Keysight Technologies CX3300 Series Device Current Waveform Analyzer

CX3322A 2-Channel Model
CX3324A 4-Channel Model

Quick Operation Guide

KEYSIGHT TECHNOLOGIES

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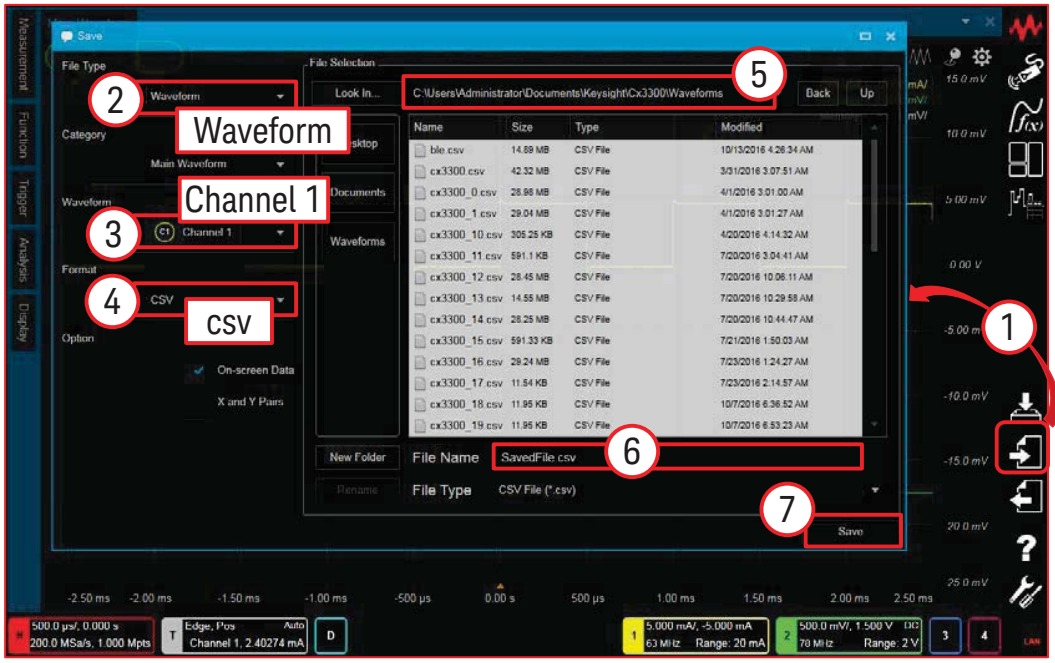
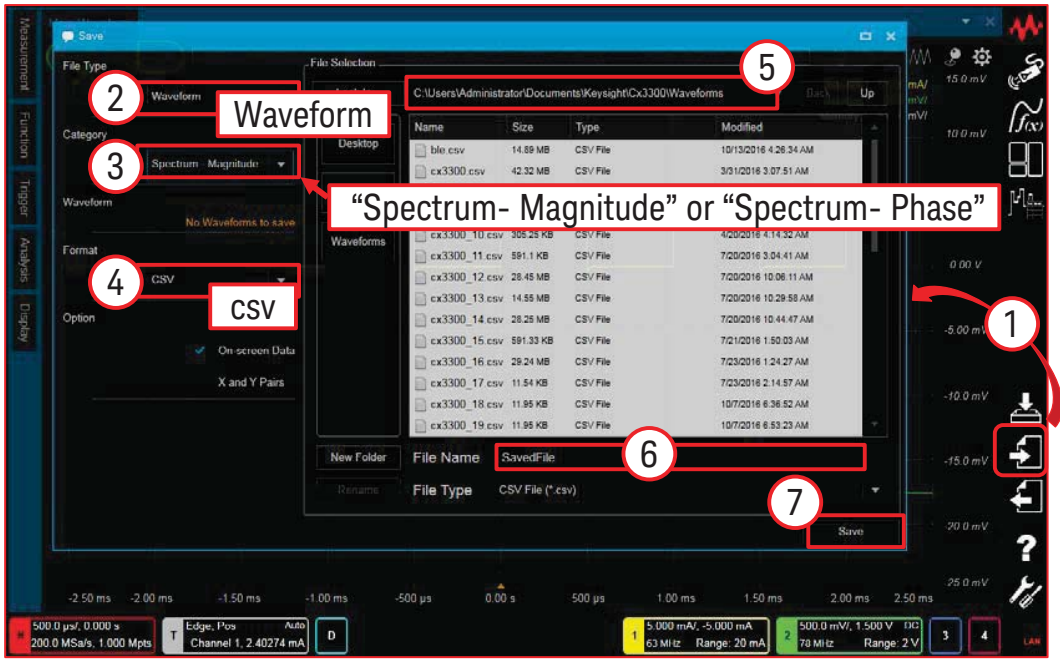
Quick Operation Guide
How to save the waveform data

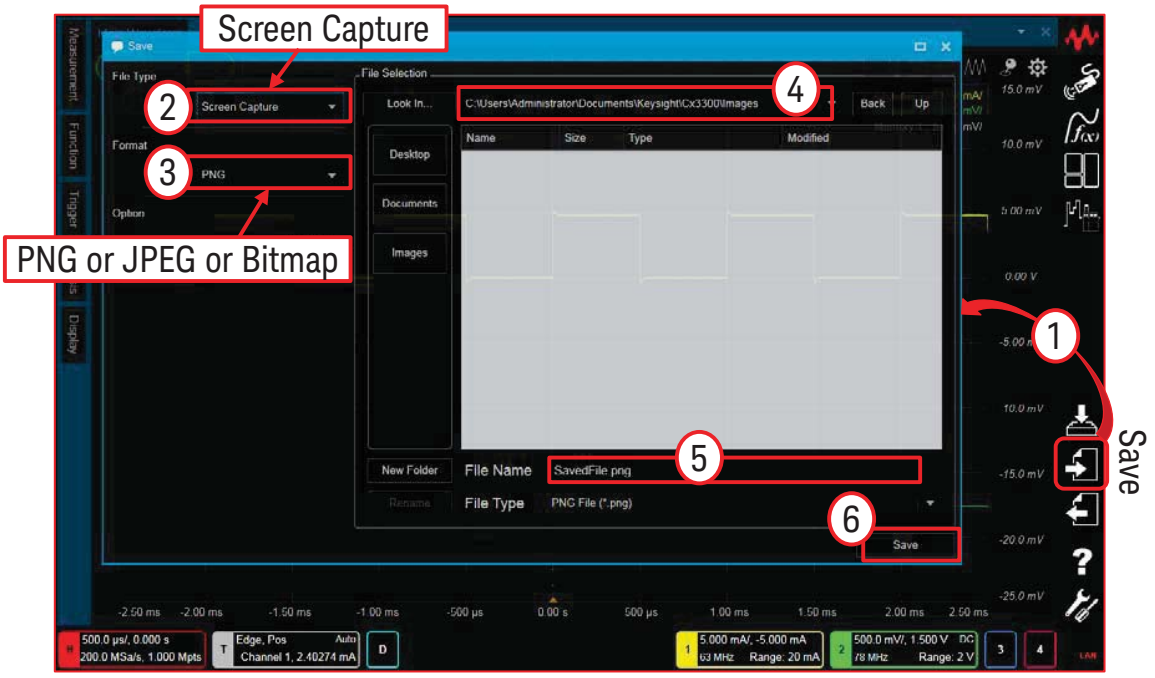
- How to save the Waveform data in CSV format.



- How to save the Waveform FFT data in CSV format.



- How to save the Window Image data (Format : PNG / JPEG / Bitmap).



- How to save all setting data and waveform data (File Type : Composite).

Note:

- For further details about the File Type and Format,
  please refer to “What types of data formats are supported on the CX3300 ?”.

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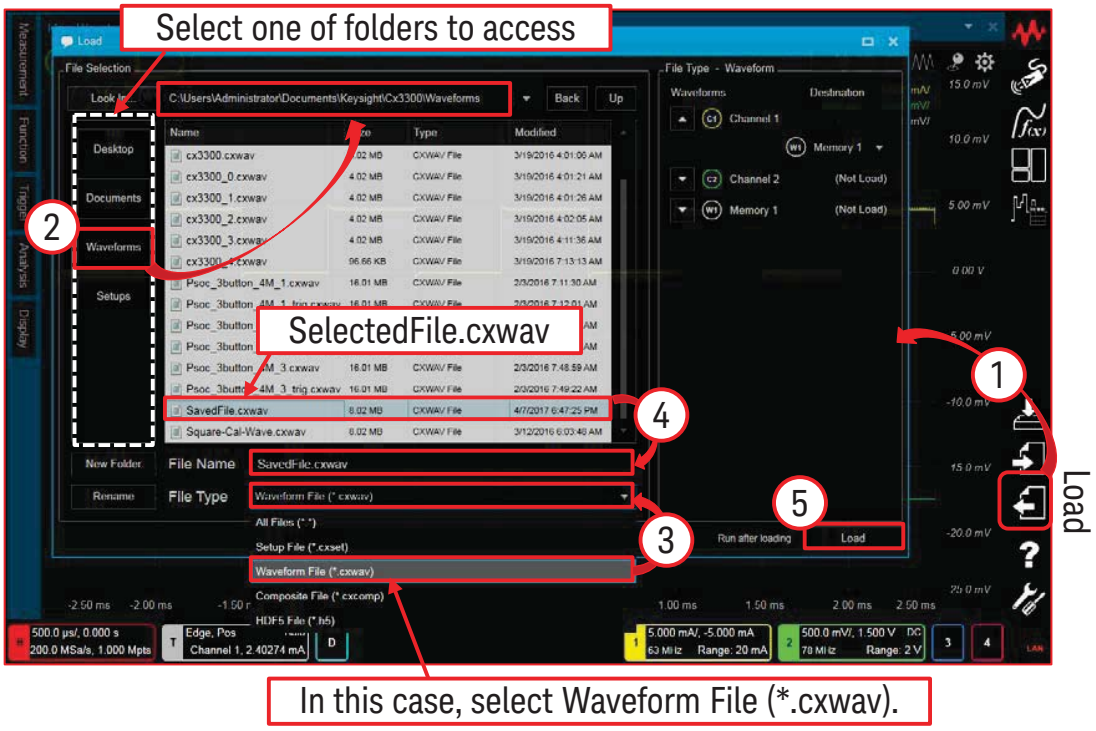
Quick Operation Guide
How to load the data



Note:

- For further details about the File Type and Format,
  please refer to “What types of data formats are supported on the CX3300?”.

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Quick Operation Guide
What types of data formats are supported on the CX3300 ?

The CX3300 supports several File Types and Formats when the setup data or the waveform data is saved or loaded.

[Detail of the File Type and Format]

<table>
<tr><th rowspan="2">File Type</th><th rowspan="2">Format</th><th colspan="2">Save</th><th colspan="2">Load</th></tr>
<tr><th>Setup</th><th>Data</th><th>Setup</th><th>Data</th></tr>
<tr><td rowspan="4">Waveform
(Waveform data)</td><td>CSV</td><td rowspan="4">No</td><td rowspan="4">Yes</td><td rowspan="4">No</td><td>No</td></tr>
<tr><td>TSV</td><td>No</td></tr>
<tr><td>Waveform</td><td>Yes</td></tr>
<tr><td>HDF5</td><td>Yes</td></tr>
<tr><td rowspan="4">Report
(Outputs the measurement and analysis result report in the dedicated style)</td><td>XPS</td><td rowspan="4">Acquisition and channel setups on the summary bar</td><td rowspan="4">Measurement and analysis result</td><td colspan="2" rowspan="4">No</td></tr>
<tr><td>CSV</td></tr>
<tr><td>TSV</td></tr>
<tr><td>Text</td></tr>
<tr><td>Composite
(All setup data and waveform data)</td><td>-</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="3">Screen Capture
(Image of the CX3300 full screen)</td><td>PNG</td><td colspan="2" rowspan="3">The images on the screen</td><td colspan="2" rowspan="3">No</td></tr>
<tr><td>JPEG</td></tr>
<tr><td>Bitmap</td></tr>
<tr><td>Setup
(All setup data or trigger setup data only)</td><td>-</td><td>Yes</td><td>No</td><td>Yes</td><td>No</td></tr>
</table>

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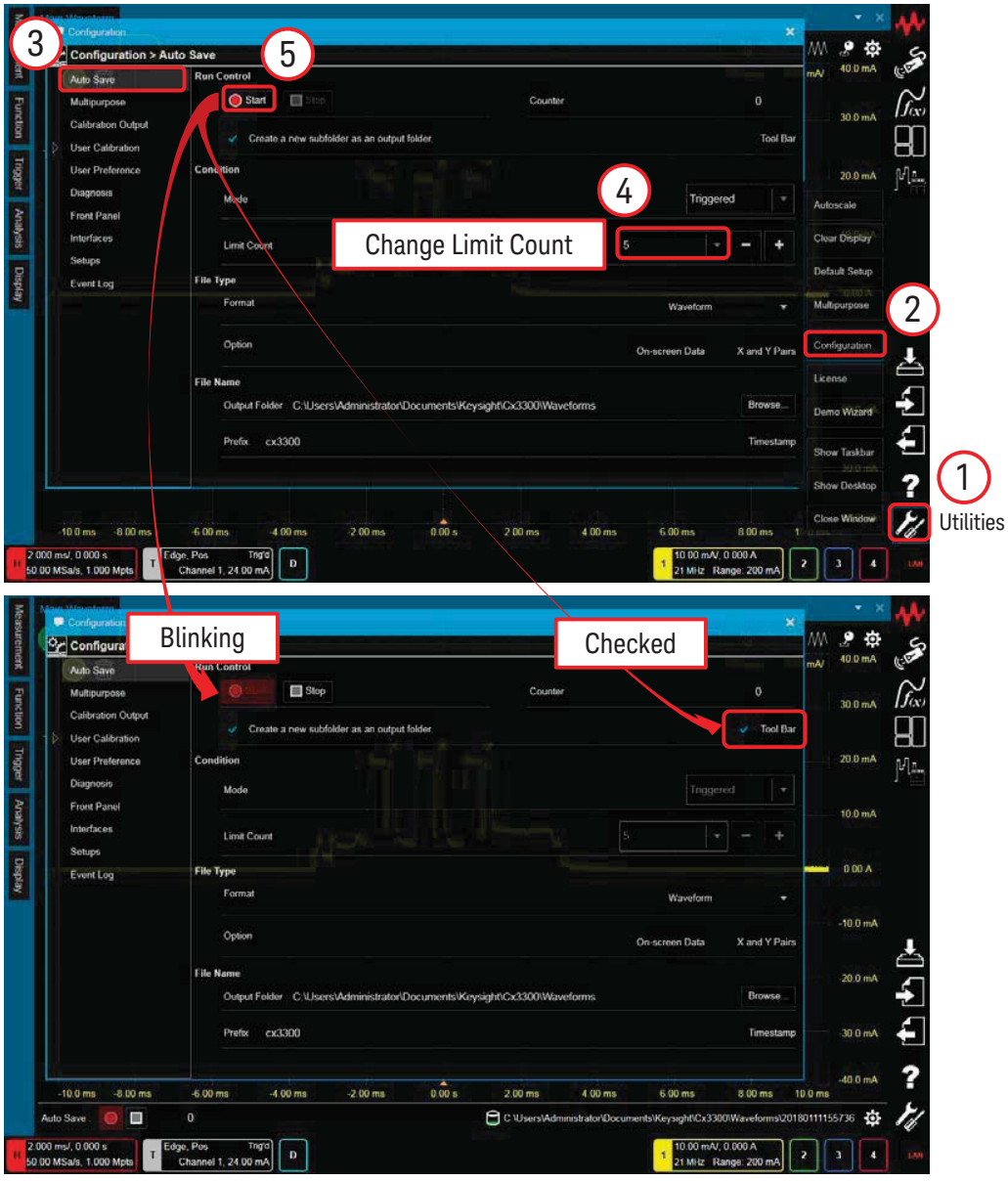
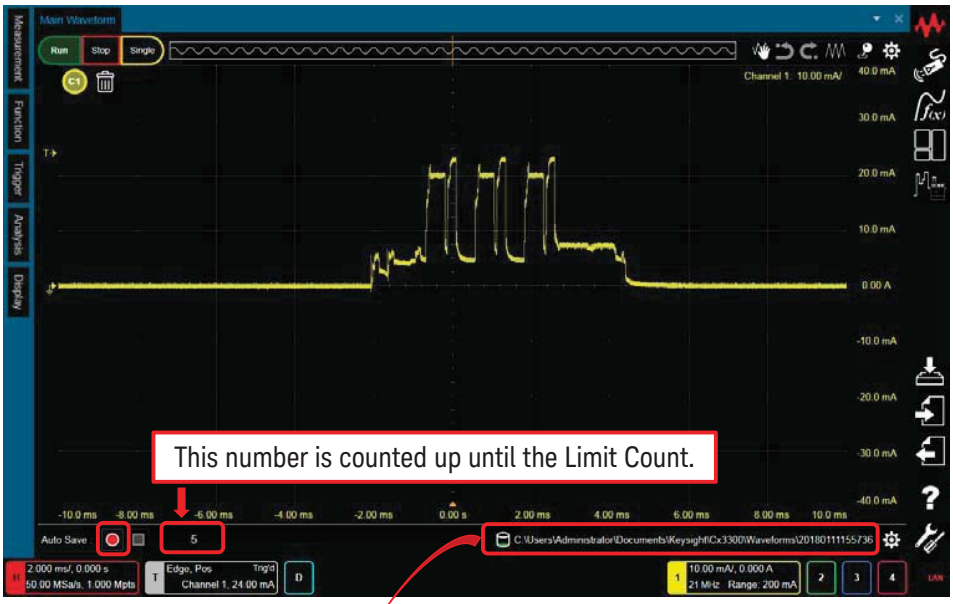
Quick Operation Guide
How to save rarely occurring waveforms automatically

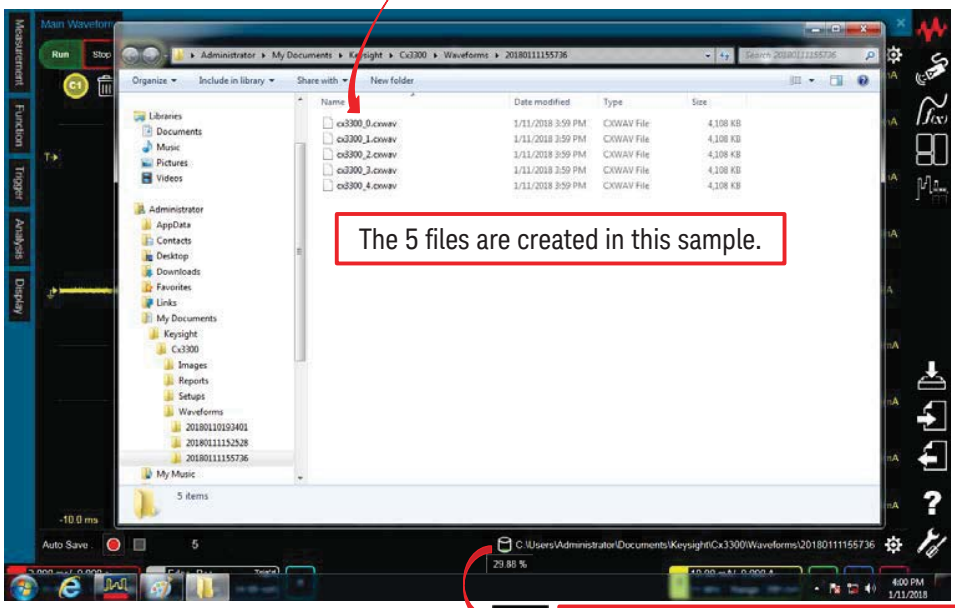
"Auto Save" can be used to automatically save a current waveform if it satisfies specific conditions.

1. Select “Utilities > Configuration > Auto Save”.



2. Push the “Auto Save” (red circle) button on the lower left of the display. The waveforms consistent with the trigger condition are stored up until the Limit Count set on the “Configuration > Auto Save” window.





Note:

- During the processing for previously acquired waveforms, the data is not saved even if the specified condition is satisfied.
- Depending on the File Type and Limit Count, the size or number of the files to be saved increases.

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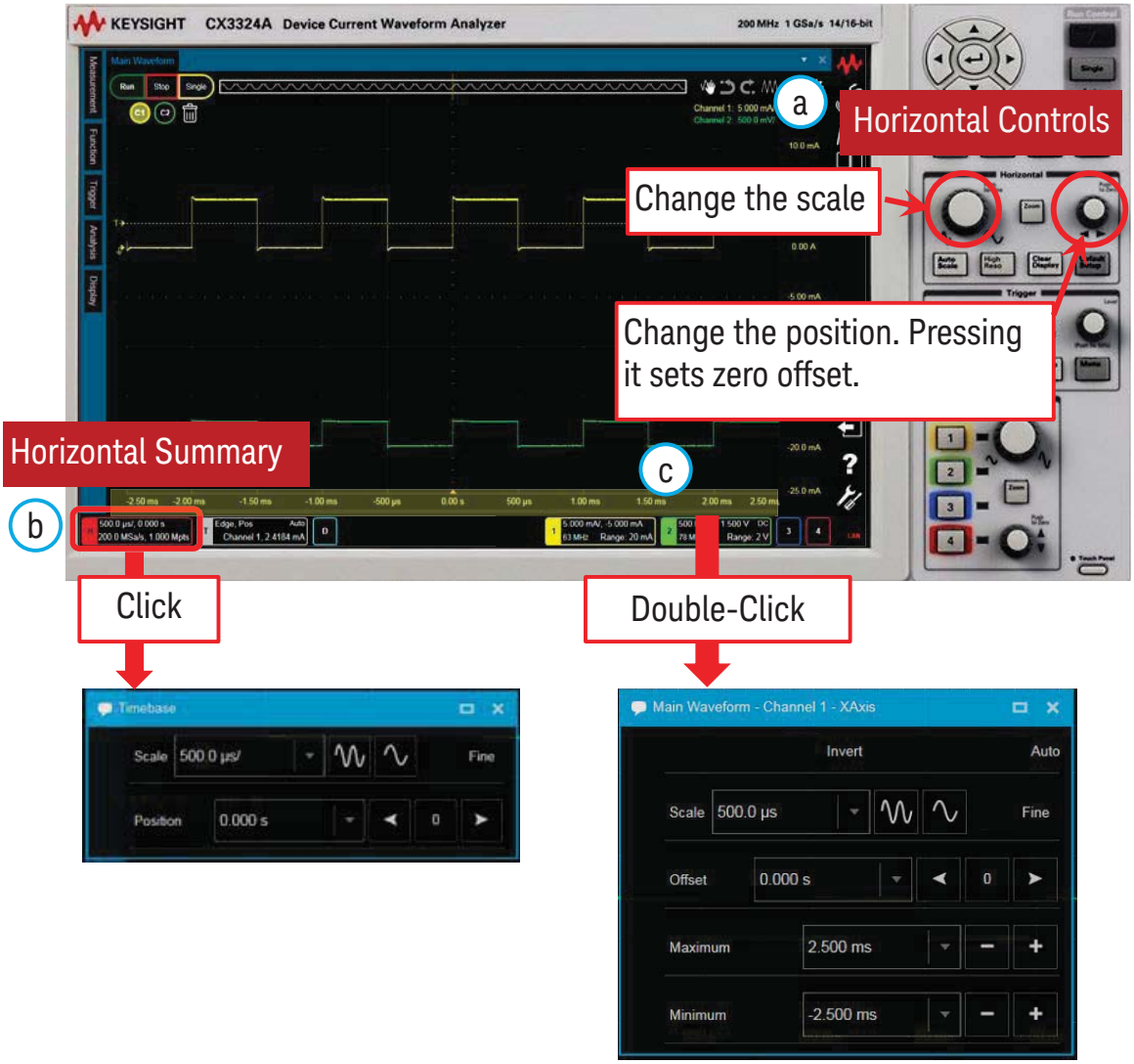
Quick Operation Guide
How to change the horizontal scale and position

You can change the horizontal scale and position using any of the following methods:

a) Using the knobs on the Horizontal Controls
b) Using the Horizontal mini dialog box
c) Using the X Axis dialog box for fine control.



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Quick Operation Guide
How to change the sampling rate

1. Click on the Horizontal summary to open the Horizontal mini dialog box.
2. Un-check “Automatic”.
3. Set the “Sampling Rate”.

Note:

- If “Auto” is enabled, a suitable sampling rate is selected automatically by the horizontal scale setting controlled by the Horizontal scale control knob.

