

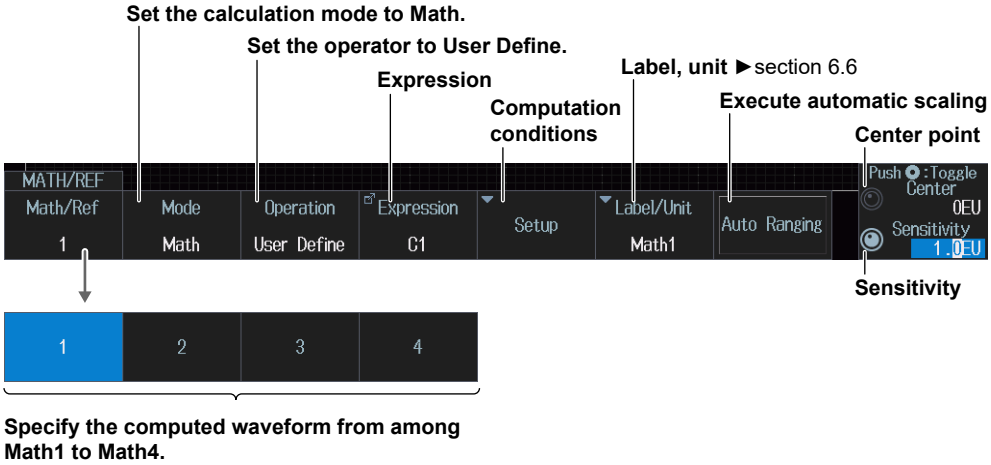
This section explains the following settings for performing user-defined computations:

- Operators
- Expression
- Computation conditions
- Labels and units
- Executing automatic scaling

► “User-Defined Computation (User Define)(Option)” in the Features Guide

## MATH/REF Menu

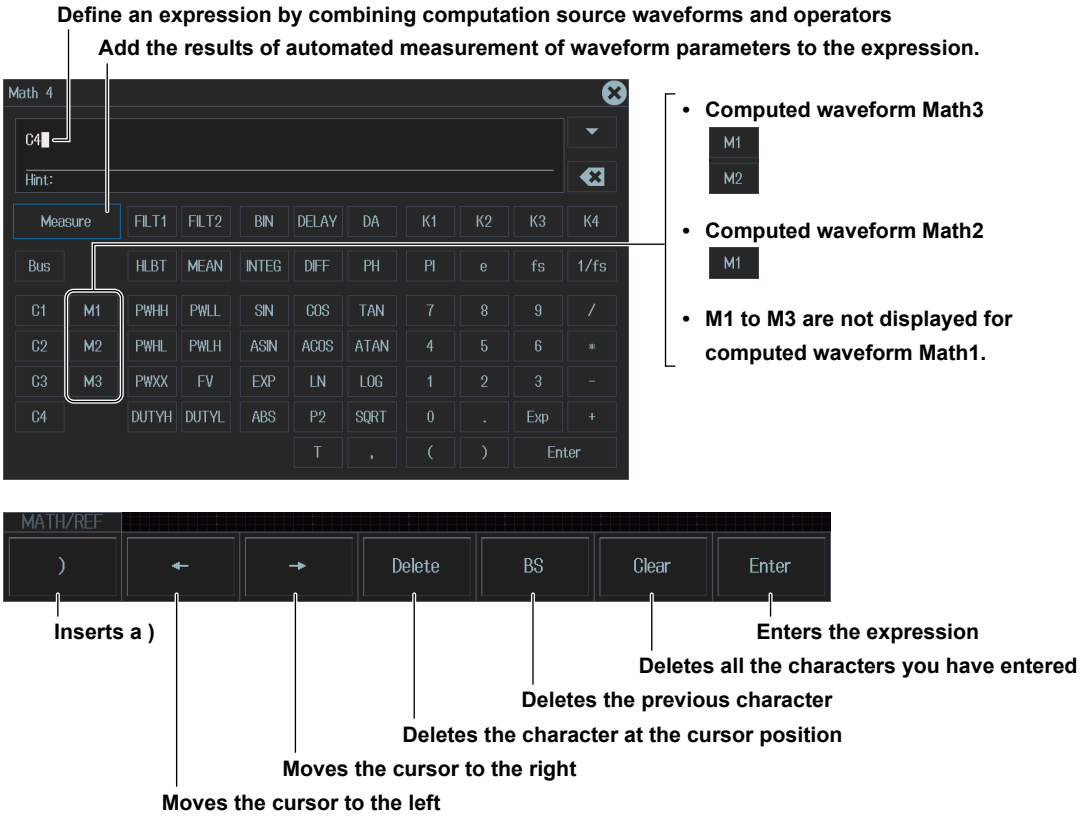
1. Press **MATH/REF**. The MATH/REF menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the MATH/REF menu from **ANALYSIS** on the top menu that is displayed.
   - Up to four computed waveforms can be displayed. To switch the setup menu, press the **Math/Ref** soft key.
2. Press the **Mode** soft key and then the **Math** soft key.
3. Press the **Operation** soft key and then the **User Define** soft key. The following menu items appear.



## Expression (Expression)

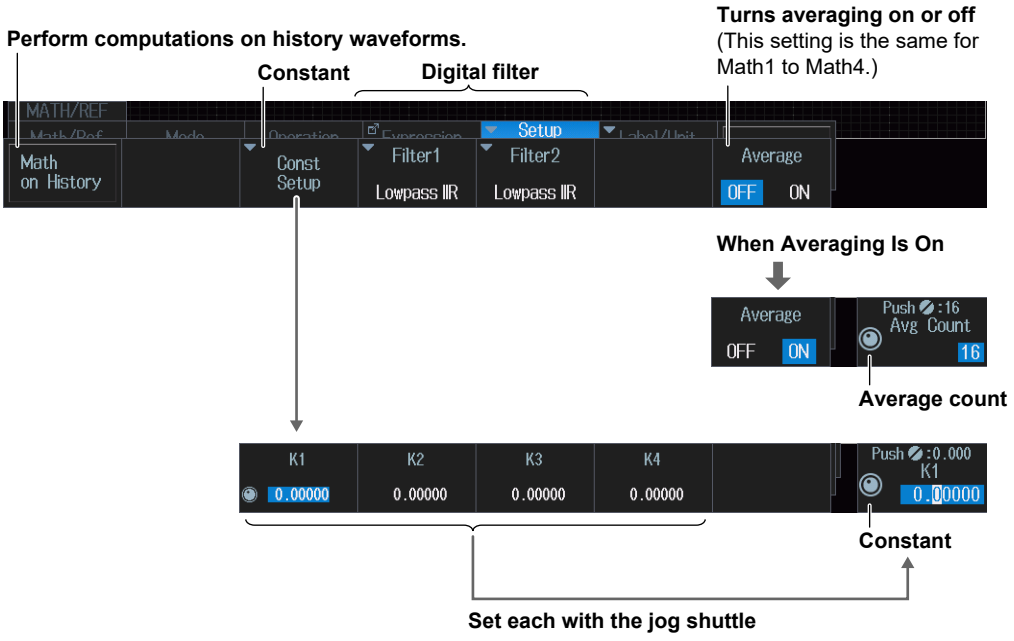
Press the **Expression** soft key. The following screen appears.

Example: Computed waveform Math4



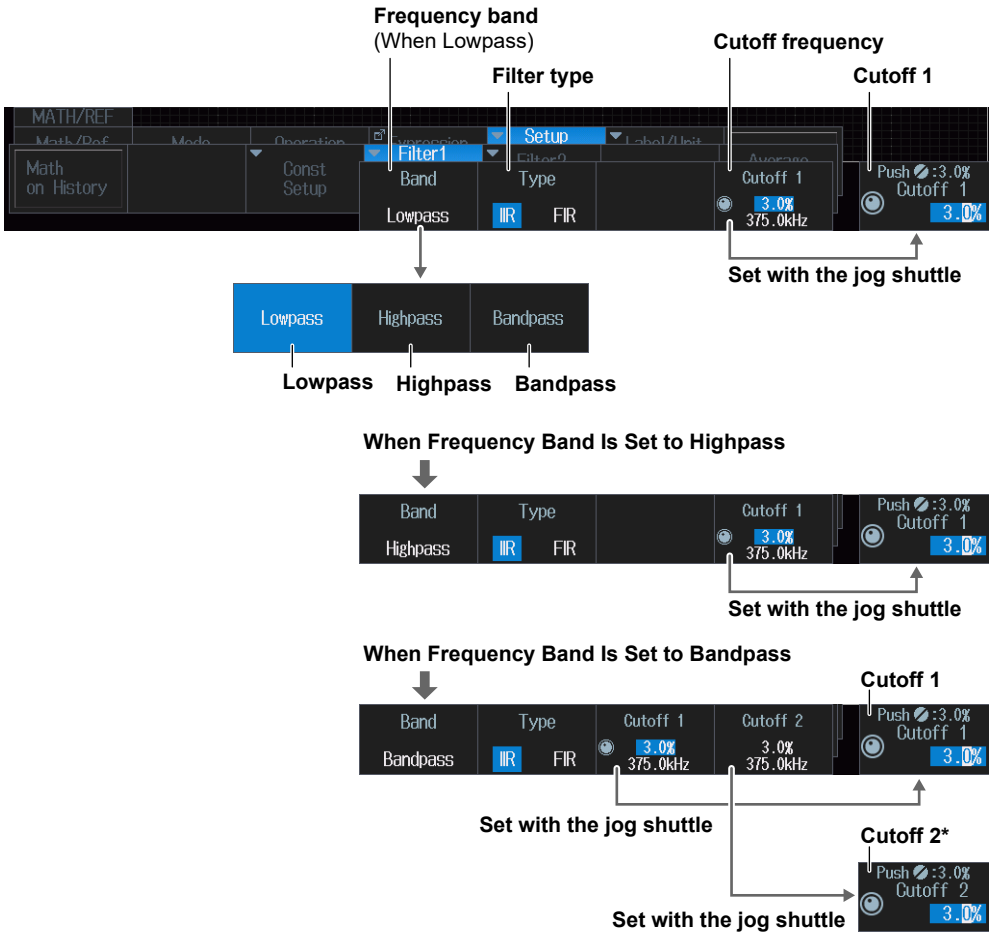

## Computation Conditions (Setup)

Press the **Setup** soft key. The following menu items appear.



## Digital filters(Filter1, Filter2)

Press the **Filter1** soft key and then the **Filter2** soft key. The following menu items appear.




* Cutoff2 is only applicable when the frequency band is set to Bandpass.

# 7.1 Displaying FFT Waveforms

This section explains the following settings for performing FFT analysis:

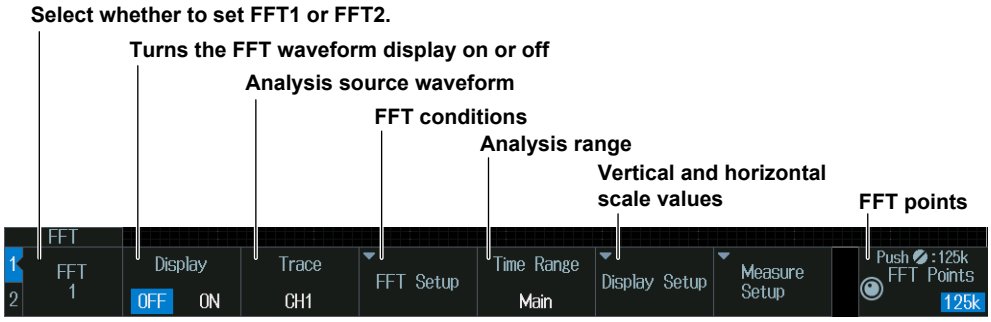
- Turning FFT waveform display on or off
- Analysis source waveform
- FFT conditions
- Analysis range
- Vertical and horizontal scale values
- FFT points

► "FFT" in the Features Guide

## FFT Menu

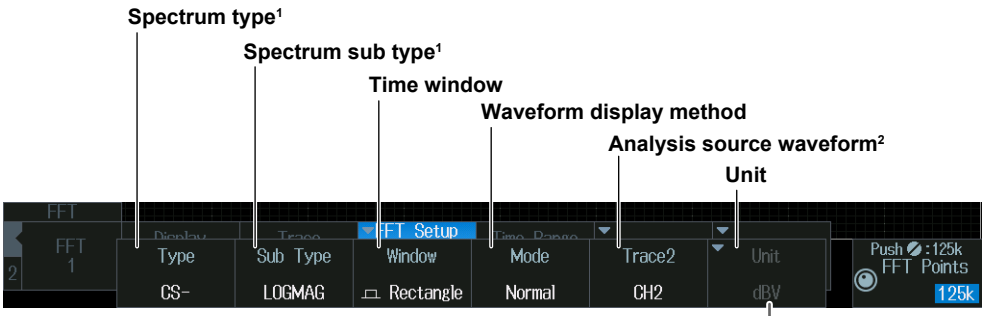
Press **SHIFT+MATH/REF** (FFT). The following menu items appear.

- You can also tap **MENU** (MENU) in the upper left of the screen and select the FFT menu from **ANALYSIS** on the top menu that is displayed.
- Up to two FFT waveforms can be displayed. To switch the setup menu, press the **FFT** soft key.

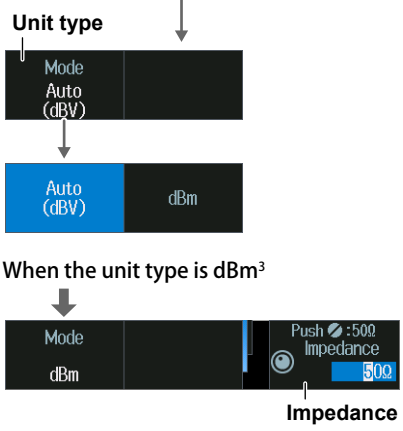



### FFT Conditions (FFT Setup)

Press the **FFT Setup** soft key. The following menu items appear.




1 This is available on models with the user-defined computation option.
2 Can only be set when Type is CS-, TF-, or CH-.
3 This is available only when Type is set to PS–, Sub Type is set to LOGMAG, and the unit of the analysis source waveform (Trace) is "V."



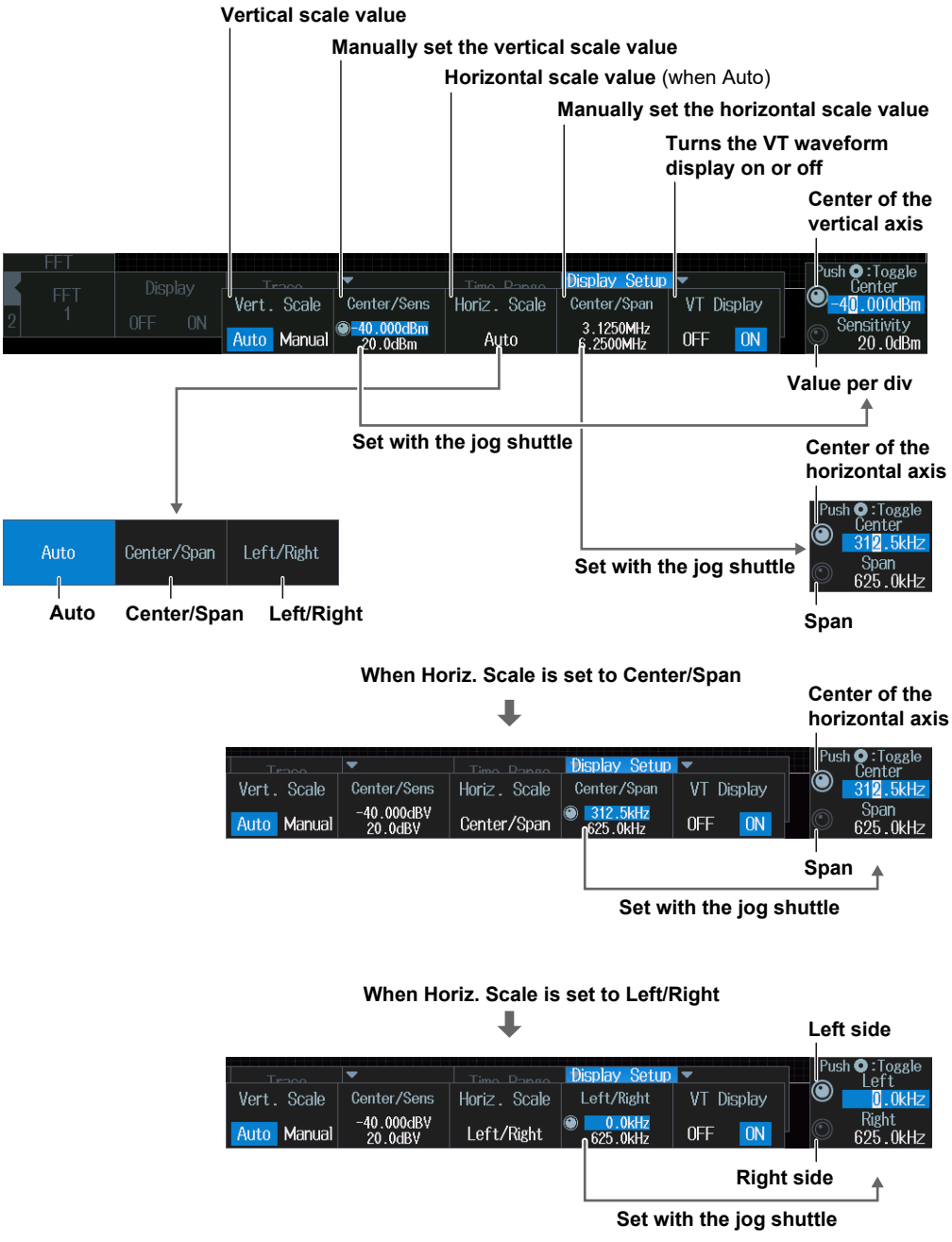
### Spectrum Type (Type/Sub Type)

Depending on the type, the following sub types can be set.

| Type | Sub Type |
|---|---|
| LS-, CS-, TF- | MAG, LOGMAG, PHASE, REAL, IMAG |
| RS-, PS-, SPD- | MAG, LOGMAG |
| CH- | MAG |

## Vertical and Horizontal Scale Values (Display Setup)

Press the **Display Setup** soft key. The following menu items appear.



# 7.2 Measuring FFT Waveforms

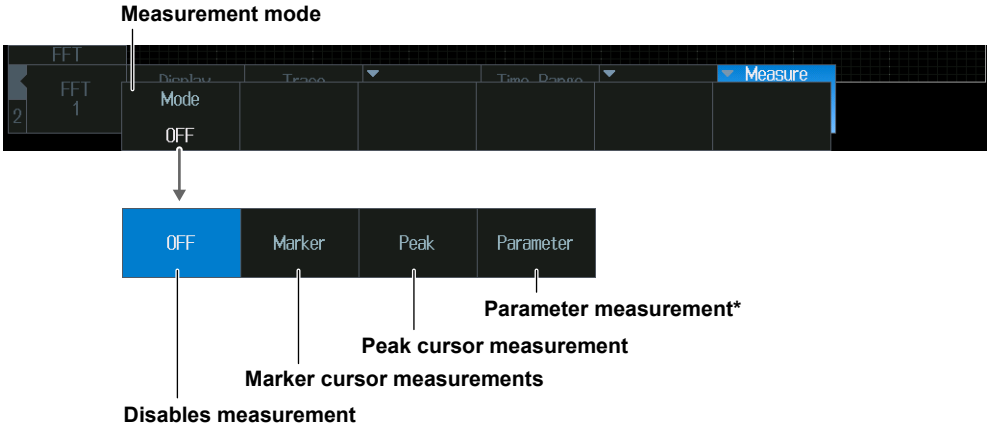
This section explains the following settings for measuring FFT waveforms:

- Measurement mode
- Marker cursor measurement
- Peak cursor measurement
- Parameter measurement

► “Measurement (Measure Setup)” in the Features Guide

## FFT Measure Setup Menu

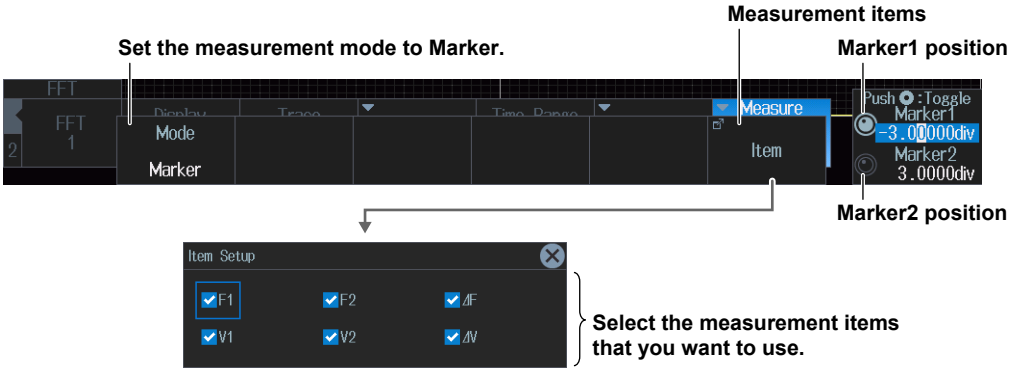
1. Press **SHIFT+MATH/REF** (FFT). The FFT menu item appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the FFT menu from **ANALYSIS** on the top menu that is displayed.
   - Up to two FFT waveforms can be displayed. To switch the setup menu, press the **FFT** soft key.
2. Press the **Measure Setup** soft key. The following menu items appear.




* Can only be set when the spectrum is set to PS-MAG, PS-LOGMAG, PSD-MAG, or PSD-LOGMAG.

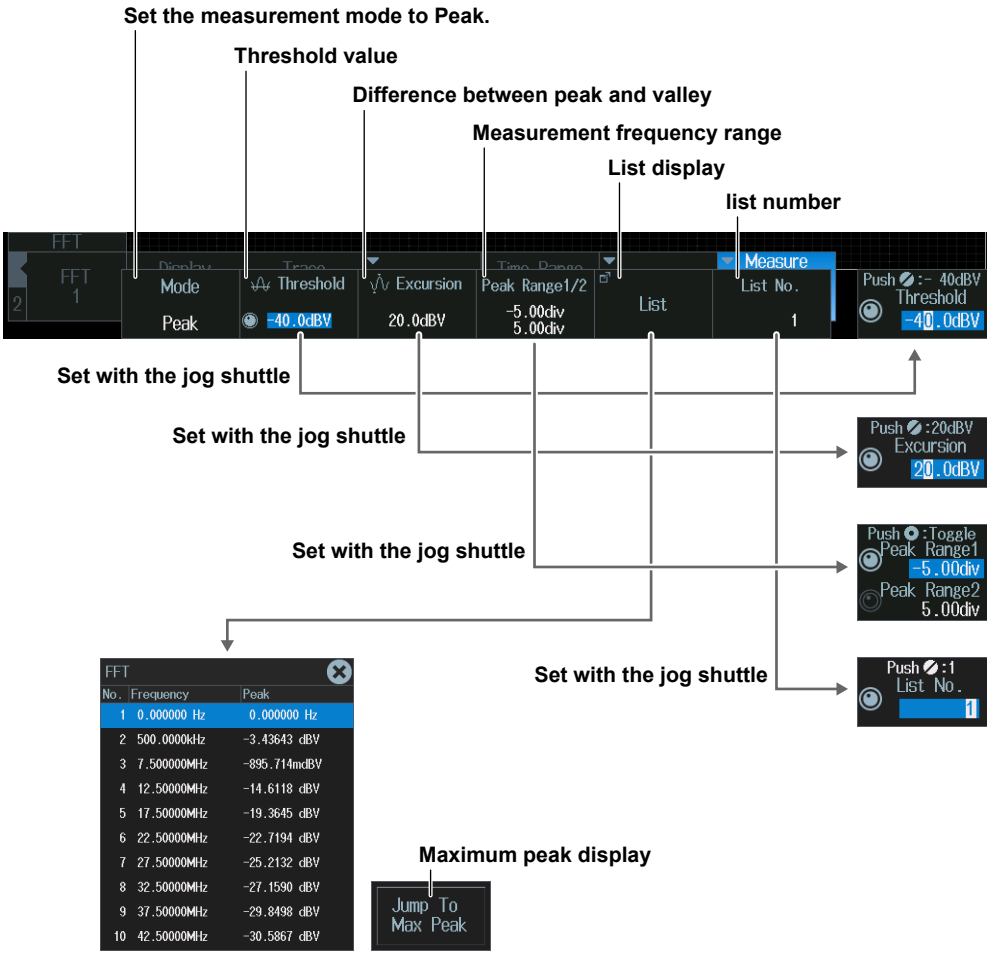
### Marker Cursor Measurement (Marker)

Press the **Mode** soft key and then the **Marker** soft key. The following menu items appear.



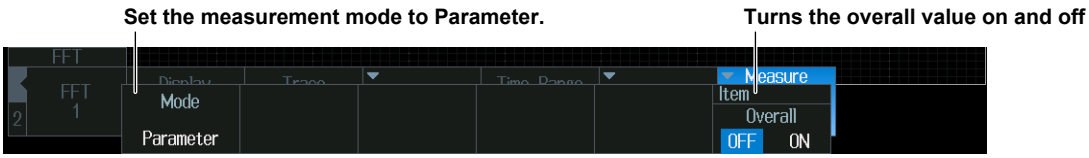
## Peak Cursor Measurement (Peak)

Press the **Mode** soft key and then the **Peak** soft key. The following menu items appear.




## Parameter Measurement (Parameter)

Press the **Mode** soft key and then the **Parameter** soft key. The following menu items appear.



# 8.1 Measuring with ΔT Cursors

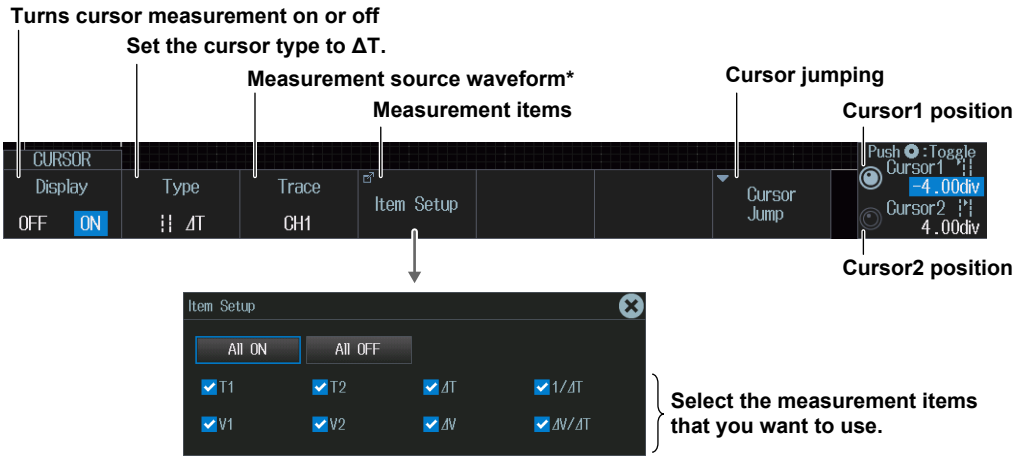
This section explains the following settings for measuring with ΔT cursors:

- Turning cursor measurement on or off
- Cursor type
- Source waveform
- Measurement items
- Cursor jumping
- Cursor position

►"ΔT Cursors (ΔT)" in the Features Guide

## CURSOR Menu

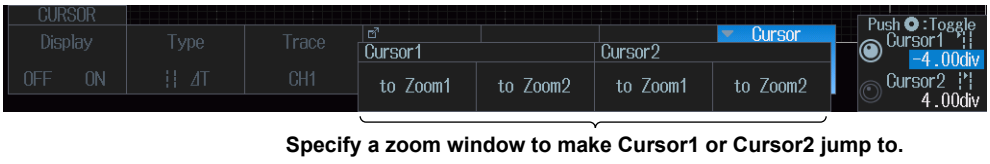
1. Press **CURSOR**. The CURSOR menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the CURSOR menu from **MEASURE** on the top menu that is displayed.
2. Press the **Type** soft key and then the **ΔT** soft key. The following menu items appear.




* CH4 or LOGIC, whichever the corresponding key is illuminated, can be selected. Specify the channel that you want to measure in advance by pressing either the CH4 key or the LOGIC key.

## Cursor Jumping (Cursor Jump)

Press the **Cursor Jump** soft key. The following menu items appear.




### *Note*

**Setting the Cursor Positions**

You can move Cursor1 and Cursor2 together by pressing SET repeatedly until the jog shuttle adjusts both of them.

When the cursors are linked, if either Cursor1 or Cursor2 moves to the edge of the screen, it cannot move any further. Therefore, if you execute cursor jump with the cursors linked, proper cursor jumping may not be achieved.

# 8.2 Measuring with ΔV cursors

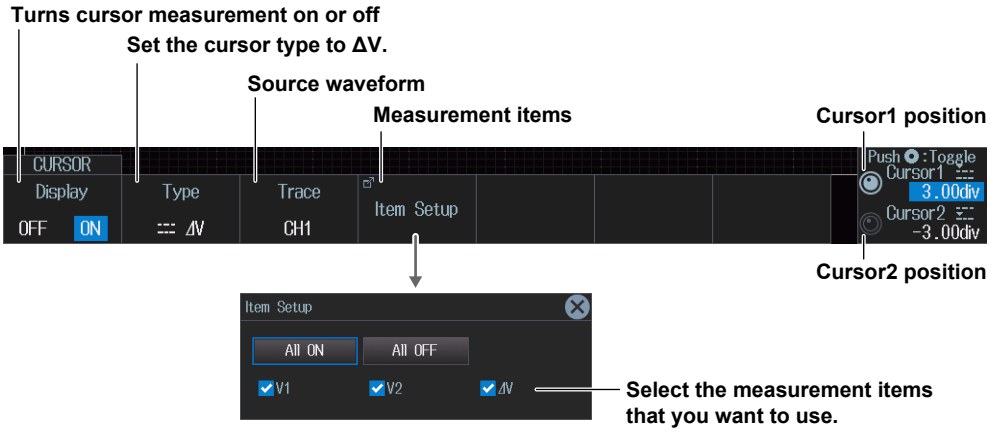
This section explains the following settings for measuring with ΔV cursors:

- Turning cursor measurement on or off
- Cursor type
- Source waveform
- Measurement items
- Cursor position

► "ΔV Cursors (ΔV)" in the Features Guide

## CURSOR Menu

1. Press **CURSOR**. The CURSOR menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the CURSOR menu from **MEASURE** on the top menu that is displayed.
2. Press the **Type** soft key and then the **ΔV** soft key. The following menu items appear.




### *Note*

**Setting the Cursor Positions**

You can move Cursor1 and Cursor2 together by pressing SET repeatedly until the jog shuttle adjusts both of them.

When the cursors are linked, if either Cursor1 or Cursor2 moves to the edge of the screen, it cannot move any further.

# 8.3 Measuring with ΔT and ΔV Cursors

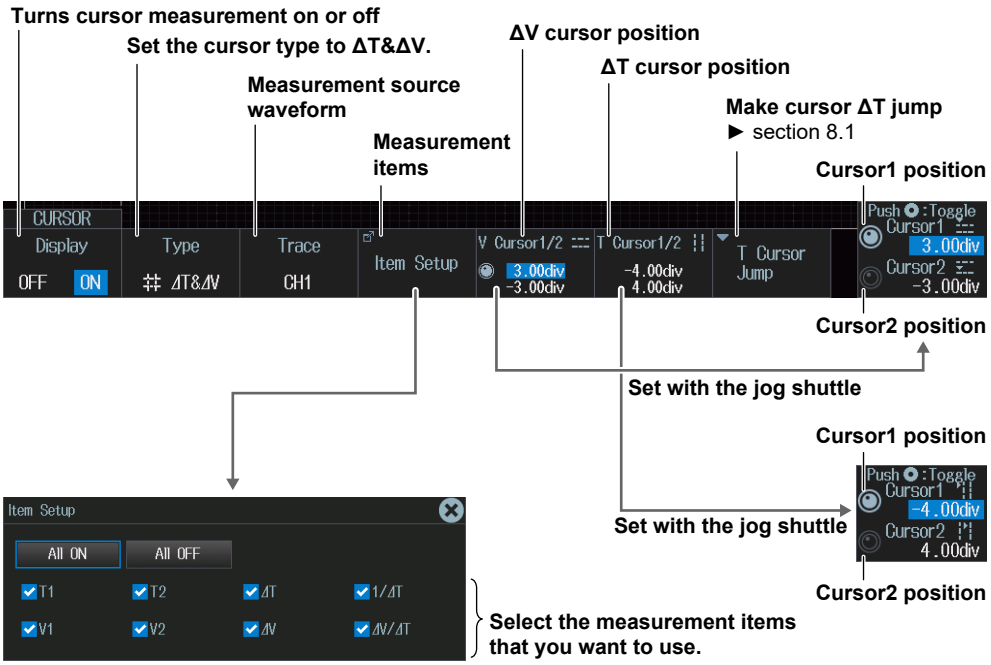
This section explains the following settings for measuring with ΔT and ΔV cursors:

- Turning cursor measurement on or off
- Cursor type
- Source waveform
- Measurement items
- Cursor position
- ΔT Cursor Jumping

► "ΔT&ΔV Cursors (ΔT&ΔV)" in the Features Guide

## CURSOR Menu

1. Press **CURSOR**. The CURSOR menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the CURSOR menu from **MEASURE** on the top menu that is displayed.
2. Press the **Type** soft key and then the **ΔT&ΔV** soft key. The following menu items appear.




### *Note*

**Setting the Cursor Positions**

You can move Cursor1 and Cursor2 together by pressing SET repeatedly until the jog shuttle adjusts both of them.

When the cursors are linked, if either Cursor1 or Cursor2 moves to the edge of the screen, it cannot move any further. Therefore, if you execute cursor jump with the cursors linked, proper ΔT cursor jumping may not be achieved.

# 8.4 Measuring with Marker Cursors (Marker)

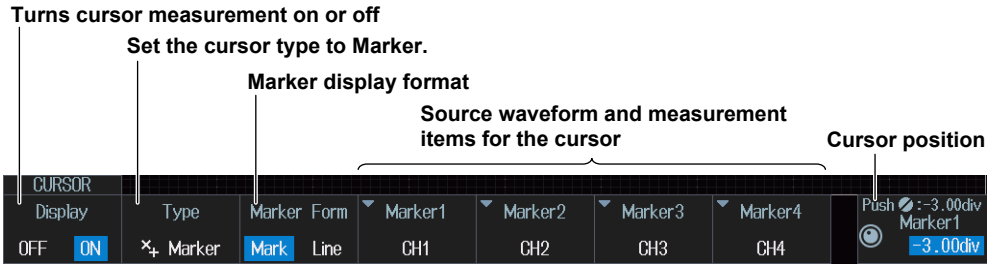
This section explains the following settings for measuring with marker cursors:

- Turning cursor measurement on or off
- Cursor type
- Marker display format
- The waveform to measure using the cursors
- Measurement items
- Cursor jumping
- Cursor position

► “Marker Cursors (Marker)” in the Features Guide

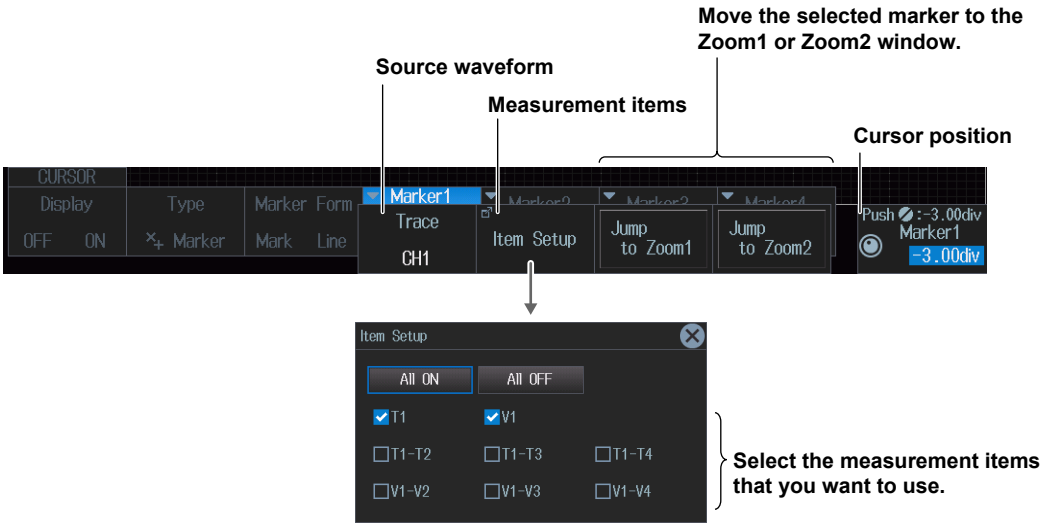
## CURSOR Menu

1. Press **CURSOR**. The CURSOR menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the CURSOR menu from **MEASURE** on the top menu that is displayed.
2. Press the **Type** soft key and then the **Marker** soft key. The following menu items appear.




### Cursor Source Waveform and Measurement Items (Marker1, Marker2, Marker3, and Marker4)

Press one of the **Marker1** to **Marker4** soft keys. The following menu items appear.



# 8.5 Measuring with Angle Cursors (Degree)

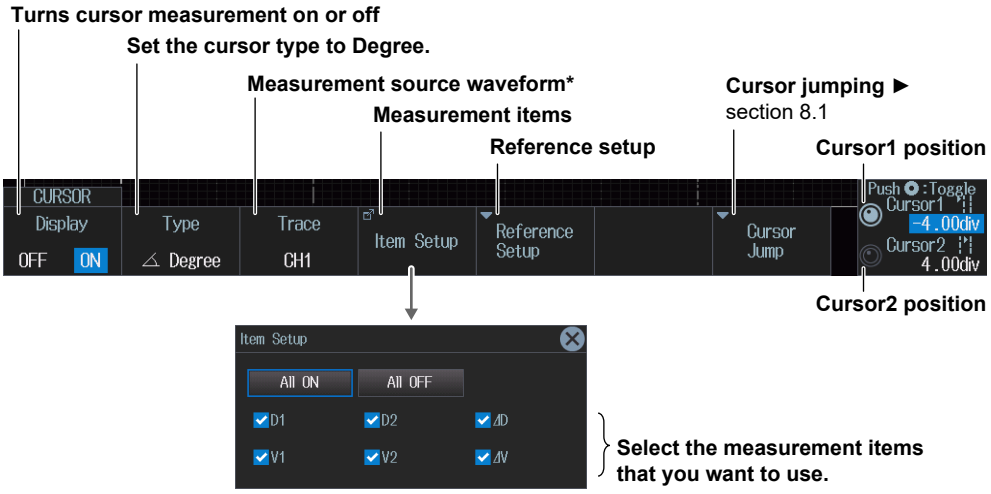
This section explains the following settings for measuring with angle cursors:

- Turning cursor measurement on or off
- Cursor type
- Source waveform
- Measurement items
- Reference setup
- Cursor jumping
- Cursor position

► “Angle Cursors (Degree)” in the Features Guide

## CURSOR Menu

1. Press **CURSOR**. The CURSOR menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the CURSOR menu from **MEASURE** on the top menu that is displayed.
2. Press the **Type** soft key and then the **Degree** soft key. The following menu items appear.




* CH4 or LOGIC, whichever the corresponding key is illuminated, can be selected. Specify the channel that you want to measure in advance by pressing either the CH4 key or the LOGIC key.

### *Note*

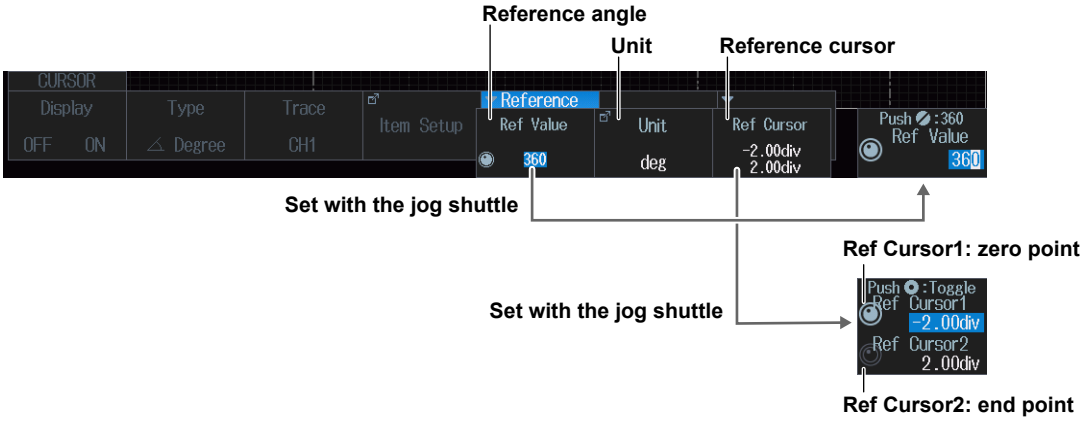
**Setting the Cursor Positions**

You can move Cursor1 and Cursor2 together by pressing SET repeatedly until the jog shuttle adjusts both of them.

When the cursors are linked, if either Cursor1 or Cursor2 moves to the edge of the screen, it cannot move any further. Therefore, if you execute cursor jump with the cursors linked, proper cursor jumping may not be achieved.

## Setting the Reference (Reference Setup)

Press the **Reference Setup** soft key. The following menu items appear.



# 9.1 Automatically Measuring Waveform Parameters

This section explains the following settings for automatically measuring waveform parameters:

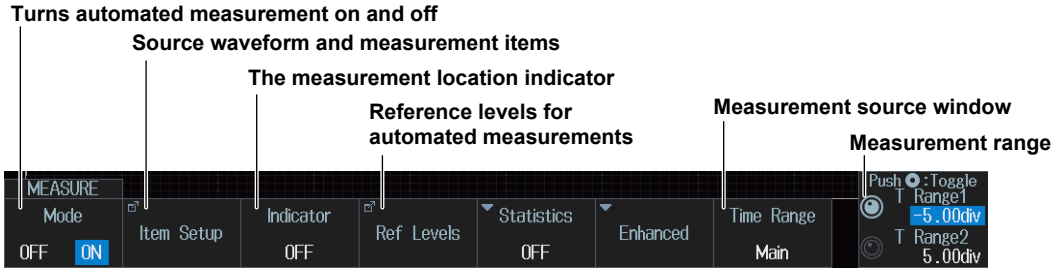
- Turning automated measurement on or off
- Measurement source waveform and measurement items
- Measurement location indicator
- Reference levels for automated measurements
- Measurement source window
- Measurement range

► "Automated Measurement of Waveform Parameters" in the Features Guide

## MEASURE Menu

Press **MEASURE**. The following menu items appear.

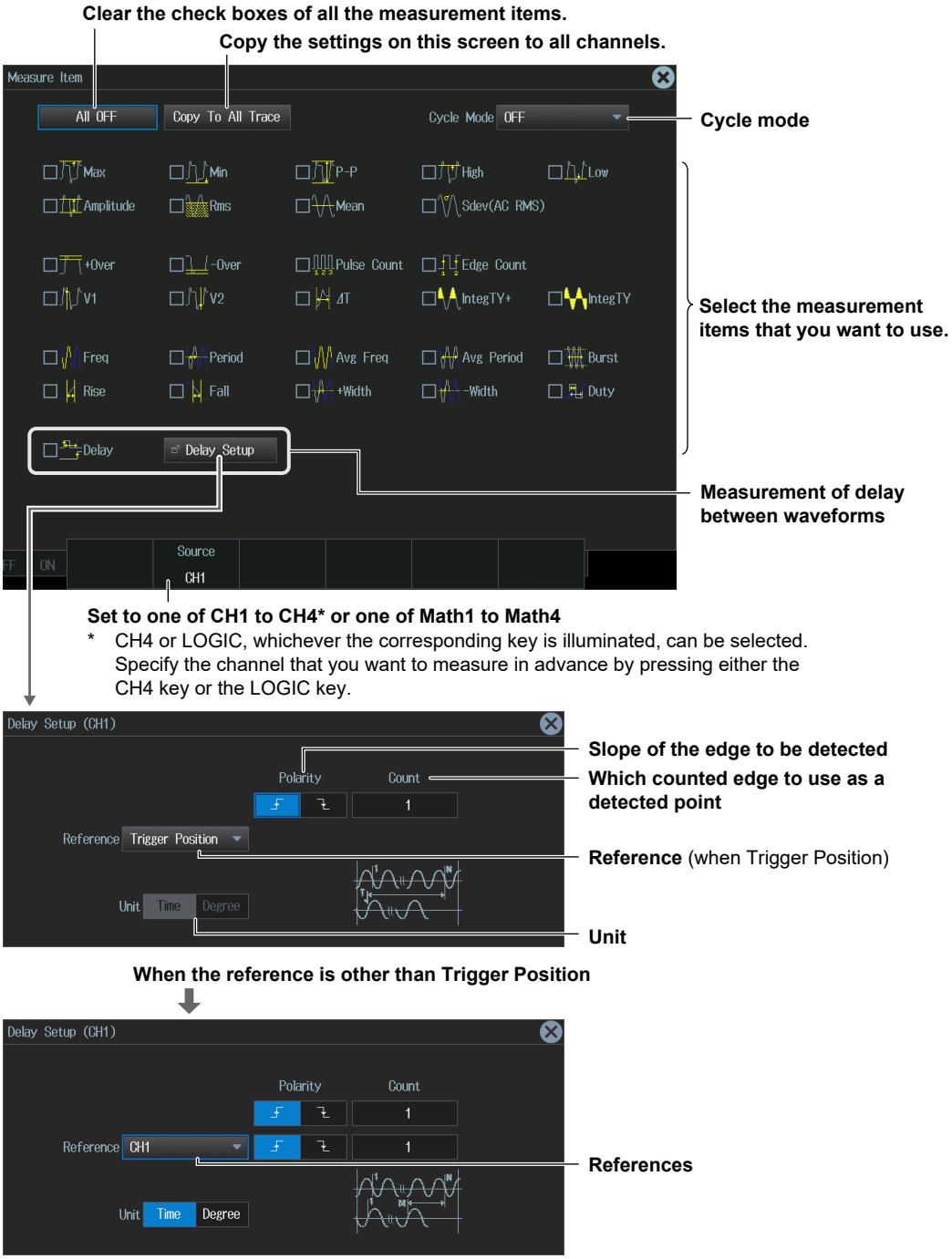
You can also tap **MENU** (MENU) in the upper left of the screen and select the MEASURE menu from **MEASURE** on the top menu that is displayed.




### Measurement Source Waveform and Measurement Items (Item Setup)

1. Press the **Item Setup** soft key.
2. Press the **Source** soft key. Select the source waveform from the setup menu that is displayed. A menu appears according to the waveform to be measured you specified.

## When the Measurement Source Waveform Is CH1 to CH4 or Math1 to Math4




## *Note*

**About Cycle Mode**

- When the power analysis type is switching loss, the cycle mode waveform parameter is fixed to SW Loss.
- When power measurement is ON, the cycle mode waveform parameter changes according to the setting of the cycle mode of power measurement.

## When the Source Waveform Is LOGIC (On models with the logic signal input port)

**Clear the check boxes of all the measurement items.**




**Select the measurement items that you want to use.**

**Measurement of delay between waveforms**

**Set the measurement source waveform to LOGIC.***

* CH4 or LOGIC, whichever the corresponding key is illuminated, can be selected. Specify the channel that you want to measure in advance by pressing either the CH4 key or the LOGIC key.



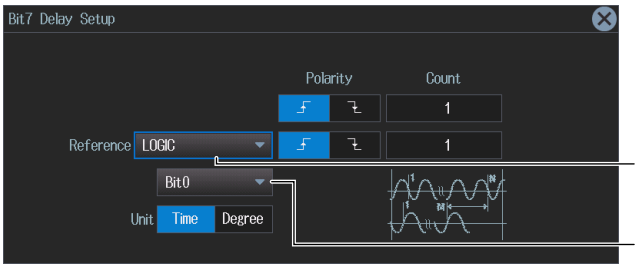

**Slope of the edge to be detected**

**Which counted edge to use as a detected point**

**Reference** (when Trigger Position)

**Unit**

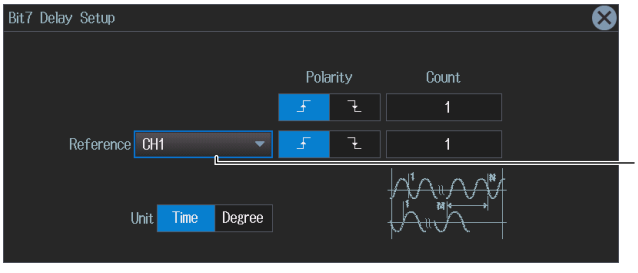
**When Reference is set to LOGIC**




**References**

**Source bit**

**When the reference is other than Trigger Position/LOGIC**




**References**

## Measurement Location Indicator (Indicator)

1. Press the **Indicator** soft key.

   You can set Indicator to OFF (the measurement location indicator is not displayed) or display a setup menu with the items whose check boxes you have selected in "Measurement Source Waveform and Measurement Items (Item Setup)."*

   * The measurement locations of the following items can be indicated.
     Max, Min, P-P, High, Low, Amplitude, Rms, Mean, Sdev(AC RMS), +Over, –Over, V1, V2, IntegTY+, IntegTY, Freq, Period, Avg Freq, Avg Period, Burst, Rise, Fall, +Width, –Width, Duty, Delay

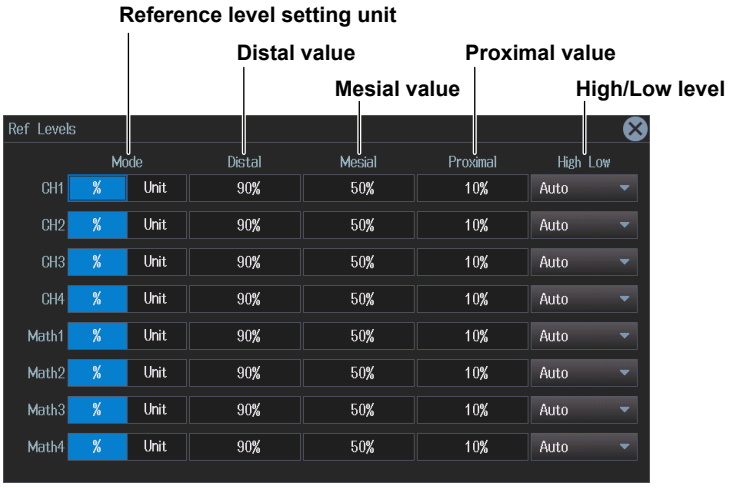
2. Use the **jog shuttle** or the **SET** key to select the item whose measurement location you want to indicate.

3. Press **SET** to confirm.

   The measurement location of the item you specify is indicated by a cursor.

## Reference Levels for Auto Measurements (Ref Levels)

Press the **Ref Levels** soft key. The following menu items appear.




## Source Window (Time Range)

Main : Set the measurement source window to the Main window.

Zoom1 : Set the measurement source window to the Zoom1 window.

Zoom2 : Set the measurement source window to the Zoom2 window.

## Measurement Range (T Range1/T Range2)

Set the measurement time period within the window specified by Time Range.

## *Note*

**About the roll-mode display**

- The instrument will not display computed waveforms (MATH waveforms) that have been generated through user-defined computation while it is acquiring waveforms in roll mode. The instrument will display the computed waveforms after it stops acquiring waveforms.
- If normal statistical processing (Continuous), serial bus analysis, waveform histogram display, or harmonic analysis is being executed, automatically measured parameter values are not displayed when waveforms are being acquired in roll mode. Measured values are shown when a trigger occurs and the roll mode display stops.
- If the record length is set such that waveform acquisition operates in single mode,* neither computed waveforms (MATH waveforms) nor automated measurement values of waveform parameters are shown while waveform acquisition in roll mode is in progress. The instrument will display the computed waveforms and automated measurement values after it stops acquiring waveforms.

  * The record length that causes waveform acquisition to operate in single mode varies depending on whether a memory expansion option (/M1, /M2, /M3) is available. For details, see chapter 6, “Waveform Acquisition,” in the Features Guide (IM DLM3054HD-01EN).

# 9.2 Processing Statistics on Automatically Measured Values

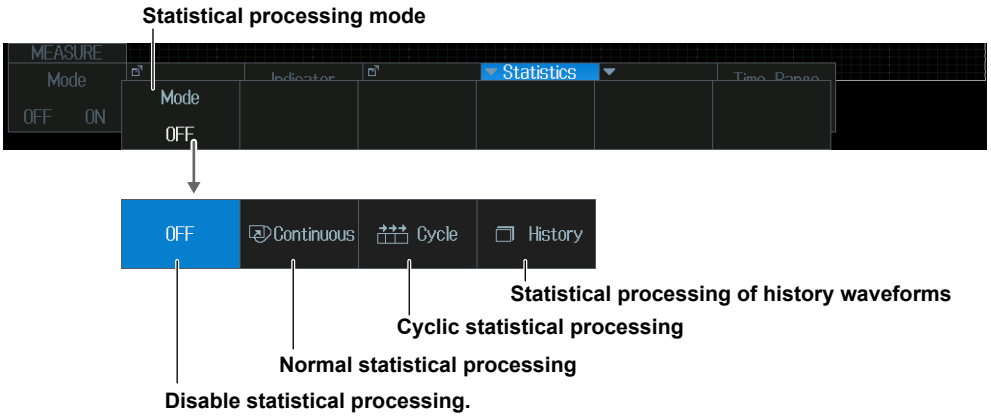
This section explains the following settings for processing statistics on automatically measured waveform parameters:

- Statistical processing mode
- Normal statistical processing
- Cyclic statistical processing
- Statistical processing of history waveforms

► "Statistics (Statistics)" in the Features Guide

## MEASURE Statistics Menu

1. Press **MEASURE**. The MEASURE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the MEASURE menu from **MEASURE** on the top menu that is displayed.
2. Press the **Statistics** soft key. The following menu items appear.

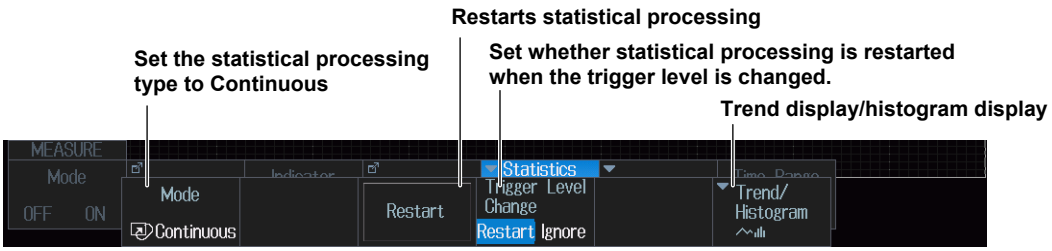



### Note

If you change the statistical processing type (Statistics), the statistical processing type (Statistics) of Measure Setup for power measurement (Power Measurement menu) also changes in sync.

### Normal Statistical Processing (Continuous)

Press the **Mode** soft key and then the **Continuous** soft key. The following menu items appear.



**Set whether statistical processing is restarted when the trigger level is changed. (Trigger Level Change)**

Restart: If the trigger level is changed during waveform acquisition, the statistical processing performed up to that point is discarded, the waveform Count is set to 1, and statistical processing restarts.

Ignore: If the trigger level is changed during waveform acquisition, waveform acquisition and statistical processing continue without statistical processing being reset.

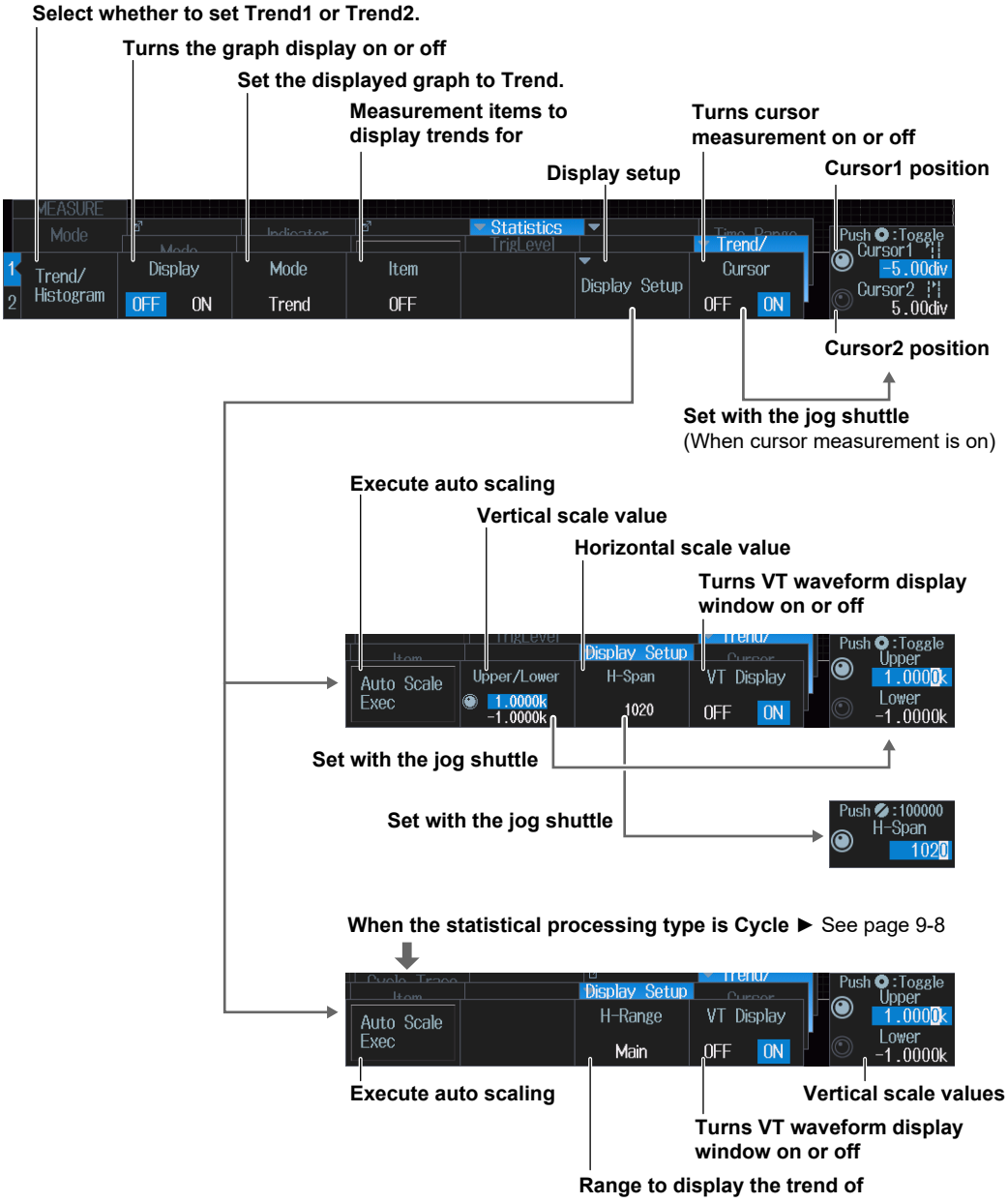
### Setting the Trend Display and the Histogram Display (Trend/Histogram)

Press the **Trend/Histogram** soft key.

- **Trend display**

  Press the **Mode** soft key and then the **Trend** soft key. The following menu items appear.

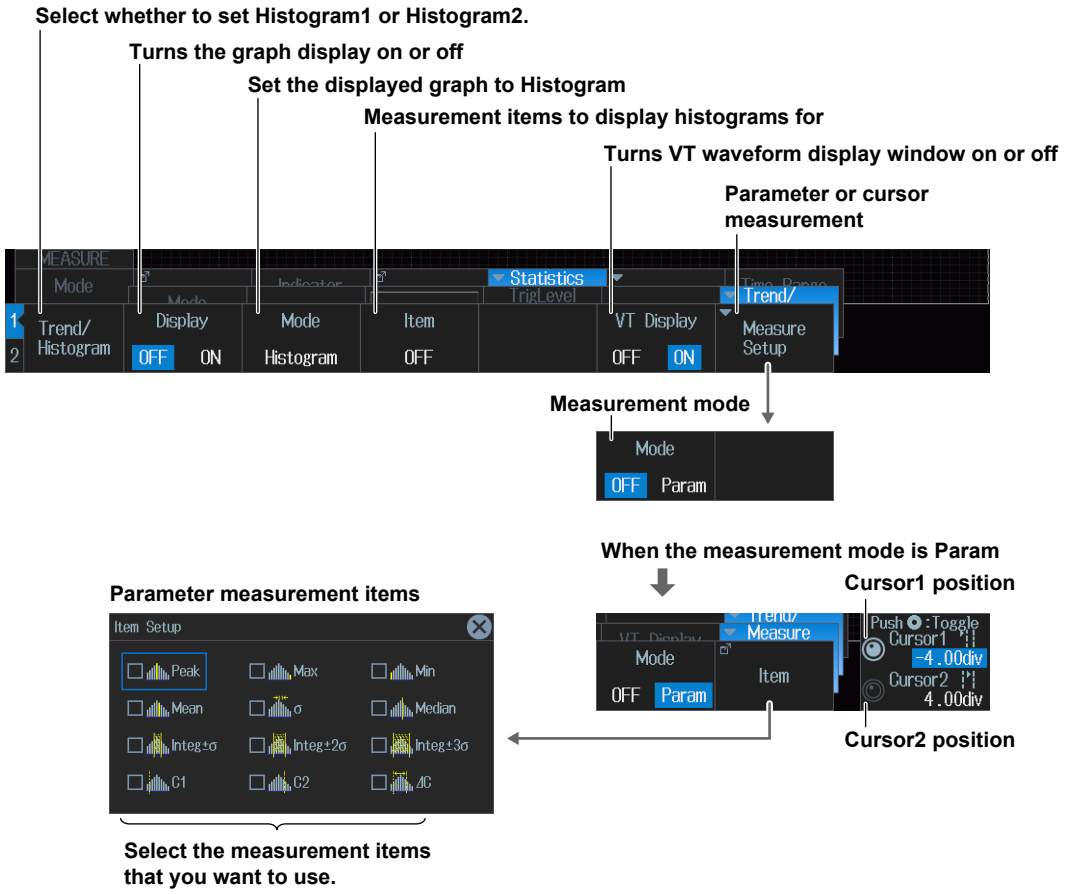
  Up to two trends can be displayed. To switch the setup menu, press the **Trend/Histogram** soft key.



