User Manual
TravelBus
2-in-1 Analyzer
(Protocol & Logic)

Publish: 2024/12

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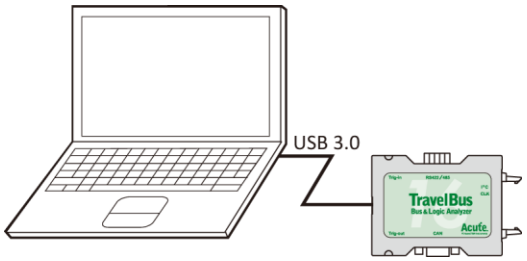
Chapter 1 Installation

Hardware

Connect the TravelBus to the PC with the USB 3.0 cable in the TravelBus kit.



Software

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 ***[Logic Analyzer] TravelBus series*** to download the TBA series. After completion of installation, the “start icon” of TBA series will appear on the desktop and the program set. User can select either one to start TBA (

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

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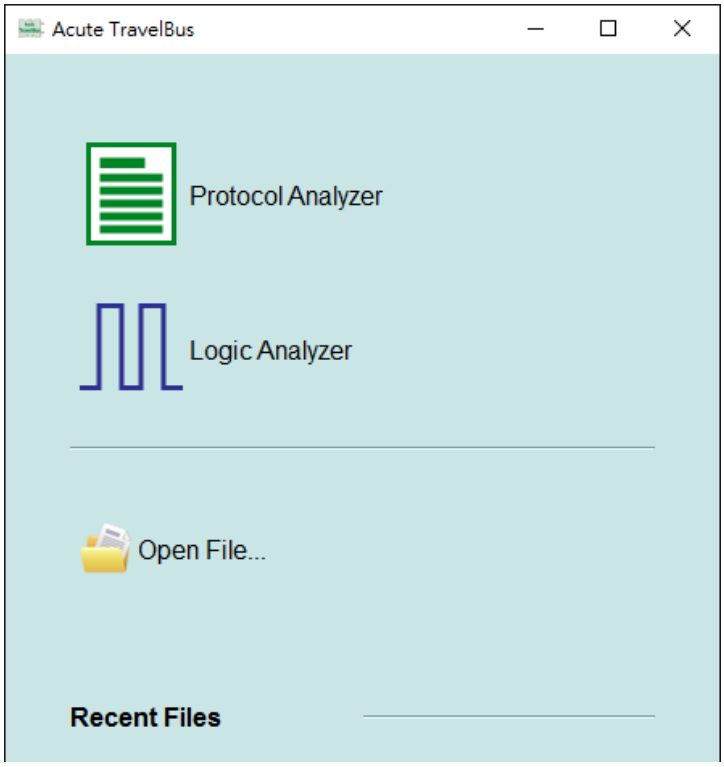

Open File… will open the old file (.TBW).

SDK

We provide SDK for user to control the software and hardware behavior.

- **Software behavior (need to keep the software executing) :** 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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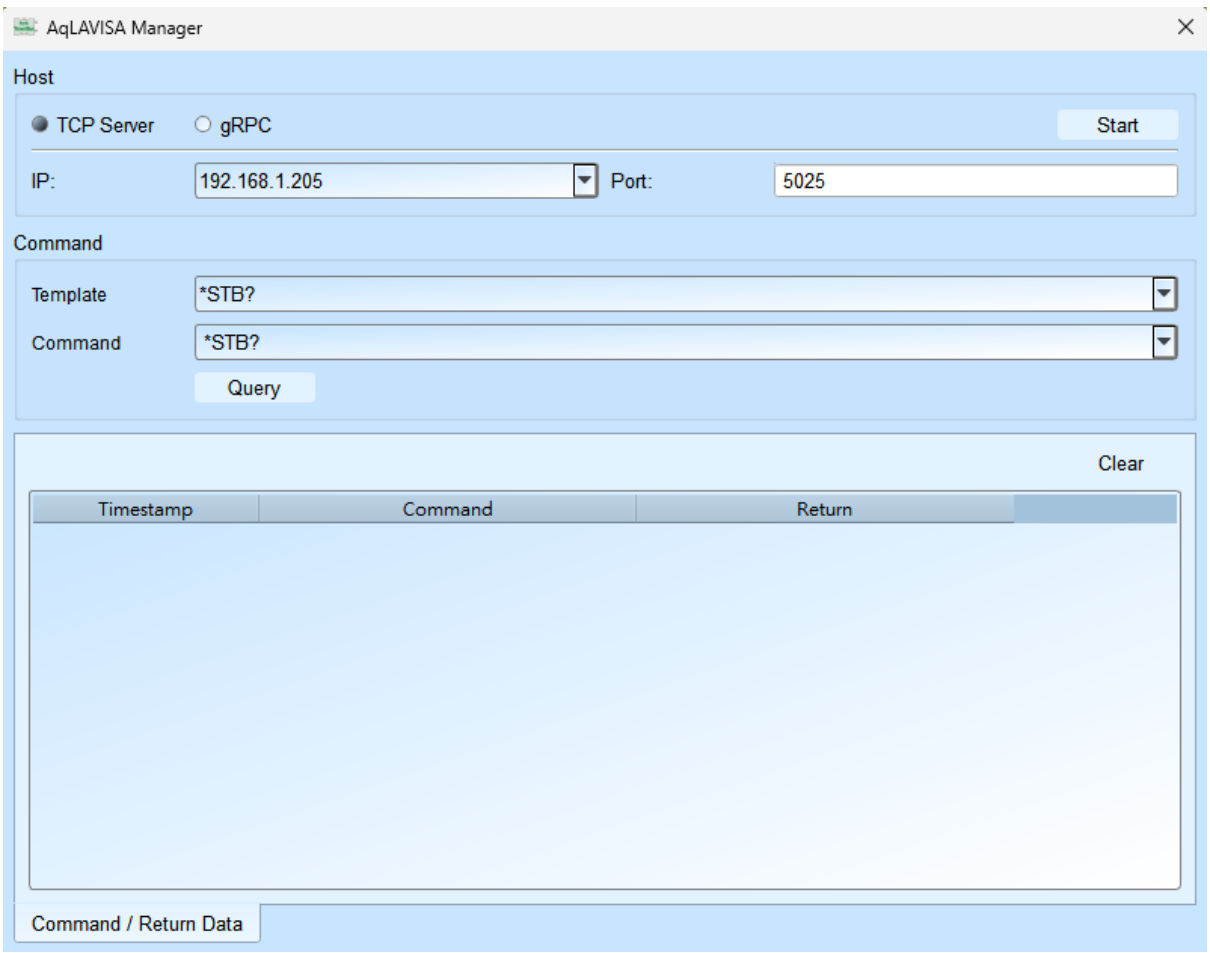