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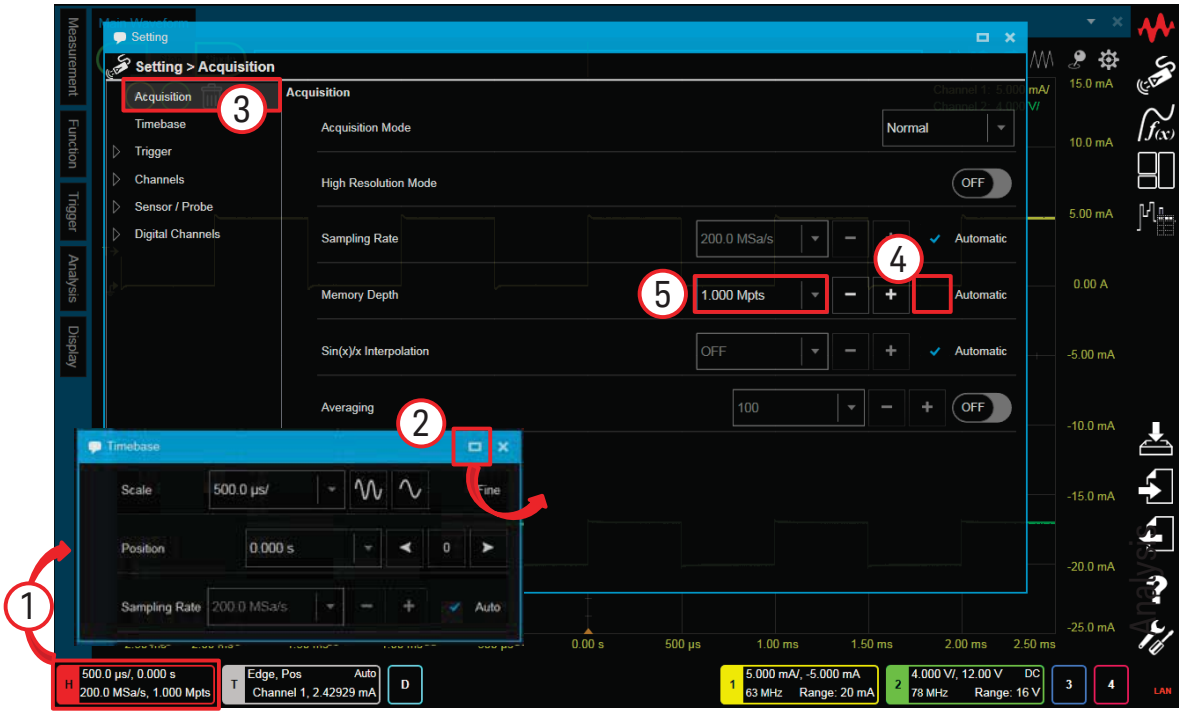
Quick Operation Guide
How to change the memory depth

1. Click on “Horizontal summary” to open the “Timebase” mini dialog box.
2. Click on the “□” at the upper right of the mini dialog box to open the Setting dialog box.
3. Select “Acquisition”.
4. Un-check “Automatic”.
5. Set the “Memory Depth”.



Horizontal Summary

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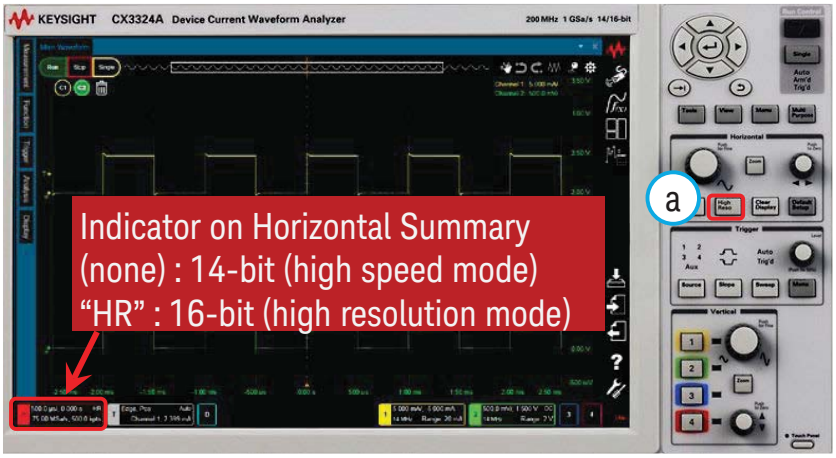
Quick Operation Guide
How to change the 14-bit or 16-bit resolution.

Change a 14-bit (high speed mode) or a 16-bit (high resolution mode) using the [High Reso] key.



Note:
The maximum sampling rate and bandwidth is automatically changed by the mode.

Resolution	Max. Sampling	Max. Bandwidth
14-bit (high speed mode)	1 G Sa/s	200 MHz
16-bit (high resolution mode)	75 Msa/s	15 MHz

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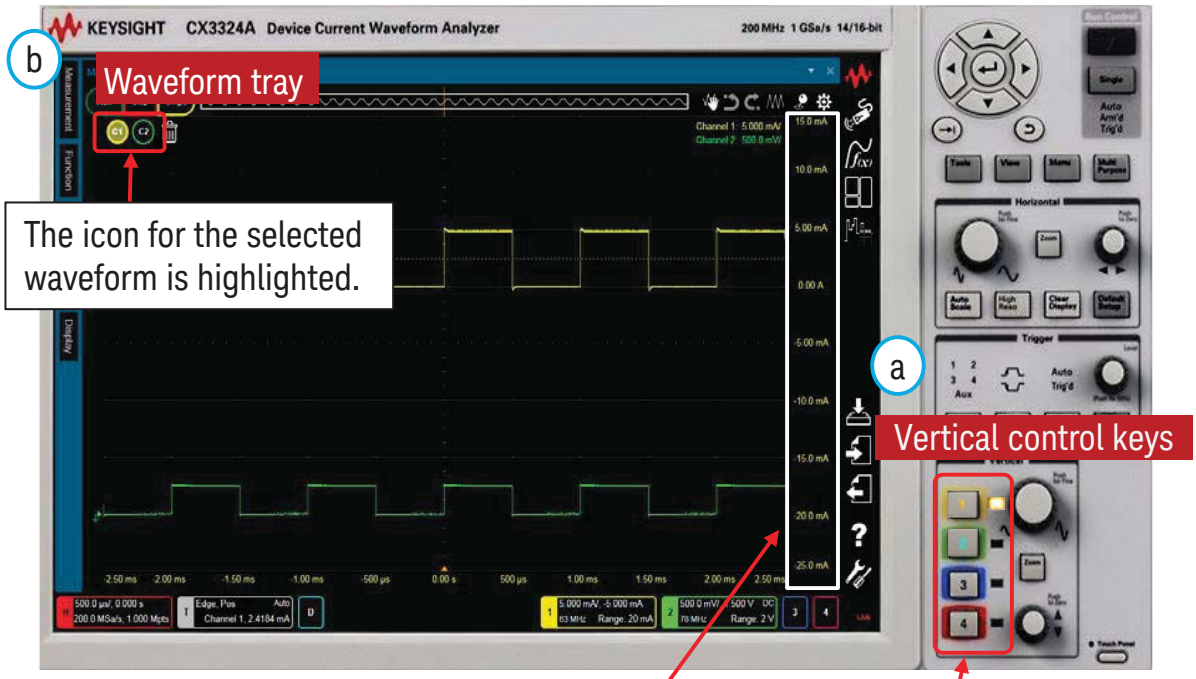
Quick Operation Guide
How to change the vertical scale and position

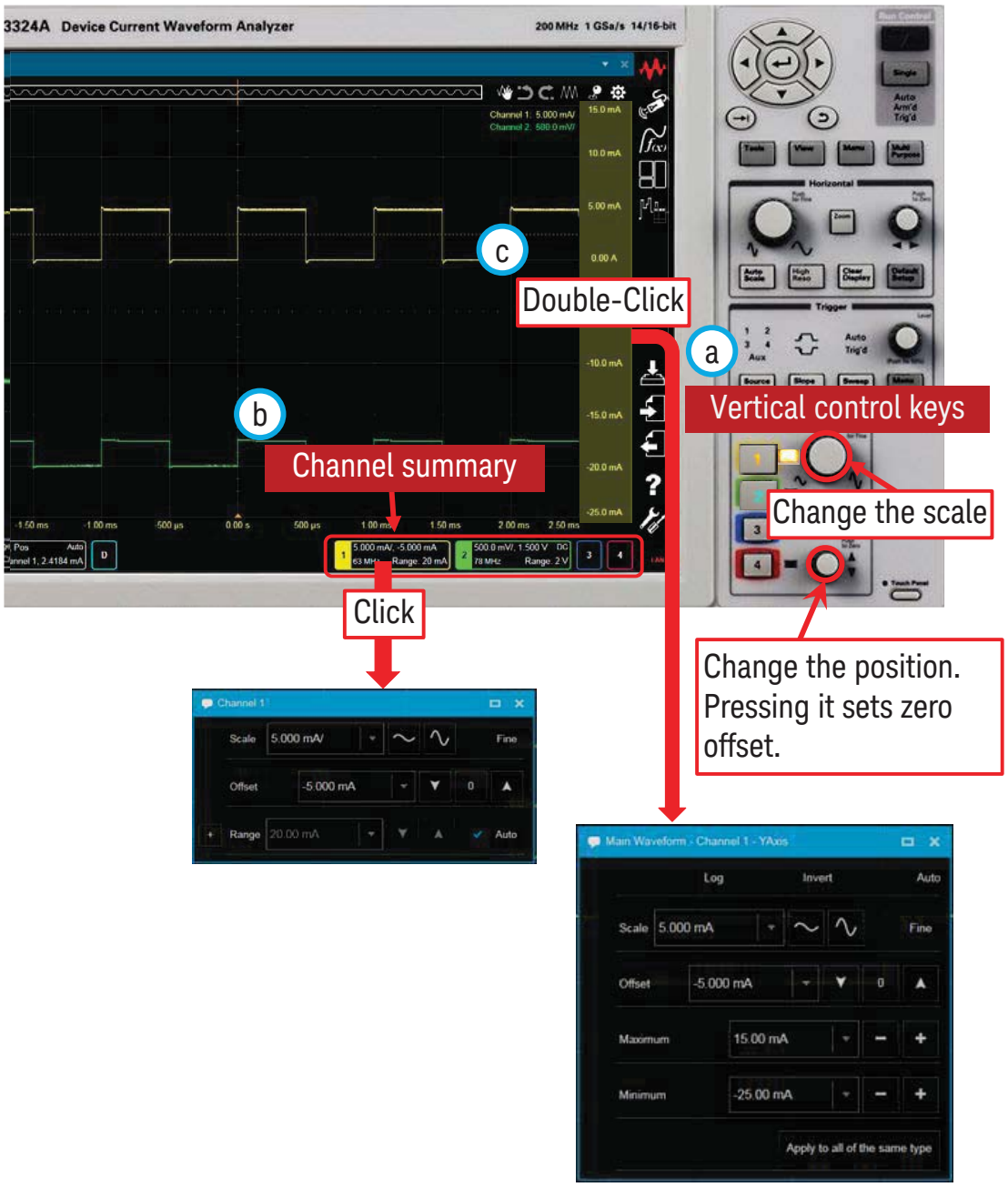
1. How to select the channel.
   Select the target waveform by either:
   a) Pressing [1], [2], [3] or [4] for the analog input channels
   OR
   b) Clicking on the icons on the Waveform tray for the analog input channels or function waveform.



2. How to Change the horizontal scale and position

You can change the horizontal scale and position using any of the following methods:

a) Using the knobs on Vertical Controls
b) Using the Vertical mini dialog box
c) Using the Y Axis dialog box for fine control.



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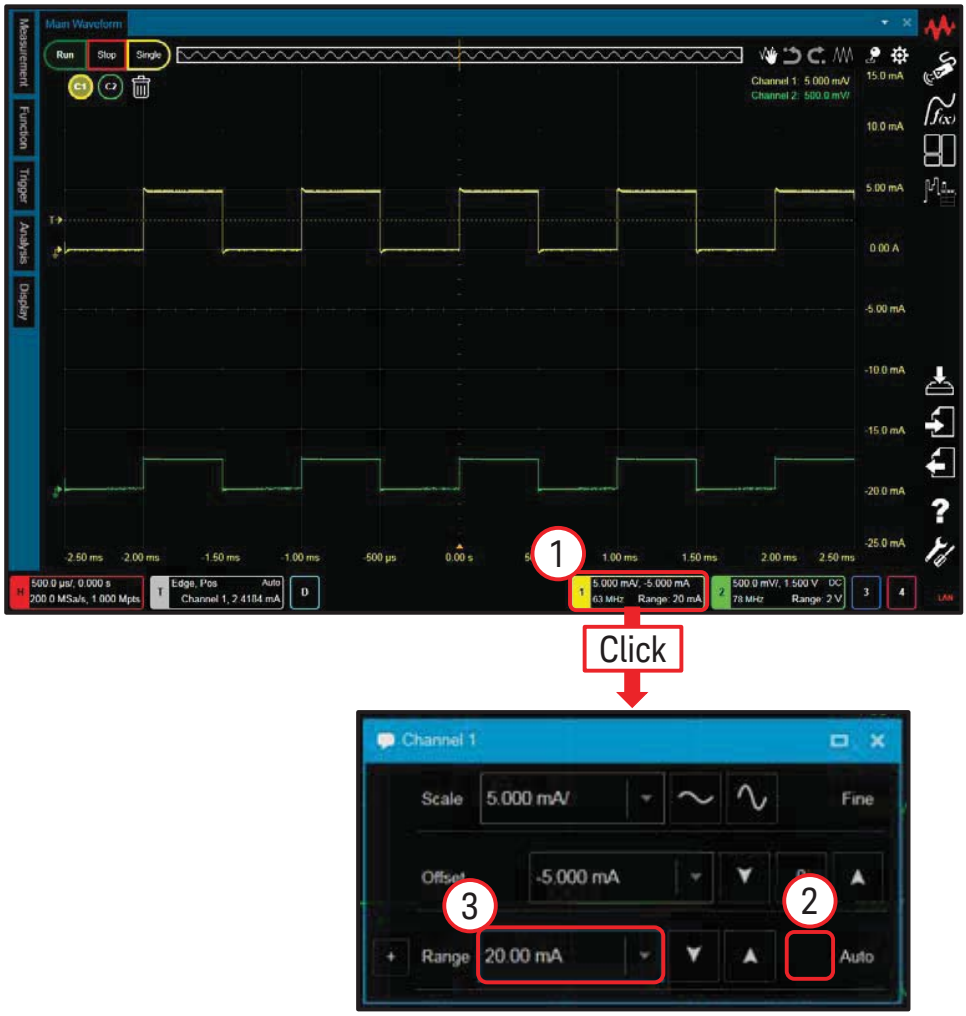
Quick Operation Guide
How to change the current range

1. Click on the Channel summary to open the Channel mini dialog box.
2. Un-check “Auto”.
3. Select the “Range”.



Note:

- If “Auto” is enabled, a suitable range is selected automatically by the vertical scale setting controlled by the Vertical scale control knob.
- The measurement bandwidth and the input resistor are automatically changed by changing the range.

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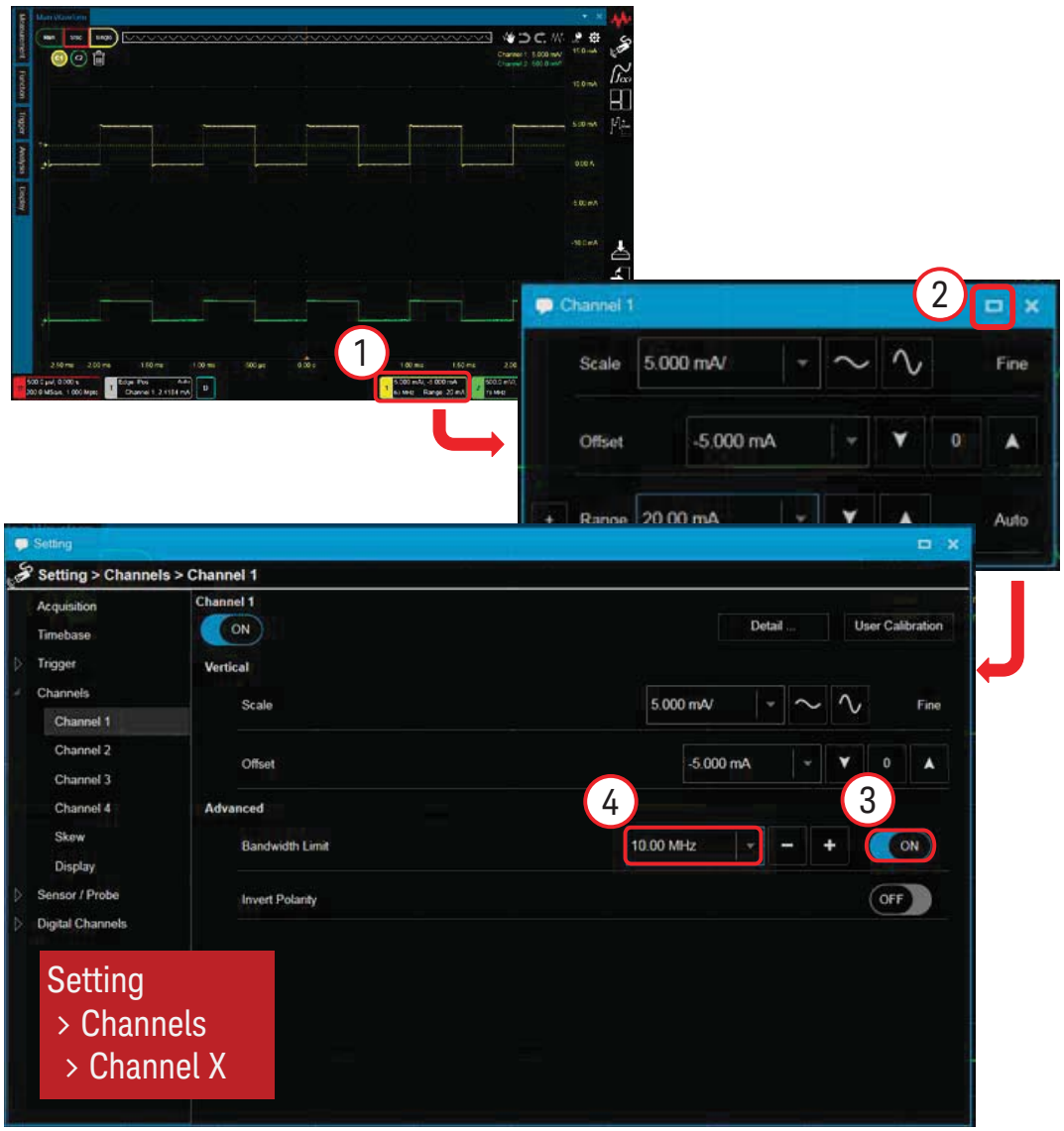
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to set the bandwidth limit

1. Click on the Channel summary to open the Channel mini dialog box.
2. Click on the "□" at the upper right of the window to open the Setting dialog box.
3. Select "ON".
4. Set the bandwidth limit.



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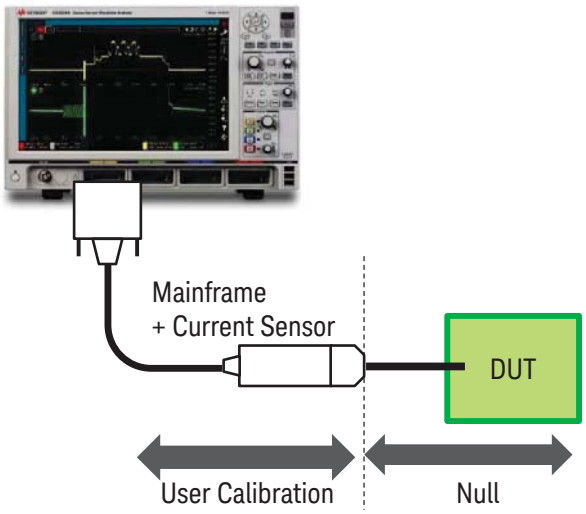
Quick Operation Guide
How to minimize the offset current

1. Perform “User Calibration”. The offset current of the current sensor will be minimized.

2. Perform a actual measurement and fix the connection and the CX3300 settings such as the current range.

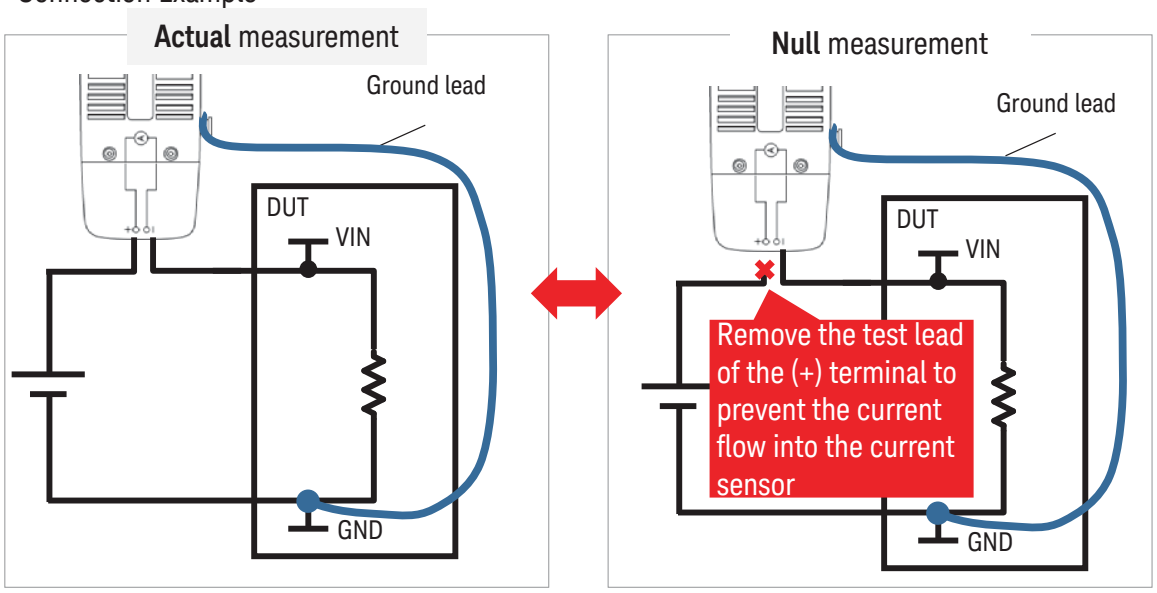
3. Perform a “Null” measurement.



3-1. Make a connection to prevent the current flow into the current sensor.

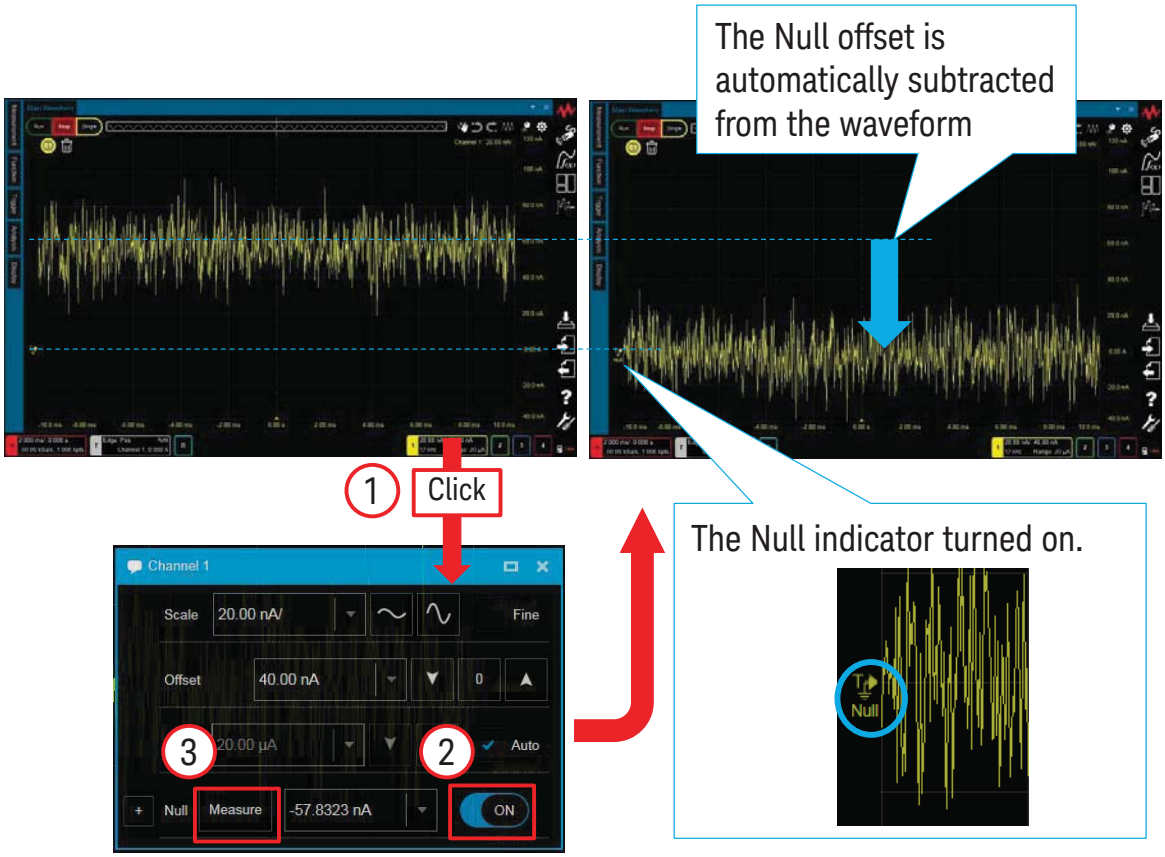
Note for connection:
- Connect either the (+) or (-) terminal of the current sensor to the stable voltage on the DUT.
- Connect the ground lead to the circuit common of the DUT.