- **Histogram display**

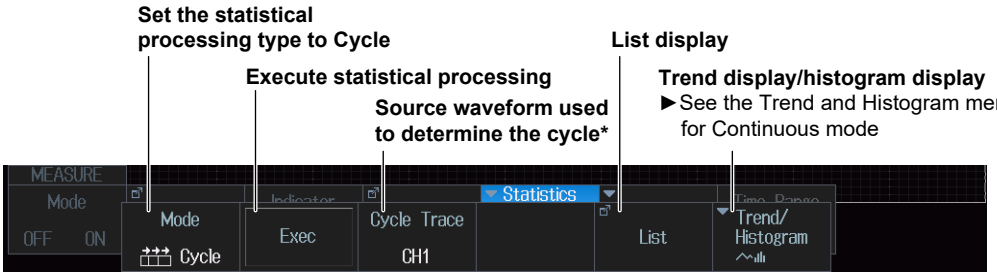
  Press the **Mode** soft key and then the **Histogram** soft key. The following menu items appear.

  Up to two histograms can be displayed. To switch the setup menu, press the **Trend/Histogram** soft key.

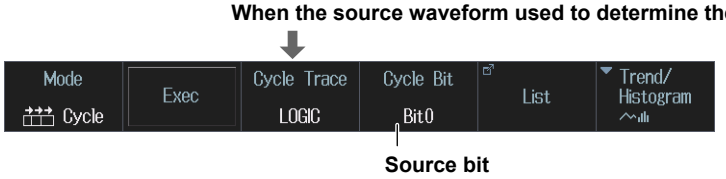



## Cyclic Statistical Processing (Cycle)

Press the **Mode** soft key and then the **Cycle** soft key. The following menu items appear.

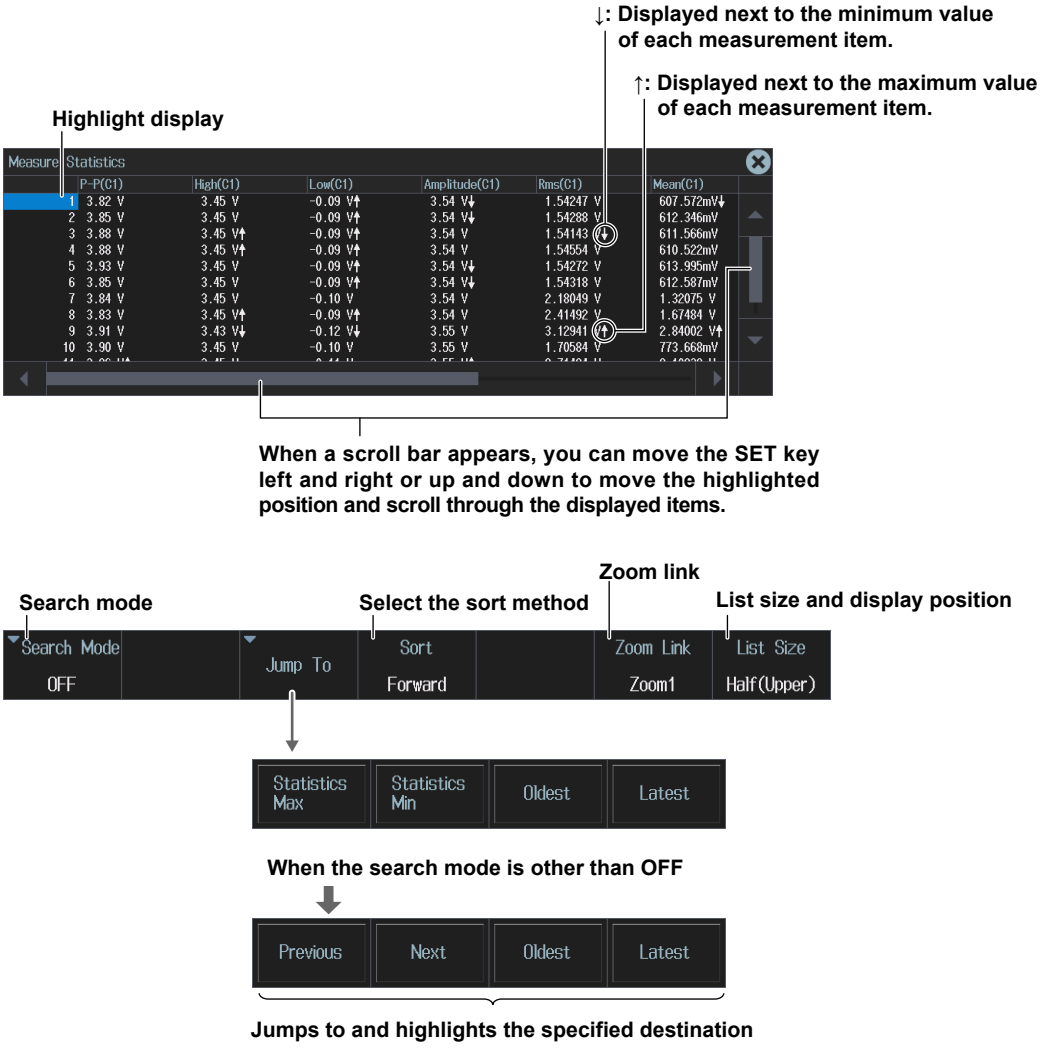



* CH4 or LOGIC, whichever the corresponding key is illuminated, can be selected.
Specify the channel that you want to measure in advance by pressing either the CH4 key or the LOGIC key.



### List Display (List)

Press the **List** soft key. The following menu items appear.

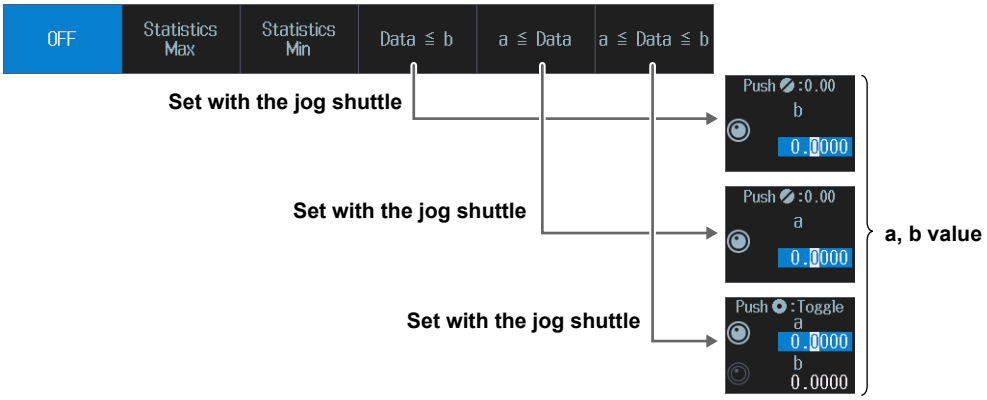



## *Note*

If you move the highlight display for the measured values up and down, you will zoom in to the corresponding position of the waveform.

- **Search Mode (Search Mode)**

***1.*** Press the **Search Mode** soft key. The following menu items appear.
If you select "Data ≤ b", "a ≤ Data" or "a ≤ Data ≤ b", set the value of a or b with the jog shuttle.




***2.*** Select the search item, and then press **ESC**. The List display menu is returned to.

**When the search mode is Data ≤ b**




Display of b value

**When the search mode is a ≤ Data**




Display of a value

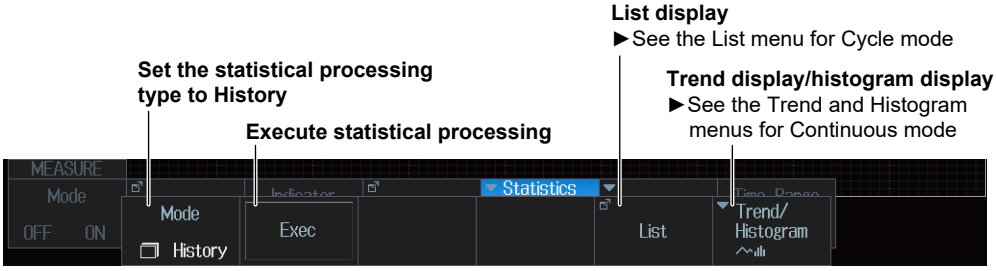
**When the search mode is a ≤ Data ≤ b**




Display of a/b value

## Statistical Processing of History Waveforms (History)

Press the **Mode** soft key and then the **History** soft key. The following menu items appear.



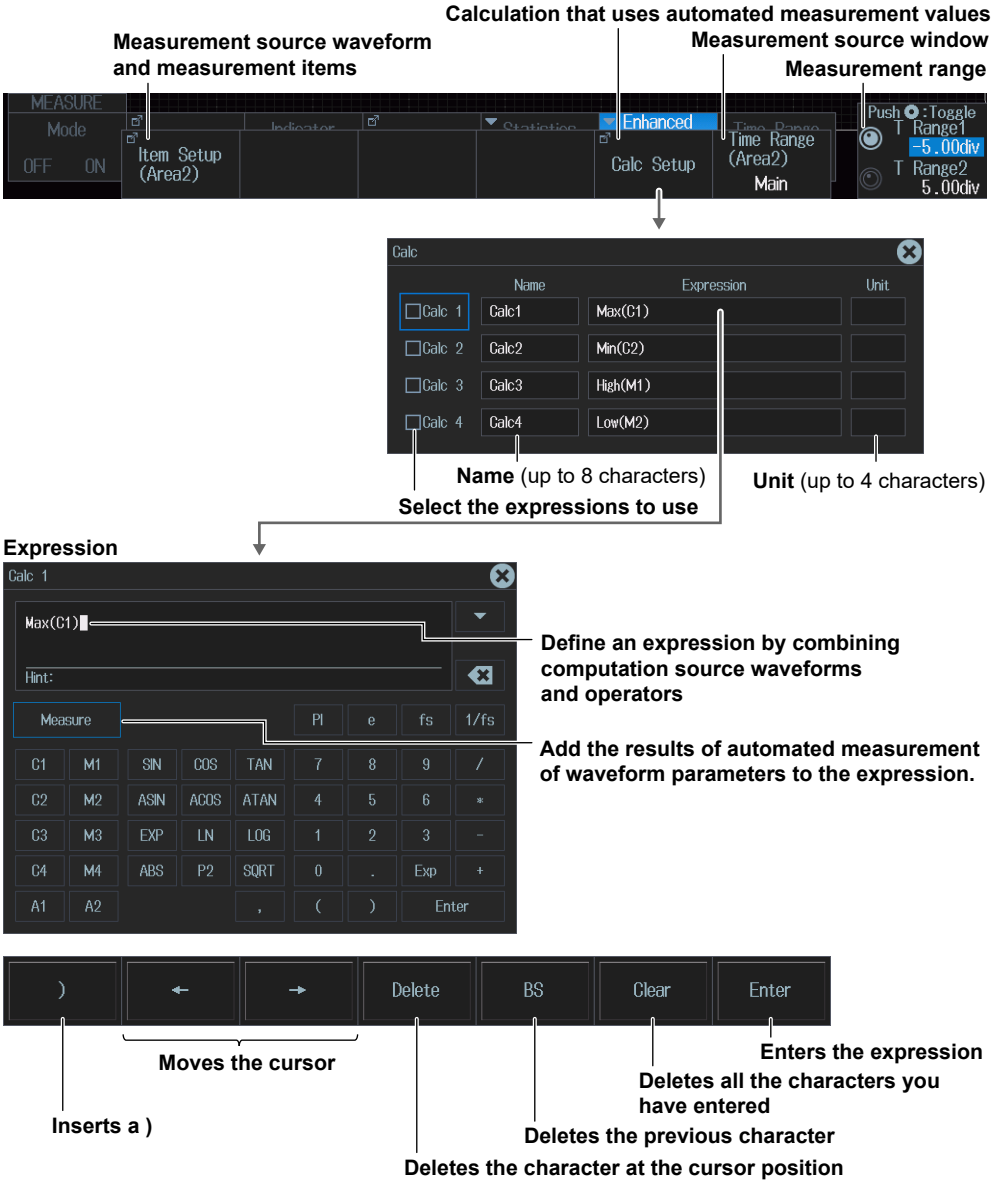
# 9.3 Measuring Enhanced Parameters

This section explains the settings used when performing automated measurement of the waveform parameters of two areas and the settings used when performing calculations using waveform parameters.

► “Enhanced Parameter Measurement (Enhanced)” in the Features Guide

## MEASURE Enhanced Menu

1. Press **MEASURE**. The MEASURE menu appears.
   You can also tap **MENU** ( ) in the upper left of the screen and select the MEASURE menu from **MEASURE** on the top menu that is displayed.
2. Press the **Enhanced** soft key. The following menu items appear.



## Measurement Source Waveform and Measurement Items (Item Setup (Area2))

Press the **Item Setup (Area2)** soft key. The screen for setting the source waveform of Area2 and the measurement items are displayed.

The screen is the same as the Item Setup screen shown in section 9.1.

# 10.1 Zooming in or out of waveforms

This section explains the following settings for zooming in on or out of waveforms:

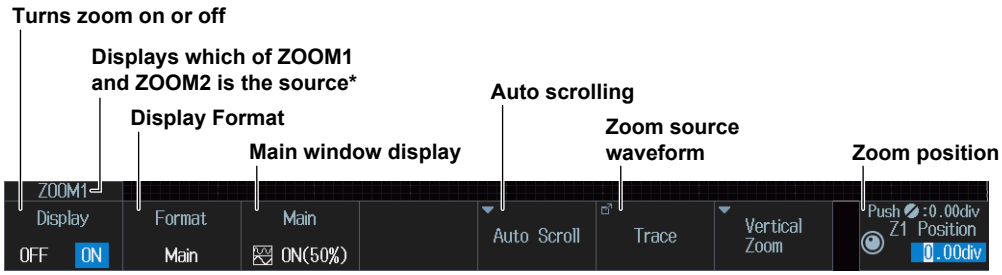
- Turning zoom on or off
- Display format
- Main window display
- Auto scrolling
- Zoom source waveform
- Zoom position
- Zoom factor

► "Zooming in on Waveforms" in the Features Guide

## ZOOM Menu

Press **ZOOM1** or **ZOOM2**. The following menu items appear.

- You can also tap **MENU** (MENU) in the upper left of the screen and select the ZOOM1 menu or the ZOOM2 menu from **ZOOM** on the top menu that is displayed.
- The zoomed waveform of up to two locations can be displayed. To switch the setting menu, press **ZOOM1** or **ZOOM2**.




* When both ZOOM1 and ZOOM2 illuminate, the key that illuminates most brightly corresponds to the setting menu item.

**When both ZOOM1 and ZOOM2 illuminate**



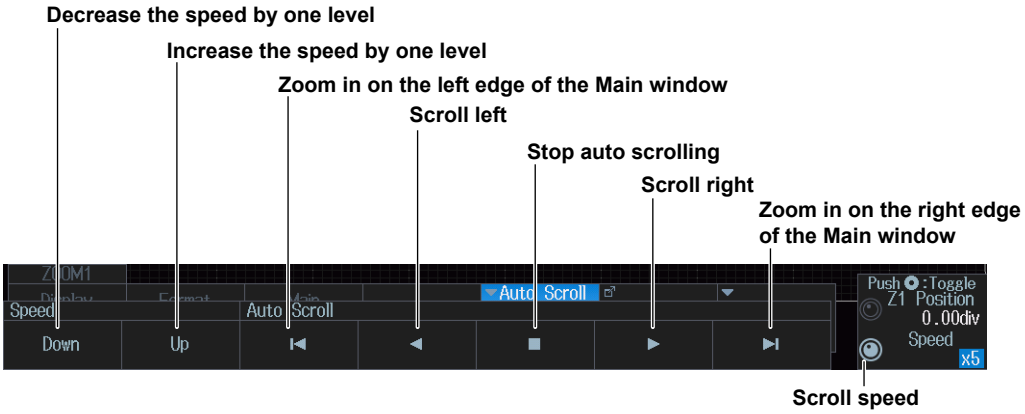

### *Note*

**Setting the Zoom Position**

When both ZOOM1 and ZOOM2 illuminate, you can move the zoom positions of ZOOM1 and ZOOM2 in a linked manner by pressing SET a number of times to make the jog shuttle control both the Z1 Position and the Z2 Position.

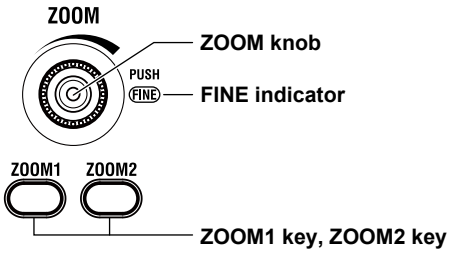
## Auto Scrolling (Auto Scroll)

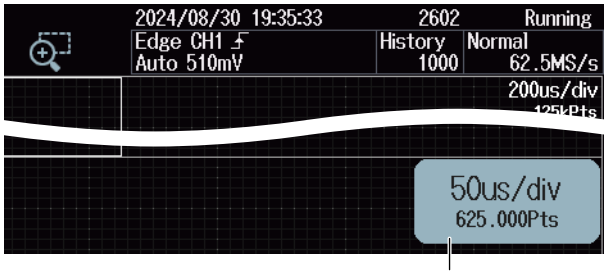
Press the **Auto Scroll** soft key. The following menu items appear.




## Setting the Zoom Factor (ZOOM knob)

1. Press **ZOOM1** or **ZOOM2** to select what the ZOOM knob controls.
   When both the Zoom1 and Zoom2 windows are displayed, the waveform of the window of whichever is illuminated brightest of ZOOM1 and ZOOM2 is controlled by the ZOOM knob.
2. Use the **ZOOM** knob to set the magnification.
   - If you press the ZOOM knob, the FINE indicator illuminates, and you can set the zoom factor with higher resolution.
   - To adjust the zoom position, turn the jog shuttle.




**While you control the knob, the zoom value and display record length are displayed in the upper right of the zoom window. The display disappears after a few seconds when you stop controlling the knob.**

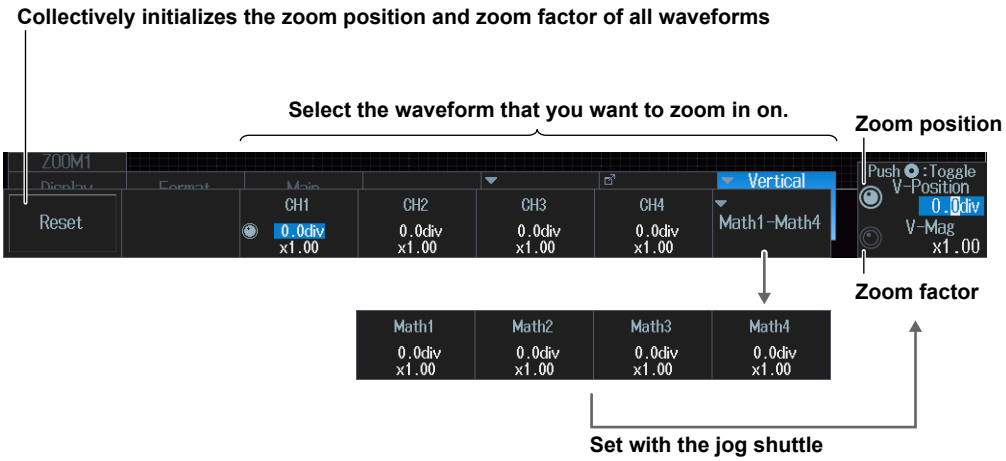
# 10.2 Zooming in or out of Waveforms in the Vertical Direction

This section explains the following settings for zooming in or out of waveforms in the vertical direction:

► **"Vertical Zoom (Vertical Zoom)" in the Features Guide**

## ZOOM Vertical Zoom menu

1. Press **ZOOM1** or **ZOOM2**. The ZOOM menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ZOOM1 menu or the ZOOM2 menu from **ZOOM** on the top menu that is displayed.
2. Press the **Vertical Zoom** soft key. The following menu items appear.




### *Note*

- You can initialize the zoom position and zoom factor of the target waveform by pressing RESET on the front panel.
- You can initialize the zoom position and zoom factor of all waveforms by pressing the Reset soft key.

# 11.1 Basic Waveform Search Operation

This section explains the following settings for searching waveforms: For details on the different search types (edge, pattern, pulse width, timeout period), see sections 11.2 to 11.5.

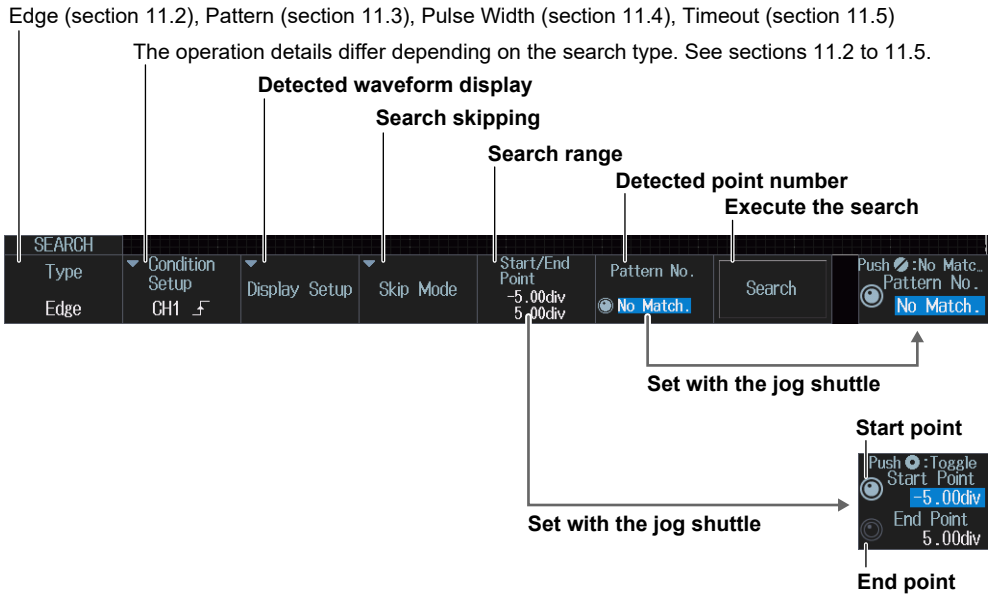
- Search range
- Search skipping
- Displaying detected waveforms
- Detected waveform display
- Executing searches

► **"Search Range (Start/End Point)," "Displaying Detected Waveforms (Display Setup)," "Search Skip (Skip Mode)," "Executing a Search (Search)," "Detected Point number (Pattern No.)," "Zooming in on Waveforms" in the Features Guide**

## SEARCH Menu

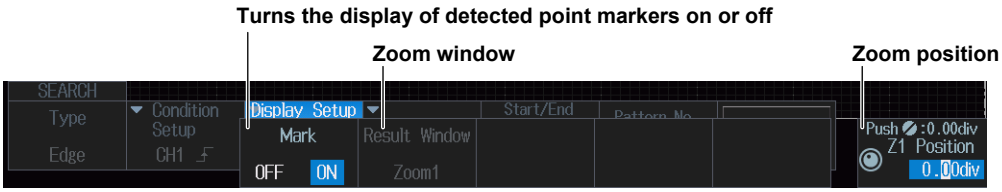
Press **SEARCH** to display the following menu.

You can also tap **MENU** (MENU) in the upper left of the screen and select the SEARCH menu from **ANALYSIS** on the top menu that is displayed.



## Detected Waveform Display (Display Setup)

Press the **Display Setup** soft key. The following menu items appear.




### Turning the Display of Detected Point Markers ON or OFF(Mark)

You can display marks at the top of the main and zoom windows to clearly show the detected position on the waveform (the detected point mark). Marks that match detected point numbers are highlighted.

### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed.

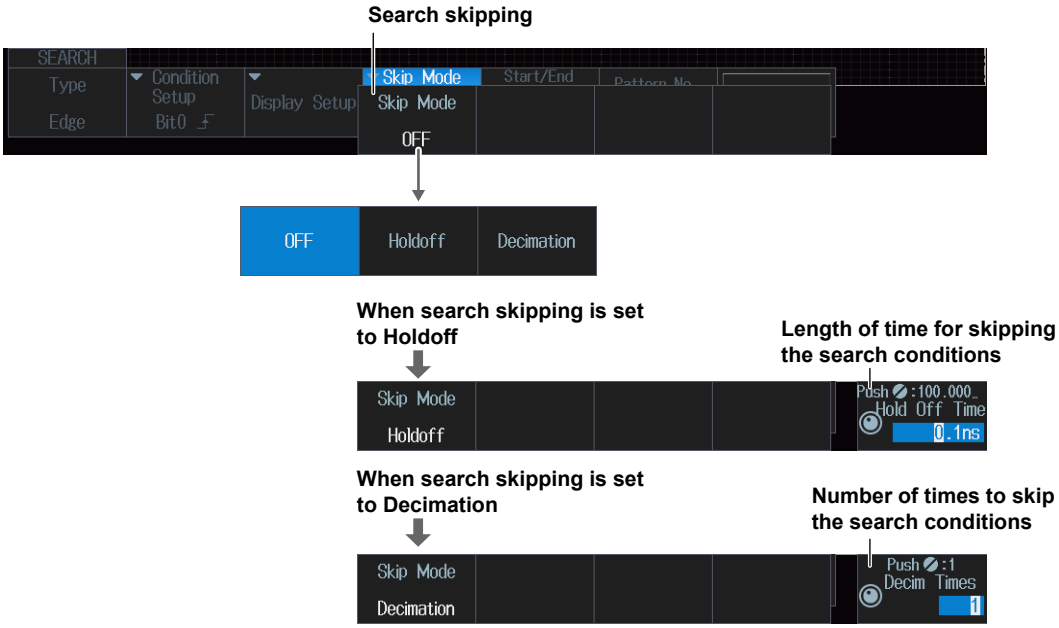
### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

## Search Skipping (Skip Mode)

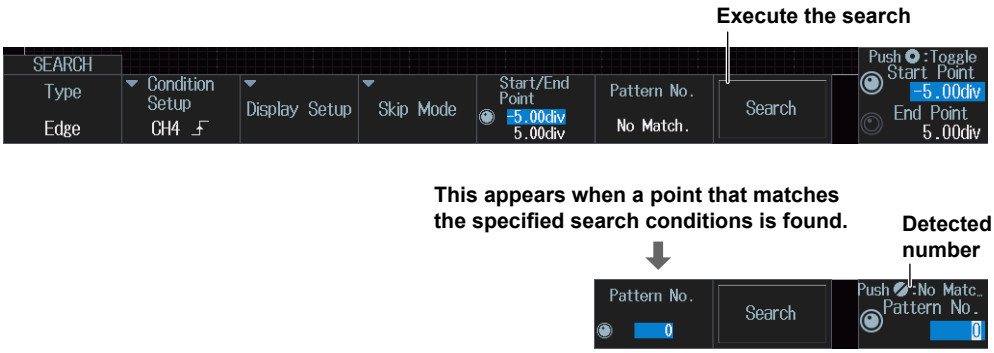
Press the **Skip Mode** soft key. The following menu items appear.

After a search condition is met, you can skip the detection of search conditions for the specified amount of time or the specified number of counts.



## Executing a Search (Search)

1. Set the search conditions.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.




### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

# 11.2 Searching for Edges

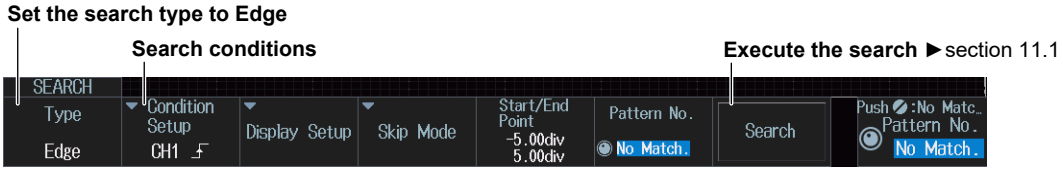
This section explains the following settings for searching for edges:

- Search type
- Search conditions
  search source waveform, slope, level used to detect source waveform edges, hysteresis

► "Search Type (Type)," "Search Conditions (Condition Setup)," in the Features Guide

## SEARCH Edge Menu

1. Press **SEARCH**. The SEARCH menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the SEARCH menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Type** soft key and then the **Edge** soft key. The following menu items appear.




## Search Conditions (Condition Setup)

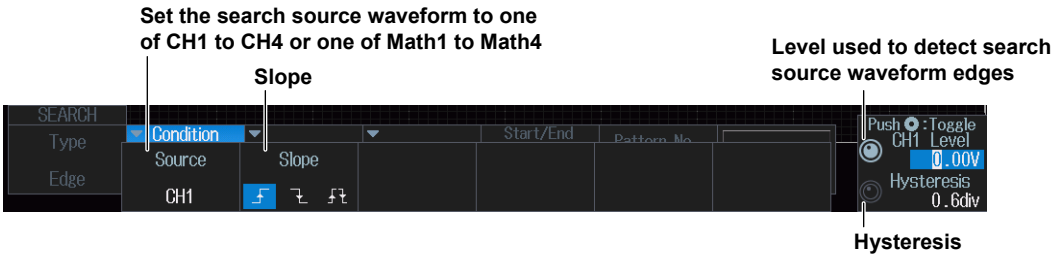
### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

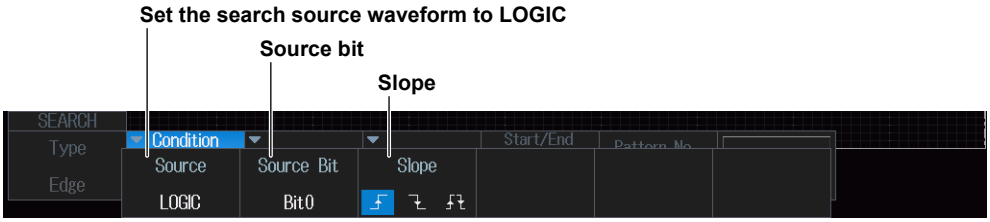
When you execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Condition Setup** soft key. A menu appears according to the waveform to be searched you specified.

### When the Search Source Waveform Is CH1 to CH4 or Math1 to Math4



### When the Search Source Waveform Is LOGIC (On models with the logic signal input port)



# 11.3 Searching with Multiple Input Patterns

This section explains the following settings for searching with multiple input patterns.

- Search type
- Search conditions

► “Search Type (Type),” “Search Conditions (Condition Setup)” in the Features Guide

## SEARCH Pattern Menu

1. Press **SEARCH**. The SEARCH menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the SEARCH menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Type** soft key and then the **Pattern** soft key. The following menu items appear.



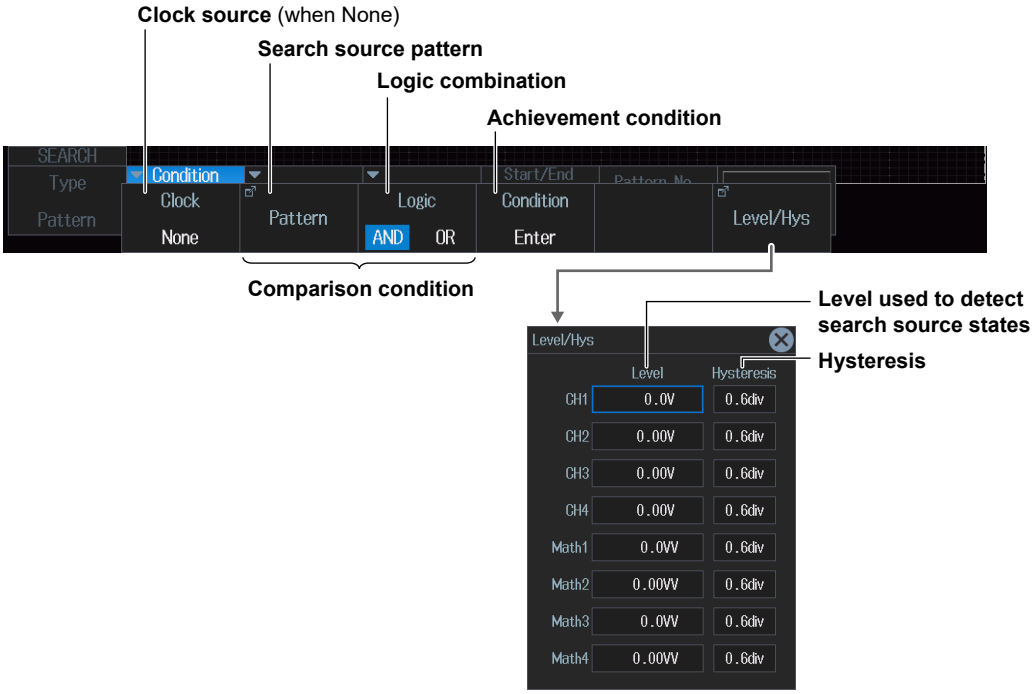

## Search Conditions (Condition Setup)

### *Note*

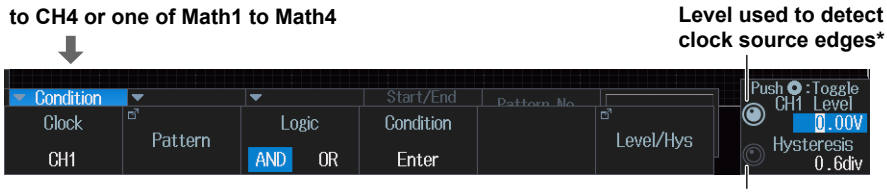
**Using the CH4 Terminal and Logic Signal Input Port**

When you execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Condition Setup** soft key. The following menu items appear.




**When the clock source is one of CH1 to CH4 or one of Math1 to Math4**




* You can also set the level and hysteresis for detecting clock source edges on the setup screen displayed by pressing the Levels/Hys soft key.

**When the clock source is LOGIC**
(On models with the logic signal input port)

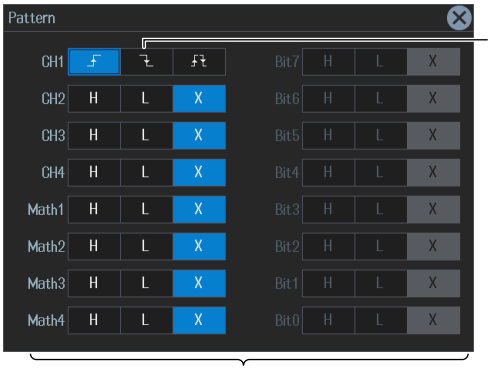


### Search Source Pattern (Pattern)

Press the **Pattern** soft key. The following menu items appear.

- **When the Clock Source Is CH1 to CH4 or LOGIC (On models with the logic signal input port)**

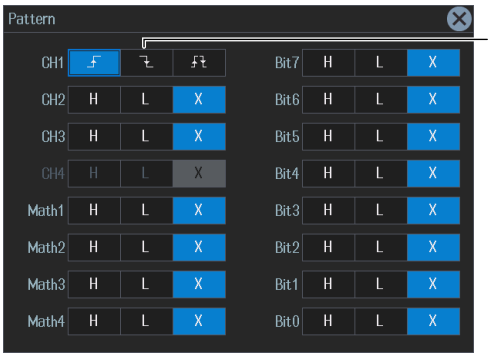
**When the CH4 key is lit**




**Set the slope of the signal set as the clock source**

**Set the pattern of the search source (signal other than the clock source)**
(LOGIC is invalid)

**When the LOGIC key is lit**




**Set the slope of the signal set as the clock source**

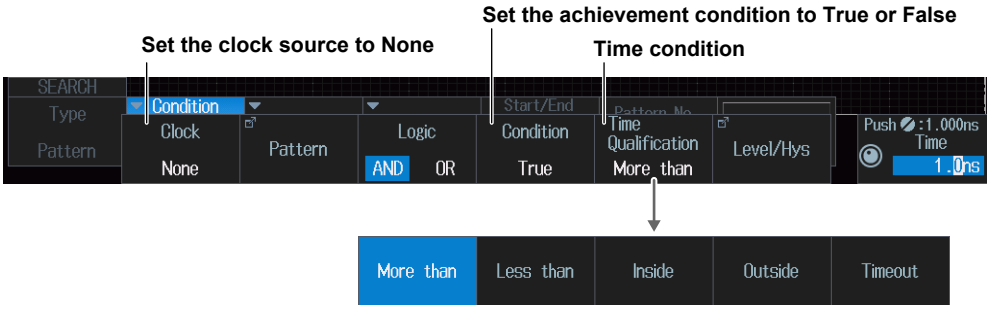
**Set the pattern of the search source (signal other than the clock source)**
(CH4 is invalid)

- **No Clock Source**

  The same menu appears as that shown above for when the clock source is CH1 to CH4 or LOGIC (on models with the logic signal input port). Because there is no clock source, set the pattern of the search sources (all of the CH1 to CH4 and LOGIC signals) (only one of CH4 or LOGIC, whose corresponding key is illuminated, can be selected).

### Time Condition (Time Qualification)

If no clock source (None) is set, the time condition is set if the achievement condition is True or False. Press the **Time Qualification** soft key. The following menu items appear.



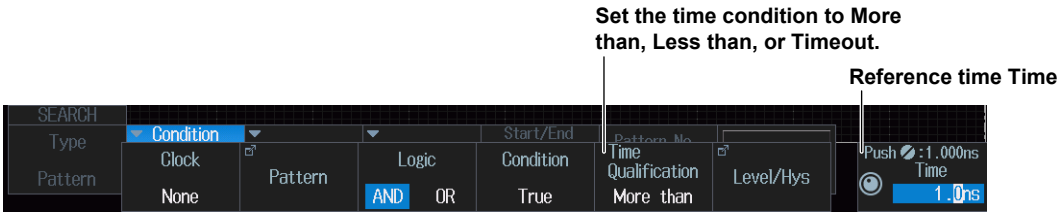

Set what kind of relationship must be established between the achievement time of the comparison condition and the specified reference times (Time or Time1 and Time2) for a point to be detected.

For details on the detected points when the time condition is met, see chapter 14, “Searching Waveforms” in the Features Guide (IM DLM3054HD-01EN). When Timeout is selected, the instrument searches for timeout points.

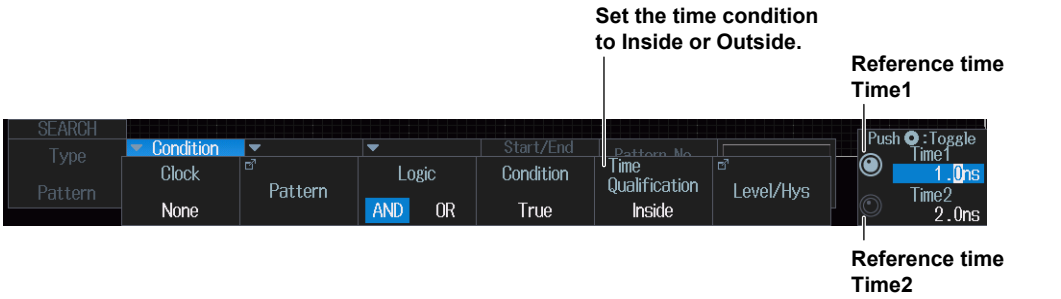
| | | |
|---|---|---|
| More than | : | When the comparison condition achievement time is longer than the specified reference time (Time) |
| Less than | : | When the comparison condition achievement time is shorter than the specified reference time (Time) |
| Inside | : | When the comparison condition achievement time is longer than reference time Time1 and shorter than reference time Time2. |
| Outside | : | When the comparison condition achievement time is shorter than reference time Time1 or longer than reference time Time2. |
| Timeout | : | When the comparison condition achievement time is longer than the specified reference time (Time) |

### Reference time (Time or Time1 and Time2)

- **When the Time Condition is More than, Less than, or Timeout**




- **When the Time Condition is Inside or Outside**



# 11.4 Searching for Pulse Width

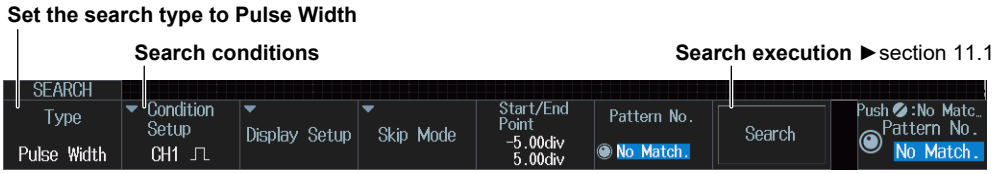
This section explains the following settings for searching for pulse width:

- Search type
- Search conditions

► “Search Type (Type),” “Search Conditions (Condition Setup)” in the Features Guide

## SEARCH Pulse Width Menu

1. Press **SEARCH**. The SEARCH menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the SEARCH menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Type** soft key and then the **Pulse Width** soft key. The following menu items appear.



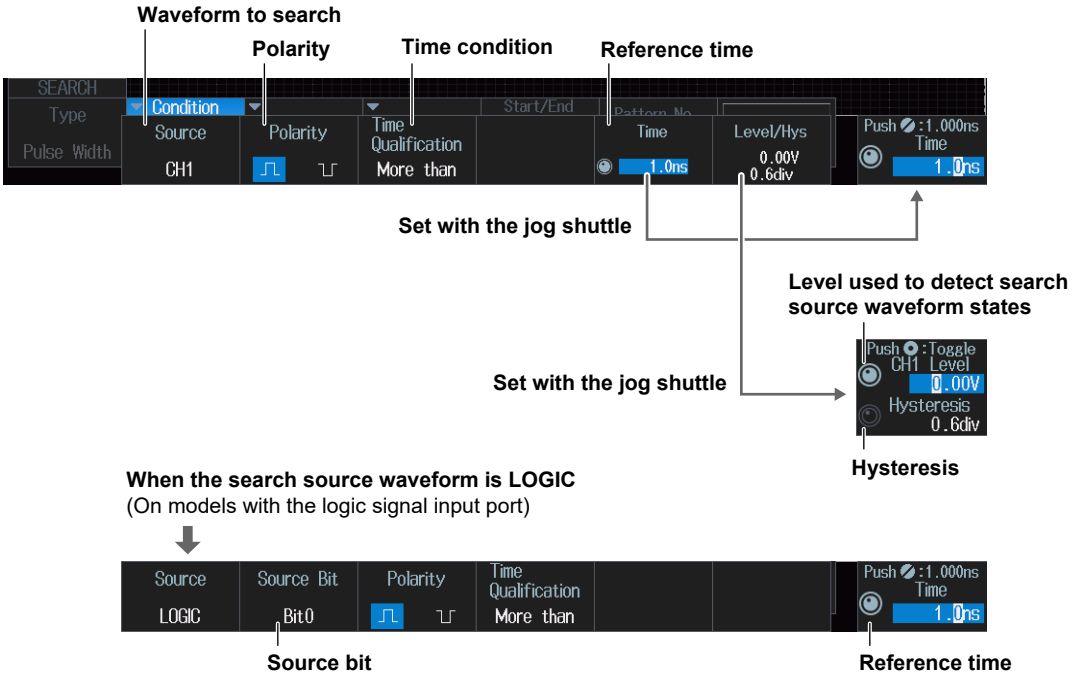

## Search Conditions (Condition Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

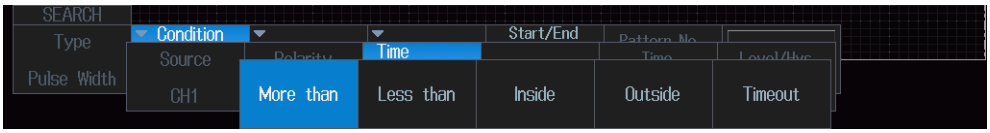
When you execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Condition Setup** soft key. The following menu items appear.




### Time Condition (Time Qualification)

Press the **Time Qualification** soft key. The following menu items appear.



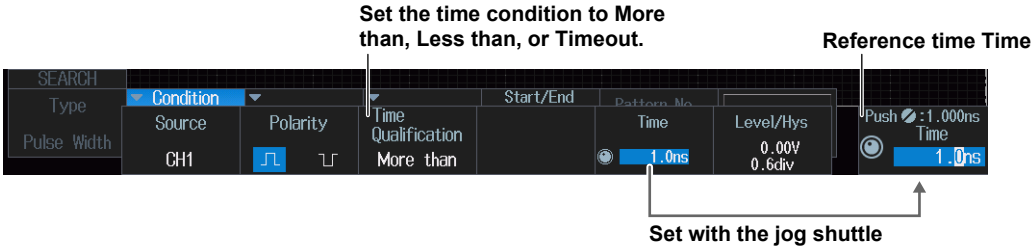

Set what kind of relationship must be established between the search source waveform's pulse width and the specified reference times (Time, Time1 and Time2) for a point to be detected.

For details on the detected points when the time condition is met, see chapter 14, “Searching Waveforms” in the Features Guide (IM DLM3054HD-01EN). When Timeout is selected, the instrument searches for timeout points.

| | | |
|---|---|---|
| More than | : | When the pulse width is longer than the specified reference time (Time) |
| Less than | : | When the pulse width is shorter than the specified reference time (Time) |
| Inside | : | When the pulse width is longer than Time1 but shorter than Time2 |
| Outside | : | When the pulse width is shorter than Time1 or longer than Time2 |
| Timeout | : | When the pulse width is longer than the specified reference time (Time) |

### Reference Times (Time or Time1 and Time2)

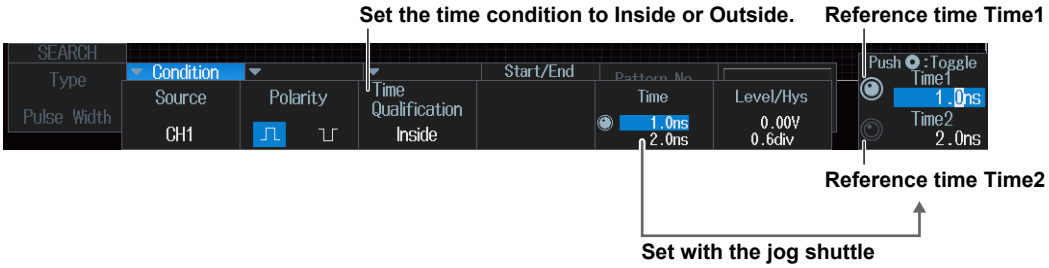
- **When the Time Condition is More than, Less than, or Timeout**




**When the search source waveform is LOGIC**
(on models with the logic signal input port)




- **When the Time Condition is Inside or Outside**




**When the search source waveform is LOGIC**
(On models with the logic signal input port)



# 11.5 Searching for Timeout Periods

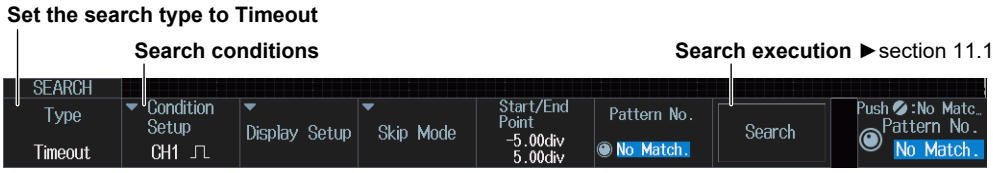
This section explains the following settings for searching for timeouts:

- Search type
- Search conditions

► “Search Type (Type),” “Search Conditions (Condition Setup)” in the Features Guide

## SEARCH Timeout Menu

1. Press **SEARCH**. The SEARCH menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the SEARCH menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Type** soft key and then the **Timeout** soft key. The following menu items appear.



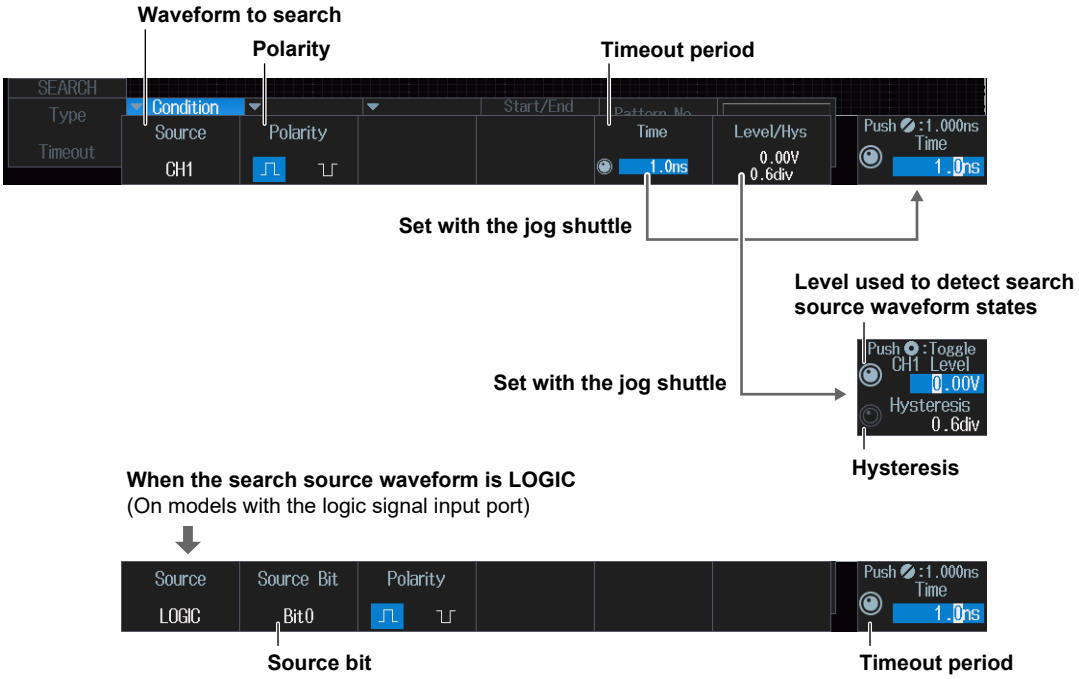

## Search Conditions (Condition Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

When you execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Condition Setup** soft key. The following menu items appear.



# 12.1 Analyzing and Searching FlexRay Bus Signals (Option)

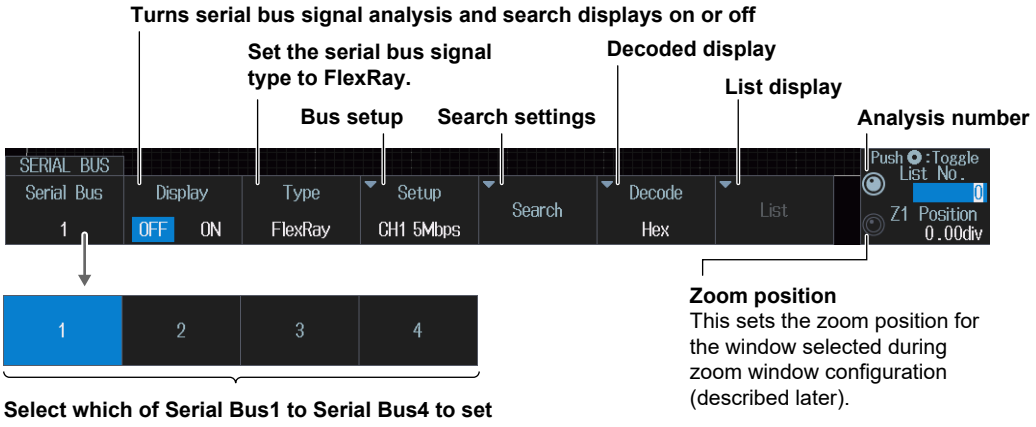
This section explains the following settings for analyzing or searching FlexRay bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, bit rate, bus channel, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, and zoom linking
- Analysis number
- Zoom position
- Search settings
  Jumping to a specified field, zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching FlexRay Bus Signals (Option)" in the Features Guide**

## SERIAL BUS FlexRay Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key. Select **FlexRay** from the setup menu that is displayed. The following menu items appear.



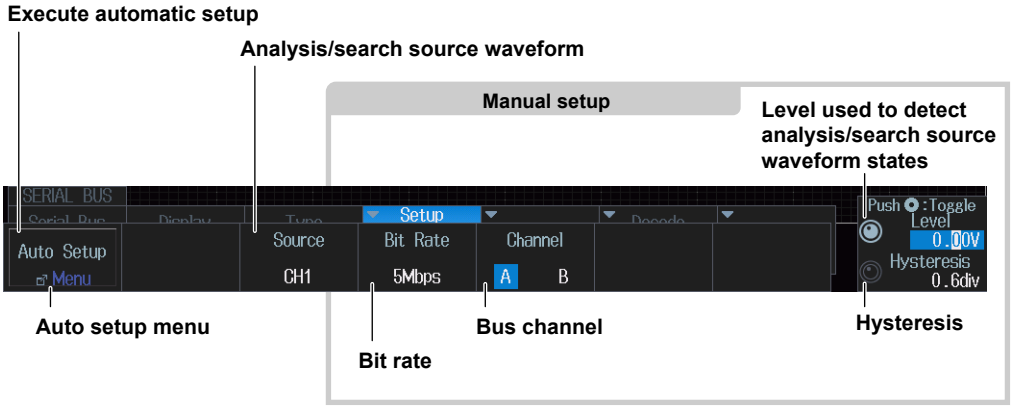
## Bus Setup (Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

If you perform an analysis or execute a search when using the logic signal input ports for input, you cannot specify CH4 as the source. Press CH4 in advance to enable input from the CH4 terminal.

Press the **Setup** soft key. The following menu items appear.



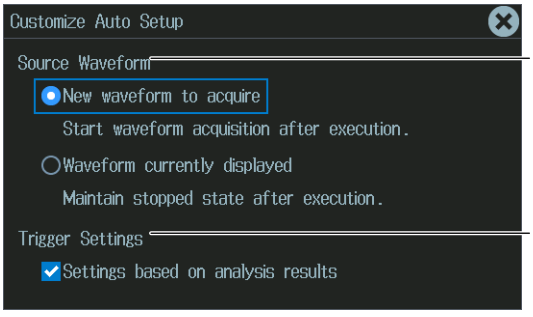

### Auto Setup (Auto Setup)

1. Press the **Source** soft key to set the analysis/search source waveform.
   Auto setup cannot be performed when the source is set to Math1 to Math4.
2. Press the **Auto Setup** soft key to execute auto setup.
   - The instrument automatically sets the bit rate, bus channel, level, and hysteresis and triggers on the start of frame (Frame Start) of the FlexRay bus signal. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

#### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




**Source waveform**
Select a new waveform to be acquired or from waveforms displayed on the screen.

**Trigger Settings**
Select the check box to set a trigger.




**Restores the default settings**

2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.
3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

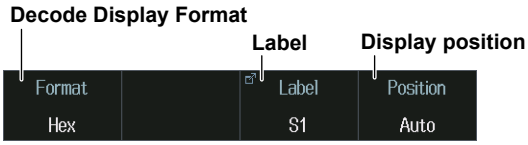
### Manual setup

After running auto setup, you can change the following settings and display decoded results.

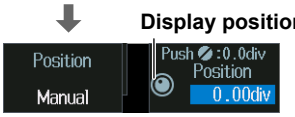
- Analysis/search source waveform
- Bit rate
- Bus channel
- Level used to detect analysis/search source waveform states
- Hysteresis

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




**When the display position is set to Manual**



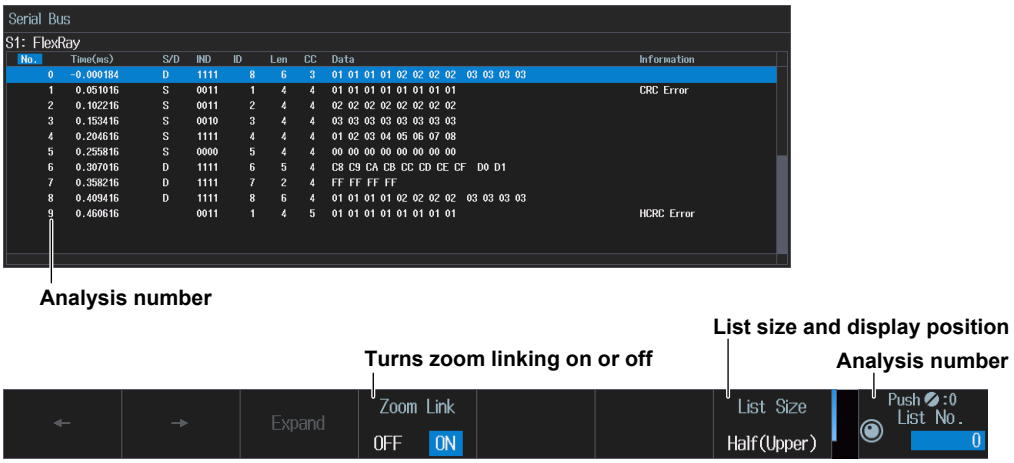

### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

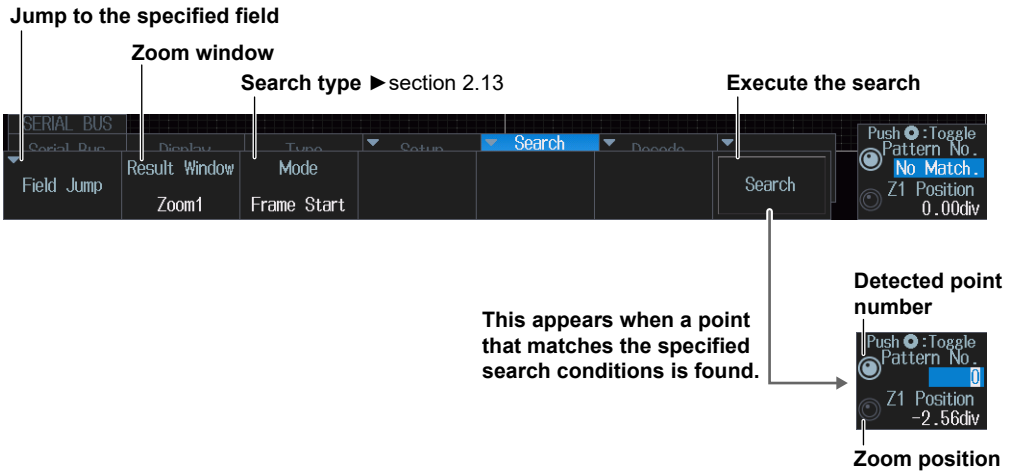
**List of analysis results**




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Jumping to the Specified Field (Field Jump)

Jumps to the field in the data frame that corresponds to the specified detected point number (Pattern No).

### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

You can set this setting in the same way that you set the trigger type to Frame Start, Error, or ID/Data. For details, see section 2.13.

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.2 Analyzing and Searching CAN Bus Signals (Option)

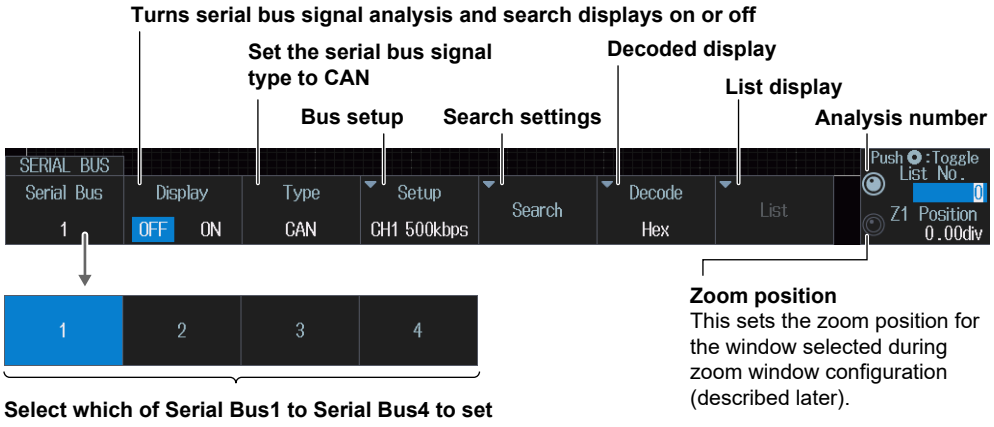
This section explains the following settings for analyzing or searching CAN bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, bit rate, recessive level, sample point, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, zoom linking, filter (list display filtering)
- Analysis number
- Zoom position
- Search settings
  Jumping to a specified field, zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching CAN Bus Signals (Option)" in the Features Guide**

## SERIAL BUS CAN Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key**.** Select **CAN** from the setup menu that is displayed. The following menu items appear.




**Select which of Serial Bus1 to Serial Bus4 to set**

**Zoom position**
This sets the zoom position for the window selected during zoom window configuration (described later).

