BusFinder Series
LA3000 / LA4000 Series
2 in 1 Analyzer (Protocol + Logic)
Manual

Publish: 2024/12

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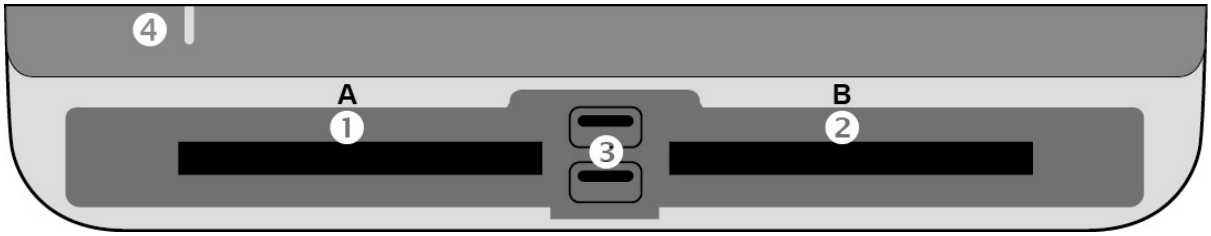
Chapter 1 Installation and Setting

Hardware Installation

Appearance and Functions of the Master Main Device



❶ Slot (Socket A)

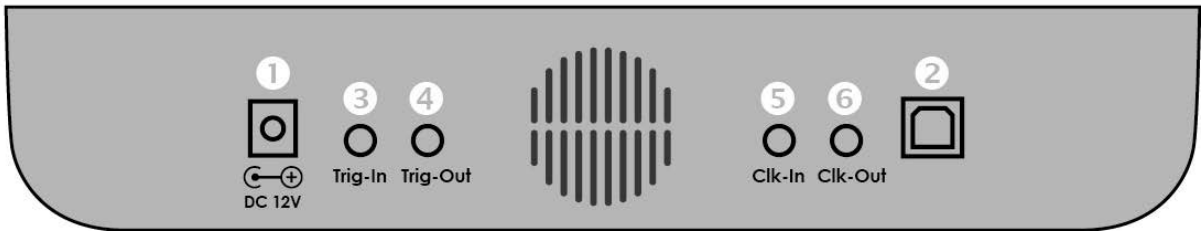
❷ Slot (Socket B)

❸ SD 4.0 data transmission socket, this USB 3.0 Type A socket is used to connect with SD 4.1-tip through the USB 3.0 cable (75cm). This socket does not apply to LA3000/LA4000 Series.

❹ LED indicator:

a. Green light: Green light is on only when power and USB cables are properly connected.

b. Red light: A long red or flashing light is displayed while the device is busy.



❶ DC 12V power jack

❷ USB 3.0 Type B transmission line jack for connection with the computer.

❸ Trigger-in jack

❹ Trigger-out jack

❺ Reference clock-in jack

❻ Reference clock-out jack

Probe Installations

Push in: Hold the pod to face the slot of the master unit. Push the pod evenly into the slot until you hear the sound of click. Then, installation is completed.

Pull out: Use two fingers to simultaneously press the two connecting rods inside the slot, respectively, and the pod will pop out.

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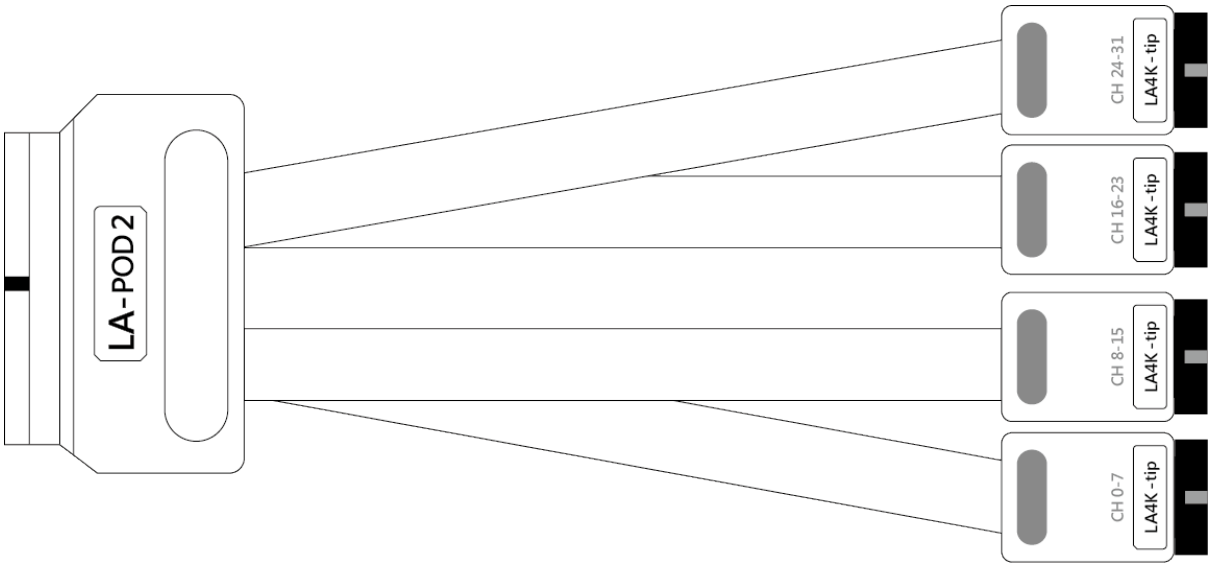
LA Probe

LA-POD 2

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
●	●	●	●	●

The LA-POD 2 can be used in any slot. It has 4 LA tips, each of which has 8 signal input channels and each pair of which is equipped with an external clock input (CK0 & CK1), respectively located at the tip labeled as 8 to 15, 24 to 31 channels.



LA4G-POD

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
		●		●

The LA4G-POD can only be used in slot A. It has 2 LA tips, each of which has 8 signal input channels and it is equipped with an external clock input (CK0), located at the tip labeled as 8 to 15 channels.

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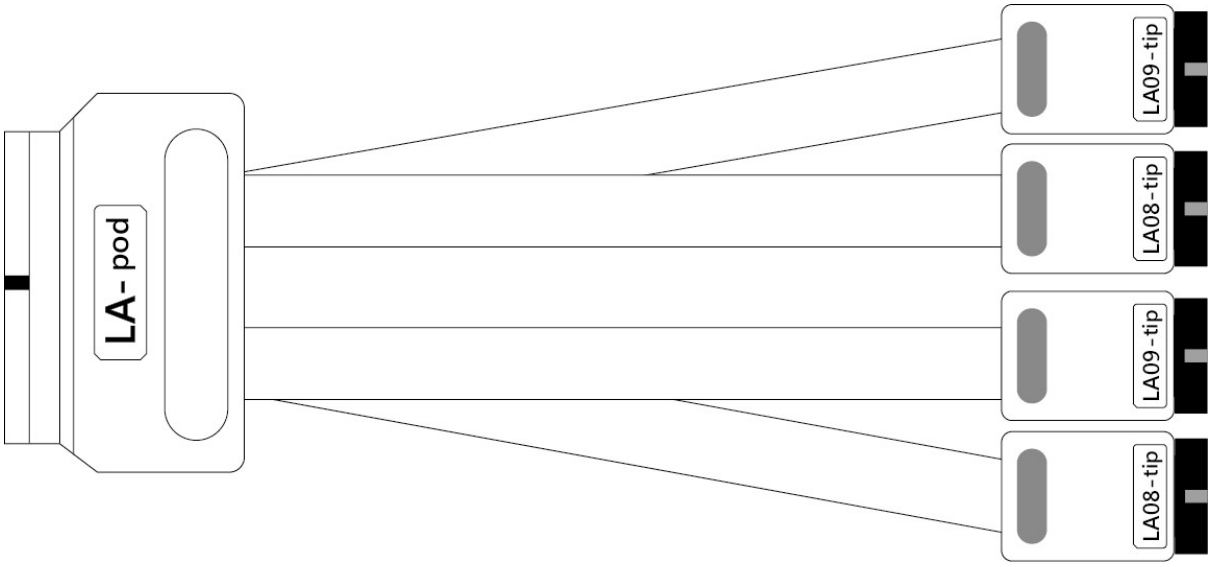
LA-POD

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
●	●	●	●	●

The LA-pod can be used in any slot. It has 4 LA tips, each of which has 8 signal input channels and each pair of which is equipped with an external clock input (CK0 & CK1), located at the channels labeled as LA09-tip.



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eDP Probe (Optional)

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
	●	●		

The eDP probe can only be installed in slot B. It mainly contains two parts:

a. Two Way Station:
   I. Way Station Top: Including Lane0±、Lane1±
   II. Way Station Bottom: Includeing Lane2±、Lane3±

b. Aux-tip: Including Aux+ and Aux-, which is Can be used with Flying Lead accessories.

Both Way Stations are equipped with GND pins and USB3.0 cables. To use the Way Station, user need to connect the USB3.0 cable to the USB Type A socket on the front of the device.

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eMMC5.1 Probe (Optional)

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
●	●	●		

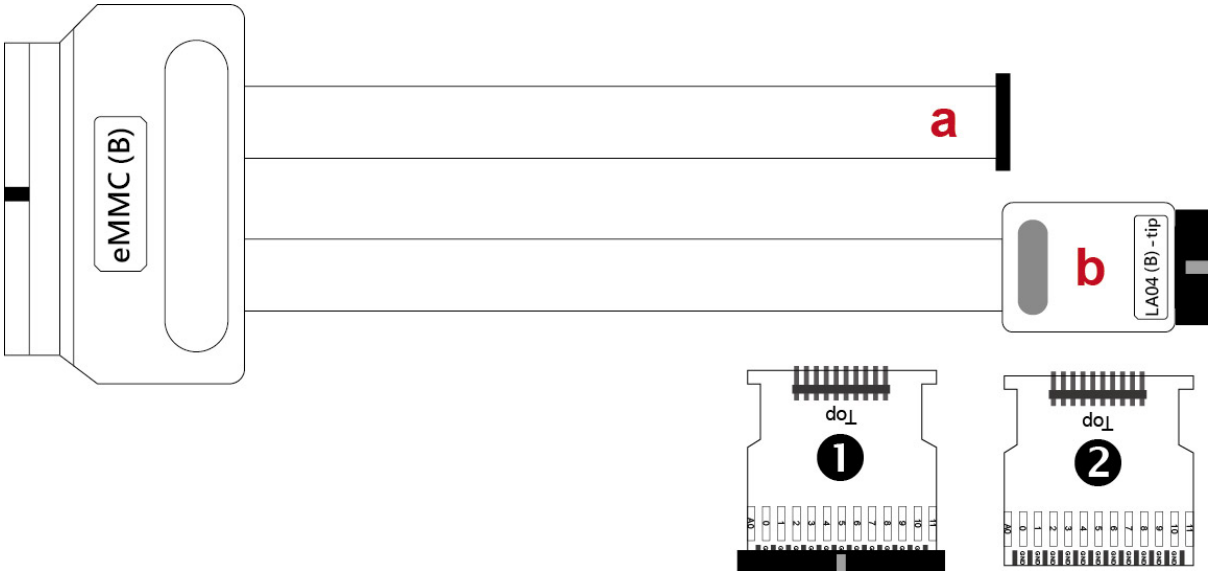
The eMMC probe can only be installed in slot B. It consists mainly of two parts:

a. eMMC cable:

The front end tip can be replaced by eMMC socket tip or welding tip according to his or her need for measurement. Top/Bottom labels are marked on the cable. When installing the connector, you must watch out for correct sides.

If you need to use voltage detection, please connect A0 pin to form an analog signal input.

b. LA-04 tip: This tip provides additional 4 input channels on eMMC probe to increase the number of input channels.



Please refer to Appendix 1- Instruction for eMMC for the pin definition. You can use the software to redefine the pin.

❶ eMMC socket tip: This is a 2.54 mm pin header.

❷ eMMC welding tip: This can be used for welding wire jumping. Please be noted that the wire length should be as short as possible to maintain good signal quality.

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NAND Flash Probe (Optional)

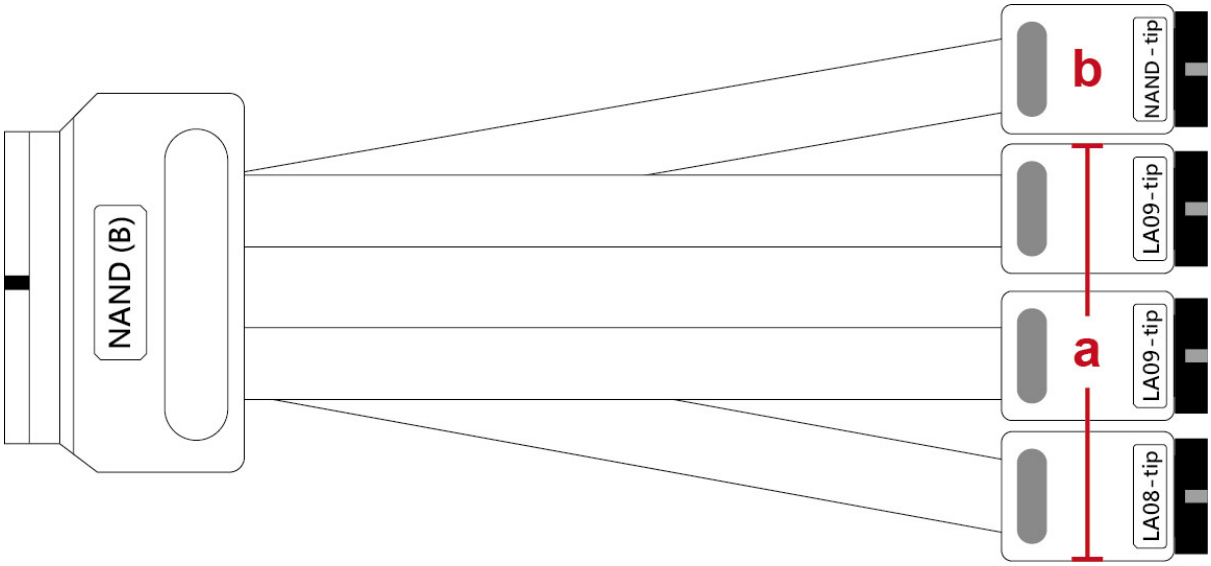
Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4068E	LA4136E	LA4068B	LA4136B
●	●	●				●	●

NAND Flash probe can only be installed in slot B. It consists mainly of two parts:

a. LA08/09 tip: This is a general signal input channel, for connecting NAND Flash pin to be measure.

b. NAN-tip: This is a pin with voltage detection function. If you need to use voltage detection, please connect A0 pin to form an analog signal input.



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MIPI D-PHY Probe(Optional)

Supported Models:

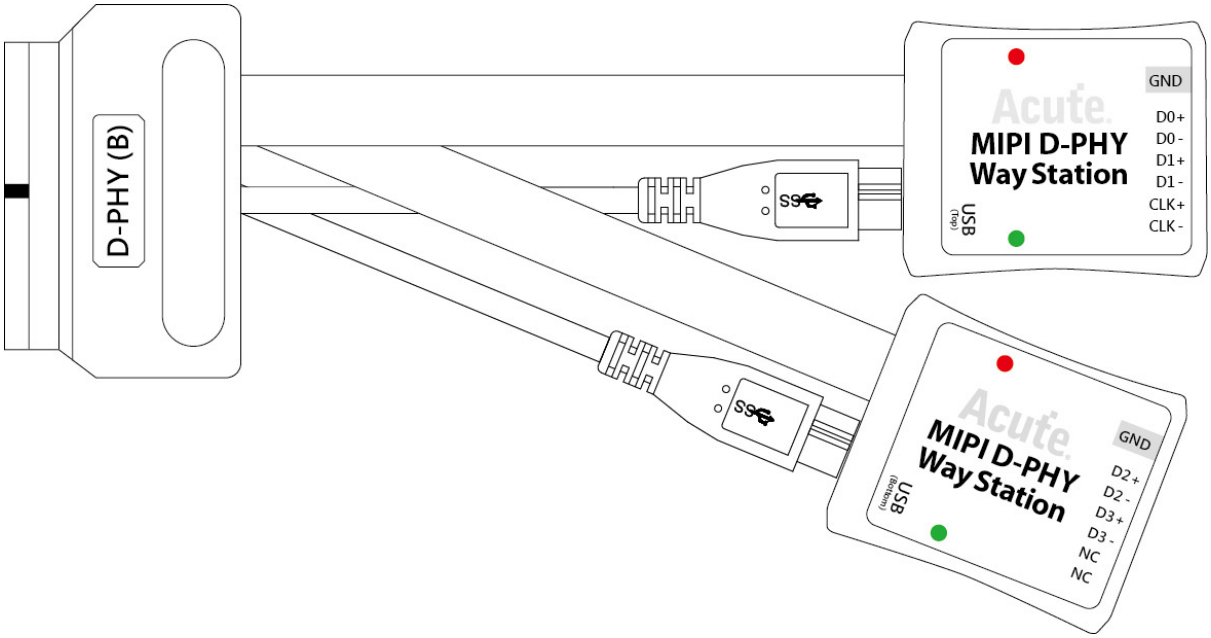
BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
	●	●		

MIPI D-PHY probe can only be installed in slot B. Including two parts:

a. Way Station Top: Including: Including D0±、D1±、CLK±

b. Way Station Bottom: Including D2±、D3±

Both Way Stations are equipped with GND pins and USB3.0 cables. To use the Way Station, user need to connect the USB3.0 cable to the USB Type A socket on the front of the device.



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SD 3.0 Probe (Optional)

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
●	●	●		

SD 3.0 probe can only be installed in slot B. It consists mainly of two parts:

a. eMMC-tip: The eMMC socket tip is used to connect with SD 3.0 tip. Top/Bottom labels are marked on the cable. When installing the connector, you must watch out for correct sides.

b. LA-04 tip: This connector provides additional 4 input channels on SD3.0 probe to increase the number of input channels.

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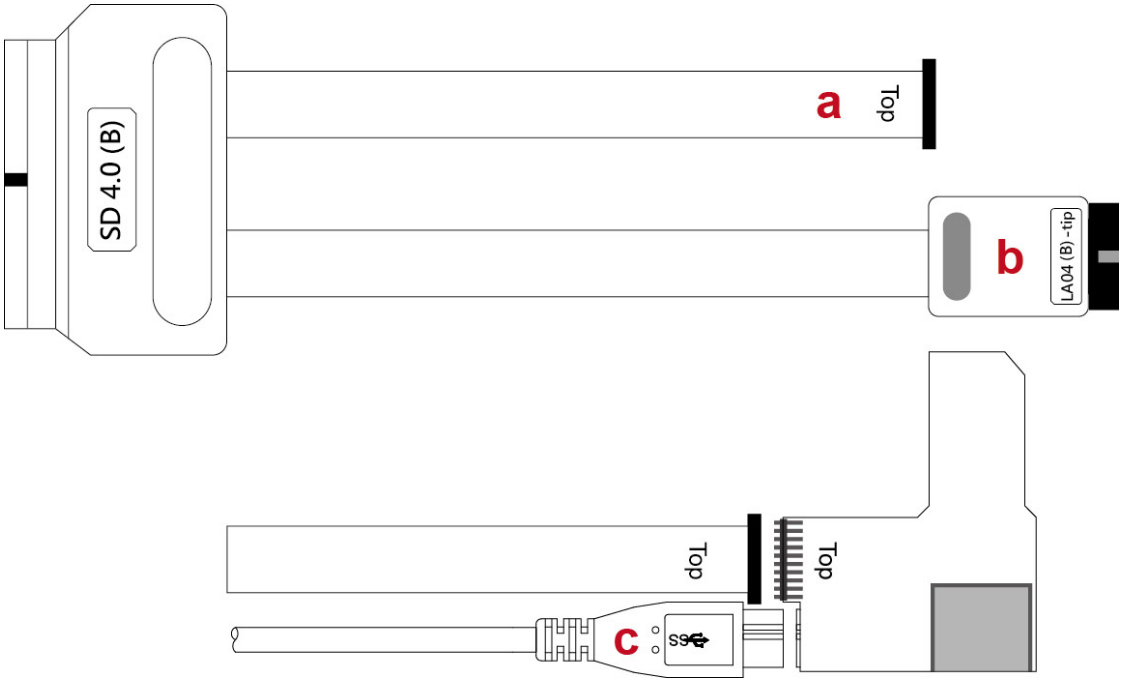
SD 4.1 (uSD 4.1) Probe (Optional)

Supported Models:

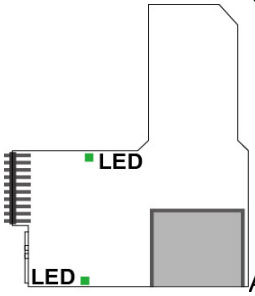
BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
●	●	●		

The SD 4.0 probe can only be installed in slot B and can be used only with SD 4.1-tip. It consists mainly of three parts:

a. The front end tip can be replaced with standard SD4.1-tip or uSD4.1-tip according to his or her need for measurement. Top/Bottom labels are marked on the cable. When installing the connector, you must watch out for correct sides.
b. LA-4 tip: This connector provides additional 4 input channels on SD4.1 probe to increase the number of input channels.
c. USB3.0 transmission line: This transmission line needs to be connected to the USB Type A socket on the front of the BusFinder unit.



SD 4.1 Pin Configuration



After connection setup is completed, start the SD 4.1 analysis mode in BusFinder software, the two LEDs on the SD 4.1-tip will be turned on indicates that the setup is correct, as shown on the right diagram.

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SGMII Probe (Optional)

Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
	●	●		

SGMII probe can only be installed in slot B. It contains:

a. A Way Station: Including TX0p/n、PX0p/n、RefClk

The Way Station contains a GND pin and a USB3.0 cable; to use the Way Station, user must connect the USB3.0 cable to the USB Type A Bottom socket on the front of the device

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UFS Probe (Optional)

Supported Models:

BF6264B	BF7264B	BF7264B+	BF7264 Pro	LA3000 Series	LA4000 Series
		●	●		

UFS probe can only be installed in slot B. It consists mainly of two parts:

a. Way Station:

I. Way Station Top: Including TX1p/n、RX1p/n

II. Way Station Bottom: Including TX0p/n、RX0p/n

b. UFS-tip: Contains A0 and A1 pins for voltage detection, channel 4 is the Reset Pin; channels 5, 6 and 7 are useless.

Both Way Stations are equipped with GND pins and USB3.0 cables. To use the Way Station, user need to connect the USB3.0 cable to the USB Type A socket on the front of the device.

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LVDS Probe (Optional)

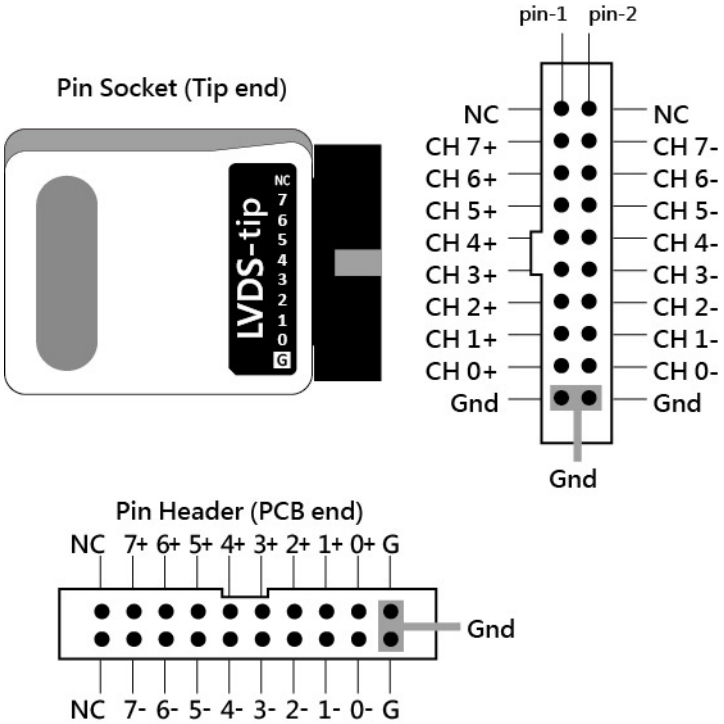
Supported Models:

BF6264B	BF7264B / B+	BF7264 Pro	LA3000 Series	LA4000 Series
●	●	●	●	●

The LDVS probe can be used in any slot. It has 1 LVDS tips + 3 LA tips. The LVDS tip has 8 LVDS signal input channels. The other LA tips are equipped with an external clock input (CK0 & CK1), located at the channels labeled as LA09-tip.

LVDS specification:

1. Data rate: 600Mbps
2. Vid-min: >150mV
3. Non-destructive: -0.5V to + 4.6V
4. Vic (Common): 0+Vid/2 to 3.3-Vid/2



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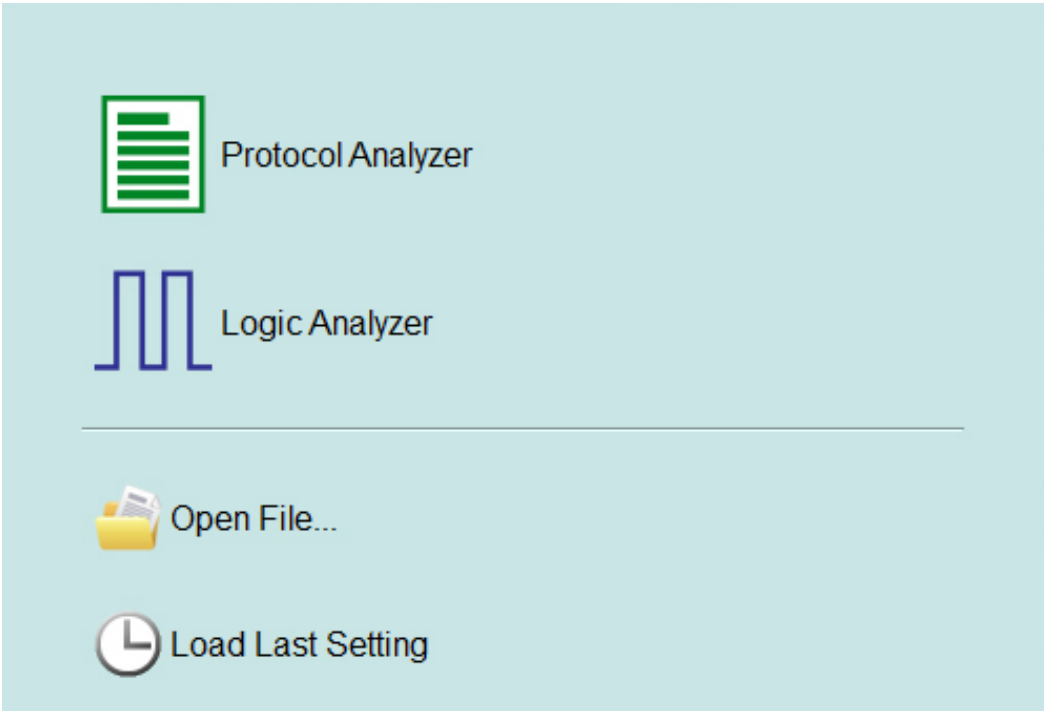
Software installation

NOTE: Since 2024, we will not provide x86(32 bit) software, only x64(64 bit) software. Whoever needs x86 software, please contact us.

Please visit the official website of Acute Technology Inc., go to the Download page->Software, and then select and download the [***Protocol Analyzer] BusFinder series*** or ***[Logic Analyzer] Logic Analyzer (LA3000. 4000 series)***. After completion of installation, the “start icon” of BusFinder/LA3000 Series /LA4000 Series will appear on the desktop and the program set. You can select either one to start BusFinder/LA3000 Series /LA4000 Series (

). After starting the software, the main menu screen will show up. You can choose to enter logic Analyzer or protocol Analyzer.



Or after entering the function window, you can select the icon below to add Logic Analyzer or Protocol Analyzer window.

Or click the Add Logic Analyzer or Add Protocol Analyzer window within the file functions.

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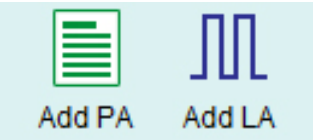
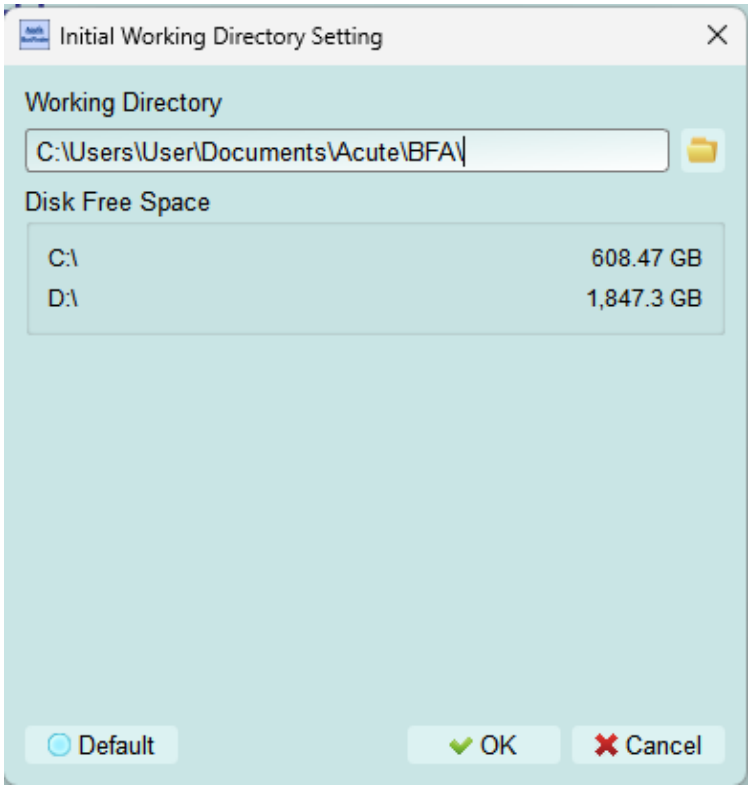


For the first-time use, the following screen will show up. Please set up the working directory that you will surely use. It is recommended that you choose the hard disk with larger remaining space for the storage of the working directory.



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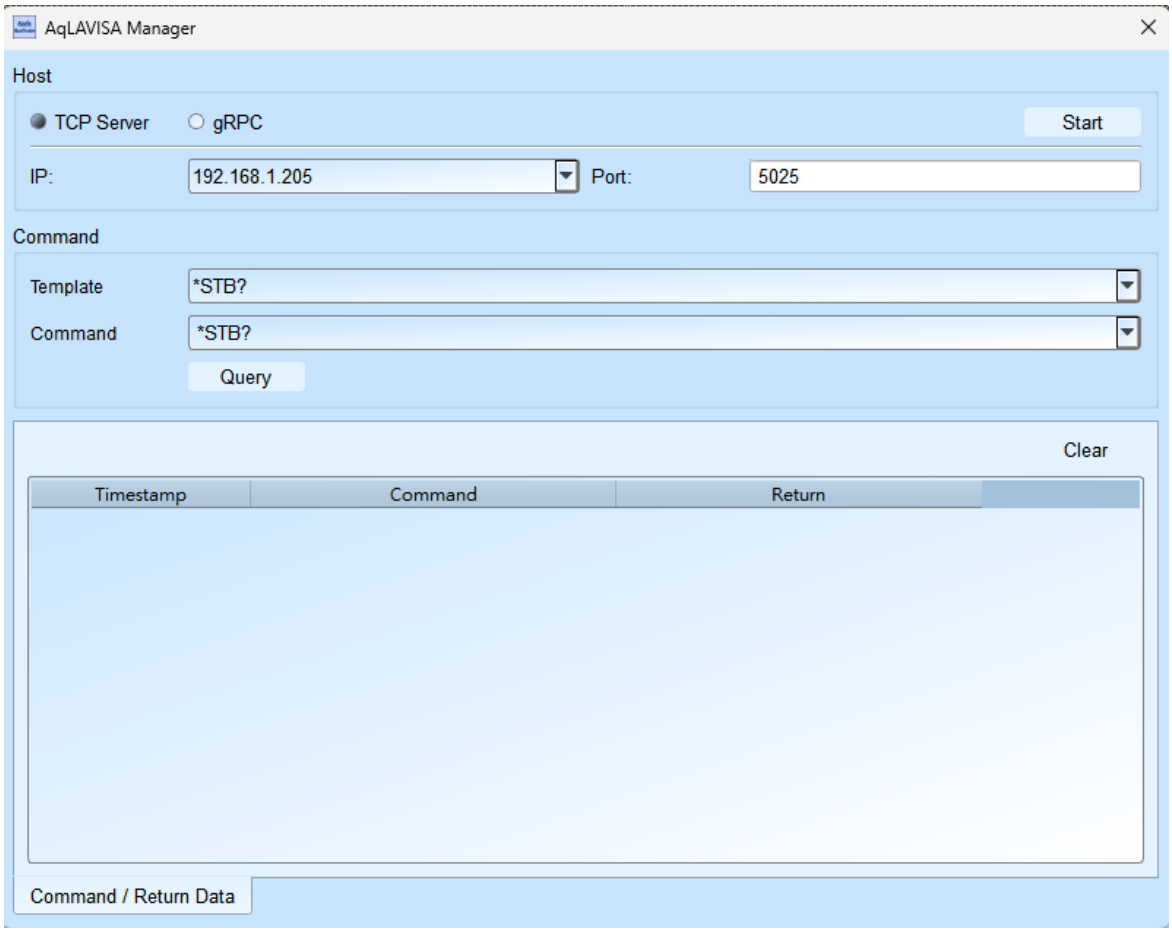
SDK

We provide SDK for controlling the software. User can monitor the software behavior by AqLAVISA Manager. Please check our official GitHub website: https://github.com/acute-technology-inc/aqvisa-grpc . Or find the label: Download→SDK(DLL)→[Logic Analyzer]AqLAVISA SDK, in our official website. Or contact us with e-mail.