Connection Example



3-2. Null measurement

1. Click on the Channel summary to open the Channel mini dialog box.
2. Turn “ON” the Null measurement.
3. Press “Measure”.



4. Restore the connection then make an actual measurement again.

Note:
The Null offset is set to zero when:

- The current sensor is disconnected
- The User Calibration is performed
- The CX3300 is closed or turned off.

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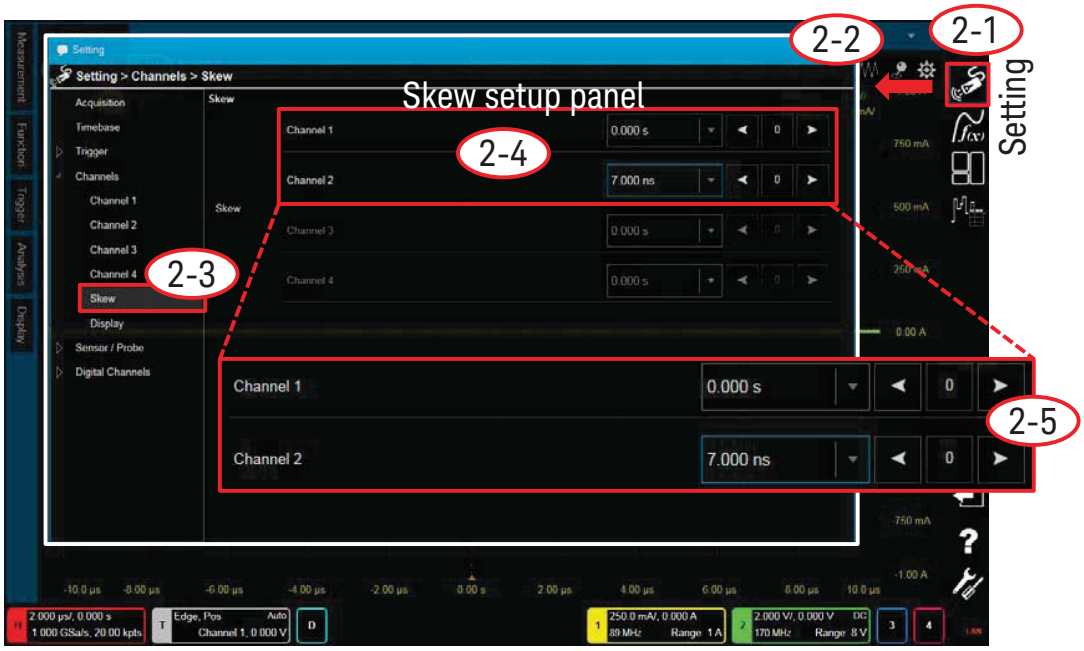
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to perform a Skew adjustment

The skew between the channels on the measurement device can be adjusted.

1. Preparation
   1-1. Connect the Current Sensor (CX1101A/CX1102A/CX1103A) or the Passive Probe Interface Adapter (CX1151A) to the device.
   1-2. Execute the measurement.

2. Settings
   2-1. Click on the “Setting” icon.
   2-2. The “Setting” dialog box opens.
   2-3. Click on “Setting>Channels>Skew".
   2-4. The Skew setup panel opens and the waveforms for the effective channels are shown behind the “Setting” dialog box.
   2-5. Adjust the skew of the other channels to the triggered channel while observing the waveforms behind the “Setting” dialog box.



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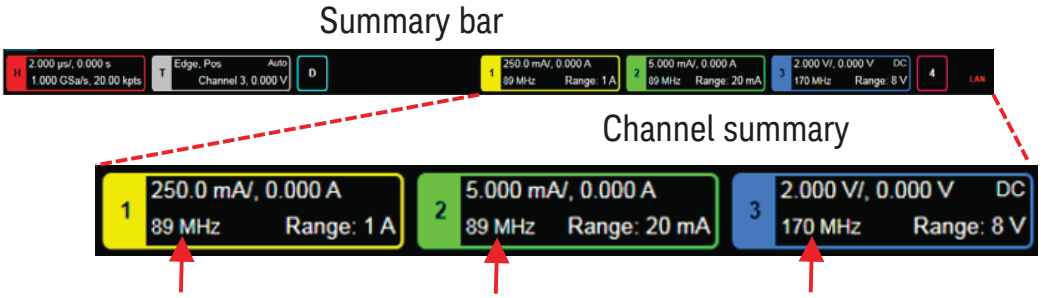
Quick Operation Guide
What determines the effective bandwidth of the instrument?

The effective bandwidth of the instrument is determined by the following settings and displayed in each “Channel summary” on the front panel.



- Bandwidth options of the mainframe

- ADC (14-bit: High speed mode or 16-bit: High resolution mode)
  For details of settings, please refer to “*How to change the 14-bit or 16-bit resolution?”.*

- Measurement range
  For details of settings, please refer to “*How to change the current range?”.*

- Sampling rate
  For details of settings, please refer to “*How to change the sampling rate?”.*

- Bandwidth Limit
  For details of settings, please refer to “*How to set the bandwidth limit?”.*

Tips: In addition, the connection type and the DUT can limit the actual measurement bandwidth at DUT. Please refer to the application note, “7 Hints for Precise Current Measurements with the CX3300 Series Device Current Waveform Analyzer” (Literature number: 5992-2118) for more information.

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CX3300 Current Waveform Analyzer

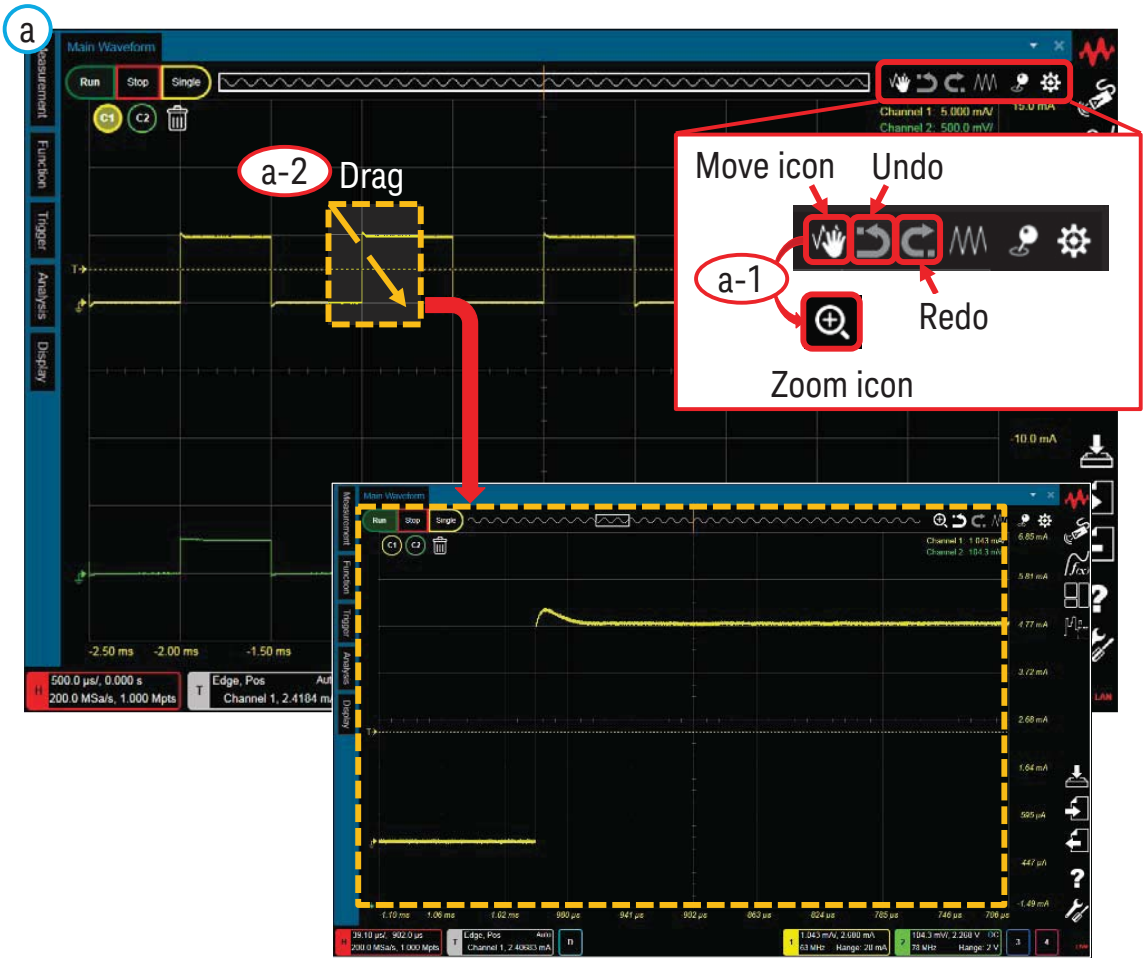
Quick Operation Guide
How to zoom in on the waveform

The CX3300 has two kinds of zoom in functions:

a. Zoom at single display
b. “Anywhere” Zoom.

a. Zoom at single display

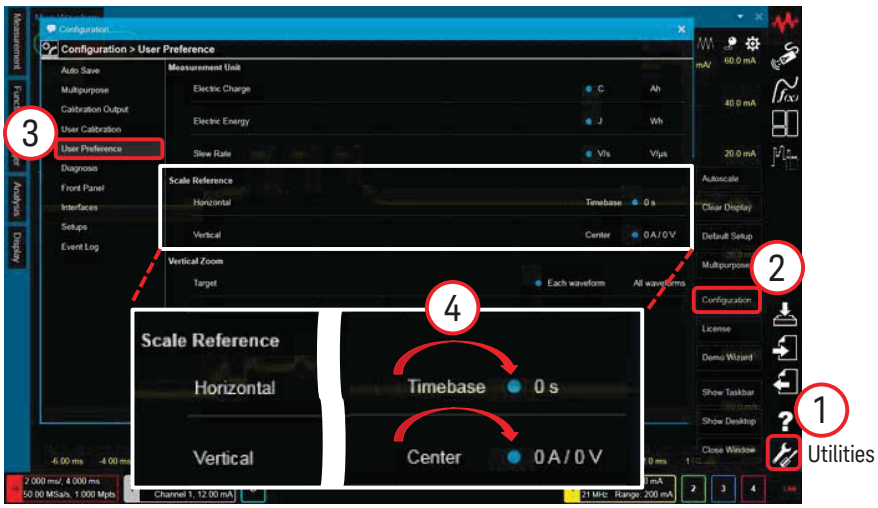
a-1. Click on the “Move” icon to change the ‘Zoom” icon.
a-2. Drag the cursor until the displayed box covers the area of interest.



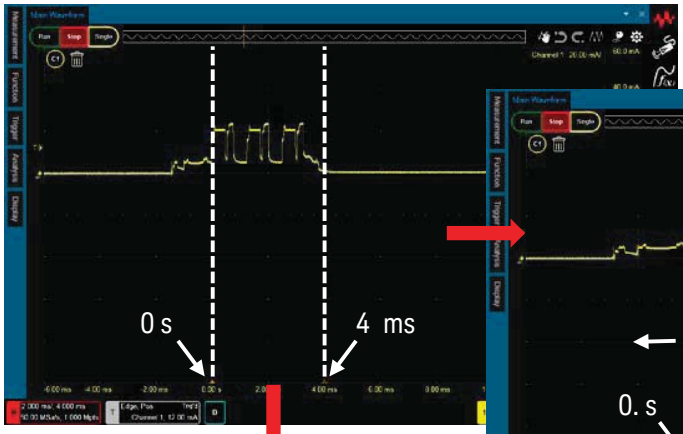
Tips: If you want to cancel the zoom, click the Undo icon.

Tips: By using the Scale Reference function, you can change the base point of the Zoom.

- Utilities > Configuration > User Preference > Scale Reference

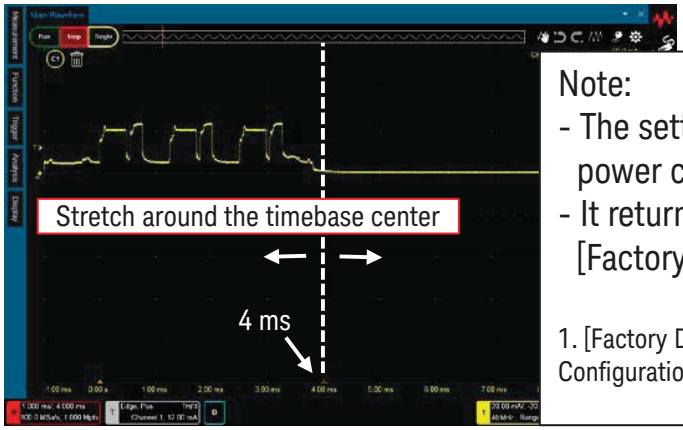


[Scale Reference > Horizontal Sample]



["0 s" selected]

["Timebase" selected]



Note:
- The setting is also retained in CX3300 power cycle and [Default Setup].
- It returns to the factory condition with [Factory Default][1].

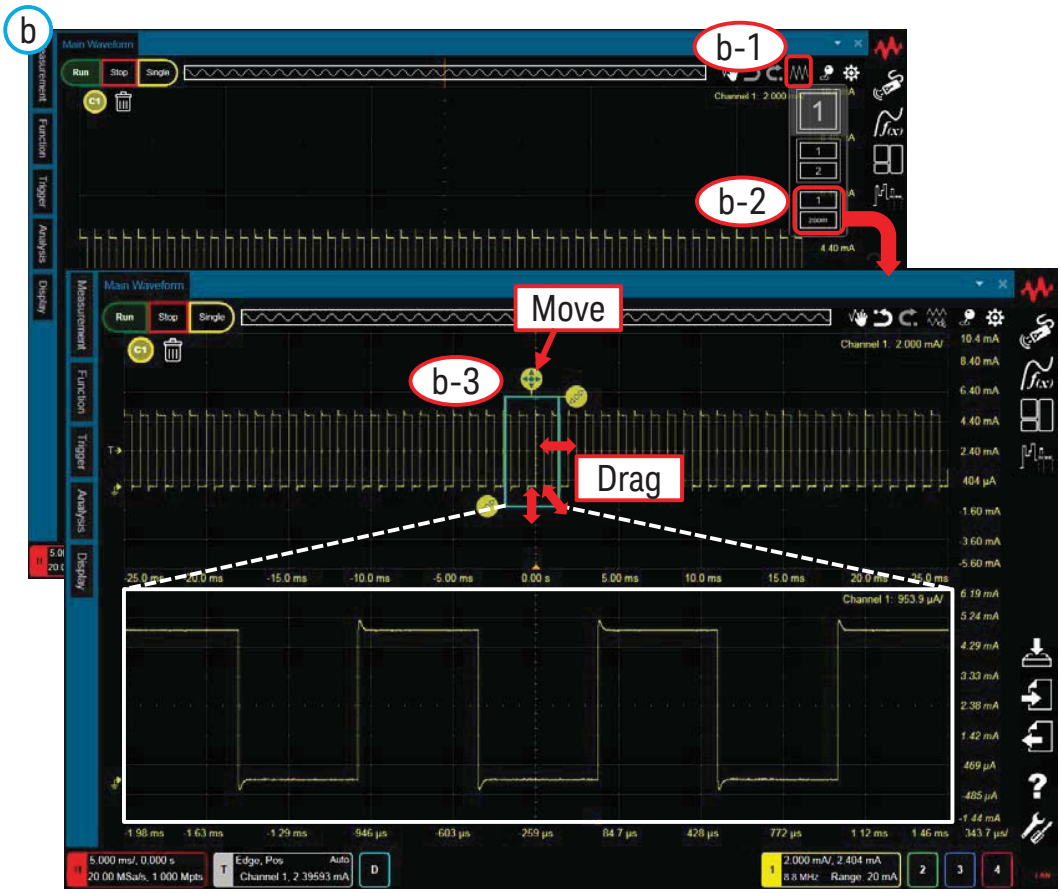
1. [Factory Default] can be selected on the "Utilities > Configuration > Setups" window.

b. “Anywhere” Zoom

b-1. Click on the “Waveforms” icon.

b-2. Click on the "1 & zoom" icon.

b-3. Drag the boundary line of the area.



Tips: You can also specify the scale and position on the Axis dialog.

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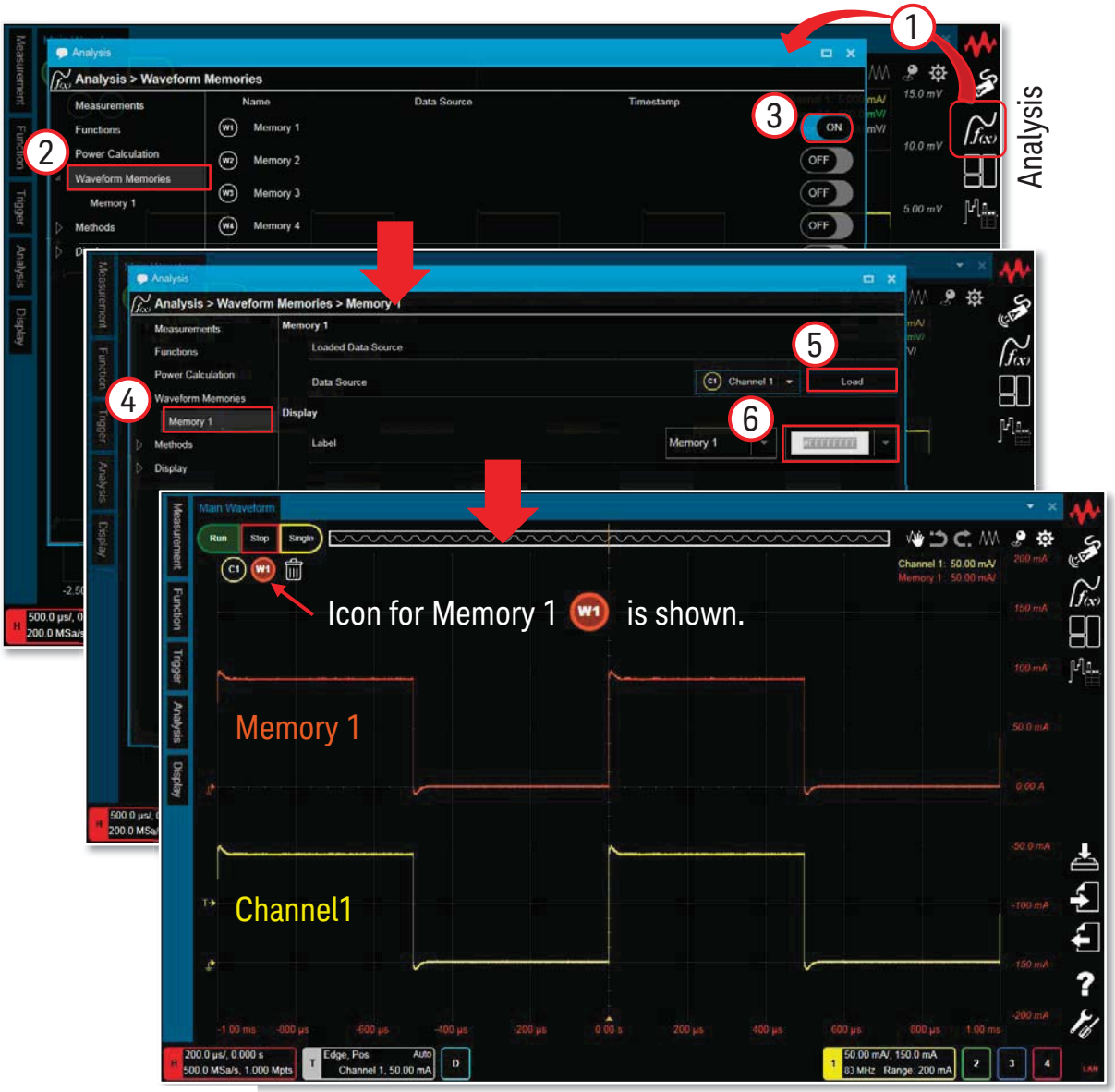
Quick Operation Guide
How to use the waveform memory

1. Click on the “Analysis” icon to open the “Analysis” dialog box.
2. Select “Waveform Memories”.
3. Select “ON”.
4. Select “Memory X” (X is a number. X=1 in this case.)
5. Press [Load]. The waveform is loaded from Memory X.
6. Change the color, if necessary.