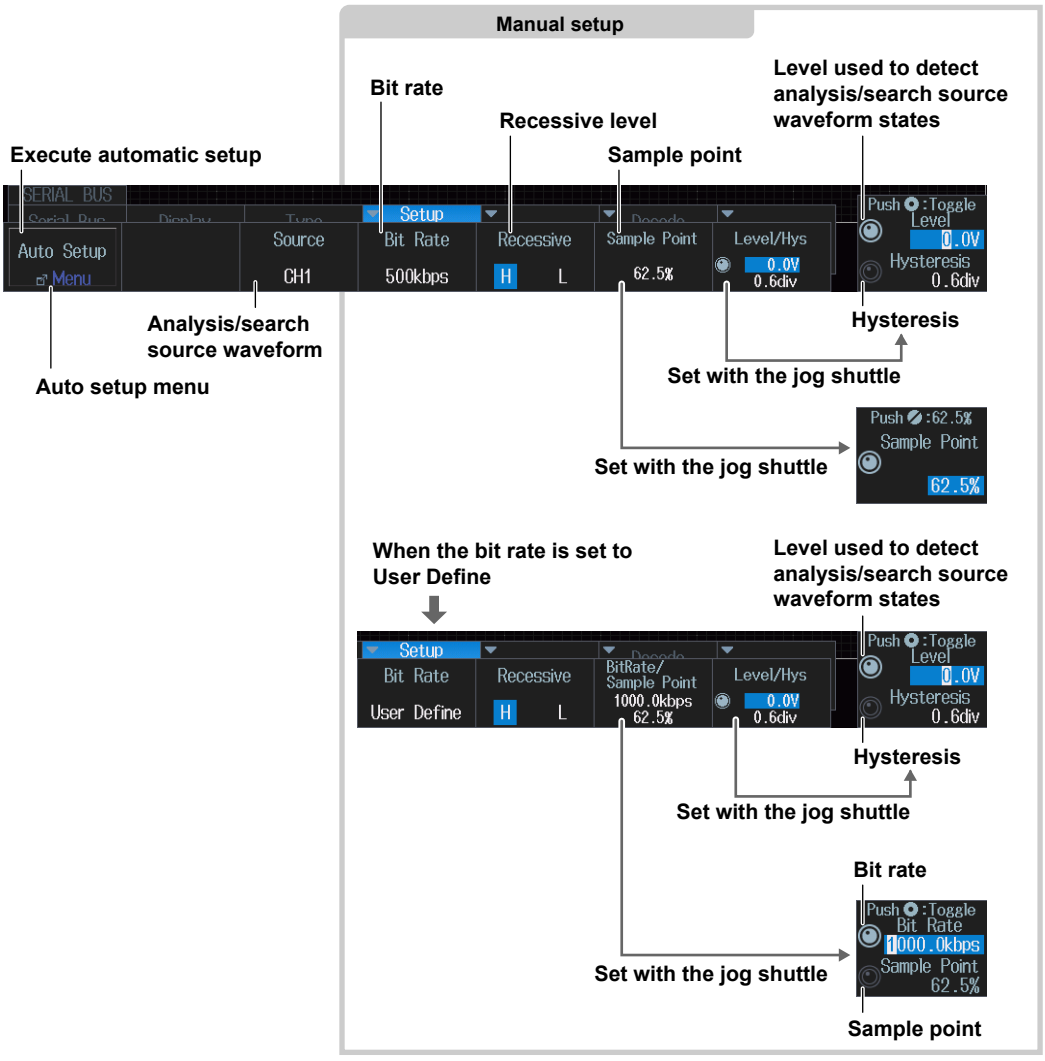
## Bus Setup (Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

If you perform an analysis or execute a search when using the logic signal input ports for input, you cannot specify CH4 as the source. Press CH4 in advance to enable input from the CH4 terminal.

Press the **Setup** soft key. The following menu items appear.



## Auto Setup (Auto Setup)

1. Press the **Source** soft key to set the analysis/search source waveform.

   Auto setup cannot be performed when the source is set to Math1 to Math4.

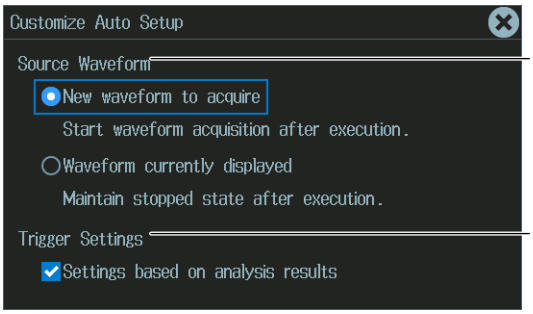
2. Press the **Auto Setup** soft key to execute auto setup.
   - The instrument automatically configures the bit rate, recessive level, sample point, level, and hysteresis and triggers on the start of frame (SOF) of the CAN bus signal. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.

   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




**Source waveform**
Select a new waveform to be acquired or from waveforms displayed on the screen.

**Trigger Settings**
Select the check box to set a trigger.




**Restores the default settings**

2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

3. Press **ESC**. The menu returns to the bus setup menu.

   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

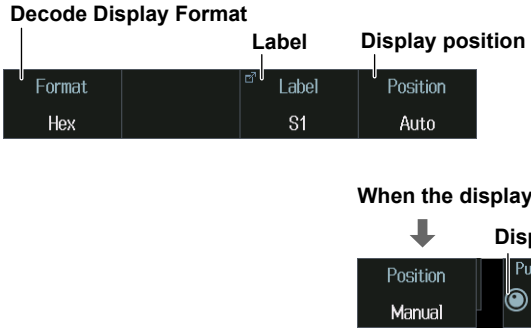
## Manual Setup

After running auto setup, you can change the following settings and display decoded results.

- Analysis/search source waveform
- Bit rate
- Recessive level
- Sample point
- Level used to detect analysis/search source waveform states
- Hysteresis

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.



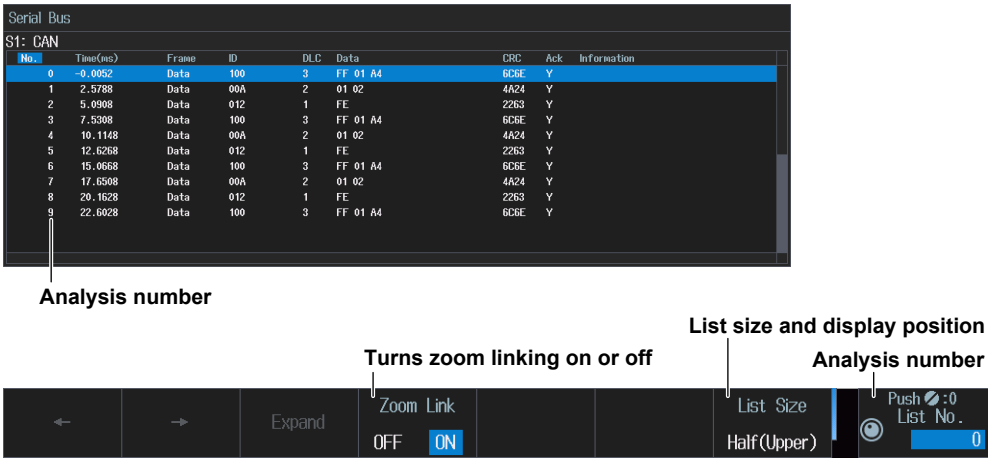

### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

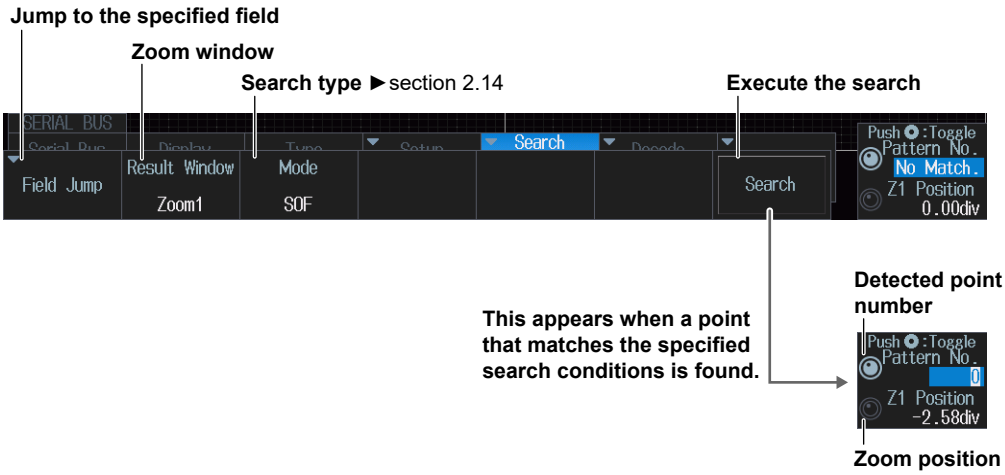
**List of analysis results**




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Jumping to the Specified Field (Field Jump)

Jumps to the field in the data frame that corresponds to the specified detected point number (Pattern No).

### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

You can set this setting in the same way that you set the trigger type to SOF, Error, or ID/Data. For details, see section 2.14.

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.3 Analyzing and Searching CAN FD Bus Signals (Option)

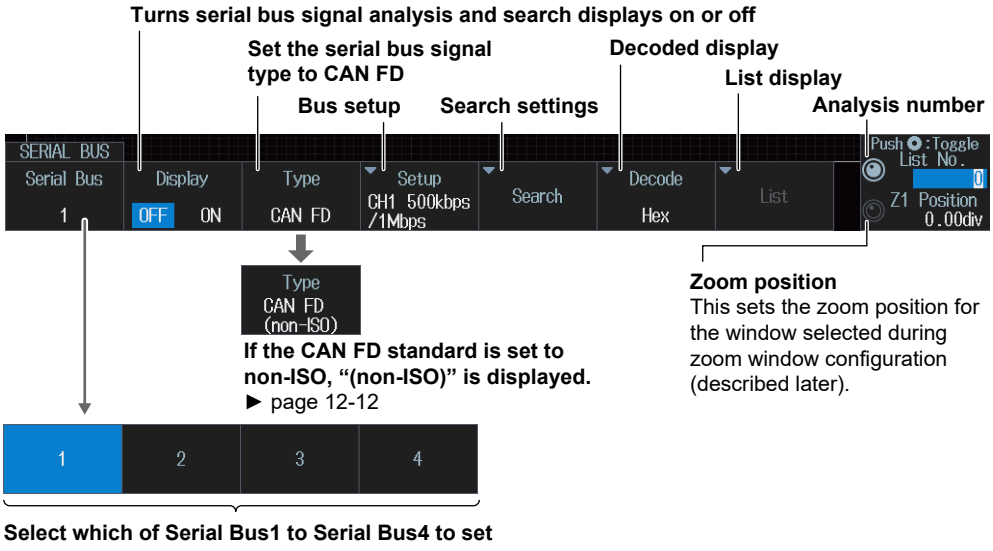
This section explains the following settings (which are used when analyzing or searching CAN FD bus signals):

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, bit rate, sample point, data phase bit rate, data phase sample point, recessive level, CAN FD standard, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, zoom linking, filter (list display filtering)
- Analysis number
- Zoom position
- Search settings
  Jumping to a specified field, zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching CAN FD Bus Signals (Option)" in the Features Guide**

## SERIAL BUS CAN FD Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key. Select **CAN FD** from the setup menu that is displayed. The following menu items appear.



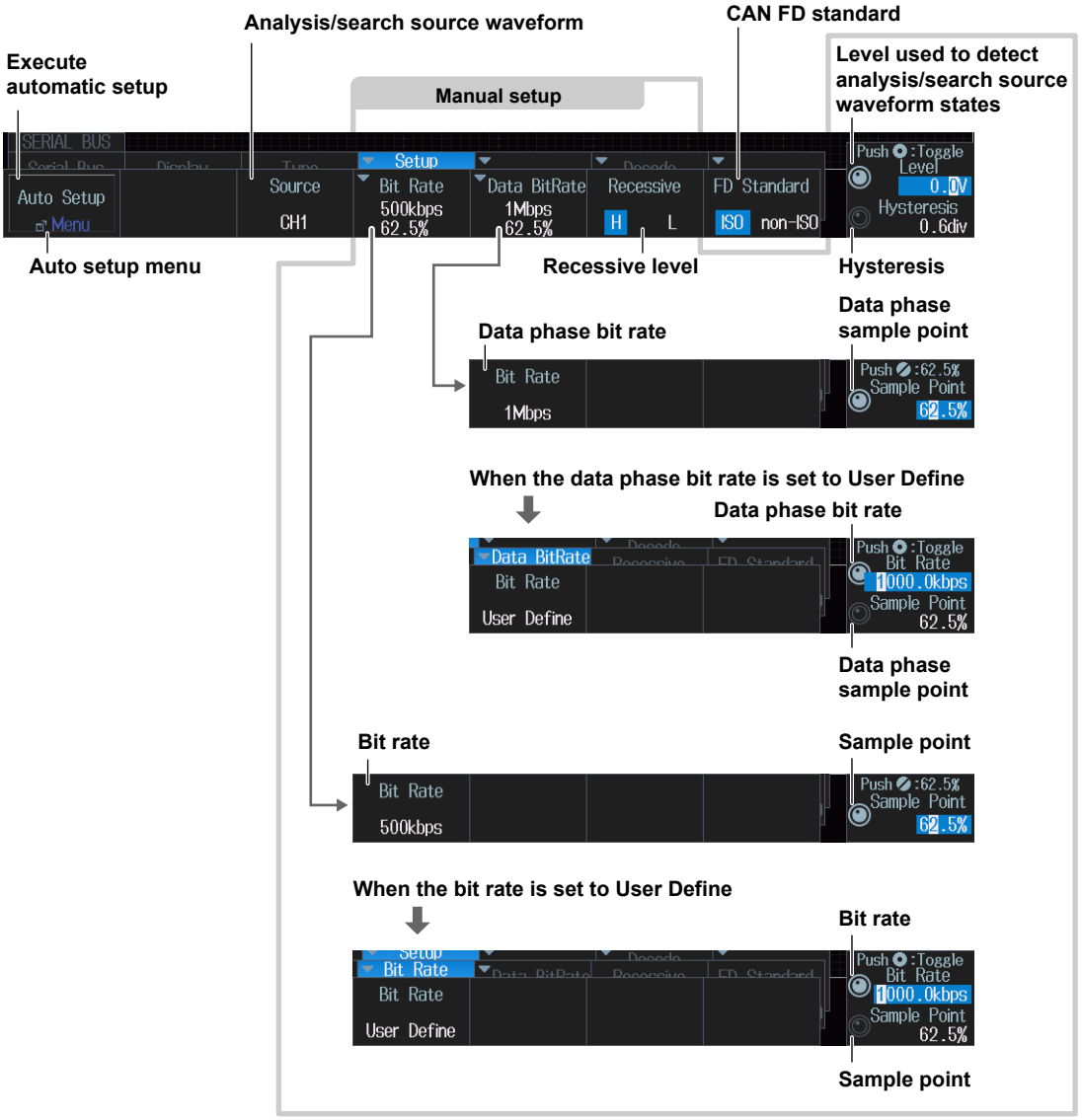
## Bus Setup (Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

If you perform an analysis or execute a search when using the logic signal input ports for input, you cannot specify CH4 as the source. Press CH4 in advance to enable input from the CH4 terminal.

Press the **Setup** soft key. The following menu items appear.



## Auto Setup (Auto Setup)

1. Press the **Source** soft key to set the analysis/search source waveform and the CAN FD standard.

   Auto setup cannot be performed when the source is set to Math1 to Math4.

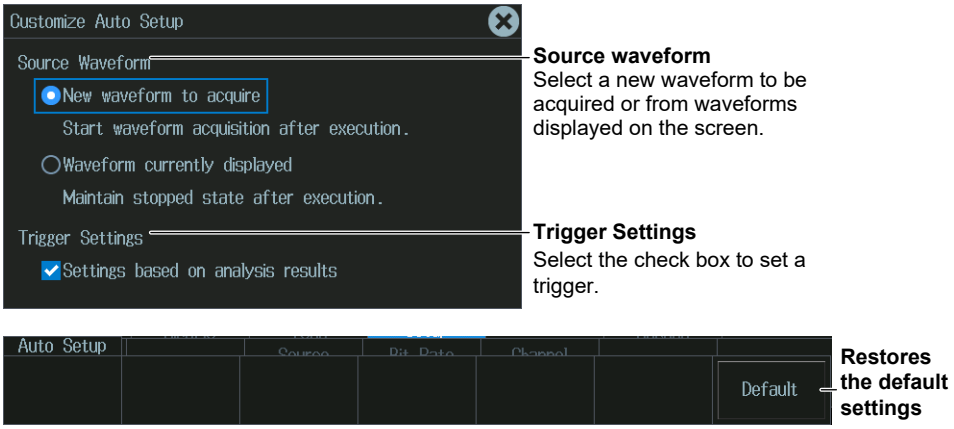
2. Press the **Auto Setup** soft key to execute auto setup.
   - The instrument automatically sets the bit rate, sample point, data phase bit rate, data phase sample point, recessive level, level, and hysteresis and triggers on the start of frame (SOF) of the CAN or CAN FD bus signal. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.

   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

3. Press **ESC**. The menu returns to the bus setup menu.

   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

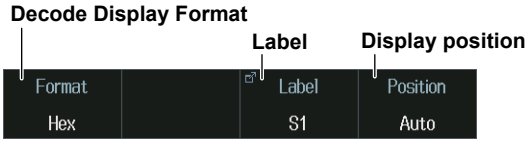
### Manual setup

After running auto setup, you can change the following settings and display decoded results.

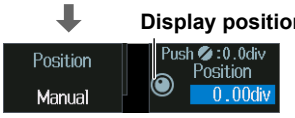
- Analysis/search source waveform
- Bit rate
- Sample point
- Data phase bit rate
- Data phase sample point
- Recessive level
- CAN FD standard
- Level used to detect analysis/search source waveform states
- Hysteresis

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




**When the display position is set to Manual**




### Display Position (Position)

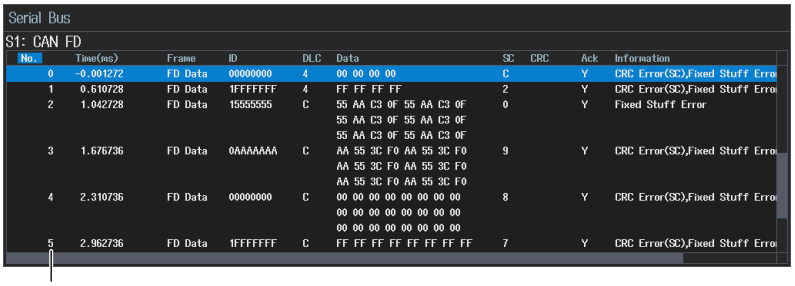
Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

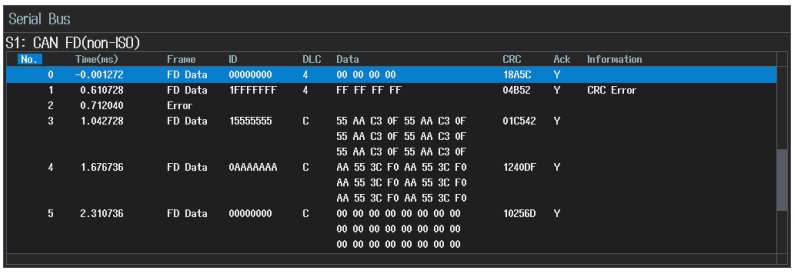
**List of analysis results**

**When the CAN FD standard is set to ISO**




Analysis number

**When the CAN FD standard is set to non-ISO**



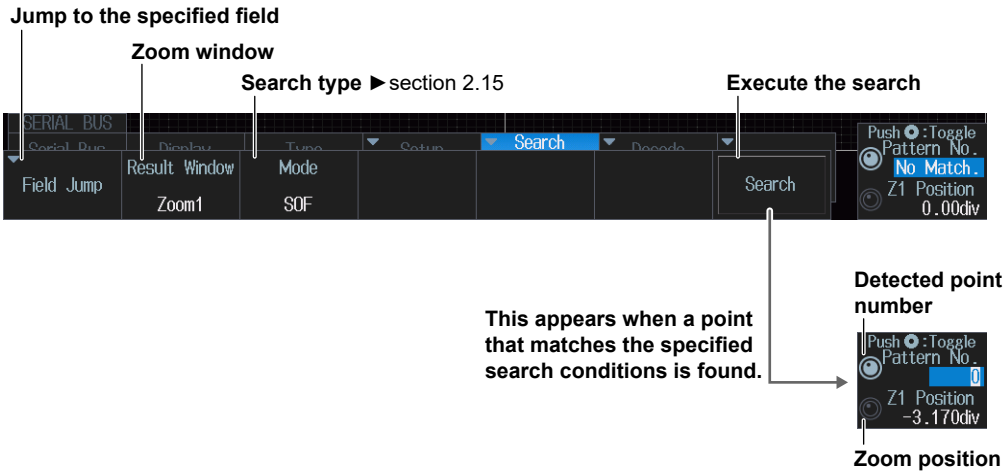




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Jumping to the Specified Field (Field Jump)

Jumps to the field in the data frame that corresponds to the specified detected point number (Pattern No).

### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

You can set this setting in the same way that you set the trigger mode to SOF, Error, ID/Data, FDF, and ESI (ErrorPassive). For details, see section 2.15.

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.4 Analyzing and Searching LIN Bus Signals (Option)

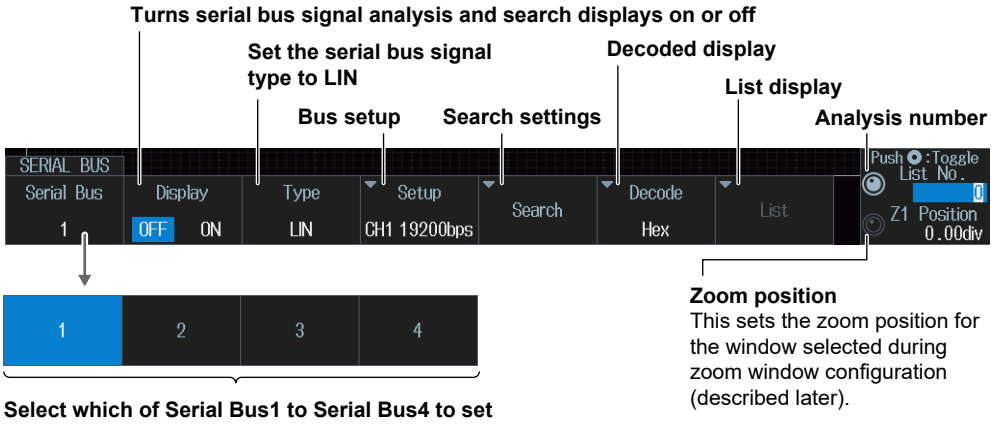
This section explains the following settings for analyzing or searching LIN bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, bit rate, revision, sample point, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, and zoom linking
- Analysis number
- Zoom position
- Search settings
  Jumping to a specified field, zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching LIN Bus Signals (Option)" in the Features Guide**

## SERIAL BUS LIN Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key. Select **LIN** from the setup menu that is displayed. The following menu items appear.



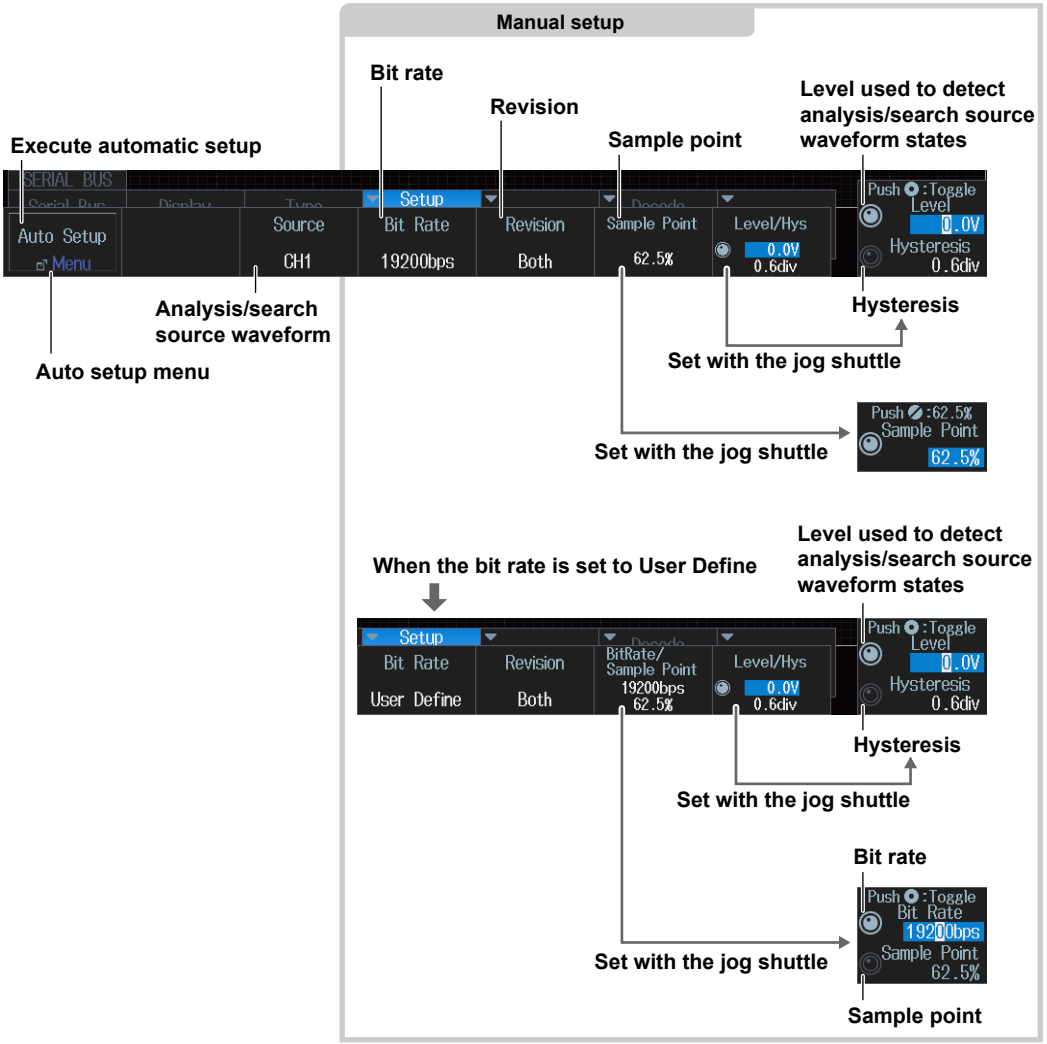
## Bus Setup (Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

If you perform an analysis or execute a search when using the logic signal input ports for input, you cannot specify CH4 as the source. Press CH4 in advance to enable input from the CH4 terminal.

Press the **Setup** soft key. The following menu items appear.



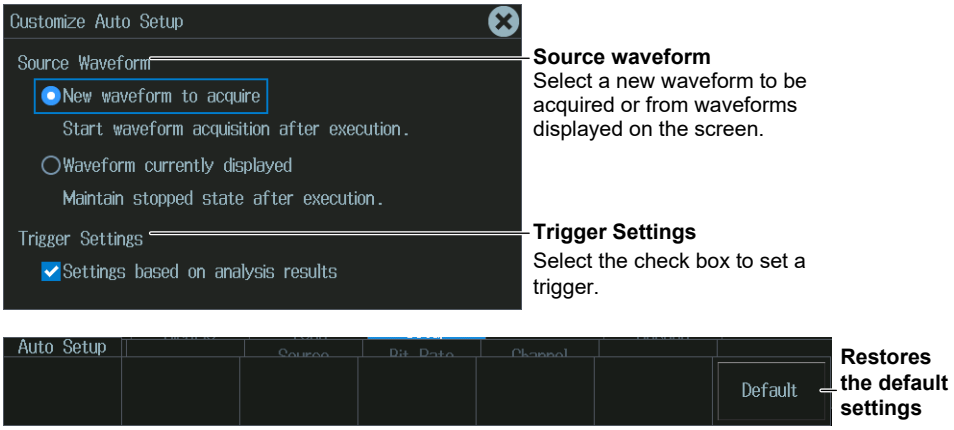
## Auto Setup (Auto Setup)

1. Press the **Source** soft key to set the analysis/search source waveform.
   Auto setup cannot be performed when the source is set to Math1 to Math4.
2. Press the **Auto Setup** soft key to execute auto setup.
   - The Instrument automatically configures the bit rate, revision, sample point, level, and hysteresis and triggers on the LIN bus signal's Break Synch. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.
3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

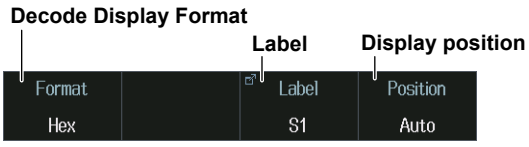
## Manual Setup

After running auto setup, you can change the following settings and display decoded results.

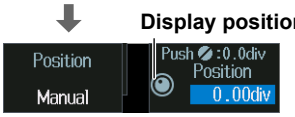
- Analysis/search source waveform
- Bit rate
- Revision
- Sample point
- Level used to detect analysis/search source waveform states
- Hysteresis

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




When the display position is set to Manual



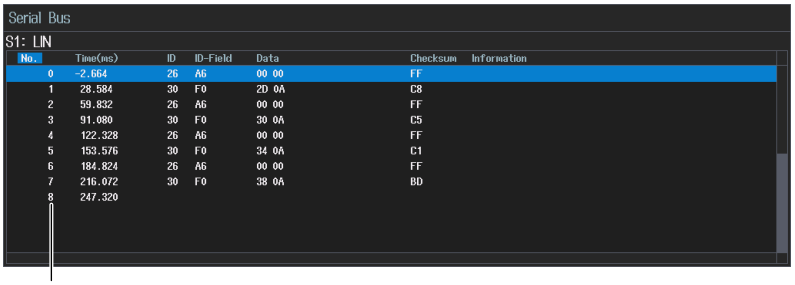

### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

**List of analysis results**



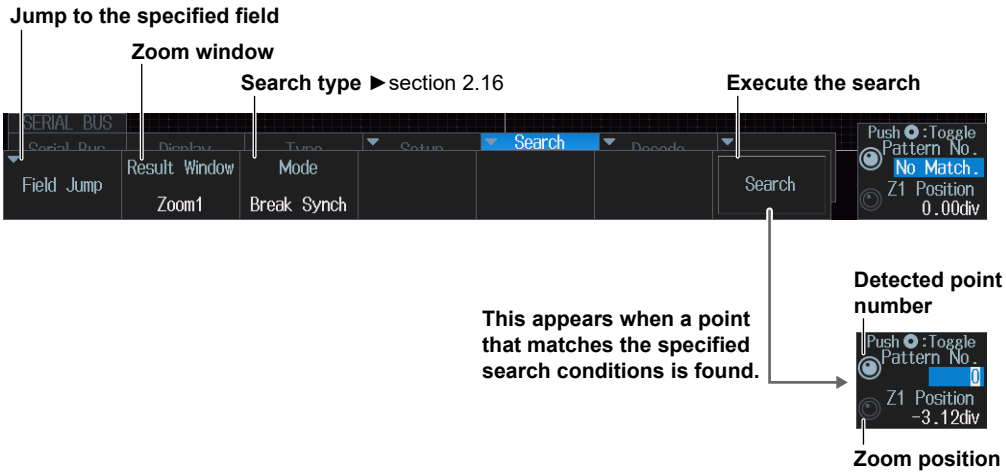




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Jumping to the Specified Field (Field Jump)

Jumps to the field in the frame that corresponds to the specified detected point number (Pattern No).

### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

You can set this setting in the same way that you set the trigger mode to Break Synch, Error, or ID/Data. For details, see section 2.16.

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.5 Analyzing and Searching CXPI Bus Signals (Option)

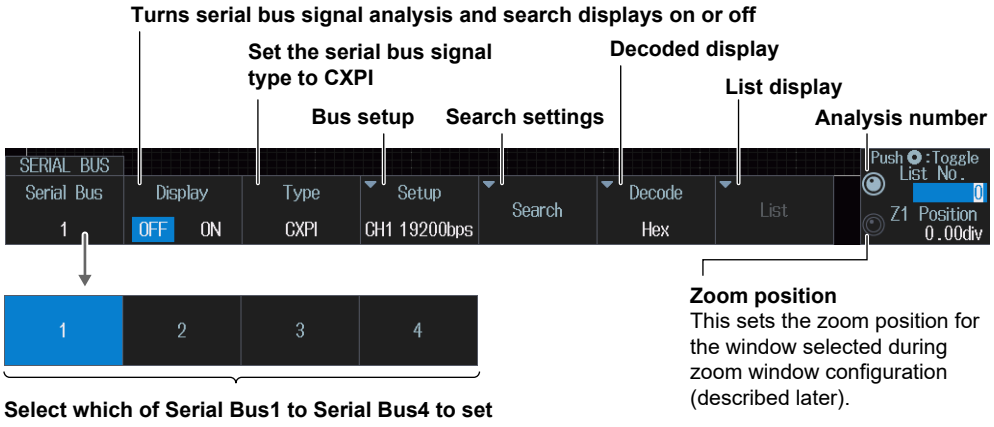
This section explains the following settings for analyzing or searching CXPI bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, bit rate, T Sample, clock tolerance, counter error detection, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, and zoom linking
- Analysis number
- Zoom position
- Search settings
  Jumping to a specified field, zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching CXPI Bus Signals (Option)" in the Features Guide**

## SERIAL BUS CXPI Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key**.** Select **CXPI** from the setup menu that is displayed. The following menu items appear.



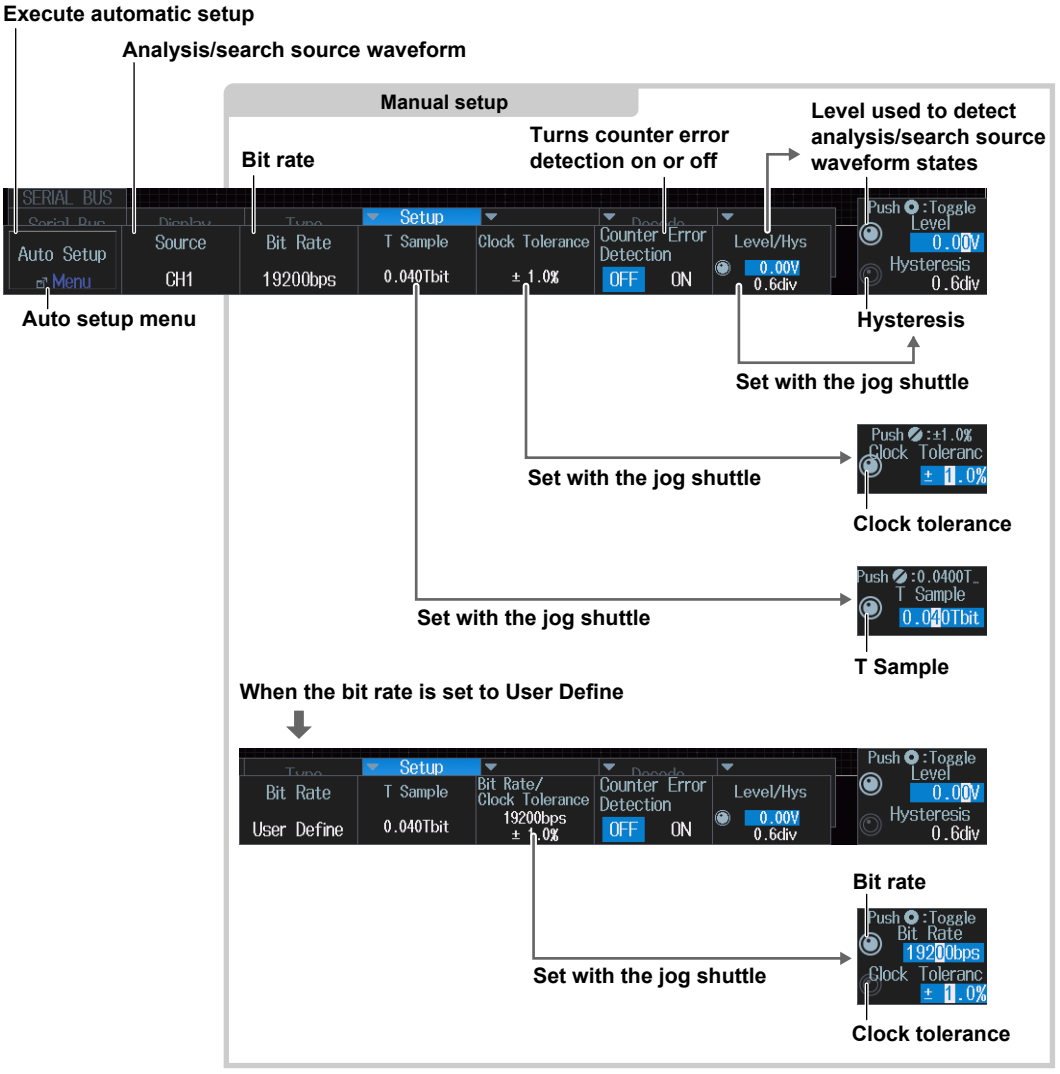
## Bus Setup (Setup)

### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

If you perform an analysis or execute a search when using the logic signal input ports for input, you cannot specify CH4 as the source. Press CH4 in advance to enable input from the CH4 terminal.

Press the **Setup** soft key. The following menu items appear.



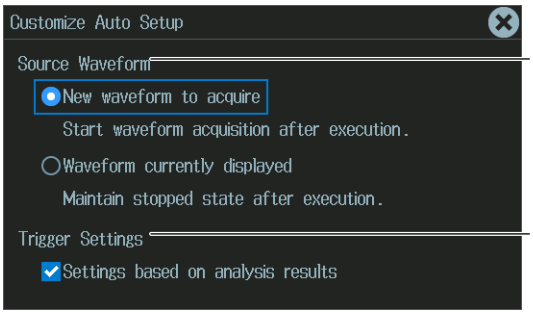
## Auto Setup (Auto Setup)

1. Press the **Source** soft key to set the analysis/search source waveform.
   Auto setup cannot be performed when the source is set to Math1 to Math4.
2. Press the **Auto Setup** soft key to execute auto setup.
   - The instrument automatically sets the bit rate, level, and hysteresis and triggers on the start position (SOF) of the CXPI bus signal. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




**Source waveform**
Select a new waveform to be acquired or from waveforms displayed on the screen.

**Trigger Settings**
Select the check box to set a trigger.




**Restores the default settings**

2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.
3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

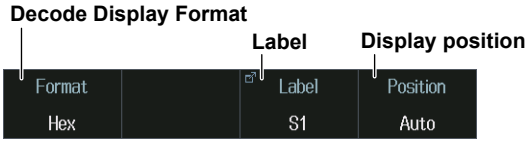
## Manual setup

After running auto setup, you can change the following settings and display decoded results.

- Analysis/search source waveform
- Bit rate
- T Sample
- Clock tolerance
- Counter error detection
- Level used to detect analysis/search source waveform states
- Hysteresis

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.







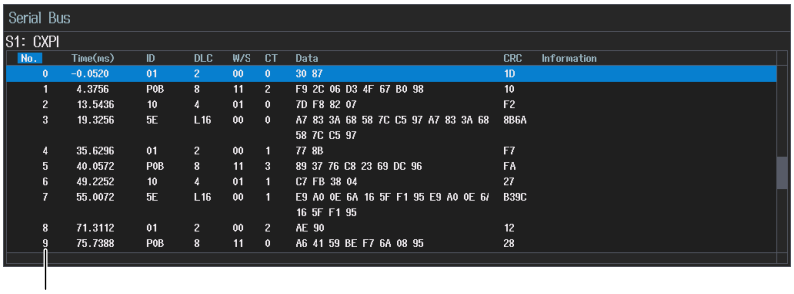
### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

**List of analysis results**



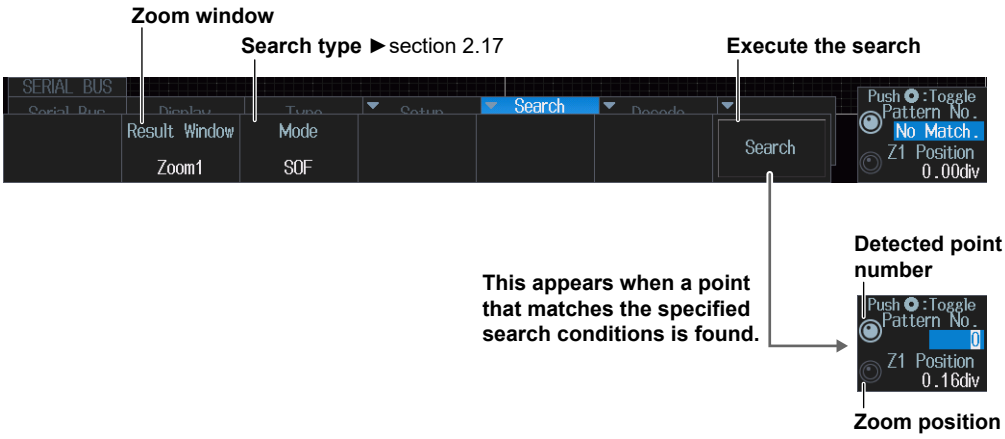




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

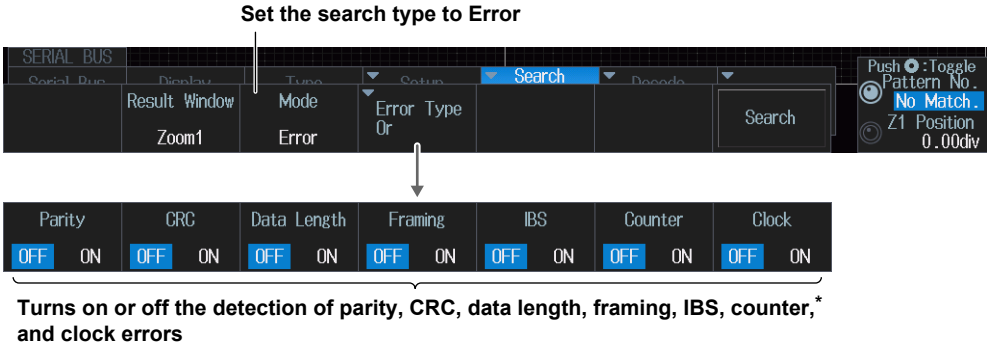
You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

## Search Type (Mode)

You can set SOF, PTYPE, and ID/Data in the same as you set the trigger setting. For details, see section 2.17.

### Error Mode

Press the **Mode** soft key and then the **Error** soft key. The following menu items appear. The instrument searches for various errors.

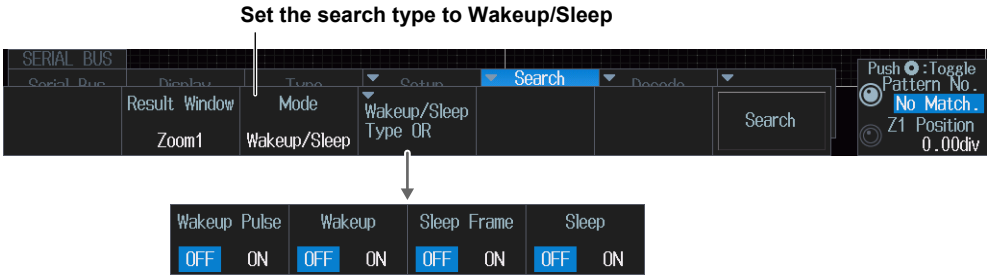



* Not displayed when counter error detection (Counter Error Detection) in the bus setup (Setup) is set to OFF.

### Wakeup/Sleep mode

Press the **Mode** soft key and then the **Wakeup/Sleep** soft key. The following menu items appear.

The instrument searches for wakeup pulses, wakeup states, sleep frames, or sleep states.




**Turns on or off the detection of wakeup pulses, wakeup states, sleep frames, or sleep states**

## Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

## Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

## Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.6 Analyzing and Searching SENT Signals (Option)

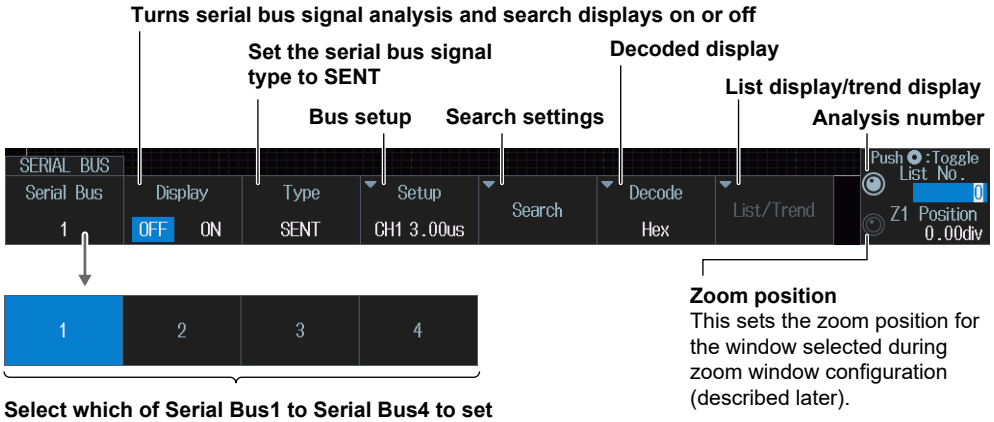
This section explains the following settings (which are used when analyzing or searching SENT signals):

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, format, display channel, fast channel data type, slow channel message type, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, and zoom linking
- Trend Display
  Display source, User Data, display settings, cursor measurement on/off, message ID
- Analysis number
- Zoom position
- Search settings
  Zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching SENT Signals (Option)" in the Features Guide**

## SERIAL BUS SENT Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key. Select **SENT** from the setup menu that is displayed. The following menu items appear.



## Bus Setup (Setup)

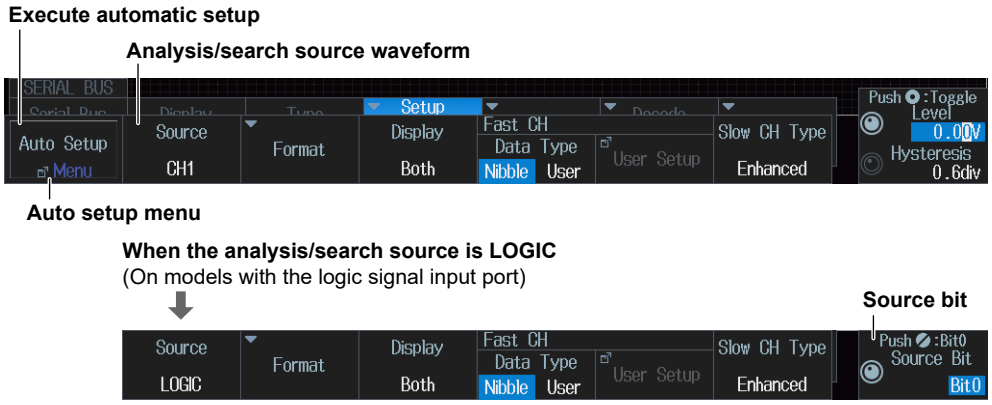
### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

When you perform an analysis or execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Setup** soft key. The following menu items appear.

### Auto Setup (Auto Setup)

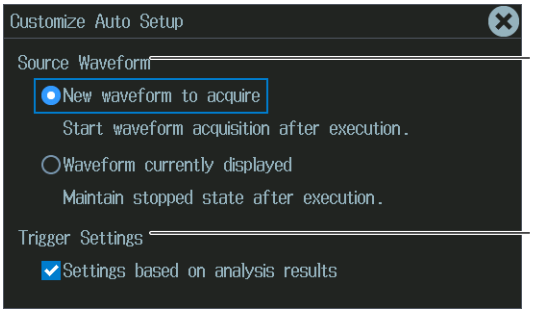



1. Press the **Source** soft key to set the analysis/search source waveform.
   You cannot use auto setup under the following circumstances.
   - When the Analysis/Search Source Waveform Is Math1 to Math4
   - When state display is applied to a LOGIC bit that is set as the analysis/search source waveform.
2. If you set the trigger source to Logic, set the source bit.
3. Press the **Auto Setup** soft key to execute auto setup.
   - The instrument automatically sets the format, level, and hysteresis and then triggers at the end of S&C of the fast channel. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




**Source waveform**
Select a new waveform to be acquired or from waveforms displayed on the screen.

**Trigger Settings**
Select the check box to set a trigger.




**Restores the default settings**

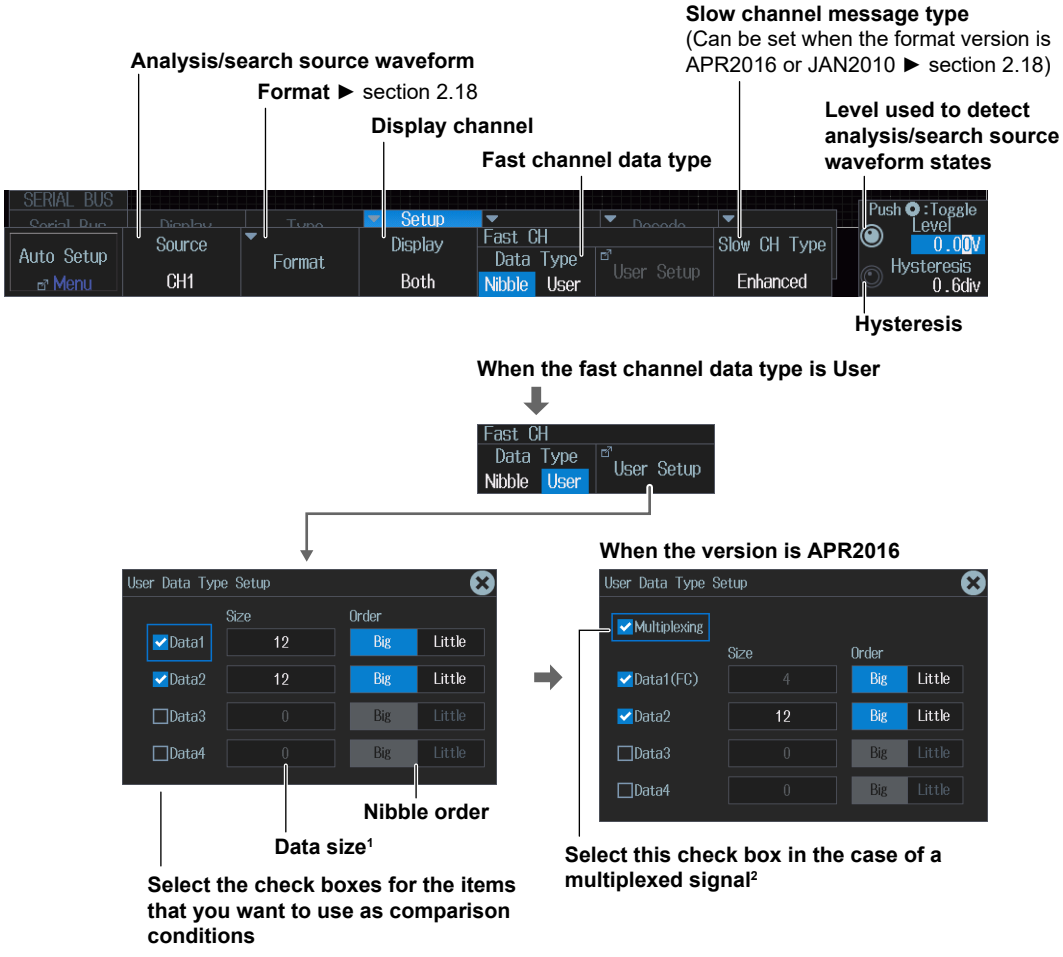
2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

## Manual setup

After running auto setup, you can change the following settings and display decoded results.

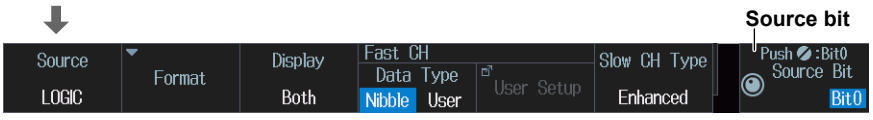
- Analysis/search source waveform
- Format
- Display channel
- Fast channel data type
- Fast channel user data type
- Slow channel message type
- Level used to detect analysis/search source waveform states
- Hysteresis




1 The total number of bits for Data1 to Data4 is up to 24. If you try to exceed the total number of bits, the data size of other pieces of Data is reduced.

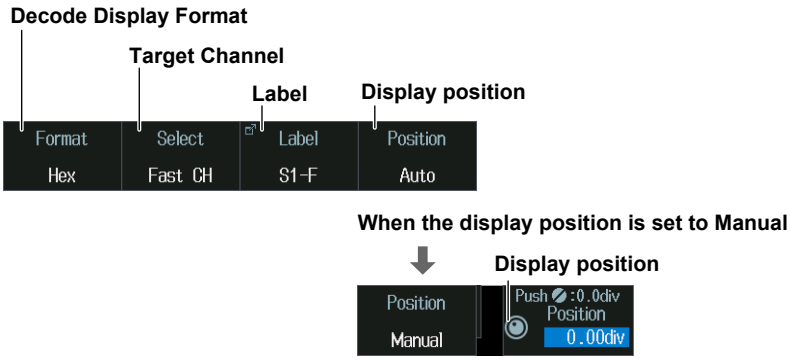
2 When the check box for Multiplexing is selected, the Size of Data1 is fixed to 4 to correspond to FC.

**When the analysis/search source is LOGIC**
(On models with the logic signal input port)



## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




### Target Channel (Select)

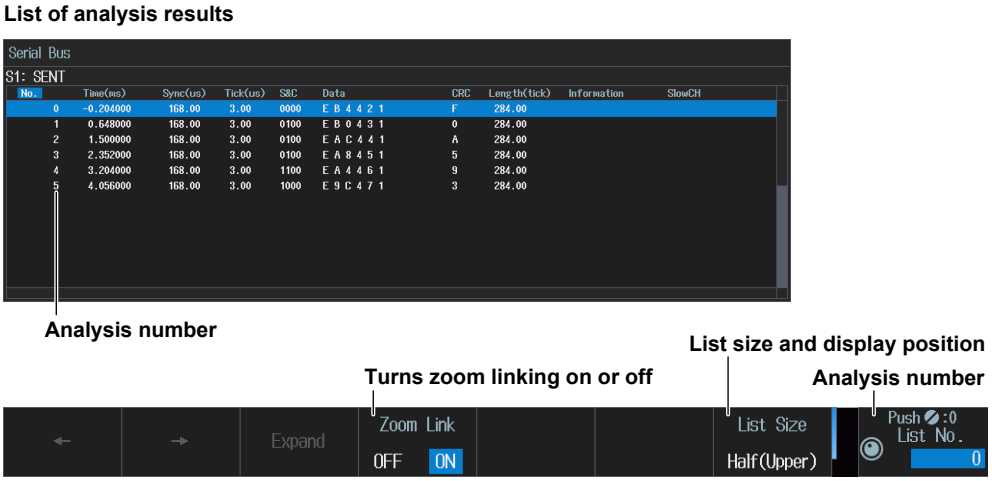
Select the channel that you want to set the label and display position of.

### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List/Trend - List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List/Trend** soft key and then the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

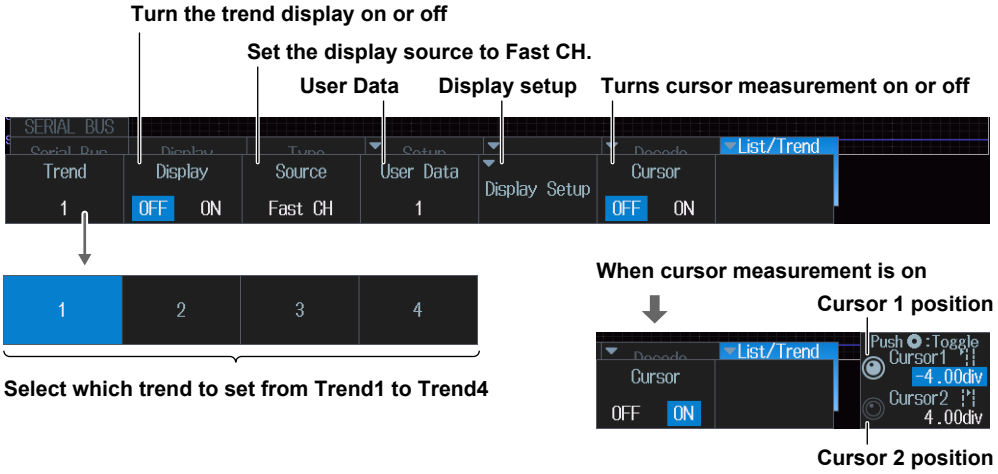


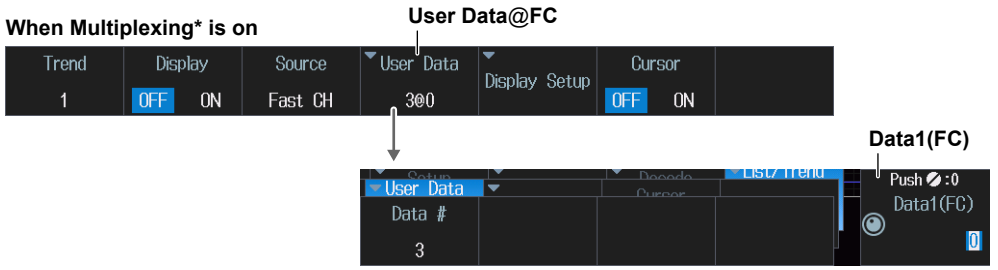

Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Trend Display (List/Trend - Trend)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List/Trend** soft key and then the **Trend** soft key.
   - The following menu items appear.
   - Up to four trends can be displayed. To switch the setup menu, press the **Trend** soft key and select a number from 1 to 4.

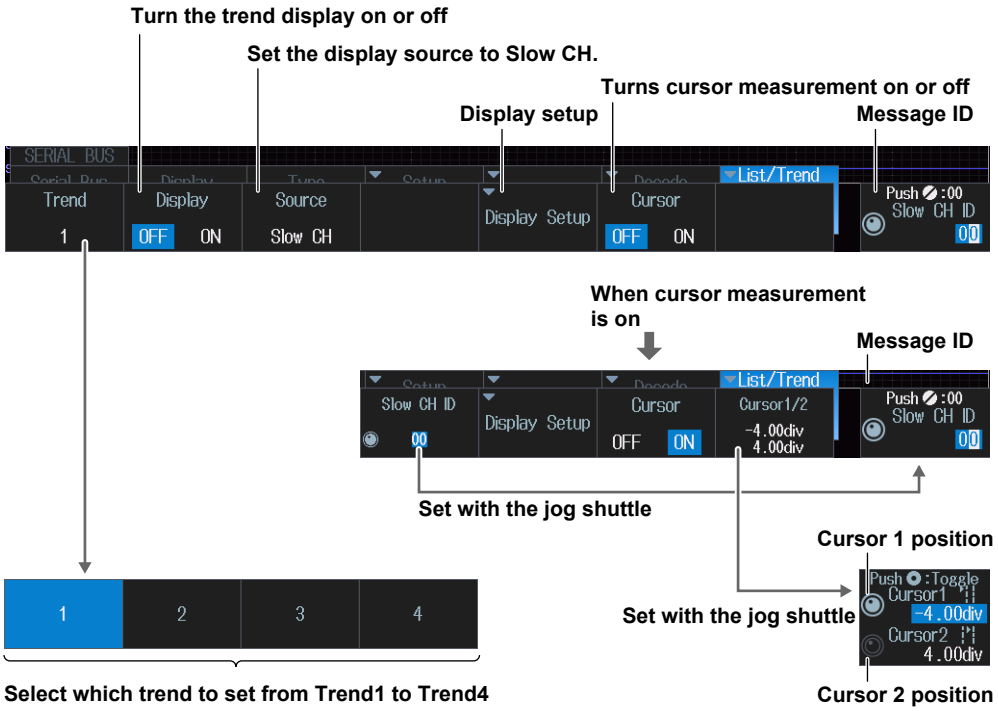
### When the Display Source Is Set to Fast Channel




* In the Fast CH data type settings, select the check box for Multiplexing.
For details, see page 12-31.

### When the Display Source Is Set to Slow Channel



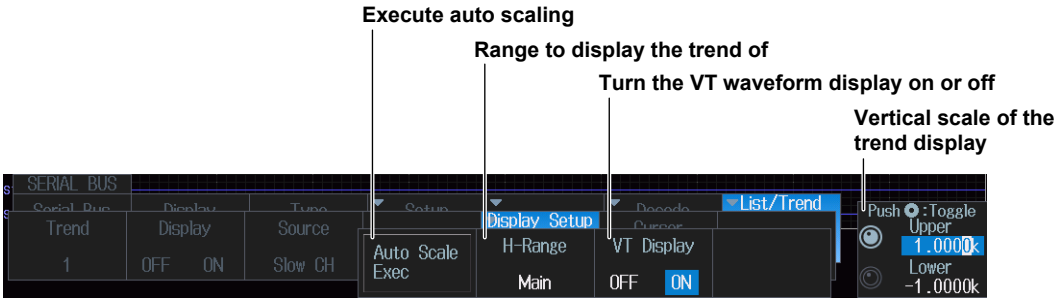

#### Message ID (Slow CH ID)

Set the message ID of the data you want to display the trend of. The selectable ID range varies depending on the decode display setting in the SERIAL BUS_SENT Menu (page 12-28), Version under Format in the bus setup (Setup) (page 12-29), and the slow channel message type in the bus setup.

| Version | FEB2008 and older | | | |
|---|---|---|---|---|
| | APR2016, JAN2010 | | | |
| Slow channel message type | Short | | Enhanced | |
| Decode display setting | Hex | Dec | Hex | Dec |
| Selectable range | 0 to F | 0 to 15 | 00 to FF | 0 to 255 |

## Configuring the Display (Display Setup)

Press the **Display Setup** soft key. The following menu items appear.



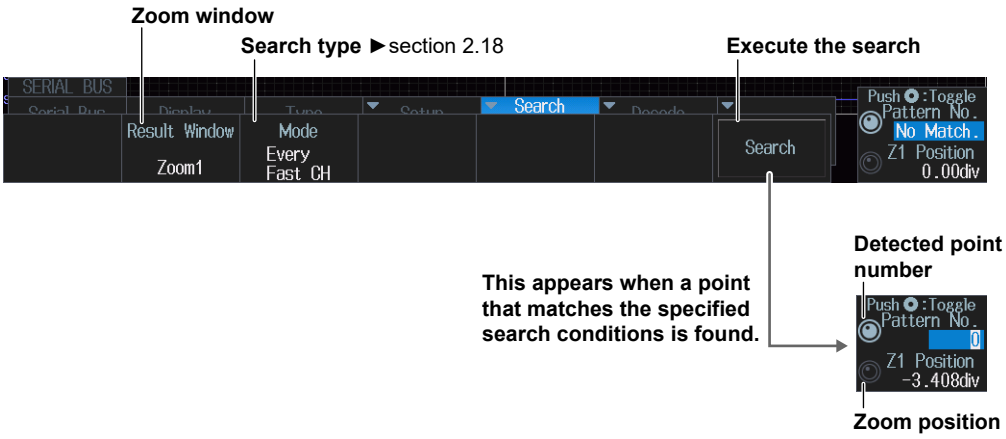

#### Executing Automatic Scaling (Auto Scale Exec)

Press the **Auto Scale Exec** soft key.