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gRPC

We provide gRPC for user to remote control our device. Please check our official GitHub website: https://github.com/acute-technology-inc/aqvisa-grpc. Or search: “aqvisa-grpc”. Or contact us with e-mail.

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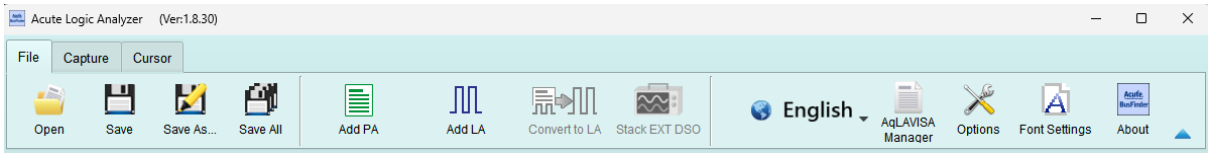
Chapter 2 Function list and operation

Protocol Analyzer

File



 **Open file**: Load the file

 **Save file:** Save the current window to file

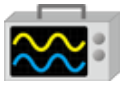
 **Save as:** Save with a new file name with specified storage range

 **Save all:** Save all Protocol Analyzer/Logic Analyzer windows to files

 **Add Protocol Analyzer:** Add a Protocol Analyzer window

 **Add Logic Analyzer:** Add a Logic Analyzer window

 **Convert to Logic Analyzer:** When the “show waveform” capture mode is enabled, you can click this function to transfer the waveform and setting parameters into the Logic Analyzer window and continue to use the Logic Analyzer window to capture Protocol.

 **Stack Oscilloscope:** You may stack a DSO to become a MSO under the Protocol Analyzer mode. But, you must choose the “show waveform” capture mode to capture the protocol data with the waveforms. Then, click the DSO icon to enter the Logic Analyzer window.

 **Language:** Display language. You can select English, Traditional Chinese, or Simplified Chinese

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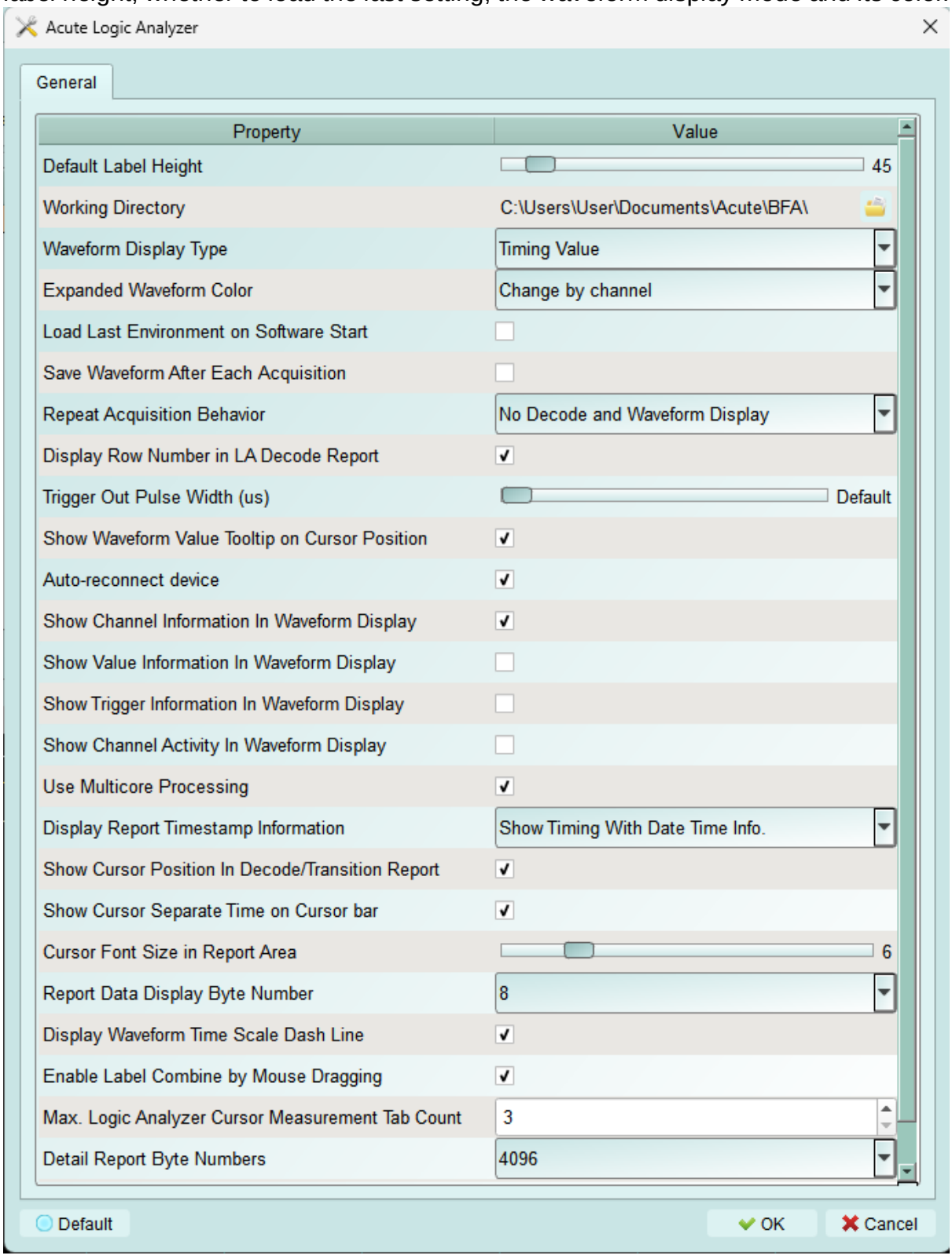
System environment settings: Here you can set the working directory, the label height, whether to load the last setting, the waveform display mode and its color.



1. Default Label Height: Modify the channel height of the waveform area.
2. Working Directory: The directory where the temporary files and waveforms are stored when the software is in operation.

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3. Waveform Display Type: Select which information to display between waveform edges. You can select either display time value, logic value or not to display.
4. Expanded waveform color: You can choose whether the colors are different between channels.
5. Load Last Environment on Software Start: When the software starts, load the settings as the file that was previously closed, waveforms will not be loaded.
6. Save Waveform After Each Acquisition: This file is stored in the working directory.
7. Repeat Acquisition Behavior: Whether to display waveform decoding, to display, choose display time (1/2/5 s).
8. Display row number in LA Decode Report: Show row number on the left to the reporting area.
9. Trigger Out Pulse Width (us): The default length is from trigger point to the end of capture. The following 2 items will be controlled by the cursor, which will display the contents of the "Select Cursor", which can be set in the waveform area shift and A-Z, and moved to the cursor position by pressing A-Z (T is the trigger point mark, not available).
10. Show Waveform Value Tooltip on Cursor Position : Show numbers of used channels, show additional names for bus decode.
11. Auto-reconnect device: Reconnect the device while re-plug the USB after device offline.
12. Show Channel Information In Waveform Display: Display the channel number in waveform area.
13. Show Value Information in Waveform Display: Digital channels display 0/1, analog channels display the voltage value.
14. Show Trigger Information in Waveform Display: Display trigger setting values.
15. Show Channel Activity In Waveform Display: Sum up the change types of the edge channel of the captured waveform.
16. Use Multicore Processing: Use multi-core to speed up data processing.
17. Display Report Timestamp Information: Display the timestamp column with timing info format / timing info with date time format (trigger point is at 0 s) /

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sample count format.

18. Show Cursor Position in Decode/Transition Report: Show cursor position in the report area time field.
19. Show Cursor Separate Time on Cursor bar: Add additional time between cursors on the horizontal timeline of the waveform area.
20. Cursor Font Size in Report Area: Cursor font size for cursor position in decode/transition report (refer to item 18).
21. Report Data Display Byte Number: This is an item set for protocol analyzer mode, and you can modify the report field to show the number of Bytes.
22. Display Waveform Time Scale Dash Line: Add dash lines on the waveform area to correspond time line to report area.
23. Enable Label Combine by Mouse Dragging: Use the left mouse button to drag a channel label onto another channel label to combine channels.
24. Max. Logic Analyzer Cursor Measurement Tab Count: Displays the number of groups of cursor measurement values in the lower right corner. Minimum of 3 groups, maximum of 10 groups.
25. Detail Report Byte Numbers: Set the limitation of displaying byte number of each detail report.

 Font Settings: User can set the font type and font size that used in display the text in waveform area, note and label.

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Keyboard Shortcuts

Function	Key
Move to cursor position	A-Z
Add a cursor to the mouse position	Shift + A-Z
Start capture	Enter
Stop capture	ESC
Search	F3 or Ctrl+F
Zoom In on waveform area	Number Pad +
Zoom Out on waveform area	Number Pad -

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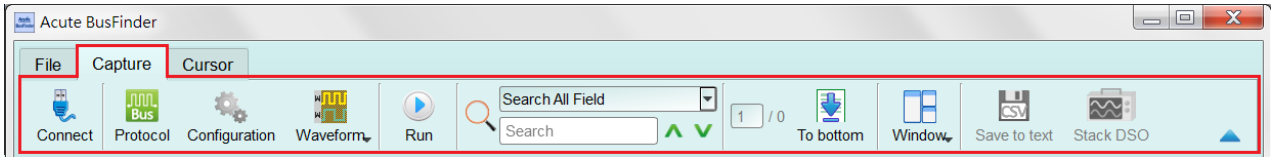
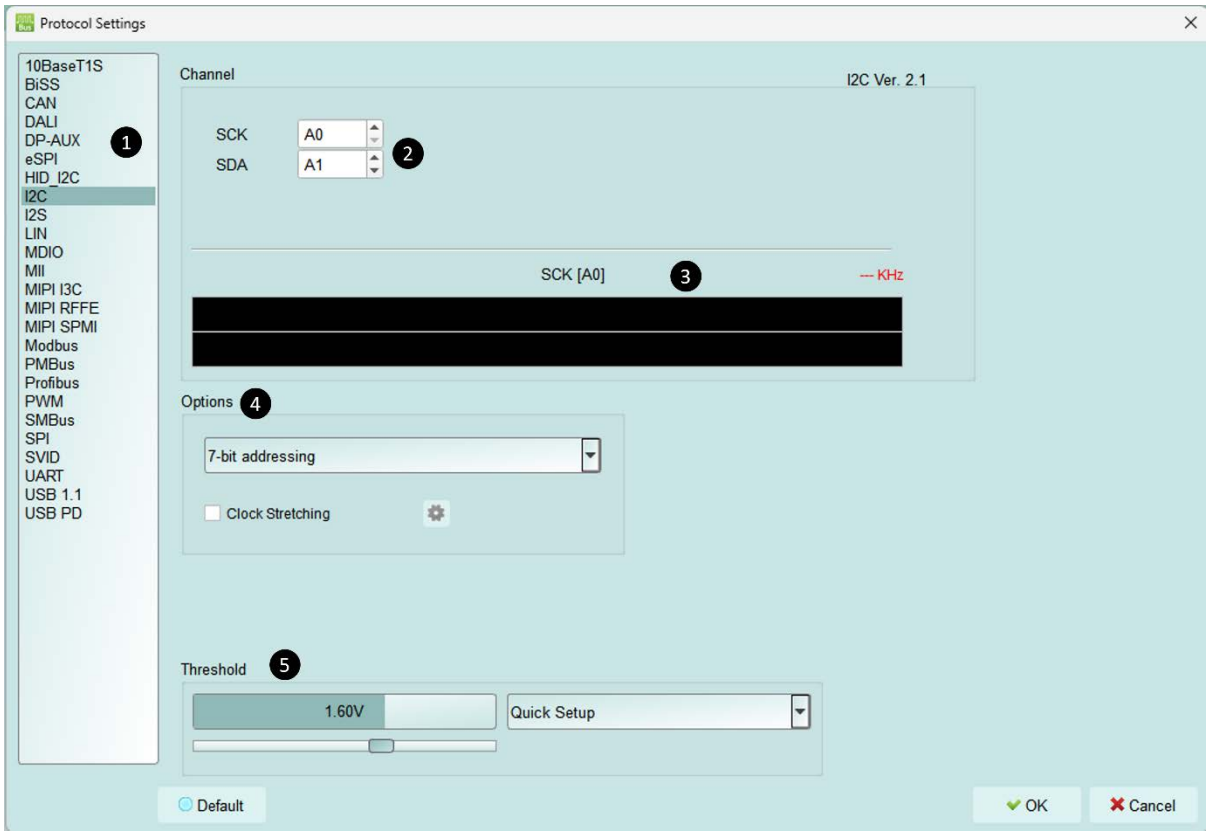
Capture



Protocol Settings

Single protocol mode

※Protocol selection for LA3000/LA4000 Series



1. **Select the protocol**
2. **Channel setting**
3. **Waveform Preview**: The signal's waveform and frequency is automatically detected.
4. **Options**: You can set the capture and decoding parameters for protocol.
5. **Trigger level**: It can be set according to the voltage level of the signal.

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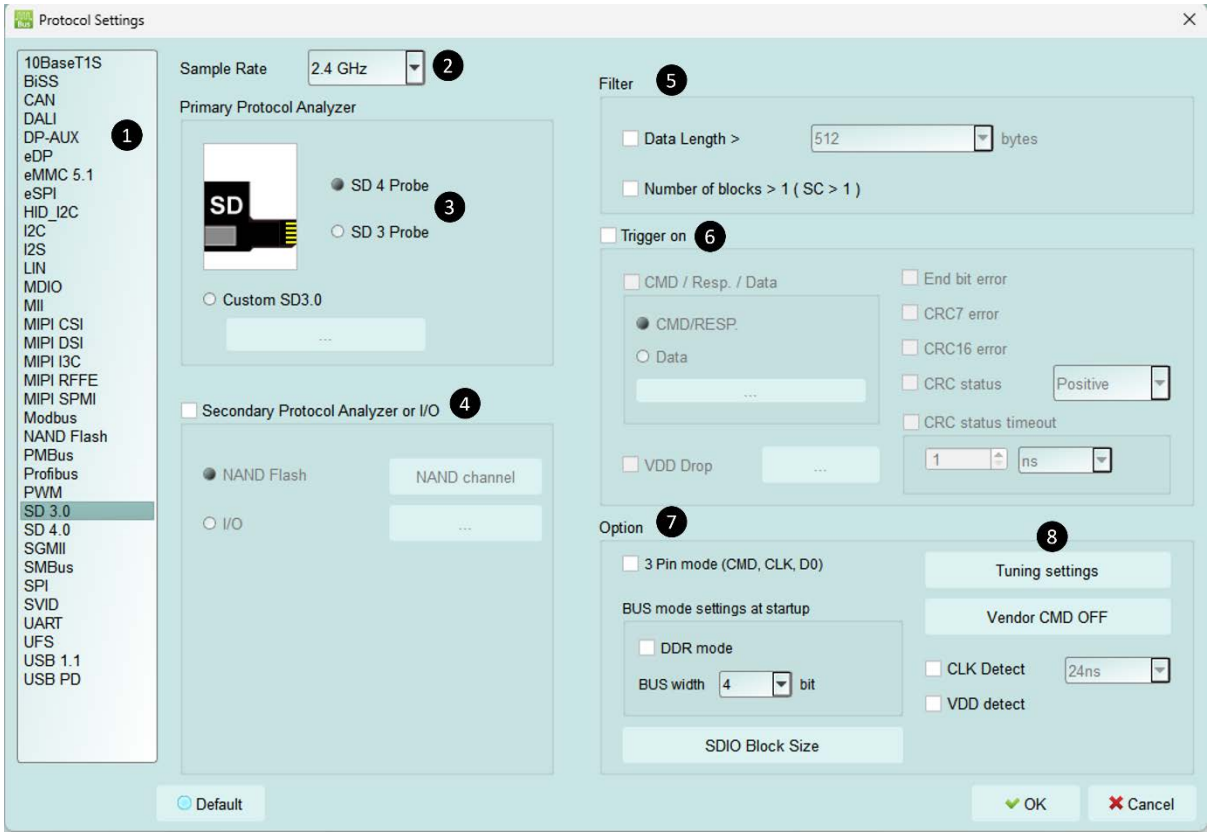
Double protocol mode

※Protocol selection for BusFinder Series



1. **Select the protocol**
2. **Sampling rate**: This parameter is effective only when “Show Waveforms” is enabled.
3. **Primary Protocol Analyzer setting**:

   Decoding of Primary Protocol Analyzer is carried out by hardware, where you can specify the probe for the measurement and select either default channel or custom channel. All the options on the right side of the setup screen are for the Primary Protocol Analyzer.
4. **Secondary Protocol Analyzer settings**:

   Decoding of Secondary Protocol Analyzer is carried out by software. Therefore, waveform data will be captured along with the data of Primary Protocol Analyzer. After Secondary Protocol Analyzer is enabled, the total amount of data returned from the device will be significantly increased, which should be noted by the user. Here you can specify which protocol to use for the secondary protocol analyzer. If you select the I / O option, only the waveform will be displayed.

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5. **Filter**: This function is for the hardware to filter data. Its common usage is to reduce the data length, allowing the device to reduce the amount of memory.
6. **Trigger:** After Trigger is set, if the signal meets the trigger condition, a red-arrow mark  will be placed in the report window and the trigger pulse will be sent out from the Trigger Out port. Using the triggering feature under the “Protocol Analytics” mode, capture will not stop because of triggers, but keep marking those places meeting the trigger condition. You may also check the Trigger List window to list all trigger positions.
7. **Options**: Adjust the setting options to change the capture or decode mode of operation.
8. **Tuning settings**: Signals on the eMMC / SD 3.0 specifications regulate the Tuning function, used to adjust the signal phases. For detailed steps, please refer to "Tuning Settings Operating Instructions" section.

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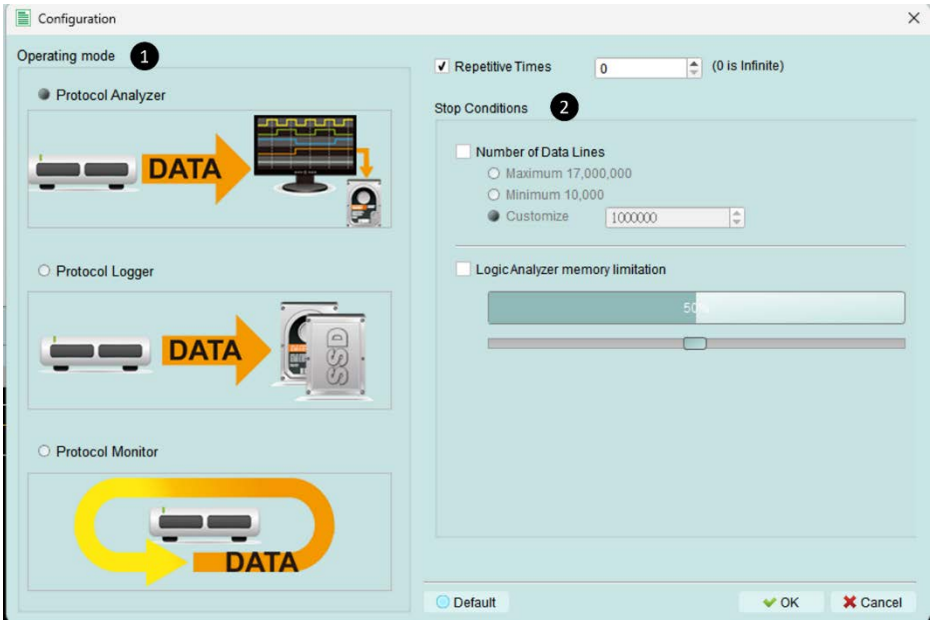
Operating mode and memory setting

There are three modes for operating mode and memory setting ( ).

Mode 1 Protocol Analyzer



Functional description:

Captured data will be sent back to the PC for real-time display. You can immediately see the protocol data right away.

Rule:

1. Data can be seen immediately.
2. If the amount of captured data is not big, you do not have to set the amount of memory.

Notice for use:

As data will be captured and displayed at the same time, the performance requirement for the USB and the computer will be higher. If the computer cannot handle the data in time, the device may automatically stop due to full memory.

If software is in operation during the capture period, the computer will respond more slowly.

- **Rules for repetitive times and automatic stop**

Repetitive Times

- If it is not enabled, the device will be stopped after the stop condition matched.
- If it is enabled, the device will be stopped after the stop condition matched, then save the captured data and repeat the captures again, according to the number of captures that has been set.

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- If the number of captures is set at 0, the device will capture data repetitively.

Two **Stop Conditions** to stop the device automatically are provided as follows:

- Number of Data Lines

  Stop the capture when the stored data line number matched the setup data line number, You can select this function if you need only sufficient number of data lines without capturing data for a long time. This function is set to OFF by default.

- Maximum Device Memory Limit

  Stop the capture when the device memory is filled to the set condition.

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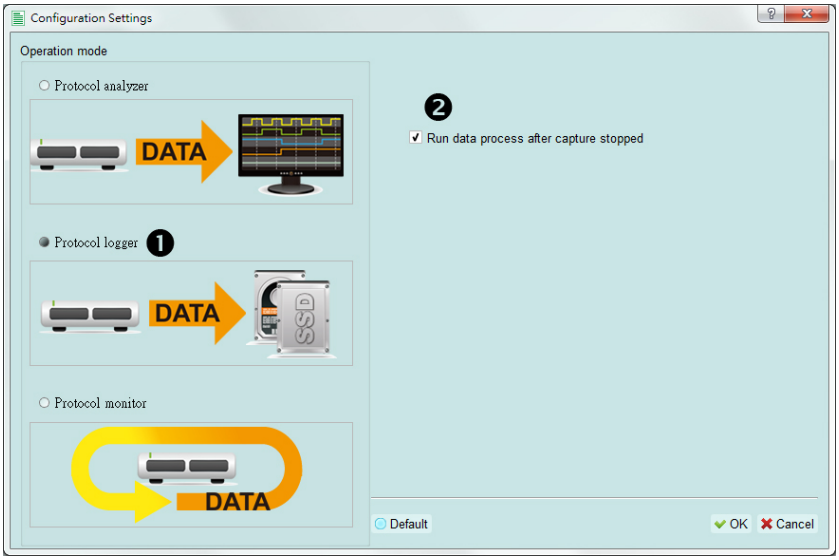
Mode 2　Protocol Logger



Functional description:

Data will be sent back to the PC for saving without being processed and displayed. Only after the user presses to stop the operation will data begin to be processed and displayed.

Rule:

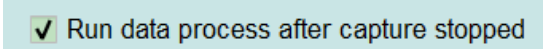
1. As long as the hard disk is big enough to respond quickly enough, it can save a great amount of data.
2. Logger file (.LOG) can be opened for Analyzer later, no need to analyze them right after the capture.

Notice for use:

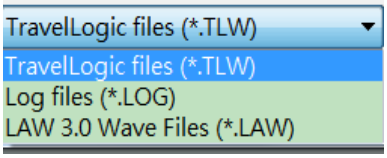
1. Performance requirements for the USB and the computer (hard disk) are high.
2. Due to the large amount of logger data, the requirements for the hard disk space and the time for follow-up Analyzer will be very great.

• **Run data process after capture stopped**

Check this option to process the data after Logger capture stopped, or the software will only save the logger data without analyzing process.



You can reload the .LOG file from Load file to re-analyze the data.



Whether you check the results immediately or load them into the file, the file

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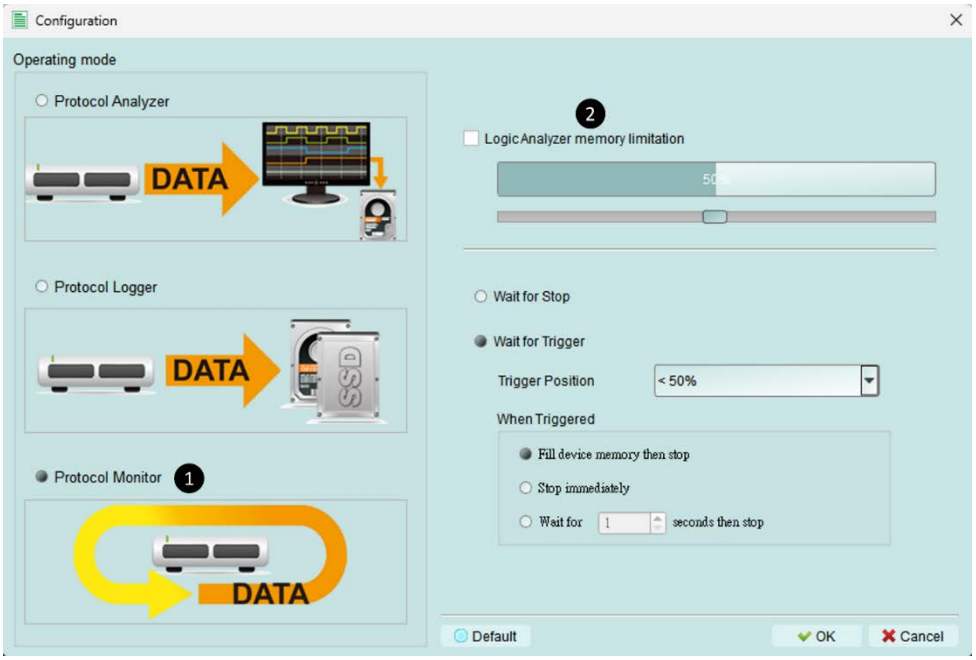
name will be converted from .LOG to .BFW.

Mode 3 Protocol Monitor



Functional description:

Data will be kept in the device and overwrote the old data without returning to the PC, the capture can be stopped by user manually or by trigger condition matched, then the device will fill the device memory until memory full and return to PC for display.

Rule:

1. During the capture period, data are not returned to the PC, reducing the performance requirements on the USB and the computer.
2. The total amount of data is the total amount of device memory.
3. Trigger conditions can be set and monitored for a long time. Device memory will be filled only when the amount of data meets the trigger conditions.

Notice for use:

1. If the trigger is not set or you have set the trigger but want to retrieve the data before the memory is full, you must manually press “Stop” to send data back to the computer.

- **Work options**
  - Maximum Device memory limit

    If the checkbox is unchecked, the max memory of the device is used.

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If the checkbox is checked, the usage ratio of the device memory can be adjusted; less memory can shorten the subsequent processing time.

- Data capture will continue until “Stop” is pressed (Wait for stop)

  Data capture will continue. If memory is full, the new data will be still captured to replace the old data, until “Stop” is pressed. Then the newest data will be sent back to the computer.

- Data capture will continue until the trigger condition is met (Wait for Trigger)

  If the trigger condition is not set, there will be no Pre/Post Trigger relationship and only the Capturing will be shown until the device memory is full.

  If the trigger condition is set, user can do more detail setting of software behavior after triggered.

  - Fill the device memory then stop: Fill the rest memory with data, according to the trigger position, then stop.
  - Stop immediately: Stop capturing immediately since triggered. The rest memory will not be filled.
  - Wait for seconds then stop: Since triggered, software will keep capturing data with seconds that user set, then stop. But if the rest memory full first, capturing stop.

  Data will be filled according to the set Trigger Position. Data capture will continue until the trigger condition and the after triggered software behavior setting is met, or “Stop” is pressed. Then, data capture will stop and the set memory will be filled.

Show Waveforms

If “Show Waveforms” is selected, the device will capture the waveform data, but show the waveforms only after the capture stops. Selection of Show Waveforms will take up more device memory.

When “Show Waveforms” is enabled, the waveform area will provide the following functions:

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1. Bus Decode 

   Press this button to refresh the bus decode.

2. Stop the bus decode 

   This button can stop the bus decode right away.

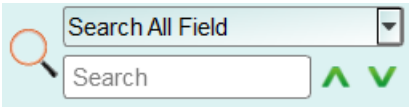
3. Add User Notes 

   User can add text note or picture note.

4. Waveform zoom in / out 

   This button can scale up or down the waveforms, but it is recommended to use the mouse cursor to zoom the waveforms in or out for your convenience.

Search



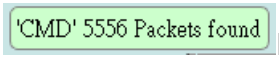
Search function can search data in the report window.

1. Enter the search text

   A mark will appear in front of the data meeting the search criteria. 

2. Search the previous piece / the next piece of data.
3. Specifiy all fields or target fields for search.

   Specifiy fields for search can reduce the search range, thus speeding up the search.

In actual search, the searched data will be shown in green background color togther with the total number of packets found. 

If no data is found, the search result will be shown in orange background color. 

To bottom

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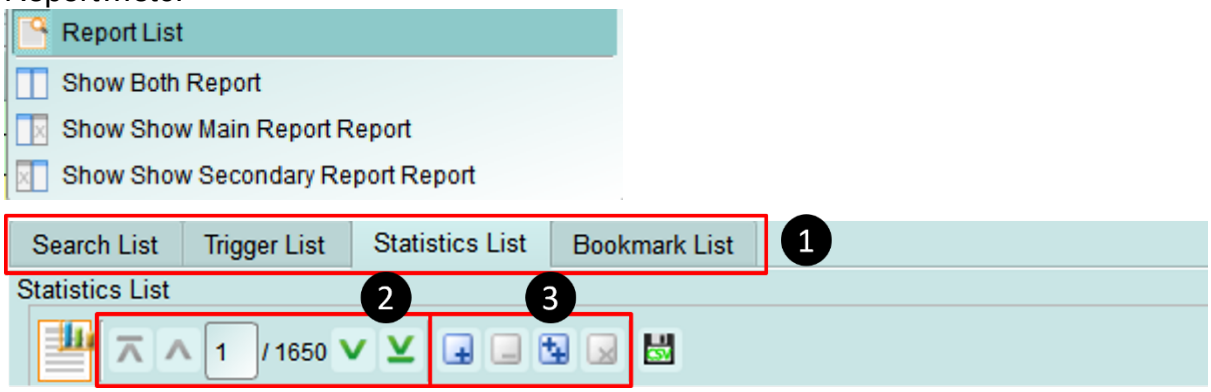
When viewing data, you press this button to move directly to the last end of data. If you press this button while the device is capturing data, the most up-to-date data will be displayed.

Window

Select to enable/disable multiple display report, such as: Report List, Show Both Report…etc.



1. Select to display different display list.
2. Use the control buttons to move the current position, or input row number to jump to specified row.
3. Use the control buttons to add/remove selected row to Bookmark List.

For detailed usage steps, please refer to Appendix II: Report List Advanced Instructions.