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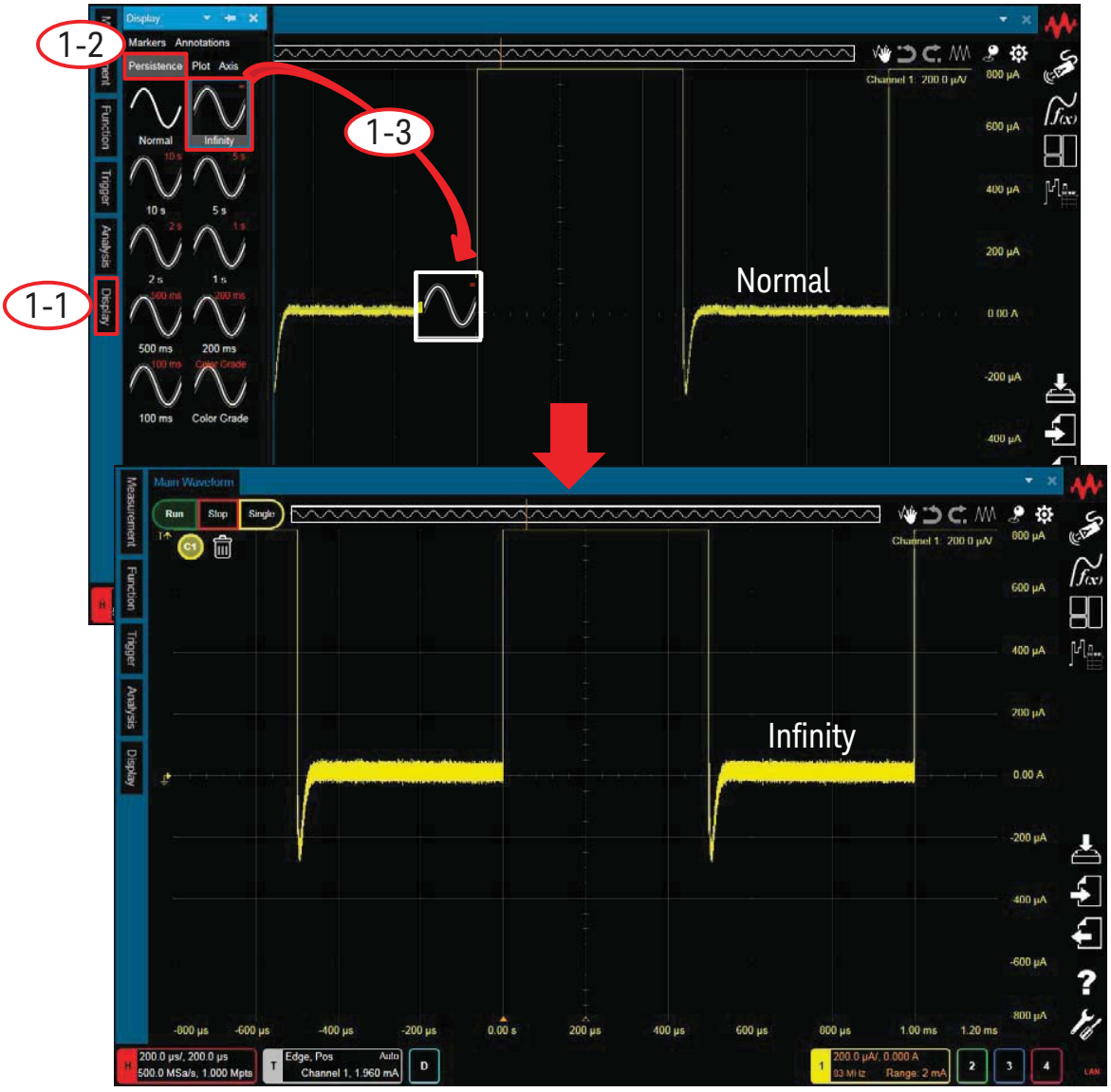
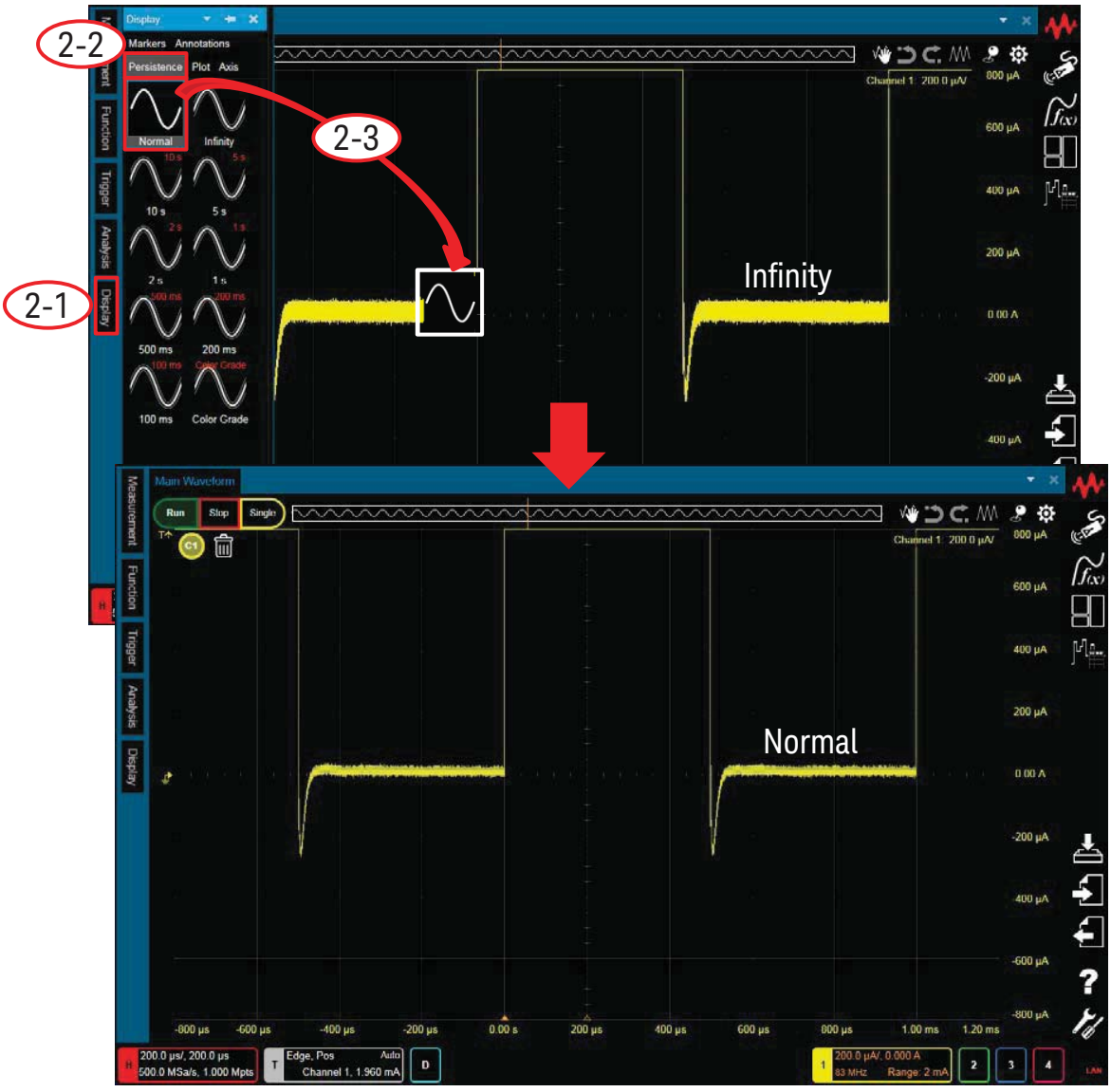
Quick Operation Guide
How to overlay multiple acquisitions

1. ON : Display > Persistence > Infinity
   - 1-1. Click the “Display” icon on the Tool Palette.
   - 1-2. Select “Persistence” on the Display tool palette.
   - 1-3. Drag and drop the “Infinity” icon on the Display tool palette onto the area of interest on the waveform.



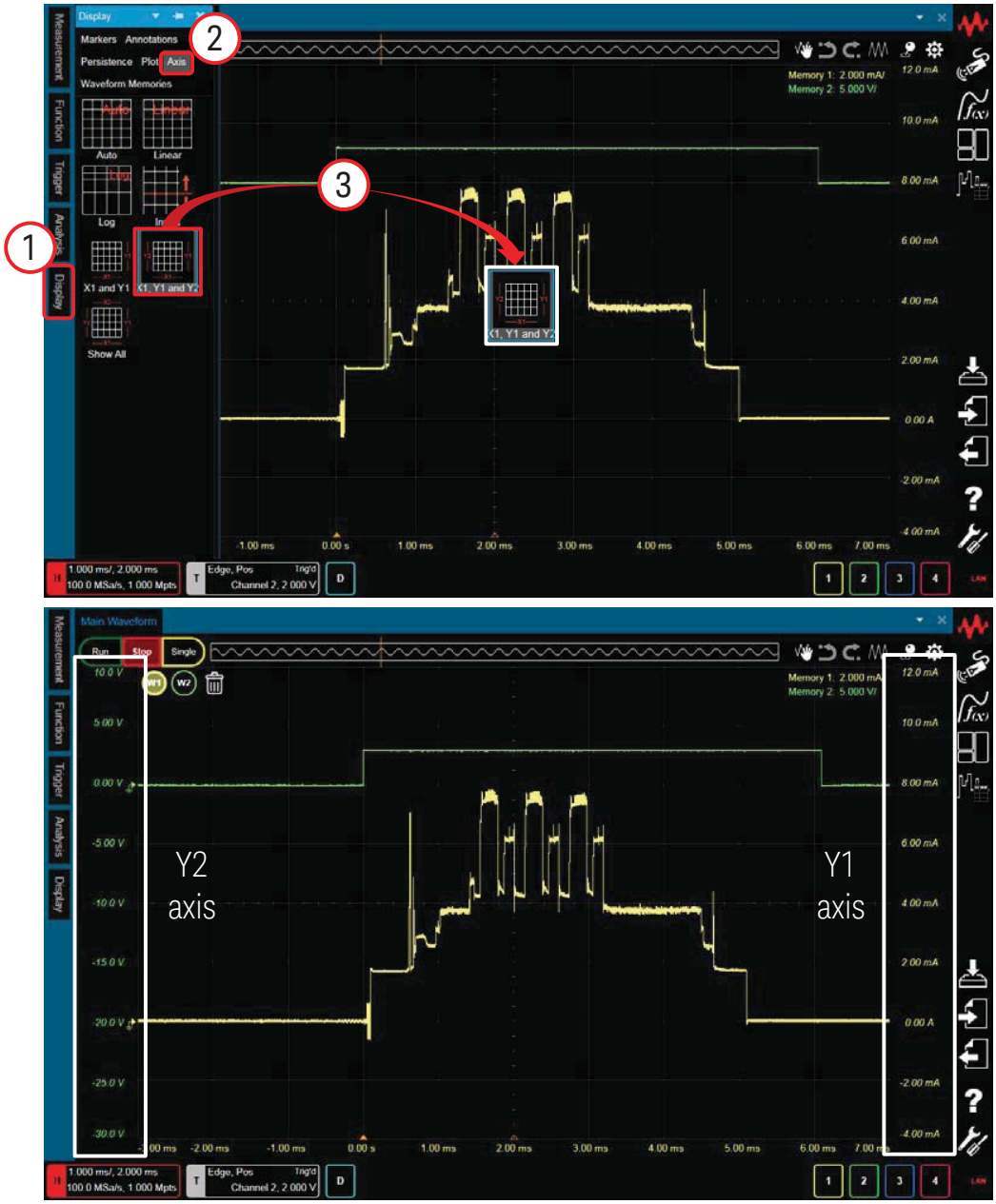
2. OFF : Display > Persistence > Normal
   2-1. Click the “Display” icon on the Tool Palette.
   2-2. Select “Persistence” on the Display tool palette.
   2-3. Drag and drop the “Normal” icon on the Display tool palette onto the area of interest on the waveform.



Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to display the secondary Y axis

1. Select “Axis” in the Display Tool Pallet. Then, drag and drop the “X1, Y1 and Y2” icon on the waveform.



2. How to delete the secondary Y Axis.
There are 2 ways to delete the secondary Y Axis.

2-1. Drag and drop the “Display > Axis > X1 and Y 1” icon.

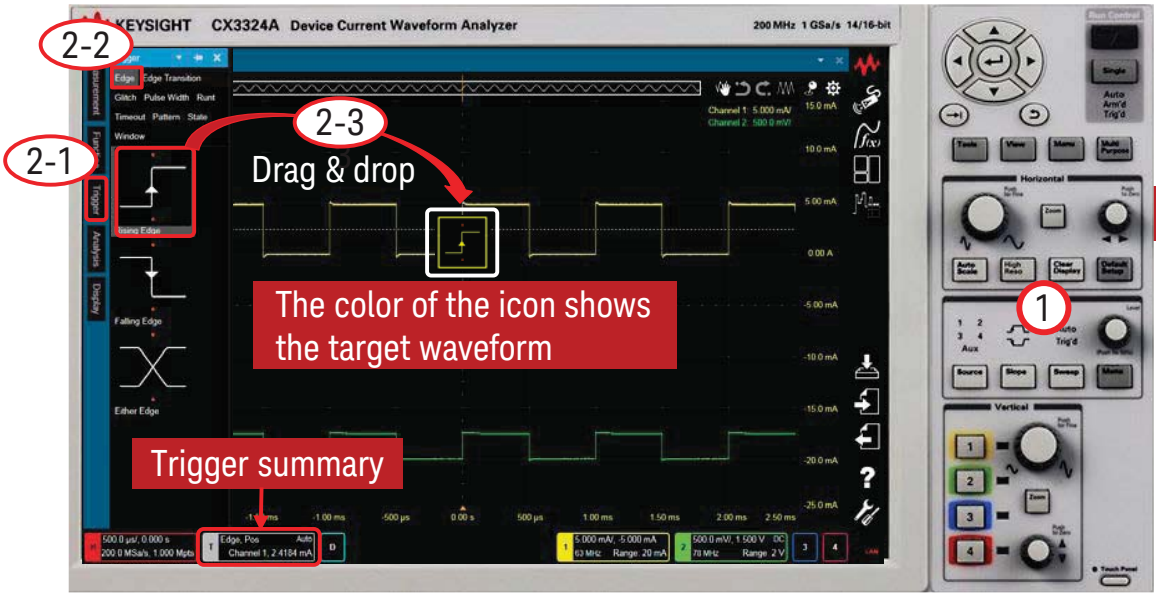
2-2. Double-click somewhere on the screen and switch OFF the “Secondary Y Axis” on the “Plot Properties” window.

Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to set the Trigger

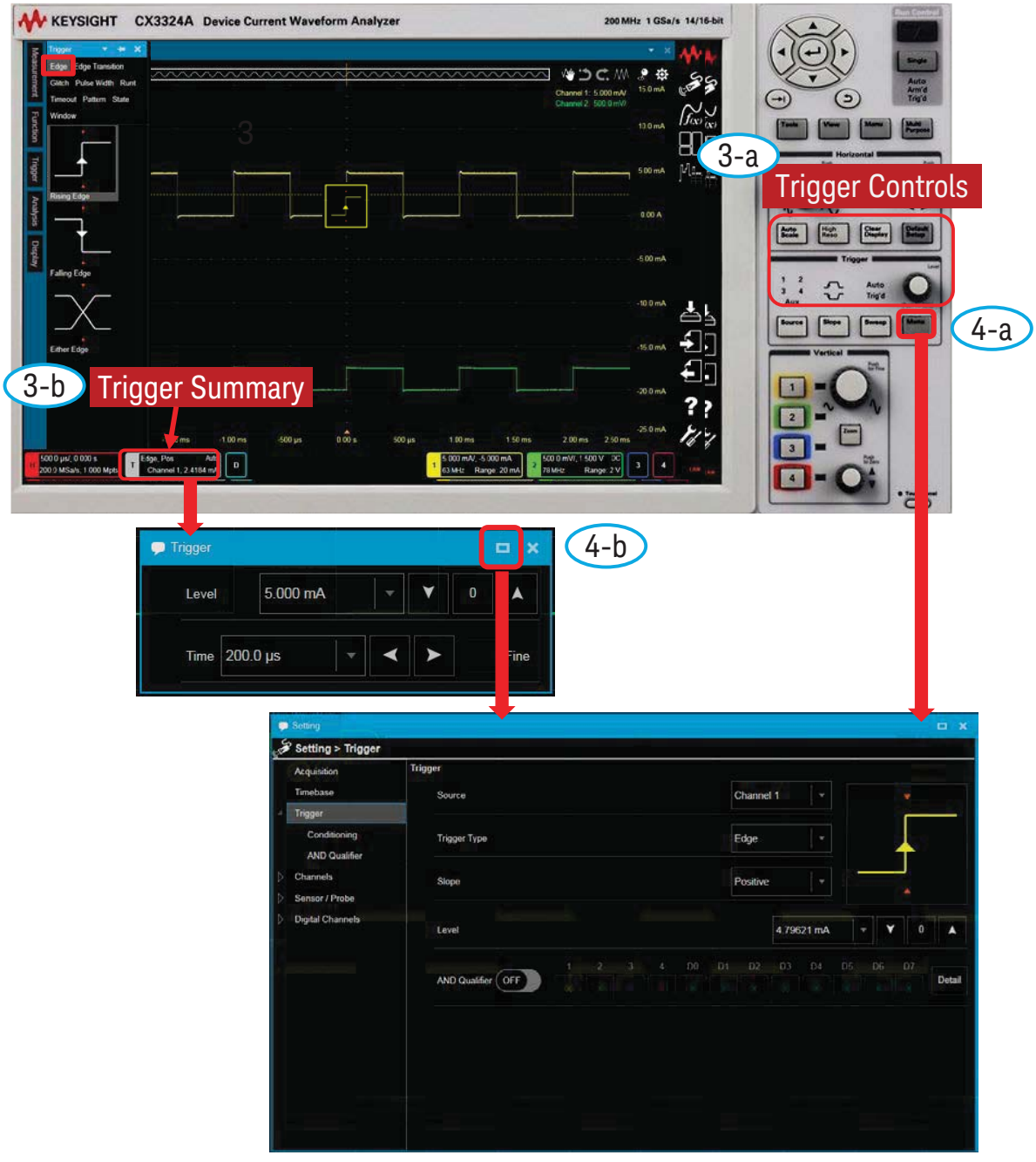
1. Press [Sweep] to set the Trigger to ON.

2. Select the Trigger Type. (Default: “Edge”)
   2-1. Select “Trigger” on the Tool Palette
   2-2. Select the Trigger Type (“Edge” in this case) from the Trigger Tool Palette
   2-3. Drag-and-drop the icon onto the target waveform. The color of the icon shows the target waveform.



3. Change the trigger source, slope and level using either:
    a) The Trigger Controls
    OR
    b) The Trigger Mini dialog box.

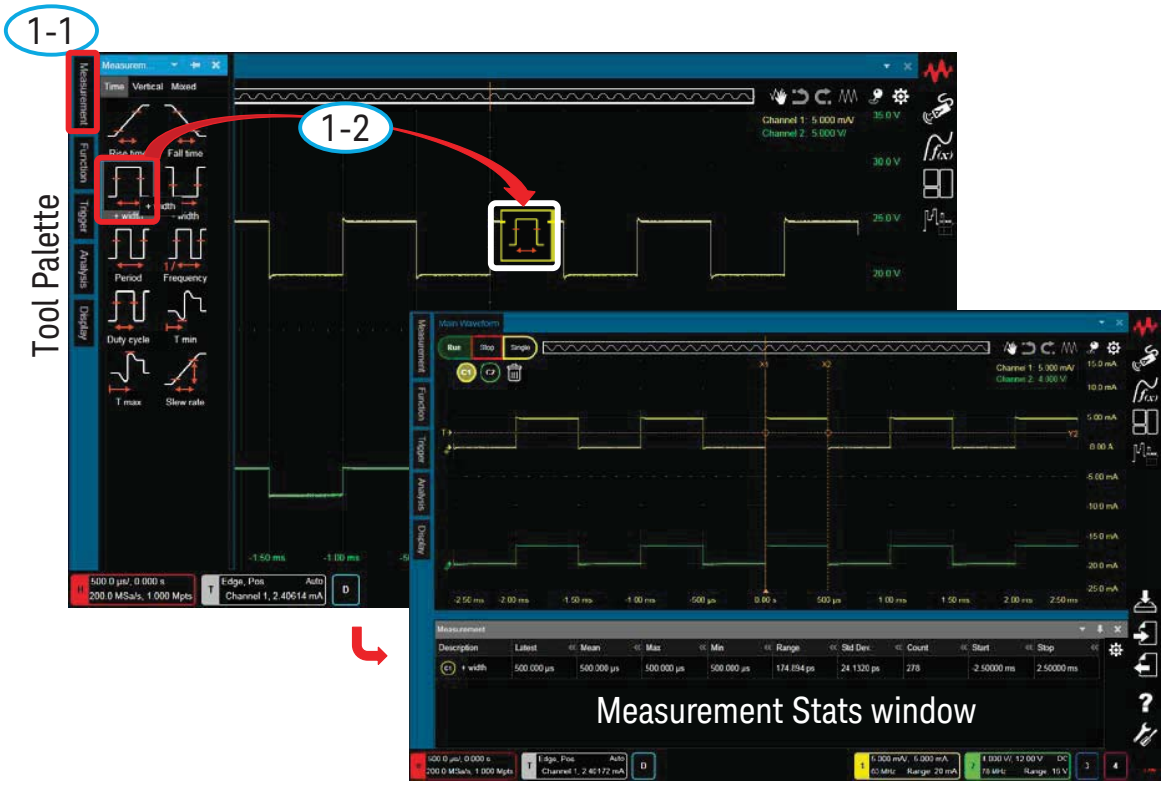
4. For more detailed conditions, open the “Setting > Trigger dialog box” by either:
    a) Pressing the [Menu] button
    OR
    b) Clicking the “□” at the upper right of the Trigger mini dialog box.



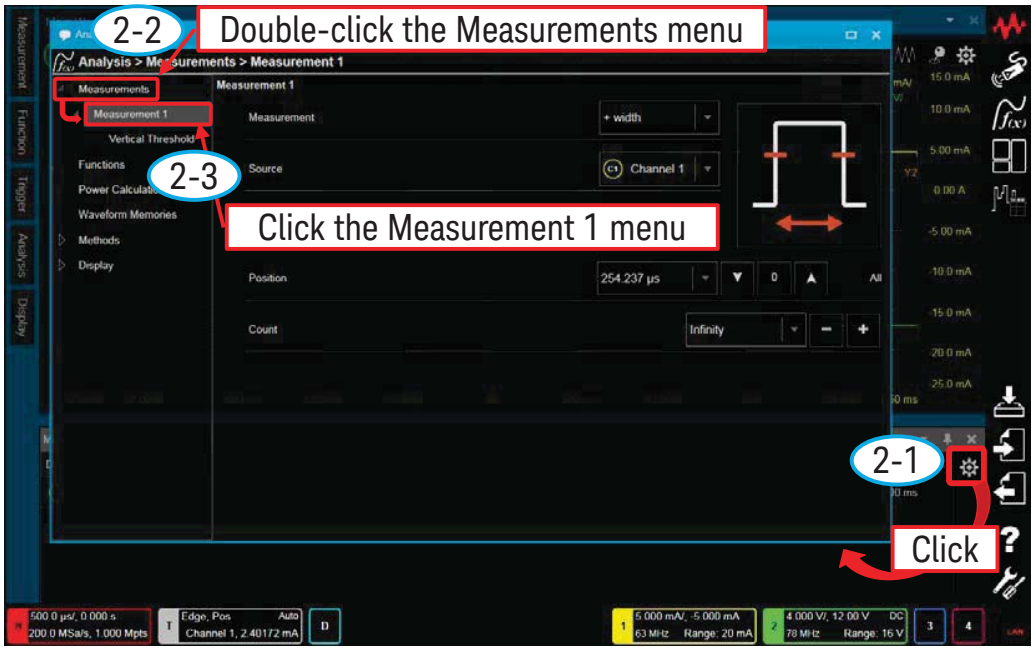
Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to apply a Measurement Function

1. Apply a Measurement Function (“+width” in this case)
   1-1. Click the “Measurement” icon on the Tool Palette.
   1-2. Drag and drop the “+width” icon onto the target. The color of the icon shows the target waveform.

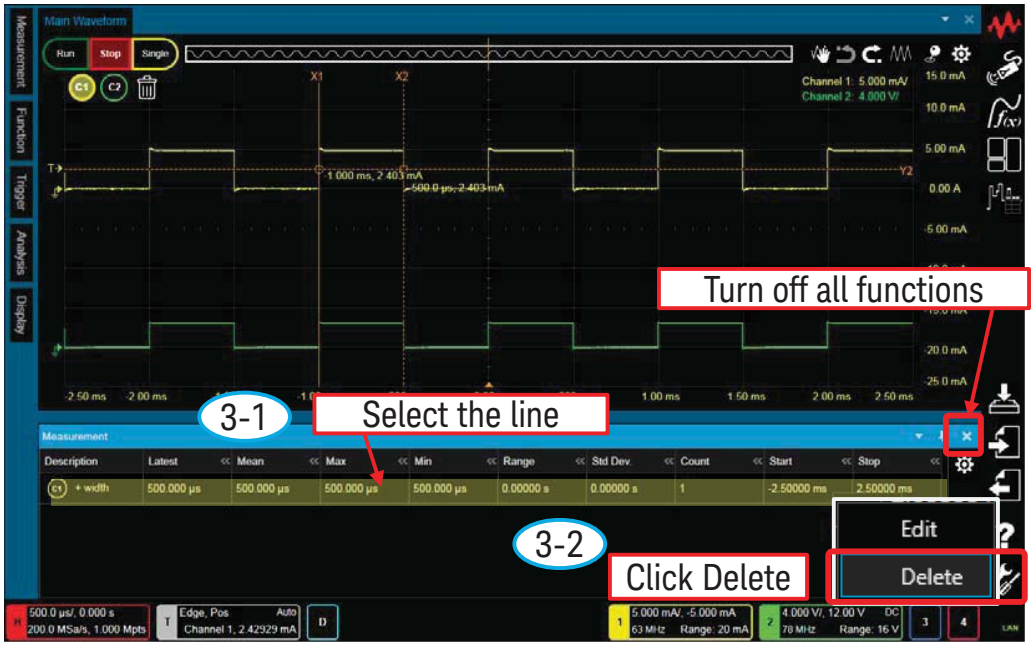


2. For more detailed conditions, open the Measurements pane by clicking the Setting icon on the Measurement Stats window and change the settings.



You can also access the Measurement pane via Side Bar > Analysis > Measurement.