The upper and lower limits are set so that the difference between the maximum data value and minimum data value in the window selected with H-Range covers 80% of the vertical scale of the Trend window.

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

This is the same as setting trigger mode Every Fast CH, Fast CH S&C, Fast CH Data, Every Slow CH, Slow CH ID/Data, and Error. For details, see section 2.18.
However, the following setting methods differ.

- If the search type is Fast CH Data mode, set the data type (Data Type) using Data Type in Fast CH in bus setup (Setup) (page 12-31).
- If the search type is Every Slow CH mode or Slow CH ID/Data mode, the Slow CH message type (Slow CH Type) is set using Slow CH Type (Slow CH Type) in bus setup (Setup) (page 12-31)).
- If the search type is Slow CH ID/Data mode, the input format (Hex/Dec) of the reference values a and b of ID/Data of Condition Setup is changed by the decode display (Decode) setting of SEARCH SENT menu (page 12-28).

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.7 Analyzing and Searching PSI5 Airbag Signals (Option)

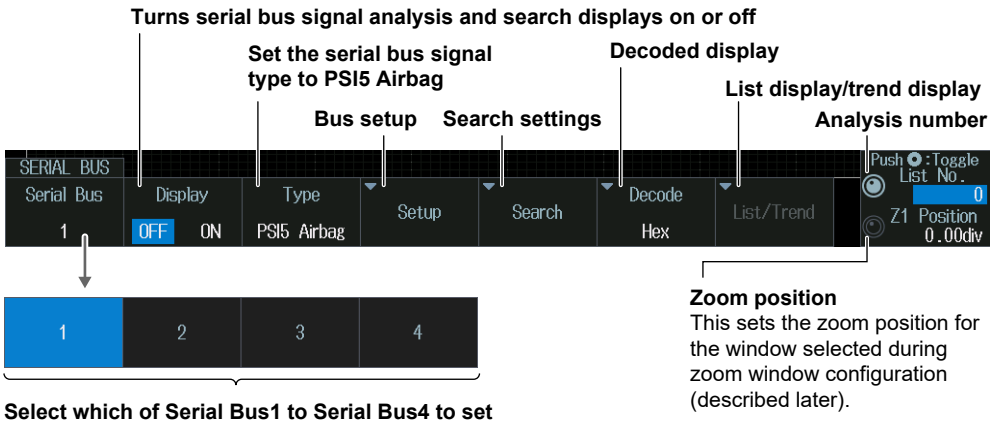
This section explains the following settings for analyzing or searching PSI5 Airbag signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, sync signal, data frame source, bit rate, data length, error detection method, sync noise rejection, clock tolerance, and the level and hysteresis used to detect the sync signal or data frame source state
- Decoded display
- List display
  List size, display position, and zoom linking
- Trend Display
  Display source, display settings, cursor measurement on/off, auto scale
- Analysis number
- Zoom position
- Search settings
  Zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching PSI5 Airbag Signals (Option)" in the Features Guide**

## SERIAL BUS PSI5 Airbag Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key. Select **PSI5 Airbag** from the setup menu that is displayed. The following menu items appear.



# Bus Setup (Setup)

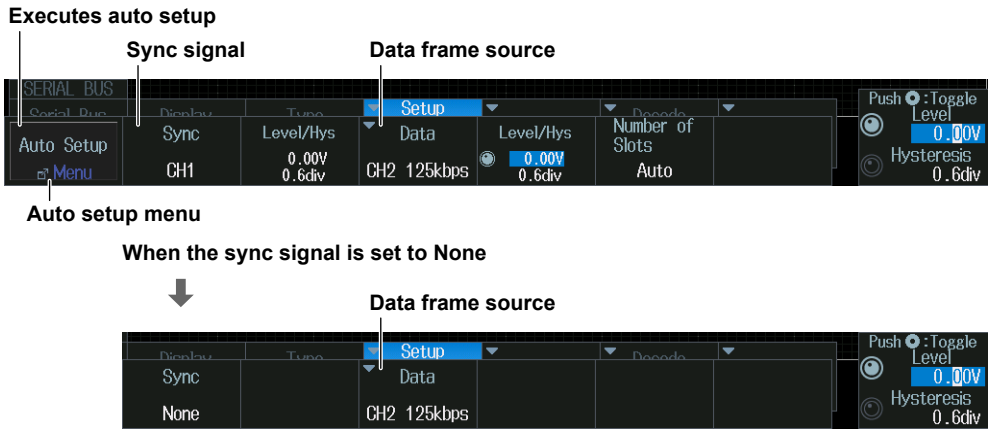
## *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

When you perform an analysis or execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Setup** soft key. The following menu items appear.

### Auto Setup (Auto Setup)

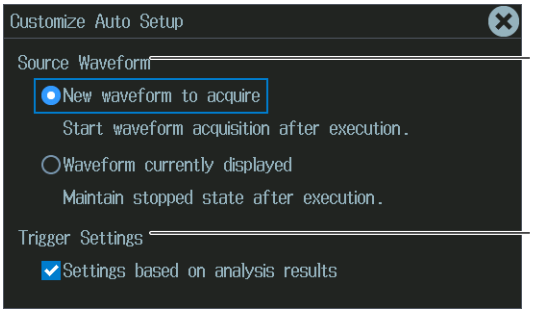



1. Press the **Sync** soft key to set the sync signal.
   - Auto setup cannot be performed when the source is set to Math1 to Math4.
   - If you select None, sync signal is not detected. Therefore, sync signal noise rejection is set to OFF.
2. Press the **Data** soft key to set the data frame source.
   Auto setup cannot be performed when the source is set to Math1 to Math4.
3. Press the **Auto Setup** soft key to execute auto setup.
   - Bit rate, data length, error detection method, sync signal noise rejection, clock tolerance, number of slots, level, and hysteresis are set automatically.
   - When the sync signal (Sync) source is CH1 to CH4, the instrument triggers on the rising edge of the sync pulse. When the sync signal source is None, the instrument triggers on the start bit of data frames. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




**Source waveform**
Select a new waveform to be acquired or from waveforms displayed on the screen.

**Trigger Settings**
Select the check box to set a trigger.




**Restores the default settings**

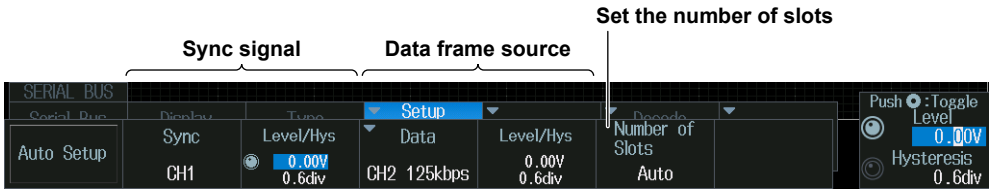
2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

## Manual setup

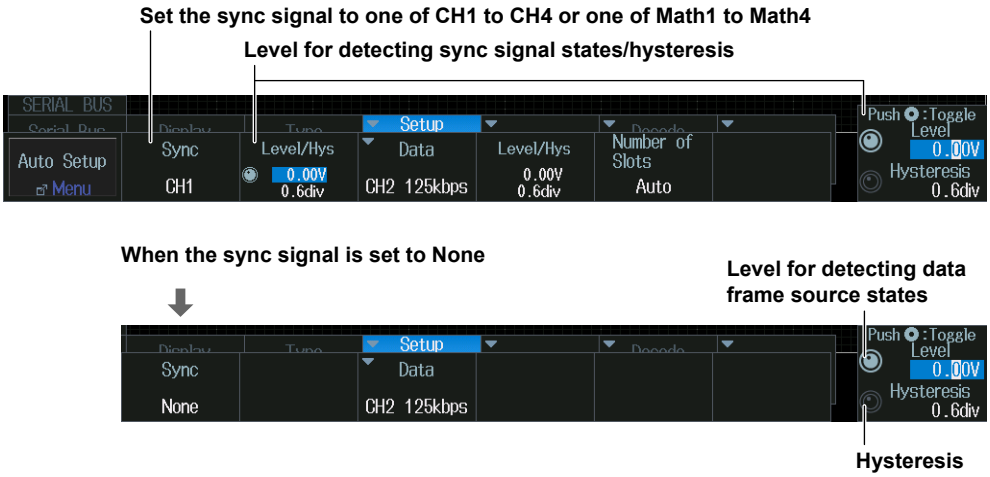
After running auto setup, you can change the following settings and display decoded results.

- Sync signal
- Level for detecting sync signal states/hysteresis
- Data frame source
- Level for detecting data frame source states/hysteresis
- Number of slots



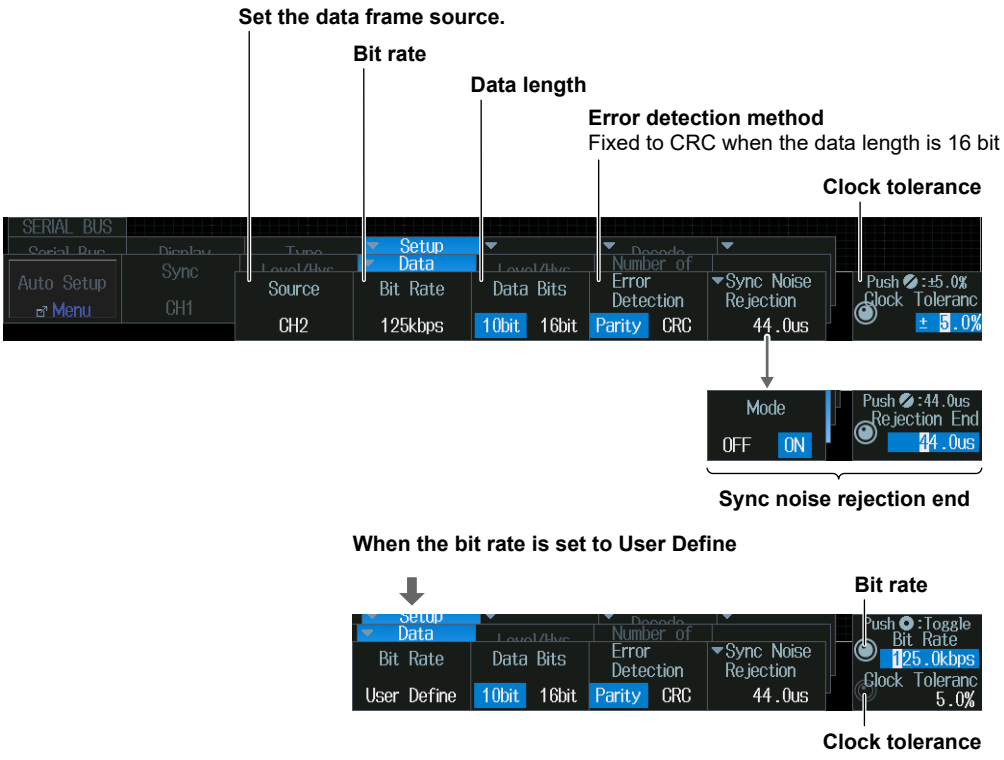
### Sync Signal (Sync)

Press the **Sync** soft key. A menu appears according to the sync signal you specified.



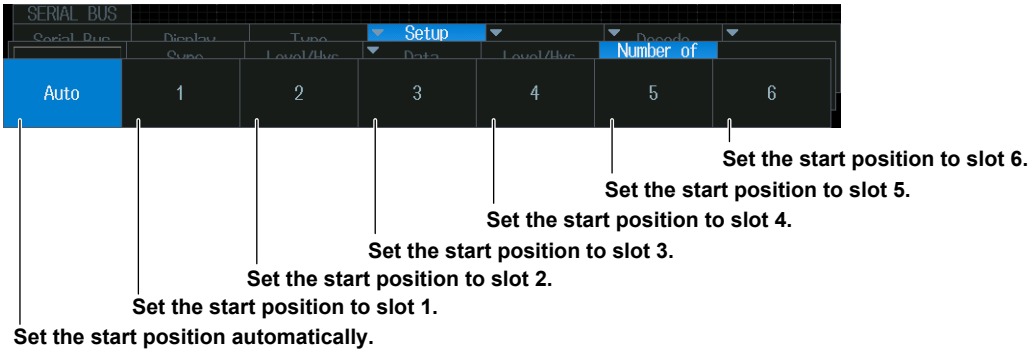

### Data Frame Source (Data)

Press the **Data** soft key. The following menu items appear.

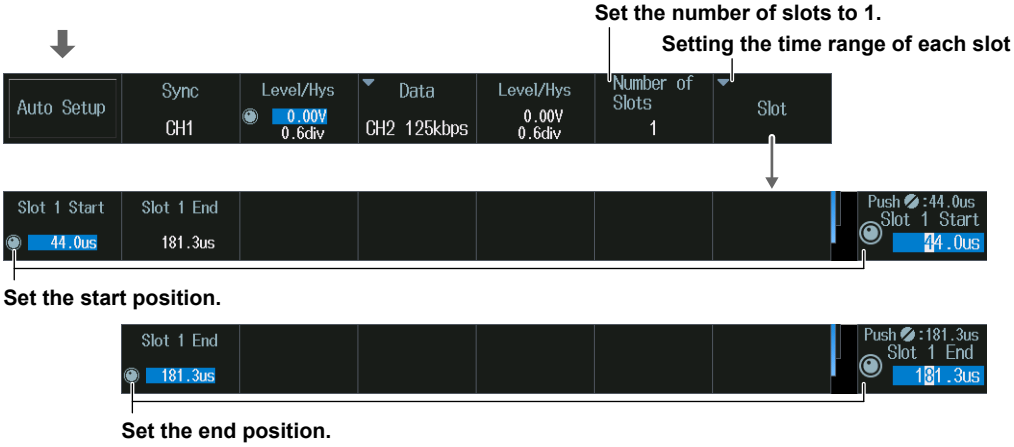


### Number of Slots (Number of Slots)

Press the **Number of Slots** soft key. The following menu items appear.

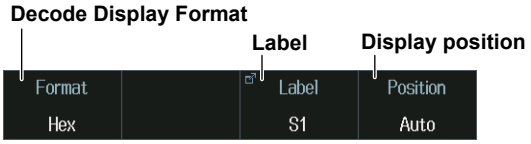



**When the number of slotsis set to for 1 to 6**

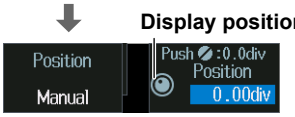



## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




**When the display position is set to Manual**



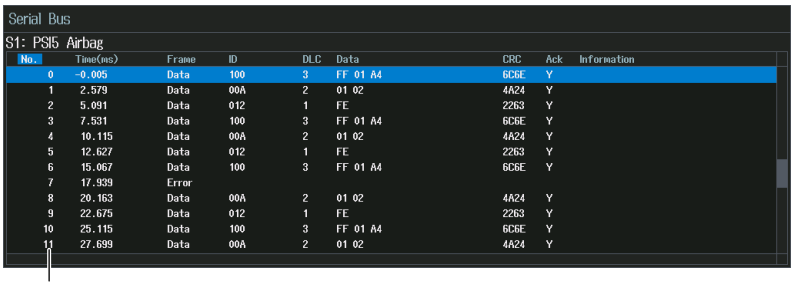

### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List/Trend - List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List/Trend** soft key and then the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

**List of analysis results**




**Analysis number**

**List size and display position**

**Turns zoom linking on or off**

**Analysis number**




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Trend Display (List/Trend - Trend)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List/Trend** soft key and then the **Trend** soft key.
   - The following menu items appear.
   - Up to four trends can be displayed. To switch the setup menu, press the **Trend** soft key and select a number from 1 to 4.

**Turn the trend display on or off**

**Display source**

**Display setup**

**Turns cursor measurement on or off**







**Select which trend to set from Trend1 to Trend4**

**When cursor measurement is on**

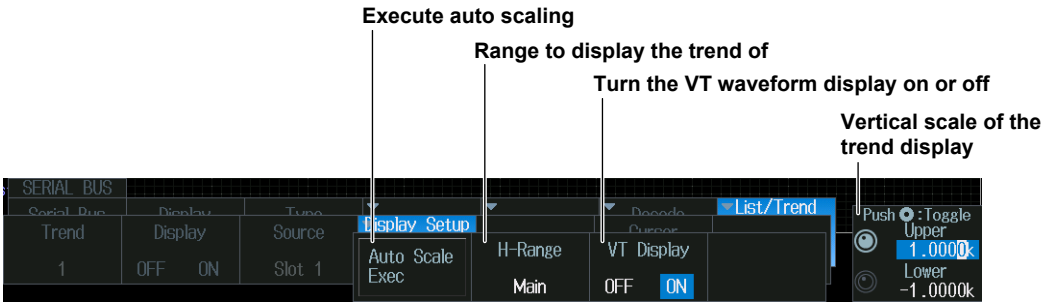
**Cursor 1 position**




**Cursor 2 position**

## Configuring the Display (Display Setup)

Press the **Display Setup** soft key. The following menu items appear.



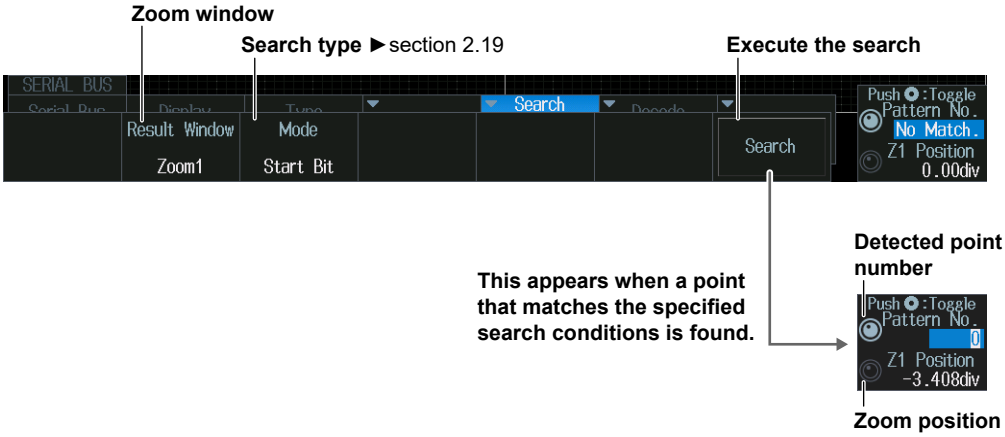

### Executing Automatic Scaling (Auto Scale Exec)

Press the **Auto Scale Exec** soft key.

The upper and lower limits are set so that the difference between the maximum data value and minimum data value in the window selected with H-Range covers 80% of the vertical scale of the Trend window.

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

This is the same as setting trigger mode Sync, Start Bit, Frame in Slot, Data, and Error. For details, see section 2.19.

Sync mode and Frame in Slot mode will not be available if the bus sync signal (Sync) is set to None.

## Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

## Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

## Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.8 Analyzing and Searching UART Signals (Option)

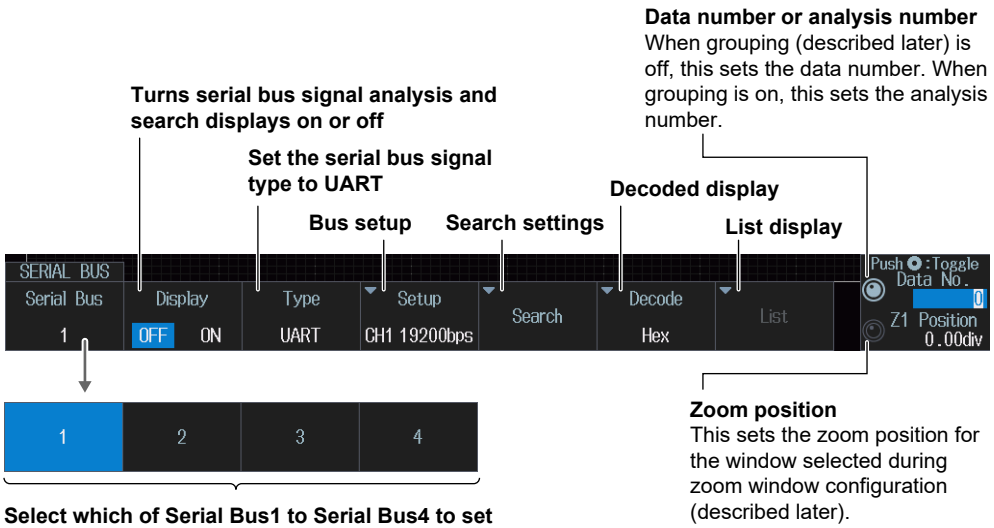
This section explains the following settings for analyzing or searching UART signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, analysis/search source waveform, data format, parity, grouping, level and hysteresis for detecting analysis/search source waveform states
- Decoded display
- List display
  List size, display position, grouping, detailed display, and zoom linking
- Analysis and data numbers
- Zoom position
- Search settings
  Zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching UART Signals (Option)" in the Features Guide**

## SERIAL BUS UART Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key**.** Select **UART** from the setup menu that is displayed. The following menu items appear.



## Bus Setup (Setup)

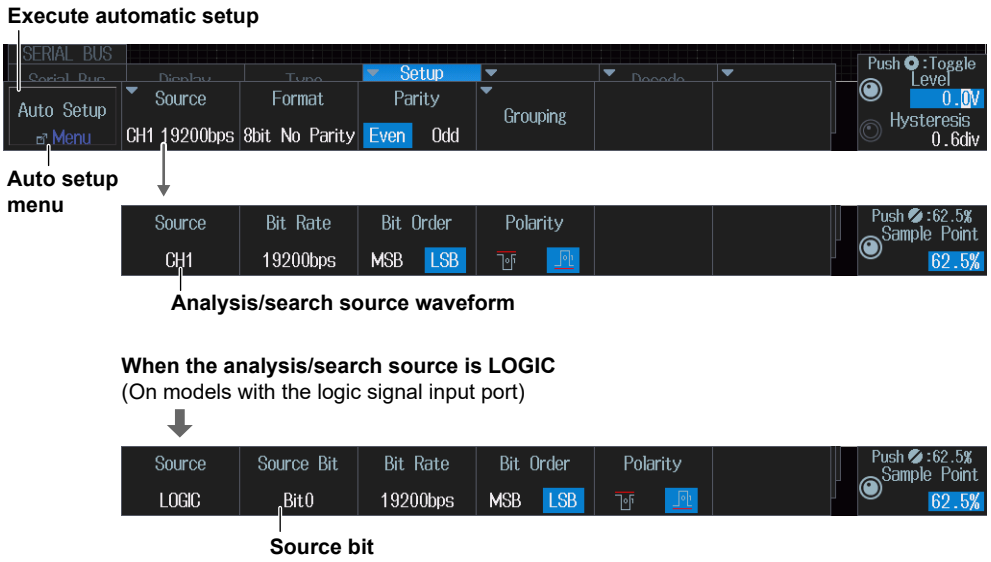
### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

When you perform an analysis or execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Setup** soft key. The following menu items appear.

### Auto Setup (Auto Setup)




1. Press the **Source** soft key to set the analysis/search source waveform. If you set the trigger source to Logic, set the source bit.

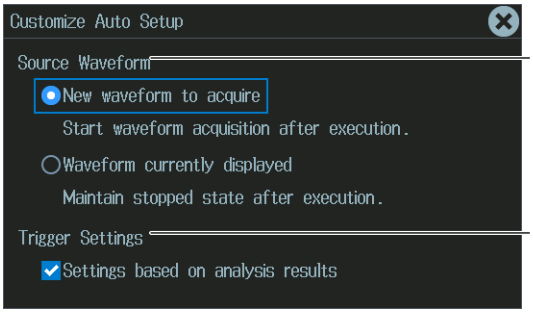
   You cannot use auto setup under the following circumstances.
   - When the Analysis/Search Source Waveform Is Math1 to Math4
   - When state display is applied to a Logic bit that is set as the analysis/search source waveform.

2. Press the **Auto Setup** soft key to execute auto setup.
   - The Instrument automatically configures the bit rate, sample point, level, and hysteresis and then triggers on the UART signal's Stop Bit. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




**Source waveform**
Select a new waveform to be acquired or from waveforms displayed on the screen.

**Trigger Settings**
Select the check box to set a trigger.




**Restores the default settings**

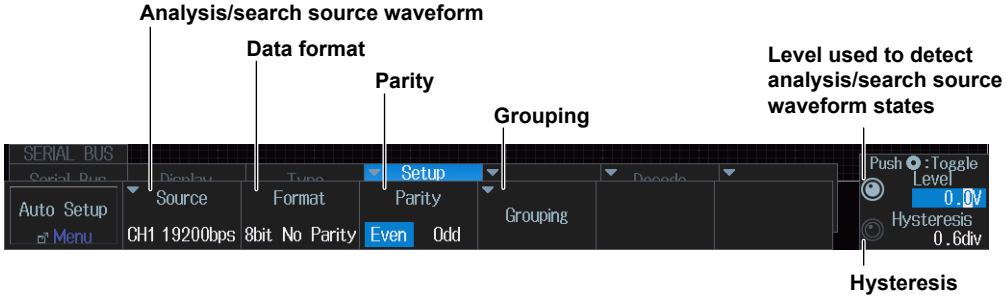
2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

## Manual setup

After running auto setup, you can change the following settings and display decoded results.

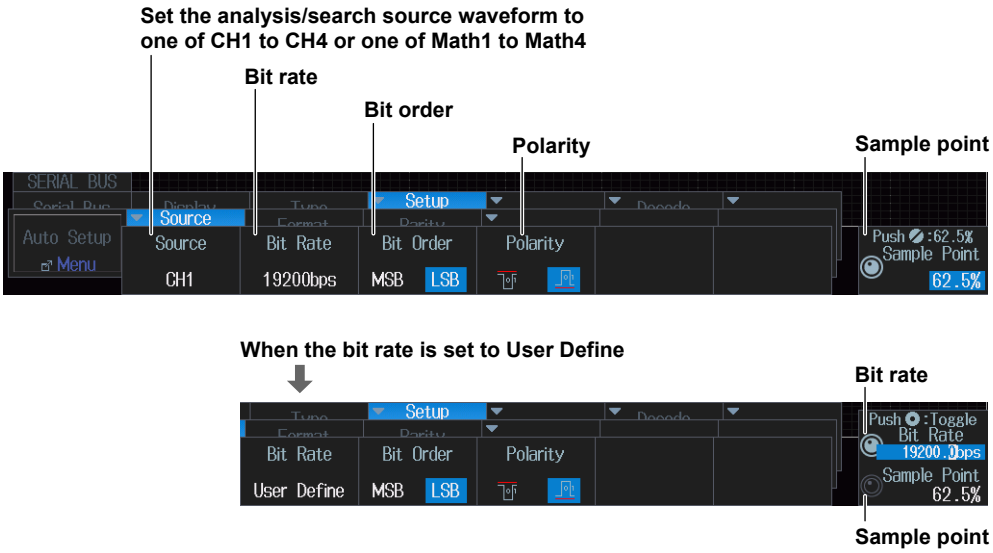
- Analysis/search source waveform
- Data format
- Parity
- Grouping
- Level used to detect analysis/search source waveform states
- Hysteresis



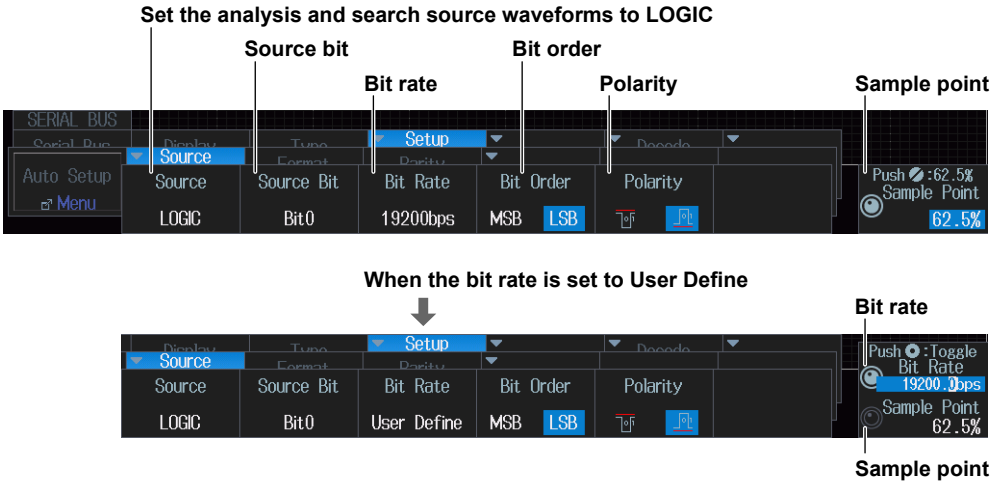
### Analysis/search source waveform (Source)

Press the **Source** soft key. A menu appears according to the analysis/search source waveform you specified.

- **When the Analysis/Search Source Waveform is CH1 to CH4 or Math1 to Math4**

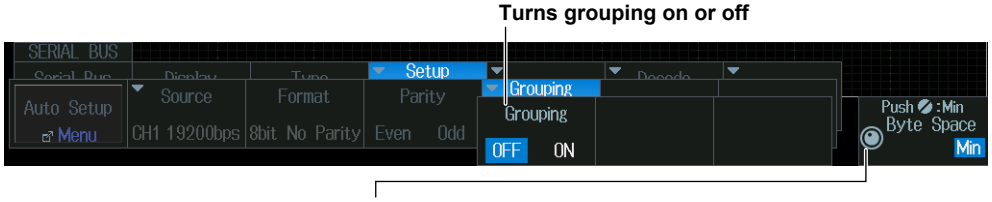



- **When the Analysis/Search Source Waveform Is LOGIC (On models with the logic signal input port)**




### Grouping (Grouping)

Press the **Grouping** soft key. The following menu items appear.

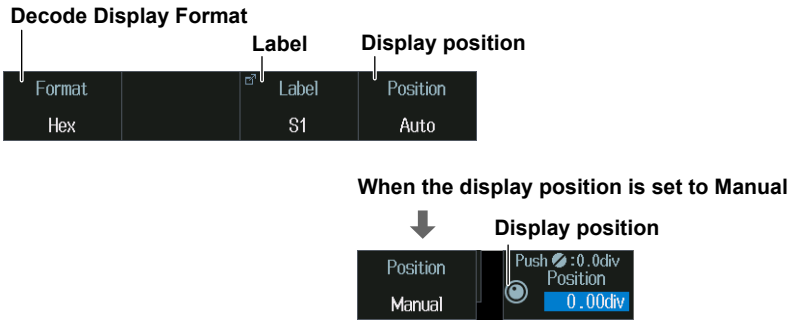



**Byte space**

When you turn grouping on, data whose time is shorter than the specified byte space (Byte Space) is decoded and displayed in a single group.

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




### Display Position (Position)

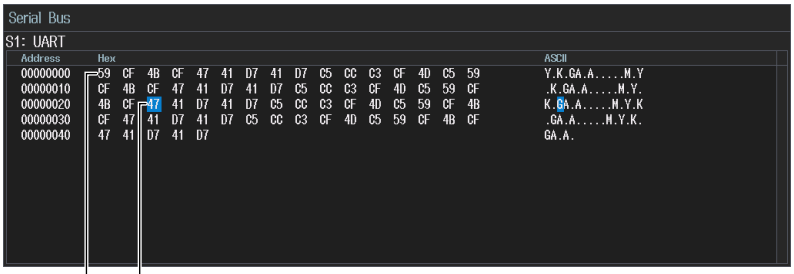
Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

### When Grouping Is Set to OFF

**List of analysis results**



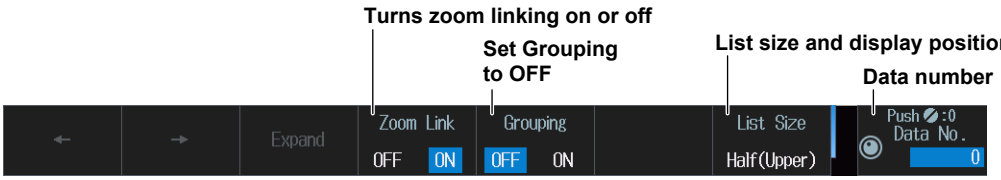

**When a framing error is detected**
The * mark is appended.

**When a parity error is detected**
The x mark is appended.

**If both a framing error and a parity error are detected**
The * mark used for framing errors is appended.

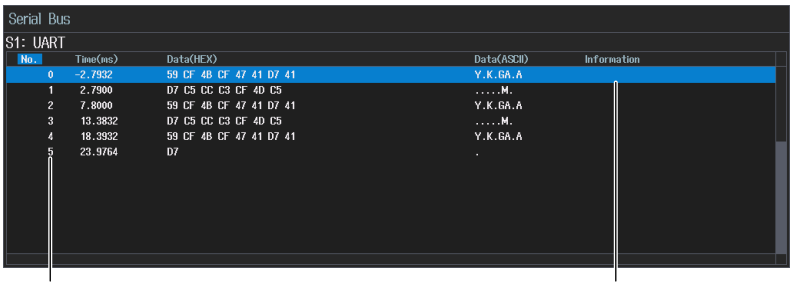
**The data that corresponds to the selected data number is highlighted.**

**Data from the leftmost side of the waveform display**



## When Grouping Is Set to ON

**List of analysis results**




**Analysis number**

**If multiple errors are detected in one piece of data, the instrument only displays the framing error indication.**
**Framing Error, Parity Error**

**Turns zoom linking on or off**

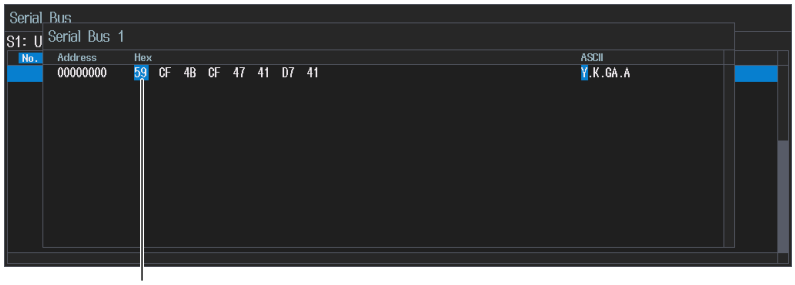
**List size and display position**

**Set Grouping to ON**

**Analysis number**




**This is the list of analysis results that is displayed when you press the Detail soft key.**
All data for the specified analysis number is displayed.




**The data that corresponds to the selected data number is highlighted.**

**Data number**

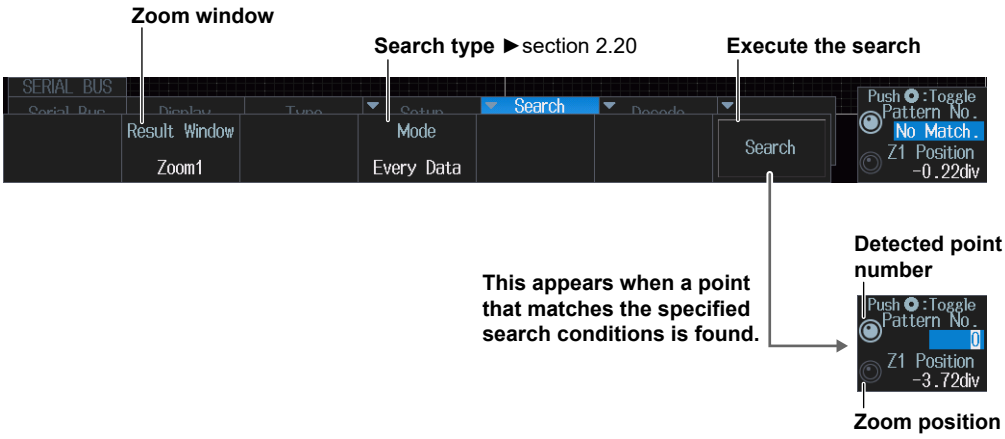



The same marks are appended to the data numbers if an error is detected as when grouping is off.

Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

You can set this setting in the same way that you set the trigger mode to Every Data, Error, or Data. For details, see section 2.20.

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.9 Analyzing and Searching I²C Bus Signals (Option)

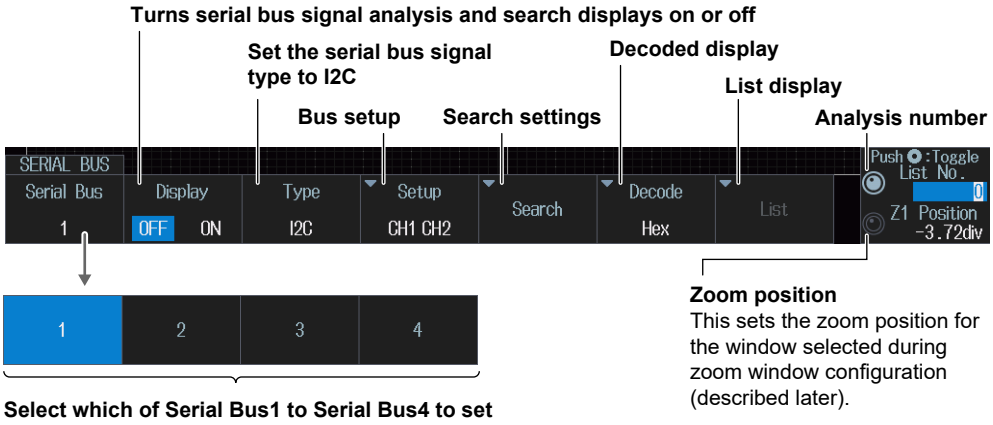
This section explains the following settings for analyzing or searching I²C bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, SCL source, SDA source, level and hysteresis for detecting SCL and SDA source states
- Decoded display
- List display
  List size, display position, detailed display, and zoom linking
- Analysis and data numbers
- Zoom position
- Search settings
  Zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching I²C Bus Signals (Option)" in the Features Guide**

## SERIAL BUS I²C Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key. Select **I2C** from the setup menu that is displayed. The following menu items appear.



## Bus Setup (Setup)

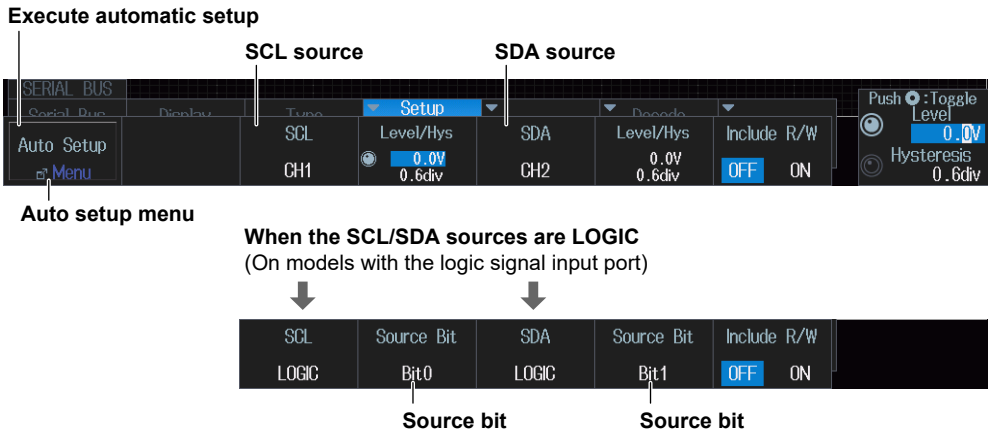
### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

When you perform an analysis or execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

Press the **Setup** soft key. The following menu items appear.

### Auto Setup (Auto Setup)




1. Press the **SCL** and **SDA** soft keys to set their sources. If you set the SCL or SDA source to Logic (L), set the source bit.

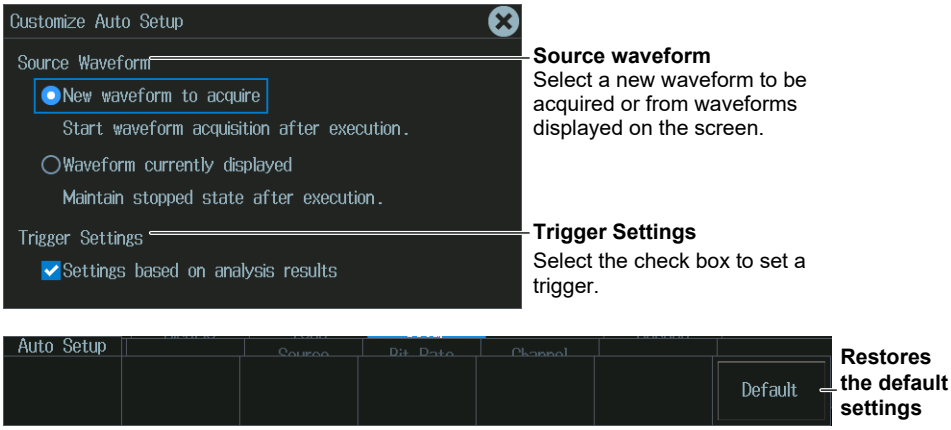
   You cannot use auto setup under the following circumstances.
   - When the SCL or SDA source is set to Math1 to Math4
   - When state display is applied to a LOGIC bit that is set as the SCL or SDA source.

2. Press the **Auto Setup** soft key to execute auto setup.
   - The instrument automatically configures the level and hysteresis and triggers on the start condition of the I²C bus signal. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
   - While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

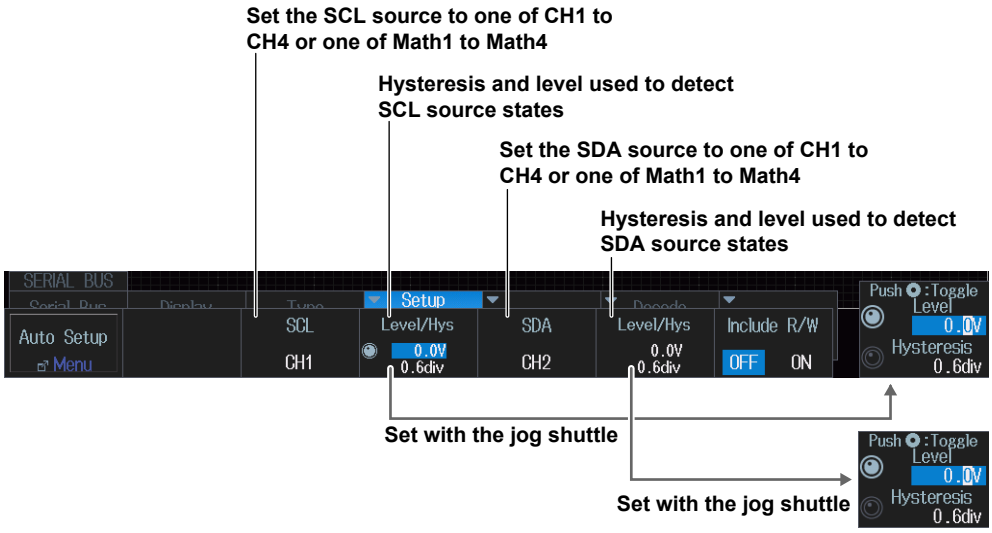
3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

## Manual Setup

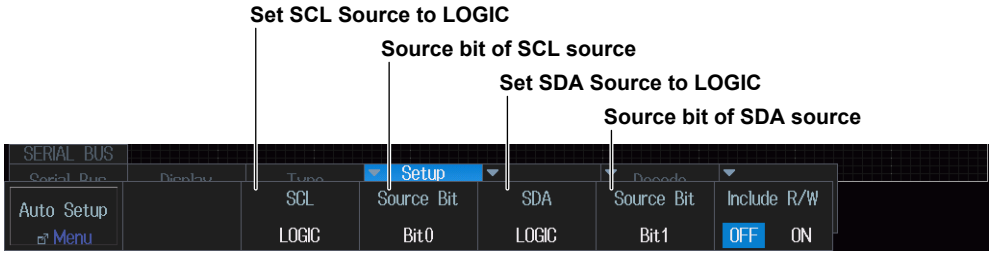
After running auto setup, you can change the following settings and display decoded results.

- SCL source
- SDA source
- Level used to detect SCL source/SDA source states
- Hysteresis

### When CH1 to CH4 and Math1 to Math4 Are Set as SCL Source and SDA Source



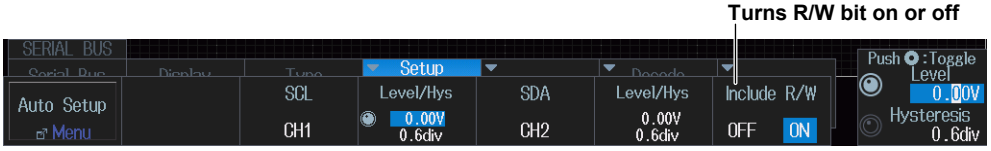

### When LOGIC is set to SCL source or SDA source (On models with the logic signal input port)




## R/W Bit Inclusion (Include R/W)

Specify whether to include the R/W bit (ON) or omit it (OFF) when setting or displaying the address. This setting affects the configuration and display of the address pattern in the following situations.

- Search type when search type is Address Data (Address in the Condition Setup screen)
- Decoded display
- When the 1st and 2nd address boxes on the list display are visible




ON: Include the R/W bit when setting or displaying the address pattern.

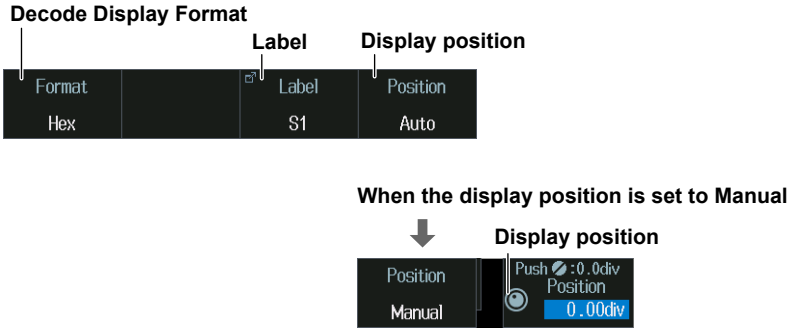
OFF: Omit the R/W bit when setting or displaying the address pattern.

### *Note*

R/W bit inclusion (Include R/W) can also be set by selecting I²C Bus Signal Trigger, then Trigger Mode (Mode), and then Address Data Mode. The settings are synced. For details about I²C bus signal trigger, see section 2.21.

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.



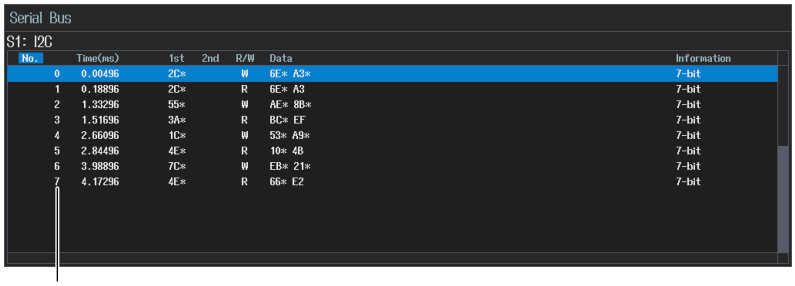

### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

**List of analysis results**




**Analysis number**

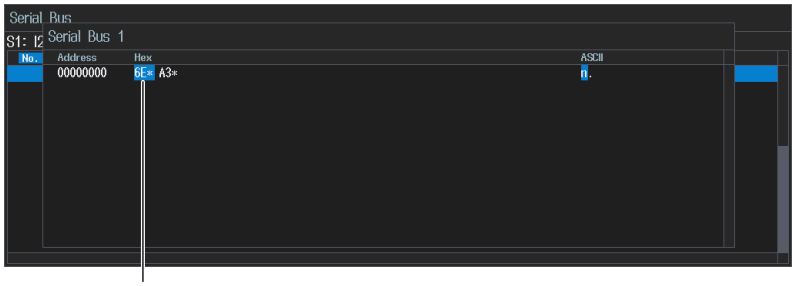
**List size and display position**

**Turns zoom linking on or off**

**Analysis number**




**This is the list of analysis results that is displayed when you press the Detail soft key.**
All data for the specified analysis number is displayed.




**The data that corresponds to the selected data number is highlighted.**

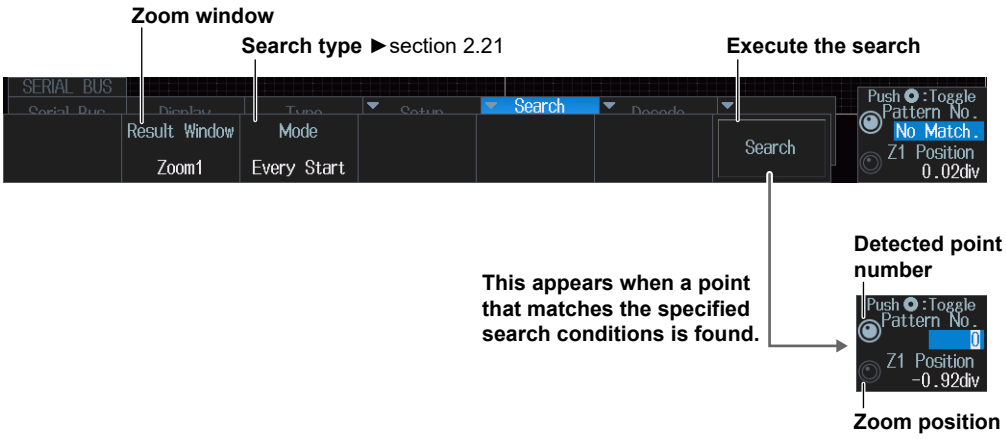
**Data number**




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Type (Mode)

You can make this setting in the same way that you set the trigger mode to Every Start, Address Data, NON ACK, General Call, Start Byte, or HS Mode. For details, see section 2.21.

### Executing a Search (Search)

1. Set the search type.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.10 Analyzing and Searching SPI Bus Signals (Option)

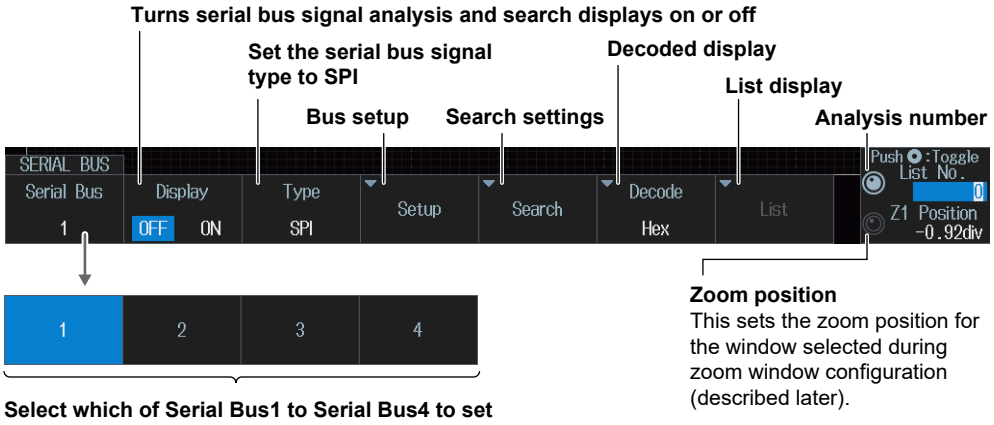
This section explains the following settings for analyzing or searching SPI bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Auto setup, wiring system, clock source, data source, chip select source, bit order
- Decoded display
- List display
  List size, display position, detailed display, and zoom linking
- Analysis and data numbers
- Zoom position
- Search settings
  Zoom window, search type, and search execution

► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching SPI Bus Signals (Option)" in the Features Guide**

## SERIAL BUS SPI Menu

1. Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.
   - You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
   - You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
   - The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.
2. Press the **Type** soft key**.** Select **SPI** from the setup menu that is displayed. The following menu items appear.



## Bus Setup (Setup)

### *Note*

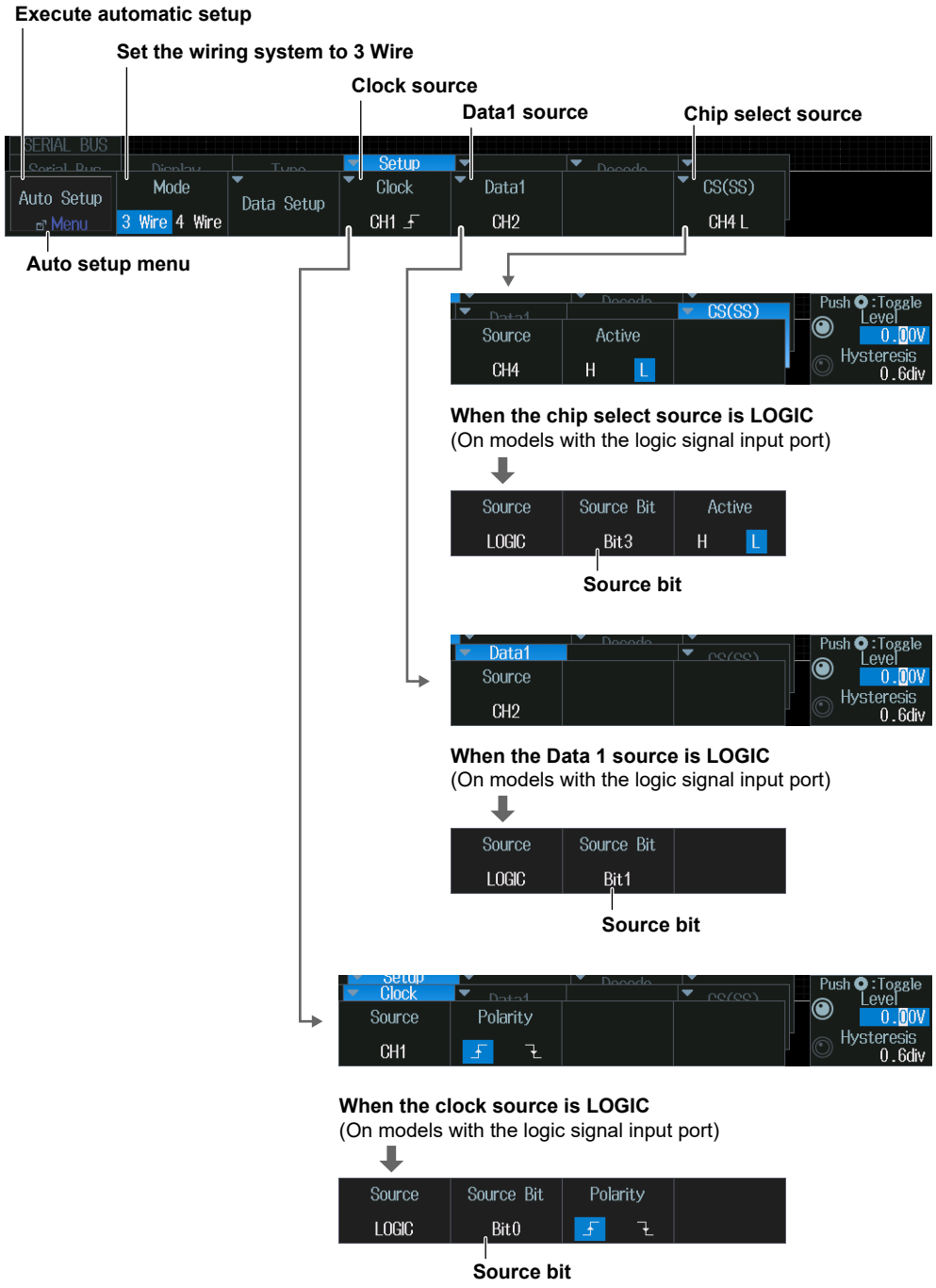
**Using the CH4 Terminal and Logic Signal Input Port**

When you perform an analysis or execute a search, you cannot use the CH4 terminal and the logic signal input port as the source at the same time. Specify the source that you want to use in advance by pressing either CH4 or LOGIC.

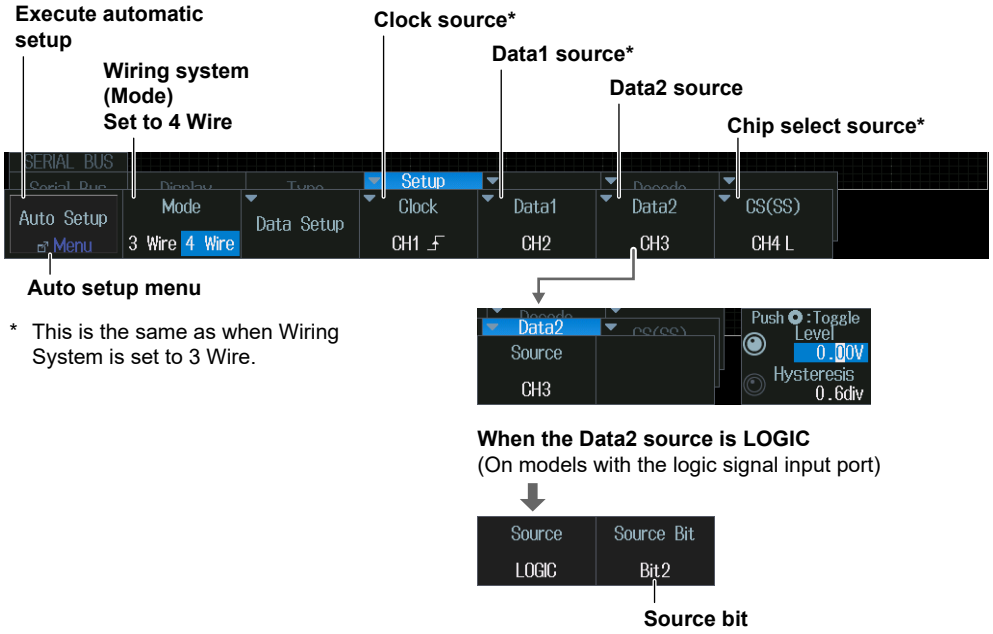
Press the **Setup** soft key. The following menu items appear.

### Auto Setup (Auto Setup)

#### When Wiring System Is 3 Wire



### When Wiring System Is 4 Wire




* This is the same as when Wiring System is set to 3 Wire.

***1.*** Press the **Mode**, **Clock**, **Data**, and **CS (SS)** soft keys to set their sources. If you select LOGIC, set the source bit (Bit0 to Bit7).

You cannot use auto setup under the following circumstances.

- When the clock, Data1, Data2, or chip select source is set to Math1 to Math4.
- When state display is applied to any of the LOGIC bits set as the clock, Data1, Data2, or chip select source.
- When the chip select source is set to None (Ignore)

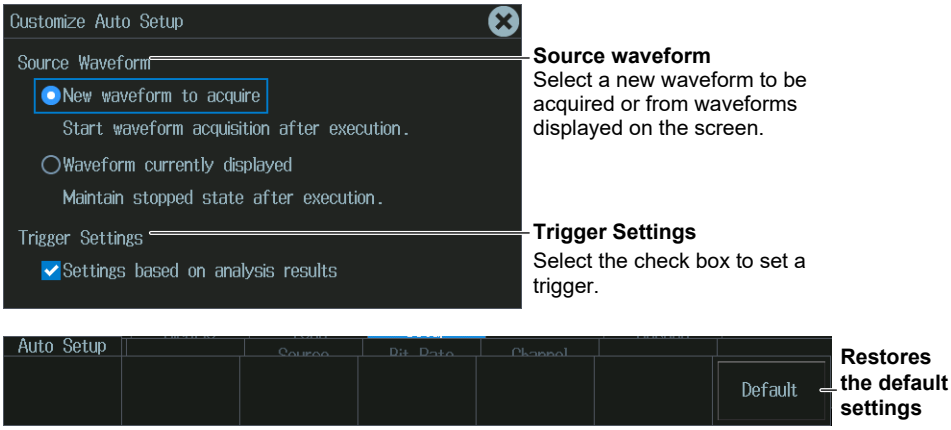
***2.*** Press the **Auto Setup** soft key to execute auto setup.

- The instrument automatically configures the level and hysteresis and then triggers on the SPI bus signal's first data byte. Triggers are not set if you unselect the Trigger Settings check box on the auto setup menu explained later.
- While the serial bus is being configured, Auto Setup changes to Abort. If you want to stop, press the **Abort** soft key.

### Auto Setup Menu (Menu)

You can set the analysis/search source waveform and select whether to set a trigger.

1. Press **SHIFT+F1**. The following screen and menu appear.
   You can also display them by pressing **SHIFT** and then the **Auto Setup** soft key.




2. Tap the screen to set the source waveform and trigger.
   - When waveform acquisition is in progress, the source waveform is fixed to a new waveform to be acquired.
   - If you clear the trigger setting check box, the trigger is not set even when auto setup is performed.

3. Press **ESC**. The menu returns to the bus setup menu.
   Press the **Auto Setup** soft key to execute auto setup. If you change the source waveform or the trigger setting from its default value, the soft key changes from Auto Setup to Auto Setup (Customized).