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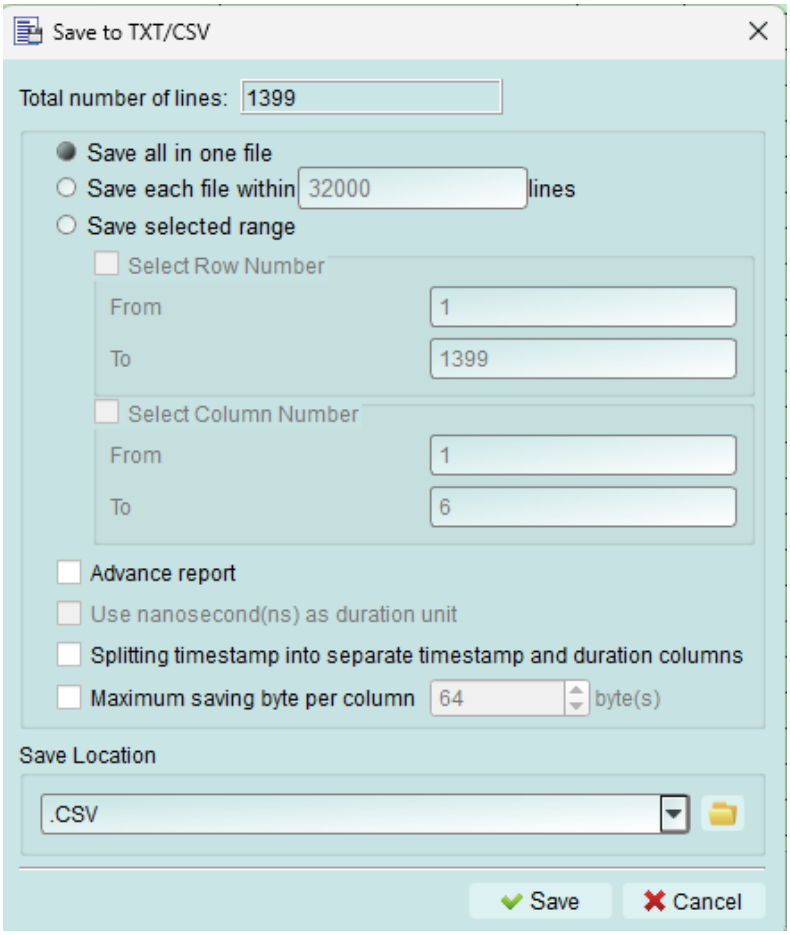
Save to text

Contents of the report may be saved as .TXT or .CSV.



Save options:

1. You can select to save the data as a file or according to the number of rows.
2. Advanced reports: If it was checkd, the detailed data would be saved.
3. Splitting timestamp into separate timestamp and duration columns: If it was checked, the timestamp column would be separated into to two columns, timestamp and duration time. (It was combined together by default).
4. Maximum saving byte per column: Set the limitation of byte numbers in one column.

Detail window

Many Protocols are equipped with a large number of numerical data, which cannot be appropriately displayed all together in the report window. Therefore, you can use the

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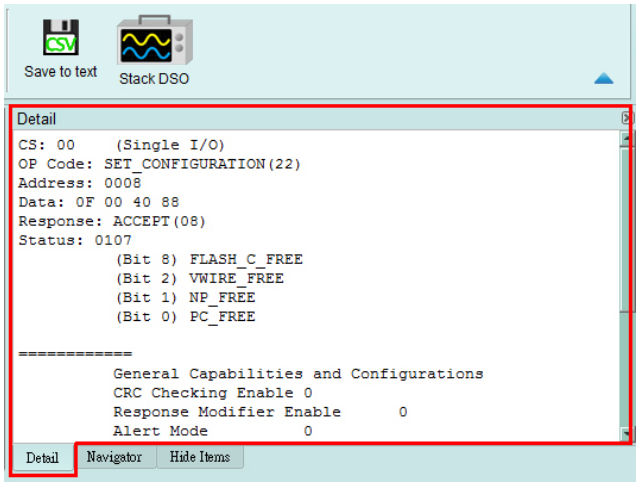
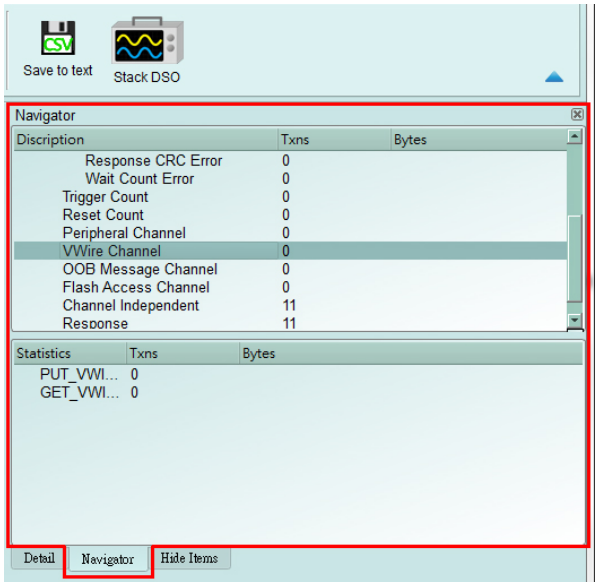
mouse to click the Data field on the report window to display the data in the detail window.



Statistics window

Data statistics are made according to the different characteristics of Protocols, so as to facilitate the understanding of the entire transmission situation, you may also click on the statistic trace to summarize all records of the selected trace into the statistic list window.



For detailed usage steps, please refer to Appendix II: Report List Advanced Instructions.

Hide Items window

In this screen, you can select to hide the data items. Software is used in this function to hide data and to restore the data as long as you click the “Clear” botton.

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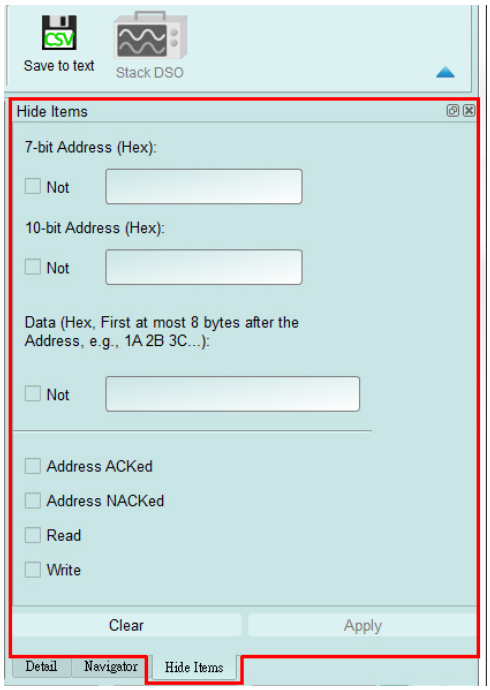
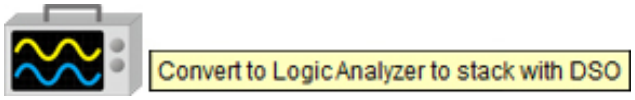
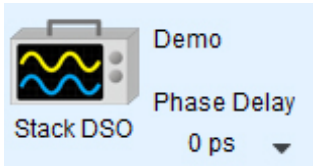


Stack Oscilloscope



The stack oscilloscope can only be enabled in the Logic Analyzer mode. If you want to enable the stack oscilloscope in the protocol Analyzer mode, you must first press the "Convert to Logic Analyzer and Stack Oscilloscope" button to switch to the Logic Analyzer mode to enable this function. It should be noted that you must open Show Waveforms in the Protocol Analyzer mode and capture the data / waveform to switch.



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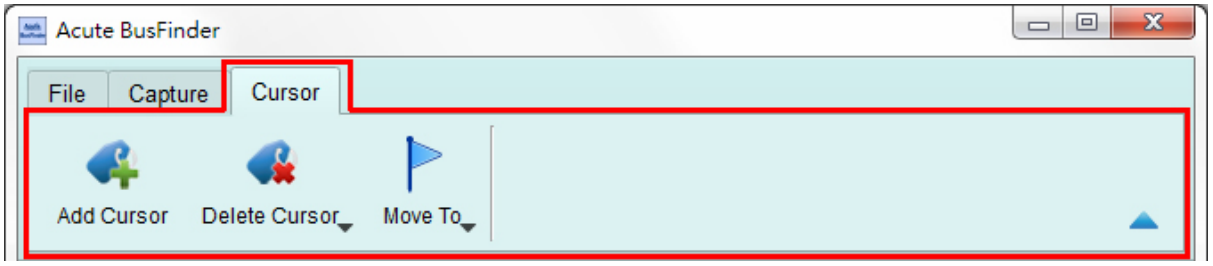
Cursor



This function includes the cursor setting and the waveform search function matching the cursor.

But it can only be operated while the ‘Show Waveform’ function was turned on.

Otherwise, user will see these buttons turn gray and disabled.

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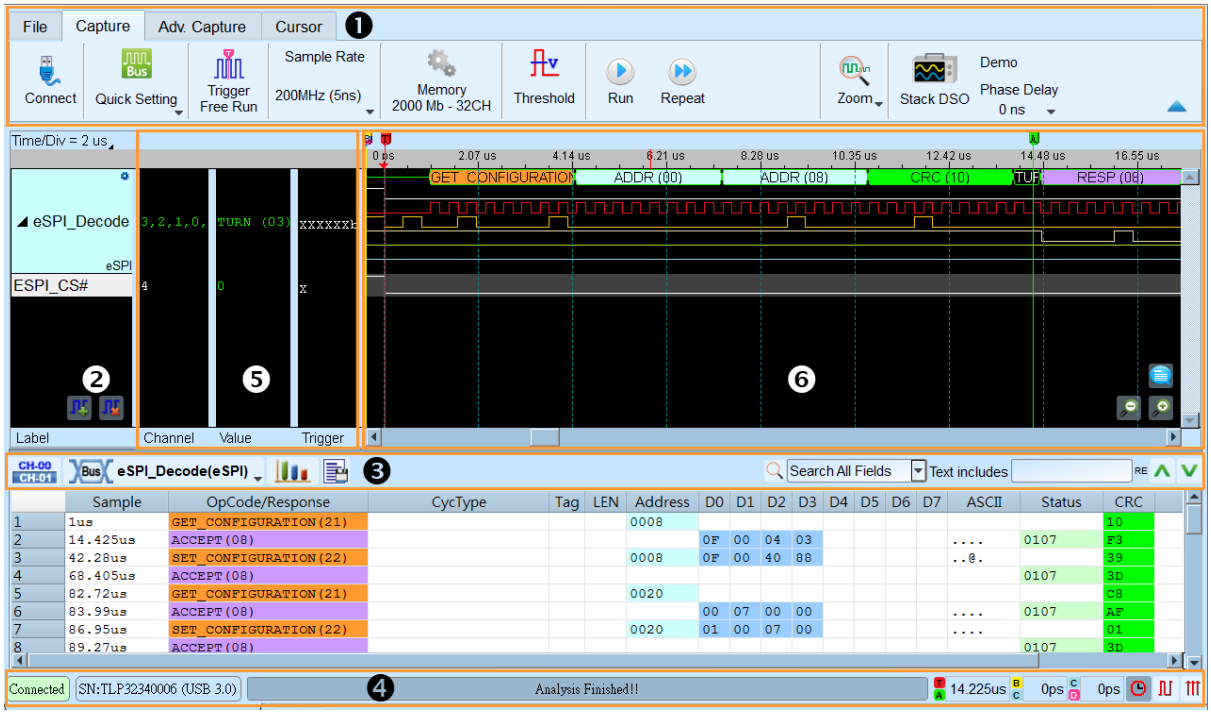
Logic Analyzer



1. **Toolbar**: Including trigger, sampling rate, threshold and other capture parameters.
2. **Channel Label**: You can use the icon () below to add and delete the channel. Pressing mouse left button on the channel label to change the channel parameter settings; Click the gear button on the top-right corner of the Bus channel to change the advanced parameter settings; Select and drag a channel label to other channel label to combine two or more channel labels.
3. **Report Window Toolbar**: In the report window, you can choose to display the channel data () or decode result (), waveform statistics (), and report the result as .CSV and .TXT output ().
4. **Status Bar**: Connection status of the device is displayed.
5. **Info**: Display channel, Value and Trigger information, can be selected to Show/Hide in Environment settings.
6. **Waveform Area**: Mouse wheel can be used to zoom in/out the waveform scale; press Shift + Key to place cursors to calculate the time interval or frequency. Please refer to the cursor section below for the cursor usage.

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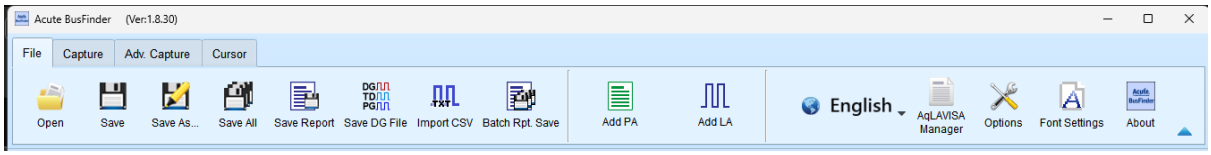
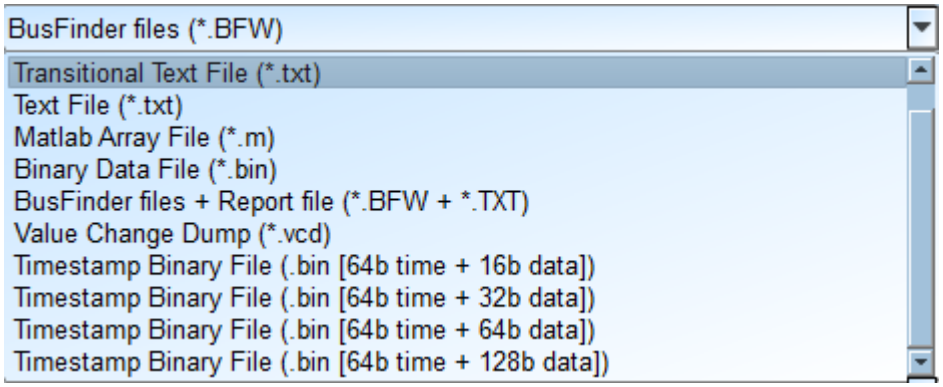
File



 Open file: Load the file

 Save file: Save the current file

 Save as: Save with a new file name and may set the storage range



User can save file as:

1. BusFinder files (*.BFW)
2. Transitional Text File(*.txt)
3. Text File(*.txt)
4. Matlab Array File(*.m)
5. Binary Data File(*.bin)
6. BusFinder files + Report file (*.BFW + *.TXT)
7. Value Change Dump (*.vcd)
8. Timestamp Binary File (*.bin)
   i. 64b time + 16b data
   ii. 64b time + 32b data
   iii. 64b time + 64b data
   iv. 64b time + 128b data

The format of Timestamp Binary File is, the first 64 bits represented time, the rest bits used to present data.

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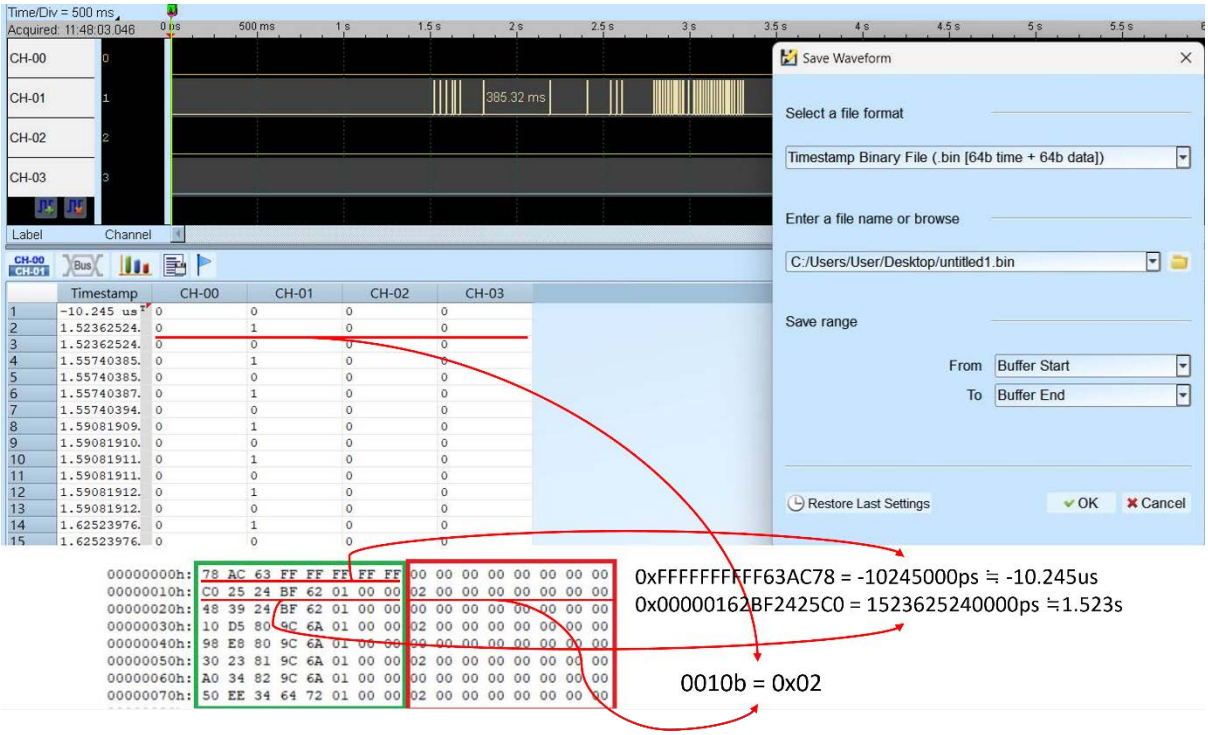

In this figure, the green block represents time, the red block means data. Take the values shown in this figure as an example, the data from left to right represents the direction from lsb to msb, so for the second line of data, the archive value is 0010b = 0x02. Note that if you choose a data bit archive format that is less than the number of channels, the extra bits will be discarded.


Save all: Save all files at once


Save report: Save the bus decode report

Saved as a DGW/PGV file:

Convert captured waveform to DGW format for the Acute Digital Data Generator(PKPG、PG2000、DG Series、TD Series), which can be used to resend the digital signals.

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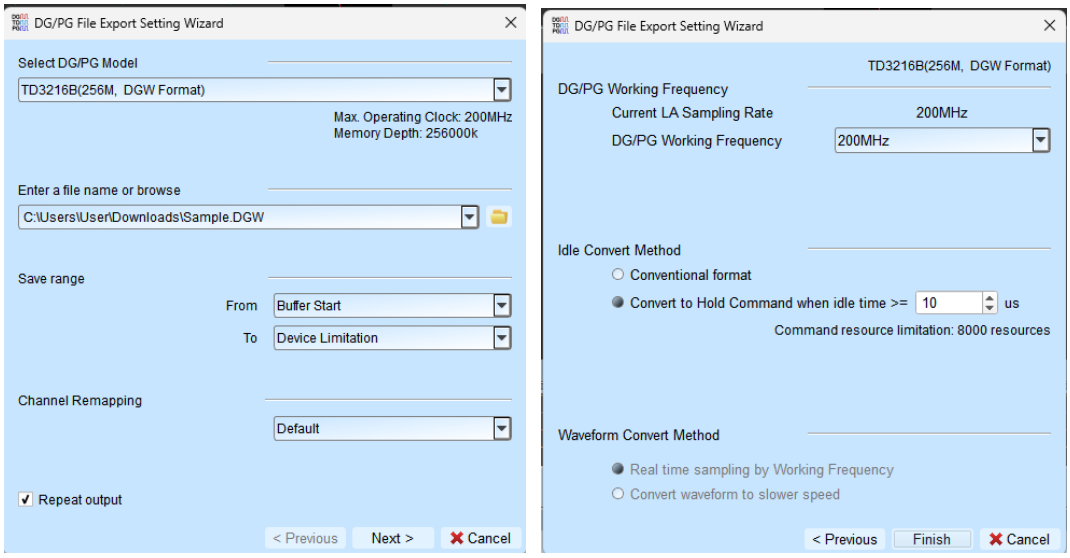

1. Select DG/TD/PG Model: The software will check the maximum working frequency and memory depth according to the selected DG/TD/PG model.
2. Enter a file name or browse

   Enter a file name and directory to save the converted DGW/PGV file.
3. Save range:

   Select the waveform range to convert to DGW/PGV file, you may select either waveform within cursor range, or select maximum available range according to DG/TD/PG's maximum memory. (Exported file size larger than DG/PG's maximum memory may not be opened by the DG/TD/PG's software.)
4. Repeat output:

   Check to add "Jump to start" command at the end of DGW/PGV file.
5. Idle Convert Method

   Select to replace signal pulse width greater than specified time to a short block of waveform with Loop instructions to save the DG/TD/PG's memory. (The waveform will become more complicated and not easy to read/edit after enable this option)
6. DG/TD/PG Working Frequency:

   Specify the DG/TD/PG working frequency.
7. Waveform Convert Method

   When the LA's sampling frequency is faster than the DG/TD/PG's working frequency, the software provides two different ways to convert the DGW/PGV wave form, one is the real time sampling mode with DG/TD/PG's maximum

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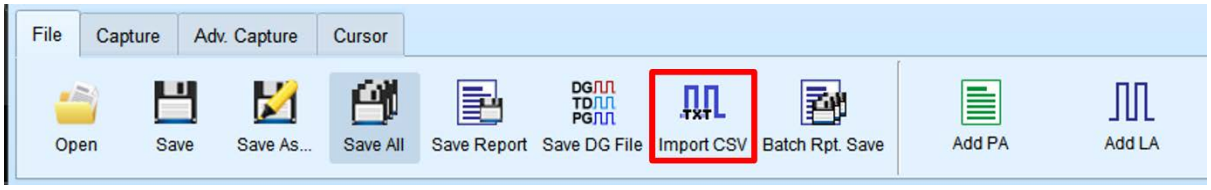
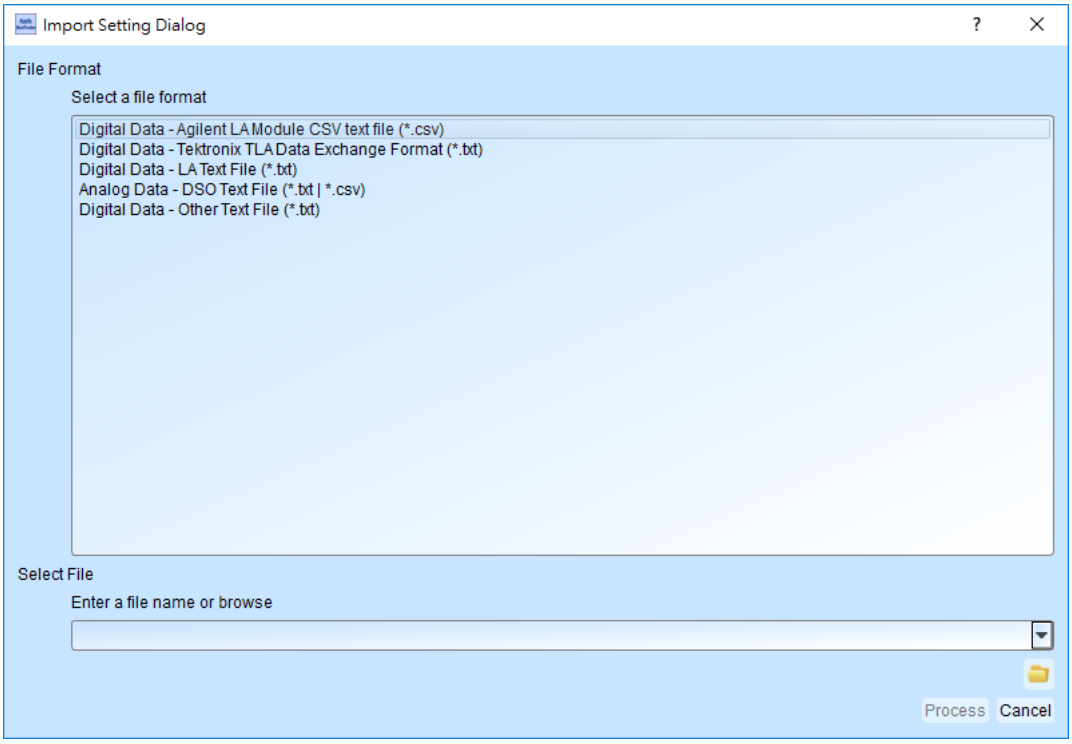
working frequency (Small signal might be lost during the conversion), the other is convert the original high speed waveform to slower DGW/PGV waveform (Slower signal speed might introduce some signal timing issue since the setup/hold time will also be changed)

Import CSV (Require hardware device connected)

LA can convert digital or analog data stored in text format to TLW format file, and turn on viewing waveforms and analysis. This function is located in the toolbar -> File -> Import CSV



After opening, you can see a variety of formatting options. Select the loading format and file name to start the conversion. If you select DSO Text File or LA Text File, you must go to the next step for advanced settings.



1. Agilent LA Module CSV text file

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After the file is opened by the Agilent LA software, the data can be exported through Export. Note that only the waveform file exported by the Module CSV text file is supported here.

(You can find the option to export Module CSV Text File in Toolbar -> File -> Export... after opening .Ala file)

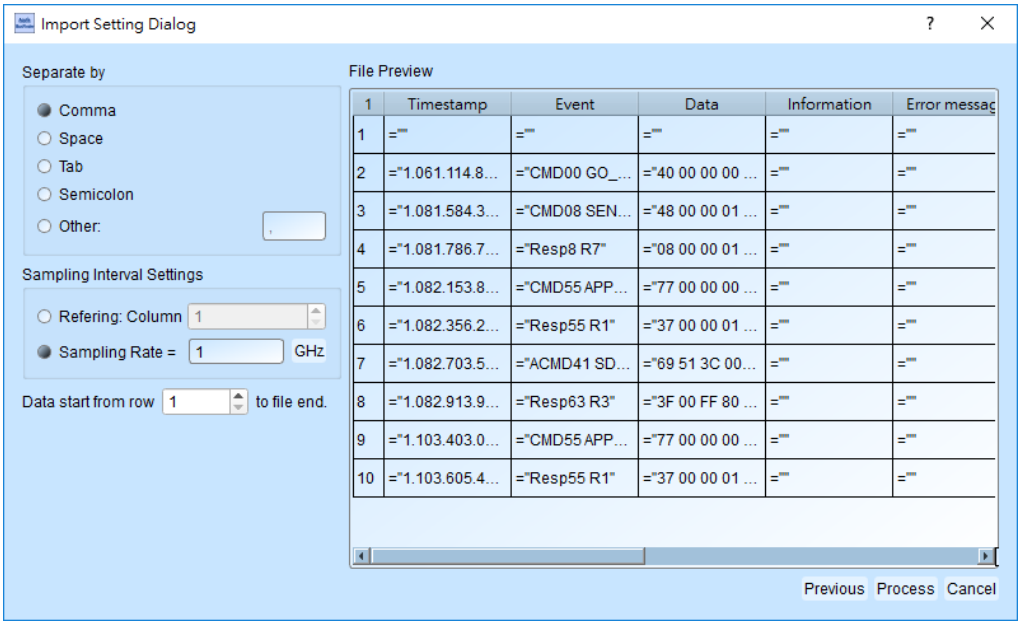
2. Tektronix TLA Data Exchange Format

   After opening the file by the TLA software, first click the File->Export Data... button after outputting the top of the List screen. Note that only the TLA Data Exchange Format is supported here. Change to TLA Data Exchange Format.

3. LA Text File

   This format still requires further confirmation of separators, data start and time fields, etc. after the file is selected.

   The data start line default will be treated as the channel label name



4. DSO Text File

   When selecting the DSO waveform, multiple files can be selected for import. After the data is added, the data processing mode can be set individually.

   The program default will check if the first ten lines of data are:

   (1). Sample Rate/Sample Interval

   (2). Trigger Position

   And automatically entered the information into the settings

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It is important to note that the numerical basic unit must be specified by the user

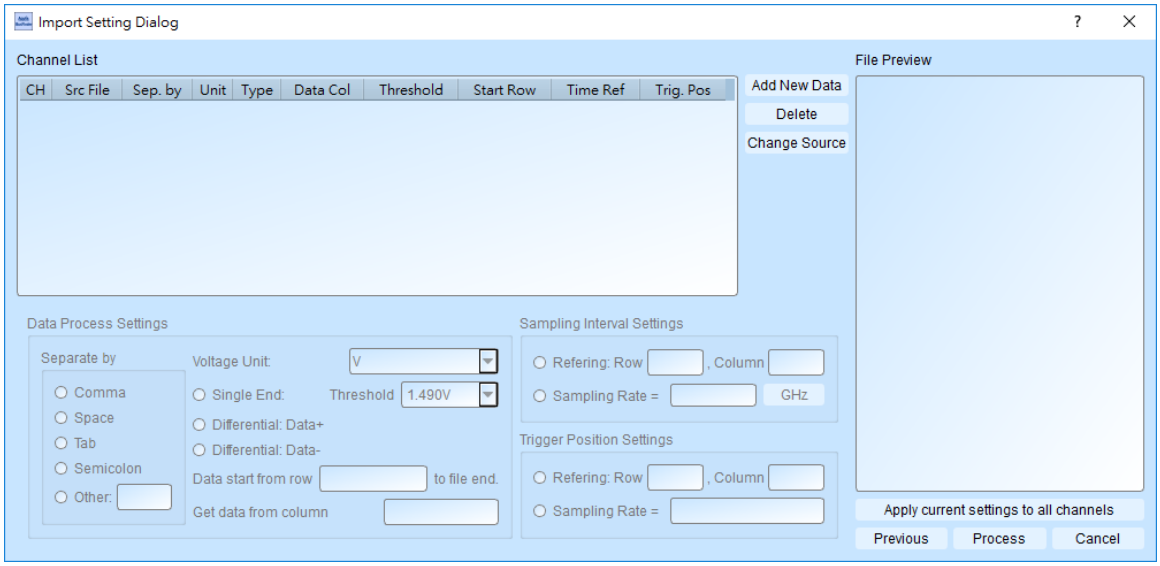
Ex: the default voltage unit is mV

Data 1357 will be interpreted as 1.357V

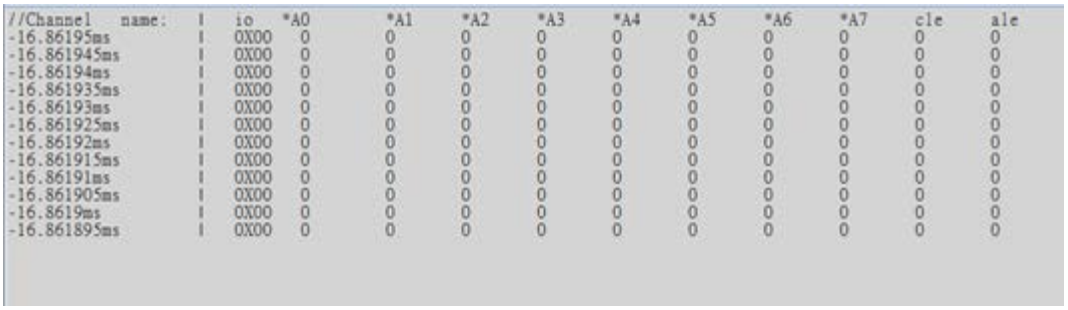
Basic unit selection uV

Data 135790 will be interpreted as 0.13579V

When analyzing with the differential signal mode, it should be noted that the settings of the positive and negative channels must be the same, and the number of positive and negative channels must be matched to be able to analyze.



5. The user can import waveforms from other logic analyzer into LA for analysis by arranging waveform data according to the following format.



//Channel name:	I	io	*A0	*A1	*A2	*A3	*A4	*A5	*A6	*A7	cle	ale
-16.86195ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.861945ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.86194ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.861935ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.86193ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.861925ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.86192ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.861915ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.86191ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.861905ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.8619ms	I	0X00	0	0	0	0	0	0	0	0	0	0
-16.861895ms	I	0X00	0	0	0	0	0	0	0	0	0	0

 Batch Rpt. Save: Store the decode report to .CSV file from multiple captured waveform files.