3. Turn the measurement function off.

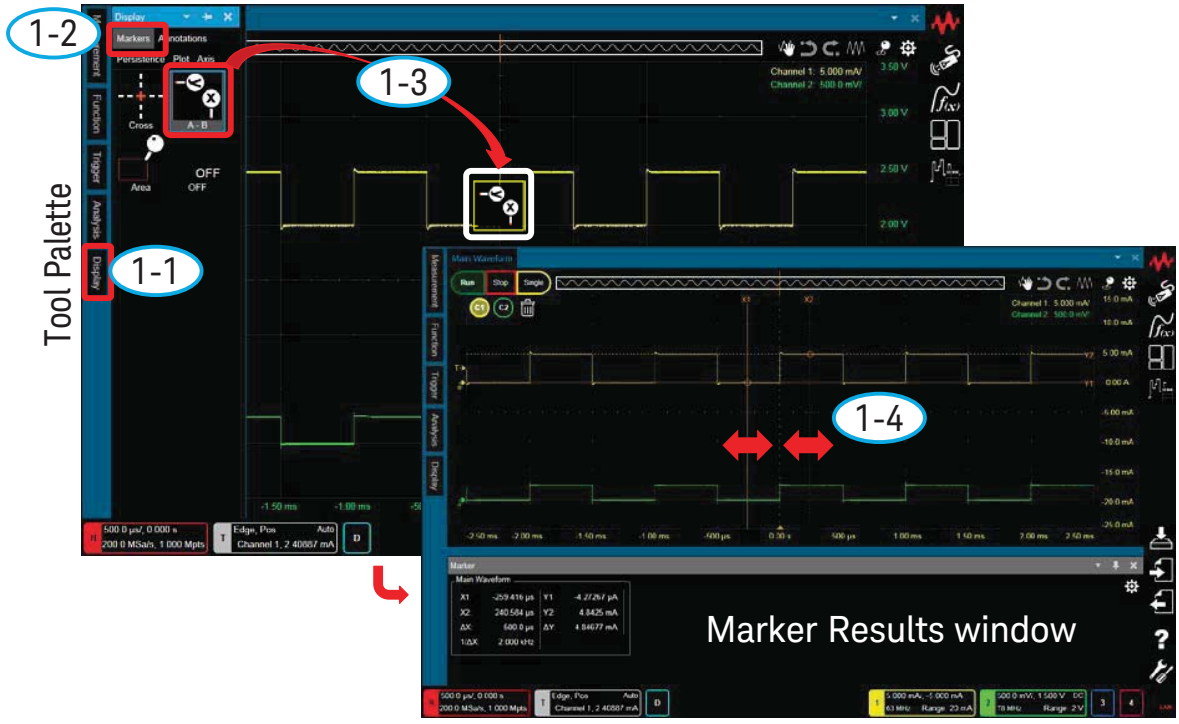


You can switch the measurement function ON and OFF on the Measurement pane as described in procedure 2.

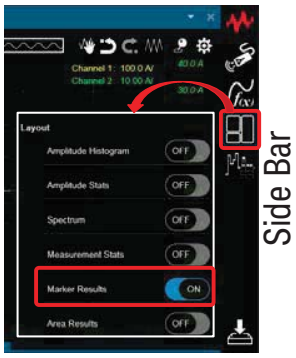
Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to apply the A-B marker

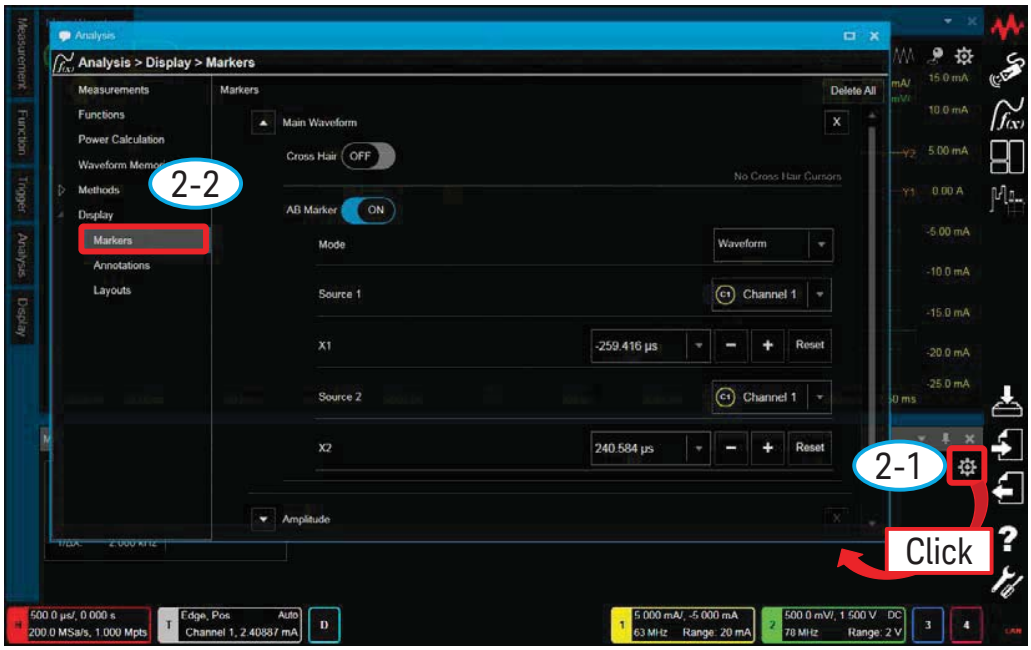
1. Turn the Marker ON.
   1-1. Click “Display” on the Tool Palette.
   1-2. Click “Markers”.
   1-3. Drag and drop the A-B marker icon onto the target. The color of the icon shows the target waveform.
   1-4. Move X1 and X2 to the target point.



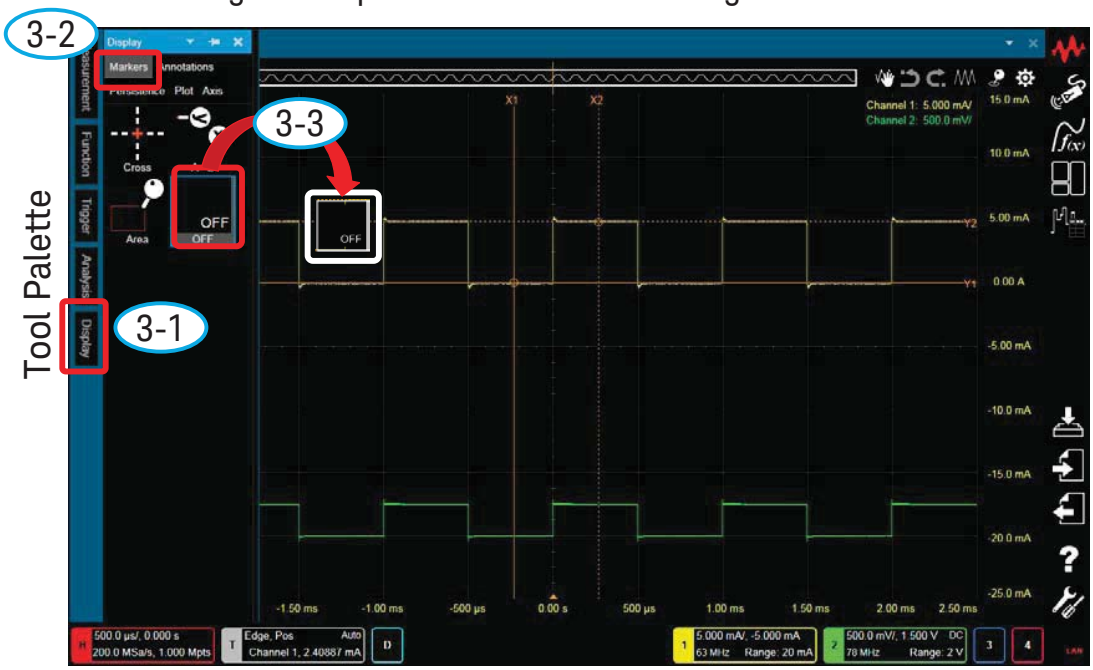
Tips: You can switch the Marker Results window ON and OFF via Side Bar > Layout > Marker Results.



2. For more detailed conditions, open the Markers dialog box by clicking the Setting icon on the Marker Results window and change the settings.



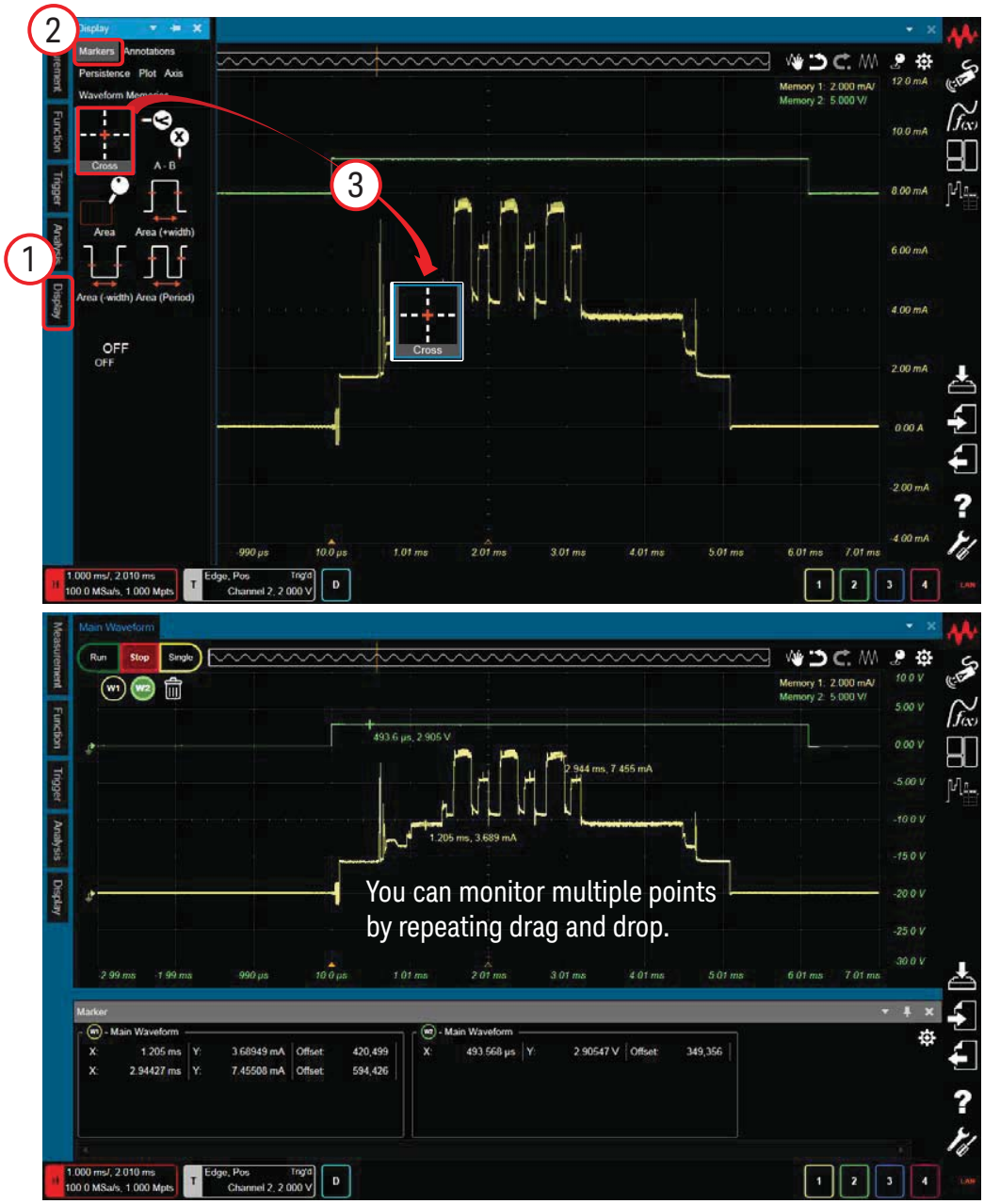
3. Turn the Marker OFF.
   3-1. Click “Display” on the Tool Palette.
   3-2. Click “Markers”.
   3-3. Drag and drop the OFF icon onto the target.



Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to place pointers on waveforms

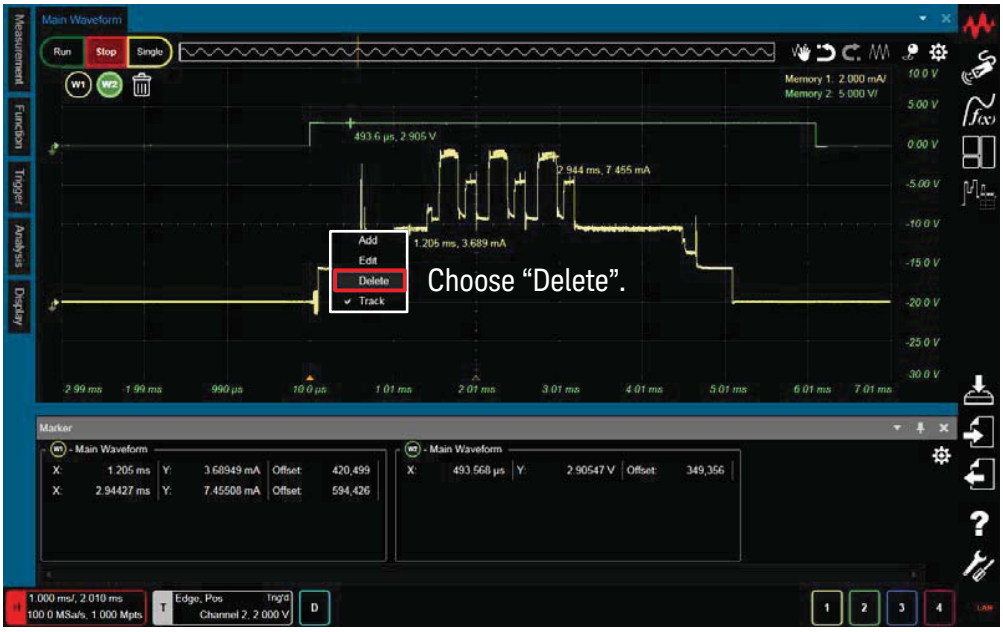
1. Select “Markers” in the Display Tool Pallet. Then, drag and drop the “Cross” icon on the point that you want to monitor.



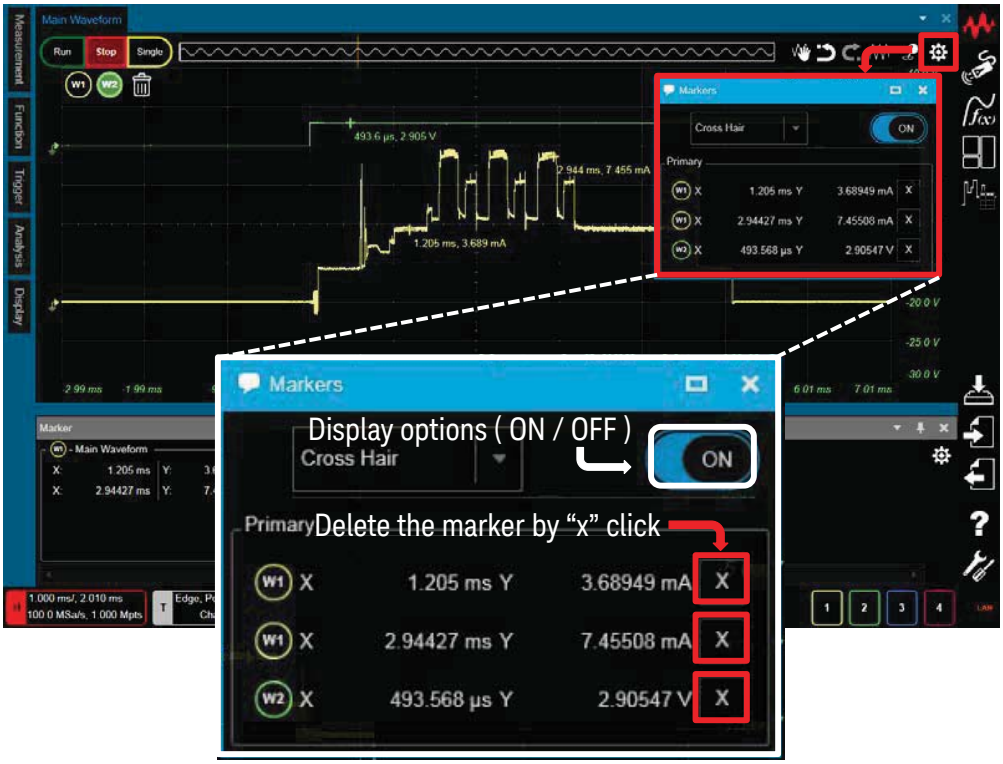
2. How to delete the Cross Hair Marker.

There are 3 ways to delete the cross hair marker.

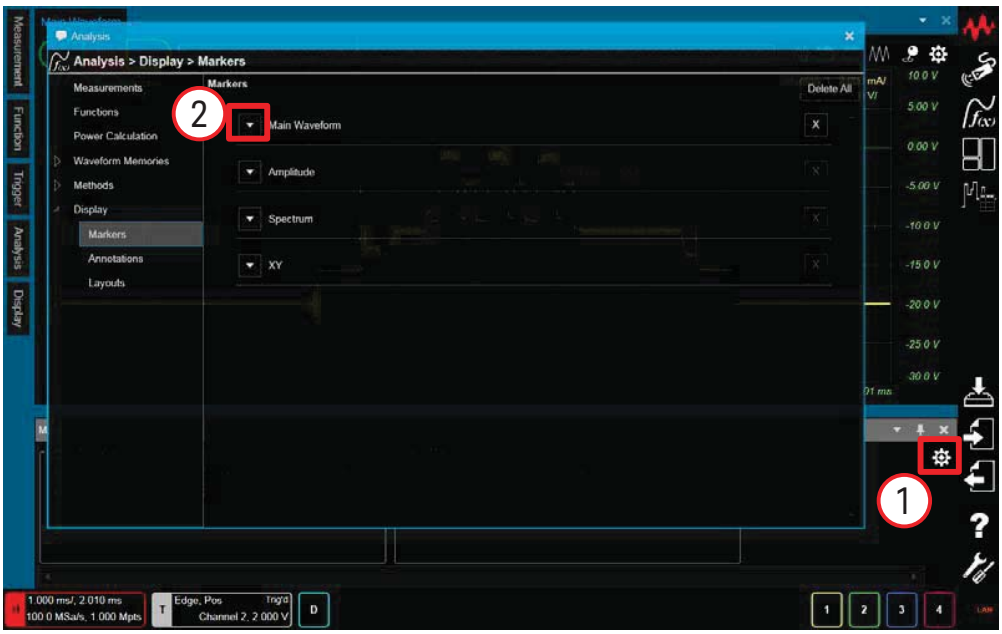
2-1. Right-click the mouse on the cross hair marker and choose “Delete”.

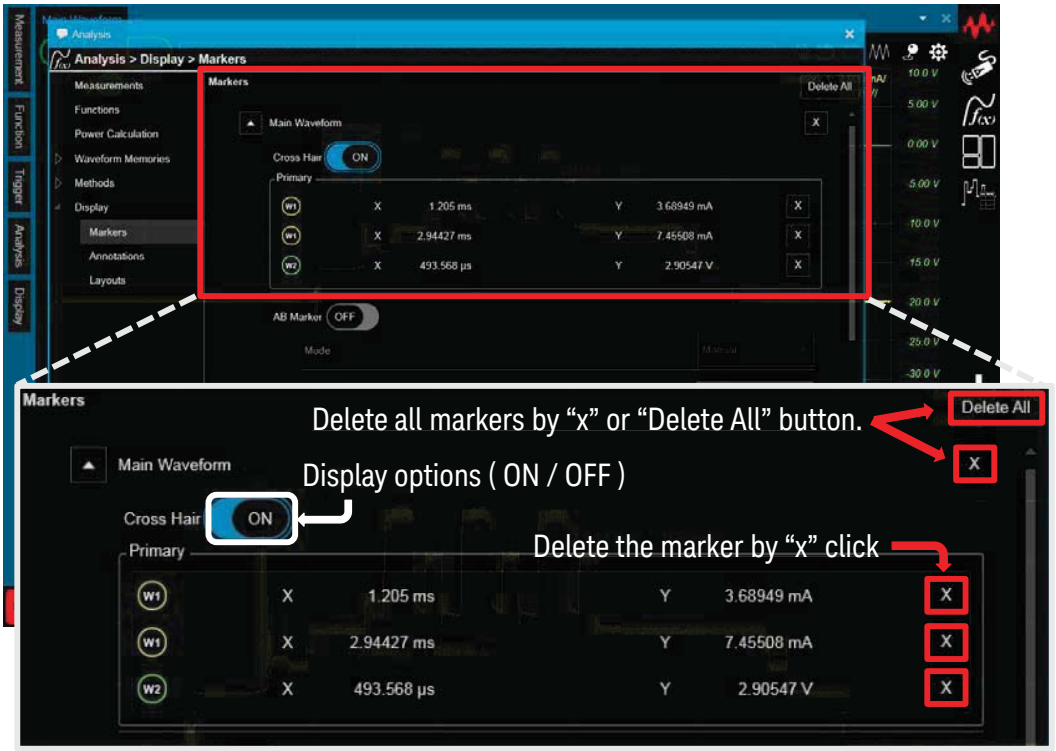


2-2. Click the gear icon on the upper right corner of the main screen.



2-3. Click the gear icon on the upper right corner of the “Marker” screen.

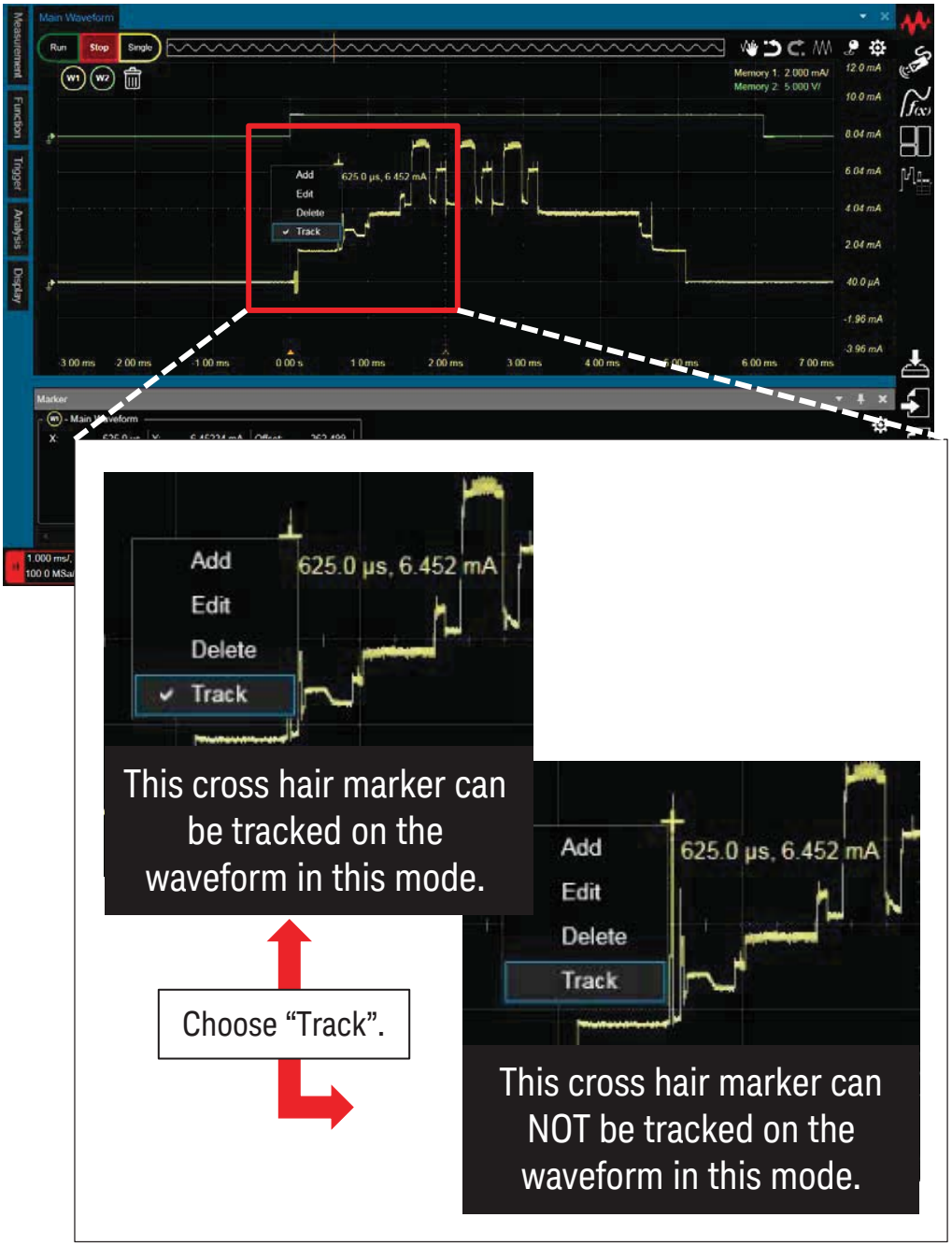




Tips :

- You can select whether or not the cross hair marker is tracked as follows:

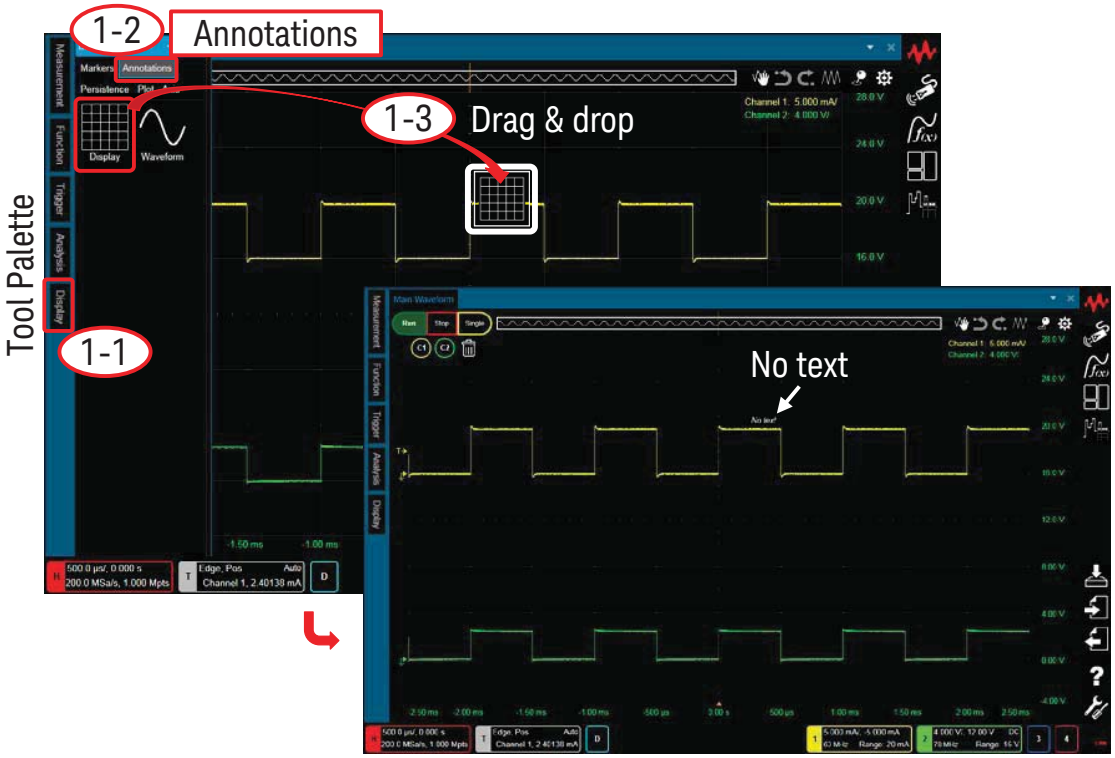
Right-click the mouse on the cross hair marker.



Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to add an Annotation

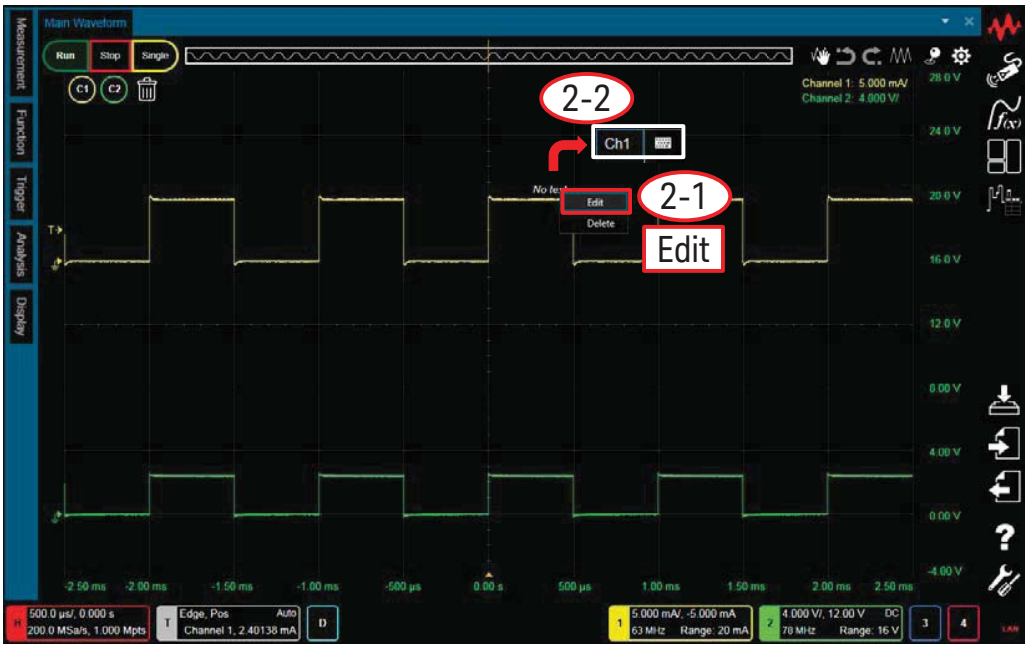
1. Drag and drop the Display icon onto the target waveform.
   1-1. Click the “Display” icon on the Tool Palette.
   1-2. Click the “Annotations” tab.
   1-3. Drag and drop the “Display” icon on the Display tool palette onto the target waveform.



2. How to edit the Annotation

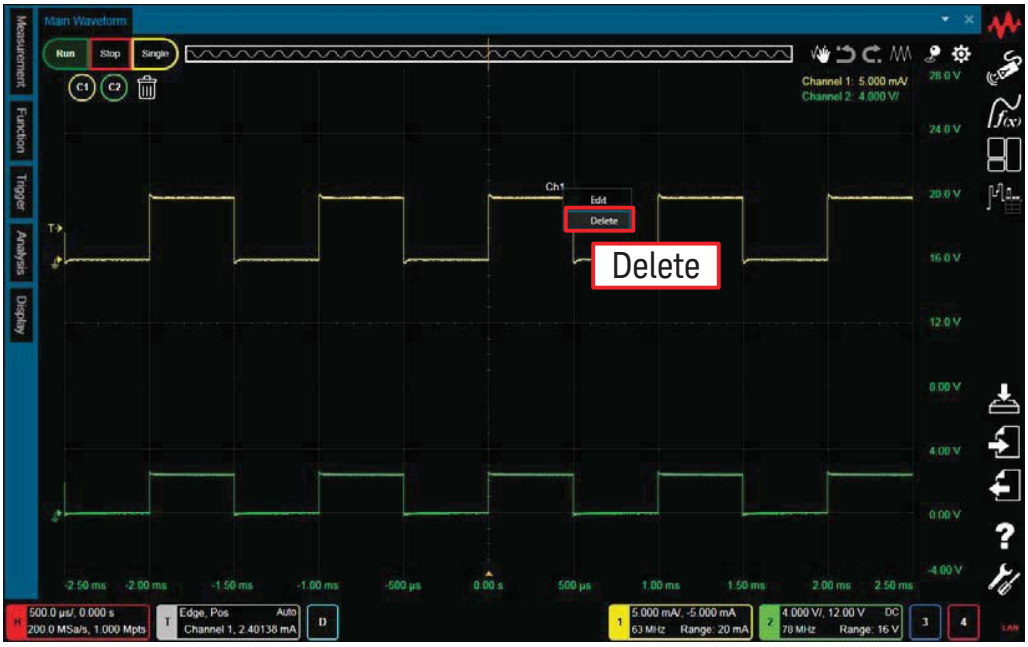
2-1. Select Edit by right clicking on “No text”.

2-2. You can edit the Annotation.



3. How to delete the Annotation

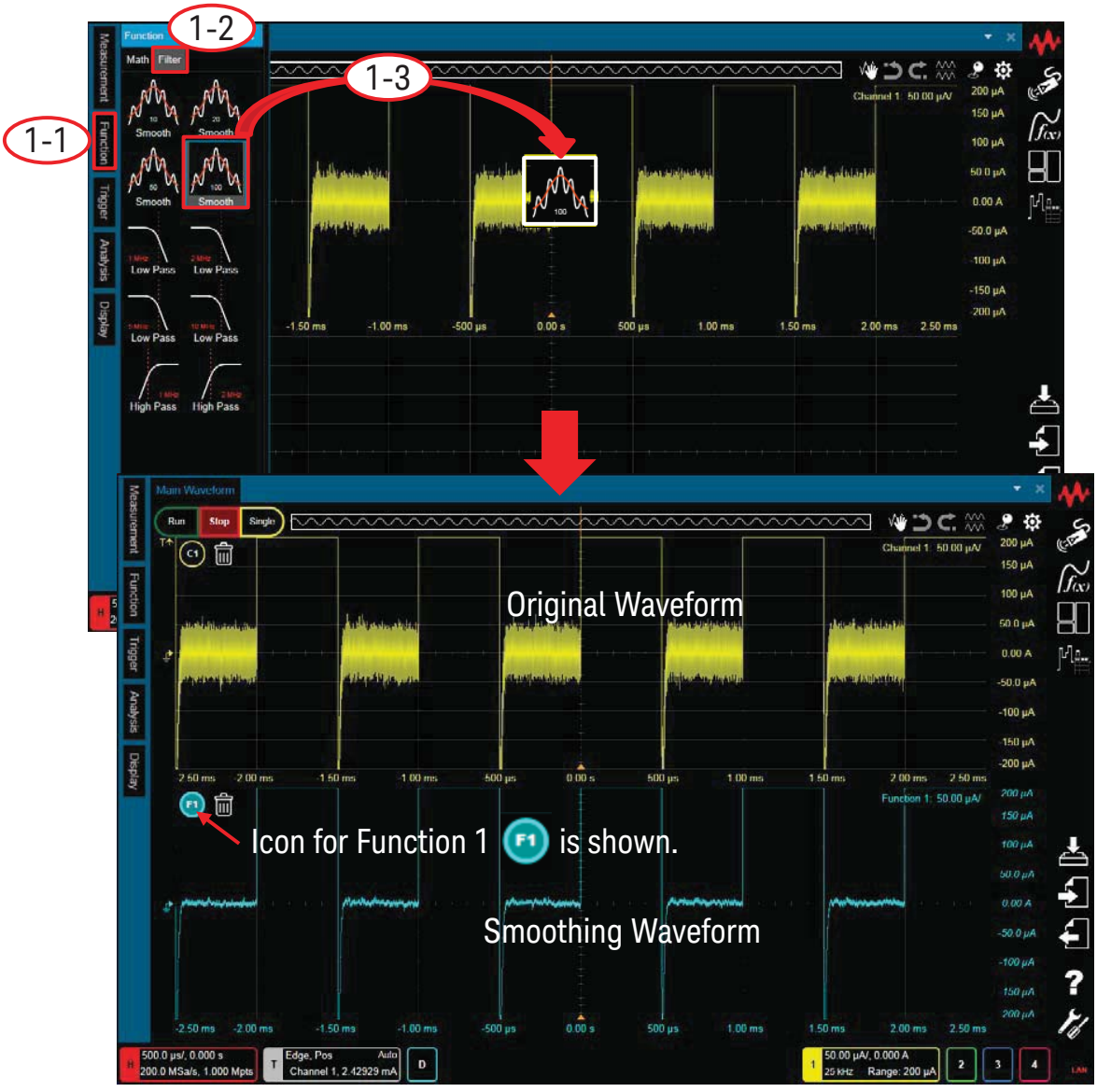
You can delete the Annotation by right clicking on it, as shown with “Ch1” in the example below, and selecting Delete.



Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to apply the post-filter

1. How to apply the post-filter
   - 1-1. Click the “Function” icon on the Tool Palette.
   - 1-2. Select “Filter” on the Function tool palette.
   - 1-3. Drag and drop the “Smooth 100pts” icon on the Function tool palette onto the area of interest on the waveform.

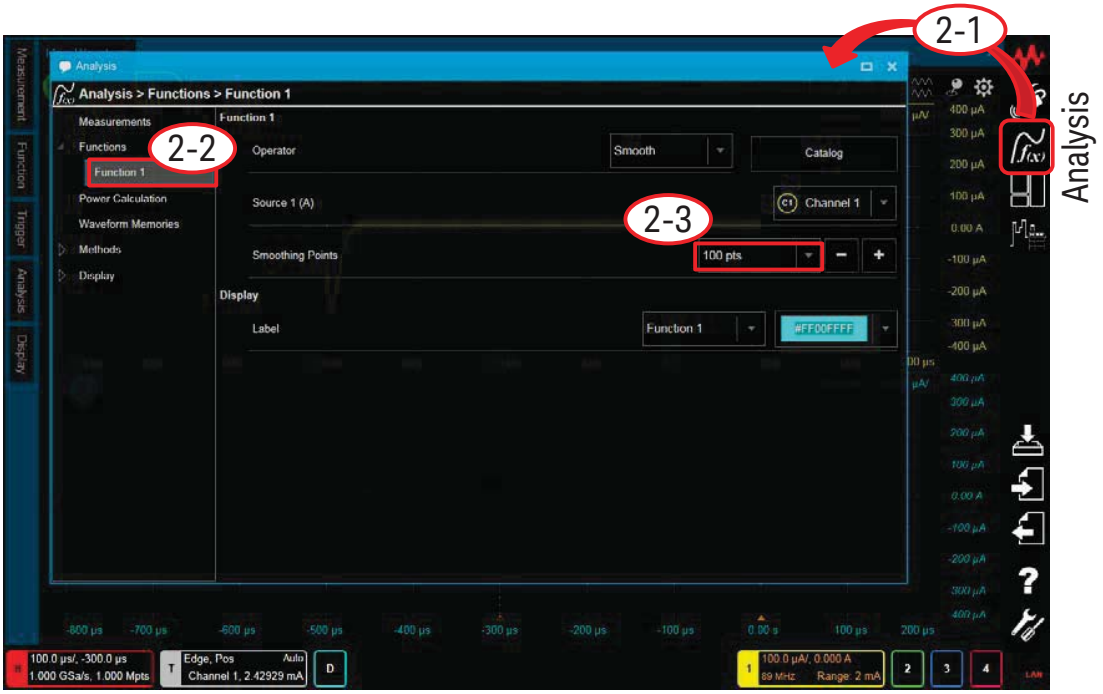


2. How to change the settings

2-1. Click on the “Analysis” icon to open the Analysis dialog box.

2-2. Select “Function 1”.

2-3. You can change the Smoothing Points.



Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to perform the FFT (Fast Fourier Transform)

1. How to apply the FFT
   1-1. Click the “Analysis” icon on the Tool Palette.
   1-2. Drag and drop the “Spectrum” icon on the Analysis tool palette onto the chosen area of interest on the waveform.

Note:

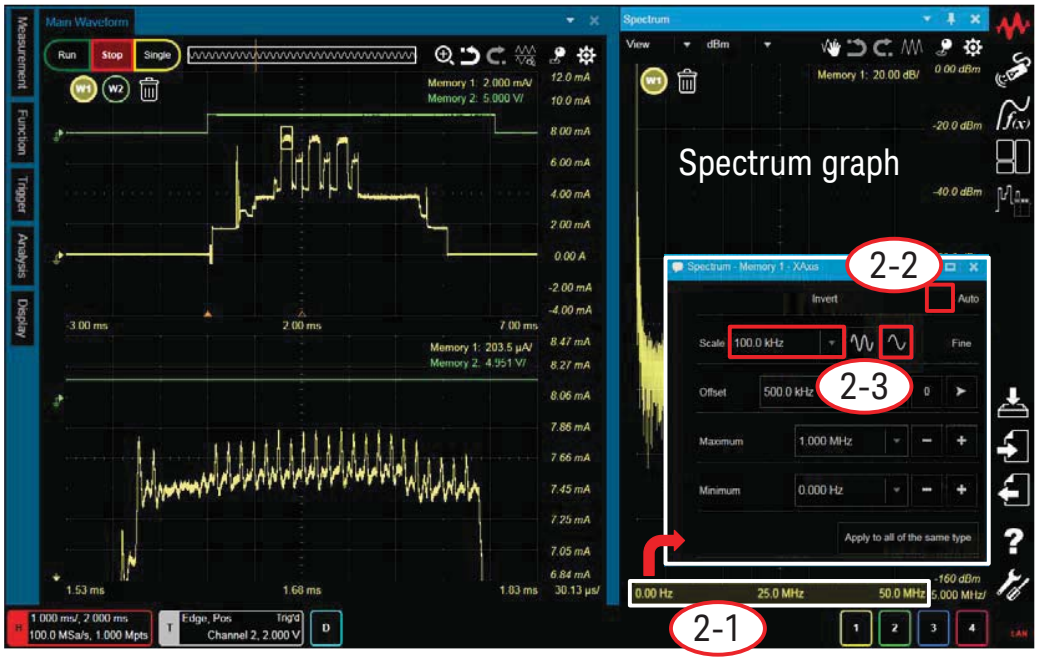
- If the Zoom window is displayed in the lower half, the dragged icon is always effective for the zoomed waveform.

2. How to change the FFT settings ?

2-1. Double-click anywhere on the horizontal axes in the Spectrum graph view.

2-2. Un-check the “Auto” box.

2-3. Click this button until the Scale is 100.0KHz.



3. How to adjust the chosen area of interest on the waveform ?

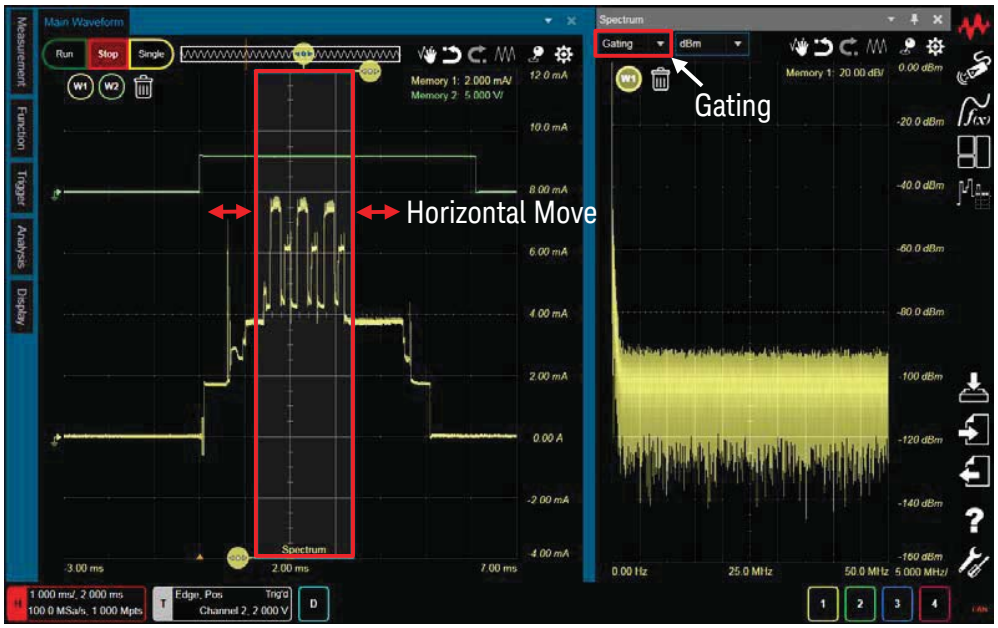
The CX3300 has two ways in which to adjust the chosen area of interest.

a) Gating Function > FFT

b) Waveform Zoom > FFT

Refer to the next page for further details.

a) Gating Function > FFT



b) Waveform Zoom > FFT

Note:

- The result of the FFT is changed in real time by adjusting the chosen area of interest on the waveform.

Keysight Technologies
CX3300 Current Waveform Analyzer

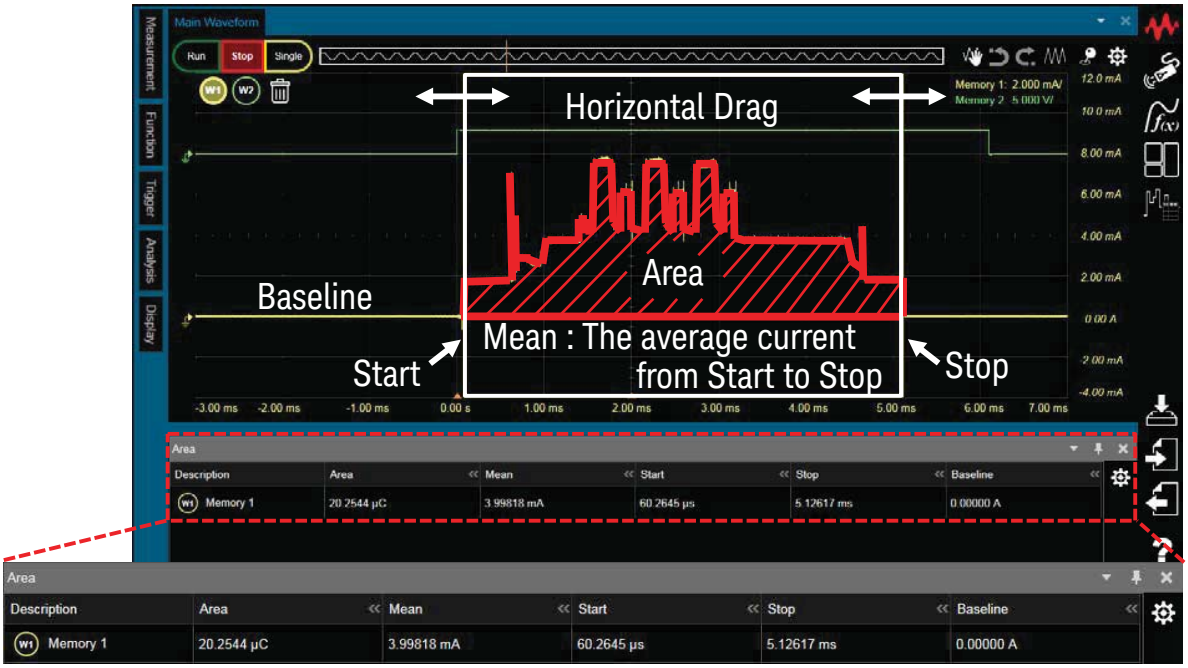
Quick Operation Guide
How to analyze the waveform in the specified area with an Area marker

There are four types of Area markers as follows; Area, Area (+width), Area (-width) and Area (period).
Using the mouse drag and drop option, the Area marker allows you to freely change the area range.
Using Area, Area (+width), Area (-width) and Area (period) marker, the area is automatically determined according to where you drag and drop the marker.

[Apply the “Area” marker]

1. Turn the Marker ON.
   1-1. Click the “Display” icon on the Tool Palette.
   1-2. Select “Markers”.
   1-3. Drag and drop the “Area” icon on the Display tool palette onto the specified area on the waveform.