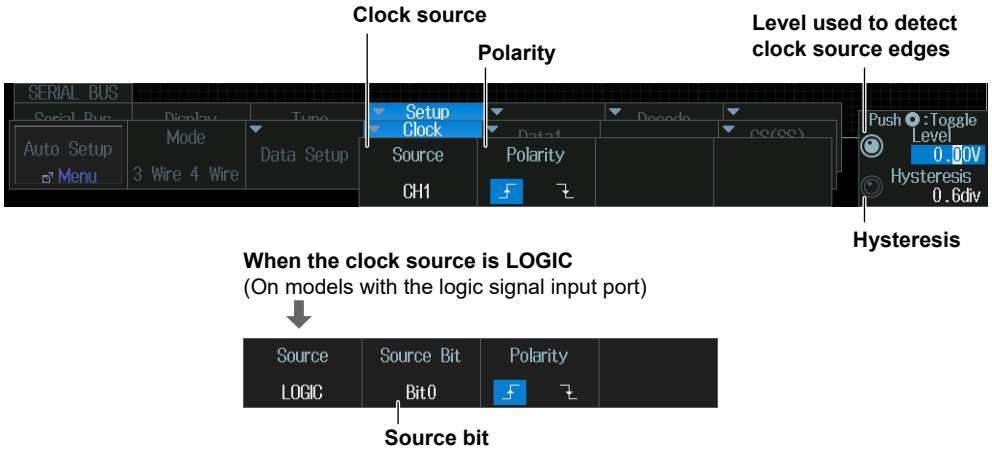
## Manual Setup

After running auto setup, you can change the following settings and display decoded results.

| | |
|---|---|
| Wiring system | Level used to detect clock source edges |
| Clock source | Level used to detect data source/chip select source states |
| Data 1 and 2 sources | Hysteresis |
| Chip select source | Polarity |

### Clock Source (Clock)

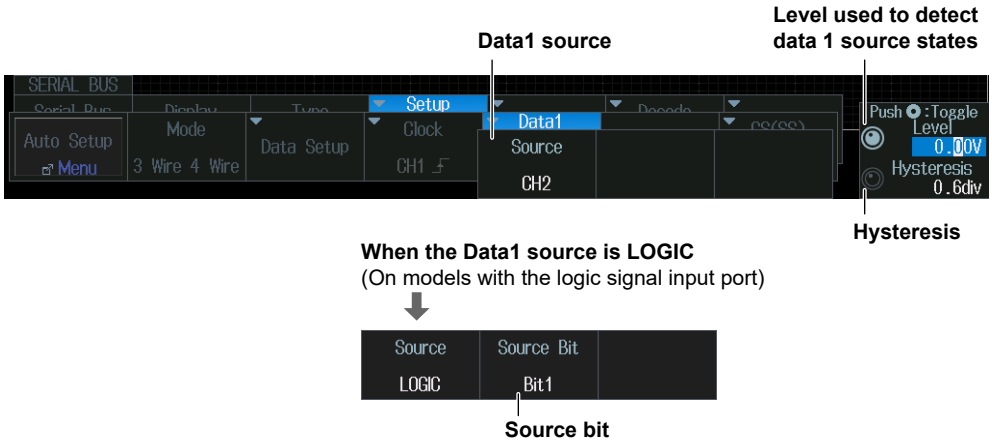
Press the **Clock** soft key. The following menu items appear.



### Data 1 and Data 2 Sources (Data1 and Data2)

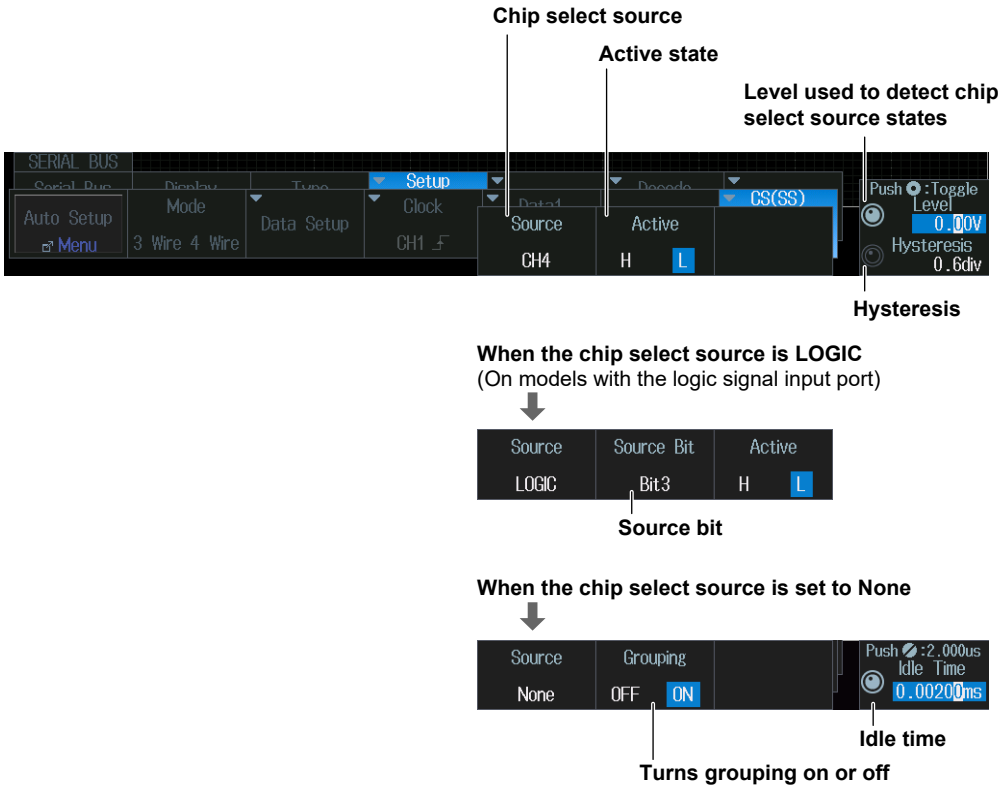
Press the **Data1** or **Data2** soft key. The following menu items appear.

This section explains how to set the Data 1 source. The Data 2 source can be set in the same way. Set the Data2 source when the wiring system is 4 Wire.



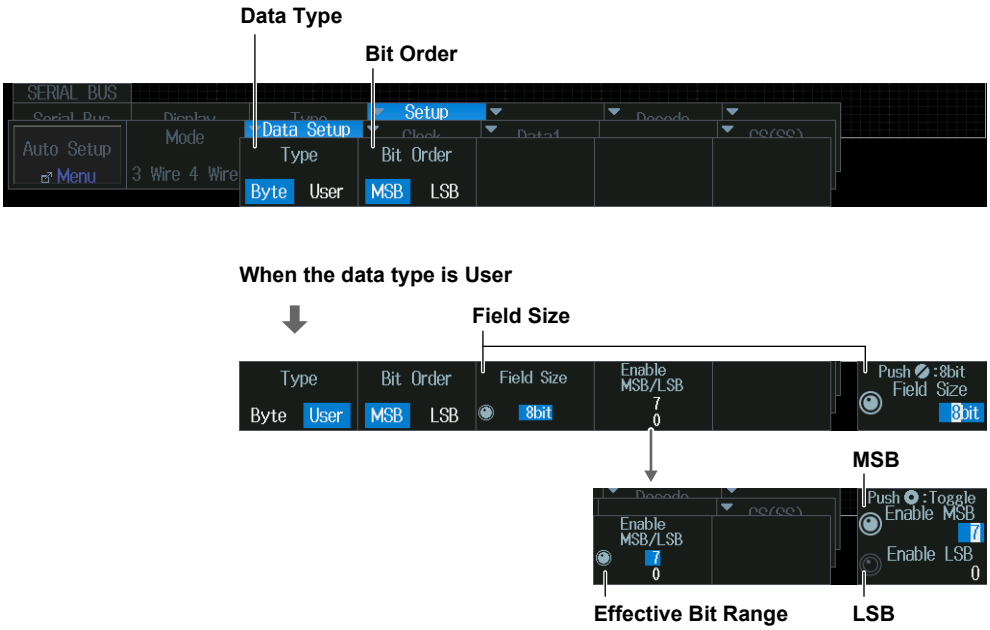

### Chip Select Source (CS (SS))

Press the **CS(SS)** soft key. The following menu items appear.



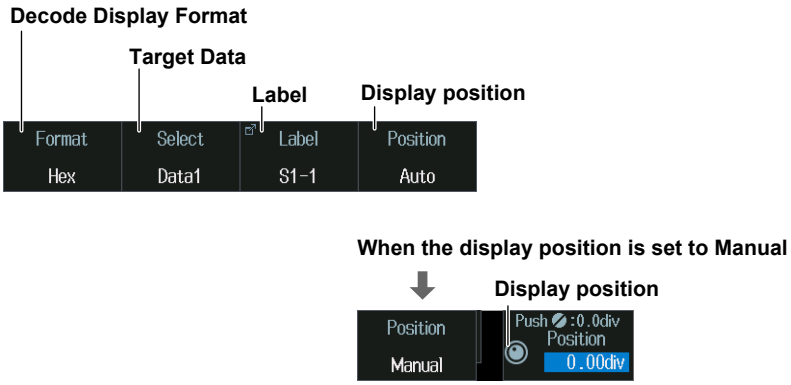
### Setting the Data Format (Data Setup)

Press the **Data Setup** soft key. The following menu items appear.




## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.




### Target Data (Select)

Select the data that you want to set the label and display position of.

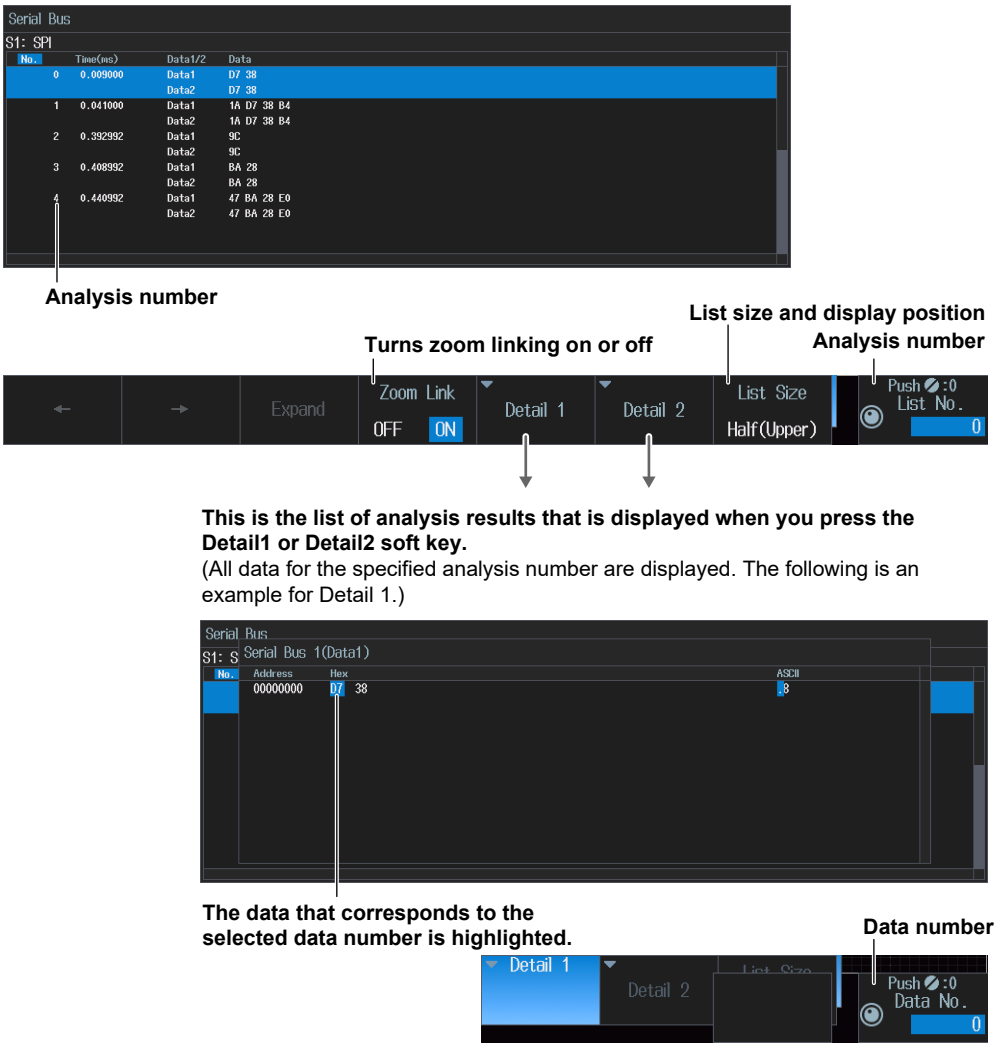
### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## List Display (List)

1. Press the **Display** soft key and turn on the analysis and search displays.
2. Press the **List** soft key.
   - The list of analysis results and he next menu appear.
   - When the wiring system is set to 3 Wire, the contents of Data 1 are displayed in a list. When the wiring system is set to 4 Wire, the contents of Data 1 and Data 2 are displayed in a list.
   - If several display settings of Serial Bus 1 to 4 are on, all the lists of analysis results of the serial buses whose display setting is on are displayed. For details, see section 12.12.

**List of analysis results**



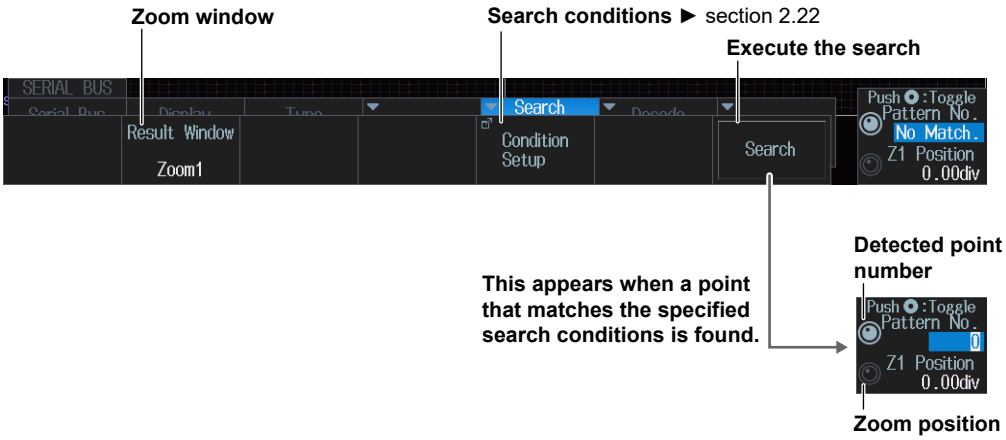

**This is the list of analysis results that is displayed when you press the Detail1 or Detail2 soft key.**
(All data for the specified analysis number are displayed. The following is an example for Detail 1.)




Data before the trigger position (on the left side of the waveform display) is assigned analysis numbers in descending order (–1, –2, and so on). Data after the trigger position (on the right side of the waveform display) is assigned analysis numbers in ascending order (0, 1, 2, and so on).

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Conditions (Condition Setup)

You can set search conditions in the same way that you set trigger conditions. For details, see section 2.22.

### Executing a Search (Search)

1. Set the search conditions.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.11 Analyzing and Searching User-Defined Serial Bus Signals

This section explains the following settings for analyzing or searching user-defined serial bus signals:

- Turning analysis and search displays on or off
- Serial bus signal types
- Bus setup
  Data source, bit rate, decoding start point, clock source, enable source, latch source
- Decoded display
- Zoom position
- Search settings
  Zoom window, search type, and search execution

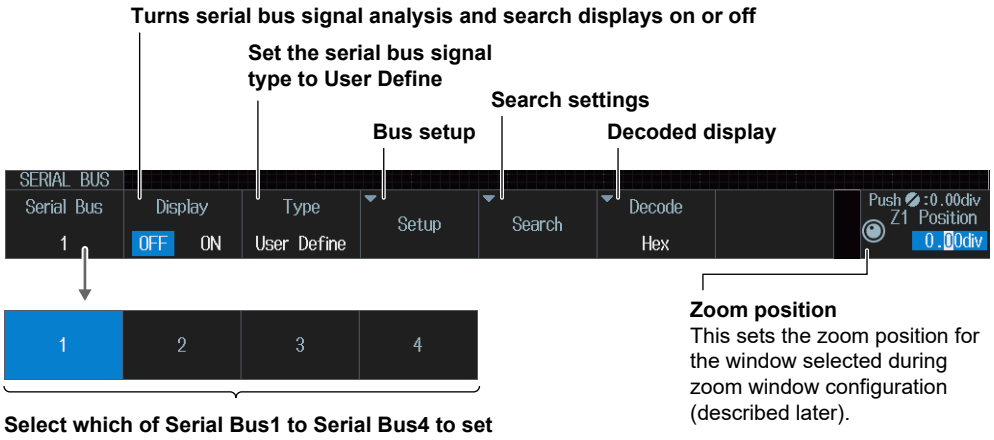
► **"Analyzing and Searching Serial Bus Signals" and "Analyzing and Searching User-Defined Serial Bus Signals (User Define)" in the Features Guide**

## SERIAL BUS User Define Menu

***1.*** Press **SHIFT+SEARCH** (SERIAL BUS). The SERIAL BUS menu appears.

- You can also tap **MENU** (MENU) in the upper left of the screen and select the SERIAL BUS menu from **ANALYSIS** on the top menu that is displayed.
- You can also press **ANALYSIS** and then the **To SERIAL BUS** soft key to display the SERIAL BUS menu.
- The instrument can analyze and search the waveforms of up to four serial bus signals. To switch the setup menu, press the **Serial Bus** soft key and select a number from 1 to 4.

***2.*** Press the **Type** soft key**.** Select **User Define** from the setup menu that is displayed. The following menu items appear.



## Bus Setup (Setup)

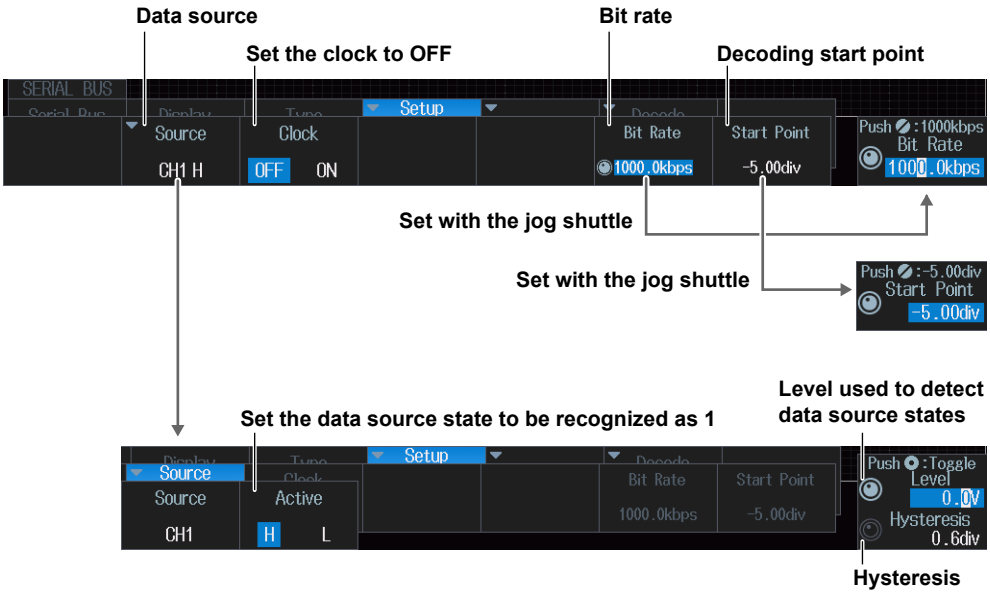
### *Note*

**Using the CH4 Terminal and Logic Signal Input Port**

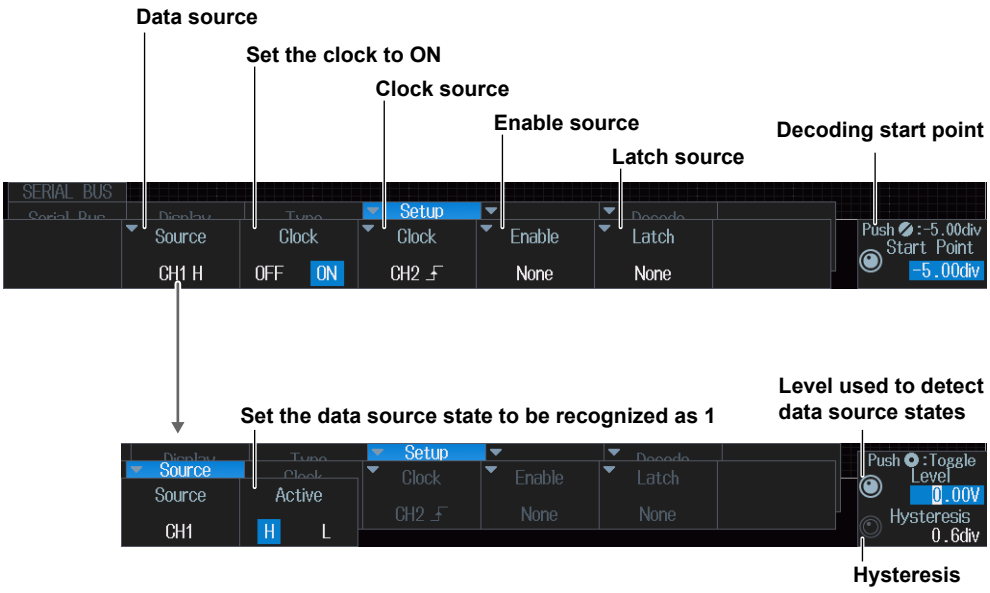
If you perform an analysis or execute a search when using the logic signal input ports for input, you cannot specify CH4 as the source. Press CH4 in advance to enable input from the CH4 terminal.

Press the **Setup** soft key. The menu that appears varies depending on whether the clock is set on or off.

### When the Clock Is Off

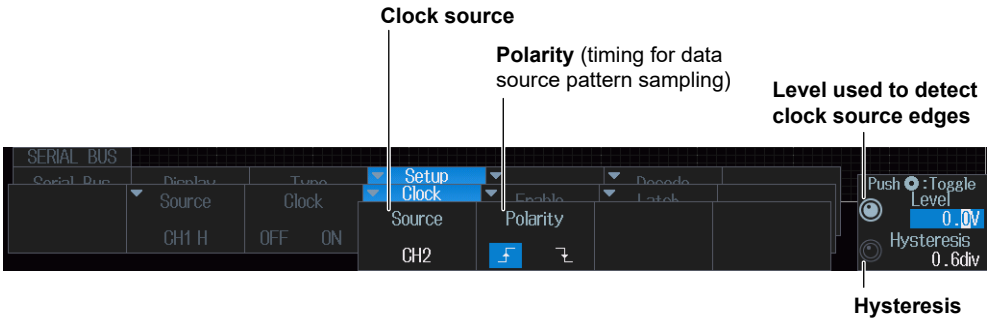



### When the Clock Is On



### Clock Source (Clock)

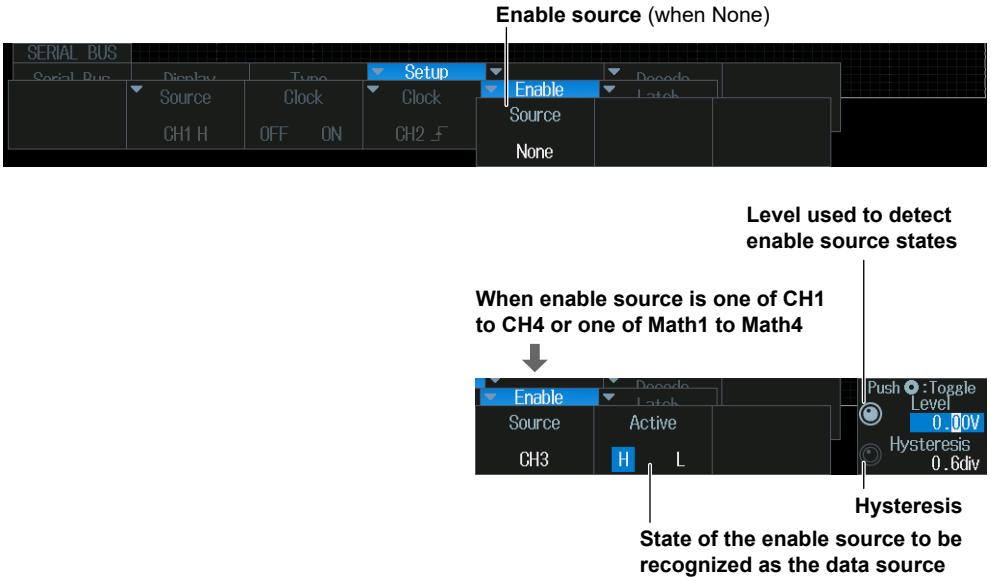
Press the **Clock** soft key. The following menu items appear.




Specify which clock source edge causes the data source to be sampled.

### Enable Source(Enable)

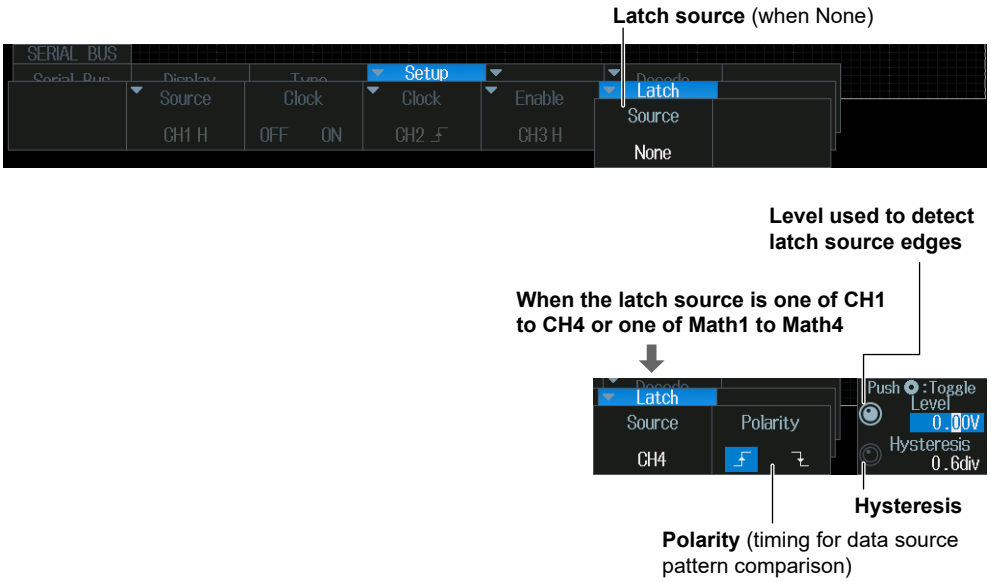
Press the **Enable** soft key. The following menu items appear.




When the data source is sampled in sync with the clock source, use the enable source to control the period for which the instrument tests the data source.

### Latch Source (Latch)

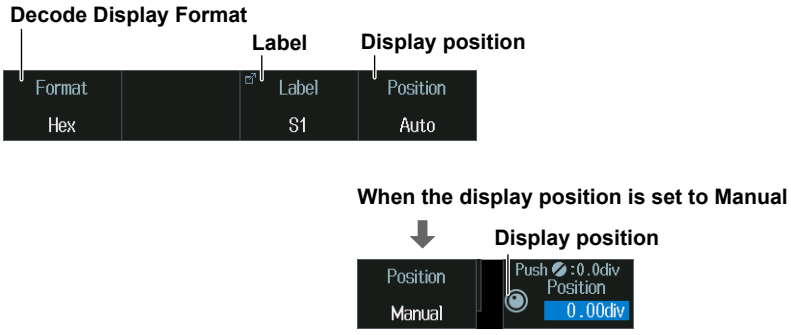
Press the **Latch** soft key. The following menu items appear.




Specify the timing at which the data source pattern sampled in sync with the clock source is compared with the specified pattern.

## Decoded Display (Decode)

Press the **Decode** soft key. The following menu items appear.

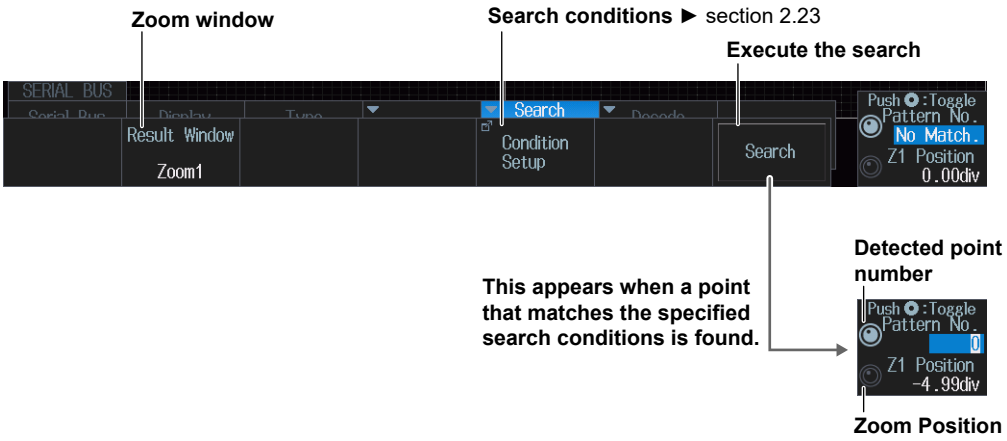



### Display Position (Position)

Set the display position of decoded results. The position is set to Auto when you execute auto setup on the analysis menu of each serial bus signal. The position changes from Auto to Manual when you drag the decode display.

## Search Setup (Search)

Press the **Search** soft key. The following menu items appear.




### Zoom Windows (Result Window)

You can configure zoom windows Zoom1 and Zoom2 when they are displayed. Zoom1 is automatically displayed during the automatic setup of the analysis settings.

### Search Conditions (Condition Setup)

You can set search conditions in the same way that you set trigger conditions. For details, see section 2.23.

### Executing a Search (Search)

1. Set the search conditions.
2. Press the **Search** soft key.
   The instrument searches for the search conditions. If the instrument finds points that match the search conditions (detected points), it shows numbers (0, 1, 2, etc.) from the left of the waveform display in the order that the points were detected.

### Detected Point Number (Pattern No.)

You can set the detected point number and display the waveform for the detected point on the zoom window.

### Zoom Position (Z1 Position/Z2 Position)

You can change the zoom position, which is the point on the waveform that is zoomed in on.

# 12.12 Displaying Multiple Lists

This section explains how to list the decoded results of multiple serial bus signals simultaneously.

► “Analyzing and Searching Serial Bus Signals” and “List Display (List)” in the Features Guide

## Serial Bus Signal Setup

1. Assign serial bus signals that you want to list simultaneously to **Serial Bus1** to **Serial Bus4**.

   ► sections 12.1 to 12.10

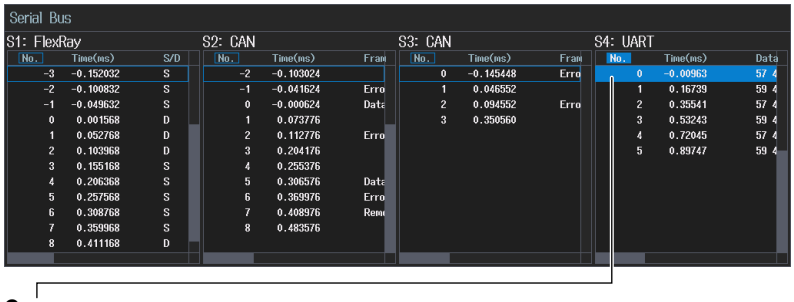
## Listing the Analysis Results (List)

2. On the Serial Bus menu whose analysis and search displays (Display) are on, press the **List** soft key.

   The list of serial buses whose analysis and search displays (Display) are on and the following menu items appear.

   **Example:** When List Size is set to Half(Upper), and the serial bus signal types are set as follows **Serial Bus1(S1): FlexRay, Serial Bus2(S2): CAN, Serial Bus3(S3): CAN, Serial Bus4(S4): UART**

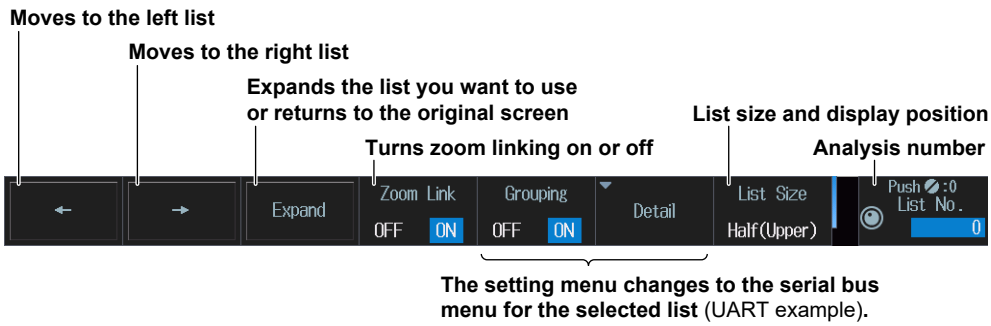
**List of analysis results**




**Cursor**

The cursor of the list that is being used is highlighted.
Only the frame appears for cursors of lists that are not being used.

- When zoom linking is on
  The zoom position in the zoom window (Result Window) moves in sync with the cursor on the list. If the signals of other lists are displayed in the same zoom window, the cursors of those lists also move in sync.




**The setting menu changes to the serial bus menu for the selected list** (UART example).

# 13.1 Displaying Waveform Histograms

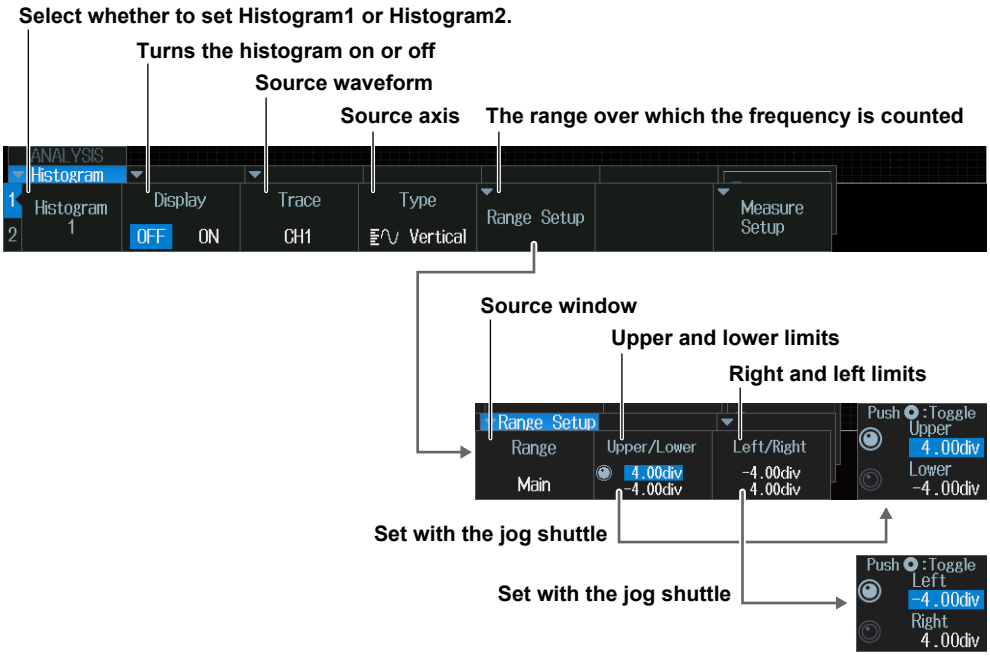
This section explains the following settings for displaying a histogram of the frequency of data occurrence in a specified area:

- Turning the histogram on or off
- Source waveform
- Source axis
- The range over which the frequency is counted

► “Waveform Histogram Display” in the Features Guide

## ANALYSIS Histogram Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Histogram** soft key. The following menu items appear.
   Up to two histograms can be displayed. To switch the setup menu, press the **Histogram** soft key.



# 13.2 Measuring Histogram Parameters

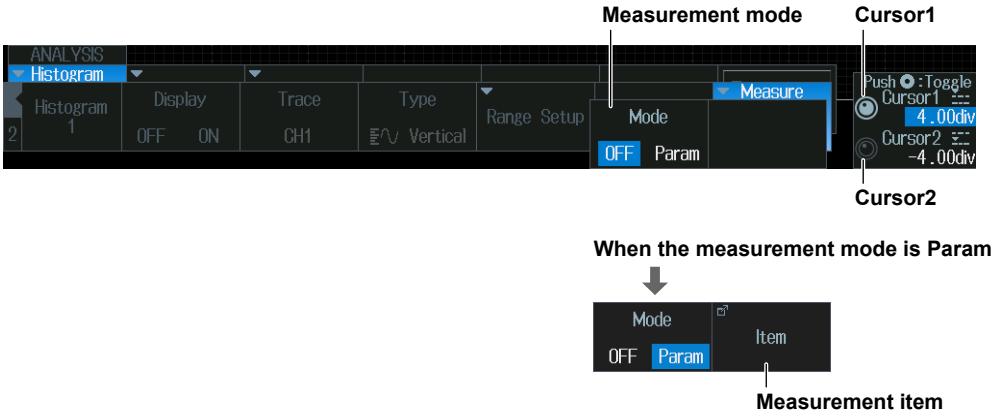
This section explains the following settings for measuring histogram parameters:

- Measurement mode
- Measurement items
- Cursor measurement

► “Measurement (Measure Setup)” in the Features Guide

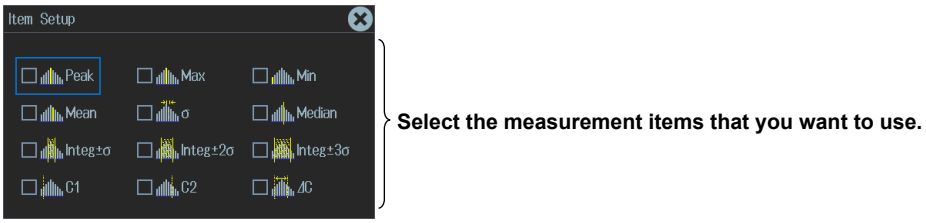
## ANALYSIS Histogram Measure Setup Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Histogram** soft key and then the **Measure Setup** soft key. The following menu items appear.




### Measurement Items (Item)

Press the **Item** soft key. The following screen appears.



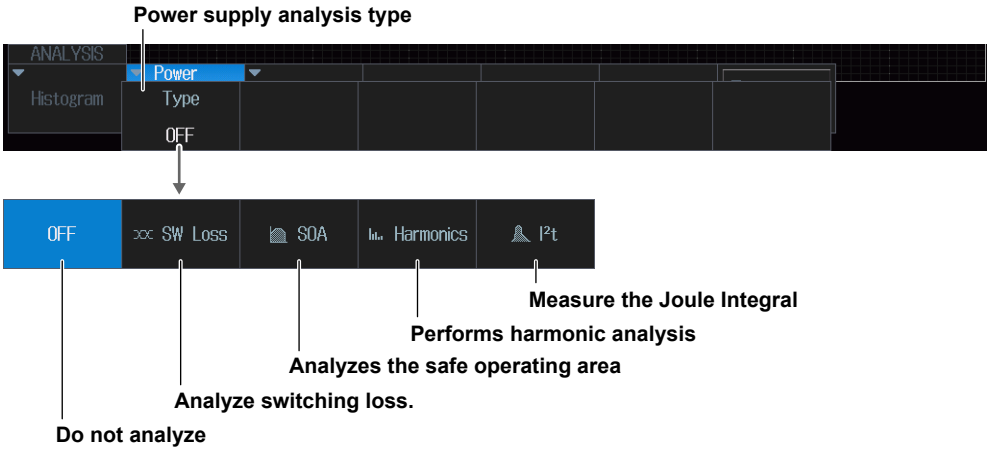
# 14.1 Power supply analysis type

This section explains how to set the power supply analysis type.

► "Type (Type)" in the Features Guide

## ANALYSIS Power Analysis Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Power Analysis** soft key. The following menu items appear.




### *Note*

Power supply analysis and power measurement of the power supply analysis feature cannot be executed simultaneously. If any of the power measurement items, Power Measurement1 or Power Measurement2, is set to ON, the power supply analysis is set to OFF. If power supply analysis is set to something other than OFF, all power measurements are set to OFF.

# 14.2 Analyzing Switching Loss

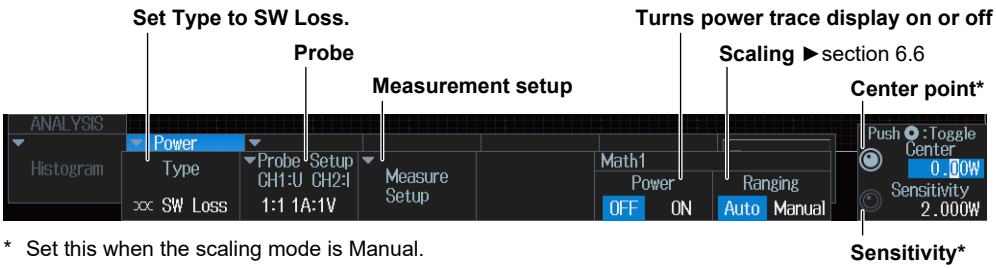
This section explains the following settings for analyzing switching loss:

- Probe
- Measurement content
  Loss type, level setup, reference levels for voltage channels, measurement items, turning measurement location indicator on or off, statistical processing, measurement source window, measurement range
- Turning power trace display on or off
- Scaling
- Center point and sensitivity

► "Switching Loss Analysis (SW Loss)" in the Features Guide

## ANALYSIS Power Analysis Menu

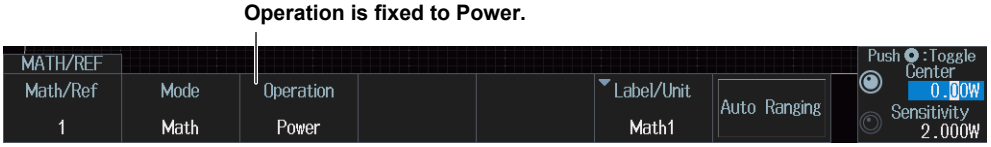
1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Power Analysis** soft key, then the **Type** soft key, and then the **SW Loss** soft key. The following menu items appear.




* Set this when the scaling mode is Manual.

### Note

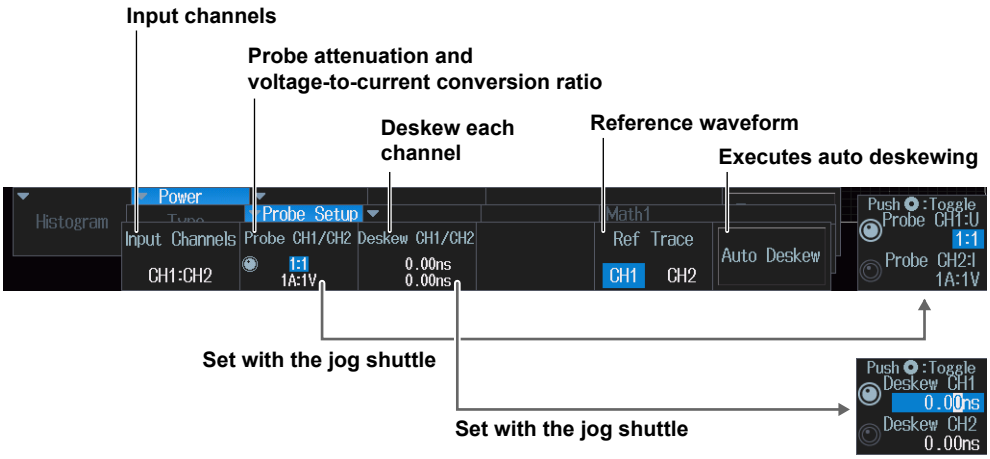
- If you set the power supply analysis type to SW Loss, automated measurement of waveform parameters is enabled. The measured values from the measurement items set on the MEASURE menu and the switching loss measurement items are displayed on the screen.
  A maximum of 120 measurement items can be displayed. If measured switching loss values are not displayed, reduce the number of MEASURE menu measurement items.
  ► section 9.1
- If you set the power supply analysis type (Type) to SW Loss, the cycle mode (Cycle Mode) on the Item Setup screen (Page 9-1) of the MEASURE key menu is fixed to SW Loss.
- If you turn Power of Math1 on, the power waveform is displayed on the screen. If you then press MATH/REF, the following menu is displayed.




If you turn Power of Math1 off, the normal computation setup menu is displayed when you press MATH/REF.

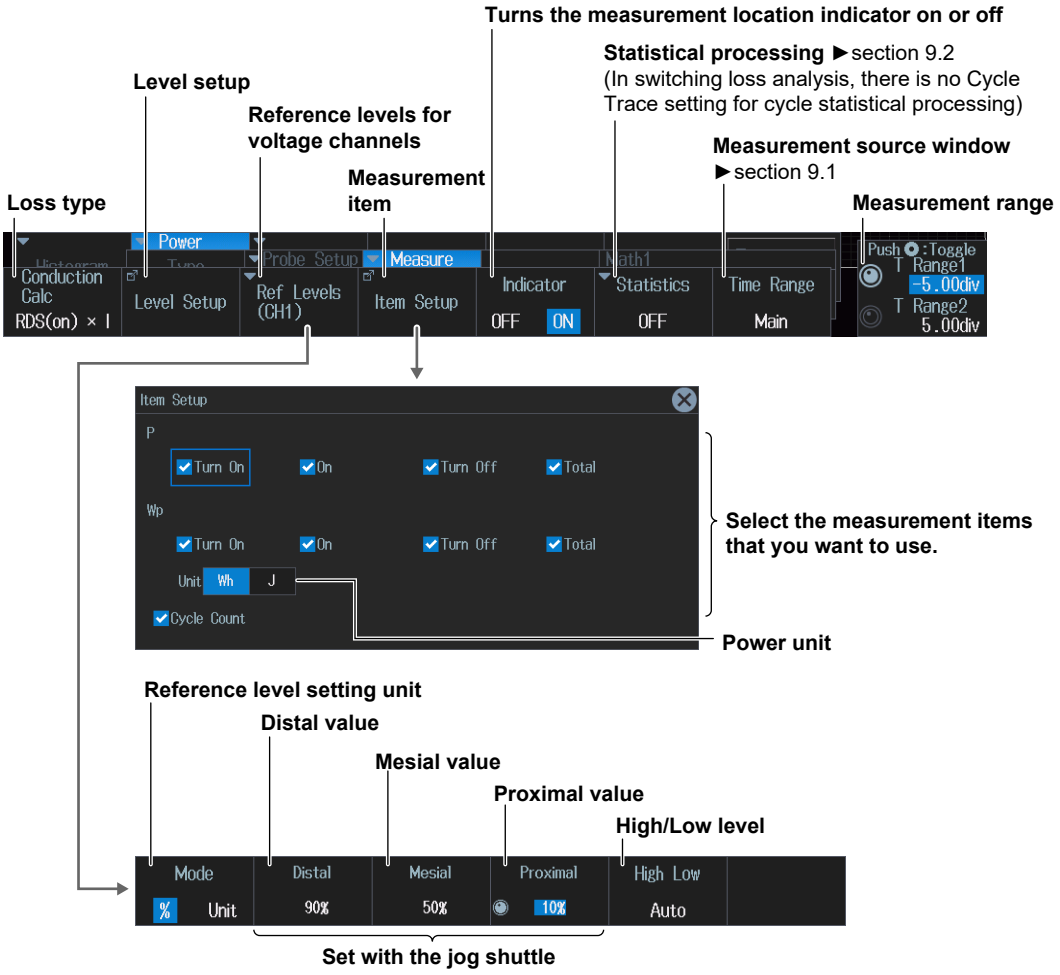
## Probe (Probe Setup)

Press the **Probe Setup** soft key. The following menu items appear.




## Measurement Setup (Measure Setup)

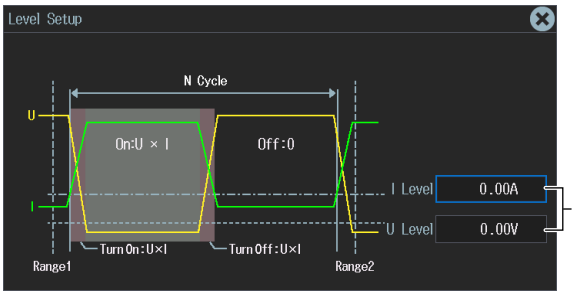
Press the **Measure Setup** soft key. The following menu items appear.



### Level Setup (Level Setup)

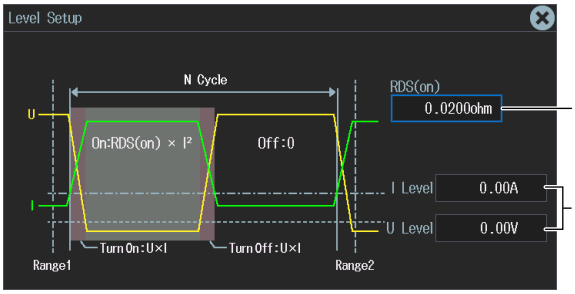
Press the **Level Setup** soft key. The following screen appears.

**When loss type is U×I**




Current and voltage levels

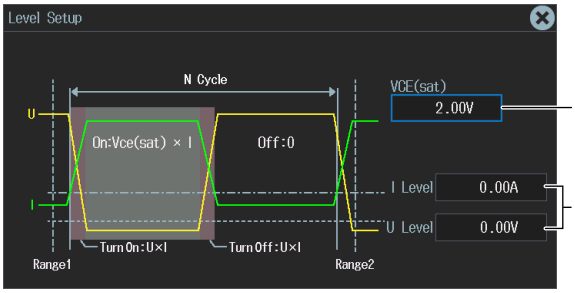
**When loss type is RDS(on)×I²**




RDS(on) value

Current and voltage levels

**When loss type is VCE(sat)×I**




VCE (sat) value

Current and voltage levels

# 14.3 Performing Safe Operating Area Analysis

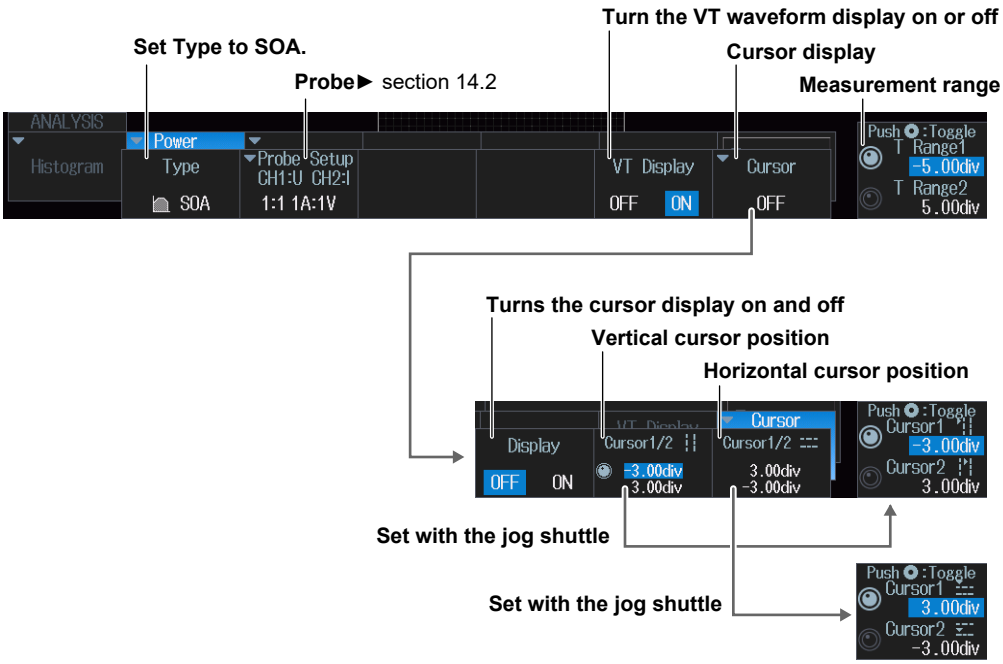
The instrument can display the safe operating area of power by plotting the voltage signal input channel and current input signal channel on the XY waveform display. This section explains the following settings for performing safe operating area analysis:

- Probe
- Turning the VT waveform display on or off
- Cursor display
- Measurement range

► "Safe Operating Area Analysis (SOA)" in the Features Guide

## ANALYSIS Power Analysis Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Power Analysis** soft key, then the **Type** soft key, and then the **SOA** soft key. The following menu items appear.




### Note

If you set the power supply analysis type to SOA, XY waveforms are automatically displayed on the screen. If you press **SHIFT+DISPLAY** (X-Y) and then the **Display** soft key, both the XY window and the SOA disappear.

# 14.4 Performing Harmonic Analysis

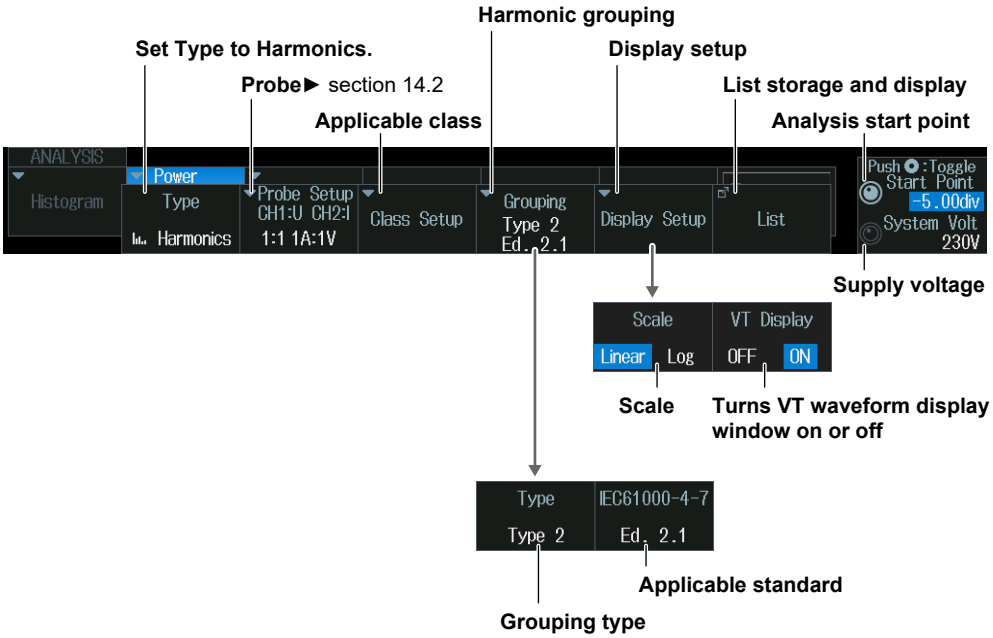
This section explains the following settings for performing harmonic analysis:

- Probe
- Applicable class
- Harmonic grouping
- Display setup
- List storage and display
  List storage, list size, and display position
- Analysis start point
- EUT's power supply voltage

► "Harmonic Analysis (Harmonics)" in the Features Guide

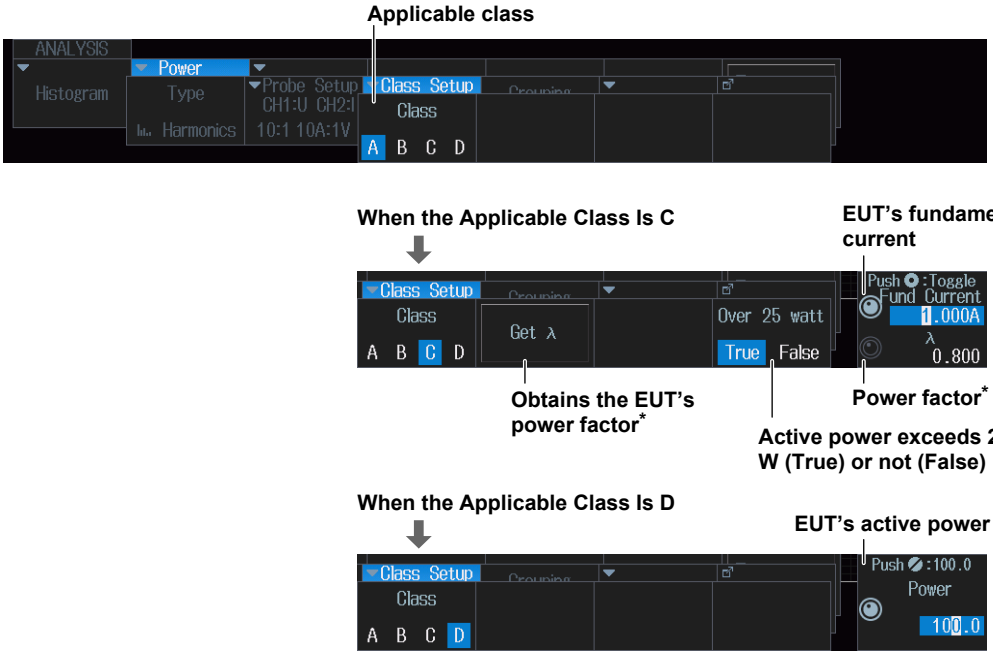
## ANALYSIS Power Analysis Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Power Analysis** soft key, then the **Type** soft key, and then the **Harmonics** soft key. The following menu items appear.



## Applicable Class (Class Setup)

Press the **Class Setup** soft key. The following menu items appear.




* You can select this when the active power exceeds 25 W (Over 25 Watt is set to True).

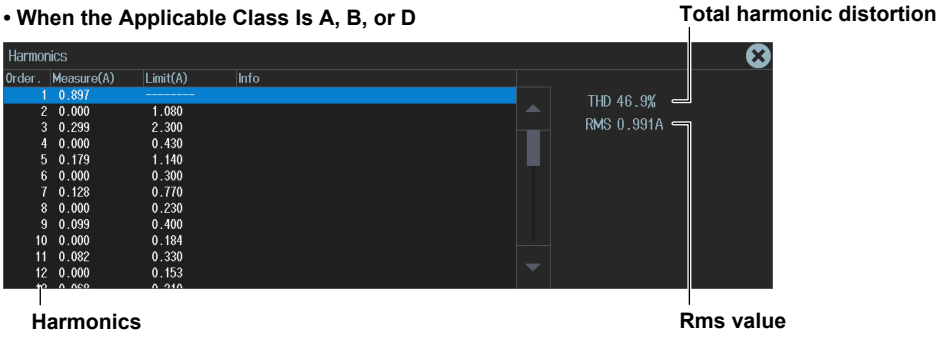
### *Note*

While λ (the power factor) is being obtained, Get λ changes to Abort. It may take time to obtain λ if the record length is long. To stop obtaining λ, press this Abort soft key.

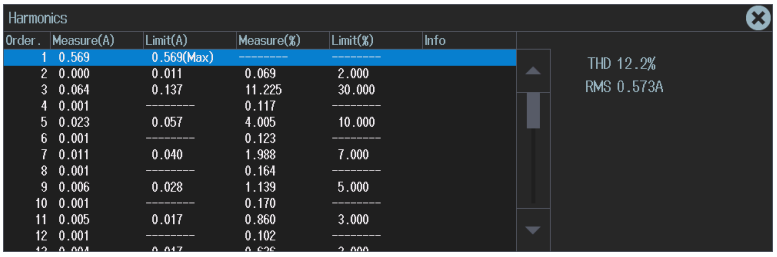
## List Storage and Display (List)

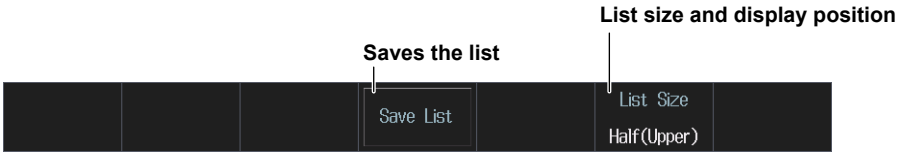
Press the **List** soft key. The following menu items appear.

**• When the Applicable Class Is A, B, or D**




**• When the Applicable Class Is C**



# 14.5 Measuring the Joule Integral

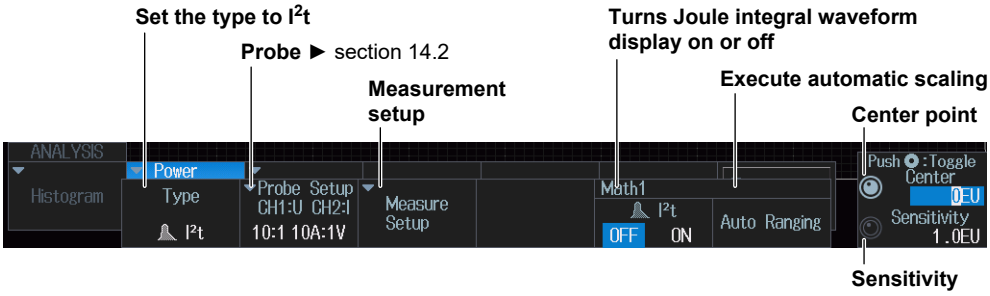
This section explains the following settings for measuring the Joule integral:

- Probe
- Measurement content
  Turning Joule integral on or off, measurement source window, measurement range
- Turning Joule integral waveform display on or off
- Auto scaling
- Center point and sensitivity

► "Measuring Inrush Current by Measuring the Joule Integral ($I^2t$)" in the Features Guide

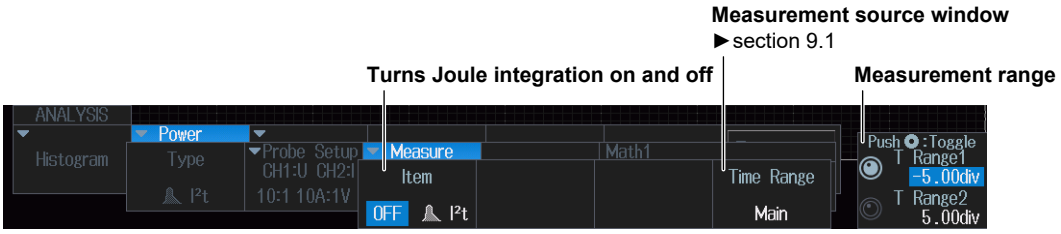
## ANALYSIS Power Analysis Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Power Analysis** soft key, then the **Type** soft key, and then the I**2**t. The following menu items appear.




### Measurement Setup (Measure Setup)

Press the **Measure Setup** soft key. The following menu items appear.



## Note

- If you set the power supply analysis type to $I^2t$, automated measurement of waveform parameters is enabled. The measured values from the measurement items set on the MEASURE menu and the Joule integral measurement items are displayed on the screen.
  A maximum of 120 measurement items can be displayed. If measured Joule integral values are not displayed, reduce the number of MEASURE menu measurement items.
  ► section 9.1
- If you turn $I^2t$ of Math1 on, the Joule integral waveform is displayed on the screen. If you then press MATH/REF key, the following menu is displayed.

**Operation is fixed to Joule integral ($I^2t$)**




If you turn $I^2t$ of Math1 off, the normal computation setup menu is displayed when you press MATH/REF.