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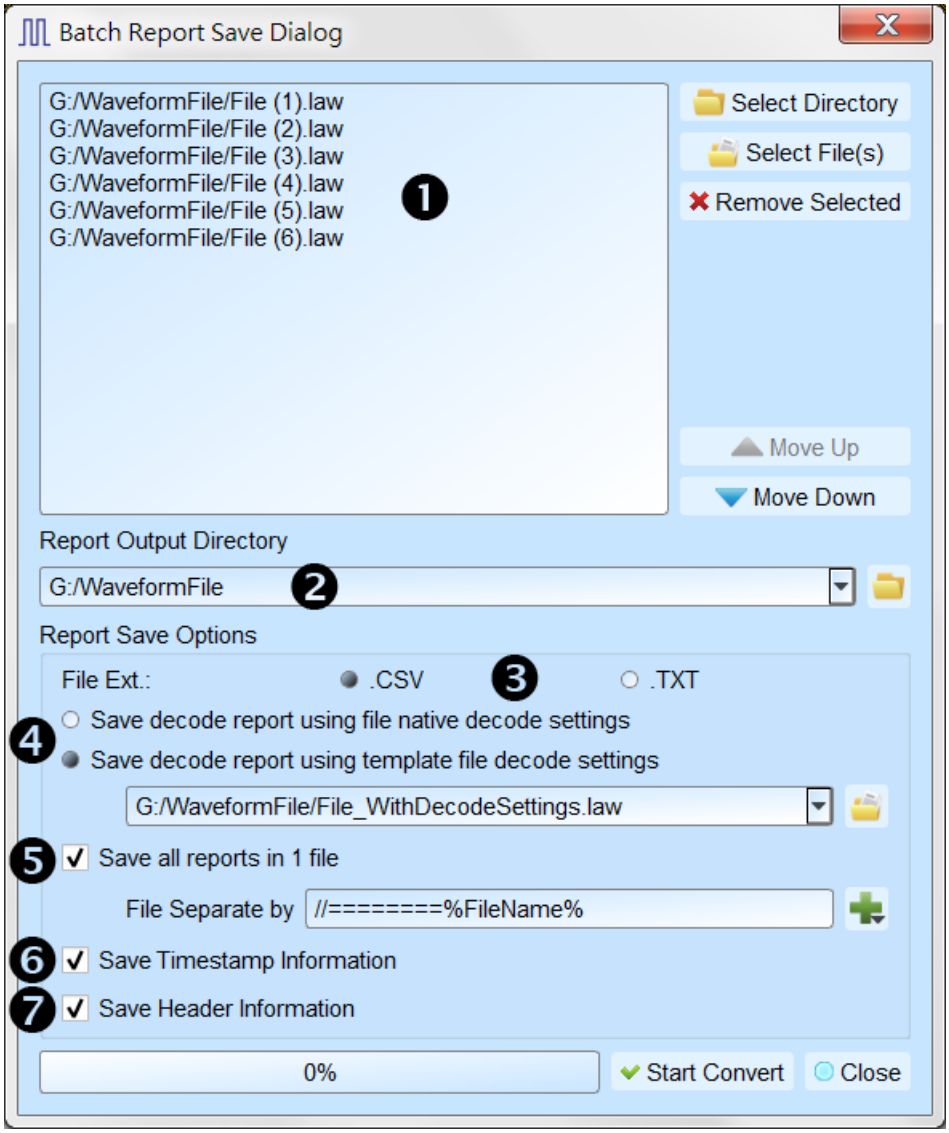
Batch Report Save Dialog



1. Select the source waveform files, accepting file formats including Acute Logic Analyzer Waveform File .BFW or .LAW.
2. Select the file directory to save the converted report file, the saved file will be saved with source file name with different extension name.
3. Select the saved file extension to .CSV or .TXT.
4. Select to use the decode settings in each file, or use the decode settings in specified file to generate the decode report.
5. Select to save the report in separated files or combine all reports into on file with separation text.
6. Select to include the timestamp column information.
7. Select to include the Header column information.

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 Add Protocol Analyzer: Add a protocol Analyzer window

 Add Logic Analyzer: Add a logic Analyzer window

 Language: Display language. You can select English, Traditional Chinese, or Simplified Chinese

 System environment settings: Here you can set the working directory, the label height, whether to load the last setting, the waveform display mode and its color.

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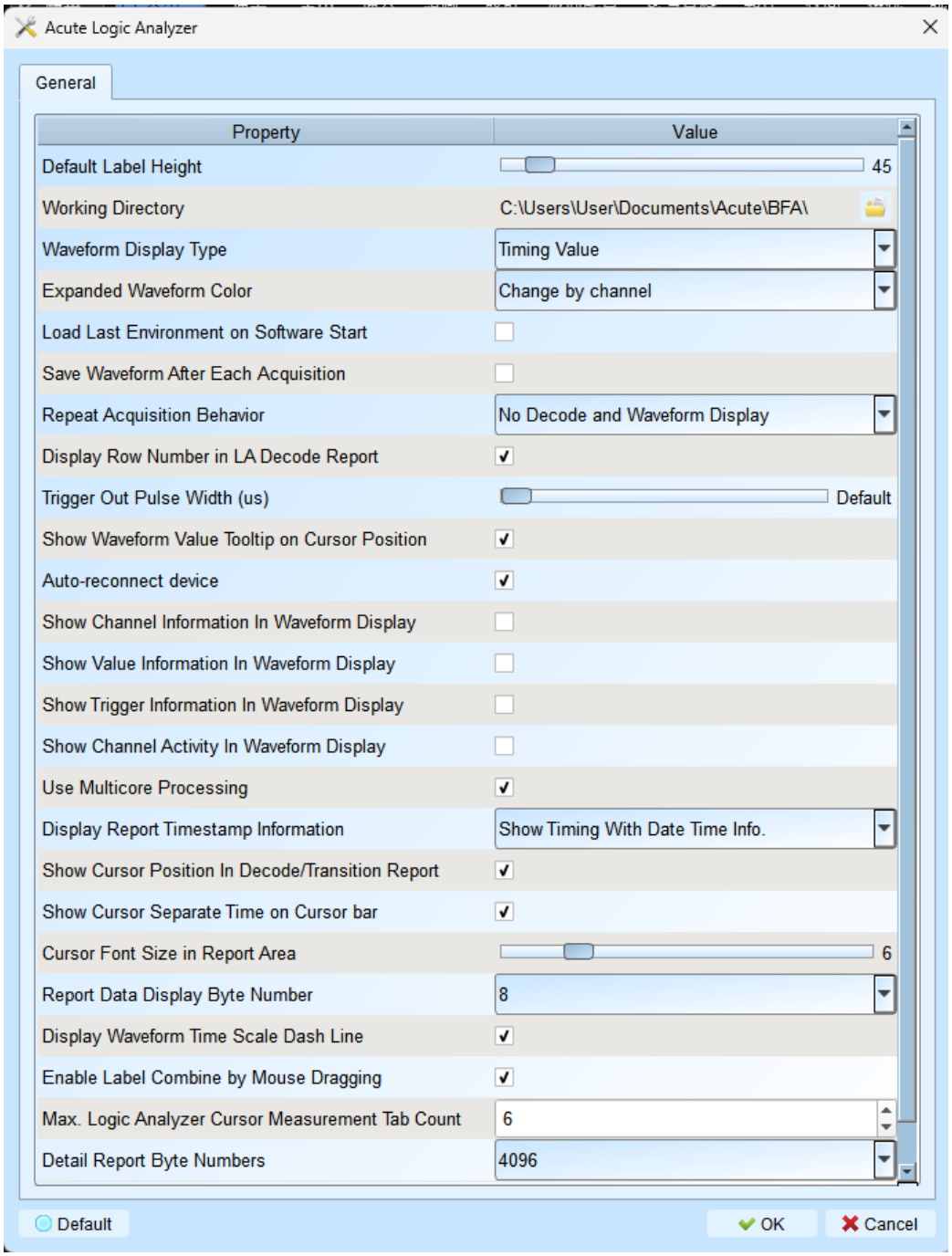

1. Default Label Height: Modify the channel height of the waveform area.
2. Working Directory: The directory where the temporary files and waveforms are stored when the software is in operation.
3. Waveform Display Type: Select which information to display between waveform edges. You can select either display time value, logic value or not to display.
4. Expanded waveform color: You can choose whether the colors are different between channels.
5. Load Last Environment on Software Start: When the software starts, load the

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settings as the file that was previously closed, waveforms will not be loaded.

6. Save Waveform After Each Acquisition: This file is stored in the working directory.
7. Repeat Acquisition Behavior: Whether to display waveform decoding, to display, choose display time (1/2/5 s).
8. Display row number in LA Decode Report: Show row number on the left to the reporting area.
9. Trigger Out Pulse Width (us): The default length is from trigger point to the end of capture. The following 2 items will be controlled by the cursor, which will display the contents of the "Select Cursor", which can be set in the waveform area shift and A-Z, and moved to the cursor position by pressing A-Z (T is the trigger point mark, not available).
10. Show Waveform Value Tooltip on Cursor Position : Show numbers of used channels, show additional names for bus decode.
11. Auto-reconnect device: Reconnect the device while re-plug the USB after device offline.
12. Show Channel Information In Waveform Display: Display the channel number in waveform area.
13. Show Value Information in Waveform Display: Digital channels display 0/1, analog channels display the voltage value.
14. Show Trigger Information in Waveform Display: Display trigger setting values.
15. Show Channel Activity In Waveform Display: Sum up the change types of the edge channel of the captured waveform.
16. Use Multicore Processing: Use multi-core to speed up data processing.
17. Display Report Timestamp Information: Display the timestamp column with timing info format / timing info with date time format (trigger point is at 0 s) / sample count format.
18. Show Cursor Position in Decode/Transition Report: Show cursor position in the report area time field.
19. Show Cursor Separate Time on Cursor bar: Add additional time between cursors on the horizontal timeline of the waveform area.

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20. Cursor Font Size in Report Area: Cursor font size for cursor position in decode/transition report (refer to item 18).
21. Report Data Display Byte Number: This is an item set for protocol analyzer mode, and you can modify the report field to show the number of Bytes.
22. Display Waveform Time Scale Dash Line: Add dash lines on the waveform area to correspond time line to report area.
23. Enable Label Combine by Mouse Dragging: Use the left mouse button to drag a channel label onto another channel label to combine channels.
24. Max. Logic Analyzer Cursor Measurement Tab Count: Displays the number of groups of cursor measurement values in the lower right corner. Minimum of 3 groups, maximum of 10 groups.
25. Detail Report Byte Numbers: Set the limitation of displaying byte number of each detail report.

 Font Settings: User can set the font type and font size that used in display the text in waveform area, note and label.

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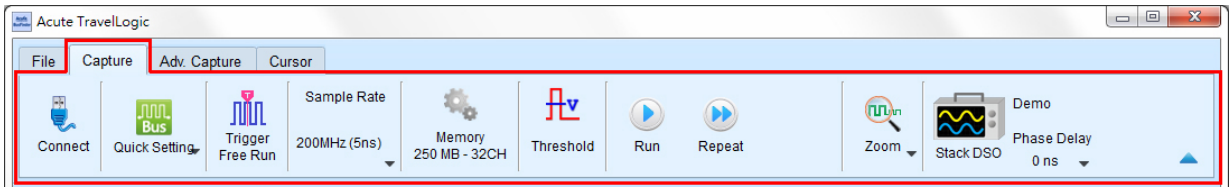
Capture



Quick Setting

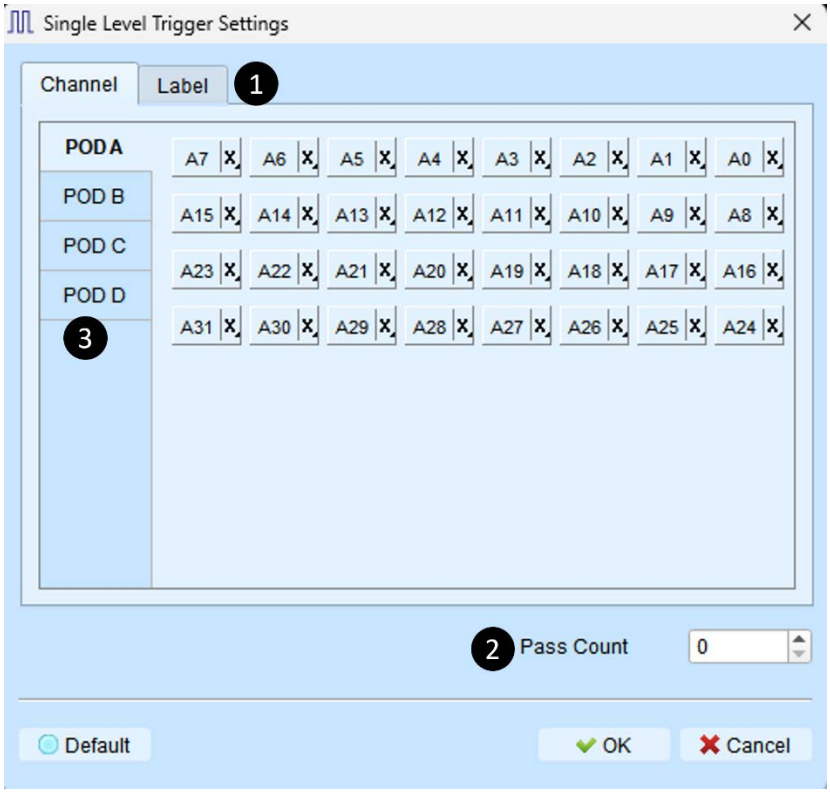
Required channels and related settings can be established quickly. If you specify to establish the bus decode, the sampling rate and threshold will be set according to the default conditions.

Trigger Parameter Settings

- **Manual Trigger**

After setting up, Click “Stop” button to position trigger point.

- **Single Level Trigger**



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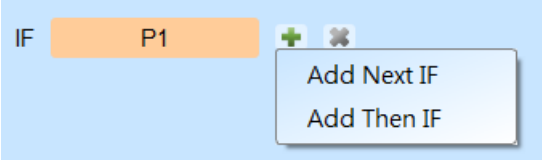
1. **Channel / Label:** You can select Don't care (X), Rising Edge (⇑), Falling Edge (⇓), Low (0), High (1), Either (⇵) or specified Value as trigger conditions.
2. **Pass Count**: The number of triggering signals that match the trigger parameters is ignored. It is preset as 0 by default to indicate that it is not ignored.
3. **POD**: Select the pod that user want to set the trigger condition.

- **Multi Level Trigger**

Multi Level triggering is composed of multiple single-stage trigger conditions. This function can have up to 16 states, each of which must be set separately and set in the same way as the single level trigger. When adding a new state, you can press the button on the top to select the relationship between each state. The relationship between each state can be a continuous trigger (Next IF) or a non-continuous trigger (Then IF).



1. **Schematic diagram of the current set of trigger conditions**
2. **Trigger conditions setting**
   As shown in the following diagram, the first and the second classes are continuous trigger, the relationship between the second and third classes are non-continuous trigger, and the third, fourth, fifth and sixth classes are continuous trigger.

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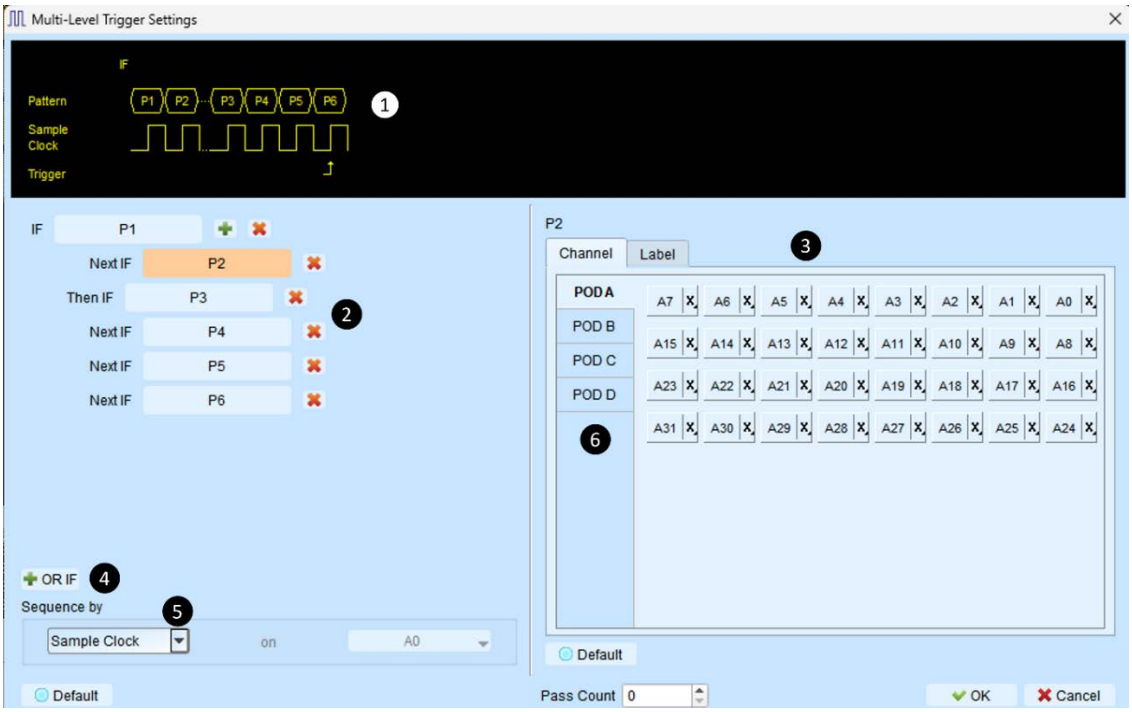

Difference between the continuous trigger and the non-continuous trigger lies in:

Continuous trigger: The signal captured by two adjacent sample clocks must meet the conditions to trigger.

Non-continuous trigger: It is triggered only when both the first condition and the second condition are met, no matter how many signals appear in between the first condition and the second condition. Therefore, such a trigger condition is not continuous at all.

A continuous trigger mode is usually set when Synchronous or State is used for measurement, because the use of synchronous clock is usually in a measurement state, and the signal is in a continuous state. Under the Asynchronous or Timing situation, it is common for the signal at the changing edge to meet the continuous triggering condition, while it is difficult for most of the signals to meet the conditions of continuous triggering, and therefore it is suitable to set non-continuous trigger as a condition for them.

3. **The area to set the trigger condition for each class.**
4. **OR IF** is the condition for establishing a parallel trigger. At this point, each set of

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trigger conditions are judging the conditions at the same time. It is triggered when any set of conditions is met.

5. **Sequence by**

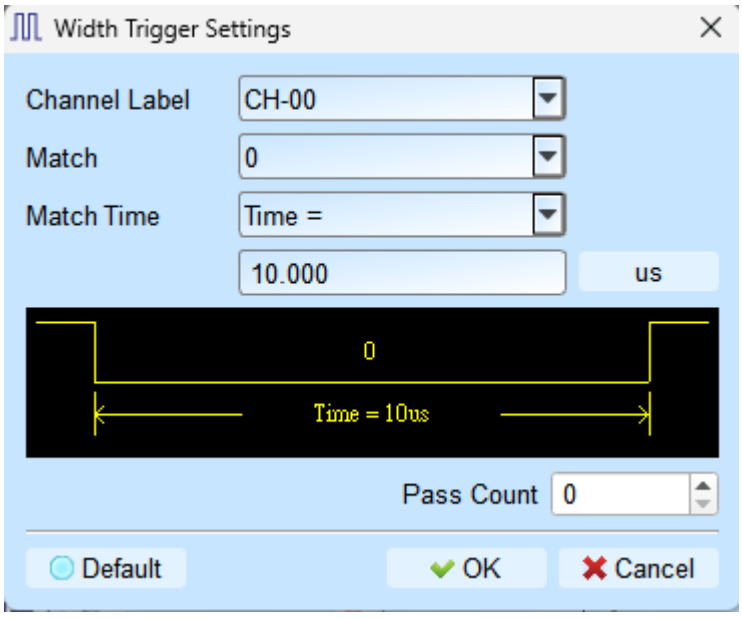
   The user can also set incidental conditions for triggering. In general, the data taken at the sampling point are used for trigger settings. If you want the specified channel at the changing edge to be triggered only, you should use the "Sequence by" setting. With such a function, the user does not have to set trigger conditions for each change at the edge, but just focus on the data to be set. For example, the signal data to be measured is valid only when the clock is at the rising edge. There are four data lines. In this case, you can set the Sequence by as Custom Rising, and then select the Clock pin as the valid condition for the data. Then, you can set the conditions for other data lines in accordance with Multi Level triggering conditions.

6. **POD:** Select the pod that user want to set the trigger condition.

This function is not supported when the sampling frequency is above 2 GHz (inclusive).

- **Width Trigger**

  The width trigger can set the trigger signal when the channel meets the trigger conditions and the length of the full pulse width.



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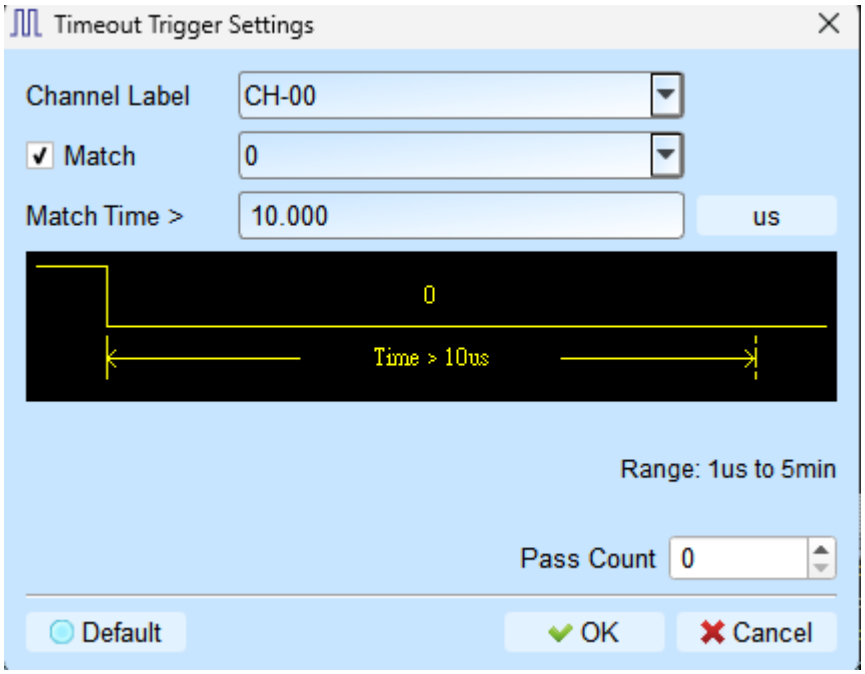
- **Timeout Trigger**

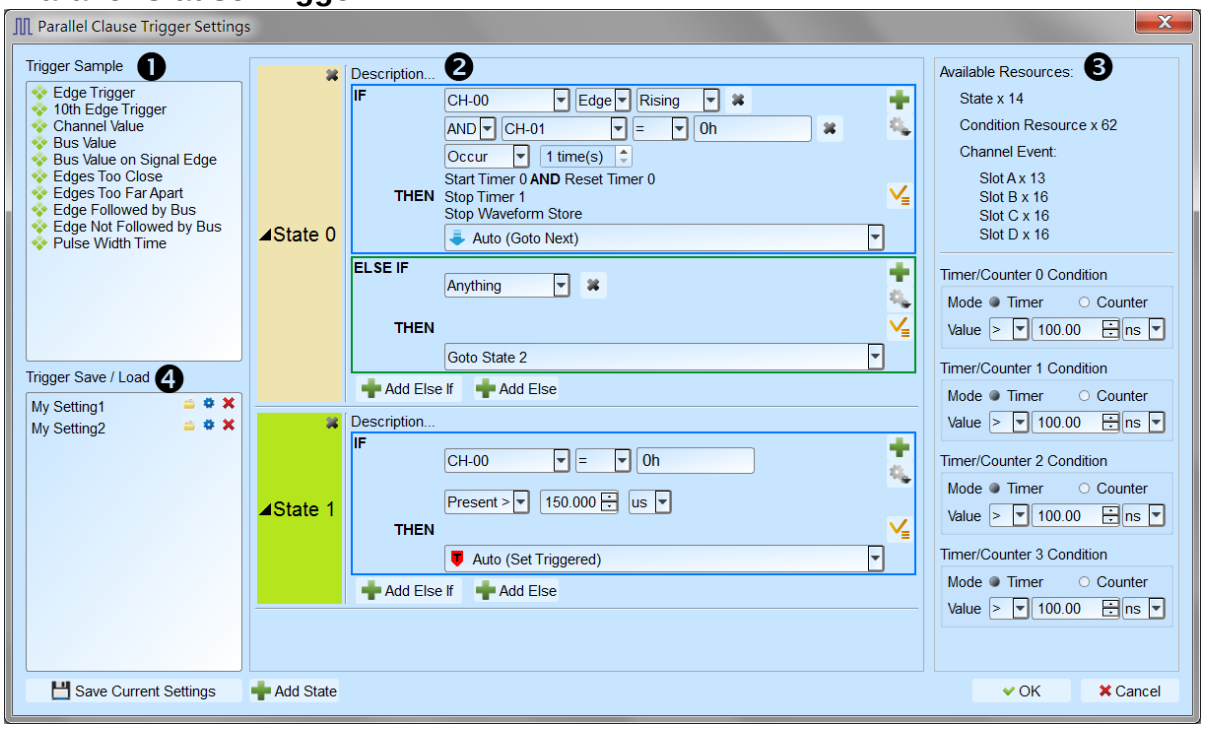
  Timeout trigger can set the time width for trigger conditions. When the signal duration exceeds the set value, it will produce a trigger signal without waiting until a complete pulse is formed.



- **External Trigger**

  The Trigger In input pulse signal of the device is taken as the trigger condition

- **Parallel Clause Trigger**



Parallel Clause Trigger feature provides 16 States, 64 Condition Resources and 4

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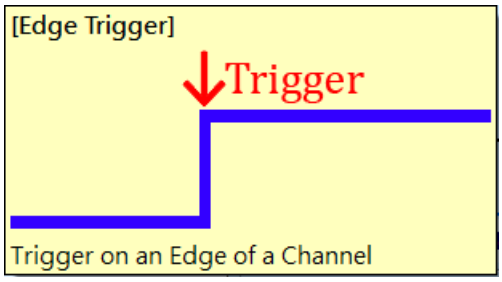
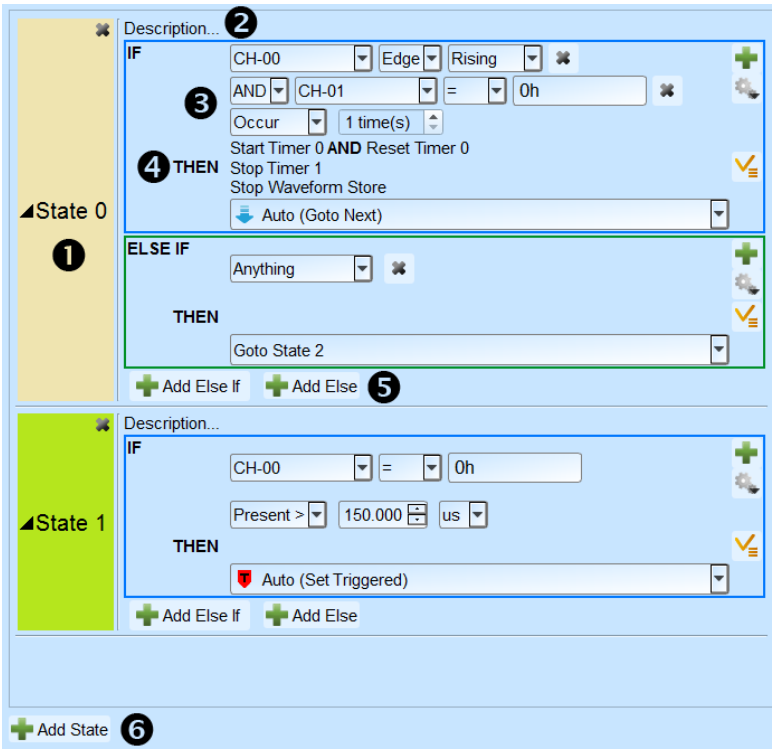
Timer/Counter conditions to help user locate the target waveform, it is also available to set State branch control flow for each IF Clause and decide whether to store waveform or not.

1. Trigger Sample: Provides several Trigger Samples for user's reference, users may also combine multiple trigger samples together for more complex trigger condition. Holding mouse cursor on each Sample for a while will pop up the sample description with schematic picture.



2. Trigger condition settings:



① State button: Click to switch between Text Read Only mode and Edit mode.

② State description: Click to edit a short user description for the State, maximum input text length is 80 characters.

③ IF Clause: Setup trigger conditions for Label selected in waveform area, and it is also available to setup AND/OR logic combination for multiple IF conditions.

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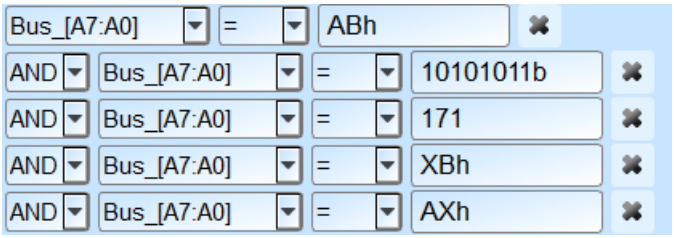
i. Channel Logic/Edge/Pattern compare: Specify value or edge condition for each channel label, it is also available to input X as don't care value for the comparison. Input value ended with h for hexadecimal value; input value ended with b for binary value; input value not ended with b or h for decimal value.



ii. Timer/Counter condition check: Check Timer/Counter conditions, condition will be set as True if the Timer/Counter value is matched, otherwise the condition is be set as False.

iii. Occur and Present time check: Additional Occur times check or Present time check when the all conditions are set to True in the IF Clause.

iv. Control buttons

Add new condition: Click to add new AND/OR IF condition, the new IF condition will consume 1 Condition Resource.

Advanced control button, including:

Get Value From: Set IF condition value by all Label value from selected Cursor position in the waveform area.

Copy: Copy all IF conditions of current IF Clause.

Paste: Paste the copied IF conditions into current IF Clause.

④ THEN Branch: Select the Branch or Trigger control flow when the IF Clause is matched [(2)]. When select Auto, the Branch or Trigger control will be determined by current State order in the setting, the Action will be set as Trigger if current State is the last State in the setting; the Action will be set as Goto Next State if current State is NOT the last State in the setting.

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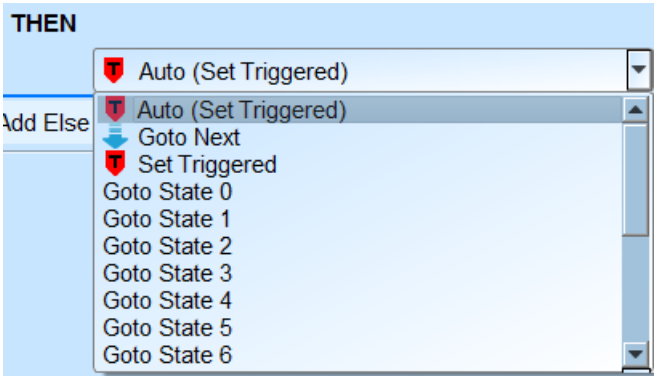

Additional Then action: Setup Timer/Counter Start/Stop/Reset actions or Waveform Store Suspend/Resume for each IF Clause when condition matched.

⑤ Add new ELSE IF / ELSE Clause: Click to add new ELSE IF / ELSE Clause, each clause condition will be checked from top to bottom, and perform the specified Action and Branch if the clause condition is matched. New clause conditions will consume Condition Resources. **ELSE Clause condition will be set as "Anything" and Branch to current State by default if the user didn't assign ELSE Clause.**

⑥ Add new State: Click to add new State Clause, the new State Clause will consume both State and Condition Resources.

3. Available Resources and Timer/Counter settings: Display remain available resource number and Timer/Counter settings.
   Timer / Counter: Parallel Clause trigger provides 4 independent Timer/Counter resources, each resource could be selected to work in Timer or Counter mode. The minimum Timer interval is 12 Sample clock intervals (i.e. 60ns when working in 200MHz sampling mode), and the maximum Timer interval is 0x3FFFFFFF (i.e. 5s when working in 200MHz sampling mode). The minimum Counter value is 1, and the maximum Counter value is 0x3FFFFFFF.