2. Click and hold the mouse button, and horizontally drag the Start or Stop line over the specified area of interest.

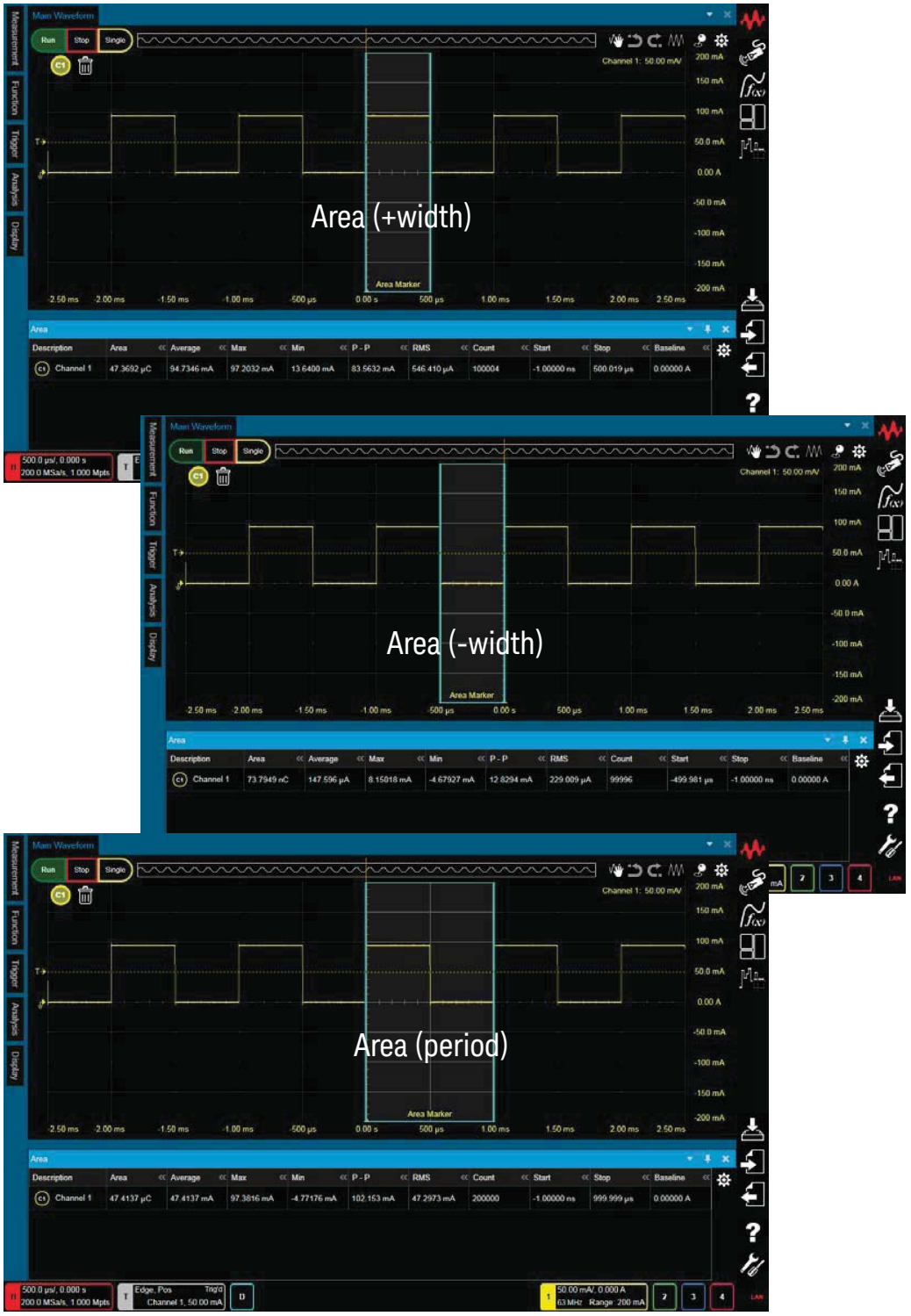


[Apply the “Area (+width), Area (-width), Area (period) marker”]

1. Apply the “Area (+width) marker
   For example, as with the Area marker, drag and drop the “Area (+width)” icon on the Display tool palette onto the area of interest.

2. The result of applying the "Area (+ width), Area (-width), Area (period) marker"

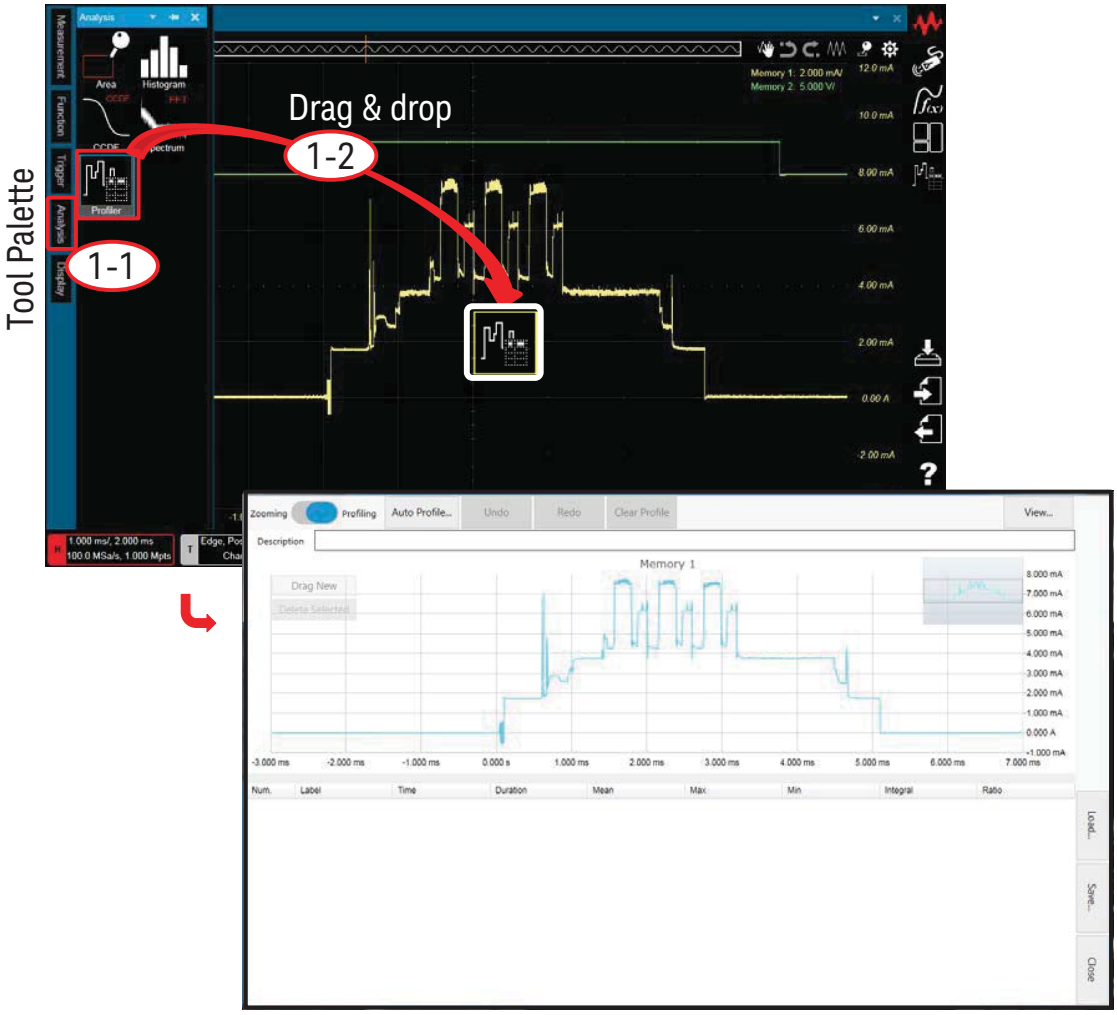
   The area is automatically determined according to where you drop the marker.



Keysight Technologies
CX3300 Current Waveform Analyzer

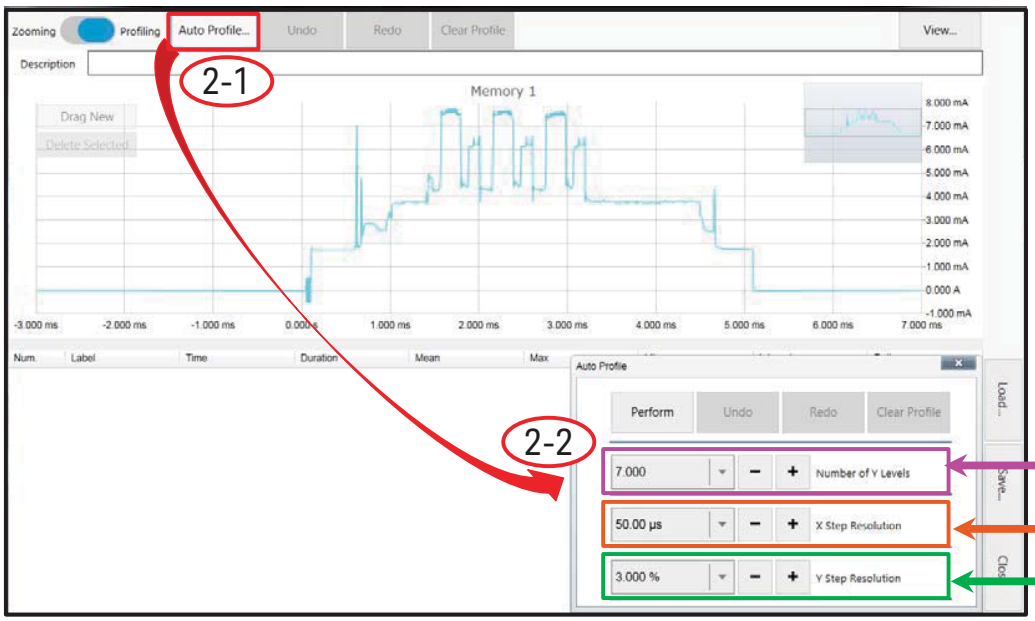
Quick Operation Guide
How to apply the Power and Current Profiler

1. Drag and drop the Display icon onto the target waveform.
   1-1. Click the “Analysis” icon on the Tool Palette.
   1-2. Drag and drop the “Profiler” icon on the Analysis tool palette onto the chosen area on the waveform.



2. Perform the Auto Profile (Optional)
   - The Auto Profile function can be used to help divide the segments into levels to view the vertical level difference. You can also manually adjust the levels of the segments.

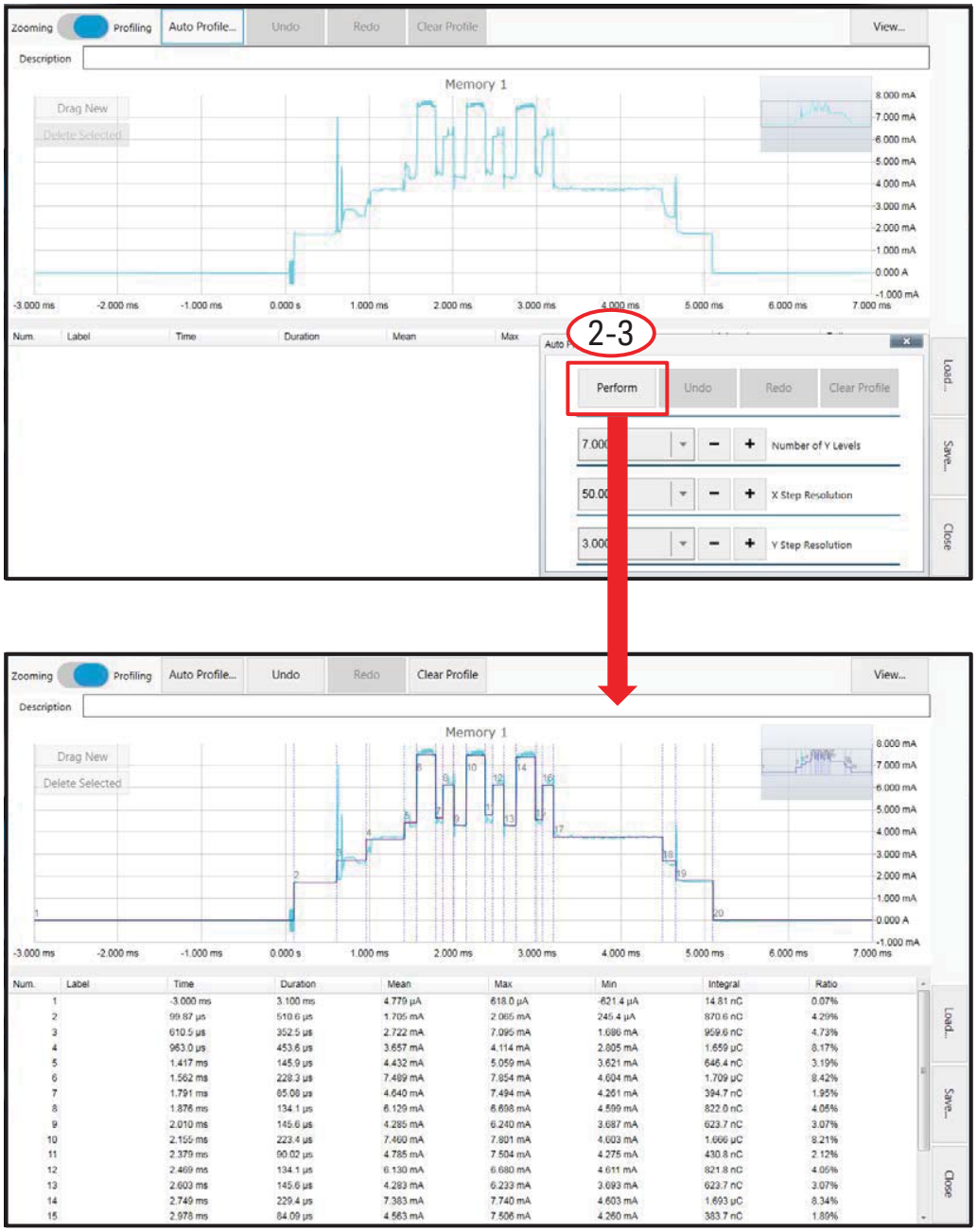
   2-1. Click the “Auto Profile” button to open the Auto Profile window.
   2-2. Check the Condition
      - Set the number of levels that you want to divide the segments into for the Number of Y Levels.
      - Set a resolution that is lower than the minimum resolution that you want to divide into levels for the Y Step Resolution.
      - Set the time which you want not to divide the different segments for X Step Resolution.



Example

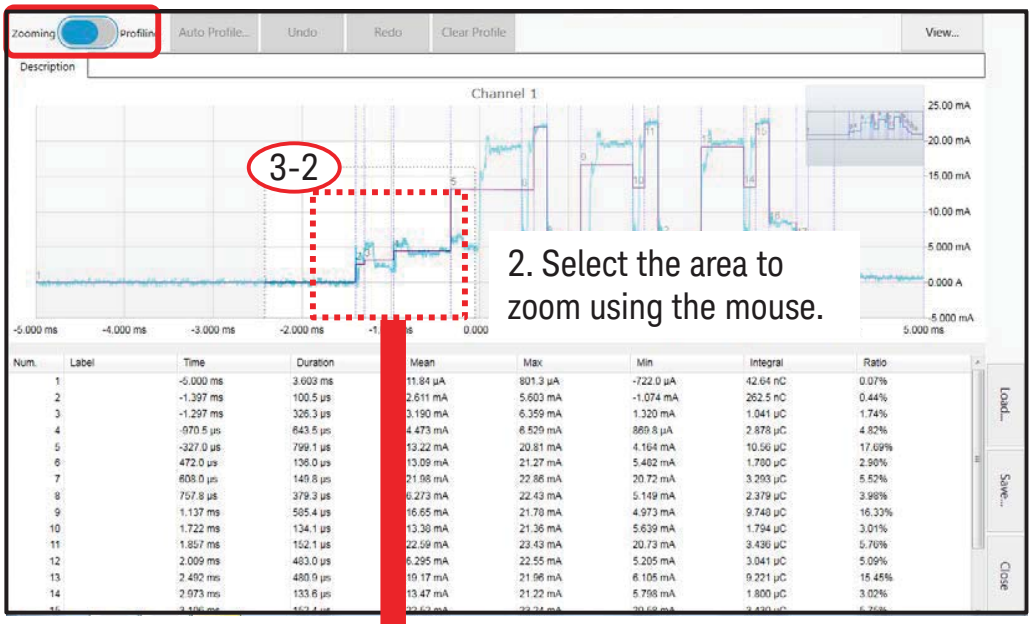
2. Perform Auto Profile (Continued)

2-3. Click the “Perform” button.



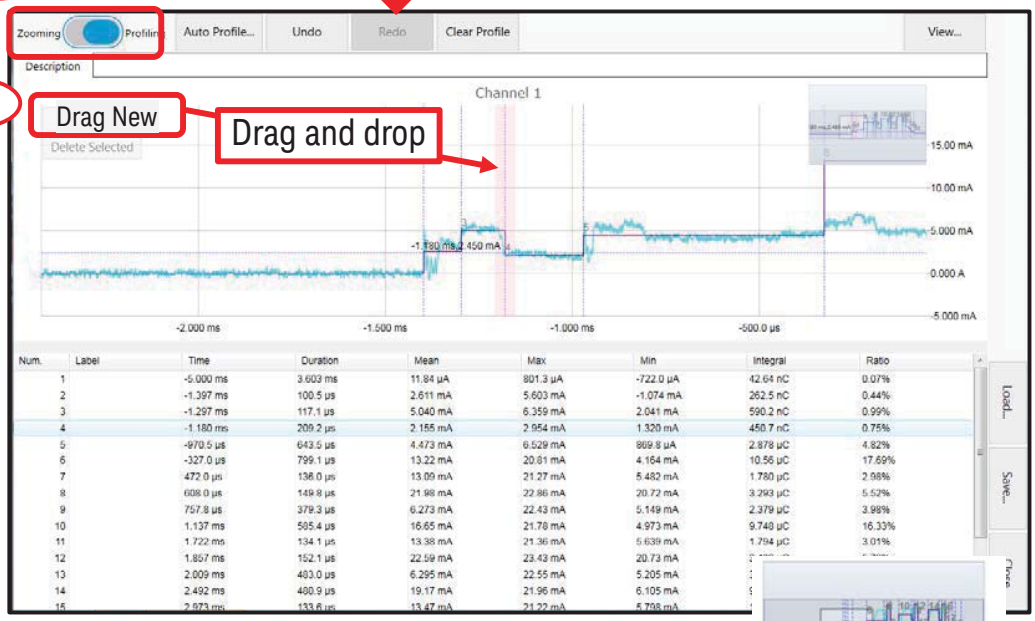
3. Adjust the position of the line of the segments manually.

3-1 Select “Zoom”.



3-3 Select “Profile”.

3-4

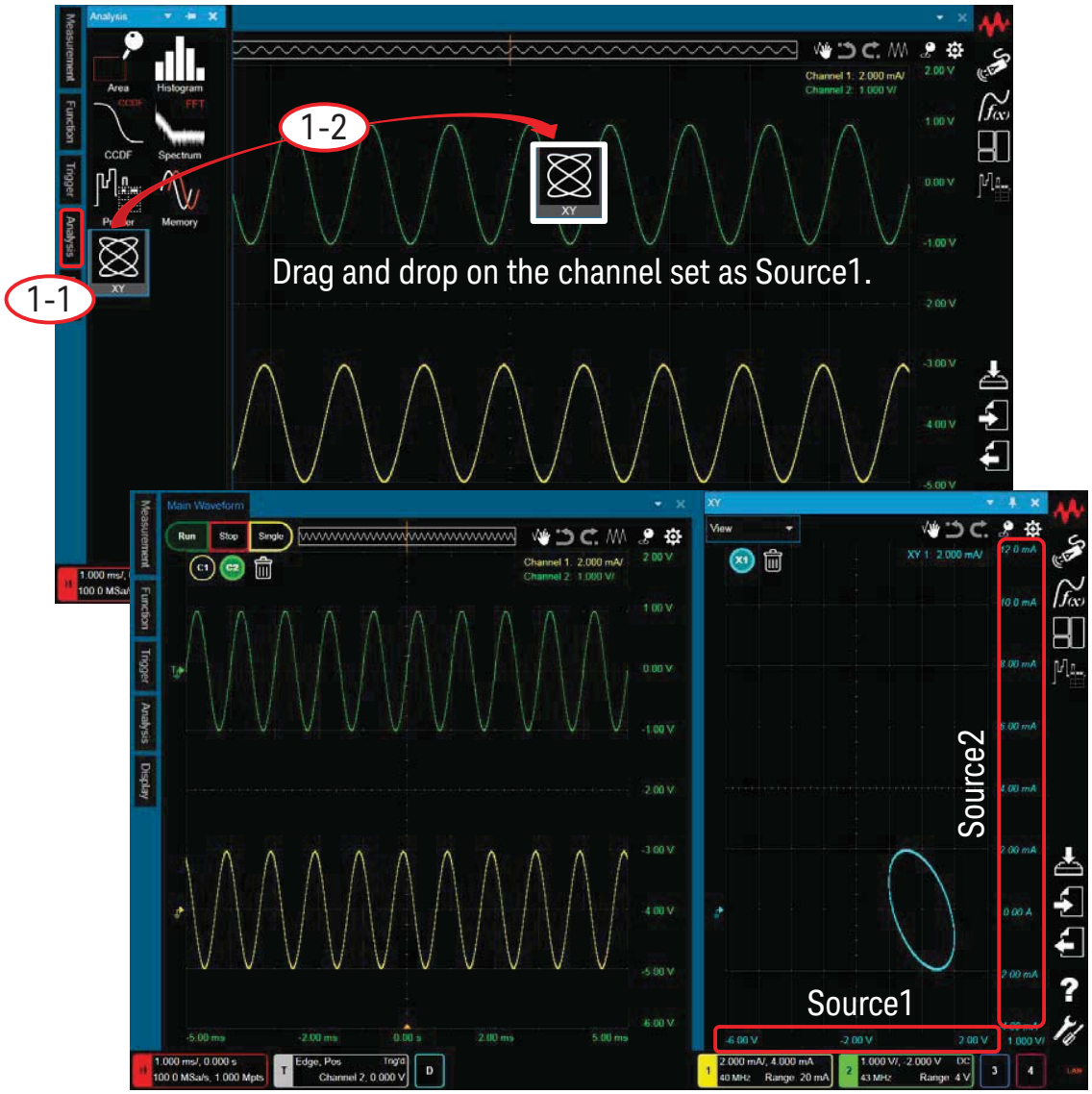


3-5 Reset zoom

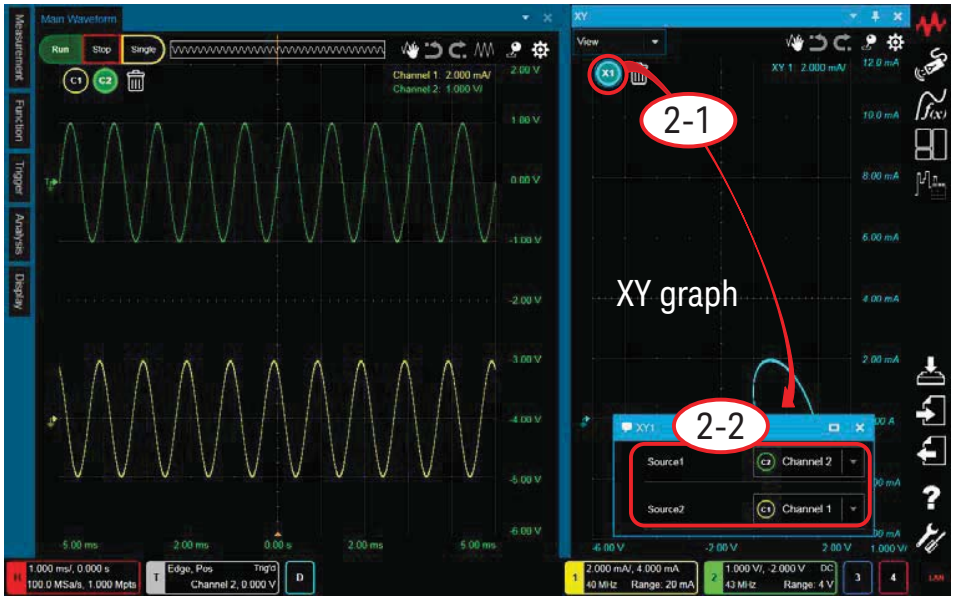
Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to apply the XY analysis

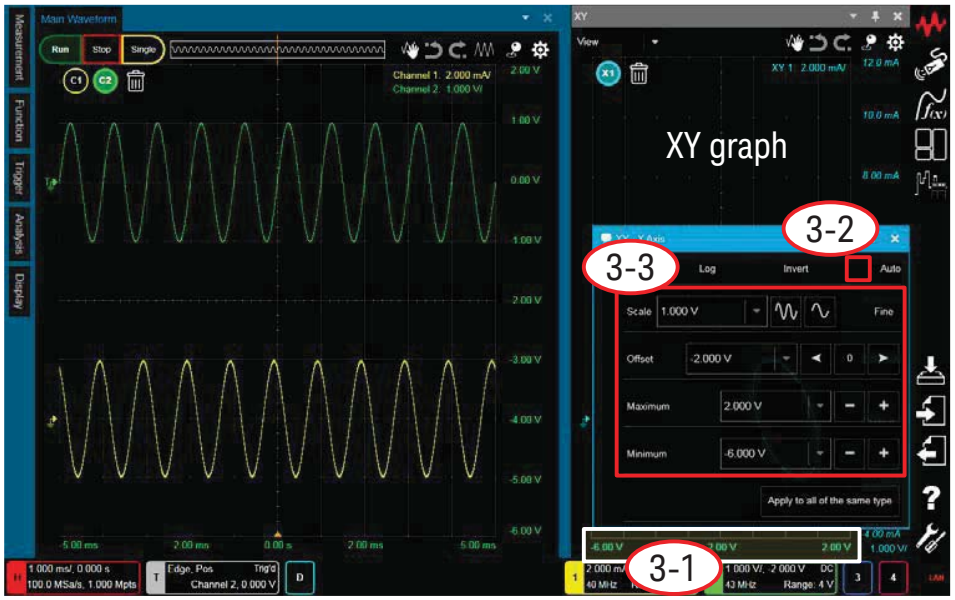
1. How to apply the XY analysis
   1-1. Click the “Analysis” icon on the Tool Palette.
   1-2. Drag and drop the “XY” icon on the Analysis tool palette on the channel set as Source1.