# 14.6 Measuring Power

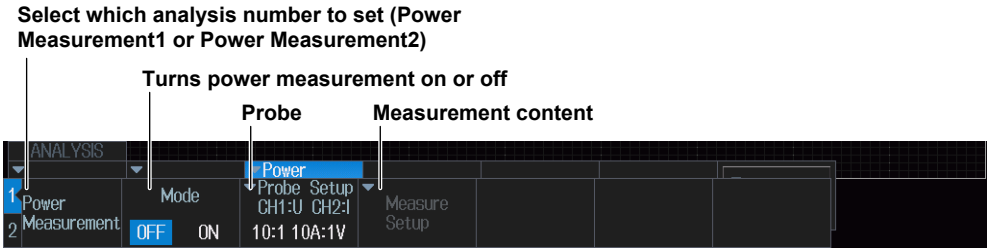
This section explains the following settings for measuring power:

- Turning power measurement on and off
- Probe
- Measurement content
  Measurement items, reference levels for auto measurement, measurement location indicator, cycle mode, calculation that uses automated measurement values, statistical processing, measurement source window, measurement range

► “Power Measurement (Power Measurement)” in the Features Guide

## ANALYSIS Power Measurement Menu

1. Press **ANALYSIS**. The ANALYSIS menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the ANALYSIS menu from **ANALYSIS** on the top menu that is displayed.
2. Press the **Power Measurement** soft key. The following menu items appear.
   Up to two power measurements can be displayed. To switch the setup menu, press the **Power Measurement** soft key.

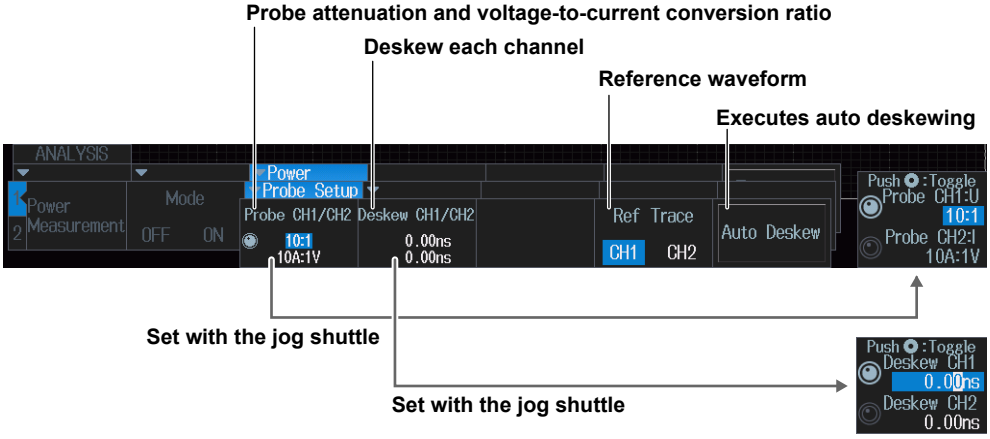



The voltage and current input channels are fixed as follows:

| Power Measurement | Voltage Input Channel | Current Input Channel |
|---|---|---|
| Power Measurement1 | CH1 | CH2 |
| Power Measurement2 | CH3 | CH4 |

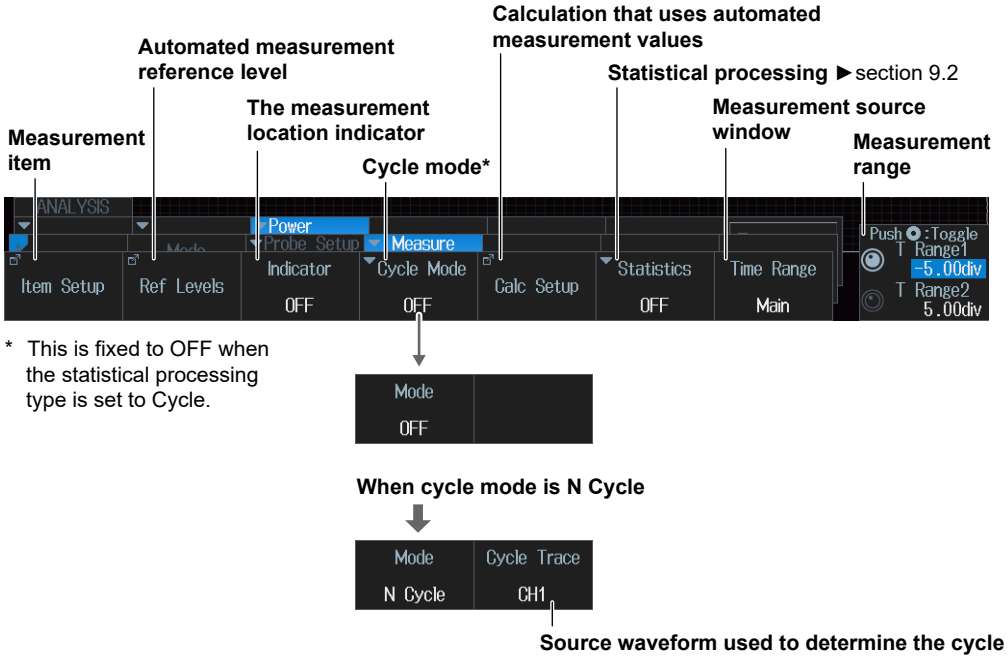
### Probe (Probe Setup)

Press the **Probe Setup** soft key. The following menu items appear.



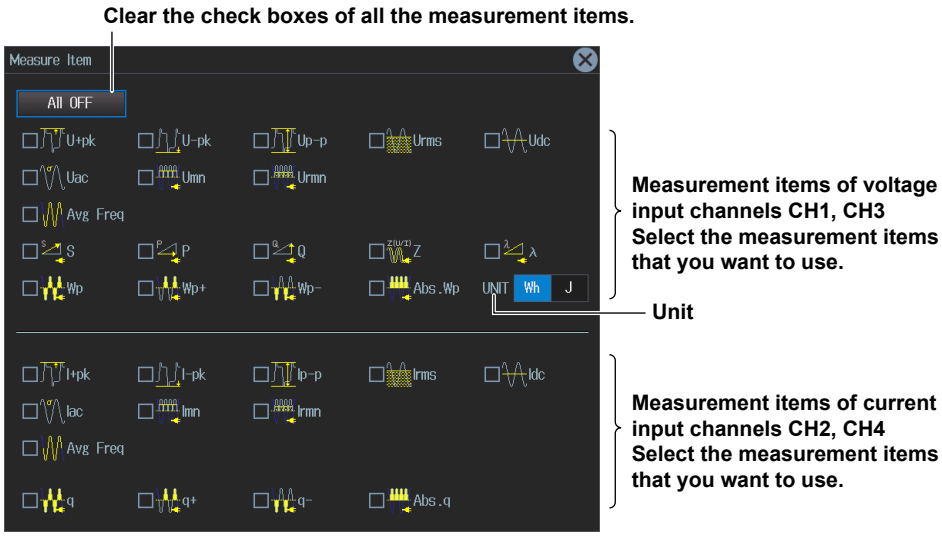
## Measurement Setup (Measure Setup)(

1. Press the **Mode** soft key and set Power Measurement ON.
2. Press the **Measure Setup** soft key. The following menu items appear.




## Measurement Items (Item Setup)

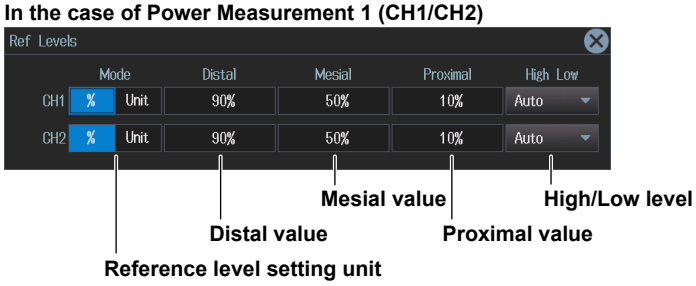
Press the **Item Setup** soft key. The following menu items appear.



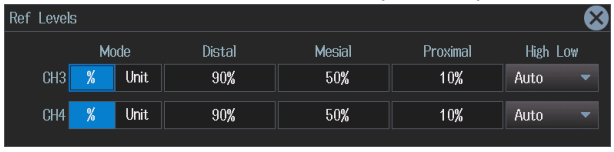
## Reference Levels for Auto Measurements (Ref Levels)

Press the **Ref Levels** soft key. Depending on the power measurement that is selected (Power Measurement1 or Power Measurement2), the following screen appears.

**In the case of Power Measurement 1 (CH1/CH2)**

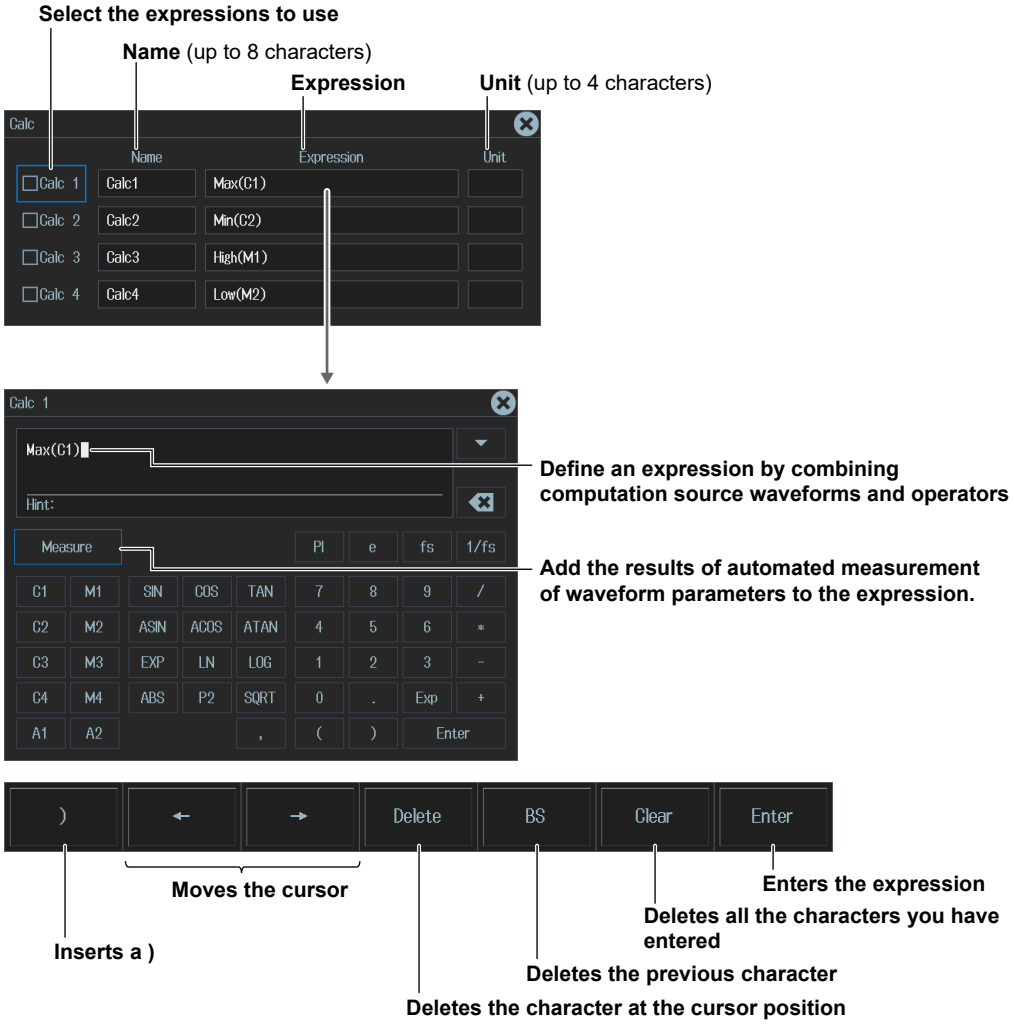



**In the case of Power Measurement 2 (CH3/CH4)**




## Calculations That Use Automated Measurement Values (Calc Setup)

Press the **Calc Setup** soft key. The following menu items appear.



## Measurement Location Indicator (Indicator)

1. Press the **Indicator** soft key.
   You can set Indicator to OFF (the measurement location indicator is not displayed) or display a setup menu with the items whose check boxes you have selected in “Setting the Measurement Items (Item Setup).”
2. Use the **jog shuttle** or the **SET** key to select the item whose measurement location you want to indicate.
3. Press **SET** to confirm.
   The measurement location of the item you specify is indicated by a cursor.

### *Note*

- If you turn Power Measurement on, automated measurement of waveform parameters is enabled. The measured values from the measurement items set on the MEASURE menu and the values of the Power Measurement measurement items are displayed on the screen.
  A maximum of 120 measurement items can be displayed. If Power Measurement measurement values are not displayed, reduce the number of MEASURE menu measurement items.
  ► section 9.1
- If you turn Power Measurement ON, the cycle mode (Cycle Mode) on the Item Setup screen (Page 9-1) of the MEASURE key menu changes in sync with the setting of the cycle mode (Cycle Mode) of Power Measurement, and it cannot be set on the MEASURE key menu.
- If you change the statistical processing type (Statistics), the statistical processing type (Statistics) of the MEASURE key menu also changes in sync.

# 15.1 Displaying History Waveforms

This section explains the following settings for displaying history waveforms, which are waveforms that were previously saved to acquisition memory:

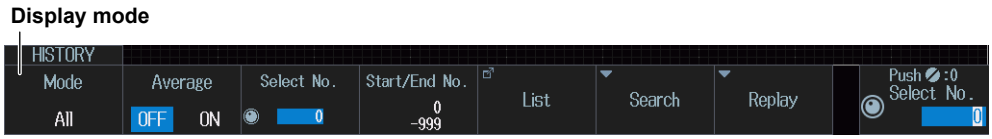
- Display mode
- Turning averaging on or off
- Highlighting of the selected record number
- Display range (start and end record numbers)
- Showing a list of timestamps
- Replay
- Gradation mode

► "Displaying and Searching History Waveforms" in the Features Guide

## HISTORY Menu

Press **HISTORY**. The following menu items appear.

You can also tap **MENU** (MENU) in the upper left of the screen and select the HISTORY menu from **ACQ/DISP** on the top menu that is displayed.




### Display Mode (Mode)

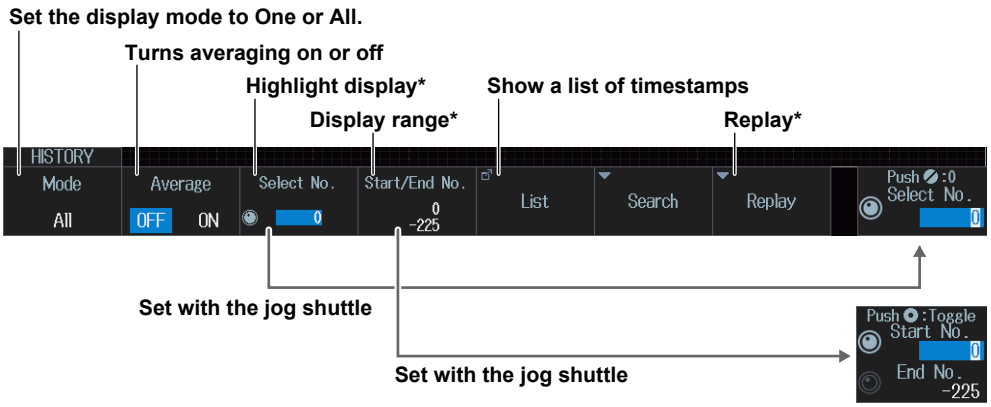
One : Only the waveform corresponding to the selected record number[1] is displayed.

All : All waveforms other than the highlighted one are displayed in an intermediate color.[1] All history waveforms from the specified start (Start Record) to stop (End Record) number are overlaid.[2]

Accumulate : The frequency of data occurrence is represented by intensity (Intensity) or by color (Color). Overlays all selected waveforms.[2]

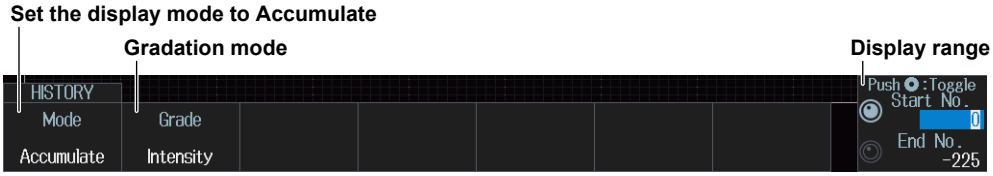
1 Specify the highlighted waveform with Select No.
2 Specify with Start and End No.

#### When the Display Mode Is Set to One or All



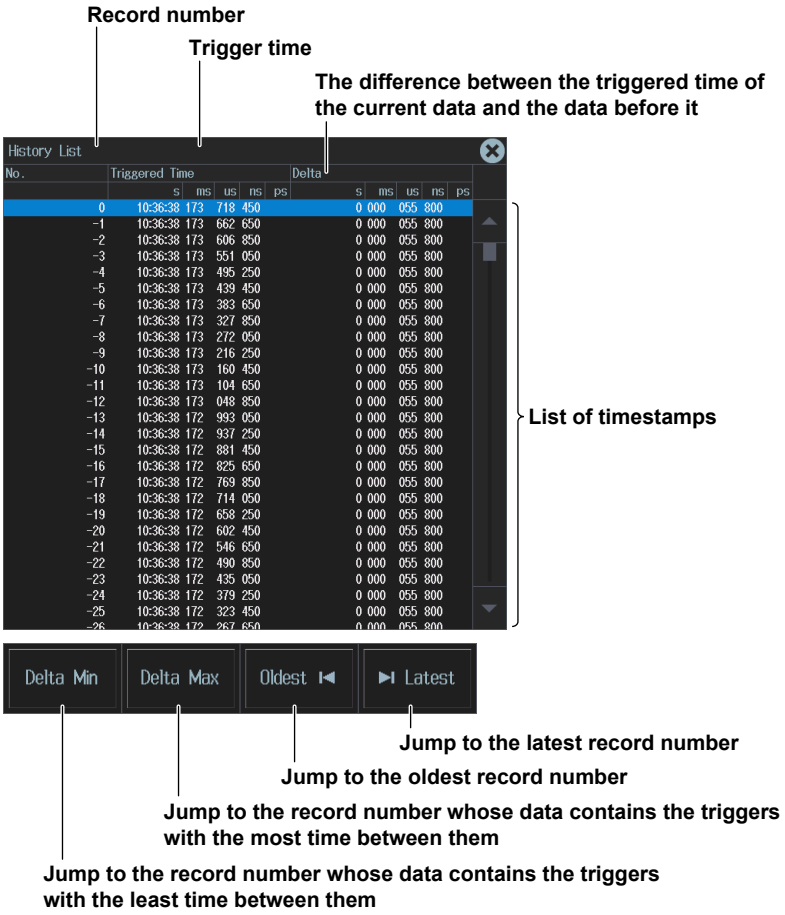

* The Select No., Start/End No, and Replay menu items appear when averaging is off.

### When the Display Mode Is Set to Accumulate




## List of Timestamps (List)

Press the **List** soft key. The following screen appears.



## Note

**Notes about Configuring the History Feature**

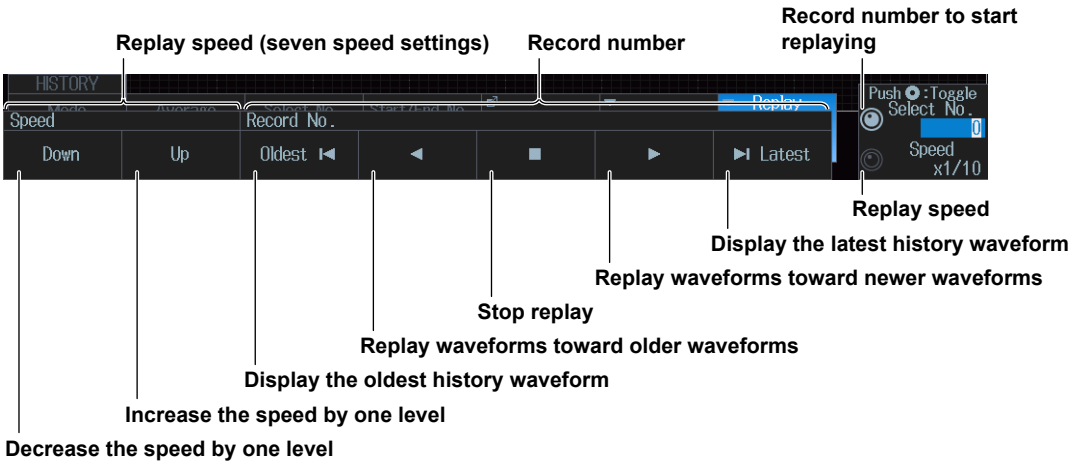
- When the acquisition mode is set to Average and the sampling mode is set to Repetitive, you cannot use the history feature.
- When the display is in roll-mode, you cannot use the history feature.
- If you stop waveform acquisition, the instrument only displays waveforms that have been acquired completely.

**Notes about Recalling Data Using the History Feature**

- Waveform acquisition stops when you display the History menu. You cannot display history waveforms while waveform acquisition is in progress.
- You can start waveform acquisition when the History menu is displayed. However, you cannot change the history feature settings while waveform acquisition is in progress.
- The settings are restricted so that the following relationship is retained: Last record (End) ≤ Select No. ≤ First record (Start).
- When you load waveform data from the specified storage device, history waveforms up to that point are cleared. The loaded waveform data is placed in record number zero. If you load a file containing multiple waveforms, the latest waveform is placed in zero, and earlier waveforms are placed in order to record numbers -1, -2, and so on.
- Computation and automated measurement of waveform parameters are performed on the waveform of the record number specified by Select No. You can analyze old data as long as you do not overwrite the acquisition memory contents by restarting waveform acquisition. If Average is set to ON, analysis is performed on the averaged waveform.
- History waveforms are cleared when you turn the power off.

## Replay (Replay)

Press the **Replay** soft key. The following menu items appear.




## Note

If you change the vertical sensitivity, vertical position, time axis setting, trigger position, or other relevant settings and then display the preview, you cannot search for or replay history waveforms.

# 15.2 Searching History Waveforms

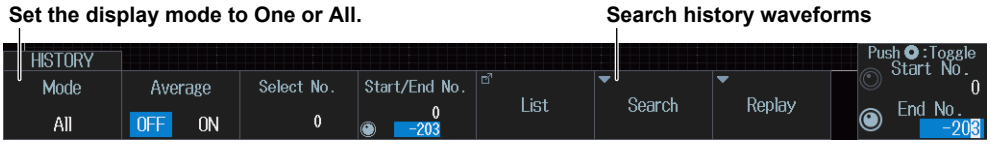
This section explains the following settings for searching history waveforms:

- Search condition
- Waveform to search
- Search source window
- Search range (rectangular zone)
- Search conditions (1 to 4)
  Search range mode
- Executing searches
- Finishing searches

► “Searching History Waveforms (Search)” in the Features Guide

## HISTORY Menu

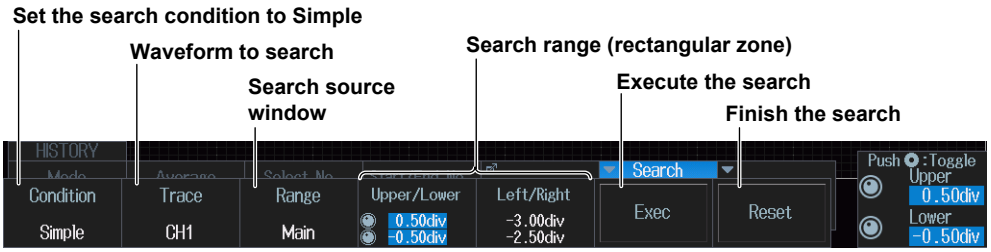
1. Press **HISTORY**. The HISTORY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the HISTORY menu from **ACQ/DISP** on the top menu that is displayed.
2. Press the **Mode** soft key, and then the **One** soft key or the **All** soft key. The following menu items appear.




## Searching History Waveforms (Search)

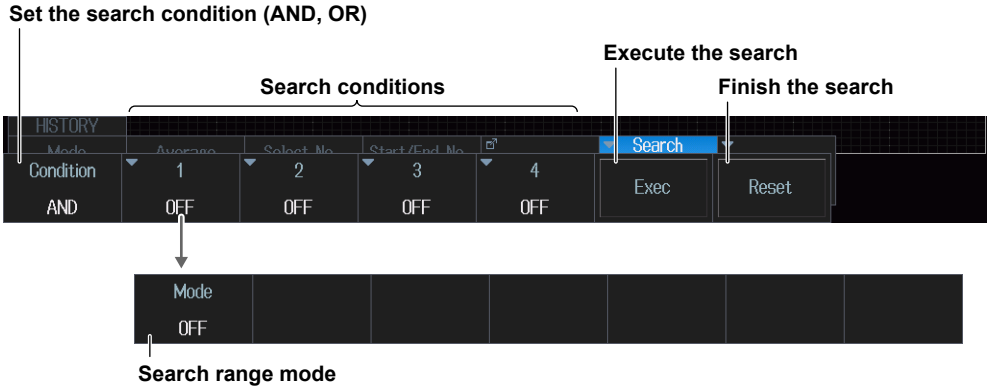
Press the **Search** soft key. The menu that appears varies depending on the search condition settings.

### When the Search Condition Is Set to Simple

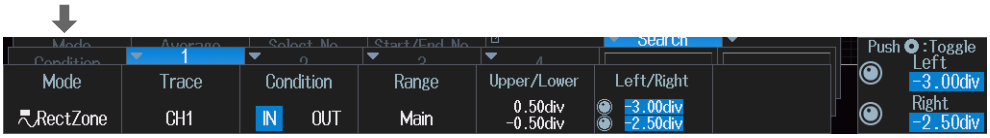



- **Search range (rectangular zone)**
  You can set the search range in the same manner that you set the reference range type for GO/NO-GO determination (RectZone). See section 2.28, and read all instances of “determination” as “search.”

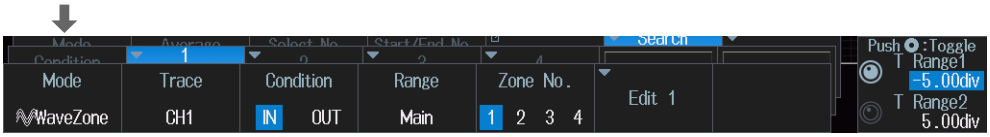
## When the Search Condition Is Set to AND or OR



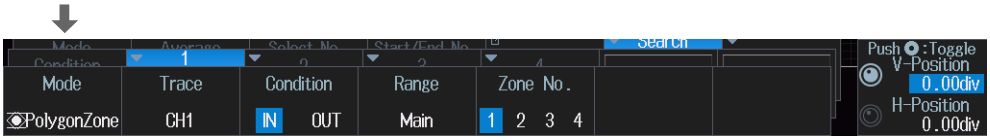

**When the search range mode is RectZone**




**When the search range mode is WaveZone**




**When the search range mode is PolygonZone**




**When the search range mode is Parameter**




- **Search Range Mode (Mode)**

  You can set the search range mode in the same manner that you set the reference range type for GO/NO-GO determination. See section 2.28, and read all instances of “determination” as “search.”

  When the search condition and the waveform to search are set as follows, there are some search ranges that cannot be set.

  - When you set the waveform to search to XY1 to XY2, you cannot set the search range mode to WaveZone.
  - When you set the waveform to search to LOGIC*, FFT1, or FFT2, you can only set the search range mode to Parameter.

  * CH4 or LOGIC, whichever the corresponding key is illuminated, can be selected. Specify the channel that you want to search through in advance by pressing either the CH4 key or the LOGIC key.

# 16.1 Loading Roll Paper Into the Built-In Printer (Option)

This section explains how to load roll paper into the optional built-in printer.

## Printer Roll Paper

Use a YOKOGAWA roll paper. Do not use any other paper. When using the printer for the first time, use the roll paper supplied with the instrument. When you need extra roll paper, please contact your nearest YOKOGAWA dealer.

Part Number: B9988AE
Specification: Heat-sensitive paper, 10 m
Minimum Quantity: 10 rolls

## Handling Roll Paper

The roll paper is made of heat-sensitive paper that changes color thermochemically. Please read the following information carefully.

**Storage Precautions**

The heat-sensitive paper changes color gradually at temperatures of approximately 70°C or higher. The paper can be affected by heat, humidity, or chemicals, whether something has been recorded on it or not. As such, please follow the guidelines listed below.

- Store the paper in a cool, dry, and dark place.
- Use the paper as quickly as possible after you break its protective seal.
- If you attach a plastic film that contains plasticizing material such as vinyl chloride film or cellophane tape to the paper for a long time, the recorded sections will fade due to the effect of the plasticizing material. Use a holder made of polypropylene to store the roll paper.
- When starching the record paper, do not use starches containing organic solvents such as alcohol or ether. Doing so may cause a malfunction.
- We recommend that you make copies of the recordings if you intend to store them for a long period of time. Because of the nature of heat-sensitive paper, the recorded sections may fade.

**Handling Precautions**

- Only use genuine YOKOGAWA roll paper.
- If you touch the roll paper with sweaty hands, there is a chance that you will leave fingerprints on the paper or smudge the recorded sections.
- If you rub the surface of the roll paper against something hard, there is a chance that the paper will change color due to frictional heat.
- If the roll paper comes into contact with chemicals, oil, and the like, there is a chance that the paper will change color or that the recorded sections will disappear.

# Loading the Roll Paper

**CAUTION**

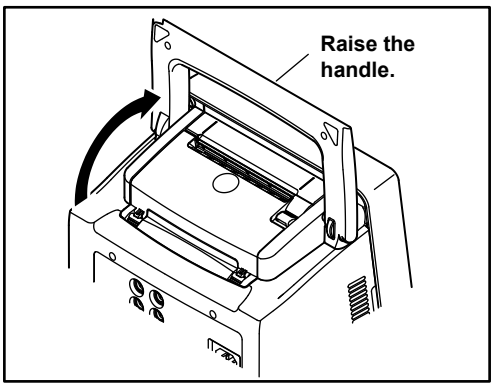
- Do not touch the print head. If you do, you may burn yourself.
- Do not touch the roll paper cutter section at the end of the printer cover. Doing so may cause injury.

**French**

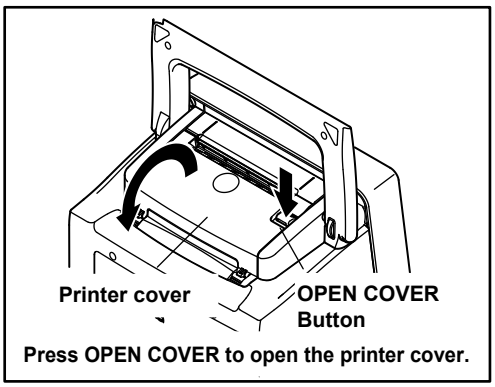
**ATTENTION**

- Ne pas toucher la tête d'impression. Vous pourriez vous brûler.
- Ne pas toucher la section du coupe-papier à l'extrémité du cache de l'imprimante. Vous pourriez vous blesser.

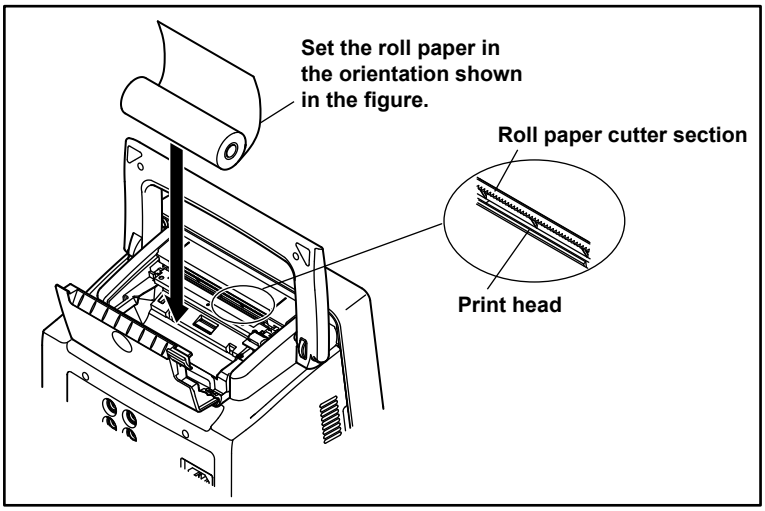
1.



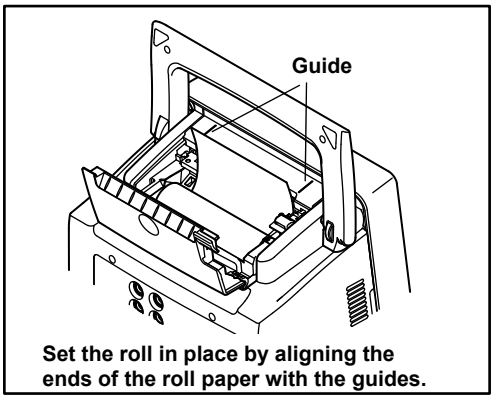

2.



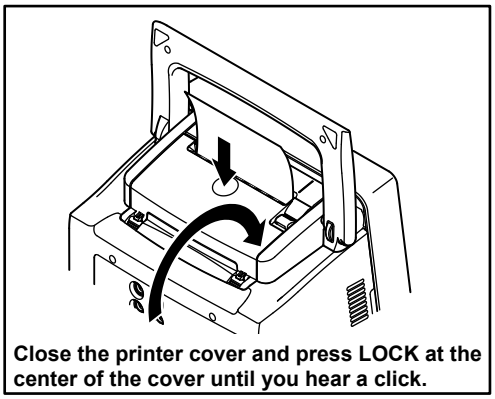

3.




4.




5.



# 16.2 Printing on the Built-in Printer (Option)

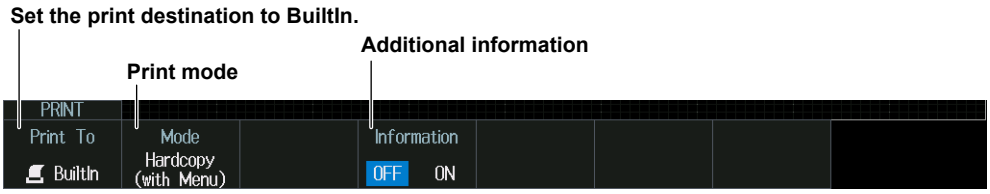
This section explains the following settings for printing on the built-in printer (option):

- Output destination
- Print mode
- Additional information

► “Printing on the Built-in Printer (BuiltIn)(Option)” in the Features Guide

## PRINT BuiltIn Menu

1. Press **SHIFT+PRINT** (MENU). The PRINT menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the PRINT menu (PRINTMENU) from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Print To** soft key and then the **BuiltIn** soft key. The following menu items appear.




### Print Mode (Mode)

Hardcopy (with Menu): The entire instrument screen is printed.

Hardcopy (without Menu): The waveform area of the instrument screen is printed. The menu is not printed.

## Printing

Press **PRINT**. The image is output to the built-in printer according to the settings.

# 16.3 Printing on a USB Printer

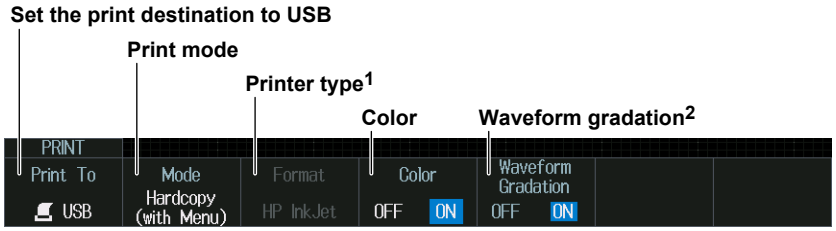
This section explains the following settings for printing on a USB printer:

- Output destination
- Print mode
- Printer type
- Color
- Waveform gradation

► “Printing on a USB Printer (USB)” in the Features Guide

## PRINT USB Menu

1. Press **SHIFT+PRINT** (MENU). The PRINT menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the PRINT menu (PRINTMENU) from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Print To** soft key and then the **USB** soft key. The following menu items appear.




1 The printer type is fixed to HP InkJet.
2 This appears when Color is set to ON.

### Print Mode (Mode)

Hardcopy (with Menu): The entire instrument screen is printed.

Hardcopy (without Menu): The waveform area of the instrument screen is printed. The menu is not printed.

### Waveform Gradation (Waveform Gradation)

Gradation can be applied to the waveform color when Color is set to ON.

ON: Gradation is applied to the waveform color.

OFF: Solid color is used for the waveform.

## Printing

Press **PRINT**. The image is output to the USB printer according to the settings.

# 16.4 Printing on a Network Printer

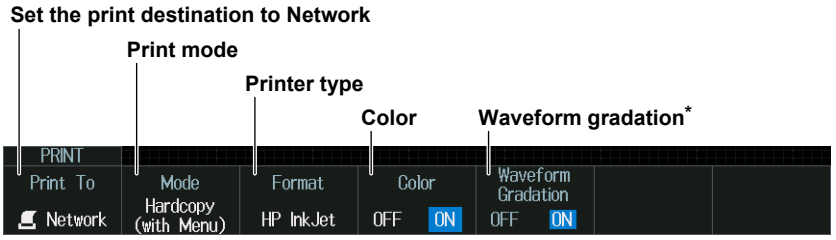
This section explains the following settings for printing on a network printer:

- Output destination
- Print mode
- Printer type
- Color
- Waveform gradation

► “Printing on a Network Printer (Network)” in the Features Guide

## PRINT Network Menu

1. Press **SHIFT+PRINT** (MENU). The PRINT menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the PRINT menu (PRINTMENU) from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Print To** soft key and then the **Network** soft key. The following menu items appear.




* This appears when Color is set to ON.

### Print Mode (Mode)

Hardcopy (with Menu): The entire instrument screen is printed.

Hardcopy (without Menu): The waveform area of the instrument screen is printed. The menu is not printed.

### Waveform Gradation (Waveform Gradation)

Gradation can be applied to the waveform color when Color is set to ON.

ON: Gradation is applied to the waveform color.

OFF: Solid color is used for the waveform.

## Printing

Press **PRINT**. The image is output to the network printer according to the settings.

***Note***

You must configure the network printer in advance by following the instructions in section 18.6.

# 16.5 Saving Screen Captures to Files

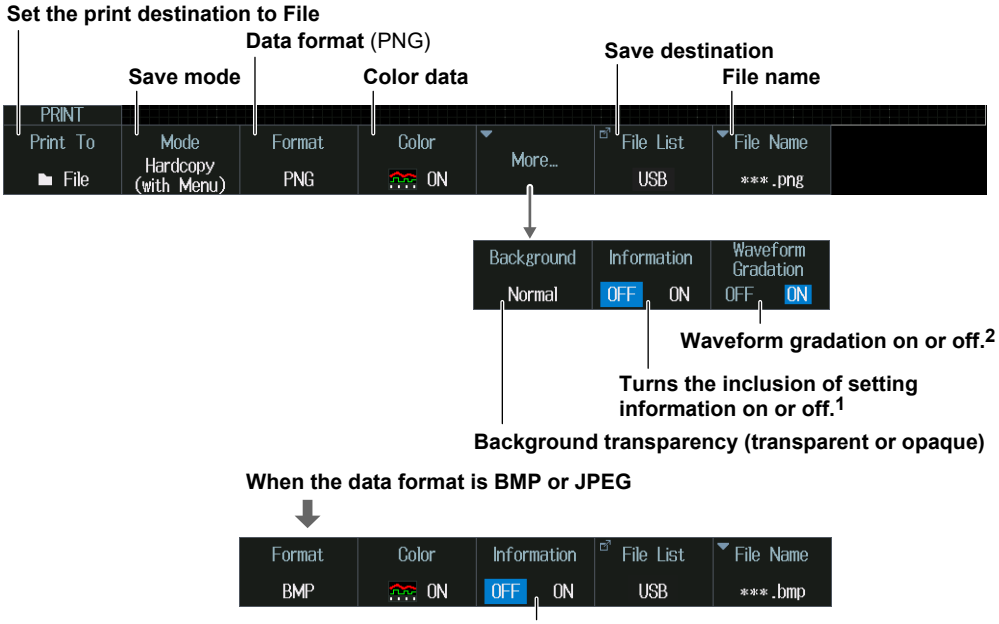
This section explains the following settings for saving screen captures to files:

- Output destination
- Save mode
- Data format
- Color data
- Background transparency (transparent or opaque)
- Including setting information
- Waveform gradation
- Save destination
- File name

► "Saving Screen Captures to Files (File)" in the Features Guide

## PRINT File menu

1. Press **SHIFT+PRINT** (MENU). The PRINT menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the PRINT menu (PRINTMENU) from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Print To** soft key and then the **File** soft key. The following menu items appear.




1 You can set this when the save mode is Hardcopy (with Menu) or Hardcopy (without Menu).
2 Gradation can be applied to the waveform color when Color data is set to ON (Rev.).

### Save mode (Mode)

Hardcopy (with Menu): The entire instrument's screen is saved.

Hardcopy (without Menu): The waveform area of the instrument's screen is saved. The menu is not saved.

Wide: As in Hardcopy (without Menu) mode, the entire instrument's screen is saved, but the time axis is magnified 2 times.

### Including Setting Information (Information)

When save mode is set to Hardcopy (with Menu) or Hardcopy (without Menu), channels, triggers, waveform acquisition, and other setting information can be included in waveform screen captures.

OFF: Setting information is not included.

ON: Setting information is included.

### Waveform Gradation (Waveform Gradation)

Gradation can be applied to the waveform color when Color data is set to ON (Rev.).

ON: Gradation is applied to the waveform color.

OFF: Solid color is used for the waveform.

### Save Destination (File List)

Specify the drive or folder to save files to in the same way as for the file feature. For details, see section 17.2.

### File name (File Name)

This is the same as the file feature (except the comment feature). You can save files with automatically generated names using sequence numbers or dates, or save the files with specific file names. For details, see section 17.2.

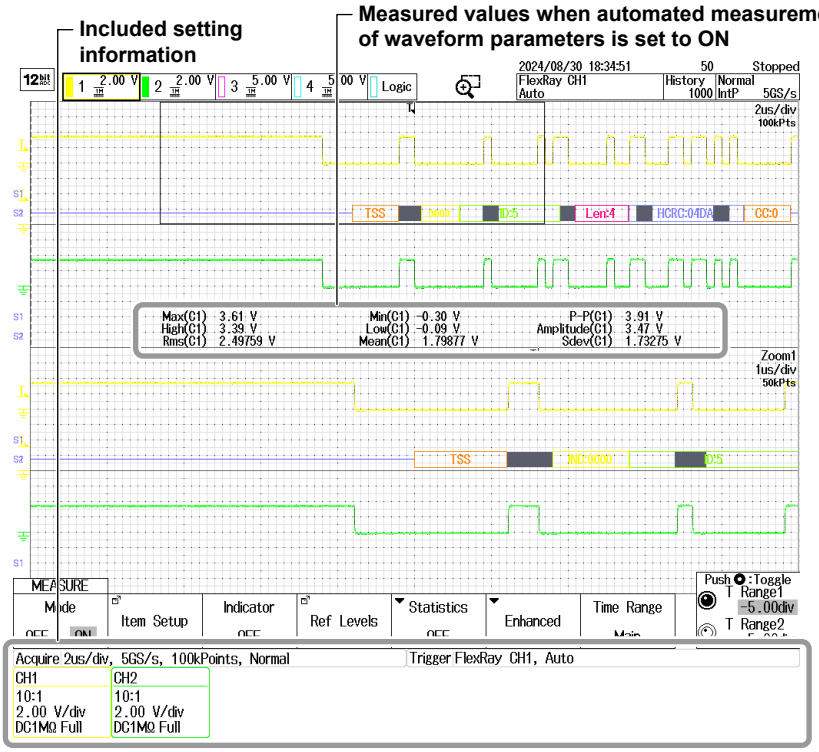
## Saving

Press **PRINT** to save the screen capture file to the specified folder.

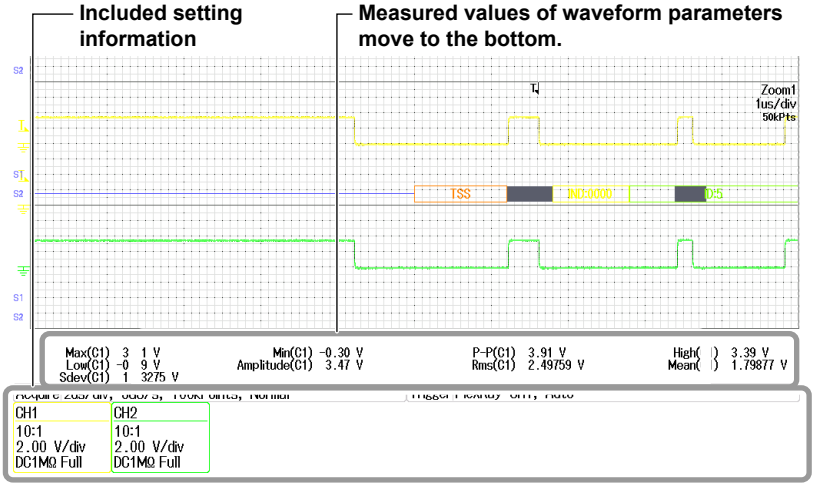
# Screen Capture Examples

### a. When the save conditions are set as follows

Save mode (Mode): Hardcopy (with Menu) Data Format (Format): PNG
Color data (Color): ON(Rev.) Background (Background): Normal
Setting information (Information): ON




### b. When ESC is pressed from the condition of a to hide the menu and the measured values of waveform parameters are displayed at the bottom of the screen



# 16.6 Printing and Saving Screen Capture Data to Multiple Output Destinations at the Same Time

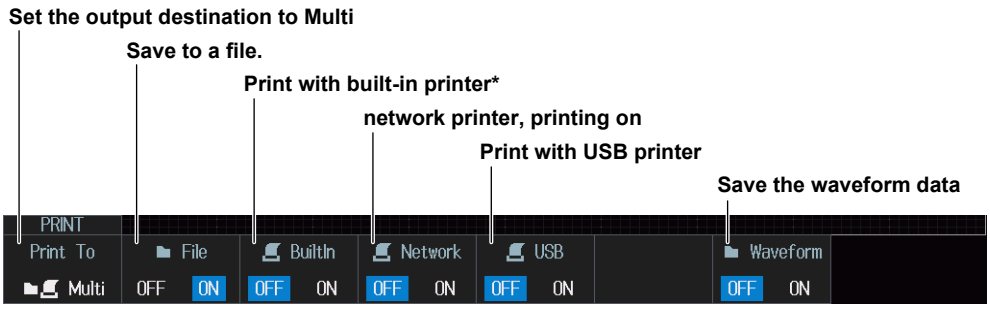
This section explains the following settings for printing and saving screen capture data and waveform data to multiple output destinations at the same time:

- Output destination
- Saving screen captures to files
- Printing screen captures on the built-in printer (option)
- Printing screen captures on the USB printer
- Printing screen captures on the network printer
- Saving Waveform Data

► **"Printing and Saving Screen Captures to Multiple Destinations (Multi)" in the Features Guide**

## PRINT Multi menu

1. Press **SHIFT+PRINT** (MENU). The PRINT menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the PRINT menu (PRINTMENU) from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Print To** soft key and then the **Multi** soft key. The following menu items appear.




* Optional

The instrument outputs screen capture data and waveform data according to the PRINT menu or FILE menu settings. For details on those settings, see the following sections.

- Saving screen captures to files
  ► section 16.5
- Printing screen captures on the built-in printer (option)
  ► section 16.2
- Printing screen captures on the USB printer
  ► section 16.3
- Printing screen captures on a network printer
  ► section 16.4
- Saving waveform data
  ► section 17.2

***Note***

You cannot execute action-on-trigger or GO/NO-GO determination if Print To is set to Multi when Print is set to ON on the ACTION menu. ► sections 2.27 to 2.28

## Printing and Saving

Press **PRINT**. The screen capture or waveform data is output to the specified output destination.

# 17.1 Connecting USB Storage Device to the USB Ports

**CAUTION**

Do not remove the USB storage device or turn off the power when the media (internal storage or USB storage device) access icon is blinking in the center of the screen or when the USB storage device access indicator is blinking. Doing so may damage the storage device or corrupt its data.

**Access Icon**




**French**

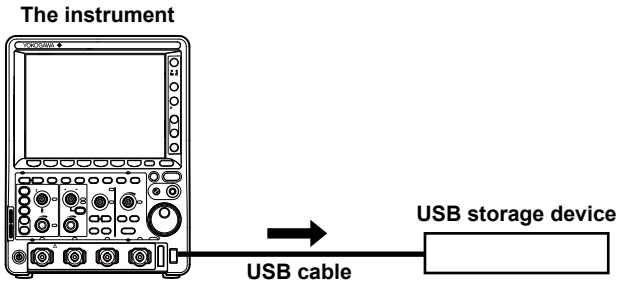
**ATTENTION**

Ne retirez pas le support de stockage USB et ne mettez pas l'alimentation hors tension lorsque l'icône d'accès au support (mémoire interne ou stockage USB) clignote au centre de l'écran ou que le voyant d'accès au support de stockage USB clignote. Vous risqueriez d'endommager le support de stockage ou les données qu'il contient.

**Icône d'accès**




You can connect/disconnect a USB cable at any time regardless of whether the instrument is on or off (hot-plugging is supported). Connect the type A connector of the USB cable to the instrument, and connect the type B connector to the USB storage device. If you connect a USB storage device when the power switch is on, the device becomes available for use after the instrument identifies it.




## *Note*

- Only connect a compatible USB keyboard, mouse, printer, or storage device to the USB port for peripherals.
- Do not connect and disconnect multiple USB devices repetitively. Provide at least a 10-second interval between removal and connection.
- Do not connect or remove USB cables from the time when the instrument is turned on until key operation becomes available (approximately 20 to 30 seconds).
- You can use USB storage device that are compatible with USB Mass Storage Class Ver. 1.1.
- The supported formats of USB storage are exFAT, FAT32, and FAT16.
- The instrument can handle up to two storage devices. If the connected medium is partitioned, the instrument treats each partition as a separate storage device. As such, the instrument can handle up to two partitions.

### Confirming What Connected USB Storage Device Can Be Used

1. Press **FILE** and then the **Utility** soft key. A file list appears.
   For details on the file list, see section 17.8.
2. Select (display one level up), and then press **SET**.
   - Since the next higher level is displayed, repeats until the media is displayed in the file list.
   - For more information on file operations, see section 17.8.

# 17.2 Saving Waveform Data

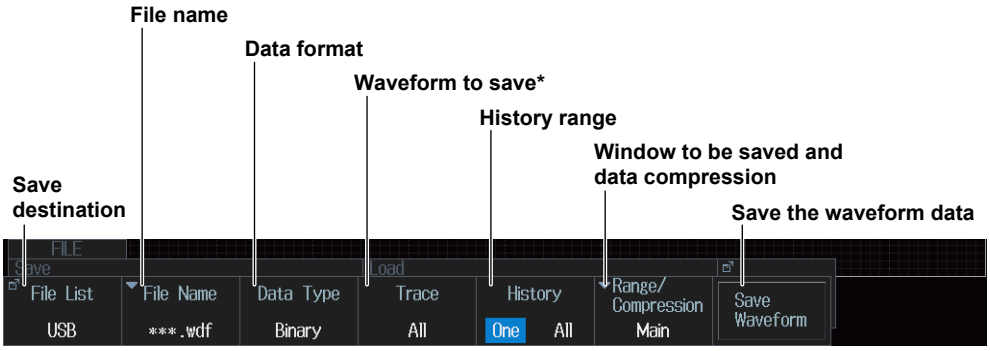
This section explains the following settings for saving waveform data:

- Save destination
- File name
- Data format
- Waveform to save
- History range
- Window to be saved
- Data compression
- Saving Waveform Data

► "Saving Waveform Data (Waveform)" in the Features Guide

## File Waveform (Save) Menu

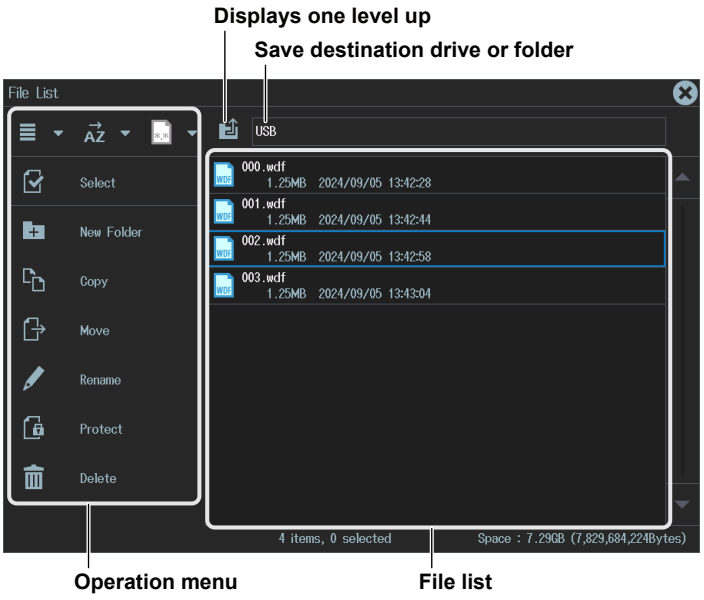
1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the FILE menu from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Waveform** soft key on the Save menu. The following menu items appear.




* The instrument saves data from the CH4 or LOGIC waveform, depending on which channel's key is illuminated.
Specify the channel that you want to save in advance by pressing either the CH4 key or the LOGIC key.

### Save Destination (File List)

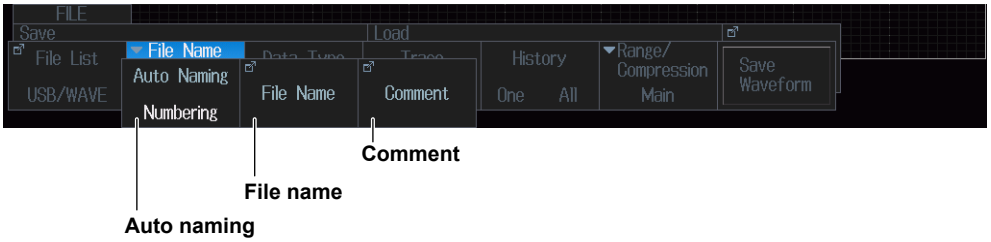
Press the **File List** soft key. The following screen appears.




For more information on file operations, see section 17.8.

## File name (File Name)

Press the **File Name** soft key. The following menu items appear.

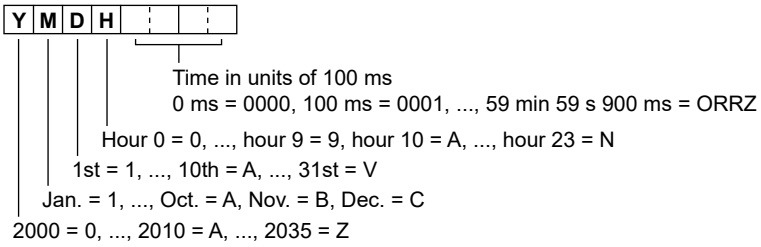



### Auto Naming (Auto Naming)

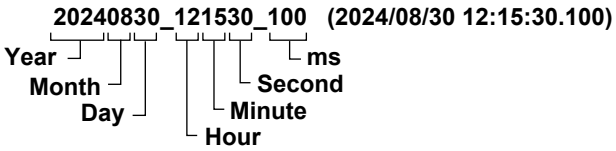
OFF: The auto naming feature is disabled. The name that you specify using the File Name setting is used. If a file with the same name exists in the save destination folder, an overwrite confirmation dialog box is displayed.

Numbering: The instrument automatically adds a three-digit number from 000 to 999 or a four-digit number from 1000 to 4999 after the common name specified using the File Name setting and saves the file.

Date: As shown in the figure below, the instrument uses an 8-character file name that is produced based on the date and time using base-36 numbers (0 to 9 and A to Z). The file name specified using the File Name setting is not used.




Date2: The file name is the date and time (down to ms) when the file is saved. The file name specified using the File Name setting is not used.




### File name (File Name)

You can set the common file name that is used when the auto naming feature is turned off or when the auto naming feature is set to Numbering.

### Comment (Comment)

You can add a comment that consists of up to 128 characters when you save a file. You do not have to enter a comment. All characters, including spaces, can be used in comments.

## Data Type (Data Type)

Binary: Data is saved in binary format (the extension is .wdf).

ASCII: Data is saved in ASCII format (the extension is .csv).

ASCII with TimeInfo.: All data is saved in ASCII format with time information (the extension is .csv).

## History Range (History)

Of the waveforms that are selected to be saved on the Trace menu, set which range of history waveforms to save.

One: The single waveform that is specified with Select No. on the HISTORY menu* will be saved.

All: All history waveforms within the range bounded by Start No. and End No. on the HISTORY menu* will be saved. If you search for history waveforms, and then select All, only the detected waveforms will be saved.

* The menu that appears when HISTORY is pressed

- **History Range One and All Settings**

  The history range is fixed to One or All depending on the display mode (Mode) and the type of data to be saved (Data Type) on the HISTORY menu.

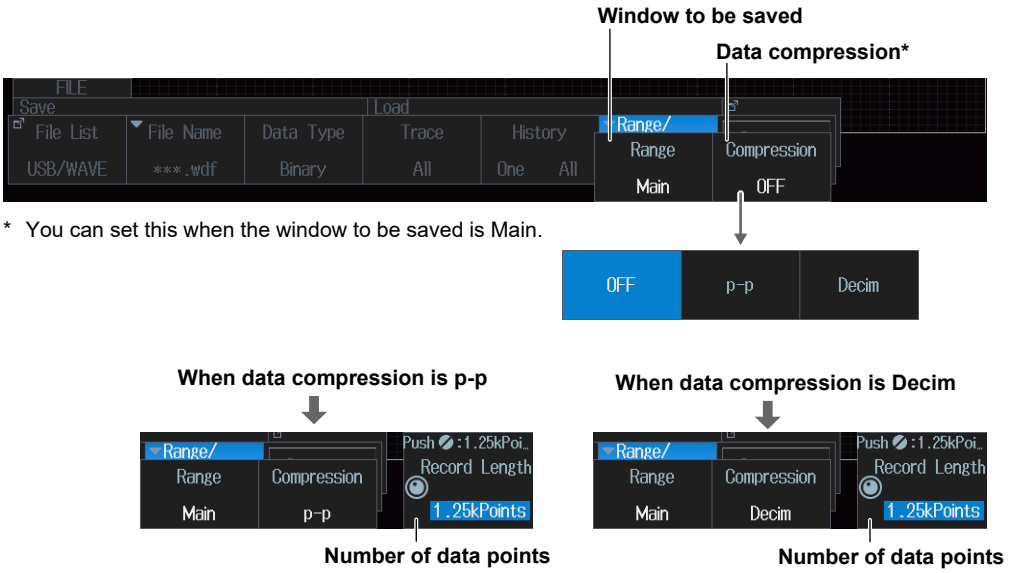
| Display Mode (Mode) on the HISTORY Menu | | One | All | Accumulate |
|---|---|---|---|---|
| Type of data to be saved (Data Type) | Binary | One or All selectable | One or All selectable | Fixed to All |
| | ASCII | Fixed to One | Fixed to One | Fixed to One |
| | ASCII with TimeInfo. | Fixed to One | Fixed to One | Fixed to One |

### *Note*

If Average on the HISTORY menu is set to ON, only a single set of averaged waveform data will be saved regardless of the display mode specified on the HISTORY menu, the type of data to be saved, and the history range.

## Window to Be Saved and Data Compression (Range/Compression)

Press the **Range/Compression** soft key. The following menu items appear.




* You can set this when the window to be saved is Main.

If the window to be saved is set to Main, you can save the waveform data by compressing or sampling it. If you want to save waveform data whose record length exceeds 1.25 Mpoints to a file in ASCII format, the data must be compressed. If the window to be saved is set to Zoom1 or Zoom2, data compression is not possible. Therefore, waveform data whose number of data points on the window to be saved exceeds 1.25 Mpoints cannot be saved to a file in ASCII format.

OFF: All the data is saved without compression or sampling.

P-P: The waveform data is P-P compressed so that the number of data points is equal to the specified number and then saved.

Decim: The data is sampled (decimated) so that the number of data points is equal to the specified number and then saved.

### About Data Compression and Waveform Loadability

Waveforms saved in the binary data format can be loaded to this instrument, but the possible loading destinations differ depending on the data compression setting.

Waveforms saved in the ASCII or ASCII with TimeInfo. format cannot be loaded to the instrument regardless of the data compression setting.

| **Waveform loading destination*** | | **Loading Waveform Data into Channels (Load to Channels)** | **Loading waveform data into reference waveforms (Load to Ref1(Math1) to Load to Ref4(Math4))** |
|---|---|---|---|
| **Data compression (Compression)** | OFF | Possible | Possible |
| | P-P | Not possible | Possible |
| | Decim | Not possible | Possible |

* For details on loading waveform data, see section 17.5.

# 17.3 Saving Setup Data

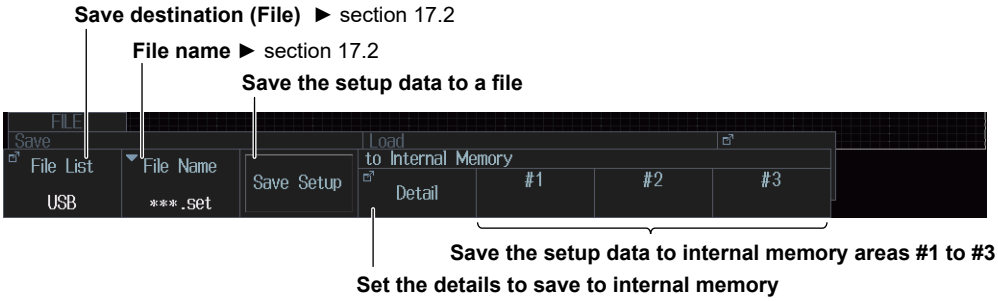
This section explains the following settings for saving setup data:
You can save setup data to a file or to three different internal memory locations.

- Save destination
- File name
- Detailed internal memory settings
- Saving setup data

► “Saving Setup Data (Setup)” in Features Guide

## File Setup (Save) Menu

1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the FILE menu from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Setup (Save)** soft key. The following menu items appear.