4. Triger Save/Load: Users may save their current trigger settings with maximum 20 characters description, or load previous saved trigger settings from the list, the saved settings will be stored into Working Directory with file name PClauseUserSetting.aqr. Copy and share the .aqr file in order to share the

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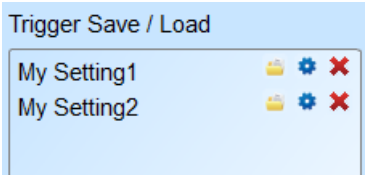
settings to other user.



Load selected Trigger settings, it's also available to select to overwrite current Trigger settings, or select to append the selected settings to the end of current Trigger settings.

Edit the display name for the selected Trigger settings.

Delete the selected Trigger settings.

(1) Timer / Counter features are provided in 300MHz, 250MHz, 200MHz and below sampling rate mode only.

(2) If these not valid trigger setting, system will be hold and the status bar will display "Wait for Trigger", and must press Stop Capture manually in order to retrieve the waveform.

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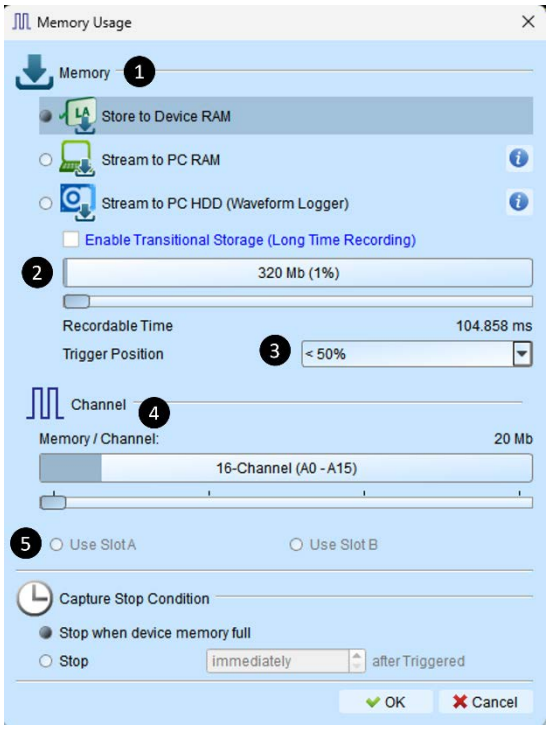
Device Memory Usage



1. Data storage mode:
    - Storage to Device RAM: Storage the data in device RAM. When it full, stop capturing, then return the data to PC for offline analysis.
    - Stream to PC RAM: Use device RAM as buffer, storage the data in PC RAM. When the buffer or PC RAM is full, stop capturing, then analyze the data.
    - Stream to PC HDD (Waveform Logger): Use device RAM as buffer, storage the data in PC HDD(or SSD). When the buffer or the HDD(or SSD) is full, stop capturing, but no any analyze unless user reopen the .LOG file.
2. Device memory usage: Setup the storage depth for capturing data, the capture will be stopped when reach the setup value.

   Recordable time: Estimate the length of the actual capture waveform based on the current settings. The time estimation will be disabled when using Transitional Storage mode.
3. Trigger Position: Set the trigger position. Percentage is used to set the trigger point in the memory. For example, if 50% is set, it indicates that up to 50% of the device memory will be retained to store the pre-trigger data.
4. Memory / Channel: The device allocates available memory based on the number

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of channels selected. The less the number of channels in use, the more memory can be allocated per channel.

5. Capture Stop Condition: User can set the stop condition.

LA3068, BusFinder6000, BusFinder7264B, BusFinder7264B+

Sample Rate	LA Conventional Storage	LA Transitional Storage	SD, eMMC Transitional Storage	NAND Flash Transitional Storage
2G, 2.4G (Slot B)	B4:B31 (28 Channels)	B4:B31 (28 Channels)	B4:B23 (20 Channels)	B4:B28 (24 Channels)
2G, 2.4G	A0:A31 (32 Channels)	A0:A27 (28 Channels)	A0:A19 (20 Channels)	A0:A23 (24 Channels)
1G	A0:B31 (64 Channels)	A0:B23 (56 Channels)	A0:B7 (40 Channels)	A0:B15 (48 Channels)
500M	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)
250M, 200M	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)

LA3136

Sample Rate	LA Conventional Storage	LA Transitional Storage	SD, eMMC Transitional Storage	NAND Flash Transitional Storage
2G, 2.4G (Slot B)	B4:B31 (28 Channels)	B4:B31 (28 Channels)	B4:B23 (20 Channels)	B4:B28 (24 Channels)
2G, 2.4G	A0:A31 (32 Channels)	A0:A27 (28 Channels)	A0:A19 (20 Channels)	A0:A23 (24 Channels)
1G	A0:B31 (64 Channels)	A0:B23 (56 Channels)	A0:B7 (40 Channels)	A0:B15 (48 Channels)
500M	A0:D31 (128 Channels)	A0:D15 (112 Channels)	A0:C15 (80 Channels)	A0:C31 (96 Channels)
250M, 200M	A0:D31 (128 Channels)	A0:D31 (128 Channels)	A0:D31 (128 Channels)	A0:D31 (128 Channels)

LA4068, BusFinder7264 Pro

Sample Rate	LA Conventional Storage	LA Transitional Storage	SD, eMMC Transitional Storage	NAND Flash Transitional Storage
4G (Slot A)	A0:A15 (16 Channels)	A0:A15 (16 Channels)		

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2G, 2.4G (Slot B)	B4:B31 (28 Channels)	B4:B31 (28 Channels)	B4:B23 (20 Channels)	B4:B28 (24 Channels)
2G, 2.4G	A0:A31 (32 Channels)	A0:A27 (32 Channels)	A0:A19 (20 Channels)	A0:A23 (24 Channels)
1G	A0:B31 (64 Channels)	A0:B23 (64 Channels)	A0:B7 (40 Channels)	A0:B15 (48 Channels)
500M	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)
250M, 200M	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)	A0:B31 (64 Channels)

LA4136

Sample Rate	LA Conventional Storage	LA Transitional Storage	SD, eMMC Transitional Storage	NAND Flash Transitional Storage
4G (Slot A)	A0:A15 (16 Channels)	A0:A15 (16 Channels)		
2G, 2.4G (Slot B)	B4:B31 (28 Channels)	B4:B31 (28 Channels)	B4:B23 (20 Channels)	B4:B28 (24 Channels)
2G, 2.4G	A0:A31 (32 Channels)	A0:A27 (32 Channels)	A0:A19 (20 Channels)	A0:A23 (24 Channels)
1G	A0:B31 (64 Channels)	A0:B23 (64 Channels)	A0:B7 (40 Channels)	A0:B15 (48 Channels)
500M	A0:D31 (128 Channels)	A0:D15 (128 Channels)	A0:C15 (80 Channels)	A0:C31 (96 Channels)
250M, 200M	A0:D31 (128 Channels)	A0:D31 (128 Channels)	A0:D31 (128 Channels)	A0:D31 (128 Channels)

6. Choose to use SlotA or Slot B (only for BF/LA3000 Series /LA4000 Series)

   This can only be used when the sampling frequency is set above 2GHz. Since the device can only use a maximum of 32 channels to capture data under this setting, the user can choose to use either SlotA or SlotB.

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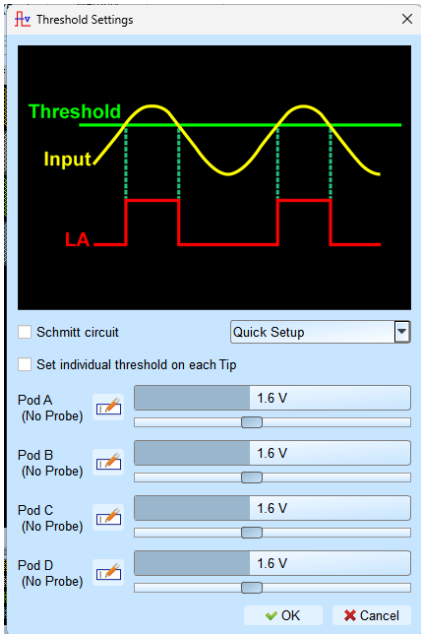
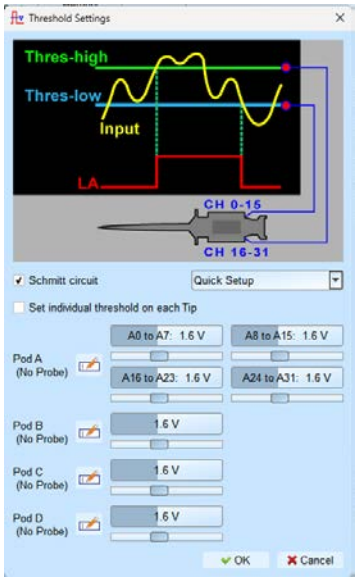
Threshold

- **Threshold Settings**

The threshold is defined as follows: When the level of the captured signal is higher than the threshold, it is Logic High, while lower than the threshold is called Logic Low. From the quick setting, you can select to set the commonly used voltage level, and then adjust the voltage. It is proposed that the threshold of a signal voltage to be measured is set at the half of the signal voltage.



- **Schmitt Circuit Threshold Mode**



When the threshold is only one set of voltage and when the voltage is close to the

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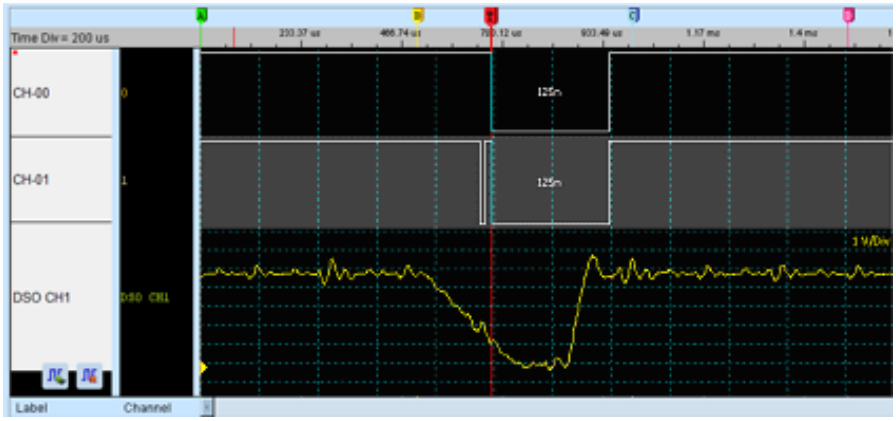
threshold during the signal transition, the signal may be slowed down to allow the device to capture a signal that may be 0 or 1 at this critical point. This will cause trouble for viewing the waveform, as shown in Figure CH-01 below.



The use of a hardware surge filter (that is, Low-Pass Filter) may filter out the noise (Glitch) and solve this problem, but may filter out true noise or high frequency signals. Therefore, the use of hardware surge filter is not suitable for solving such problems.

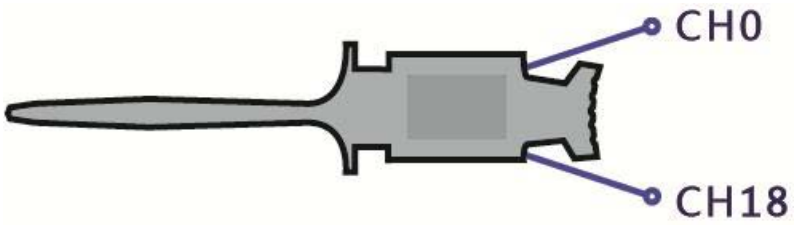
Therefore, the appropriate approach is to use two sets of thresholds to determine the digital signal. In electronics, the use of Schmitt Trigger will cause the phenomenon of hysteresis on the voltage signal, thus eliminating noise interference and solving the phenomenon of signal jitter (transient state).

When using Schumacher Circuit functions, both channels must be used for measurements. Therefore, each measurement point must be connected with two test lines to form two sets of thresholds. As there is no limit on which set should be Threshold-High or Threshold High, you can arbitrarily select either one.

Threshold of the first set is A0-A15

Threshold of the second set is A16-A31

In actual wiring, the two sets must be paired. For example, A0 and A16 are paired, A1 and A17 are paired, and so on.



The rules for logic judgment are: The signal voltage to be measured must exceed Threshold-High to be logic 1, and when the signal drops, the signal voltage to be

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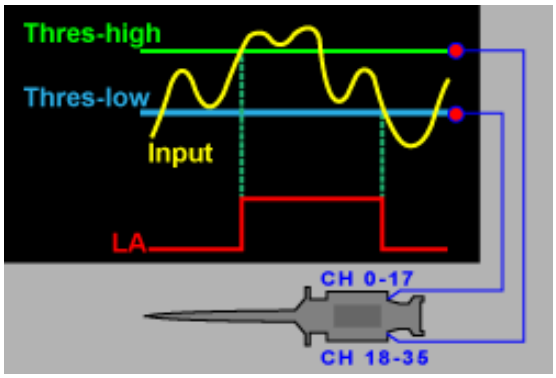
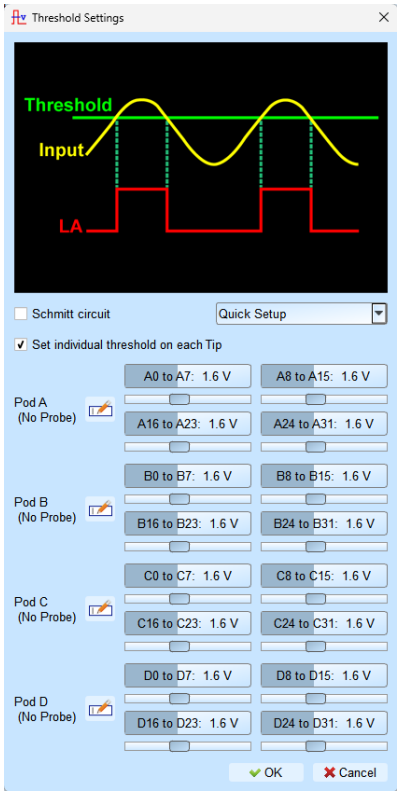
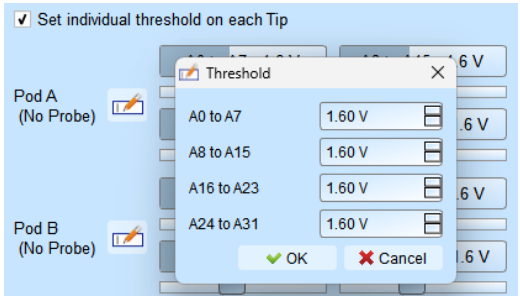
measured must be lower than Threshold-Low to be recognized as logic 0. Those signals between the Threshold-High and Threshold-Low are falling in the non-transposed area. The last logical state is shown as below:



- **Set individual threshold on each Tip**





User can detailly adjust the threshold of each tip while setting this checkbox be checked. Or even more, click the  button, user can directly type the value in need.

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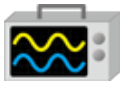
Stack Oscilloscope



Using BusFinder and the Oscilloscope Stack functions, you need to install the special software provided by each oscilloscope brand. The software names are shown in the following table.

DSO brand	Software
Acute	Acute DSO software
Gwinstek	Please download the GW USB driver from the Gwinstek website
Tektronix	Please download the **TEKVISA CONNECTIVITY SOFTWARE** from the Tektronix website.
Agilent Keysight	Please download the **KEYSIGHT IO LIBRARIES SUITE** from the Keysight website.
LeCroy	Please download the **NI-VISA** and Drivers from the **NI** website.
HAMEG	Please download the **NI-VISA** and Drivers from the **NI** website.
Rohde & Schwarz	Please download the **NI-VISA** and Drivers from the **NI** website.

Oscilloscope-supportive models:

DSO brand	Model	USB	TCP/IP
Acute	• DS-1000 • MSO3000 • TravelScope2000/3000	√	
Gwinstek	• GDS-1000A/2000/2000E/3000	√	
Tektronix	• TDS1000B/1000C/2000B/2000C/3000/3000B/ 3000C/5000/5000B/7000 • DPO2000/3000/4000/4000B/5000/7000 7000C/70000/70000B • DSA70000/70000B • MSO2000/3000/4000/4000B/5000 • MDO3000/4000/4000B/4000C • MDO32, MDO34, MSO54, MSO56, MSO58, MSO64 • MDO4014B-3, MDO4034B-3, MDO4054B-3, MDO4054B-6, MDO4104B-3, MDO4104B-6, MDO4024C, MDO4034C, MDO4054	√	√

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	C, MDO4104C		
Keysight(Agilent)	• DSO1000A/5000A/6000A/6000L 7000A/7000B/9000A • MSO6000A/7000A/7000B/9000A • DSO-X 2000A/3000T/3000G/4000A/6000A/ 9000A • DSA 9000A • DSA-X 9000A/9000Q • MSO-X 2000A/3000T/3000G/4000A/6000A • EXR 100A/400A • DSAZ634A, DSOZ634A, DSAZ632A, DSOZ632A, DSAZ594A, DSOZ594A, DSAZ592A, DSOZ592A, DSAZ504A, DSOZ504A, DSAZ334A, DSOZ334A, DSAZ254A, DSOZ254A, DSAZ204A, DSOZ204A, DSOS054A, DSOS104A, DSOS204A, DSOS254A, DSOS404A, DSOS604A, DSOS804A, MSOS054A, MSOS104A, MSOS204A, MSOS254A, MSOS404A, MSOS604A, MSOS804A	√	√
LeCroy	• WaveRunner / WaveSurfer / HDO4000 / HDO6000 / SDA 8 Zi-A / DDA 8 Zi-A		√
HAMEG	• HMO3000/2000/1000	√	√
R & S	• RTO1000 / 2000 / 3000 • RTE1000 • RTM3000 • RTP164 • MXO44, MXO54, MXO58		√

There are two methods for hardware wiring:

TravelLogic is the Master, while the oscilloscope is the Slave.

Wiring direction is from TravelLogic's Trig-Out ➔the oscilloscope's Trig-In (see Figure 1)

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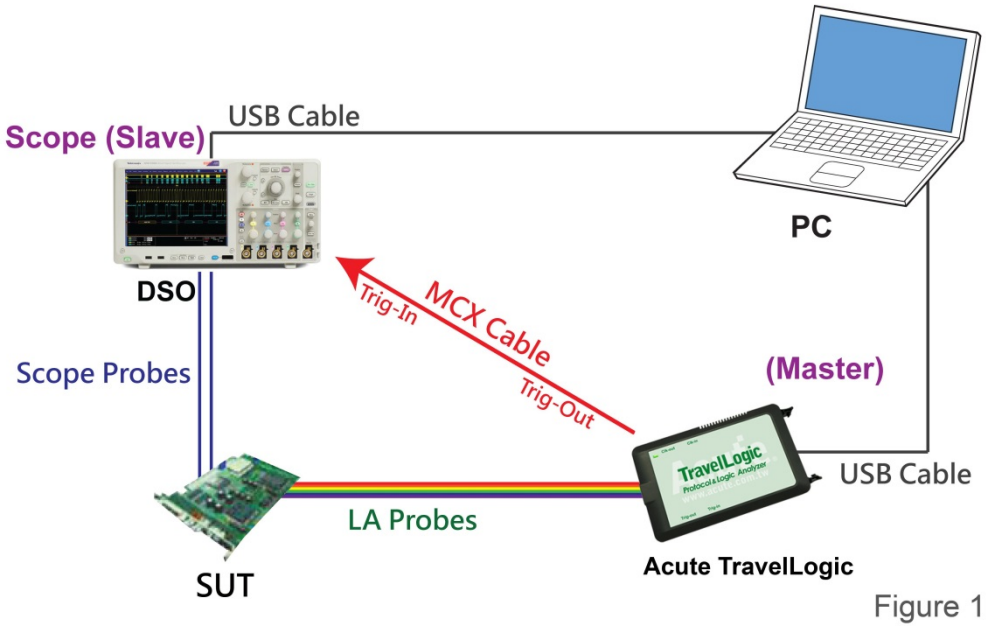

Figure 1

In Figure 1, the USB or Ethernet (TCP / IP) interface is connected to the computer, and then connect the BNC-MCX cable to the TravelLogic Trig-Out and the trigger input interface (Ext-Trig, Aux In or Trig-In) of the oscilloscope. MDO4000 Series is fixed in the analog channel CH4.

The oscilloscope is the Master, while the TravelLogic is the Slave.

Wiring direction is from the oscilloscope's Trig-Out ➔TravelLogic's Trig-In (see Figure 2).

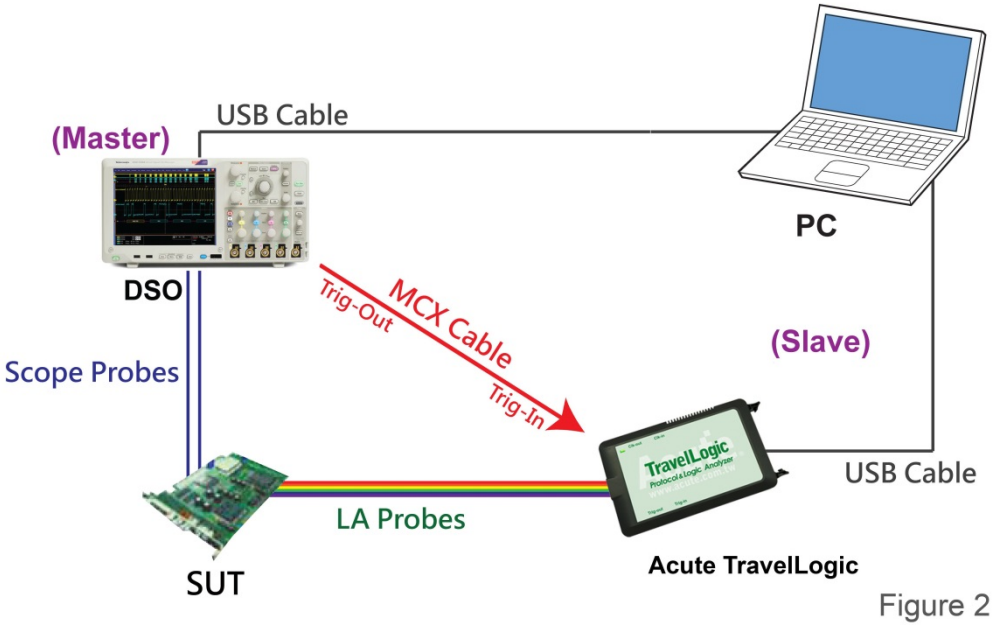

Figure 2

In Figure 2, the BNC-MCX cable is connected to the TravelLogic Trig-In and the

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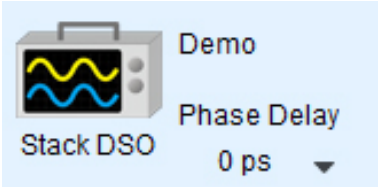
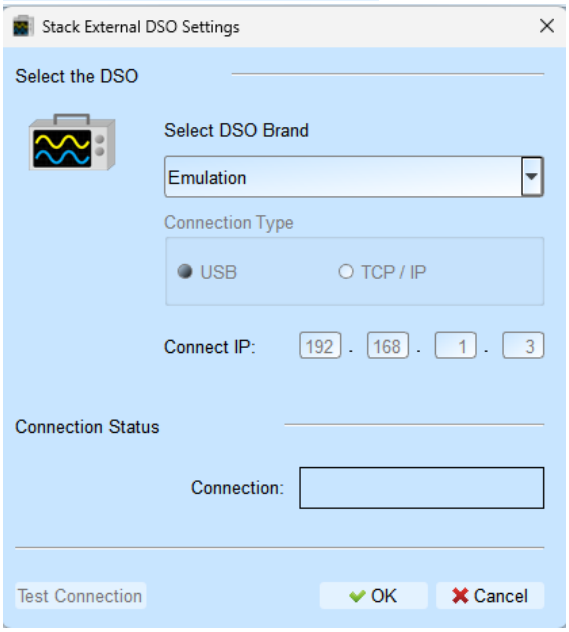
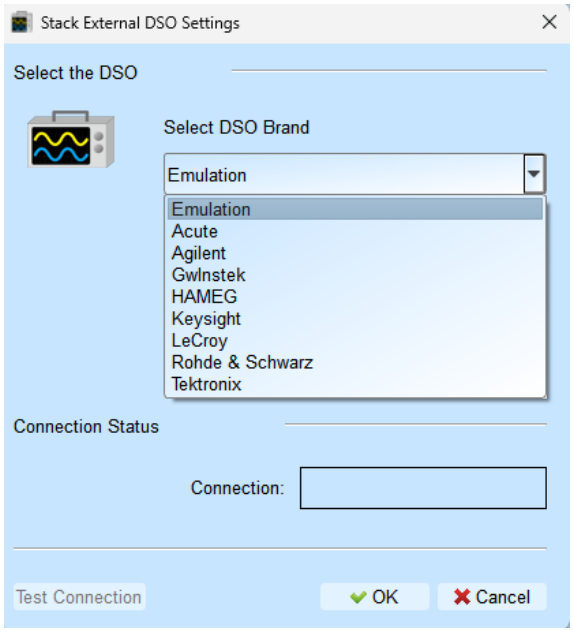
trigger output interface (Trig-Out) of the oscilloscope. After completing the above actions, press the "Stack Oscilloscope" button, as shown below:







Select the DSO

Select the brand that needs to be stacked on the oscilloscope. When there is no DSO hardware available for stacking, emulation is the mode used to read back the storage files of DSO stack.

Connection Type

It can be used to select USB, TCP / IP, according to the connection interface provided by the oscilloscope brands.

Connect IP

It can be used to select TCP / IP for the connection mode and enter IP address. When the Ethernet crossover cable is used, it is recommended that the IP settings of the two machines be 192.168.1.2 and 192.168.1.3 respectively. Gateway is the same, set to 192.168.1.1, and DHCP is set to OFF. If the IP setting does not take effect, please disable and then enable the network, or reboot to make the network settings effective.

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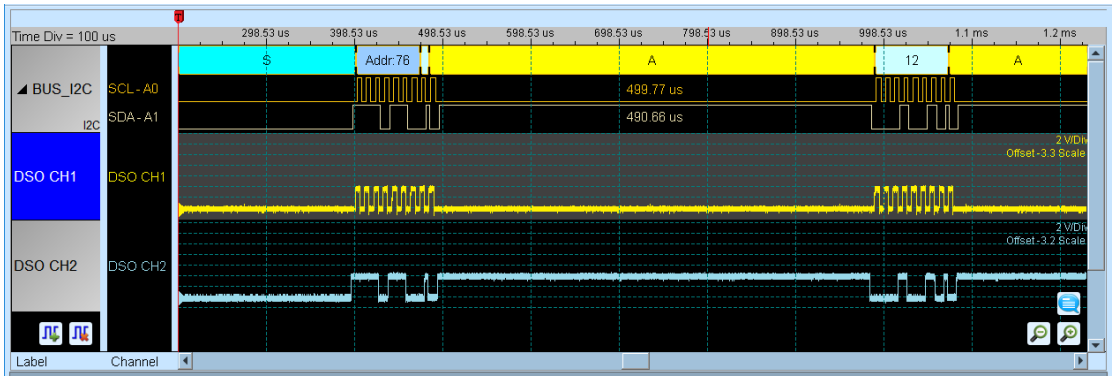
Test Connection / Connection Status

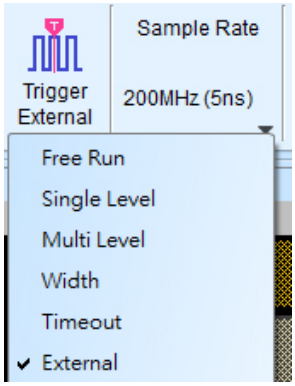
It can be used to connect the oscilloscope / display the current stack oscilloscope model and automatically add the oscilloscope channel to the waveform window.

Screen of oscilloscope stack



Oscilloscope is set as the master, while the TravelLogic is set as the slave

If the stack is composed of the oscilloscope as the master and TravelLogic as the slave, you must not only complete the above-mentioned basic settings but also set the external trigger signal. For the hardware wiring, please refer to Figure 2. Press "Trigger Condition" → "External Trigger", as shown below.



Stack Delay

When TravelLogic is triggered successfully, the Trig-Out signal is transmitted through Cable to the DSO with a time delay, resulting in a deviation between the logic and the analog signal time displayed by the waveforms. Therefore, the stack delay time must be set to compensate the delay. In the waveform display screen, you can put the mouse on the top of the DSO waveforms, hold down the Shift key, and then use the mouse's left button to drag the DSO waveforms to the appropriate location to

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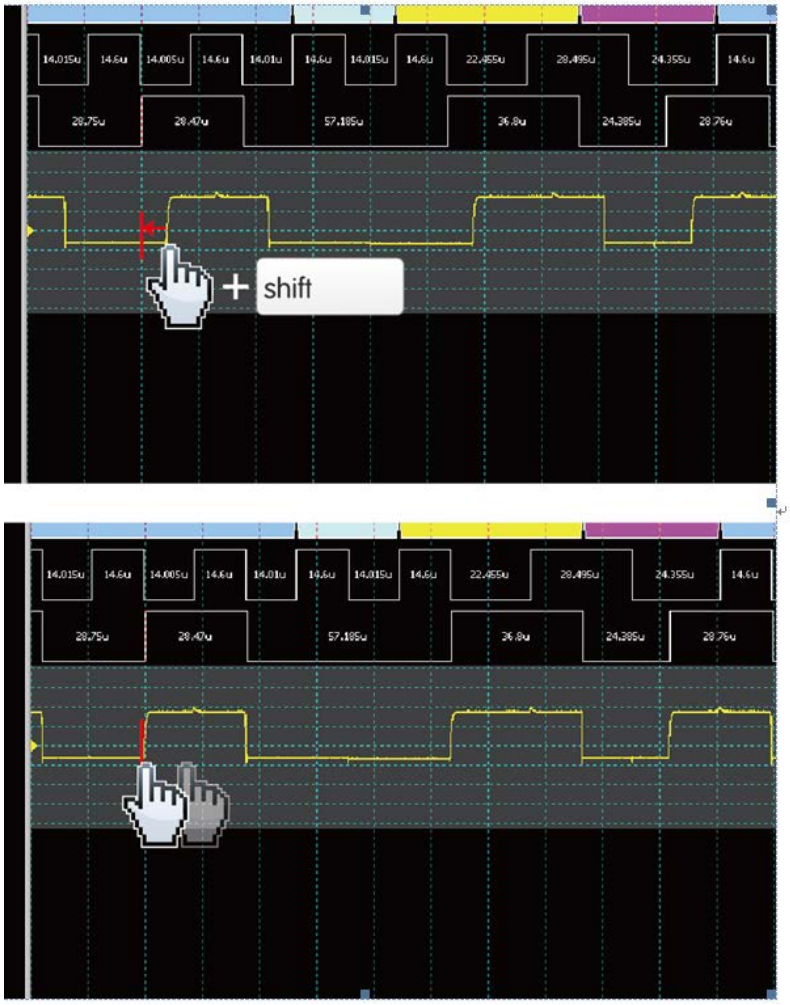
complete the stack delay correction.