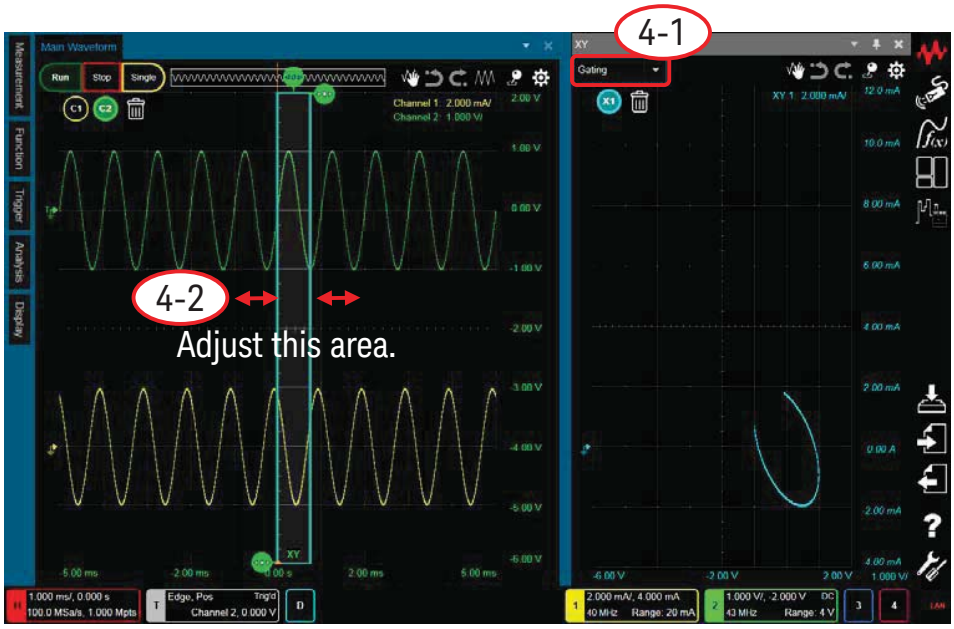
2. How to change the target channels
   2-1. Double-click “X1” icon in the XY graph view.
   2-2. Set the target channel as Source1 and Source2 on the XY1 window.



3. How to adjust the scale of the graph
   3-1. Double-click anywhere on the horizontal or vertical axes in the XY graph view.
   3-2. Un-check the “Auto” box.
   3-3. Adjust the scale on this area.



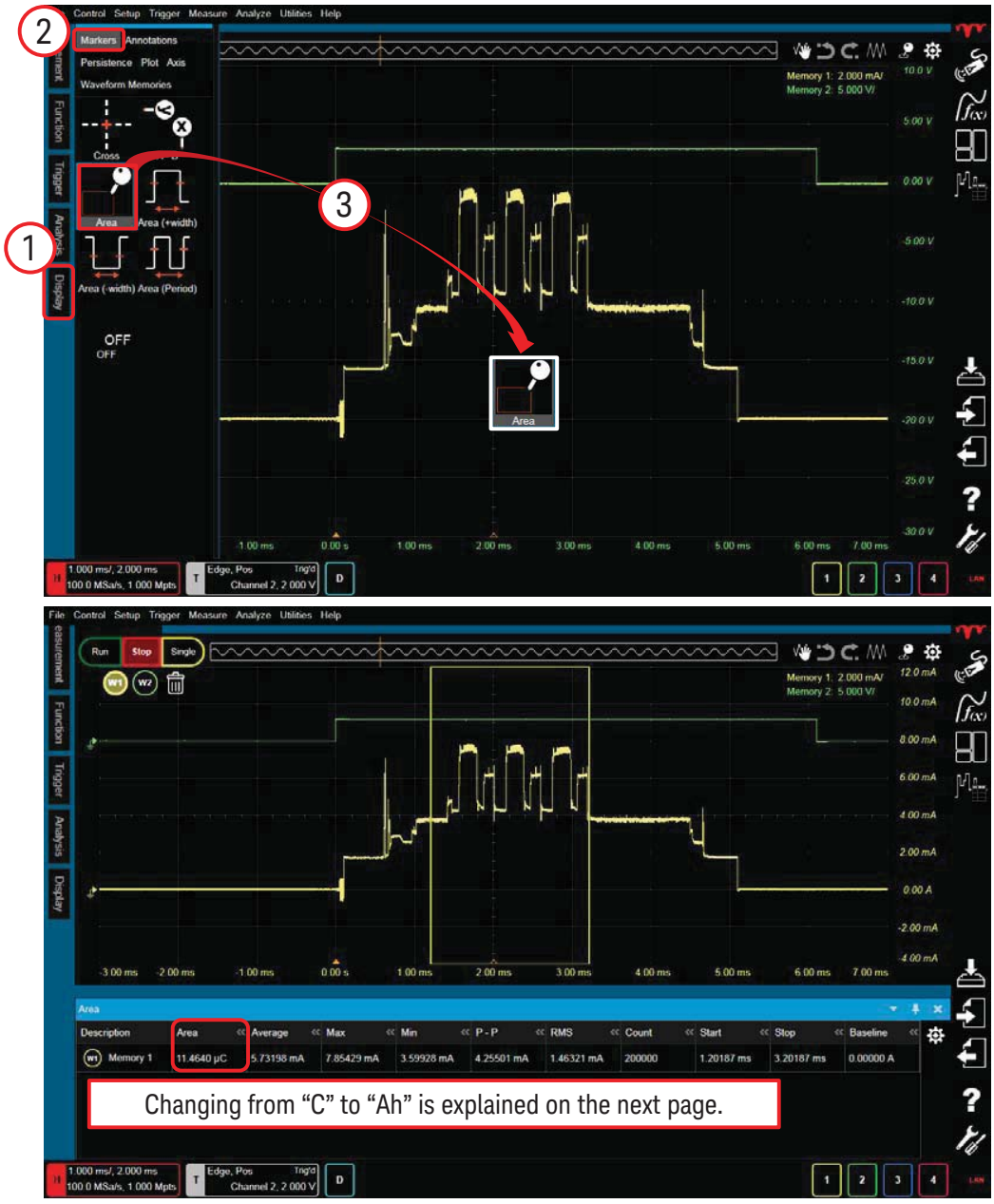
4. How to adjust a specific area on the waveform.
   4-1. Select “Gating” from “All/View/Gating” at the top left on the XY graph.
   4-2. The result of the XY graph is changed in real time by adjusting the specified area on the waveform.



Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to change the measurement units (Clone to Ampere Hour) in Area analysis

1. Select “Markers” in the Display Tool Pallet, then drag and drop the “Area” icon on the interest area on the waveform.



2. Select “Utilities > Configuration > User Preference” window.

Note:
- The setting is also retained in CX3300 power cycle and [Default Setup].
- It returns to the factory condition with [Factory Default][1].

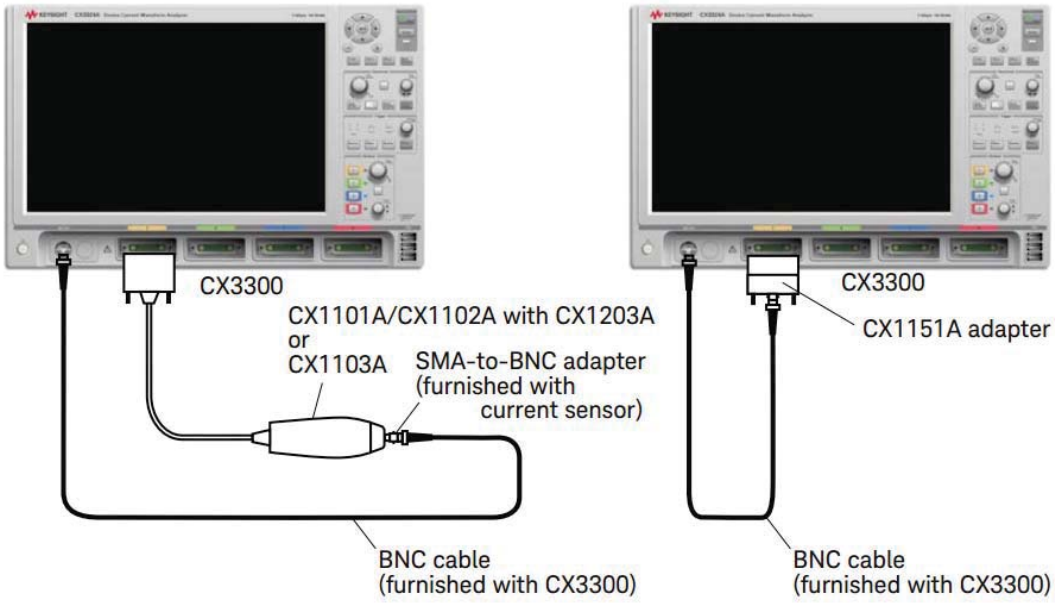
1. [Factory Default] can be selected on the “Utilities > Configuration > Setups” window.

Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to perform User calibration

User calibration is effective for making more accurate measurements by allowing you to perform error corrections of measurement data.

1. Before starting the user calibration, connect the CX1100 to the CX3300 analog input channel.



Note:

- If you connect the CX1101A/CX1102A, attach the CX1203A sensor head to it and set the CX1203A slide switch to 0 Ω.

2. How to perform User calibration ?

2-1. Click on the “Utilities” icon to open the Utilities menu.

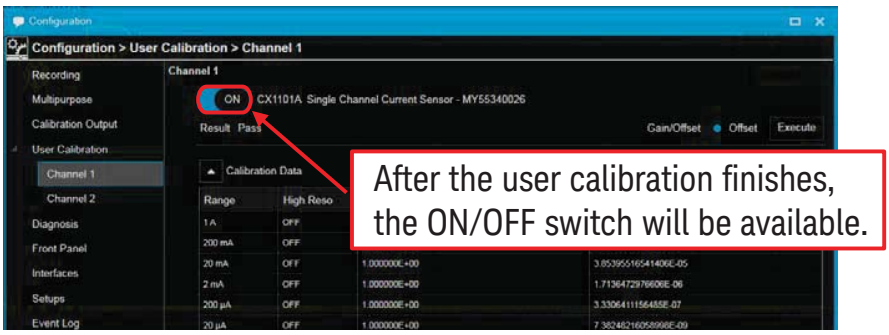
2-2. Click “Configuration” to open the “Configuration” dialog box.

2-3. Click “User Calibration” to display the “Configuration>User Calibration” screen.

2-4. Select the “Gain/Offset” or “Offset” radio button for the channel under user calibration.

2-5. Click the “Execute” button of the channel.

2-6. The dialog box which asks you to connect the CX1100 input to the Aux Out terminal is shown. If you are ready, click the “OK” button. The user calibration will start.



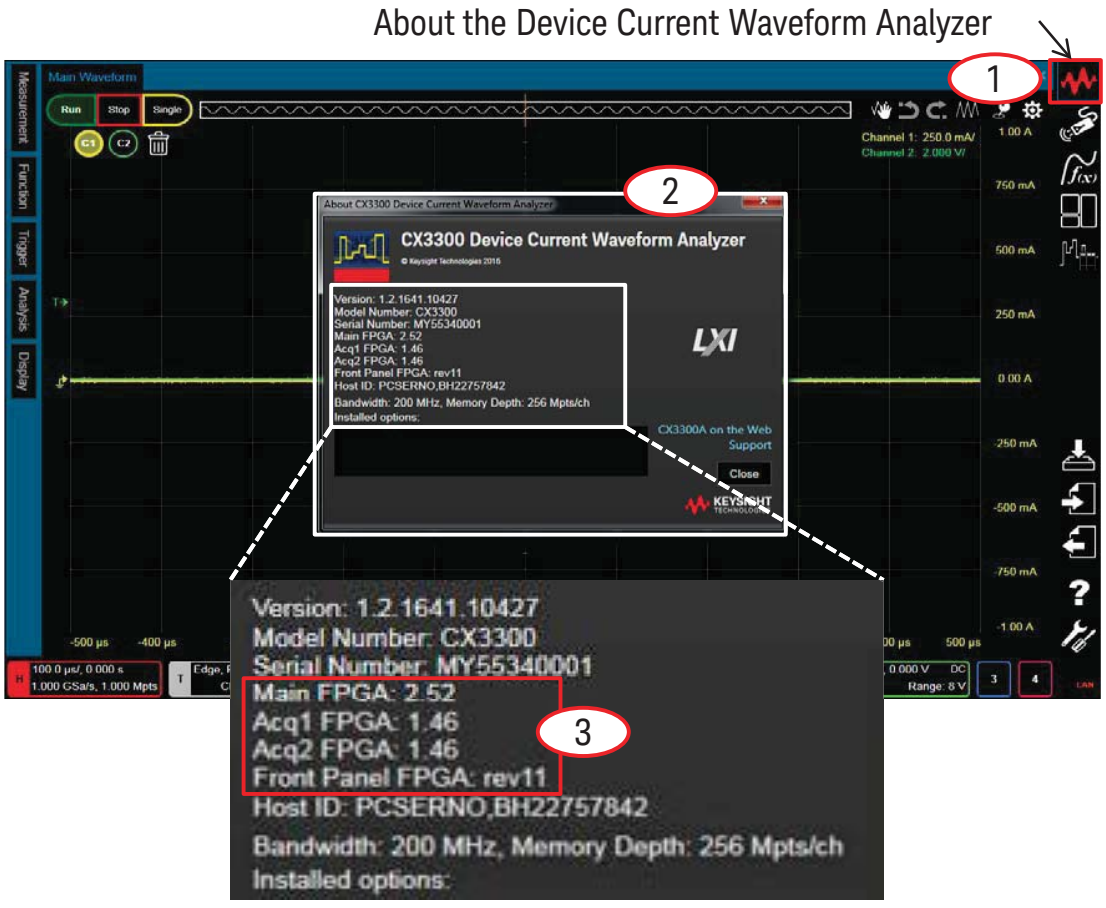
Note:

- The data is not cleared by turning the CX3300 off.
- Once you disconnect the CX1100 from the CX3300, the user calibration data for this channel will be cleared.

Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to check the firmware revisions

1. Click on the "About Device Current Waveform Analyzer" icon.
2. The “About CX3300 Device Current Waveform Analyzer” window will open.
3. The Firmware revisions are displayed.

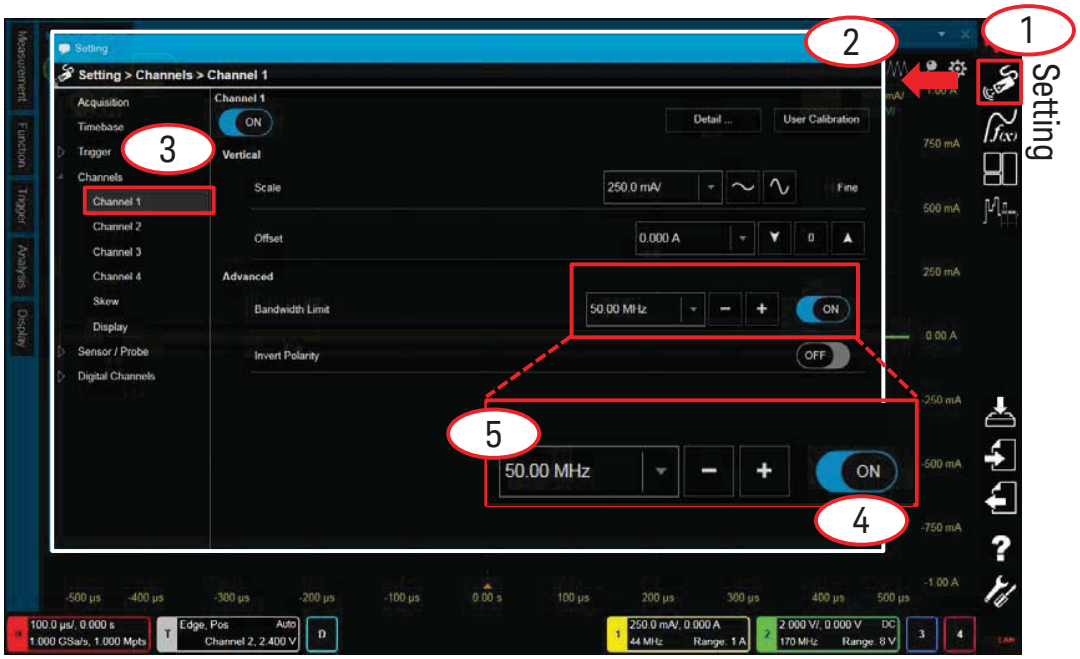


Keysight Technologies
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to simulate the 50 MHz or 100 MHz bandwidth option on the mainframe with the 200 MHz option.

The mainframe has three maximum bandwidth options, 50 MHz, 100 MHz and 200 MHz. In order to simulate the 50 MHz or 100 MHz option on the mainframe with the 200 MHz option, follow the procedure below.

1. Click on the “Setting” icon.
2. The “Setting” dialog box opens.
3. Click on "Setting>Channels>Channel 1" to open the channel 1 setup panel.
4. Set the Bandwidth Limit setting to "ON".
5. Set the “Bandwidth Limit” to 50 MHz for checking the performance of the 50 MHz option and to 100 MHz for checking the performance of the 100 MHz option.



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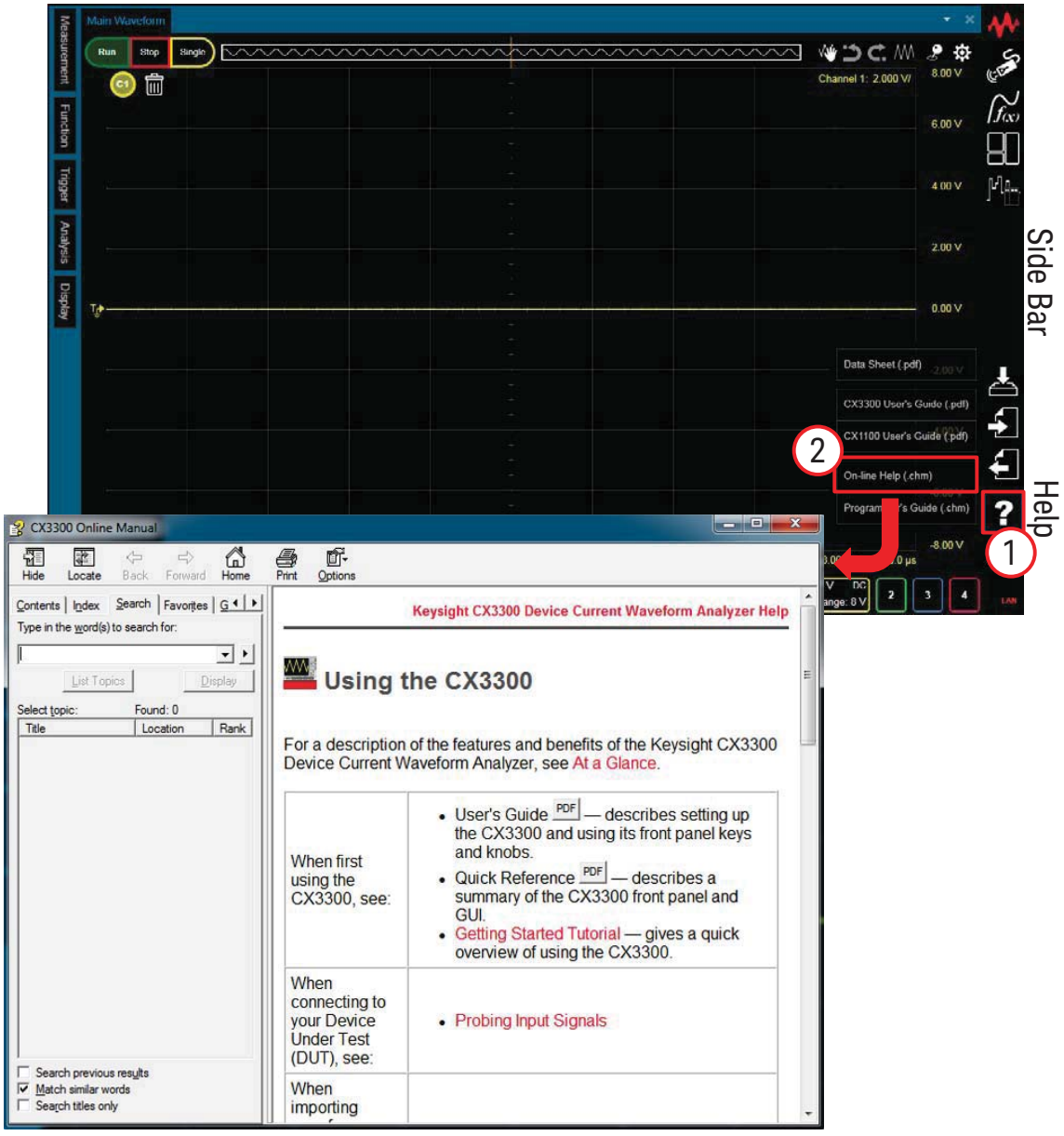
Quick Operation Guide
Where to find the Online help

1. Click the “Help” icon on the Side Bar.
2. Click the “On-line Help (.chm)” button to open the online help.



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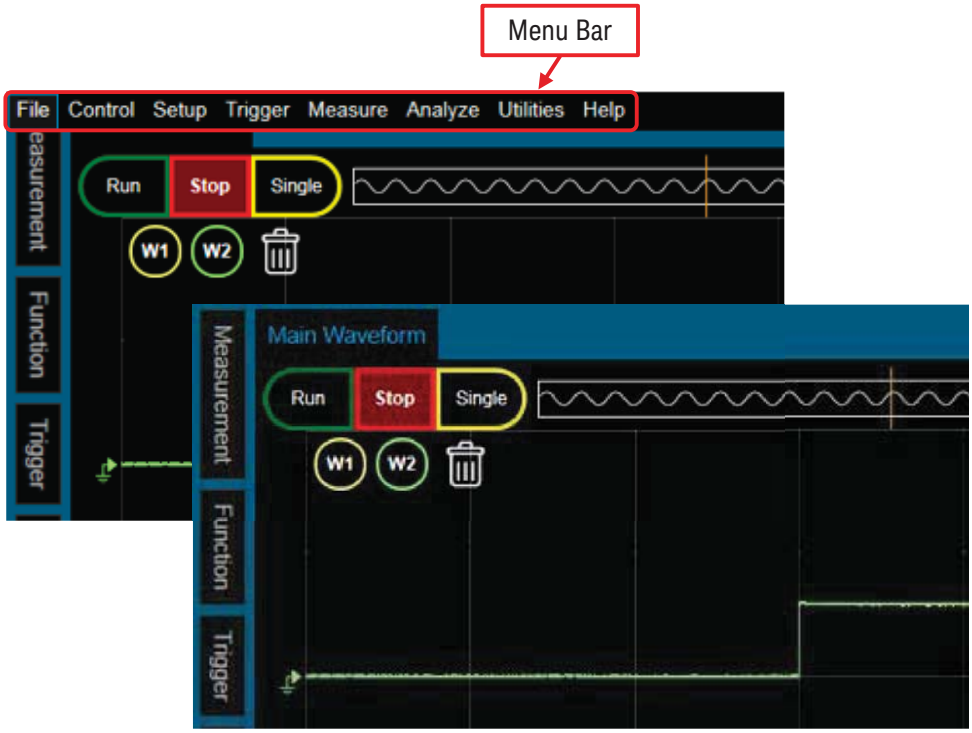
CX3300 Current Waveform Analyzer

Quick Operation Guide
How to display the menu bar

There are two ways to display the menu bar.

1. Hover the mouse arrow over the upper edge of the monitor.
2. Click the blue bar at the top of the monitor, or click any other area.



Note:

- By selecting “Utilities> Menu Bar” from the Menu Bar, it is displayed at all times. By doing the same operation again, you can hide the Menu Bar.
- The setting is also retained in CX3300 power cycle and [Default Setup].
- It returns to the factory condition with [Factory Default][1].

1. [Factory Default] can be selected on the “Utilities > Configuration > Setups” window.

This information is subject to change without notice.
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