### Saving Setup Data (Save Setup)

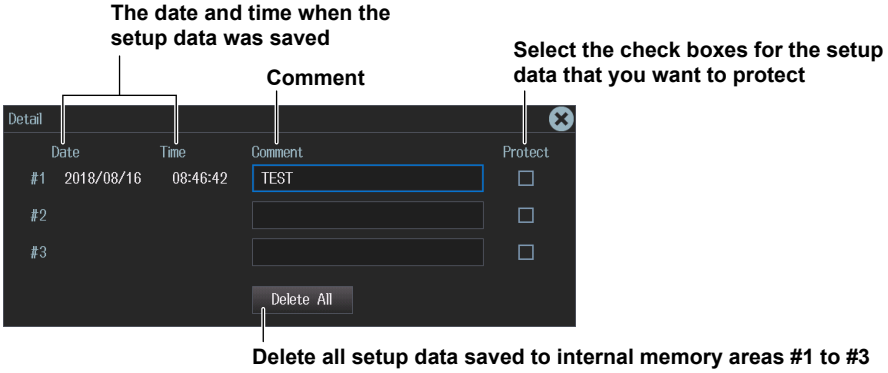
Save setup data to a file with a .set extension.

### Saving Setup Data (to Internal Memory; #1 to #3)

Save setup data to internal memory areas #1 to #3.

### Setting Internal Memory Details (to Internal Memory; Detail)

Press the **Detail** soft key. The following screen appears.



# 17.4 Saving Other Types of Data

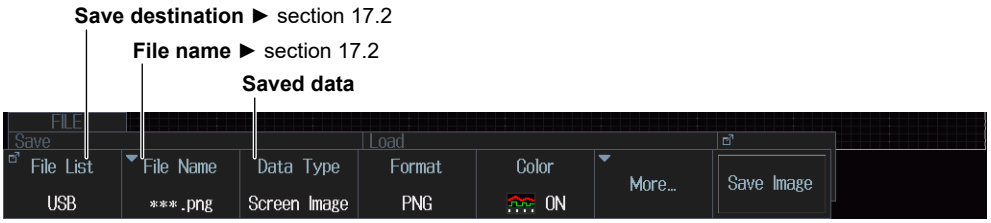
This section explains the following settings for saving screen captures, waveform zone data, snapshot waveform data, automated measurement values of waveform parameters, serial bus analysis results, FFT results, histogram data, and the list of timestamps:

- Save destination
- File name
- Saved data
- Data format
- Color data
- Waveform zone number
- Serial bus
- FFT
- Histogram
- Saved data

► “Saving Other Types of Data (Others)” in Features Guide

## File Others (Save) Menu

1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the FILE menu from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Others (Save)** soft key. The following menu items appear.




### Data Type to Save (Data Type)

Screen Image: Save the display to a PNG, BMP, or JPEG file.
- You can select whether to include setting information such as channels, triggers, and waveform acquisition, in waveform screen captures. For details on screen captures that include setting information, see section 16.5.
- Screen captures that can be saved on the FILE menu are those that correspond to Hardcopy (without Menu) save mode on the SHIFT+PRINT menu.

Wave-Zone: Save the waveform zone to a file with a .zwf extension.

Snap: Save the waveform data captured in a snapshot to a file with a .snp extension.

Measure: Save the results of automatic waveform parameter measurement to a file in CSV format.

Serial Bus: Save the results of the serial bus analysis specified by Serial Bus1 to Serial Bus4 to a file in CSV format.

FFT: Save the computed result specified by FFT1 or FFT2 to a file in CSV format. Up to 1.25 Mpoints of data can be saved.
- When Freq Info. is set to ON, all data is saved with frequency information.
- When Freq Info. is set to OFF, all data is saved without frequency information.

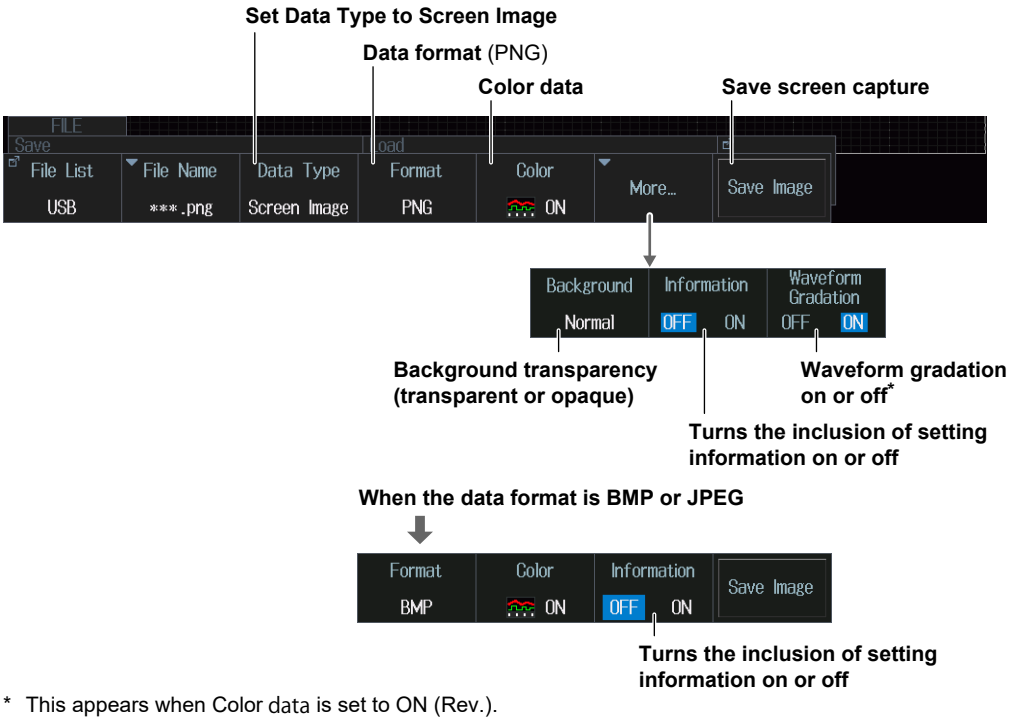
Histogram: Save the waveform or waveform parameter histogram specified by Histogram1 or Histogram2 to a file in CSV format.

History List: Save the list of timestamps to a file in CSV format.

***Note***

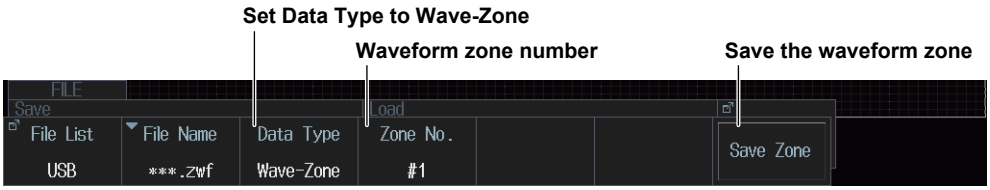
The serial bus analysis results are saved according to the settings made on the HISTORY menu. If the history mode is set to One, the analysis results of the specified record number's waveform are saved. If the history mode is set to All or Accumulate, the analysis results of all the displayed waveforms are saved.

### When Data Type Is Screen Image



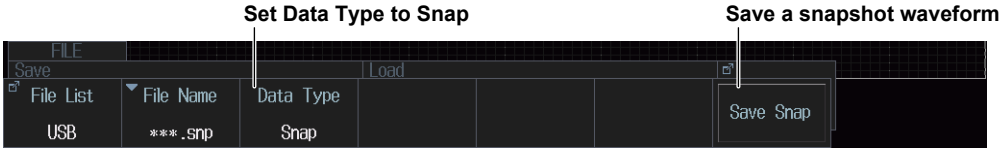

* This appears when Color data is set to ON (Rev.).

### When Data Type Is Wave-Zone

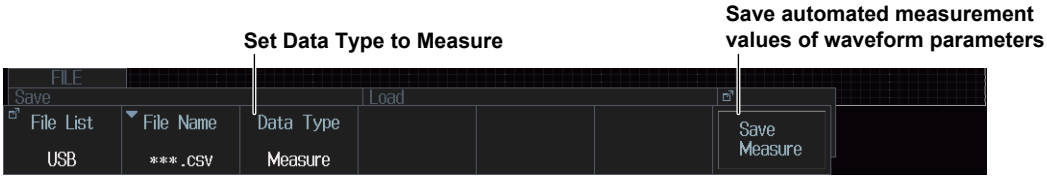



You can save waveform zones #1 to #4 to different files.

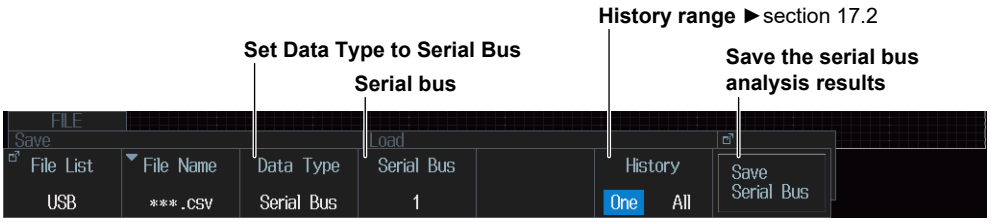
### When Data Type Is Snap



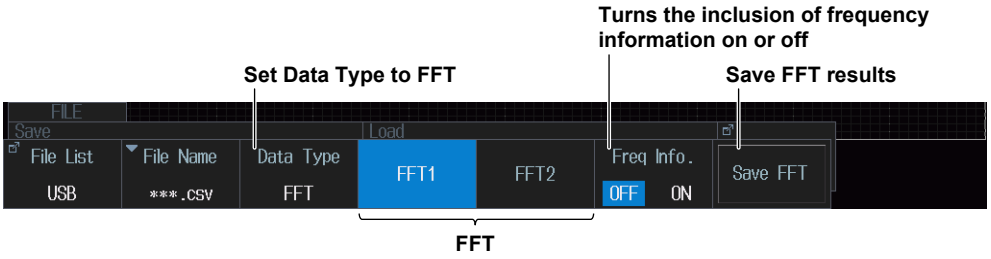

### When Data Type Is Measure



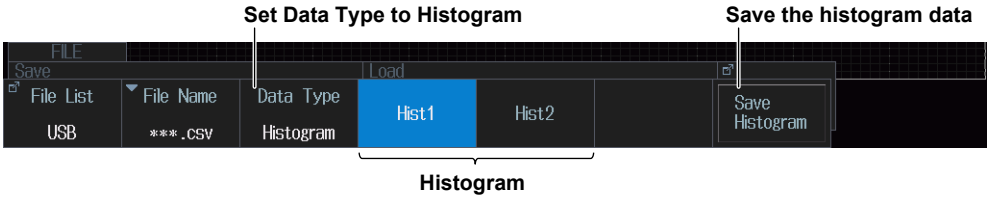
### When Data Type Is Serial Bus




### When Data Type Is FFT




### When Data Type Is Histogram




### When Data Type is History List



# 17.5 Loading Waveform Data

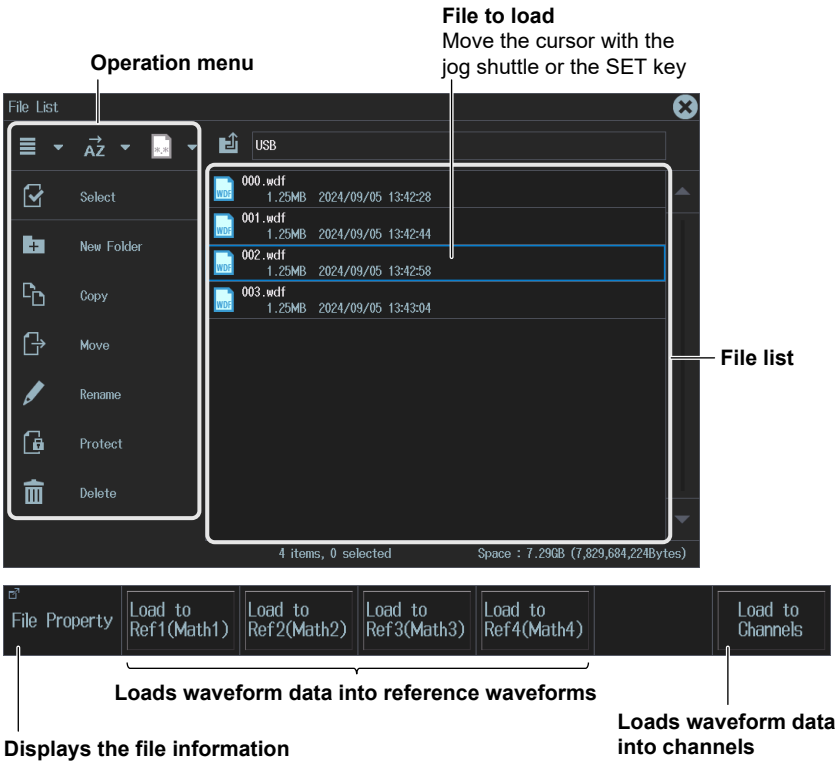
This section explains the following settings for loading waveform data:

- Displaying file information
- Loading waveform data into reference waveforms
- Loading waveform data into channels

► "Loading Waveform Data (Waveform)" in Features Guide

## File Waveform (Load) Menu

1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** ( ) in the upper left of the screen and select the FILE menu from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Waveform (Load)** soft key. The following screen and menu items appear.




### Selecting Files

Select the file to load from the file list. ► section 17.8

### Loading Waveform Data into Reference Waveforms (Load to Ref1(Math1), Load to Ref2 (Math2), Load to Ref3 (Math3), Load to Ref4 (Math4))

You can specify waveform data files that have the .wdf extension and load them as reference waveforms. Reference waveforms are treated as part of the computation feature. You can display reference waveforms by specifying Ref in a mode from Math/Ref 1 to Math/Ref 4.

## Loading Waveform Data into Channels (Load to Channels)

You can specify waveform data files that have .wdf extensions and load them with setup data. Loaded data is cleared when you start measurement.

### *Note*

To load a file saved from the waveform data of multiple channels as a reference waveform, use Load to Channels to load the waveform into channels, and then load the waveform as a computation reference waveform (see section 6.7).

# 17.6 Loading Setup Data

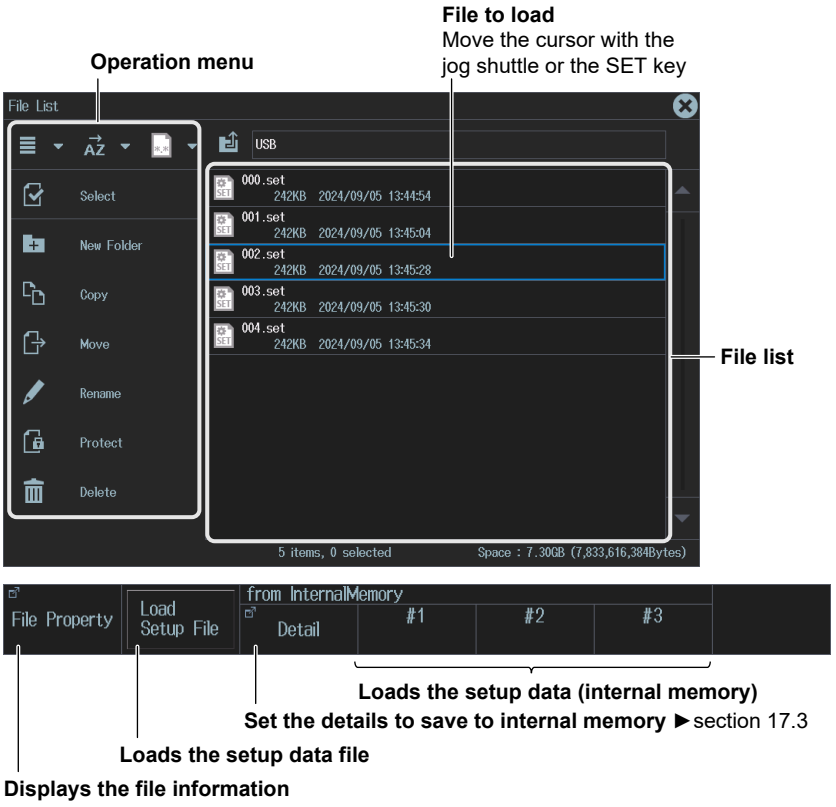
This section explains the following settings for loading setup data:
Both the method for loading setup data that has been saved to a file and the method for loading setup data that has been saved in the internal memory are explained.

- Displaying file information
- Data to load
- Loading data

► "Loading Setup Data (Setup)" in the Features Guide

## File Setup (Load) Menu

1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the FILE menu from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Setup (Load)** soft key. The following menu items appear.




### Selecting Files

Select the file to load from the file list. ► section 17.8

### Loading Setup Data (Load Setup File)

Select a setup data file that has the .set extension and load it.

### Loading Setup Data (from InternalMemory; from #1 to #3)

Load setup data from internal memory areas #1 to #3.

# 17.7 Loading Other Types of Data

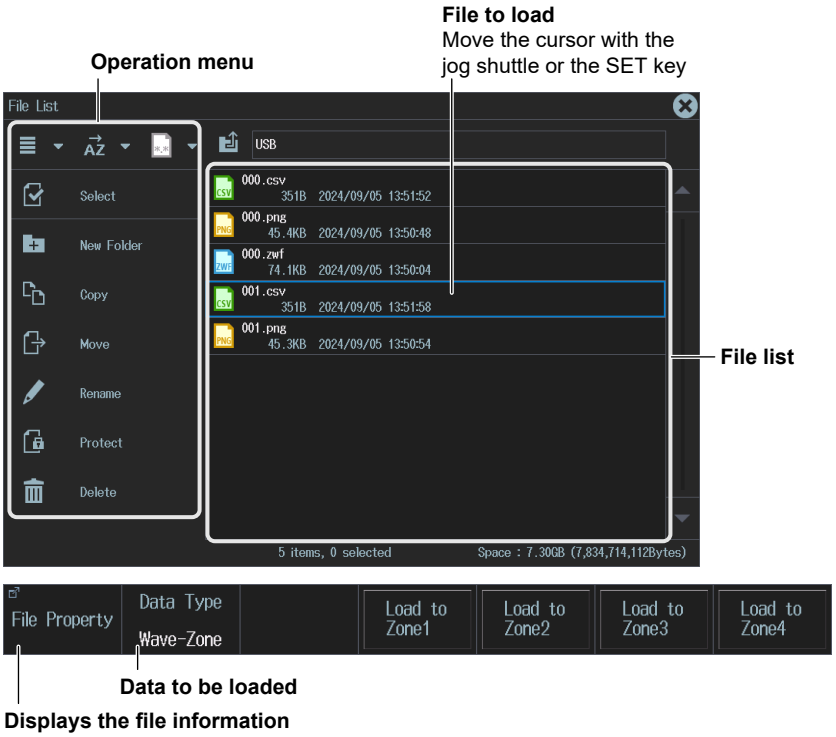
This section explains the following settings for loading waveform zones, polygonal zones, snapshot waveforms, or serial bus waveform symbol data:

- Displaying file information
- Data to load
- Loading data

► "Loading Other Types of Data (Others)" in Features Guide

## File Others (Load) Menu

1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the FILE menu from **FILE/PRINT** on the top menu that is displayed.
2. Press the **Others (Load)** soft key. The following menu items appear.




### Selecting Files

Select the file to load from the file list. ► section 17.8

### Data Type to Load (Data Type)

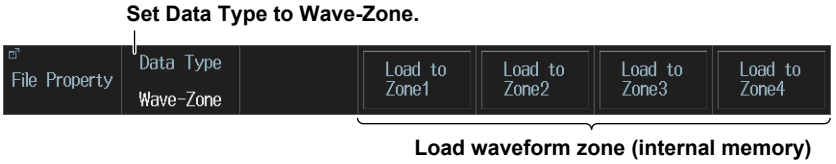
Wave-Zone: Load waveform zone files that have the .zwf extension that you created on the instrument into internal memory areas Zone1 to Zone4.

Polygon-Zone: Load polygonal zone files that have the .msk extension that you created with the Mask Editor software into internal memory areas Zone1 to Zone4.

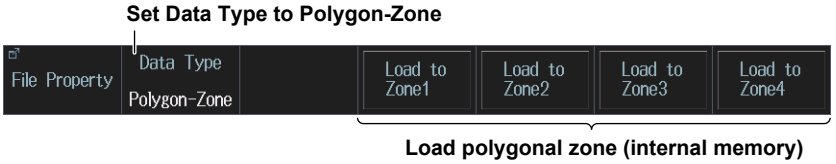
Snap: Load snapshot waveform files that have the .snp extension that you have saved.

Symbol: Load physical value/symbol definition files that have the .sbl extension that you have edited using the Symbol Editor tool.

### When Data Type Is Wave-Zone




### When Data Type Is Polygon-Zone




### When Data Type Is Snap




### When Data Type Is Symbol



# 17.8 Performing File Operations

This section explains the following settings for performing various file operations from the file list or the file utility menu:

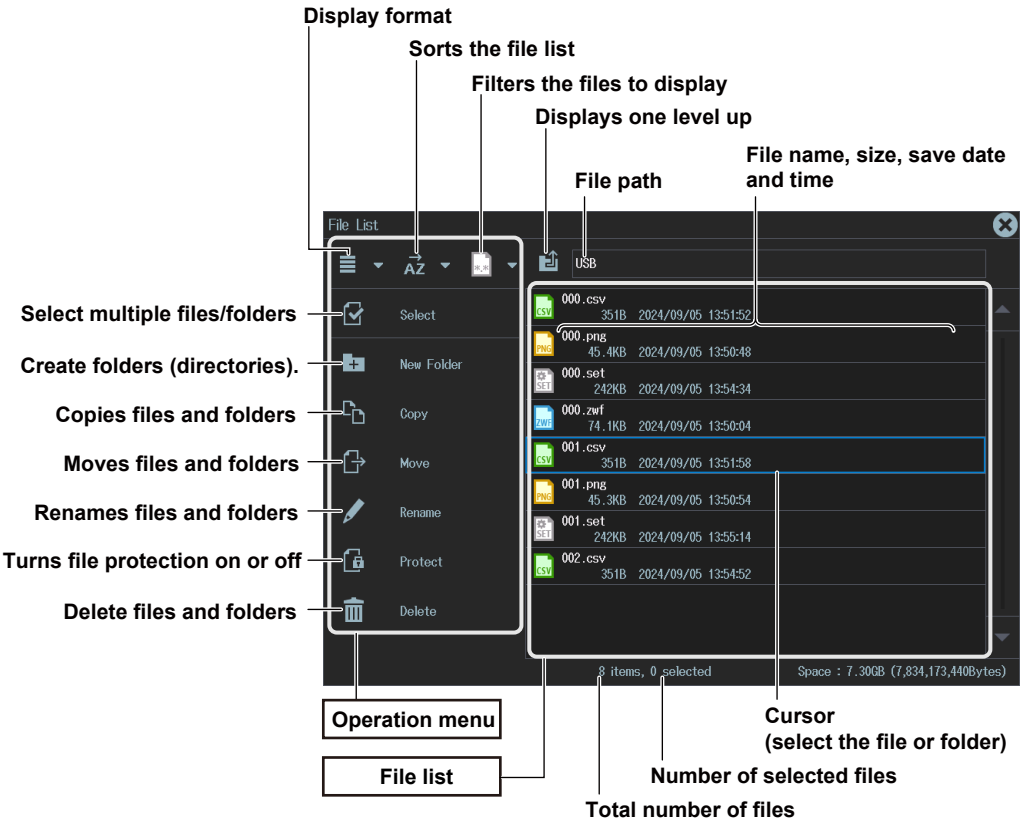
File list
- Display format
- Sorting the file list
- Filtering files to be displayed

- Displaying the parent folder
- Selecting multiple files and folders (All Set, All Reset, and Set/Reset)
- Creating folders (directories)
- Coping files and folders
- Moving files and folders
- Renaming files and folders
- Turning file protection on or off
- Deleting files and folders

FILE UTILITY menu
- Displaying file information
- Turning file protection on or off
- Selecting multiple files and folders (All Set, All Reset, and Set/Reset)

► “File Operations (Utility)” in Features Guide

## File List (File List)



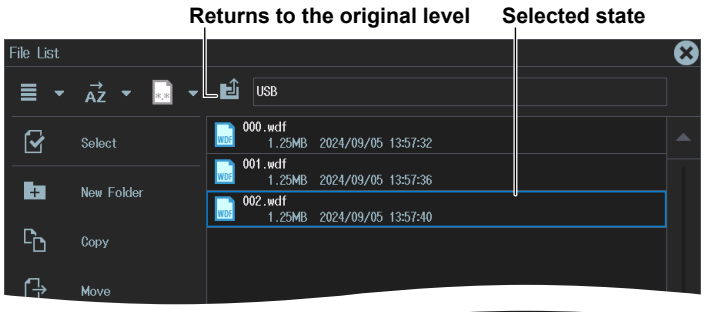
## Switching Between the Operation Menu and the File List

- Tilt **SET** (●) to the left to move the cursor to the operation menu. Tilt it to the right to move the cursor to the file list.
- To move the cursor between ☰*, AZ*, and *, tilt the **SET** key to the left or right.
  * The icon varies depending on the selected menu item.
- To move the cursor to the (display one level up), move the cursor to the top of the file list, then tilt **SET** up.

## Selecting the Operation Target (File List)

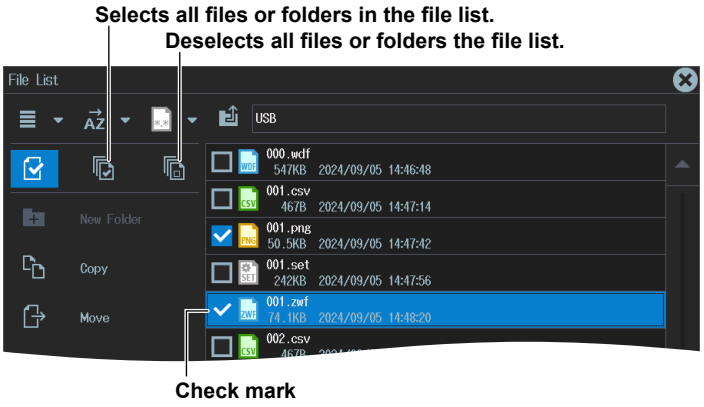
### When Operating a File or Folder

1. Turn the **jog shuttle** or move **SET** (●) up and down to move the cursor to the file or folder you want to select.
   A blue frame appears around the selected file or folder.
2. To display inside of a folder, move the cursor to the folder and press **SET** (●).
   To return to the original level, move the cursor to (display one level up) and press **SET**.




### When Operating Multiple Files and Folders (Select)

1. Display the content of a drive or folder that contains multiple files or folders that you want to select.
2. Select **Select** (☑) on the operation menu and press **SET**. The following screen appears.
   The cursor moves to the file list.




3. Move the cursor to a file or folder that you want to select on the file list.

4. Press **SET** (●).
   - A check mark is displayed next to the selected file or folder.
   - Press **SET** again to remove the check mark.
5. Repeat steps 3 and 4 to select all the files and folders you want.
   - To select all or deselect all, move the cursor to the operation menu, select Select All () or Deselect All (), and then press **SET**.
   - To close the multiple selection screen, move the cursor to the operation menu, select **Select** () and press **SET**. Multiple selection will be canceled.

## Selecting the Operation Content (Operation Menu)

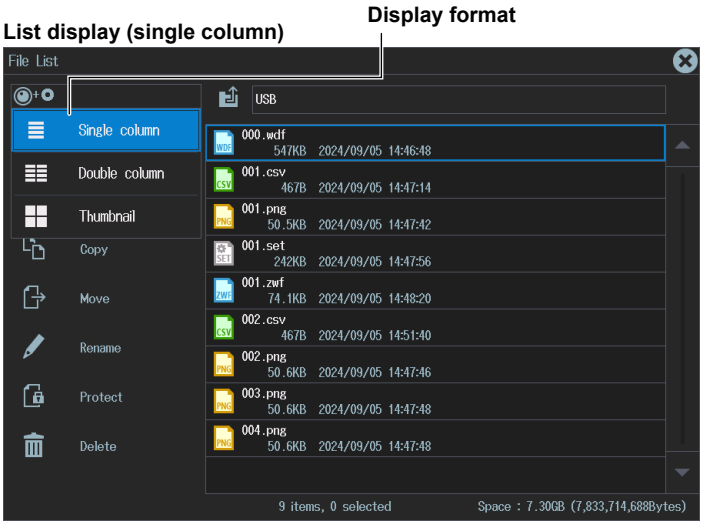
1. Turn the **jog shuttle** or move **SET** (●) up and down to move the cursor to the menu item you want to use.
2. Press **SET** (●).
   - The screen for the selected item appears.
   - To return to the previous screen, press **ESC**.

## Display Format (☰)

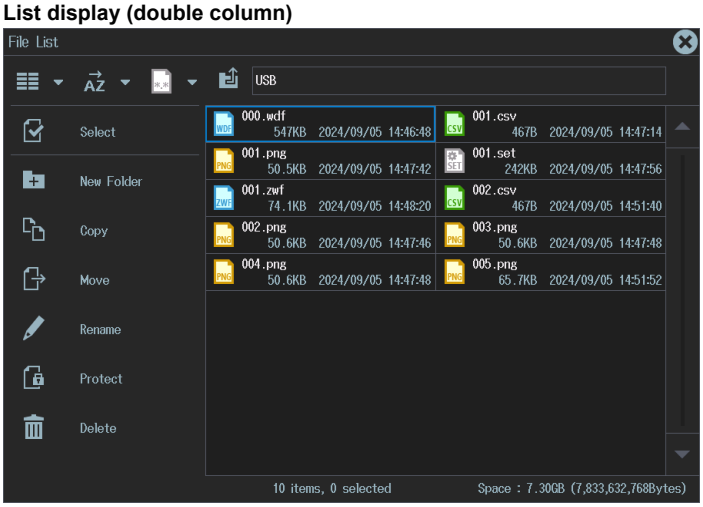
Select ☰* from the operation menu and press **SET**. The following screen appears.

* The icon will change according to the currently selected display format.

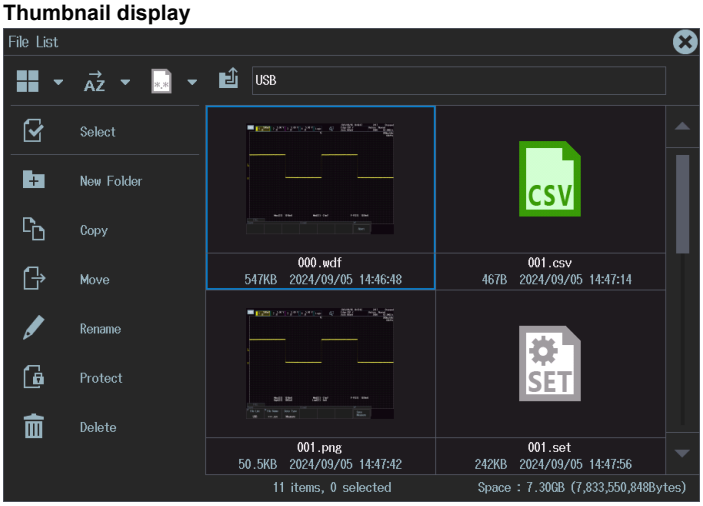
**List display (single column)**




**List display (double column)**



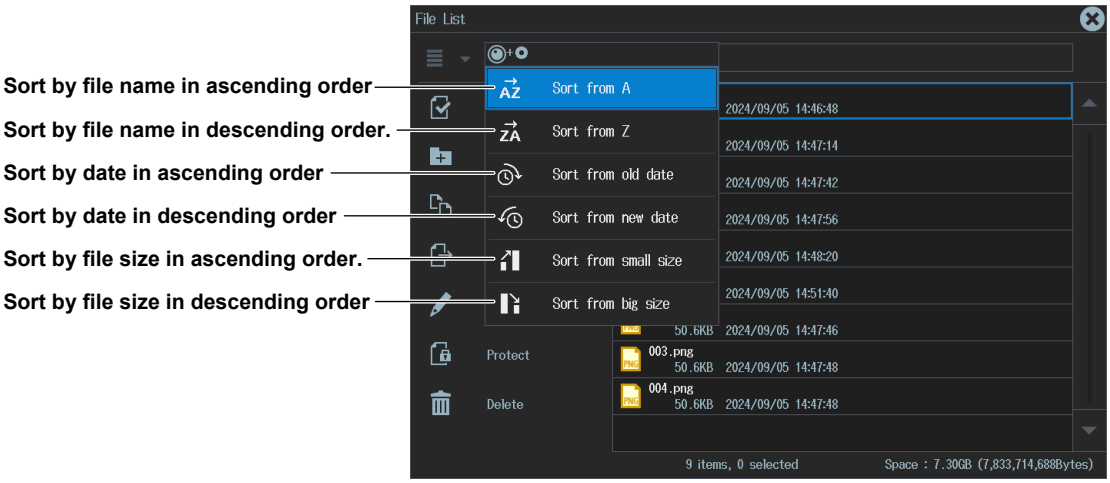

**Thumbnail display**



## Sorting the File List (AZ)

Select AZ* from the operation menu and press **SET**. The following screen appears.

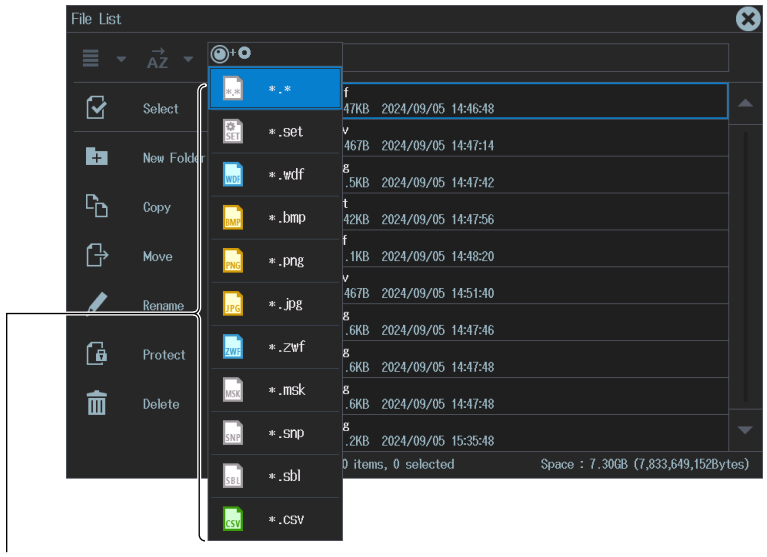
* The icon will change according to the current sort order.




## Filtering the Files to Display (*.*)

On the operation menu, select *.*, and press **SET**. The following screen appears.

* The icon varies depending on the selected file type.



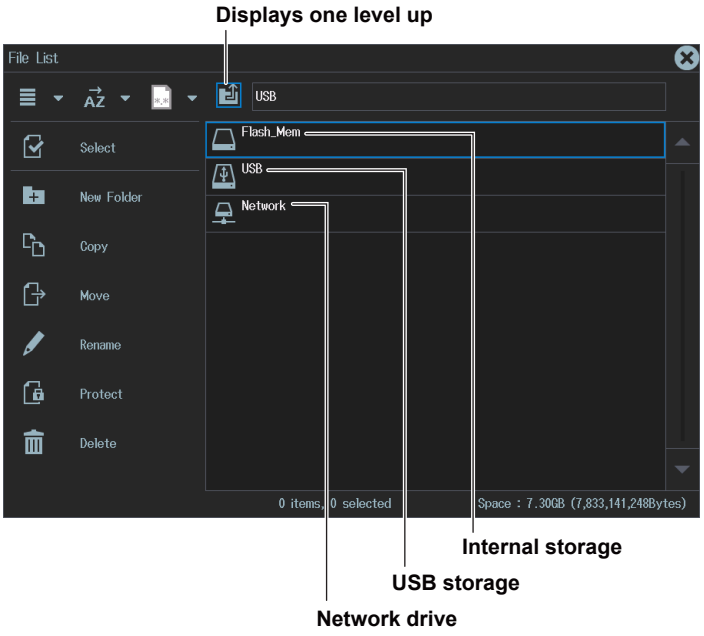

**Select the type of files to display in the file list.**

*.*: All files
*.set: Setup files
*.wdf: Waveform files
*.bmp: Image files (BMP)
*.png: Image files (PNG)
*.jpg: Image files (JPEG)
*.zwf: Waveform zone files
*.msk: Polygonal zone files
*.snp: Snapshot waveform files
*.sbl: Symbol definition files
*.csv: CSV files

## Displaying one level up ( )

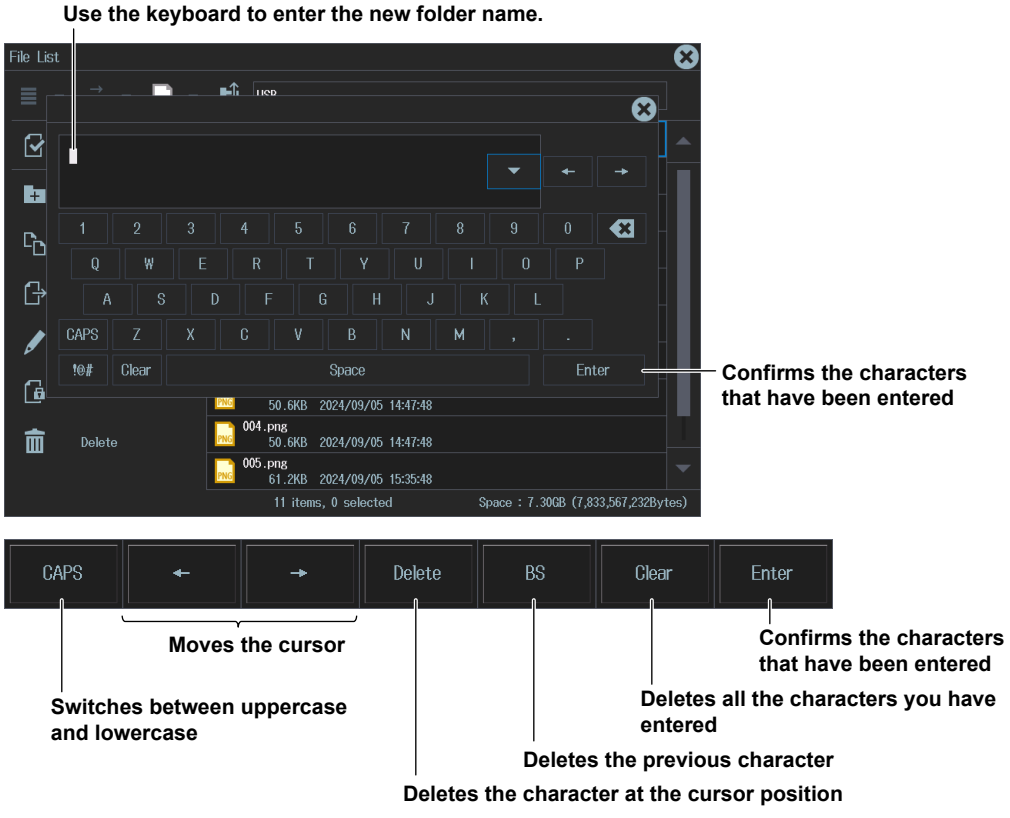
Select , and press **SET**. The next higher level is displayed on the file list.

By displaying the highest level, you can change the storage device.



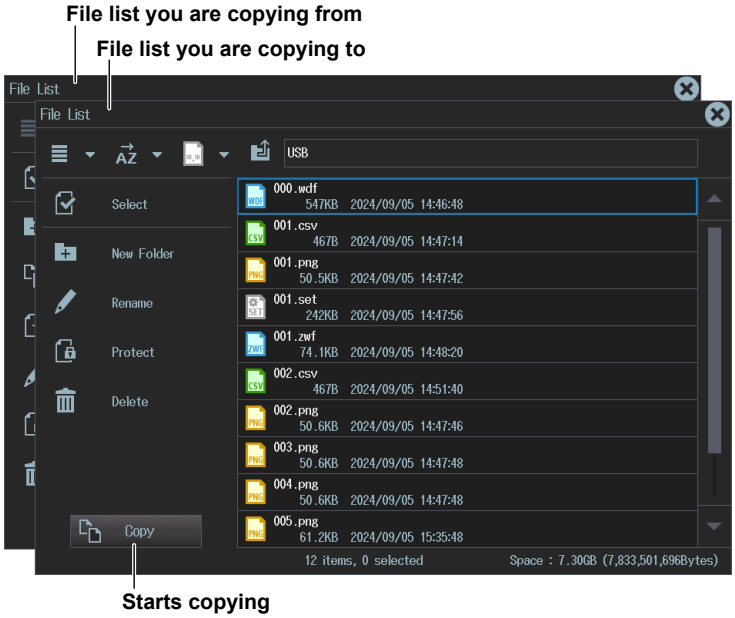

## Making Folders (Directories) ( (New folder)

1. Create a folder and display the content of the drive or folder on the file list.
2. Select **New Folder** from the operation menu and press **SET**. The following screen appears.



## Copying Files and Folders (Copy)

1. Select the files and folders in the file list that you want to copy.
2. Select **Copy** from the operation menu and press **SET**. The following screen appears.



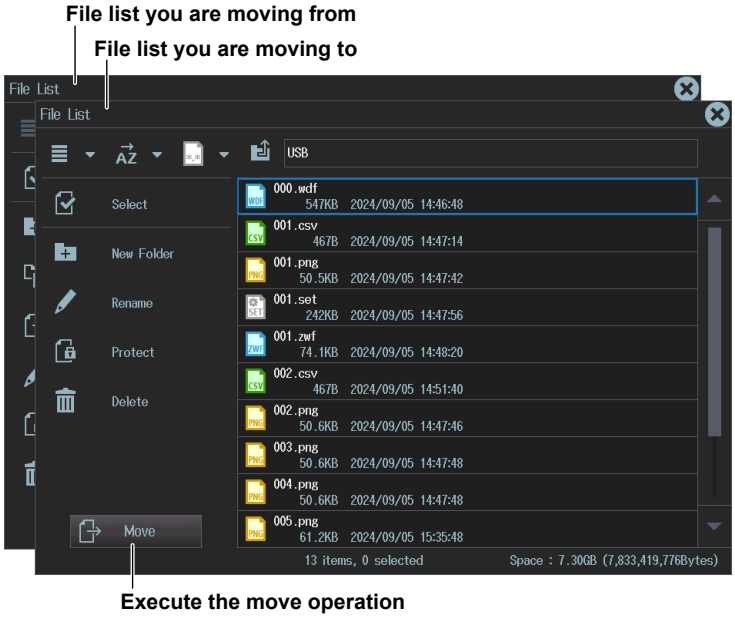

3. Select the drive or folder on the file list that you are copying to.
4. Tilt **SET** to the left and go to the copy destination operation menu.
5. Select **Copy** and press **SET**. The files or folders are copied.

### *Note*

- By selecting multiple files, you can copy them all at the same time. For details on how to select multiple files, see page 17-17.
- You can perform file operations on the file list that you are copying to as well.

## Moving Files and Folders (Move)

1. Select the files and folders in the file list that you want to move.
2. Select **Move** from the operation menu and press **SET**. The following screen appears.



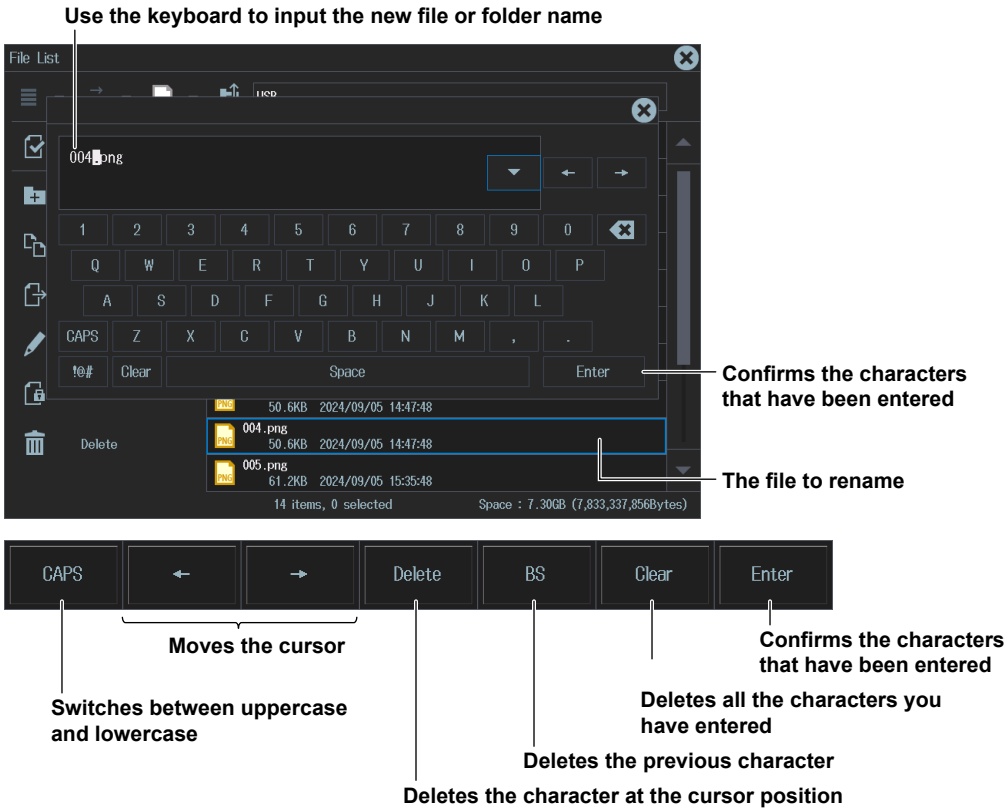

3. Select the drive or folder in the file list that you are moving to.
4. Tilt **SET** to the left and go to the move destination operation menu.
5. Select **Move** and press **SET**. The files or folders are moved.

### *Note*

- By selecting multiple files, you can move them all at the same time. For details on how to select multiple files, see page 17-17.
- You can perform file operations on the file list that you are moving files to as well.

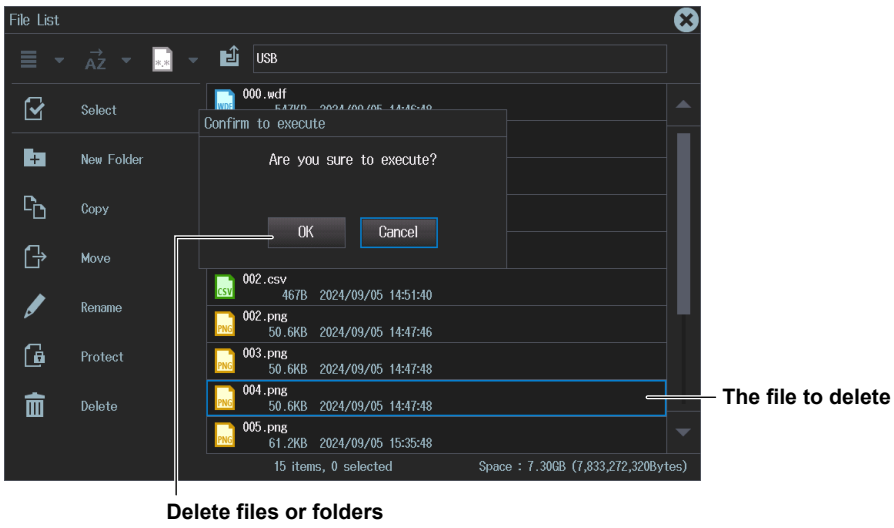
## Renaming Files and Folders (Rename)

1. Select the file or folder that you want to rename from the file list.
2. Select **Rename** from the operation menu and press **SET**. The following screen appears.




## Deleting Files and Folders (Delete)

1. Select the file or folder that you want to delete from the file list.
2. Select **Delete** from the operation menu and press **SET**. The following screen appears.



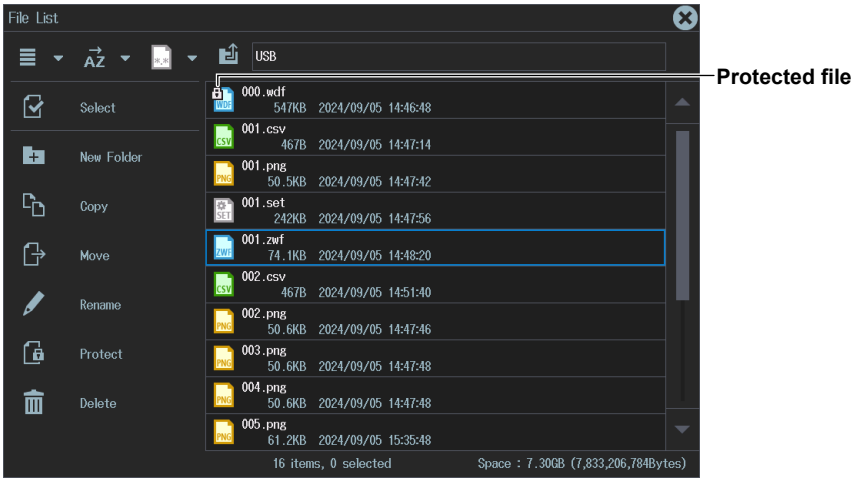

### *Note*

By selecting multiple files, you can delete them all at the same time. For details on how to select multiple files, see page 17-17.

## File Utility Menu

1. Press **FILE**. The FILE menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the FILE menu from FILE/PRINT on the top menu that is displayed.
2. Press the **Utility** soft key. The following menu items appear.




### Turning Protection On or Off (Protect ON/OFF)

You can set protection of selected files on or off.

| Protection | Description |
|---|---|
| ON | File protection is on for the selected file.<br>The file can be read from. Writing is not allowed. Deleting is also not allowed. |
| OFF | File protection is off for the selected file.<br>The file can be read and written. |

### All Set/All Reset

This is the same function as Select All ()/Deselect All () in Select () (page 17-17) of the operation menu.

All Set: Select all the files. A check mark is displayed next to each of the selected files.

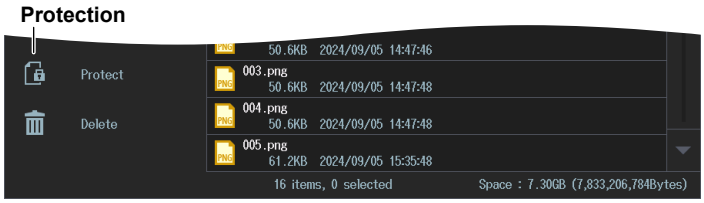
All Reset: Deselect all the files.

### Set/Reset

Invert the selection status of the file highlighted by the cursor. This is the same function as when Select () (page 17-17) of the operation menu is selected. A check mark is displayed next to each of the selected files.

## *Note*

File protection can also be turned on or off on the operation menu.



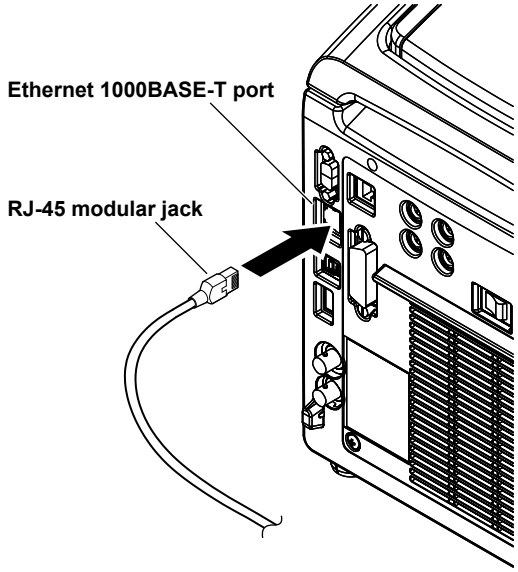
# 18.1 Connecting the Instrument to a Network

This section explains how to connect the instrument to a network.

## Ethernet Interface Specifications

There is a 1000BASE-T port located on the rear panel of the instrument.

| Item | Specifications |
|---|---|
| Ports | 1 |
| Electrical and mechanical specifications | IEEE802.3 compliant |
| Transmission system | Ethernet(1000BASE-T/100BASE-TX/10BASE-T) |
| Communication protocol | TCP/IP |
| Supported services | Server: FTP, VXI-11, and Socket, PTP master (/CY option), HTTP (Web)<br>Client: FTP (Net Drive), SMTP (Mail), SNTP, LPR (Net Print), DHCP, and DNS, PTP slave |
| Connector type | RJ-45 connector |




## Items Required to Connect the Instrument to a Network

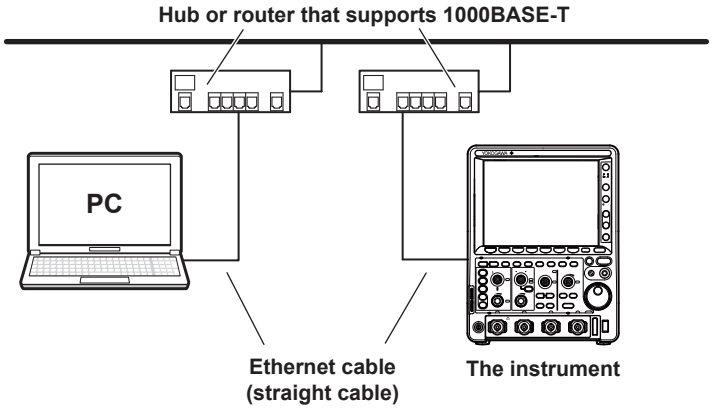
### Cable

Use a network cable appropriate for the data rate of your network.

# Connection Method

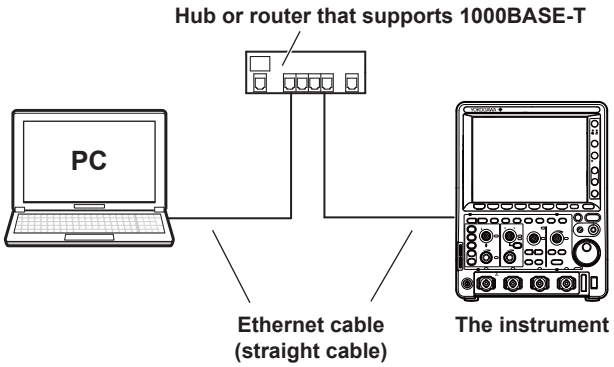
## To Connect to a PC over a Network

1. Turn off the instrument.
2. Connect one end of an Ethernet cable to the ETHERNET 1000BASE-T port on the rear panel.
3. Connect the other end of the Ethernet cable to a hub or router.
4. Turn on the instrument.




## To Connect to a PC through a Hub or Router

1. Turn off the instrument and the PC.
2. Connect one end of an Ethernet cable to the ETHERNET 1000BASE-T port on the rear panel.
3. Connect the other end of the Ethernet cable to a hub or router.
4. Connect the PC to the hub or router in the same way.
5. Turn on the instrument.




***Note***

- Use a hub or router that conforms to the transfer speed of your network.
- When you connect a PC to the instrument through a hub or router, the PC must be equipped with an auto switching 1000BASE-T/100BASE-TX/10BASE-T network card.
- Do not connect the instrument to a PC directly. Direct communication without a hub or router is not guaranteed to work.

# 18.2 Configuring TCP/IP Settings

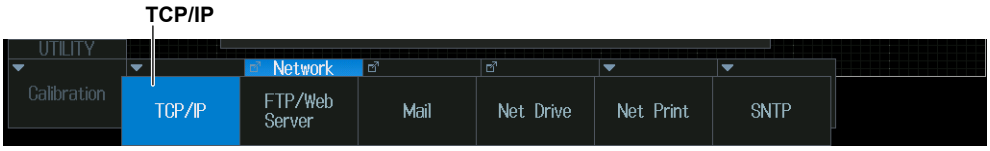
This section explains the following TCP/IP settings for connecting to a network:

- DHCP (IP address, subnet mask, and default gateway)
- DNS (domain name, DNS server IP address, and domain suffix)

► "TCP/IP (TCP/IP)" in the Features Guide

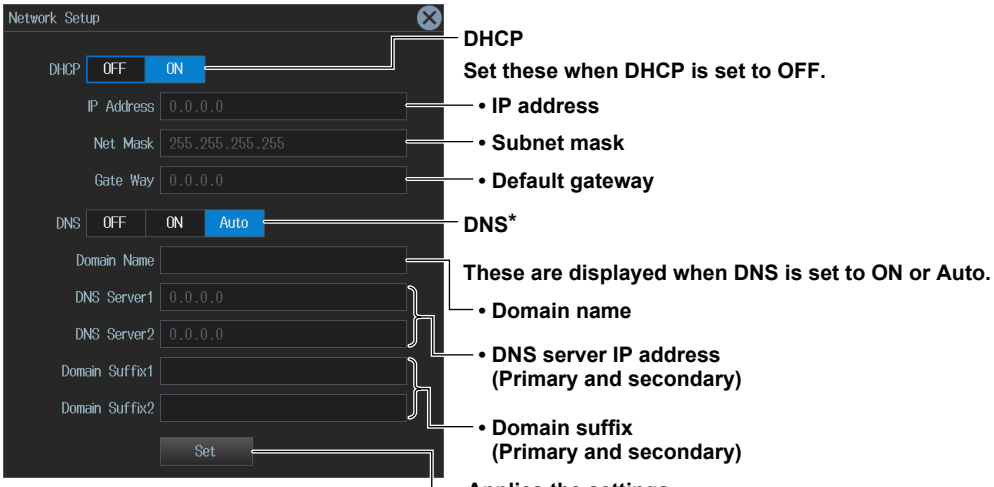
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




### TCP/IP(TCP/IP)

Press the **TCP/IP** soft key. The following screen appears.




* DNS Auto is displayed when DHCP is set to ON.

**DNS(DNS)**

OFF: Disable the DNS.

ON: DNS is enabled. Set the domain name, the DNS server IP address, and the domain suffix.

Auto: DNS is enabled. Set the domain suffix. The domain name and the DNS server IP addresses are set automatically. This option can only be selected when DHCP is on.

# 18.3 Accessing the instrument from a PC (FTP Server)

This section explains the following settings for accessing the instrument from a PC on a network:

- User name
- Password
- Timeout
- Executing FTP client software

► “FTP Server (FTP/Web Server)” in Features Guide

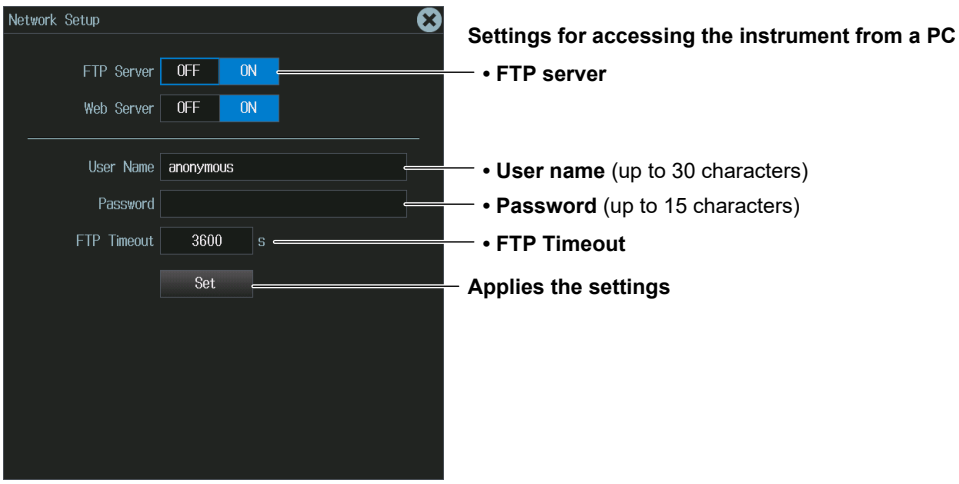
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




## FTP Server (FTP/Web Server)

Press the **FTP/Web Server** soft key. The following screen appears.




### Executing FTP Client Software (Set)

Start an FTP client on a PC.

Enter the user name and password that you set on the instrument’s network setup screen, which is shown above, and connect to the instrument.

### *Note*

If you set the user name to “anonymous,” you can connect to the instrument without entering a password.

# 18.4 Monitoring the Instrument's Display from a PC (Web Server)

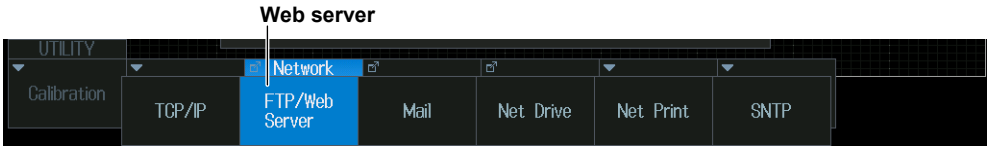
This section explains the following settings for accessing the instrument from a PC on a network:

- User name
- Password
- Operations on the PC

► "Web Server (FTP/Web Server)" in Features Guide

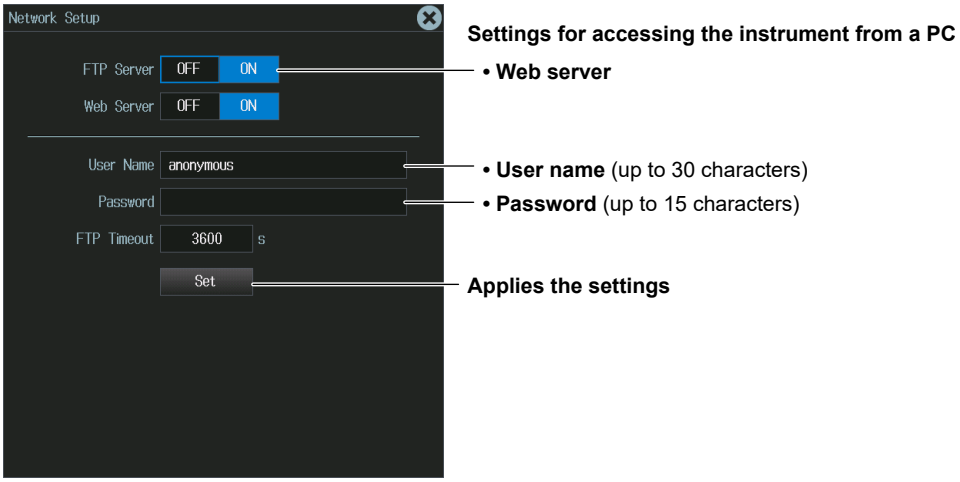
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




### Web Server (FTP/Web Server)

Press the **FTP/Web Server** soft key. The following screen appears.