Stacking line:

BNC-MCX line 100cm for standalone DSOs

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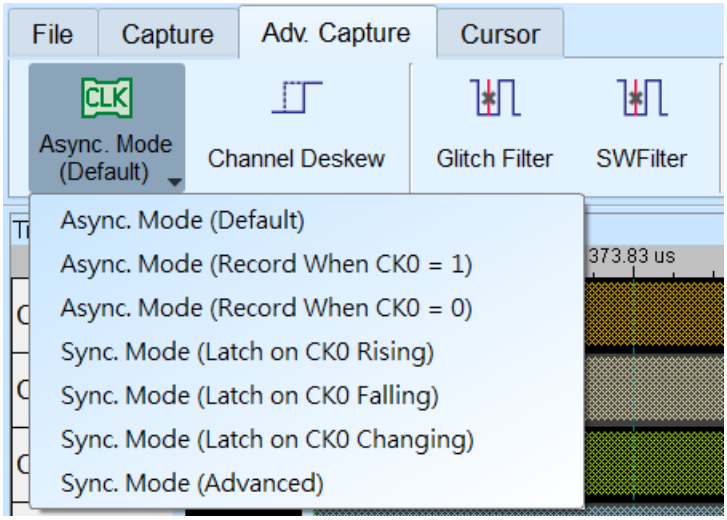
Advanced Capture Setting



- **Capture mode setting**

Asynchronous mode:

Asynchronous mode, also known as timing Analyzer, is based on the internal clock as a sampling frequency. It is recommended that the sampling frequency be set at about 10 times the signal to be measured, with the minimum not less than 5 times. Any rates lower than 5 times will cause distortion. Asynchronous sampling will cause sampling error from the actual capture to the signal, with the error time being the reciprocal of the sampling frequency.

The default mode is to capture the signal at the sampling frequency. If you want to increase the signal capture frequency, you can add a qualifier by selecting CK0 and setting a channel to be 0 or 1. For example, when Chip Select is 0 to allow to capture the signal, you can select the asynchronous mode (recorded when CK0 = 0) to add the qualifier. After the qualifier condition is selected, the device will automatically turn on the transpose mode to capture the signal.

Synchronous mode:

Synchronous mode, also known as the state Analyzer, uses the external input clock as the sampling frequency. The channel marked with CK0 on the signal line is the external clock input channel. When the external clock stops, the signal capture will also stop, forming a synchronous operation between the two.

Easy setting

CK0 is used as the input clock when it is at the edge of Rising / Falling / Either.

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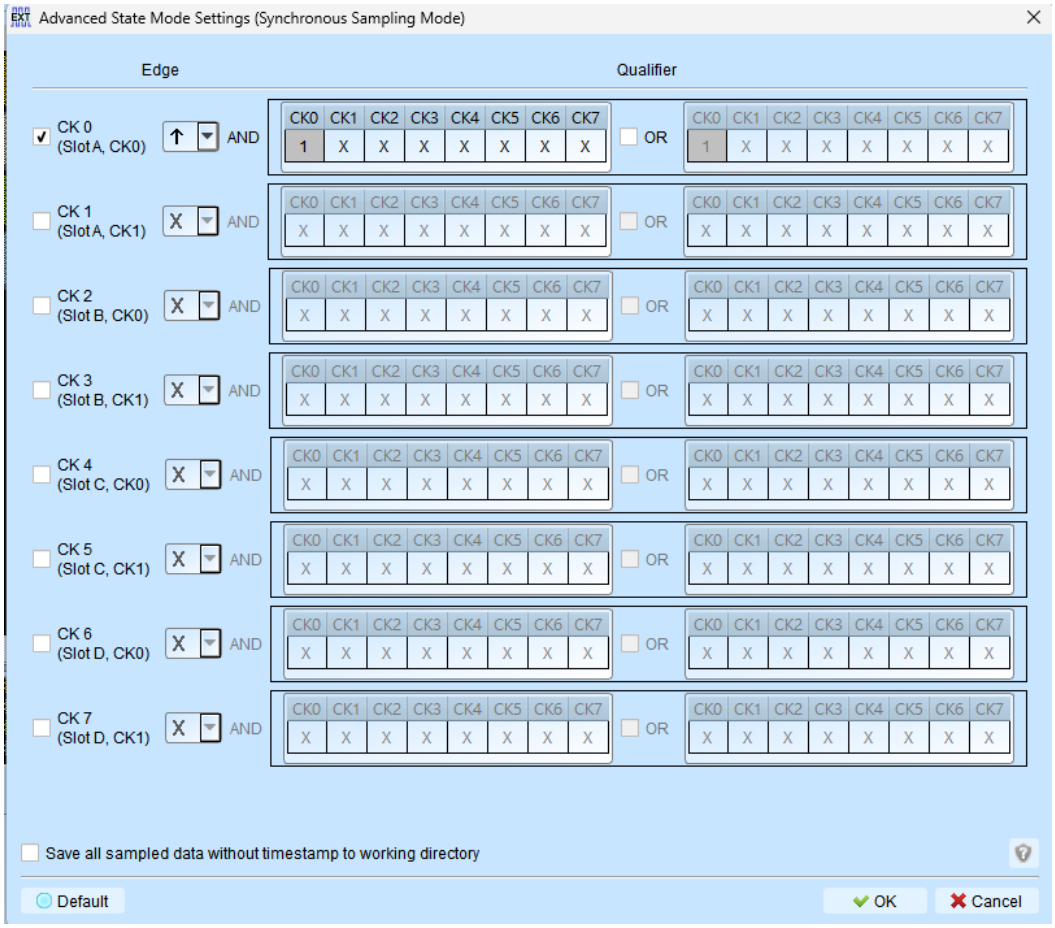
Advanced setting

The content of the easy setting looks like the following figure. Only the Ck0 at the changing edge is used for synchronous sampling.



Advanced setting allows you to use multiple sets of Edge conditions to sample at the same time. Each set of Edge conditions has two sets of qualifiers, any of which is met, sampling will take place immediately. Take the following conditions as an example:

CK0↑ +Ck3=0 Sampling will take place immediately.

CK0↑ +Ck2=1 Sampling will take place immediately.

CK2↓ Sampling will take place immediately.

CK[3:0]=1001 or 0010 Sampling will take place immediately (without referring to the Edge conditions).

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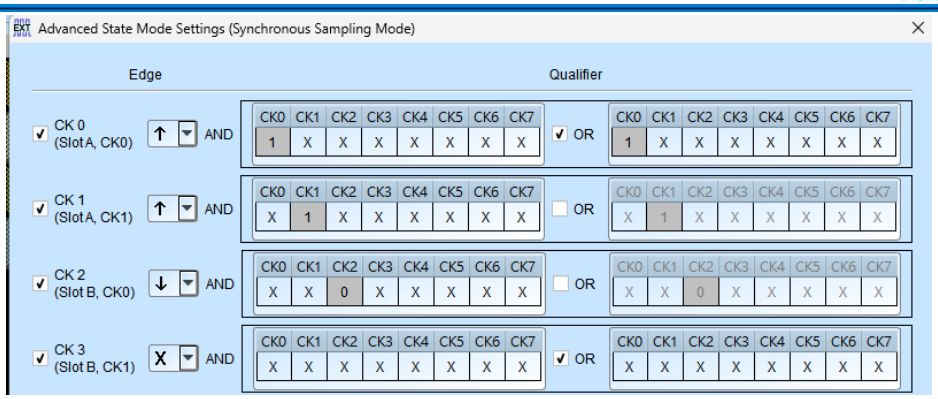
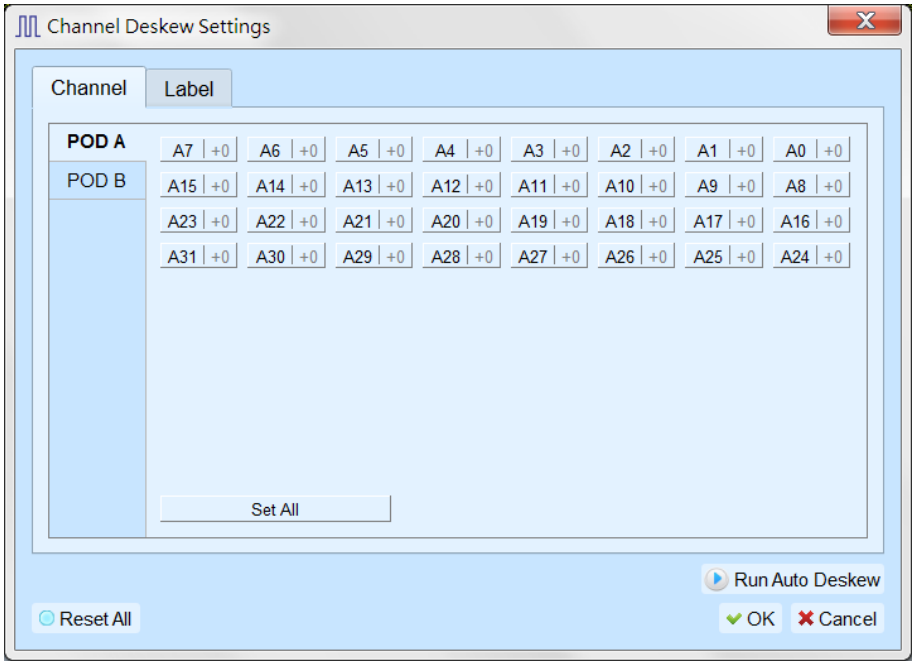


- **Channel Deskew Settings**

The channel phase could be adjusted to eliminate the channel skew, the adjustable range is from -1170ps to 1170ps, and you may use the Auto Deskew function or input the phase value manually.



Before running the Auto Deskew, you need to setup the target clock channel and the sampling edge of the clock, and the software will capture, analyze the waveform according to your settings and provide the suggested deskew settings.

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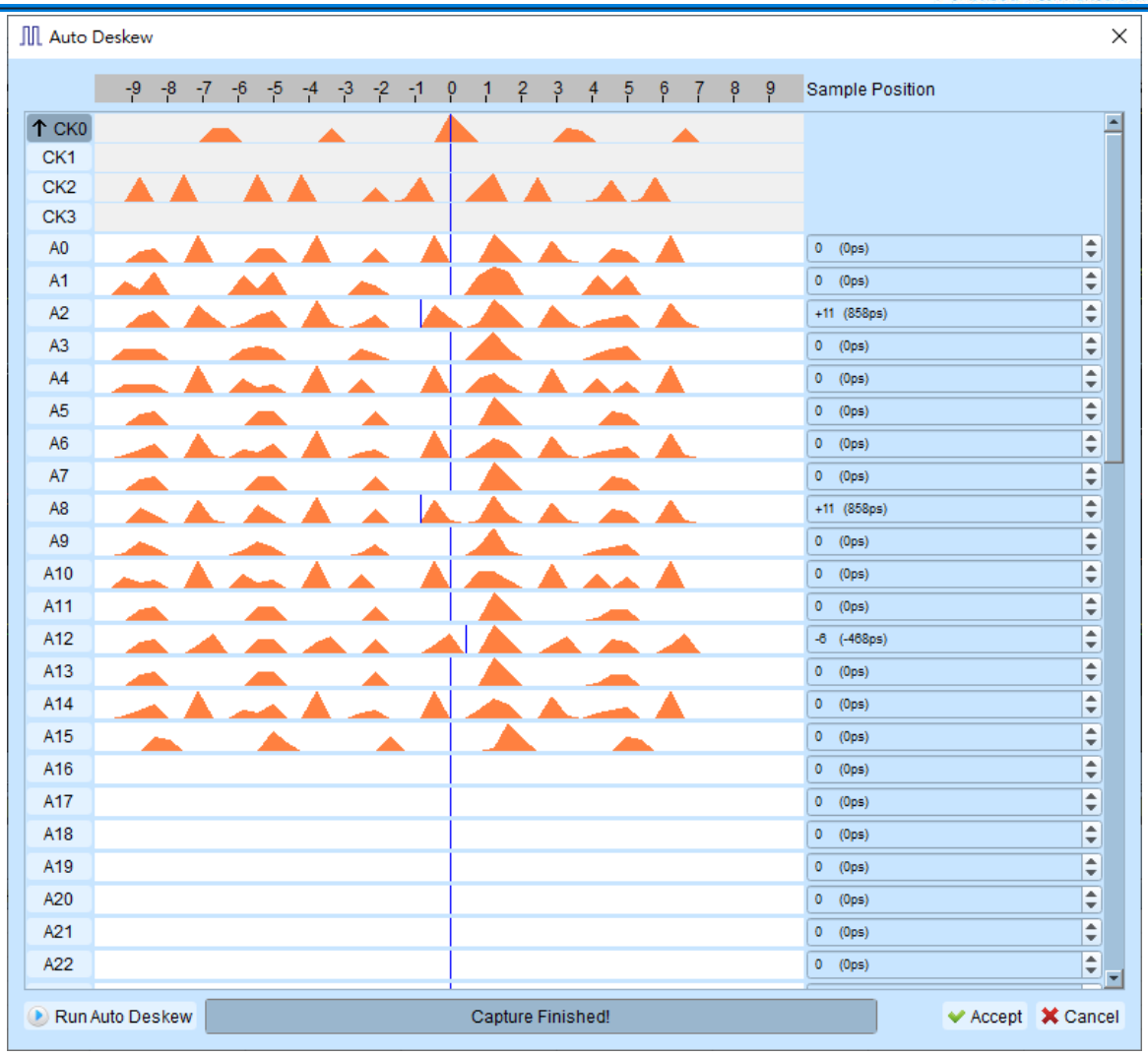

- **Glitch filter settings**

The hardware glitch filter function is used to filter out unwanted glitches and logical misjudgment caused by slow transitions. It can be regarded as a low-pass filter to remind the user that the glitches may sometimes lead to poor quality of data transmission. You can use the Logic Analyzer and Oscilloscope Stack to determine the signal integrity and whether there are unexpected glitches.

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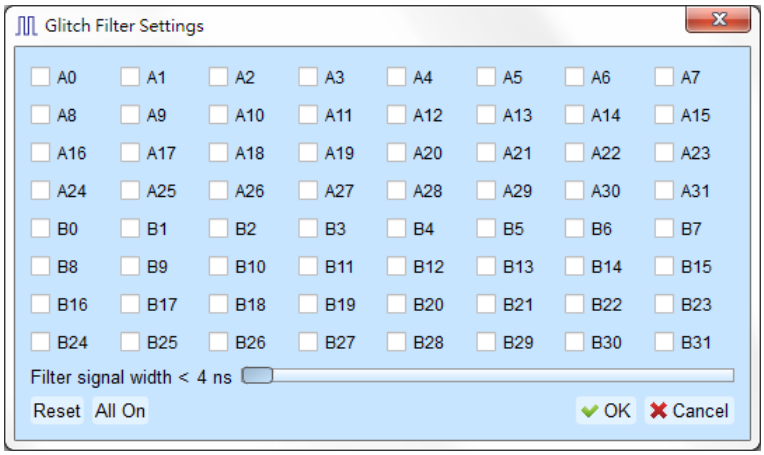
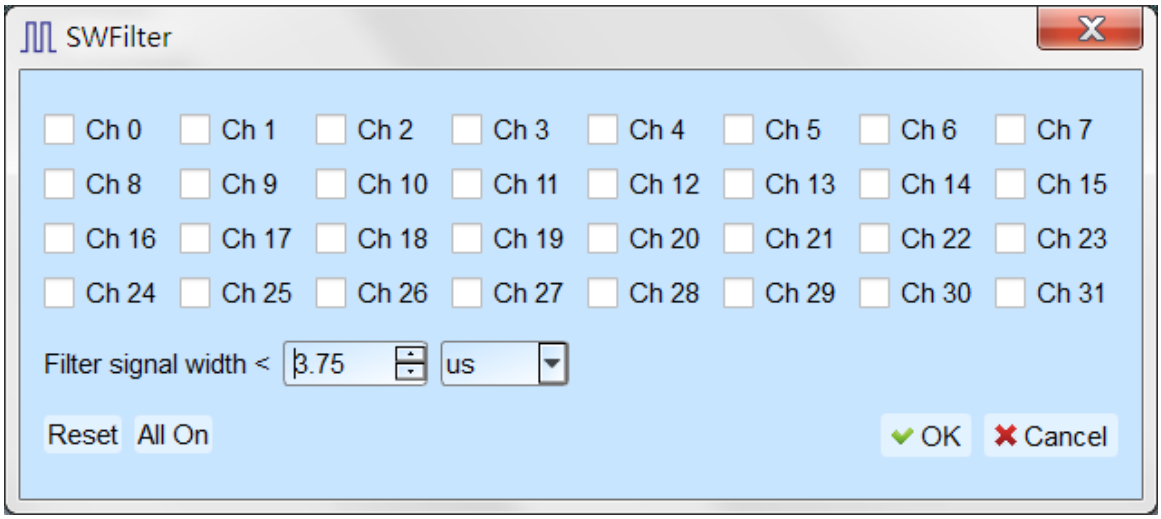


This filter function can be set to filter the signals of less than 5ns-35ns wide. After this filter function is enabled, it will filter before the hardware is triggered. Channels that use the glitch filter function are marked with a red dot on the channel label for identification.

- **Software Glitch filter settings**



This filter function can be set to filter the signals with pulse width range from 1ps to 1ms. Applying this filter function will only change the display and decode contents, the trigger and recordable time will remain not effected. Disabling this filter function will restore all waveform contents back to the original un-filtered waveform.

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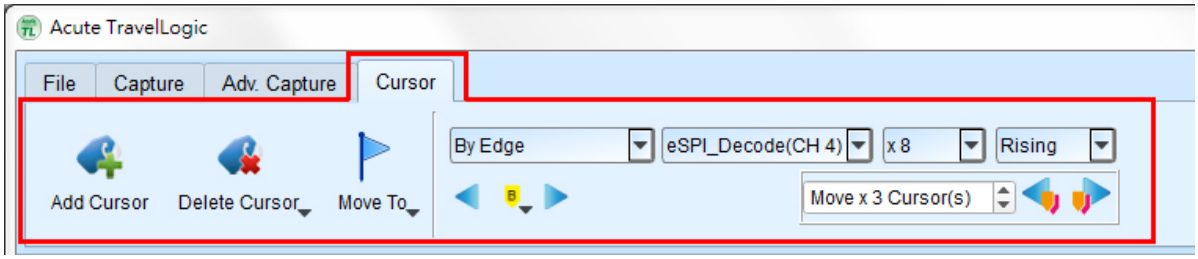
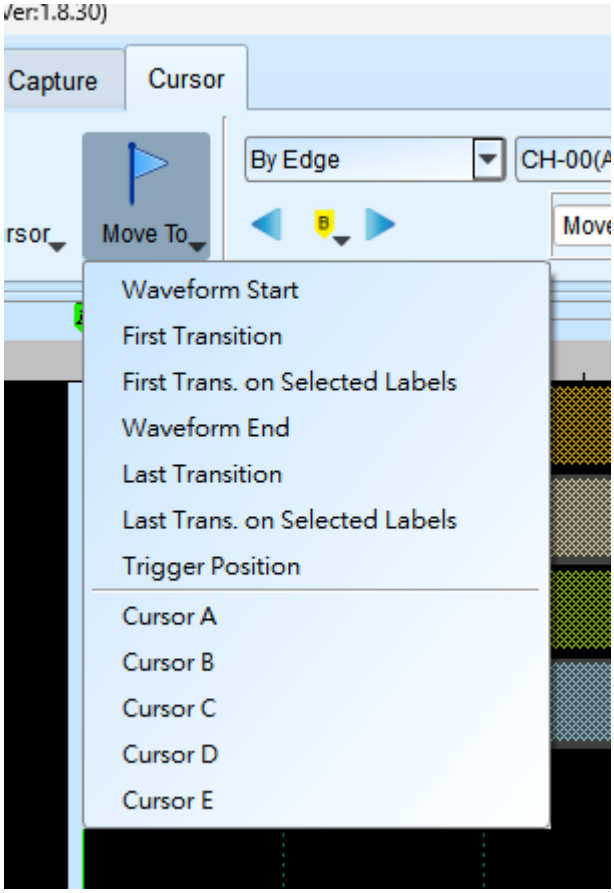
Cursor

This function includes the cursor setting and the waveform search function matching the cursor.



Move To: Move the focused timestamp position in the waveform area according to the selection.



Waveform Start: Move to the beginning of waveform

First Transition: Move to first waveform transition

First Transition on Selected Label: Move to first waveform transition of selected label

Waveform End: Move to the end of waveform

Last Transition: Move to the last waveform transition

Last Transition on Selected Label: Move to the last waveform transition of selected

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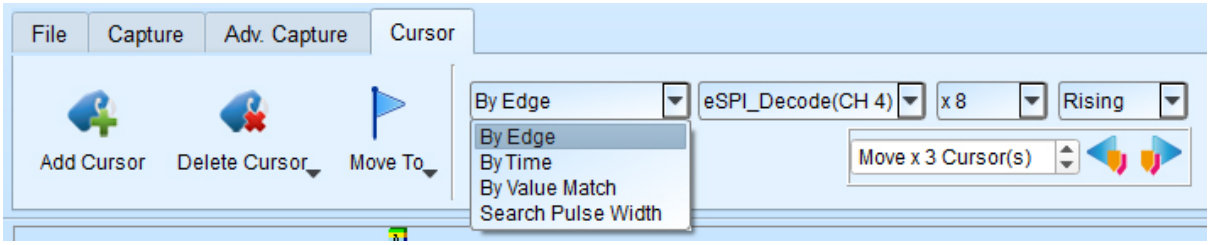
label

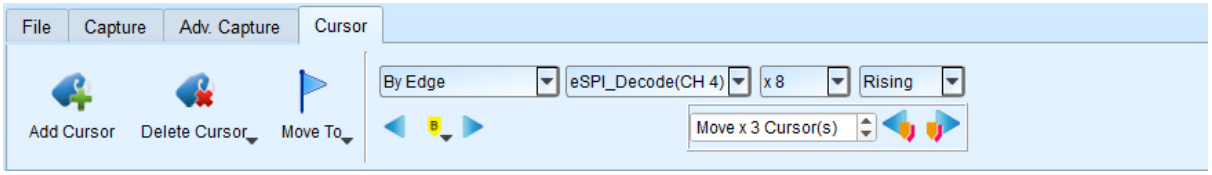
Trigger Position: Move to the trigger position

Cursor A-Z: Move to the Cursor position

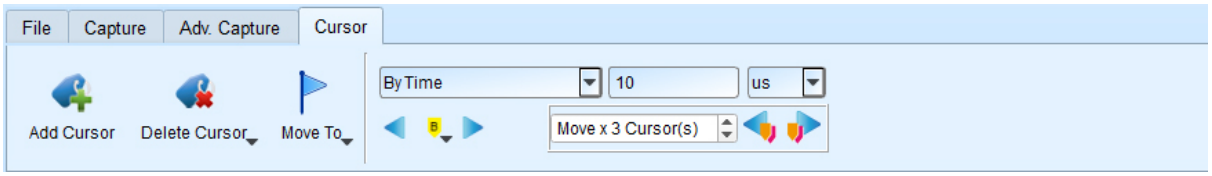
Waveform search is divided into four modes:



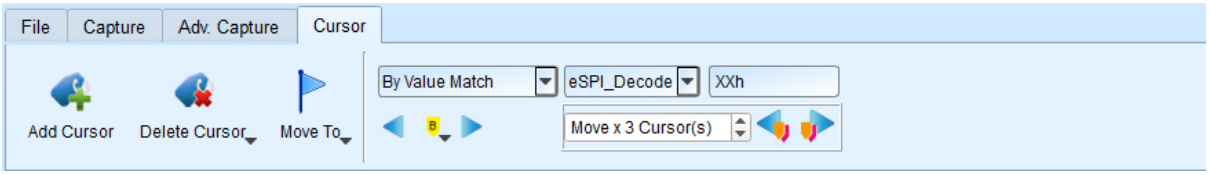
1. By Edge: Move the specified cursor position according to the number of Rising / Falling / Either edges (x1 ~ x4096) of the specified channel.



2. By Time: Move the specified cursor position forward or backward to specify the amount of time.



3. By Value Match: In search of displayed value content of the specified channel, if the specified channel is the bus Protocol, the text comparison will be used for the search; if the specified channel is the bus or channel, the numerical comparison will be used for the search.



4. Search Pulse Width: The waveform pulse widths meeting the conditions can be searched on the specified channels. The single-cursor movement function on the left side or the multiple-cursor movement function on the right side can be used on any operation meeting or exceeding the conditions.

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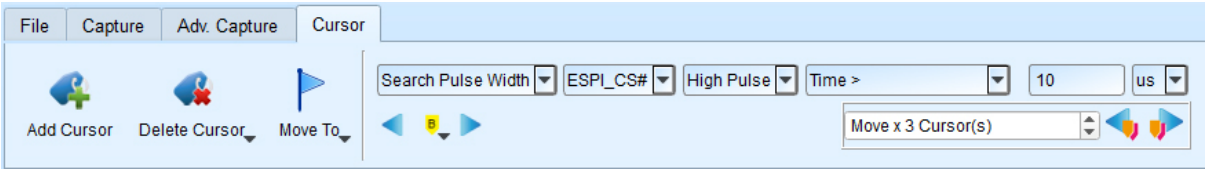

The starting point of the search is set to the current position of the selected cursor.

Cursor usage:

The cursor system has two special-purpose cursors: the triggering cursor T and the search-specific cursor B, respectively.

To add a new cursor, you can use the left mouse button to click the “Add Cursor Button” () on the top or press the Shift+ letter key. To delete a cursor, you can click the “Delete Cursor Button” () on the top.

Cursor movement method:

1. Using the left mouse button to drag the cursor sign or cursor line on the top of the waveform window, you can achieve the purpose of moving the cursor.
2. Use the keyboard A-Z to quickly navigate to the mouse cursor location.
3. Use the keyboard Shift + A-Z to move the cursor to the place where the mouse cursor is. If the cursor does not exist, you can add the cursor to the mouse cursor without dragging the cursor.

The value on the frequency / time display bar at the bottom right of the screen will change as the cursor moves.

 From left to right are the interval time, frequency calculation, the number of sampling statistics, respectively.

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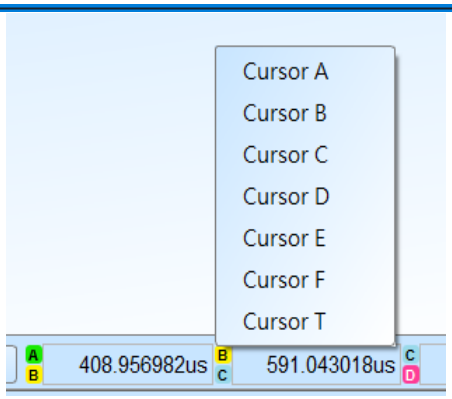

Clicking the cursor name, you can switch the cursor.

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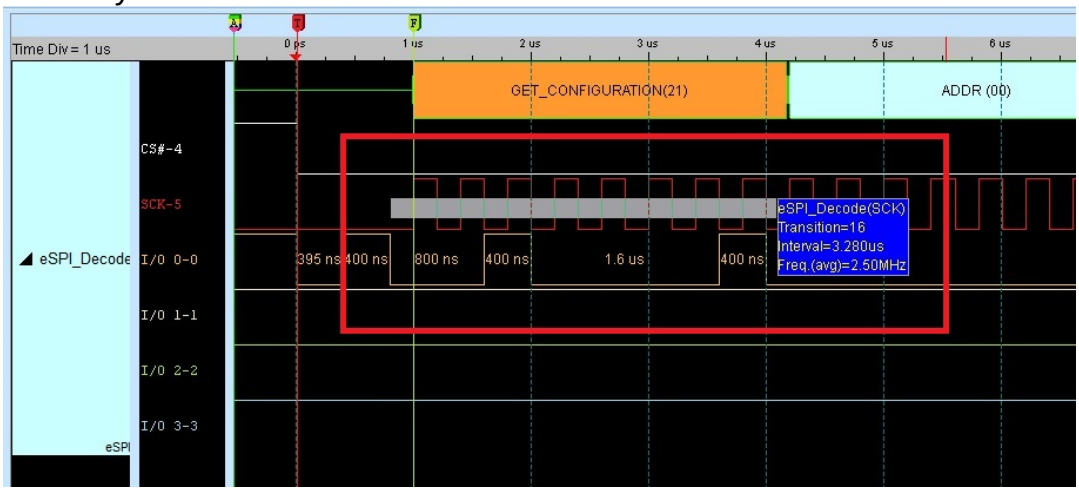
Waveform Area

1. Use the left mouse button to drag the waveform in the waveform display area.
2. You can use the mouse wheel or click the zoom in button on the screen to zoom the waveforms in or out  .
3. To add text / graphic annotation  , you can add text or graphic annotation data in the waveform area.
4. Quick calculation function

   If you press the right button to drag in the waveform display area, you can circle the range to be observed, and show the number of signal transitions in the observation interval, the length of time and the average frequency information. This function can also be used in the waveform display area under the protocol Analyzer mode.



5. Add/Delete the waveform label.

- Add labels

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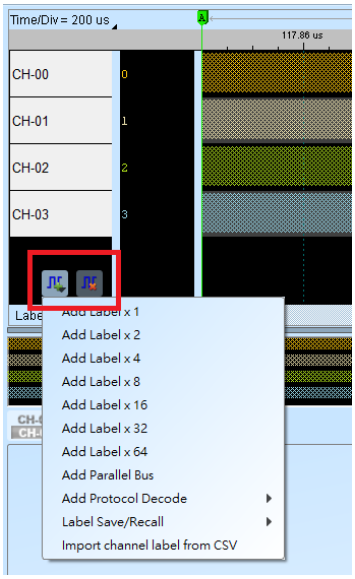
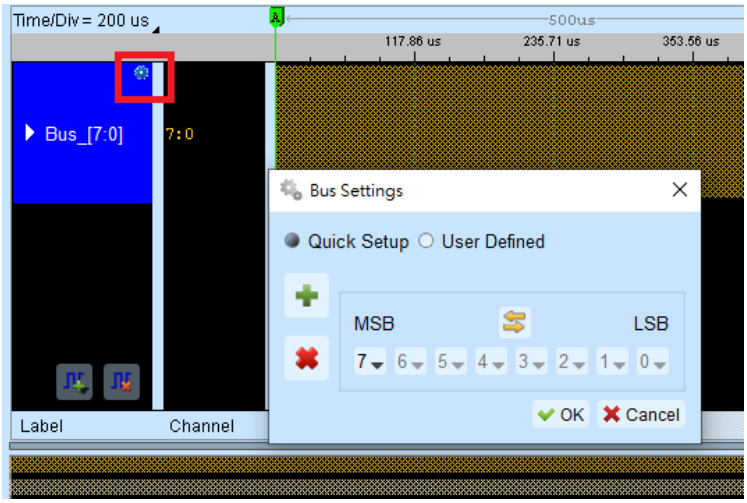
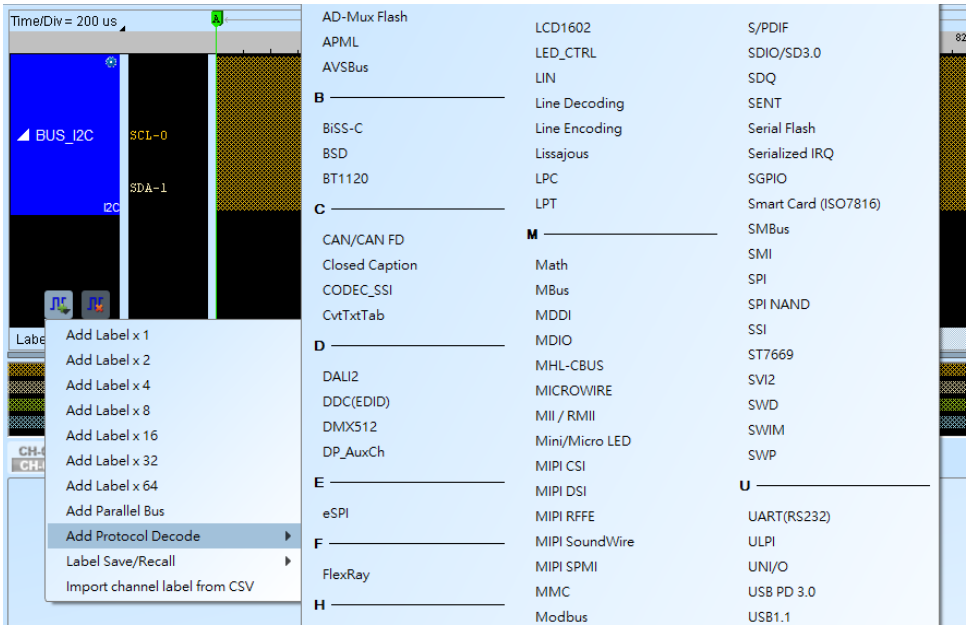


- Add parallel bus



- Add protocol decode



- Label Save/Recall: Save the current channel settings or load the saved channel label.

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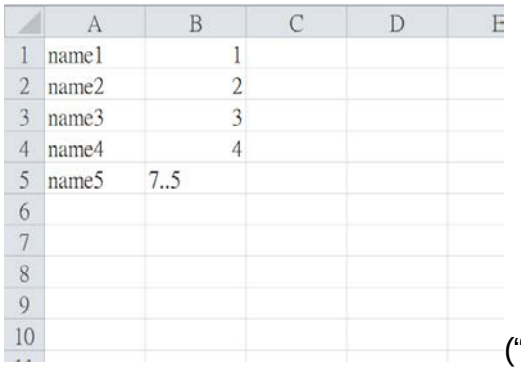
- Import channel label from CSV file. The file format like the following,

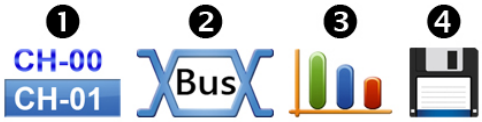


	A	B	C	D	E
1	name1	1			
2	name2	2			
3	name3	3			
4	name4	4			
5	name5	7..5			
6					
7					
8					
9					
10					

(“name5” is parallel bus from ch5-ch7)

Notice: The feature can only import channel name, channel number and parallel buses. It can’t import protocol decode.

Report Area



1. Display the channel status.
2. Display the results of the bus decode, or create customize report from multiple decodes.
3. Waveform data statistics

   When setting, select the channel and determine the type of statistics. If you only need to count the specific range, you can use the cursor to select the specified range. By default, the range is the entire waveform area. To apply the same measurement values to other channels, you need only click and drag the items to be copied, and multiple sets of the same measurements will be added to the other channels. To add a variety of measurement values on the same channel, you need only to click and drag on the channel name, and a number of different types of measurements will be added.

Type	Channels
Period	1
Frequency	1
Edge Count	1
Cycle Count	1
Positive Cycle Count	1
Negative Cycle Count	1
Positive Pulse count	1

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Negative Pulse count	1
Positive Pulse Width	1
Negative Pulse Count	1
Channel-to-Channel Rising Delay	2
Channel-to-Channel Falling Delay	2
Channel Rising to Channel Falling Delay	2
Channel Falling to Channel Rising Delay	2
Phase Delay	2

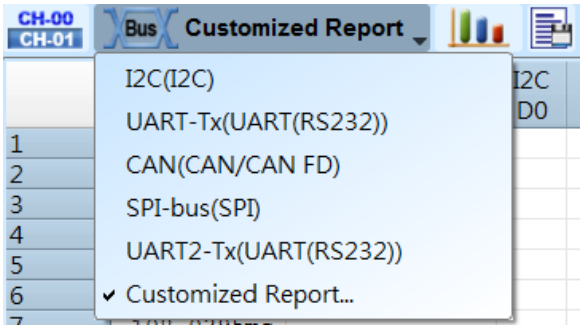
4. Report area storage

   Report contents can be saved as text files.

Bus decode Settings

Please see the bus trigger and Analyzer manual

Customized Report Settings



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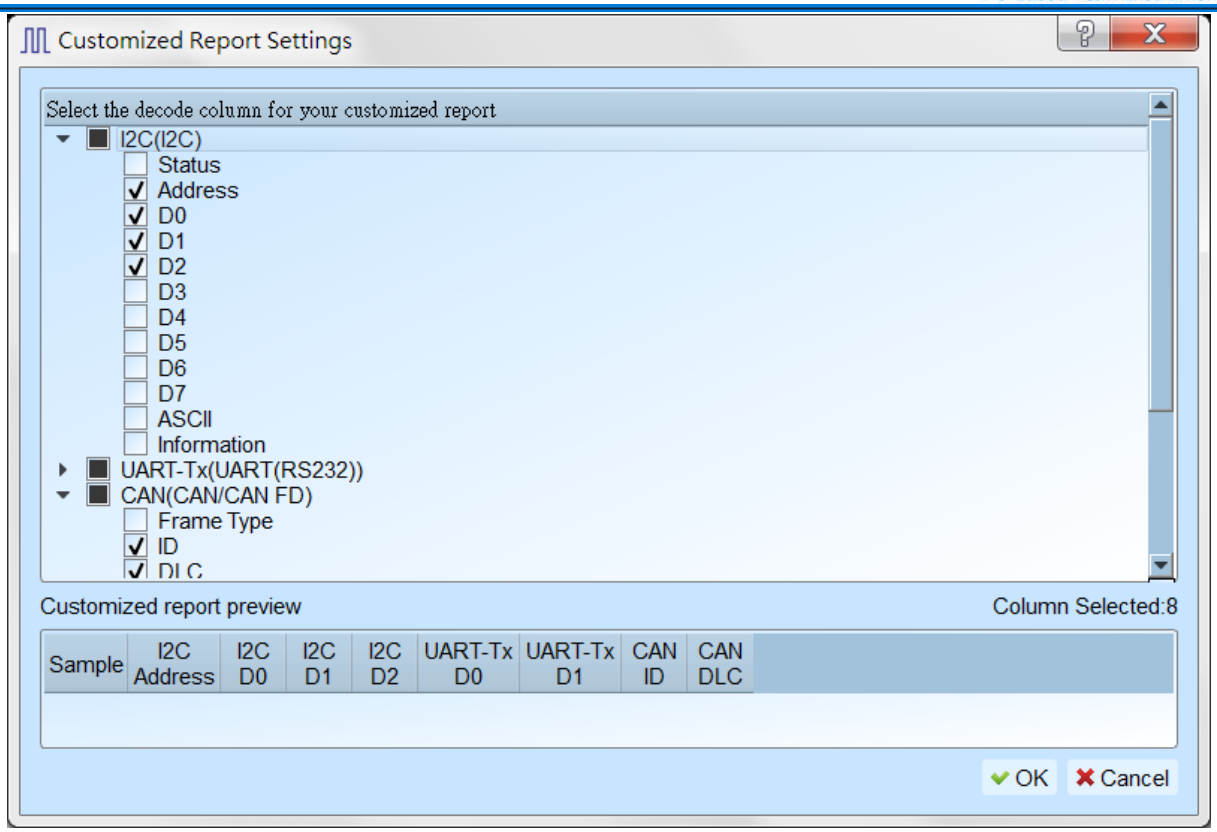

All Bus Decoders enabled in waveform area will be listed in the setting window, you may select interested columns from each Reports, the preview window will show how many columns you have selected and combine them to create your customized report.

Note: The Bus Decoders must be setup correctly in order to fetch the correct column names for the customized report.

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Chapter 3 Technical support

Contact information

Acute website: http://www.acute.com.tw

E-Mail: service@acute.com.tw

Tel: +886-2-29993275 Fax: +886-2-29993276

If 

shows up in the Demo mode during the execution of BusFinder/LA3000/LA4000 software, please try the following steps to solve the issue:

(1) Install the latest version of the software, please go to the official website of Acute Technology Inc. - Download - Software, and then select the BusFinder/LA3000/LA4000 to download and install.

(2) Please use the original USB3.0 Cable in the kit.

(3) Go to the device manager and check the driver status.

Please connect the device USB cable to the computer and then go to the system device manager to check whether the Acute USB BootLoader or Acute USB3.0 Product shows up. Please go to the Acute Website - Download - Software, download the USB3.0 driver and follow the troubleshoot manual in the package to reinstall the driver.

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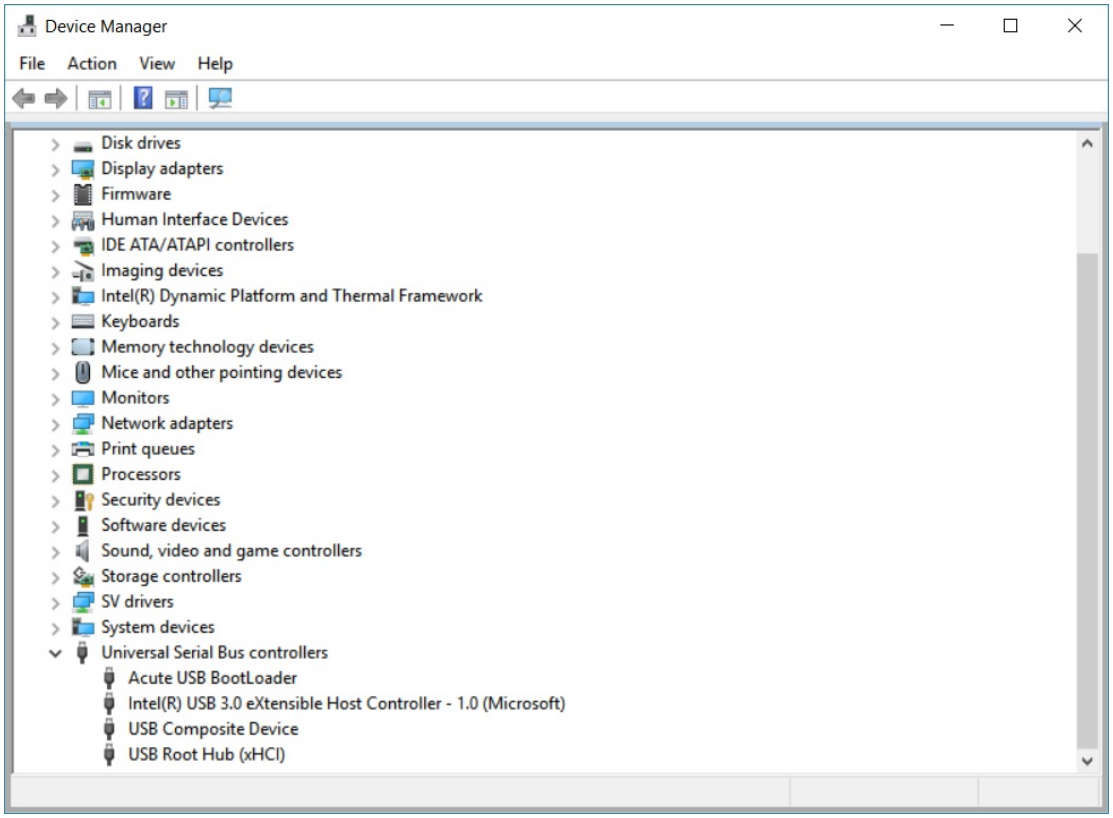

(4) Remove all probes and re-plug the USB3.0 Cable or restart the computer to check whether the driver appears.

(5) After the above steps are taken but the problem is still there, please contact our company.

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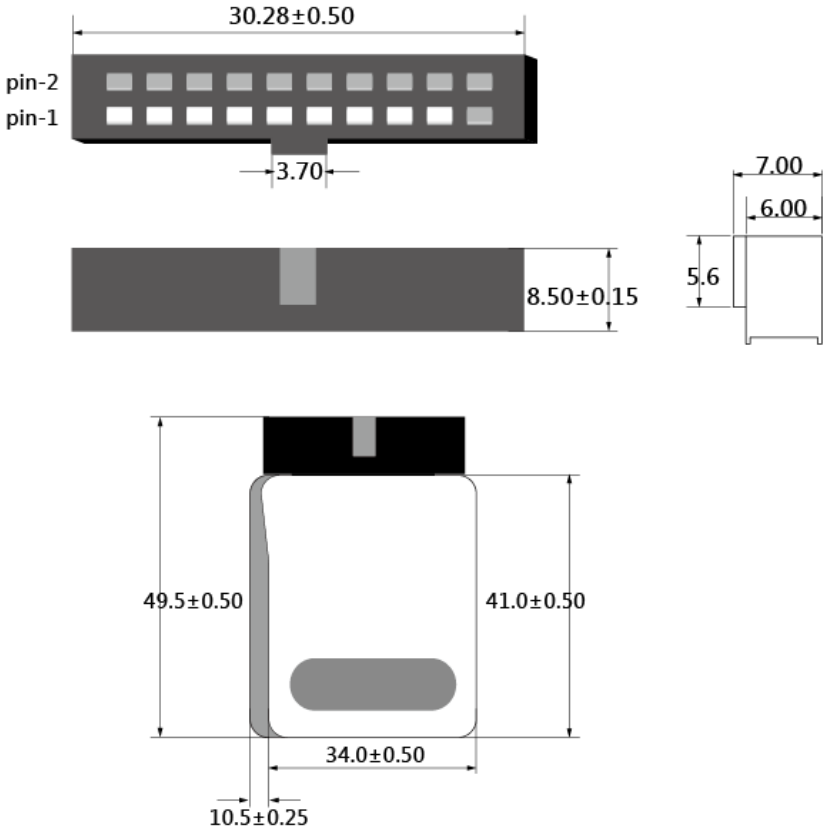
Appendix 1 Probe Sizes and Pin Definitions

LA Probe

LA Tip Dimensions

The following figure shows the pin socket and the case dimensions of LA tip. (Mates with: 2.54 mm box header or pin header)

20-pin Logic Analyzers: Probe tip = Pin socket, Pitch=2.54, Unit: mm.



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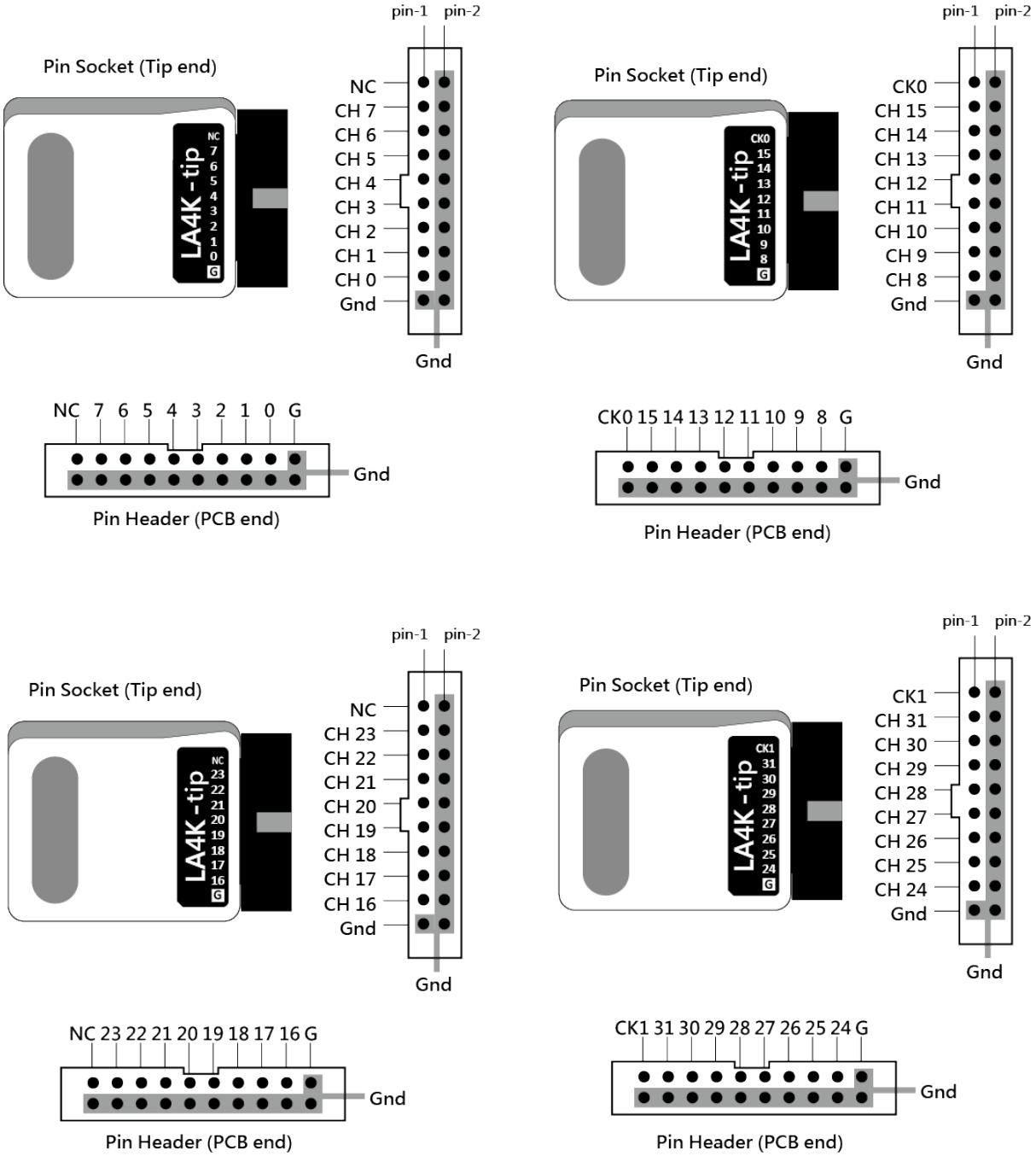
LA probe pin assignments

The following figure shows the single-ended LA tip inputs, and a LA probe includes four LA tips.

LA-POD 2



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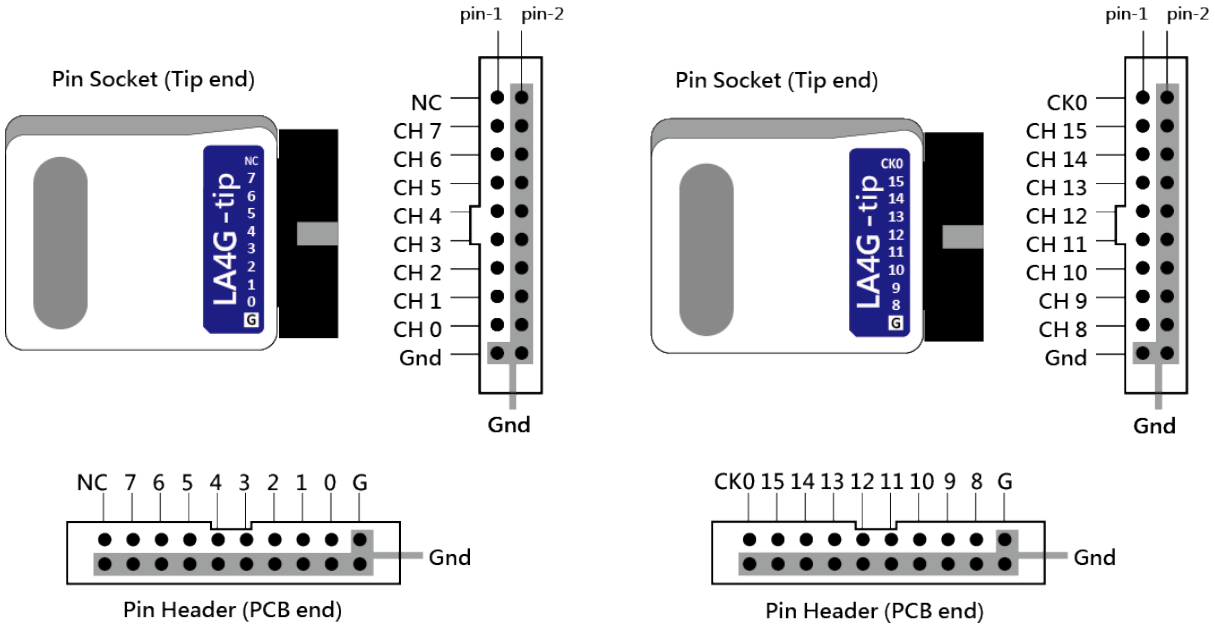
LA4G-POD



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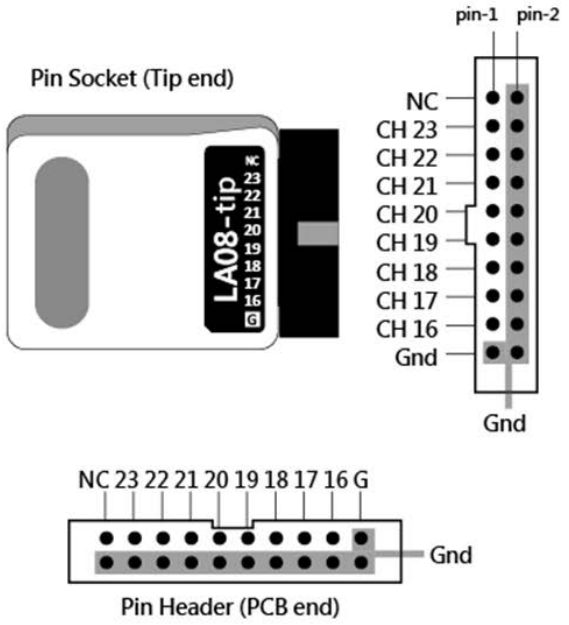
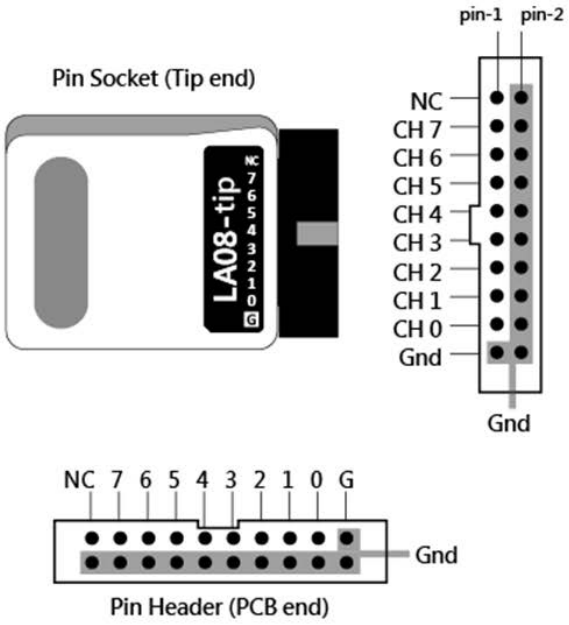
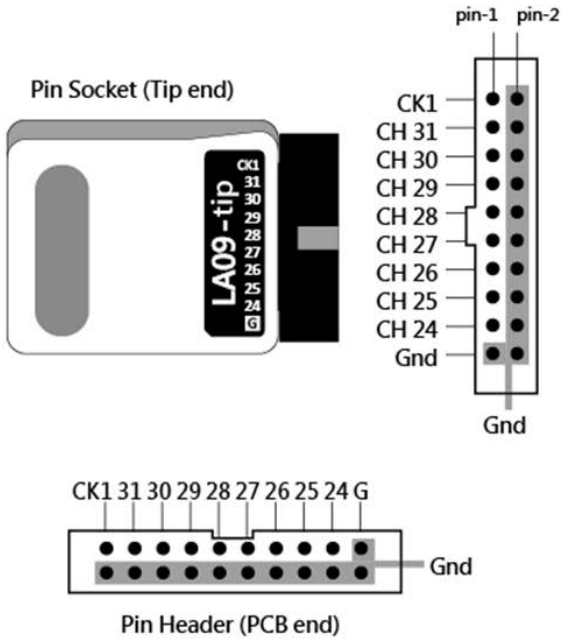
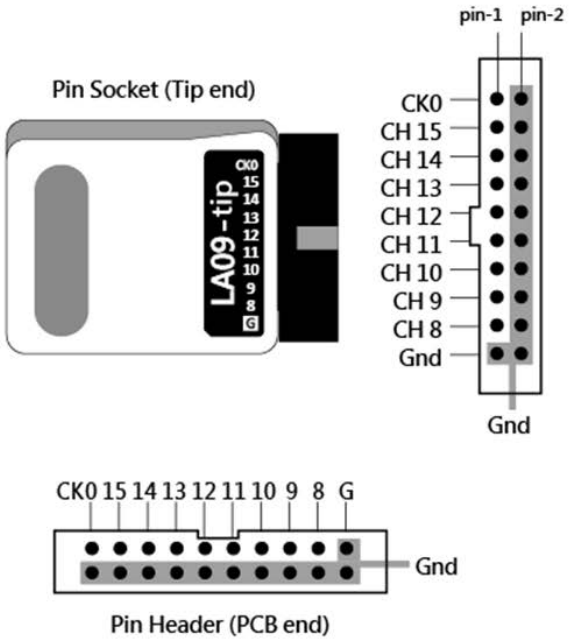
LA-POD









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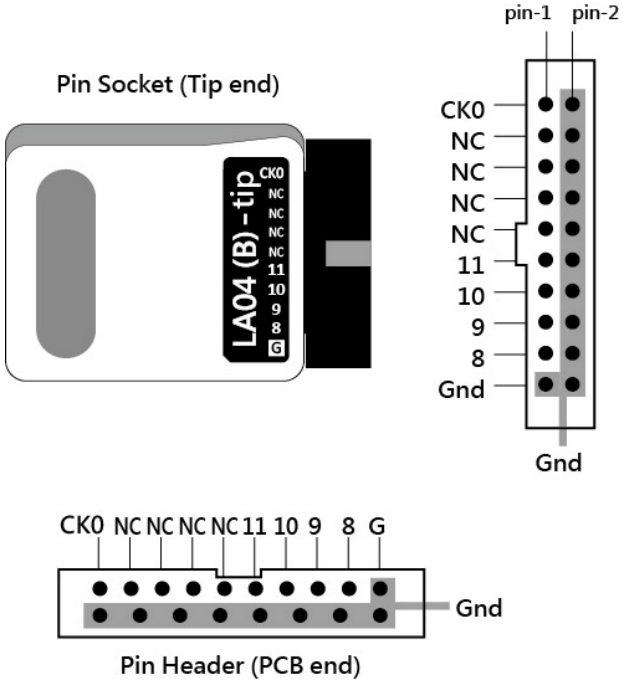
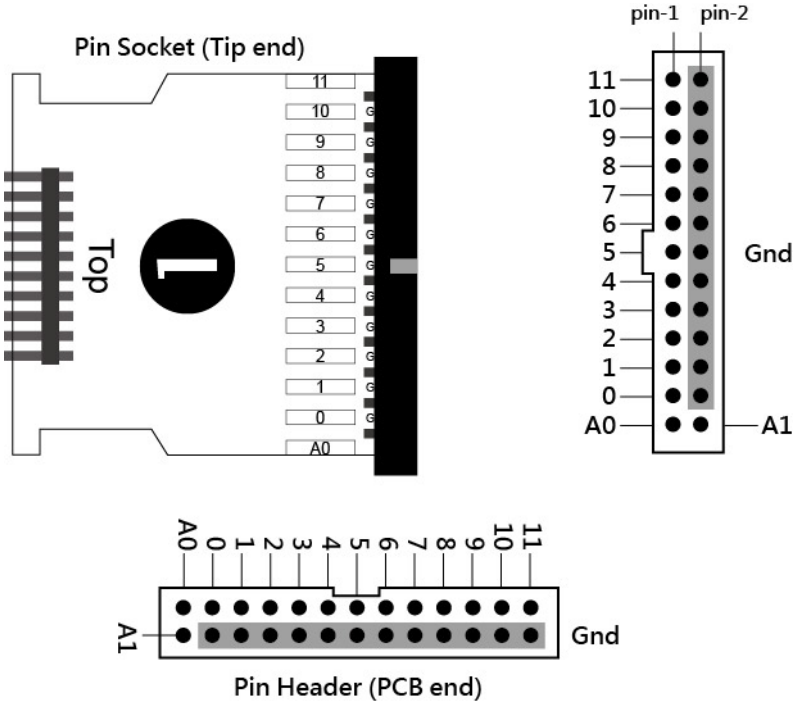
eMMC5.1 Probe

LA04-tip pin assignments

The following figure shows the single-ended LA tip inputs, and a LA probe includes four LA tips.



eMMC connector pin configuration



26-pin eMMC connector: Probe tip = Pin socket, Pitch=2.54, Unit: mm.

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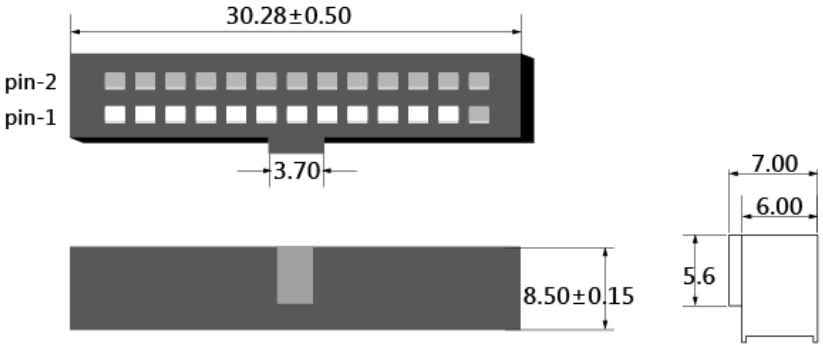
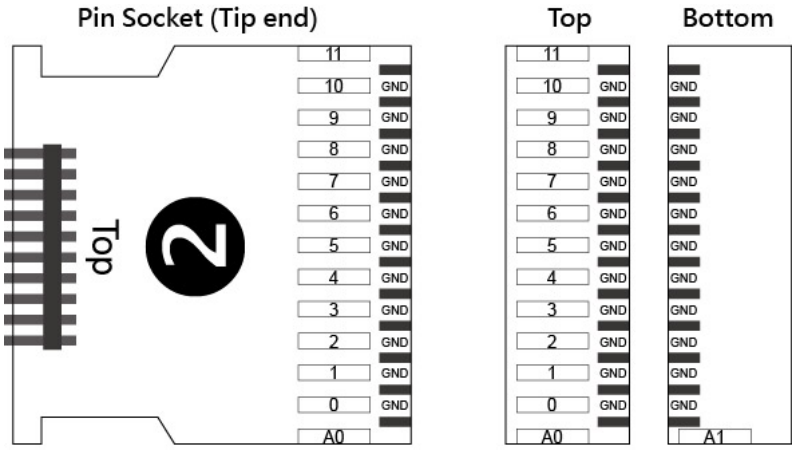


eMMC jumper connector pin configuration



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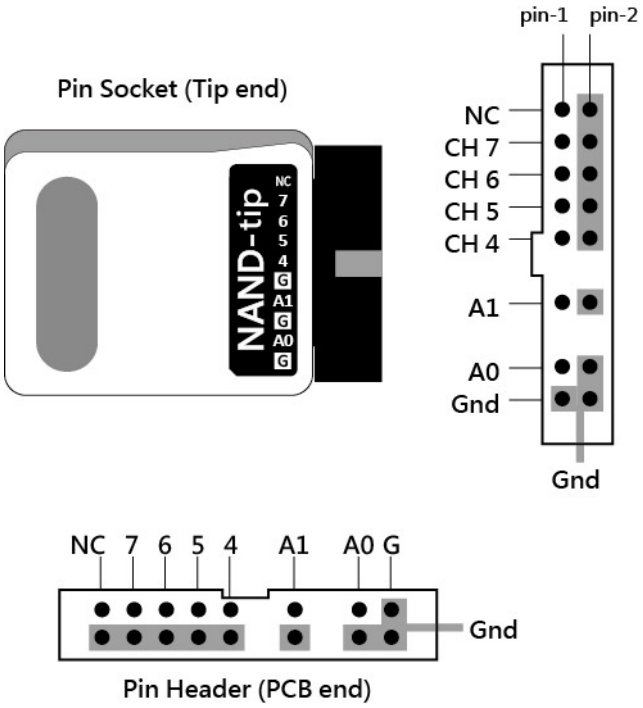
NAND Flash Probe

NAND-tip pin assignments

The following figure shows the single-ended LA tip inputs, and a LA probe includes four LA tips.