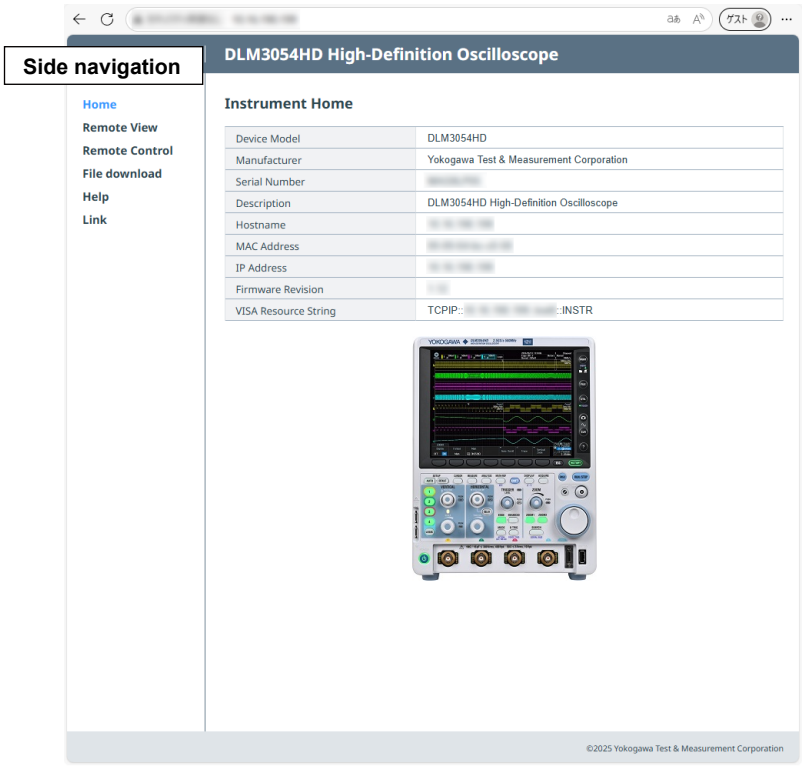



***Note***

If you set the user name to "anonymous," you can connect to the instrument without entering a password.

## Operations on the PC

1. Connect the instrument to the network via Ethernet.
2. Start a web browser on a PC connected to the network.
3. Enter "http://IP address/" in the address bar to connect to the instrument.
   The IP address is the IP address of the instrument.
4. Enter the user name and password set on the previous page, and click OK. The instrument's home screen appears.
   User name and password are case-sensitive.
5. Click a side navigation item. The corresponding screen appears.

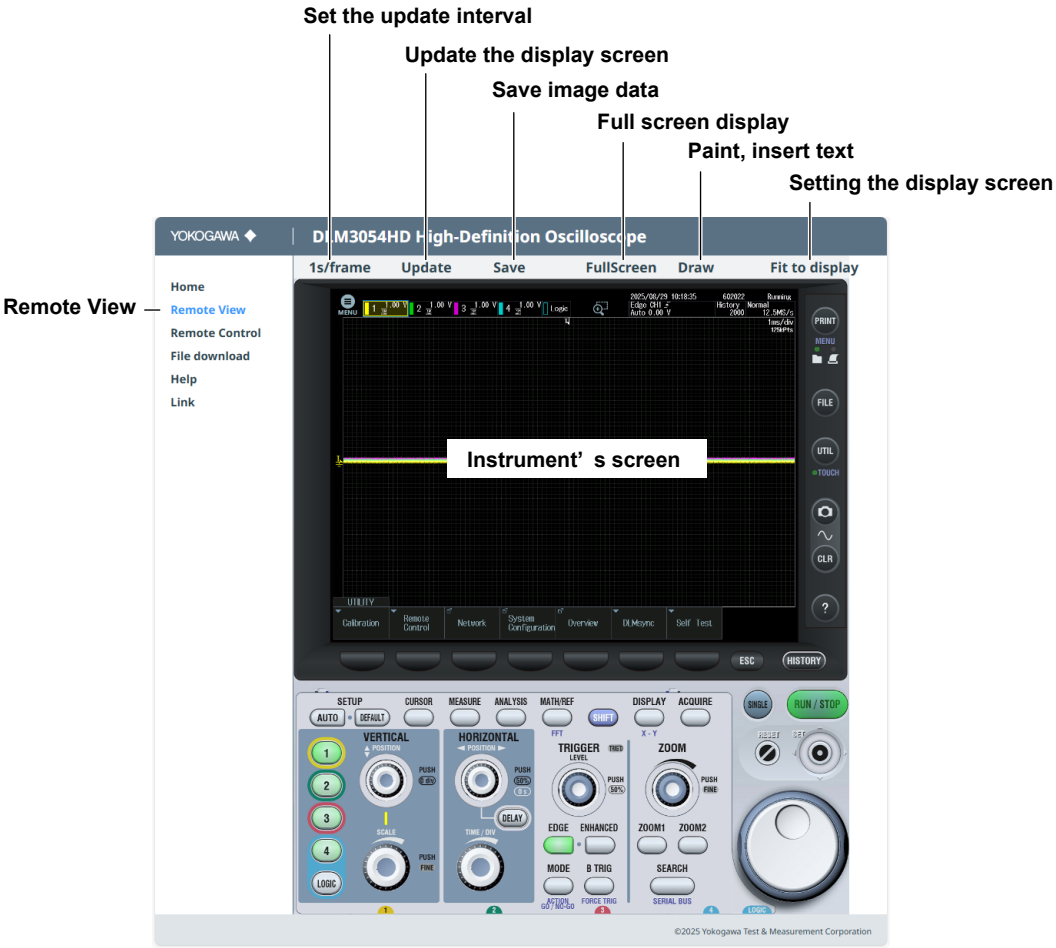



### Home (Home)

Click **Home**. Information about the instrument is displayed.

## Remote View (Remote View)

Click **Remote View** to display the following screen.




### Set the update interval

Click **1s/frame**, and select the update interval for the display screen.

When you change the update interval, the display on the menu also changes from 1s/frame to the selected update interval.

### Update the display screen

Click **Update**. The display screen is updated.

### Save image data

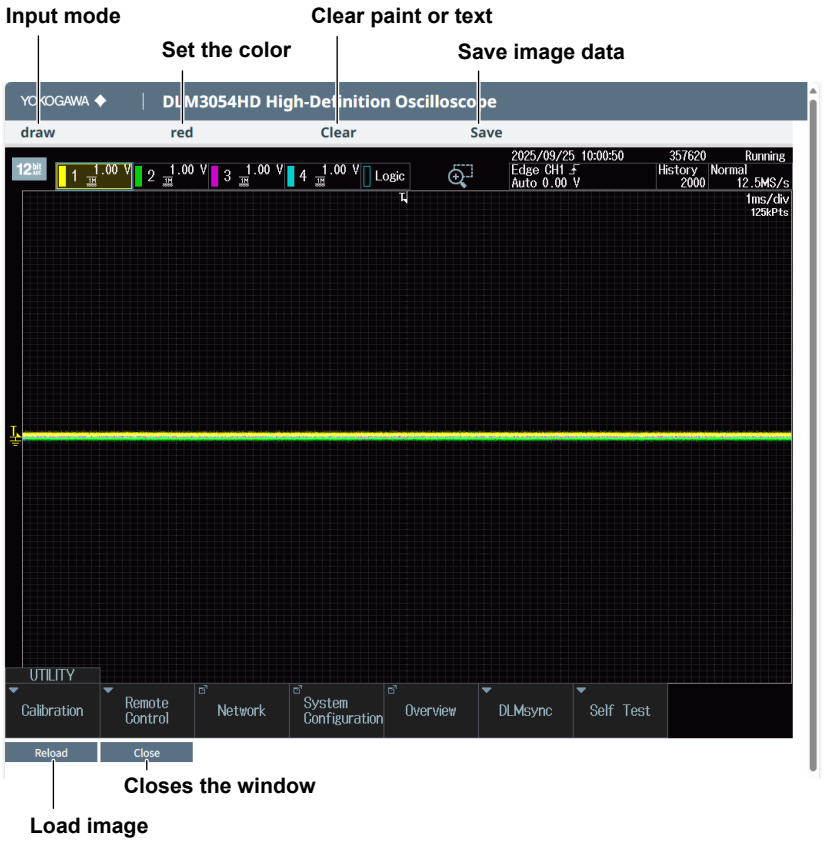
Click **Save**. The instrument's screen is saved in the PC.

### Full screen display

Click **Full Screen**. Open the screen of this instrument in a new tab.

### Paint, insert text

Click **Draw** to display the following screen.




- **Add lines**

1. Set the input mode to **draw**.
2. Drag the mouse. A line is added.

- **Add text**

1. Set the input mode to **text**.
2. Click where you want to add text. An input screen appears.
3. Enter the text, and click OK. The text is added.

### Setting the display screen

Click **Fit to display** the following menu.

Fit to display: The sizes of the instrument's screen and control panel automatically adjust to the size of the browser window.

Full size: The sizes of the instrument's screen and control panel remain constant even if the browser window size changes.

When the display screen setting is changed, the display on the menu also changes from Fit to display to Full size.

## Remote Control (Remote Control)

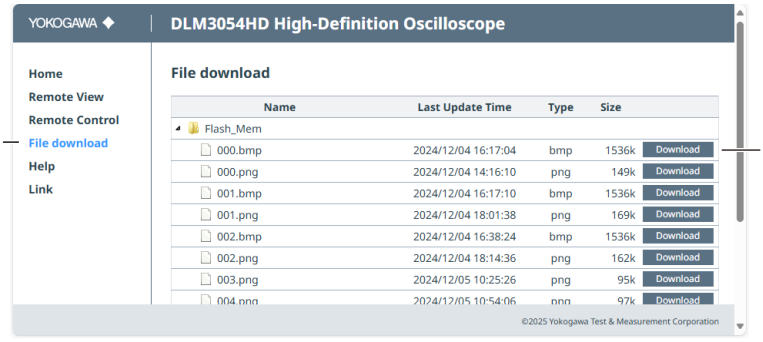
Click **Remote Control** to display the following screen. You can control the instrument's screen and panel keys. As with remote display explained earlier, s/frame, Update, Save, Full Screen, Draw, and Fit to display operations are available.




## File download (File download)

Click **File download**. The directory structure of the instrument's internal storage (/C8 option) or a USB memory device connected to the instrument is displayed.

Click **Download** to download the file to your PC.




## Help (Help)

Click **Help**. Shows a help document stored in the instrument.

## Link (Link)

Click **Link**. Displays a link to our website.

# 18.5 Configuring Mail Transmission (SMTP Client Function)

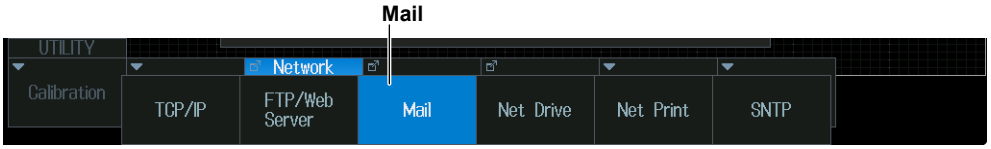
This section explains the following settings for transmitting mail to a specified mail address on a network:

- Mail server
- Mail address
- Comments
- Attaching image files
- Timeout
- User authentication
- Sending a test mail

► “Mail (Mail)” in Features Guide

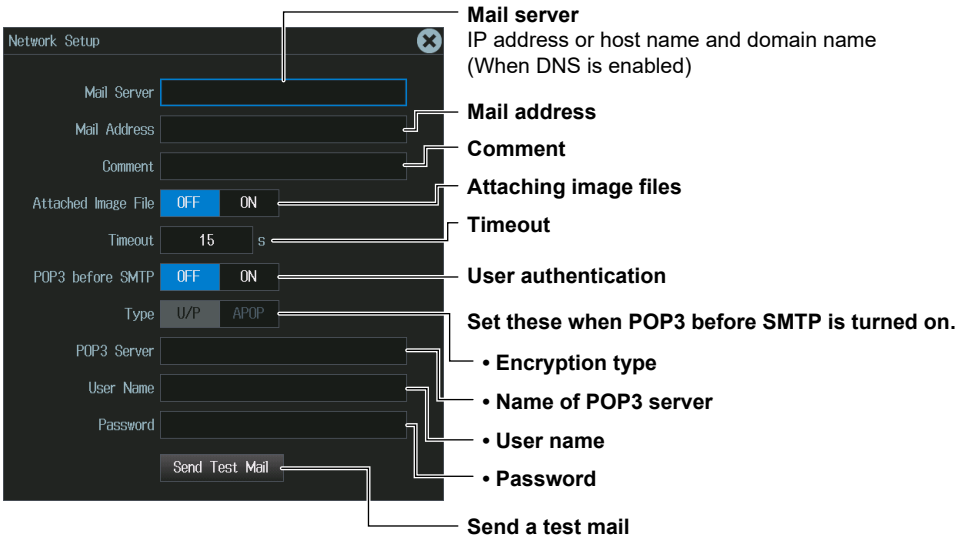
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




### Mail (Mail)

Press the **Mail** soft key. The following screen appears.



# 18.6 Connecting to a Network Drive

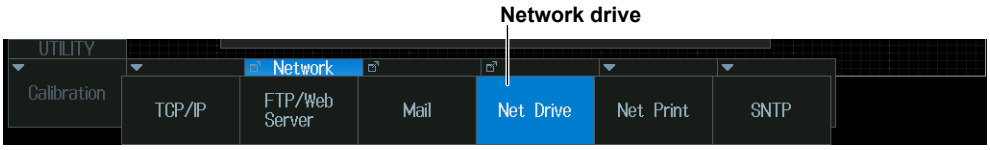
This section explains the following settings for accessing a drive on the network (net drive) through an Ethernet connection to load or save various data of the instrument:

- FTP server (file server)
- User name
- Password
- Turning FTP passive mode on or off
- Timeout
- Connecting to and disconnecting from network drives

► “Network Drive (Net Drive)” in the Features Guide

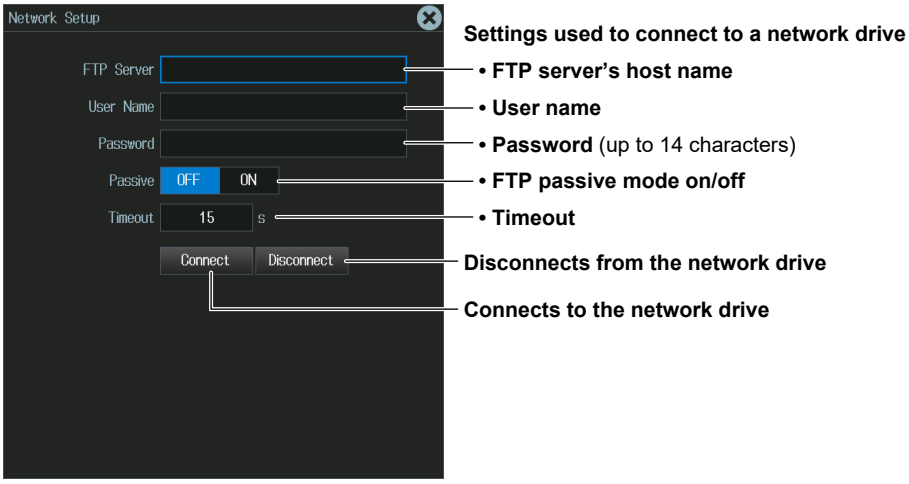
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




### Configuring Network Drive (Net Drive) Settings and Connecting to It

Press the **Net Drive** soft key. The following screen appears.



# 18.7 Configuring a Network Printer

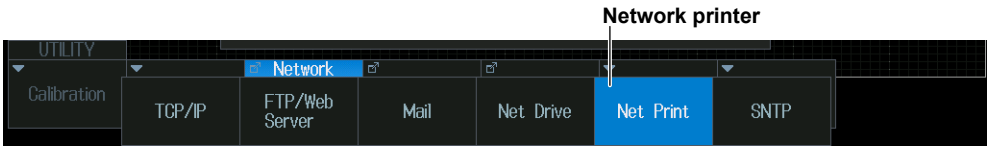
This section explains the following settings for printing screen images to a network printer:

- LPR server
- LPR name
- Timeout

► “Network Printer (Net Print)” in the Features Guide

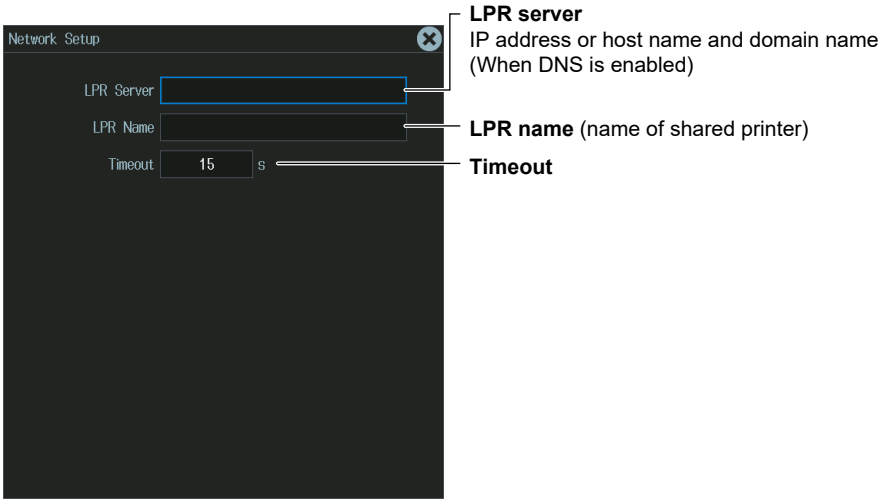
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




### Network Printer (Net Print)

Press the **Net Print** soft key. The following screen appears.



# 18.8 Using SNTP to Set the Date and Time

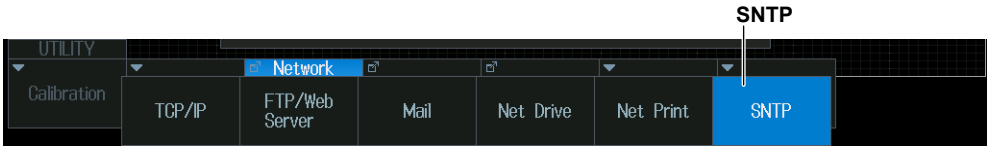
This section explains how to use SNTP to set the Instrument's date and time.

- SNTP server
- Timeout
- Executing time adjustment
- Automatic adjustment

► "SNTP (SNTP)" in the Features Guide

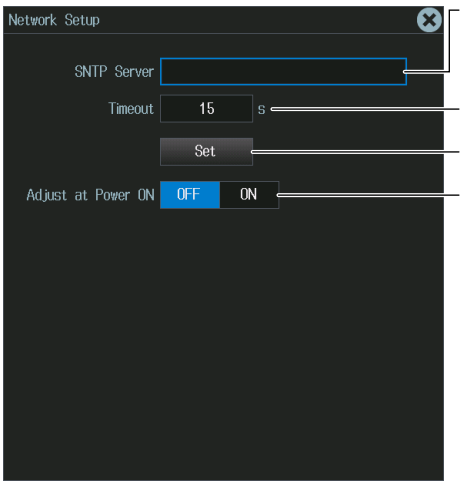
## UTILITY Network Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Network** soft key. The following menu items appear.




### SNTP(SNTP)

Press the **SNTP** soft key. The following screen appears.




**SNTP server**
IP address or host name and domain name
(When DNS is enabled)

**Timeout**

**Execute time adjustment**

**Automatic adjustment**

# 19.1 Starting and Stopping Synchronous Operation (DLMsync)

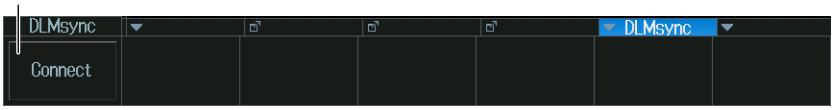
This section explains the settings for connecting this instrument to another DLM3034HD or DLM3054HD.

► “Synchronous Operation (DLMsync)” in the Features Guide

## UTILITY DLMsync Menu

1. Press **UTILITY** to display the UTILITY menu.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from UTILITY on the top menu.
2. Press the **DLMsync** soft key to display the following menu.

**Starts synchronous operation**
This instrument becomes the main unit and connects to the sub unit.
When a connection is established, the soft key menu changes to Disconnect.

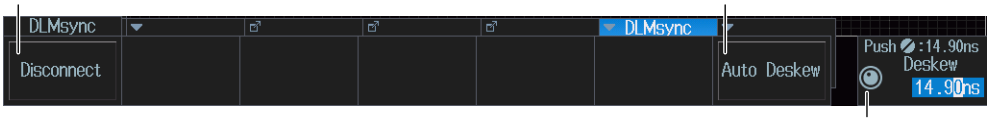



### Ending Synchronous Operation

Press the **Disconnect** soft key.

**Ends synchronous operation**
Disconnects from the sub unit.

**Executes auto deskewing**
► section 19.2




**Correcting the sampling skew between units**
► section 19.2

### *Note*

- During synchronous operation, a main unit or sub unit icon is displayed at the top of the screen.
- “Trigger: Controlled by Main Unit” is displayed at the top of the sub unit screen during synchronous operation.

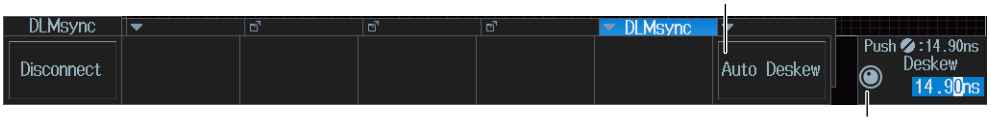
# 19.2 Correcting the Sampling Skew between Units

This section explains the settings for correcting the sampling timing error (skew) between the main unit and sub unit.

## UTILITY DLMsync Menu

1. Press **UTILITY** to display the UTILITY menu.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from UTILITY on the top menu.
2. Press the **DLMsync** and then the **Connect** soft key to display the following menu.

**Executes auto deskewing**
Auto deskewing is performed according to the connected signal source.




**Correcting the sampling skew between units**

### Correcting the Sampling Skew between Units (Deskew)

Turn the jog shuttle to set the correction value for the sampling timing between units.

You can also tap the jog shuttle setting menu in the lower right of the screen and use the numeric keypad that appears on the screen.

**Jog shuttle setting menu**




**Correcting the sampling skew between units**

***Note***

To execute on auto deskew, you need to apply a same signal to CH1 of the main unit and CH1 of the sub unit through probes with the same specifications.
For details, see chapter 22, “Synchronous Operation,” in the Features Guide, IM DLM3054HD-01EN.

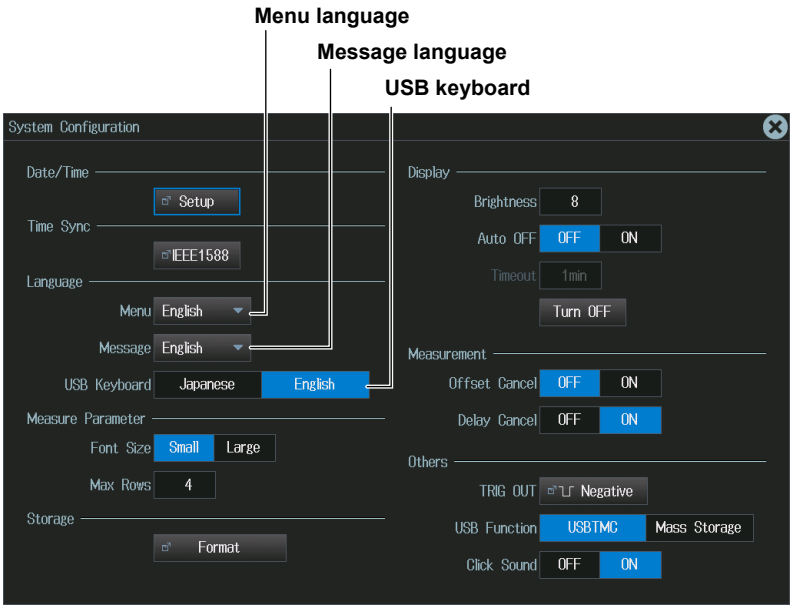
# 20.1 Changing the Menu, Message , and USB Keyboard Languages

This section explains how to set the menu language, message language and USB keyboard language of the instrument.

► "Language (Language)" in Features Guide

## UTILITY System Configuration Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **System Configuration** soft key. The following menu items appear.




***Note***

Some terminology is always displayed in English.

### USB Keyboard (USB Keyboard)

You can use the following keyboards that conform to USB Human Interface Devices (HID) Class Ver. 1.1.

English: 104-key keyboards

Japanese: 109-key keyboards

For details on how the instrument keys are mapped to the keys on a USB keyboard, see appendix 7 in the Features Guide, IM DLM3054HD-01EN.

# 20.2 Setting the Click Sound, Measured Value Font Size, and Number of Rows for Displaying Measurement Values

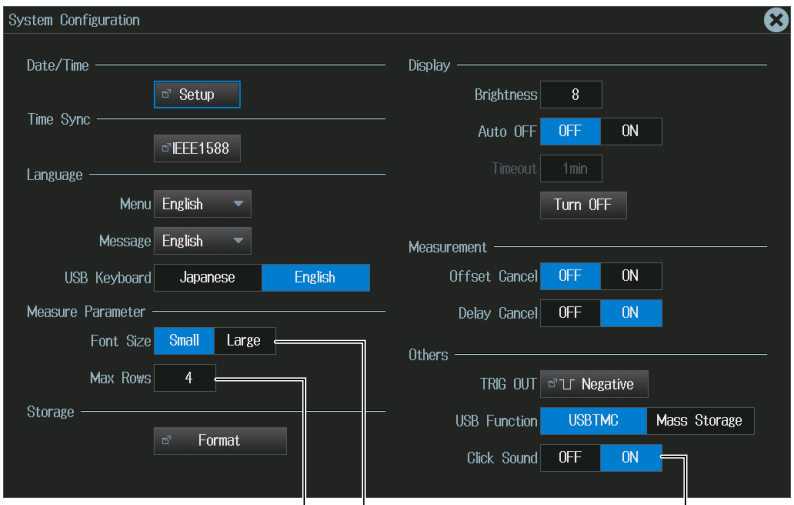
This section explains the following settings:

- Click sound on/off
- Measured value font size
- Number of rows for displaying measured values

► "Measurement Display (Measure Parameter)" and "Turning On or Off the Click Sound (Click Sound)" in the Features Guide

## UTILITY System Configuration Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **System Configuration** soft key. The following menu items appear.



# 20.3 Viewing Setup Information (Overview)

This section explains how to view the current setup information.

► “Overview (Overview)” in the Features Guide

## UTILITY Overview Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **Overview** soft key. The following menu items appear.

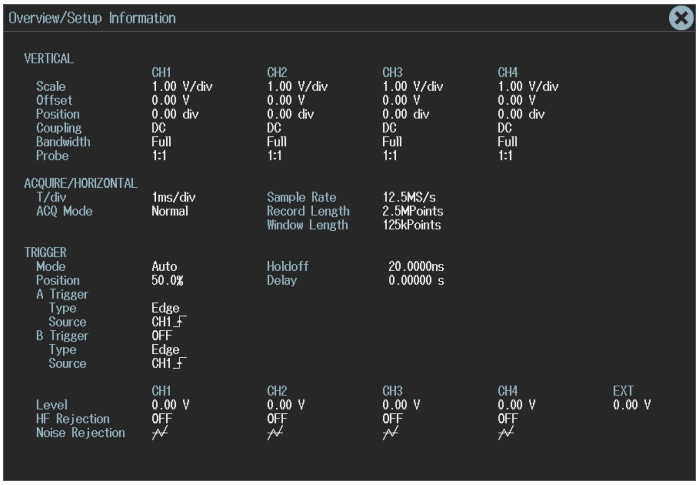



**Display of Setup Information 2**

**Display of Setup Information 1**

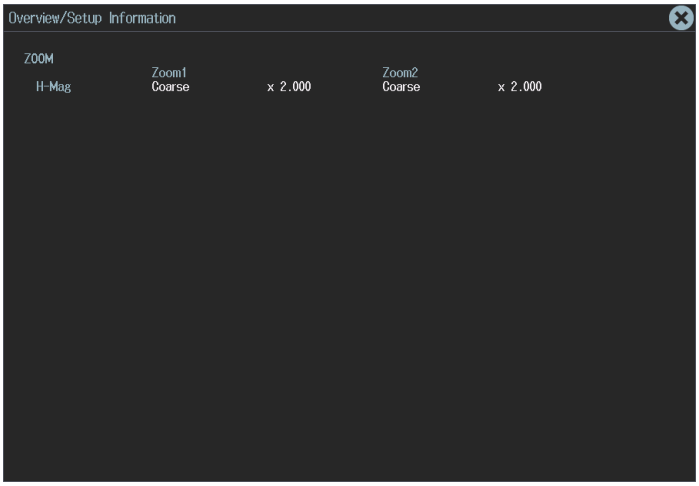
### Displaying Setup Information 1 (Setup Information1)

Press the **Setup Information1** soft key. The following screen appears.




### Displaying Setup Information 2 (Setup Information2)

Press the **Setup Information2** soft key. The following screen appears.



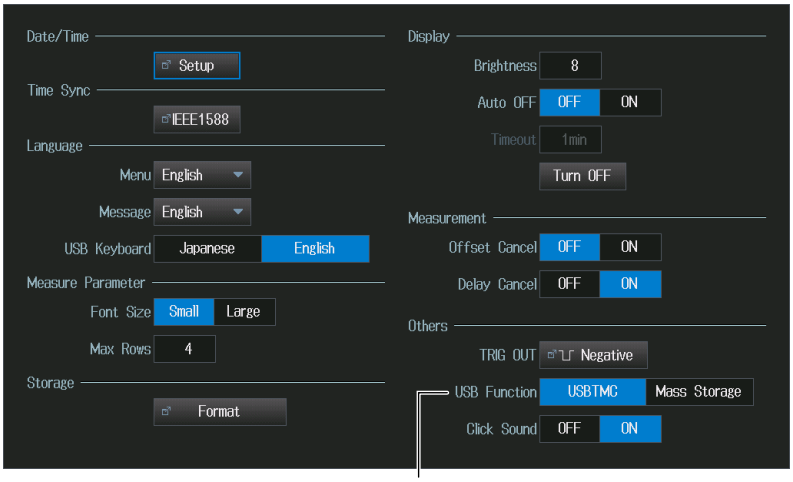
# 20.4 Using the Instrument as a USB Storage Device

This section explains the setting that enables you to use the instrument as a USB storage device through a USB connection made between the USB port on the instrument's rear panel and a PC.

► "USB Communication (USB Function)" in the Features Guide

## UTILITY System Configuration Menu

1. Press **UTIL**. The UTILITY menu appears.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu that is displayed.
2. Press the **System Configuration** soft key. The following menu items appear.




**Set USB Function to Mass Storage**

### *Note*

- From a PC, you can access the instrument's internal storage as a storage device. You cannot access the instrument's network drives or the storage device connected to the instrument's USB ports.
- Mass Storage functions as a read-only storage device.
- When you perform file operations in the internal storage with this instrument, the content of the internal storage of the instrument displayed on the PC is updated. During updating, the display on the PC may momentarily disappear.
- The USB communication function (USB Function) can also be set in Remote Control from the UTILITY menu. The setting values are linked with the settings on the System Configuration menu.




**USB Function**

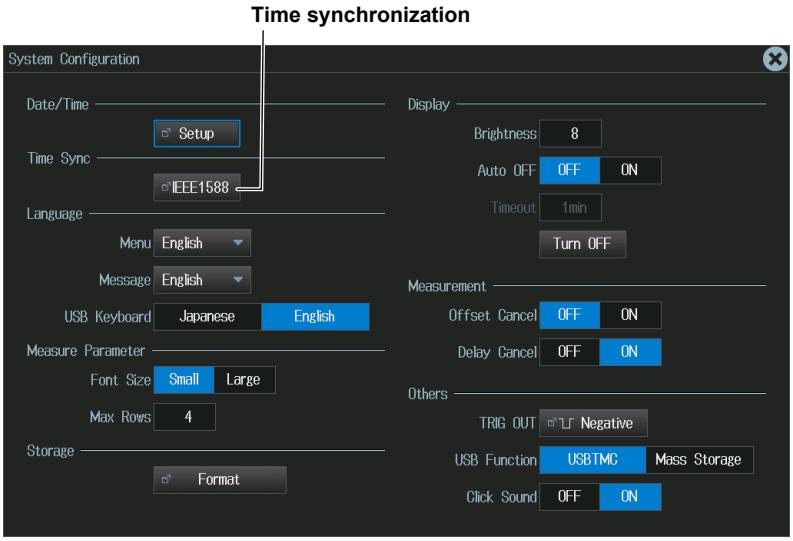
# 20.5 Synchronizing the Clock Using IEEE 1588

This section explains the settings used when running the instrument as a IEEE1588 slave device and synchronizing the clock and sampling clock by receiving Precision Time Protocol (PTP) packets from a master device.

► “IEEE 1588 Time Synchronization Feature (Time Sync)” in the Features Guide

## UTILITY System Configuration Menu

1. Press **UTILITY**to display the UTILITY menu.
   You can also tap **MENU** (MENU) in the upper left of the screen and select the UTILITY menu from **UTILITY** on the top menu.
2. Press the **System Configuration** soft key to display the following menu.

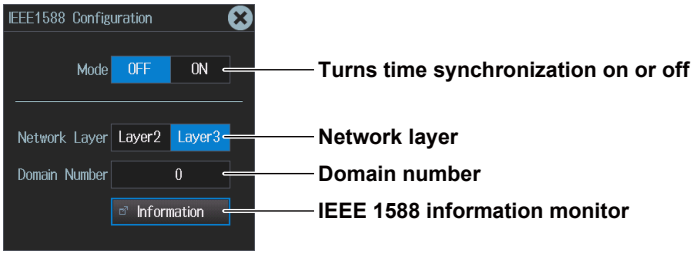



### Time synchronization (IEEE1588)

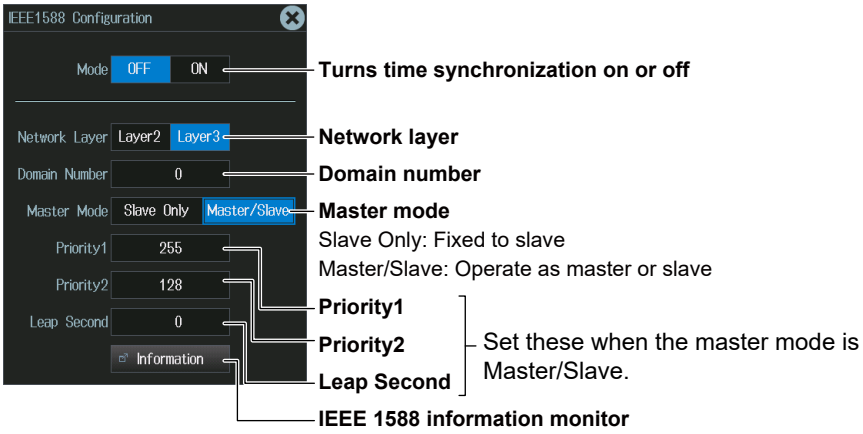
Press the **IEEE1588** soft key. The following menu appears.

Set the network layer, domain number, and so on and then press Mode (ON).

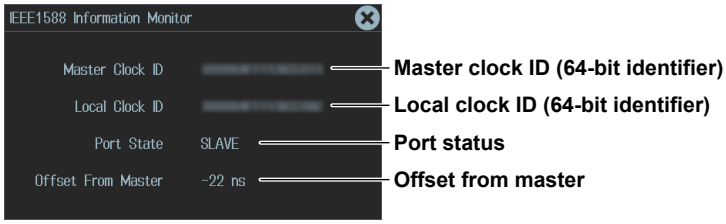
**When the IEEE1588 master function (/CY) option is not installed**



### When the IEEE1588 master function (/CY) option is installed




## IEEE 1588 information monitor (Information)




### *Note*

To operate as a slave device, turn on time synchronization and start measurement after appears at the top of the screen. is displayed when the sampling clock stabilizes.
To operate as a master device, turn on time synchronization and start measurement after appears at the top of the screen.

# Index


## Numerics

Page

1000BASE-T port ..... 18-1

## A

Page

ACQUIRE menu ..... 3-1
acquisition mode ..... 3-1
ACTION Action on Trig menu ..... 2-81
ACTION Go/Nogo menu ..... 2-82
action-on-trigger ..... 2-81
Address Data mode ..... 2-65
A Delay B ..... 2-78
ANALYSIS Histogram menu ..... 13-1, 13-2
ANALYSIS Power Analysis menu ..... 14-1
ANALYSIS Power Analysis menu (harmonics) ..... 14-6
ANALYSIS Power Analysis menu (I2t) ..... 14-9
ANALYSIS Power Analysis menu (SOA) ..... 14-5
ANALYSIS Power Analysis menu (SW loss) ..... 14-2
ANALYSIS Power Measurement menu ..... 14-11
applicable class ..... 14-7
area (XY) ..... 5-3
A to B(n) ..... 2-78
A trigger ..... 2-79
auto naming ..... 17-4
auto scrolling ..... 10-2
auto setup (I2C bus) ..... 12-52
auto setup (PSI5) ..... 12-37
auto setup (SENT) ..... 12-29
auto setup (SPI bus) ..... 12-59
auto setup (UART) ..... 12-45

## B

Page

backlight ..... 4-5
bandwidth limit ..... 1-5
bit and bus display order ..... 1-11
bit settings ..... 1-7
Break Synch mode ..... 2-40
broadcasting system ..... 2-76
B trigger ..... 2-79
B TRIG menu ..... 2-78
bus display ..... 1-9
bus setup (CAN bus analysis and search) ..... 12-7
bus setup (CAN FD bus analysis and search) ..... 12-12
bus setup (CXPI bus analysis and search) ..... 12-23
bus setup (FlexRay bus analysis and search) ..... 12-2
bus setup (I2C bus analysis and search) ..... 12-52
bus setup (LIN bus analysis and search) ..... 12-18
bus setup (PSI5 analysis and search) ..... 12-37
bus setup (SENT analysis and search) ..... 12-29
bus setup (SPI bus analysis and search) ..... 12-59
bus setup (UART analysis and search) ..... 12-45
bus setup (user-defined bus analysis and search) ..... 12-67

## C

Page

cables ..... 18-1
Calc Setup (power measurement) ..... 14-13
Calc Setup (waveform parameter) ..... 9-11
CAN FD bus analysis and search ..... 12-11
CAN FD bus trigger ..... 2-33
channels, loading to ..... 17-12
chip select source (SPI bus analysis and search) ..... 12-62
chip select source (SPI bus trigger) ..... 2-72
CH menu ..... 1-1
class setup (harmonic analysis) ..... 14-7
clear trace ..... 4-4
clock source ..... 11-7
clock source (SPI bus analysis and search) ..... 12-61
clock source (SPI bus trigger) ..... 2-70
clock source (user-defined bus analysis and search) ..... 12-68
clock source (user-defined bus trigger) ..... 2-74
color ..... 4-2
combination (B TRIG) ..... 2-78
Combination (B TRIG) ..... 2-78
computation conditions ..... 6-13
computation mode ..... 6-1
computation source waveform ..... 6-2
Condition Setup (CAN bus trigger) ..... 2-30, 2-31
Condition Setup (CAN FD bus trigger) ..... 2-36
Condition Setup (CXPI bus trigger) ..... 2-45, 2-46
Condition Setup (edge search) ..... 11-4
Condition Setup (FlexRay bus trigger) ..... 2-26, 2-27
Condition Setup (I2C bus trigger) ..... 2-66, 2-68
Condition Setup (LIN bus trigger) ..... 2-41, 2-42
Condition Setup (pattern search) ..... 11-7
Condition Setup (PSI5 trigger) ..... 2-59
Condition Setup (pulse width search) ..... 11-11
Condition Setup (SENT trigger) ..... 2-52, 2-53
Condition Setup (SPI bus trigger) ..... 2-72
Condition Setup (timeout search) ..... 11-14
Condition Setup (UART trigger) ..... 2-62
Condition Setup (user-defined bus trigger) ..... 2-74, 2-75
connection procedure (Ethernet) ..... 18-2
continuous ..... 9-6
count setting ..... 6-6
count type ..... 6-6
CS (SS) (SPI bus analysis and search) ..... 12-62
CS (SS) (SPI bus trigger) ..... 2-72
cursor jumping ..... 8-1
CURSOR menu ..... 8-1
cursor position, setting ..... 8-1, 8-2, 8-3, 8-5
CXPI bus analysis and search ..... 12-22
cycle ..... 9-8
cycle mode ..... 9-2, 14-12, 14-14
cyclic statistical processing ..... 9-8

## D

Page

data compression ..... 17-5
Data mode (PSI5 trigger) ..... 2-59
Data mode (UART trigger) ..... 2-62
data source (SPI bus analysis and search) ..... 12-62
data source (SPI bus trigger) ..... 2-71
data source (user-defined bus analysis and search) ..... 12-67
data source (user-defined bus trigger) ..... 2-73
data to load ..... 17-14
data to save ..... 17-8
Decode (CAN bus) ..... 12-9
Decode (CAN FD bus) ..... 12-14
Decode (CXPI bus) ..... 12-25
Decoded Display(CAN bus) ..... 12-9
Decoded Display(CAN FD bus) ..... 12-14
Decoded Display(CXPI bus) ..... 12-25
Decoded Display(FlexRay bus) ..... 12-3
Decoded Display(I2C bus) ..... 12-55
Decoded Display(LIN bus) ..... 12-20
Decoded Display(PSI5) ..... 12-40

Decoded Display(SENT) ..... 12-32
Decoded Display(SPI bus) ..... 12-63
Decoded Display(UART) ..... 12-48
Decoded Display(user-defined serial bus)..... 12-69
Decode (FlexRay bus)..... 12-3
Decode (I2C bus) ..... 12-55
Decode (LIN bus) ..... 12-20
Decode (PSI5)..... 12-40
Decode (SENT) ..... 12-32
Decode (SPI bus) ..... 12-63
Decode (UART)..... 12-48
Decode (user-defined serial bus) ..... 12-69
delay ..... 6-4
delay cancel..... 2-4
delay canceling..... 2-4
DELAY key ..... 2-3
deskew (logic signal) .....1-11
detected point mark .....11-2
detected waveform display .....11-2
difference between peak and valley ..... 7-4
digital filter ..... 6-14
display, filtering files..... 17-20
display format (file list)..... 17-19
DISPLAY menu..... 4-1, 4-3
display mode ..... 15-1
display setup (edge search) .....11-2
Display Setup (FFT) ..... 7-2
display setup (PSI5) ..... 12-42
display setup (SENT)..... 12-34

## E

edge count..... 6-7
EDGE menu ..... 2-5
edit..... 2-85
enable source (user-defined bus analysis and search)..... 12-68
enable source (user-defined bus trigger)..... 2-75
enable (user-defined bus analysis and search)..... 12-68
enable (user-defined bus trigger) ..... 2-75
ENHANCED CAN FD menu ..... 2-33
ENHANCED CAN menu..... 2-28
ENHANCED CXPI menu ..... 2-43
ENHANCED Edge OR menu..... 2-7
ENHANCED FlexRay Menu ..... 2-25
ENHANCED I2C menu..... 2-64
ENHANCED Interval menu..... 2-23
ENHANCED LIN menu..... 2-39
ENHANCED Pattern menu..... 2-8
ENHANCED_PSI5 Airbag Menu ..... 2-56
ENHANCED Pulse Width menu ..... 2-13
ENHANCED Rise/Fall Time menu..... 2-15
ENHANCED Runt menu..... 2-17
ENHANCED SENT menu..... 2-48
ENHANCED SPI menu..... 2-69
ENHANCED Timeout menu..... 2-19
ENHANCED TV menu..... 2-76
ENHANCED UART menu..... 2-60
ENHANCED User Define menu ..... 2-73
ENHANCED Window menu..... 2-20
ENHANCED Window OR menu ..... 2-22
equation..... 6-13
error mode (CAN bus trigger)..... 2-29
error mode (CAN FD bus trigger) ..... 2-35
error mode (CXPI bus search)..... 12-26
error mode (CXPI bus trigger) ..... 2-44
error mode (FlexRay bus trigger) ..... 2-26
error mode (LIN bus trigger)..... 2-40
error mode (PSI5 trigger)..... 2-59
error mode (SENT trigger)..... 2-55
error mode (UART trigger)..... 2-62
ESI mode..... 2-38
Ethernet..... 18-1
Ethernet interface specifications..... 18-1
Every Data mode..... 2-62
Every Fast CH mode ..... 2-50
Every Slow CH mode ..... 2-52
Every Start mode..... 2-65
expression ..... 6-13

## F

Fast CH Data mode..... 2-51
Fast CH S&C mode..... 2-51
FDF mode..... 2-38
FFT conditions..... 7-1
FFT Measure Setup menu..... 7-3
FFT menu ..... 7-1
FFT results, saving ..... 17-10
field jumping (CAN bus)..... 12-10
field jumping (CAN FD bus)..... 12-16
field jumping (FlexRay bus)..... 12-5
field jumping (LIN bus)..... 12-21
file filtering ..... 17-20
file list..... 17-3, 17-16
file list, sorting..... 17-20
file name..... 17-4
File Others (Load) menu..... 17-14
File Others (Save) menu ..... 17-8
files and folders, copying..... 17-22
files and folders, deleting..... 17-24
files and folders, moving..... 17-23
files and folders, renaming ..... 17-24
file, selecting..... 17-17
File Setup (Load) menu..... 17-13
File Setup (Save) menu..... 17-7
File Utility menu..... 17-25
File Waveform (Load) menu .....17-11
File Waveform (Save) menu..... 17-3
filtering (files to display)..... 17-20
filter settings ..... 6-4
filter type..... 6-4
FlexRay bus analysis and search..... 12-1
FlexRay bus trigger ..... 2-25
folders (directories), creating..... 17-21
forced trigger [FORCE TRIG] ..... 2-80
FORCE TRIG ..... 2-80
Frame in slot mode..... 2-58
Frame Start mode..... 2-26
FTP server..... 18-4

## G

general call ..... 2-67
General Call mode..... 2-67
GO/NO-GO determination ..... 2-82
gradation mode..... 4-3
graticule ..... 4-1
grid..... 4-1
grouping..... 12-47

## H

HDTV..... 2-77
high speed mode ..... 2-68
histogram display (statistical processing)..... 9-8
histogram, saving ..... 17-10
history ..... 9-10
HISTORY menu..... 15-1, 15-4
history range..... 17-5

history waveform, searching ..... 15-4
Holdoff ..... 2-2
hold-off time ..... 2-2
HS Mode ..... 2-68

## I

Page

I2C bus analysis and search ..... 12-51
ID/Data mode (CAN bus trigger) ..... 2-29
ID/Data mode (CAN FD) ..... 2-35
ID/Data mode (CXPI bus trigger) ..... 2-45
ID/Data mode (FlexRay bus trigger) ..... 2-26
ID/Data mode (LIN bus trigger) ..... 2-41
ID OR mode (CAN bus trigger) ..... 2-31
ID OR mode (CAN FD bus trigger) ..... 2-37
ID OR mode (CXPI bus trigger) ..... 2-46
ID OR mode (FlexRay bus trigger) ..... 2-27
ID OR mode (LIN bus trigger) ..... 2-42
IIR filter ..... 6-4
Include R/W ..... 2-65, 12-54
information ..... 16-3, 16-7, 17-9
initial computation point ..... 6-5
initial point ..... 6-5
input coupling ..... 1-2
input range ..... 2-6
intensity ..... 4-3, 15-1
internal memory, details ..... 17-7
ISO ..... 2-35, 12-11
item (histogram) ..... 13-2
Item Setup (Area2) ..... 9-12
item setup (power measurement) ..... 14-12

## J

Page

judgment conditions ..... 2-83

## L

Page

label display ..... 1-4
label (Math/Ref) ..... 6-11
label/unit ..... 6-9
Language ..... 20-1
latch ..... 12-69
latch source (user-defined bus analysis) ..... 12-69
latch source (user-defined bus trigger) ..... 2-75
latch (user-defined bus trigger) ..... 2-75
level setup ..... 14-4
LIN bus analysis and search ..... 12-17
linear scaling ..... 1-4
list (CAN bus analysis) ..... 12-9
list (CAN FD bus analysis) ..... 12-15
list (CXPI bus analysis) ..... 12-25
list display (CAN bus analysis) ..... 12-9
list display (CAN FD bus analysis) ..... 12-15
list display (CXPI bus analysis) ..... 12-25
list display (file list) ..... 17-19
list display (FlexRay bus analysis) ..... 12-4
list display (I2C bus analysis) ..... 12-56
list display (LIN bus analysis) ..... 12-20
list display (multiple display) ..... 12-71
list display (PSI5 analysis) ..... 12-41
list display (SENT analysis) ..... 12-32
list display (SPI bus analysis) ..... 12-64
list display (statistical processing) ..... 9-9
list display (UART analysis) ..... 12-48
list (FlexRay bus analysis) ..... 12-4
list (harmonic analysis) ..... 14-8
list (history waveform) ..... 15-2
list (I2C bus analysis) ..... 12-56
list (LIN bus analysis) ..... 12-20
list (multiple display) ..... 12-71
list (peak cursor measurement) ..... 7-4
list (PSI5 analysis) ..... 12-41
list, saving ..... 14-8
list (SENT analysis) ..... 12-32
list (SPI bus analysis) ..... 12-64
list (statistics of automatically measured values) ..... 9-9
list (UART analysis) ..... 12-48
LOGIC menu ..... 1-6
loss, type of ..... 14-3

## M

Page

mail ..... 18-10
mail transmission settings ..... 18-10
mapping ..... 4-1
marker cursor measurement (FFT) ..... 7-3
marker (FFT) ..... 7-3
MATH/REF menu ..... 6-1
MEASURE Enhanced menu ..... 9-11
measurement items (angle cursor) ..... 8-5
measurement items (FFT) ..... 7-3, 7-4
measurement items (histogram) ..... 13-2
measurement items (marker cursor) ..... 8-4
measurement items (power measurement) ..... 14-12
measurement items (switching loss) ..... 14-3
measurement items (waveform parameter) ..... 9-1
measurement items (XY waveform) ..... 5-2
measurement items (ΔT cursor) ..... 8-1
measurement items (ΔT&ΔV cursor) ..... 8-3
measurement items (ΔV cursor) ..... 8-2
measurement location indicator (power measurement) ..... 14-14
measurement location indicator (waveform parameter) ..... 9-4
measurement source window ..... 9-4
measurement time period ..... 9-4
MEASURE menu ..... 9-1
Measure Setup (Joule integral) ..... 14-9
Measure Setup (switching loss) ..... 14-3
MEASURE Statistics menu ..... 9-6
message language ..... 20-1
mode (acquisition mode) ..... 3-1
mode (CAN bus trigger) ..... 2-29
mode (CAN FD bus trigger) ..... 2-35
mode (computation mode) ..... 6-1
mode (CXPI bus trigger) ..... 2-44
mode (FlexRay bus trigger) ..... 2-26
mode (Go/Nogo) ..... 2-83
mode (I2C bus trigger) ..... 2-65
mode (LIN bus trigger) ..... 2-40
MODE menu ..... 2-1
mode (PSI5 trigger) ..... 2-58
mode (SENT trigger) ..... 2-50
mode (TV trigger) ..... 2-76
mode (UART trigger) ..... 2-62
Moving Avg ..... 6-4

## N

Page

Net Drive ..... 18-11
Net Print ..... 18-12
network connection ..... 18-1
network drive ..... 18-11
next higher level folder, displaying ..... 17-21
NON ACK mode ..... 2-67
normal statistical processing ..... 9-6
NTSC ..... 2-76

## O

Page

offset (Offset) ..... 1-5

operation details, selecting ..... 17-18
operation menu ..... 17-17
operation menu and file list, switching between ..... 17-17
overview ..... 20-3

## P

PAL ..... 2-76
parameter (FFT) ..... 7-4
parameter (Go/Nogo) ..... 2-87
parameter measurement (FFT) ..... 7-4
pattern (Edge OR trigger) ..... 2-7
pattern (pattern search) ..... 11-8
pattern (pattern trigger) ..... 2-9
pattern (Window OR trigger) ..... 2-22
peak cursor measurement (FFT) ..... 7-4
peak (FFT) ..... 7-4
phase shift ..... 6-4
polygonal zone ..... 2-86
polygonal zone, loading ..... 17-15
PolygonZone ..... 2-86
POSITION knob (vertical axis) ..... 1-13
power supply analysis, type of ..... 14-1
PRINT BuiltIn menu ..... 16-3
printer roll paper ..... 16-1
PRINT File menu ..... 16-6
PRINT Key ..... 16-3, 16-4, 16-5, 16-7, 16-9
print mode (built-in printer) ..... 16-3
print mode (network printer) ..... 16-5
print mode (USB printer) ..... 16-4
PRINT Multi menu ..... 16-9
PRINT Network menu ..... 16-5
PRINT USB menu ..... 16-4
probe (analog signal) ..... 1-4
probe (power measurement) ..... 14-11
probe (power supply analysis) ..... 14-3
probe setup (power measurement) ..... 14-11
protection, turning on and off ..... 17-25
PSI5 Airbag trigger ..... 2-56
PSI5 analysis and search ..... 12-36
PTYPE mode (CXPI bus trigger) ..... 2-45

## R

range (edge trigger) ..... 2-6
rectangular zone ..... 2-84
RectZone ..... 2-84
reference level during automated measurement ..... 9-4, 14-13
reference range type ..... 2-83
reference range using waveform parameters ..... 2-87
reference setting (angle cursor) ..... 8-6
reference setup ..... 8-6
reference time (interval trigger) ..... 2-24
reference time (pattern search) ..... 11-9
reference time (pattern trigger) ..... 2-10
reference time (pulse width search) ..... 11-12
reference time (pulse width trigger) ..... 2-14
reference time (rise/fall time trigger) ..... 2-16
reference time (runt trigger) ..... 2-18
reference time (window trigger) ..... 2-21
Reference Waveform Information Display (Information) ..... 6-11
reference waveform, loading ..... 6-10
reference waveform, loading into ..... 17-11
Ref Levels (power measurement) ..... 14-13
Ref Levels (waveform parameter) ..... 9-4
replay ..... 15-3
roll paper handling ..... 16-1
roll paper, loading ..... 16-2
rotary count ..... 6-7
RUN/STOP key ..... 3-3
R/W bit on/off ..... 2-65, 12-54

## S

sampling mode ..... 3-2
save destination ..... 17-3
save mode ..... 16-6
SCALE knob (vertical axis) ..... 1-12, 1-13
scale value ..... 7-2
scaling ..... 6-9
SCL source ..... 2-65, 12-53
screen capture, saving ..... 17-9
SDA source ..... 2-65, 12-53
SDTV (480/60p) ..... 2-77
search (CAN bus) ..... 12-10
search (CAN FD bus) ..... 12-16
search conditions (edge) ..... 11-4
search conditions (pattern) ..... 11-6
search conditions (pulse width) ..... 11-10
search conditions (timeout period) ..... 11-13
search (CXPI bus) ..... 12-26
SEARCH Edge menu ..... 11-4
search (FlexRay bus) ..... 12-5
search (history waveform) ..... 15-4
search (I2C bus) ..... 12-57
search (LIN bus) ..... 12-21
SEARCH menu ..... 11-1
search mode ..... 9-10
SEARCH Pattern menu ..... 11-6
search (PSI5) ..... 12-42
SEARCH Pulse Width menu ..... 11-10
search (SENT) ..... 12-35
search, skipping ..... 11-2
search source pattern ..... 11-8
search (SPI bus) ..... 12-65
SEARCH Timeout menu ..... 11-13
search (UART) ..... 12-50
search (user-defined bus) ..... 12-70
search (waveform search) ..... 11-3
select all or deselect all ..... 17-17, 17-25
select or deselect ..... 17-17, 17-25
SENT analysis and search ..... 12-28
SENT trigger ..... 2-48
serial bus analysis results, saving ..... 17-10
SERIAL BUS CAN FD menu ..... 12-11
SERIAL BUS CAN menu ..... 12-6
SERIAL BUS CXPI menu ..... 12-22
SERIAL BUS FlexRay menu ..... 12-1
SERIAL BUS I2C menu ..... 12-51
SERIAL BUS LIN menu ..... 12-17
SERIAL BUS PSI5 Airbag menu ..... 12-36
SERIAL BUS SENT menu ..... 12-28
SERIAL BUS SPI menu ..... 12-58
SERIAL BUS UART menu ..... 12-44
SERIAL BUS User Define menu ..... 12-66
serial bus waveform symbols, loading ..... 17-15
setting information, including ..... 16-7, 17-8
settings when trigger level changes ..... 9-7
SINGLE key ..... 3-3
single mode ..... 2-1
skip mode ..... 11-2
Slow CH ID/Data mode ..... 2-53
smoothing ..... 6-4
SMTP client ..... 18-10
snapshot waveforms, loading ..... 17-15
snapshot waveforms, saving ..... 17-9
SNTP ..... 18-13
SOA ..... 14-5
SOF mode (CAN bus trigger) ..... 2-29

SOF mode (CAN FD bus trigger) ..... 2-35
SOF mode (CXPI bus trigger) ..... 2-44
SPI bus analysis and search ..... 12-58
Start bit mode ..... 2-58
start byte ..... 2-68
Start Byte mode ..... 2-68
state display ..... 1-10
statistical processing of history waveforms ..... 9-10
symbol ..... 17-14
Sync mode ..... 2-58

## T

thumbnail display ..... 17-19
time condition (interval trigger) ..... 2-24
time condition (pattern search) ..... 11-9
time condition (pattern trigger) ..... 2-10
time condition (pulse width search) ..... 11-11
time condition (pulse width trigger) ..... 2-14
time condition (rise/fall time trigger) ..... 2-16
time condition (runt trigger) ..... 2-18
time condition (window trigger) ..... 2-21
TIME/DIV knob ..... 1-14
timestamps, displaying the list of ..... 15-2
timestamps, saving the list of ..... 17-10
total harmonic distortion ..... 14-8
trend display ..... 9-7
trend display (PSI5 analysis) ..... 12-41
trend display (SENT analysis) ..... 12-33
trend/histogram ..... 9-7
trend (PSI5 analysis) ..... 12-41
trend (SENT analysis) ..... 12-33
trigger conditions (CAN bus) ..... 2-30, 2-31
trigger conditions (CAN FD bus) ..... 2-36, 2-38
trigger conditions (CXPI bus) ..... 2-45, 2-46
trigger conditions (FlexRay bus) ..... 2-26, 2-27
trigger conditions (I2C bus) ..... 2-66, 2-68
trigger conditions (LIN bus) ..... 2-41, 2-42
trigger conditions (PSI5) ..... 2-59
trigger conditions (SENT) ..... 2-52, 2-53
trigger conditions (SPI bus) ..... 2-72
trigger conditions (UART) ..... 2-62
trigger conditions (user-defined bus) ..... 2-74
trigger delay ..... 2-3
trigger level (Edge OR trigger) ..... 2-7
trigger level (pattern trigger) ..... 2-11
trigger level (window OR trigger) ..... 2-22
trigger mode ..... 2-1, 3-2
trigger mode (PSI5) ..... 2-58
trigger position ..... 2-3
trigger source pattern (Edge OR trigger) ..... 2-7
trigger source pattern (pattern trigger) ..... 2-9
trigger source pattern (window OR trigger) ..... 2-22
trigger type (CAN bus) ..... 2-29
trigger type (CAN FD bus) ..... 2-35
trigger type (CXPI bus) ..... 2-44
trigger type (FlexRay bus) ..... 2-26
trigger type (I2C bus) ..... 2-65
trigger type (LIN bus) ..... 2-40
trigger type (SENT) ..... 2-50
trigger type (UART) ..... 2-62

## U

UART analysis and search ..... 12-44
UART trigger ..... 2-60
unit ..... 6-9, 7-1
USB keyboard language ..... 20-1
USB storage device ..... 20-4
USB storage device, connection ..... 17-1
user-defined serial bus analysis and search ..... 12-66
Userdef TV ..... 2-77
UTILITY DLMsync menu ..... 19-1
UTILITY Network menu (FTP server) ..... 18-4, 18-5
UTILITY Network menu (mail) ..... 18-10
UTILITY Network menu (Net Drive) ..... 18-11
UTILITY Network menu (Net Print) ..... 18-12
UTILITY Network menu (SNTP) ..... 18-13
UTILITY Network Menu (TCP/IP) ..... 18-3
UTILITY Overview menu (setting information) ..... 20-3
UTILITY System Configuration menu (click sound) ..... 20-2
UTILITY System Configuration menu (Display) ..... 4-5
UTILITY System Configuration Menu (IEEE 1588) ..... 20-5
UTILITY System Configuration menu (language) ..... 20-1
UTILITY System Configuration menu (measured value) ..... 20-2
UTILITY System Configuration menu (offset cancel) ..... 1-5
UTILITY System Configuration menu (USB function) ..... 20-4

## V

vertical position (analog signal) ..... 1-13
vertical scale ..... 1-12, 1-13
vertical zoom ..... 10-3

## W

wakeup/sleep mode (CXPI bus search) ..... 12-27
wakeup/sleep mode (CXPI bus trigger) ..... 2-47
waveform acquisition ..... 3-3
waveform assignment ..... 4-1
waveform gradation (file) ..... 16-7
waveform gradation (network printer) ..... 16-5
waveform gradation (USB printer) ..... 16-4
waveform search ..... 11-1
waveform zone ..... 2-84
waveform zones, loading ..... 17-15
waveform zones, saving ..... 17-9
WaveZone ..... 2-84
Web Server ..... 18-5
what to operate, selecting ..... 17-17
window to save ..... 17-5

## X

XY Measure Setup menu ..... 5-2
X-Y menu ..... 5-1

## Z

zoom factor ..... 10-2
ZOOM knob ..... 10-2
ZOOM menu ..... 10-1
ZOOM Vertical Zoom menu ..... 10-3