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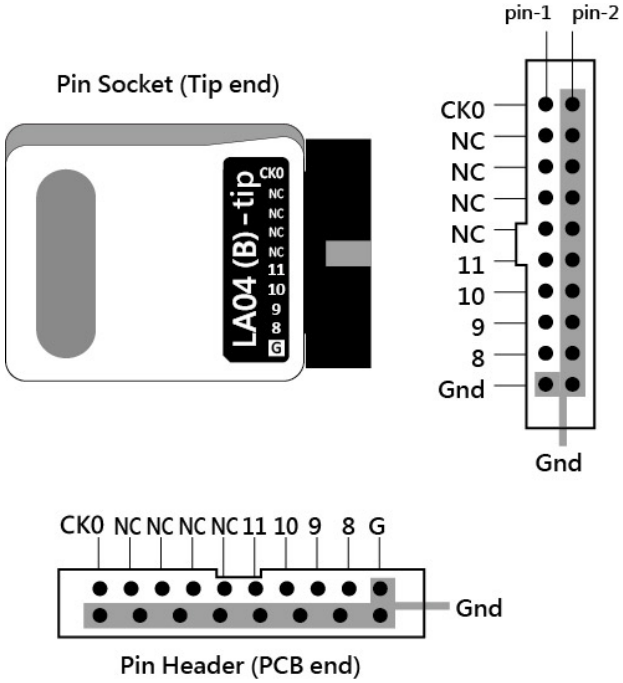
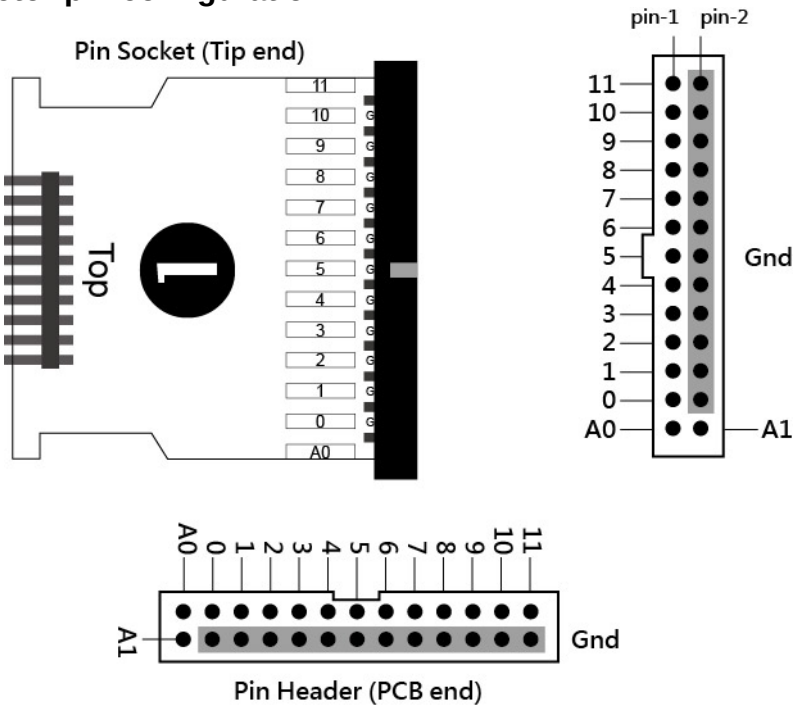
SD3.0 Probe

LA04-tip pin assignments

The following figure shows the single-ended LA tip inputs, and a LA probe includes four LA tips.



eMMC connector pin configuration



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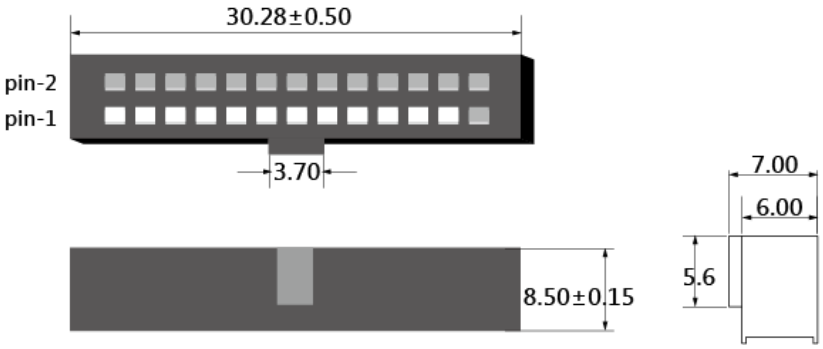
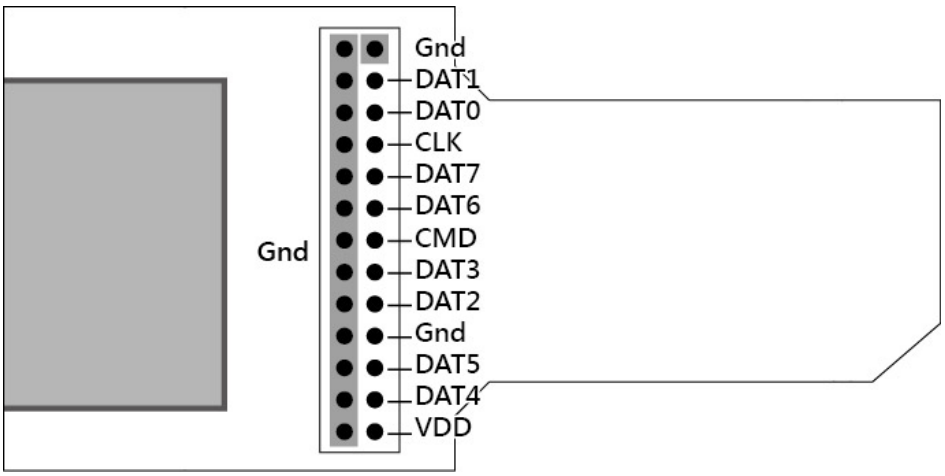
26-pin eMMC connector: Probe tip = Pin socket, Pitch=2.54, Unit: mm.



SD3.0 transfer plate pin configuration



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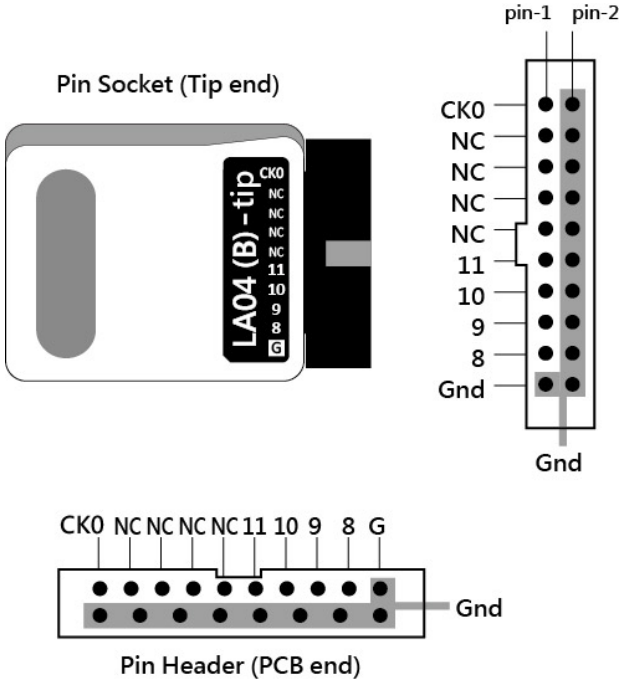
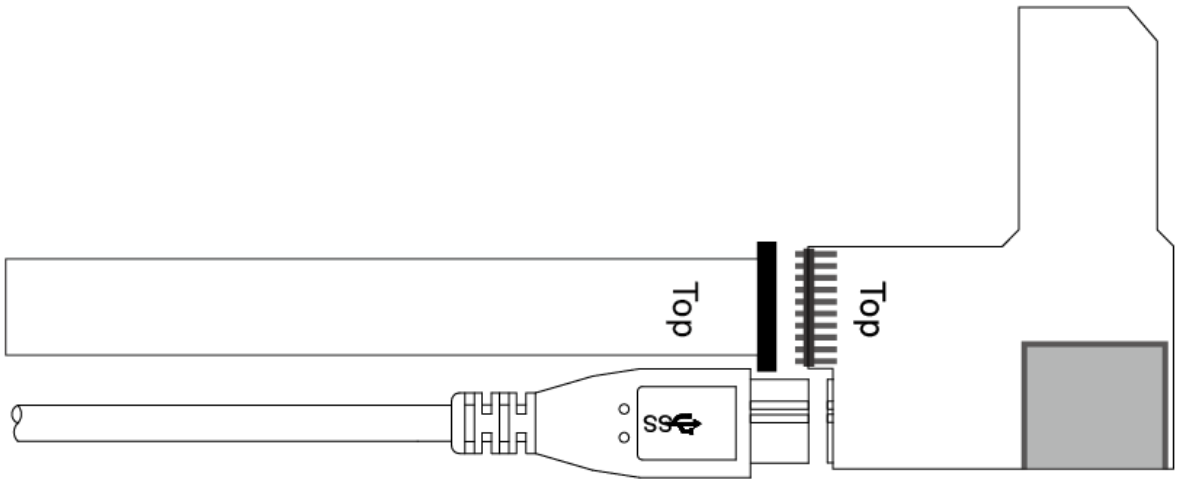
SD4.1 (uSD4.1) Probe

LA04-tip pin assignments

The following figure shows the single-ended LA tip inputs, and a LA probe includes four LA tips.



SD4.0 transfer plate pin configuration



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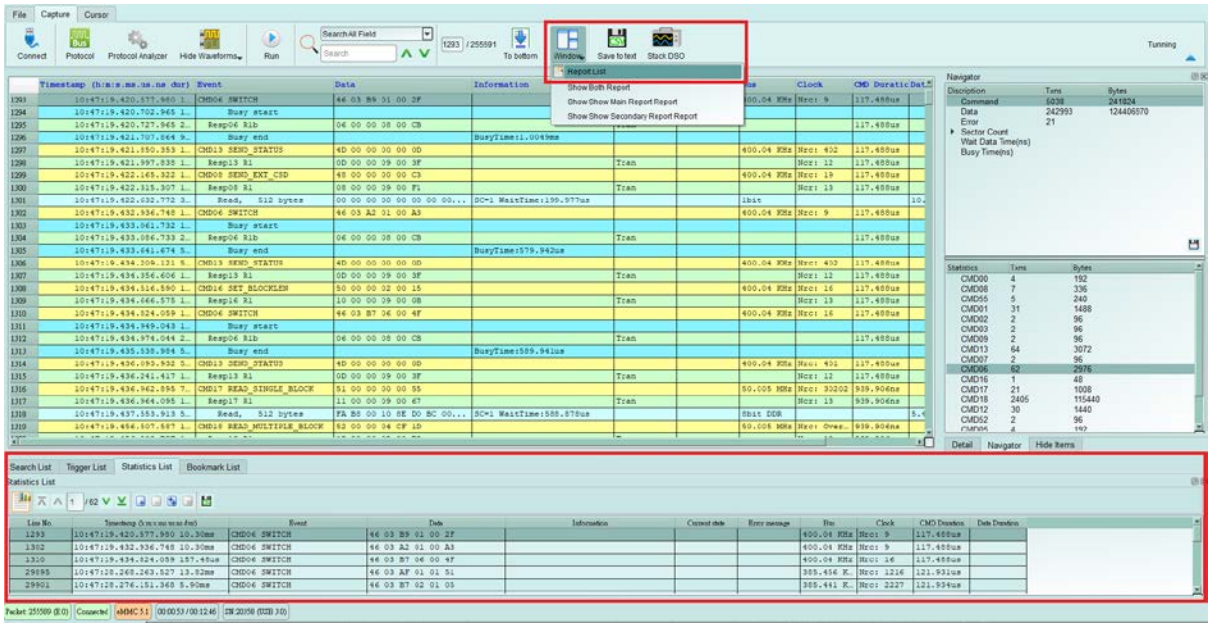
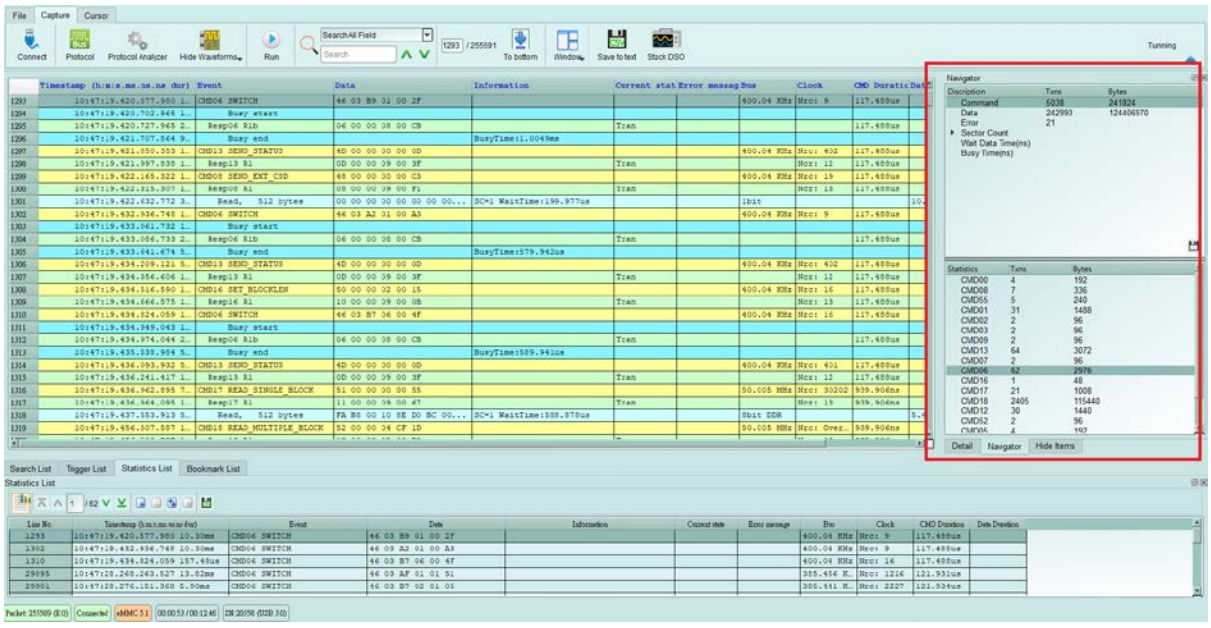
Appendix 2 Report List Advanced Instructions

1. Select the Window button-> Report list on the toolbar, the software will open the report list function and present it at the bottom of the main window. It can be adjusted the most suitable viewing size.



2. This function can be combined with the statistics function, please click the Navigator tab on the right side of the main window.



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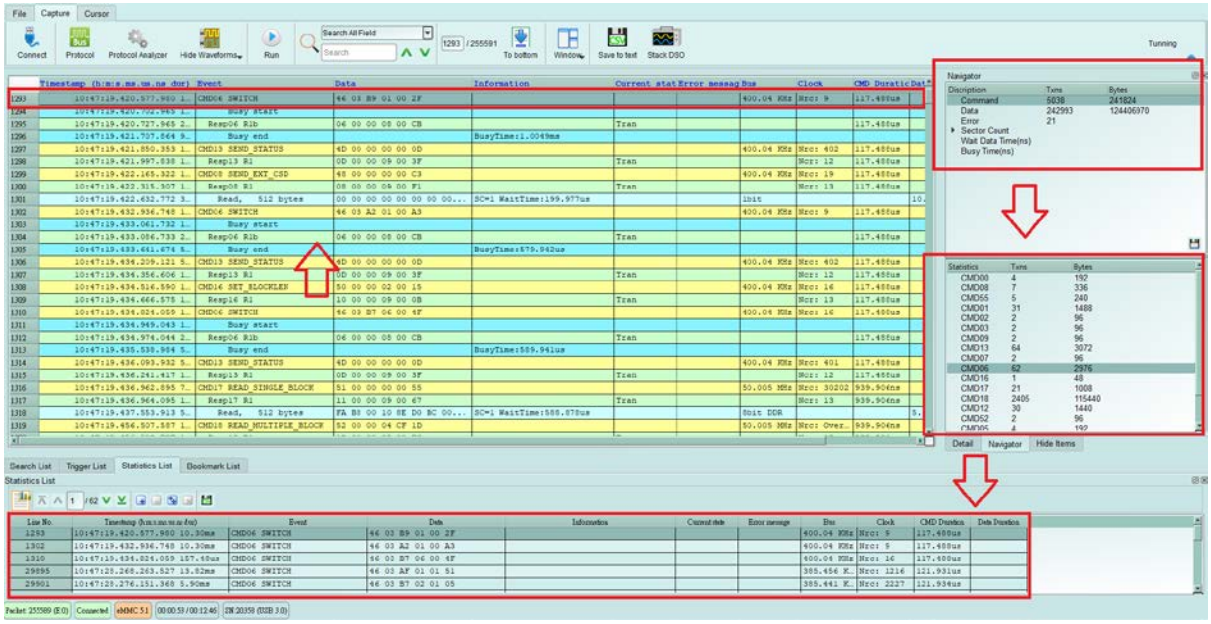
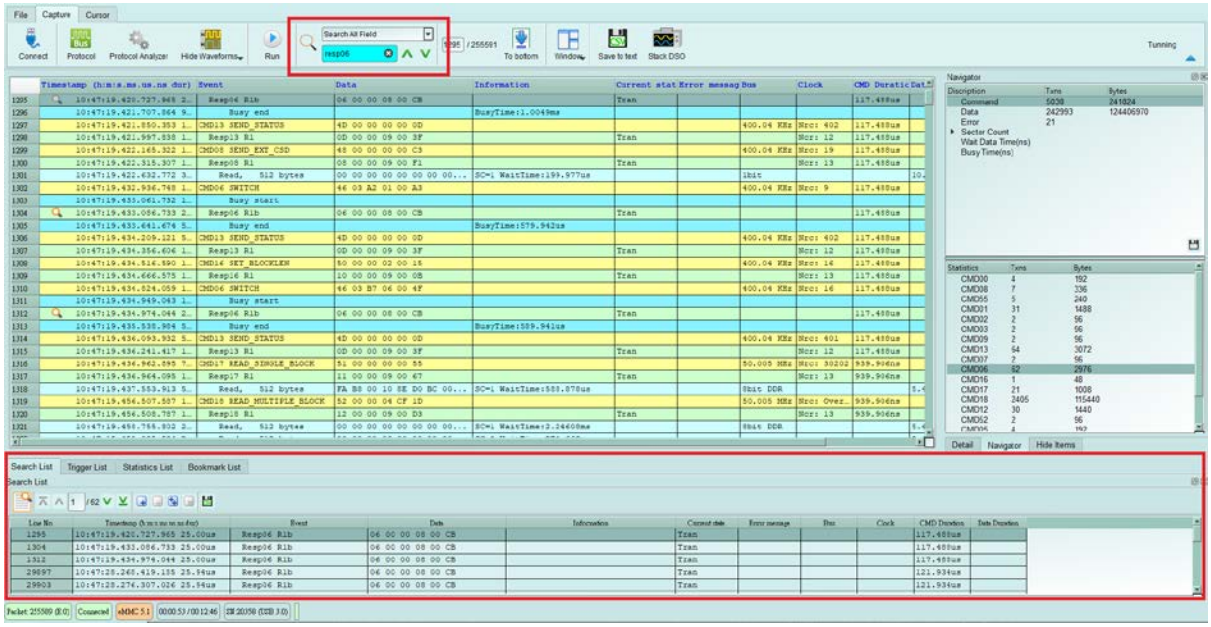
3. Click the items of the statistical function in sequence, the statistical results will be presented in the Statistic List in the report list, and can be clicked on this table to track the position of this data in the main report area.



4. This function also provides Search, Trigger and Bookmark List can be used,

(1). Search List



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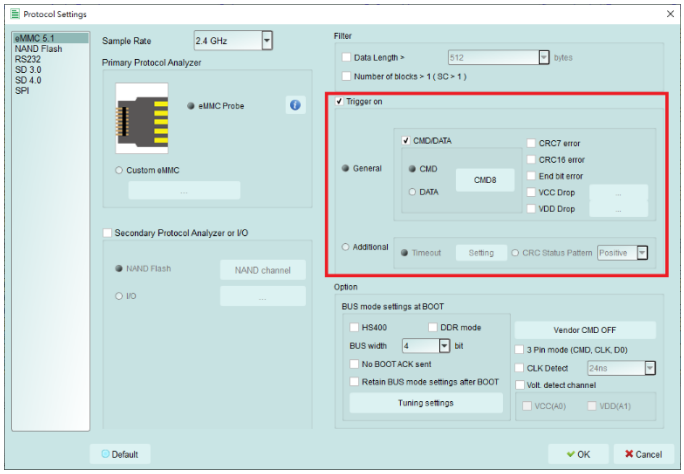
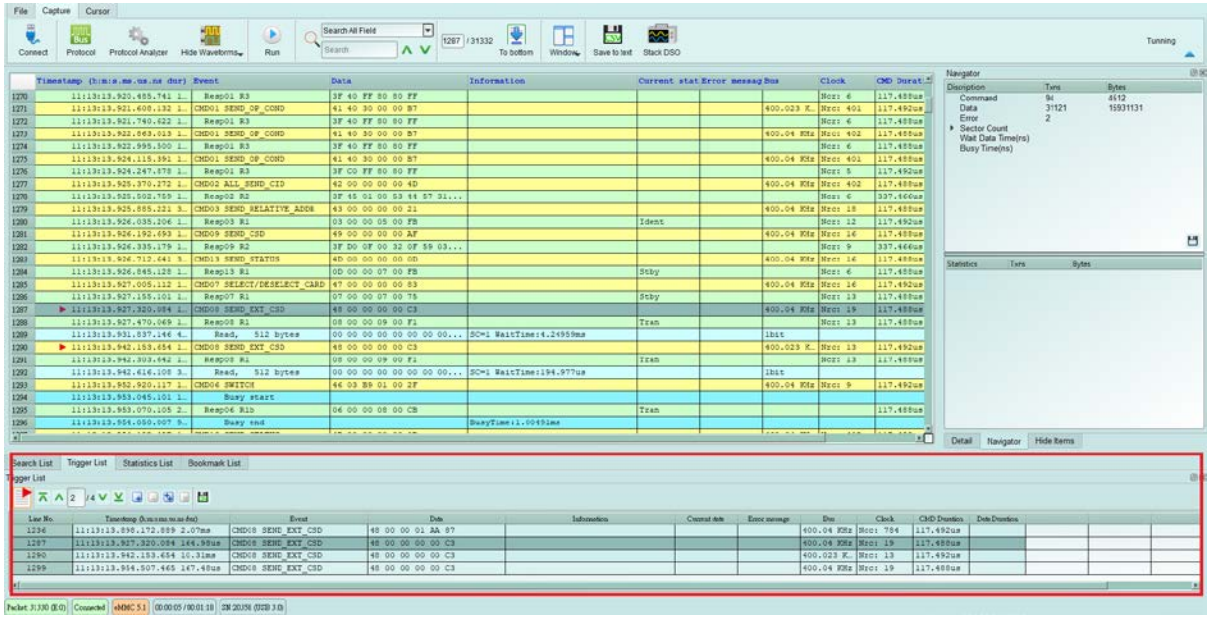
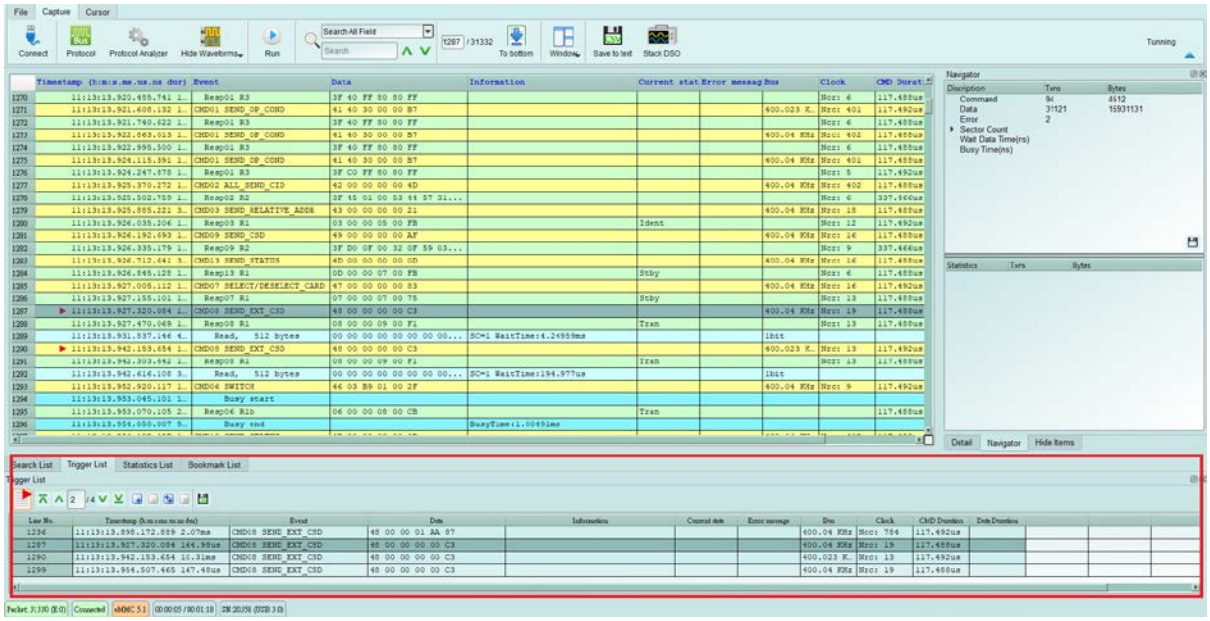
(2). Trigger List





(3). Bookmark List (right click in the main report area to add)



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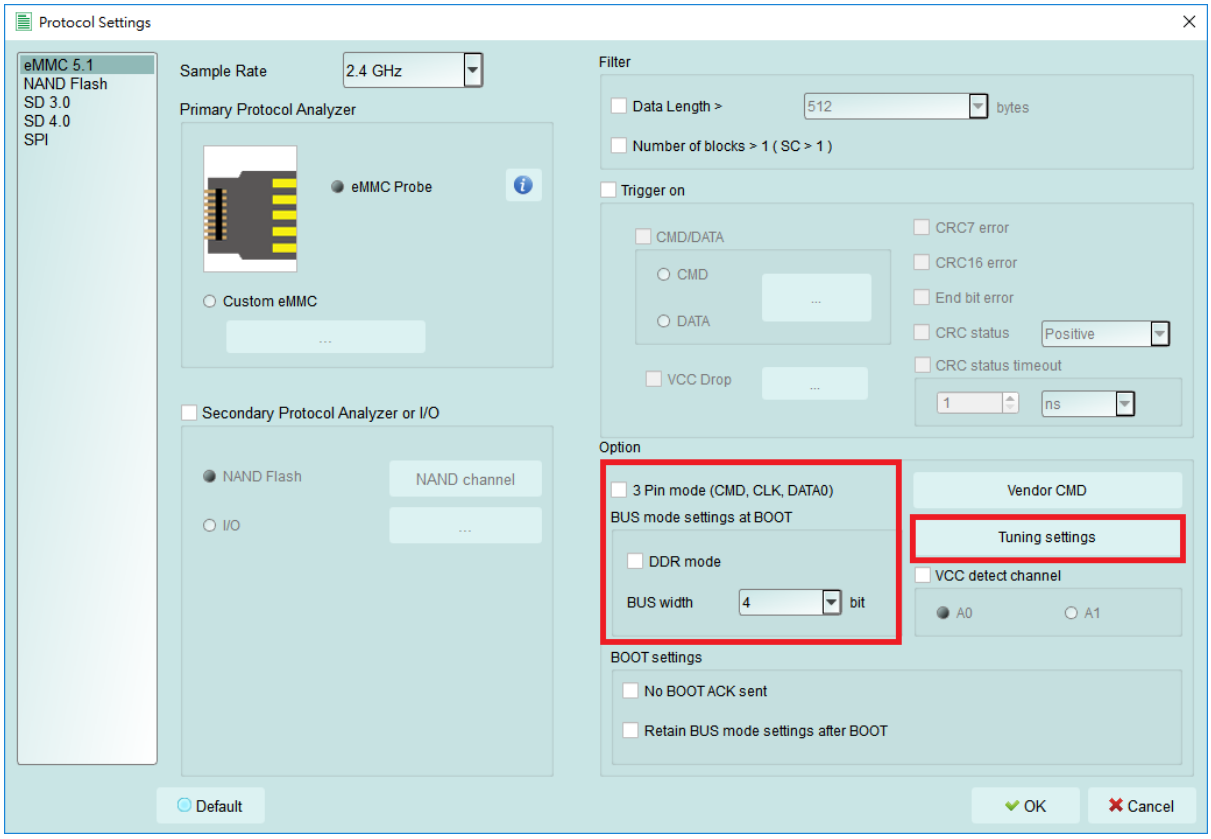
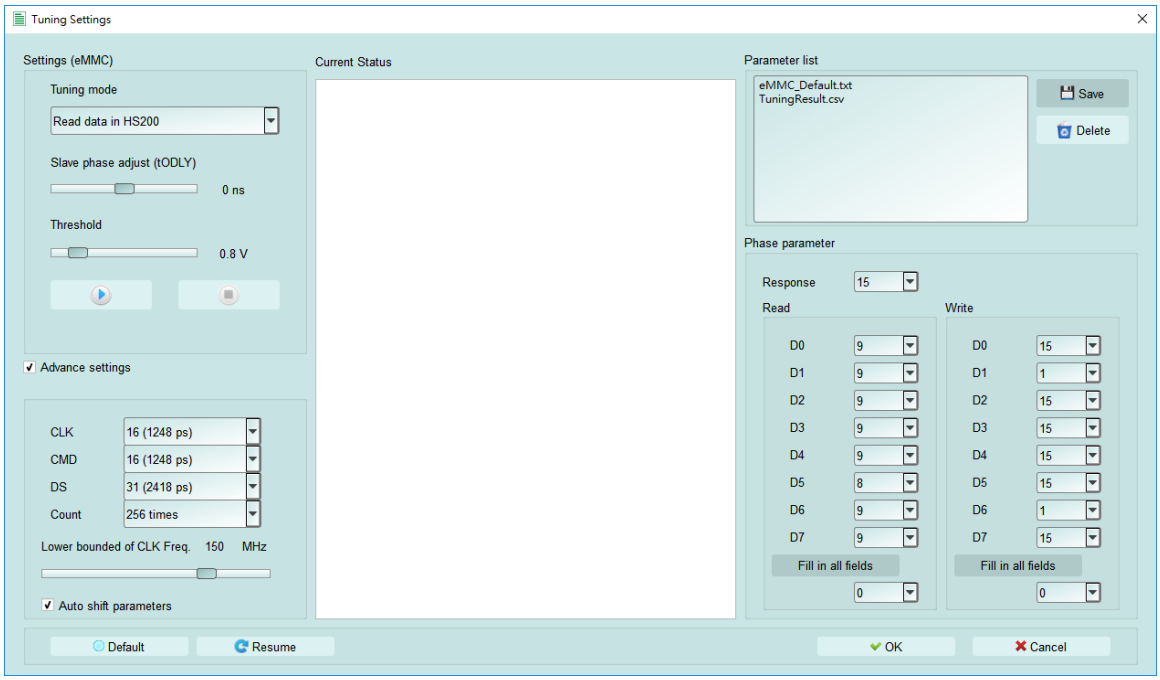
Appendix 3 Tuning settings

Please set BUS mode settings at BOOT and 3Pin mode first in Protocol Settings.

Then click Tuning settings to enter the tuning function.





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Settings:

1. Tuning Mode:

(1)Read/Write data in HS200/HS400 (eMMC),

(2)Read/Write data in SDR/DDR (SD3.0),

(3)Any CMD. to tune RESP. ,

It is necessary to tune the part of the CRC16 error. Guide the test object to the mode which you selected and send the command and the data.
Read data can be read using CMD17, 18, 46
Write data can be written using CMD24, 25, 47

2. Slave phase adjust (tODLY):

Each time the Busfinder performs tuning, 31 steps of 2418 ps phase adjustment can be performed. However, if this is out of range, this option can be adjusted to perform a larger phase adjustment.

3. Threshold:

Adjust trigger level,

4.  **:** start tuning,

5.  **:** stop tuning,

Advanced settings:

1. CLK, CMD, DS(eMMC):

Adjustable phase of CLK, CMD, DS(eMMC)

2. Count:

With reference to the number of data blocks, after tuning starts, tuning will do CRC16 detection for data, and refer to the number of data block settings. This number is used as a statistic to calculate the correct phase position.

3. Lower bounded of CLK Freq. :

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Tuning CLK lower bound. If the CLK during the tuning process is lower than this value, this segment of data will not be used.

4. Auto shift parameters :

If checked, if tuning fails, the set parameters will be adjusted automatically and tuning will start automatically.

Current Status:

Displays the current tuning function status and displays the result.
If successful, it will show Tuning succeed,
Fail to show Recommend to re-tune with different parameters.

Parameter list:

Reload, save parameter settings

Phase parameter:

If tuning is successful, the value will be automatically written, or manually adjusted.

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