- **Hardware behavior(DO NOT need to keep the software executing):** Please find the label, Download->SDK(DLL)-> [Logic Analyzer] TravelBus SDK；Or contact us with e-mail. Please note it, there has no any decode processing, only capture data and save.

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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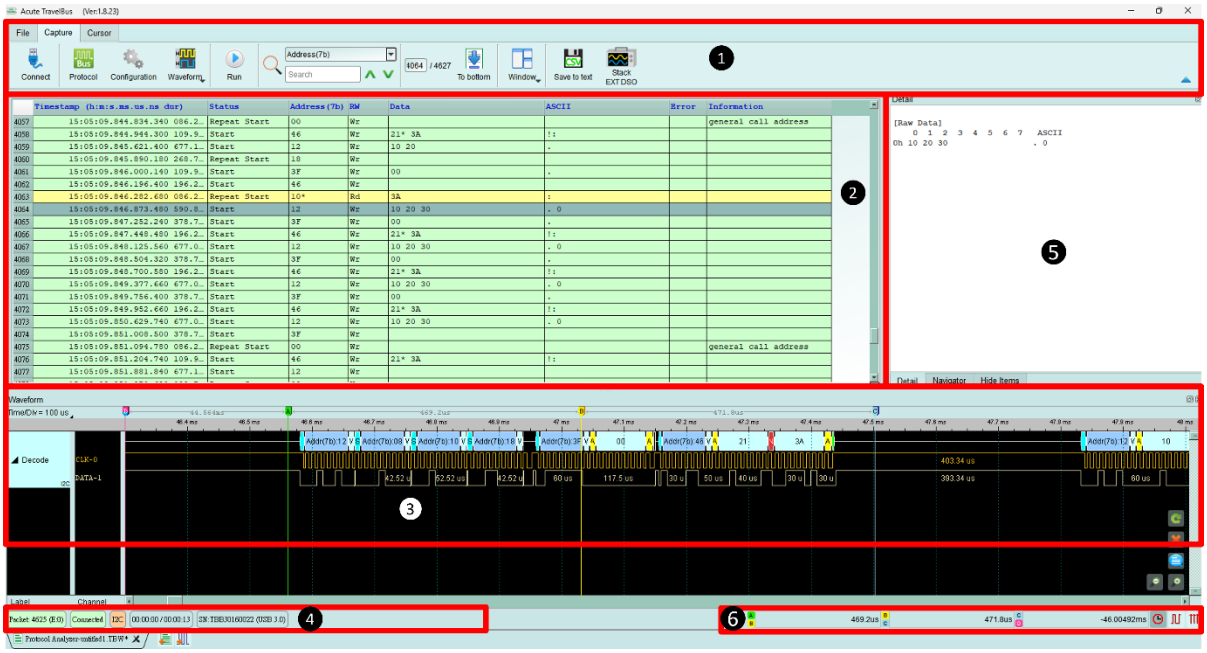
Chapter 2 Operations

Protocol Analyzer

Main Window



1. **Toolbar** includes Protocol, Waveform, Run, Search and Save to text which format is .csv or .txt.
2. **Report Window** displays real-time protocol data.
3. **Waveform** displays the waveforms only when the Waveform option is checked.
4. **Status Bar** shows if the TravelBus is connected to the PC, what protocol, time captured/available time to capture, ….
5. **Detail/Navigator/Filter** shows the protocol data detail and is able to filter those data.
6. **Cursors** display the time/frequency difference between cursors.

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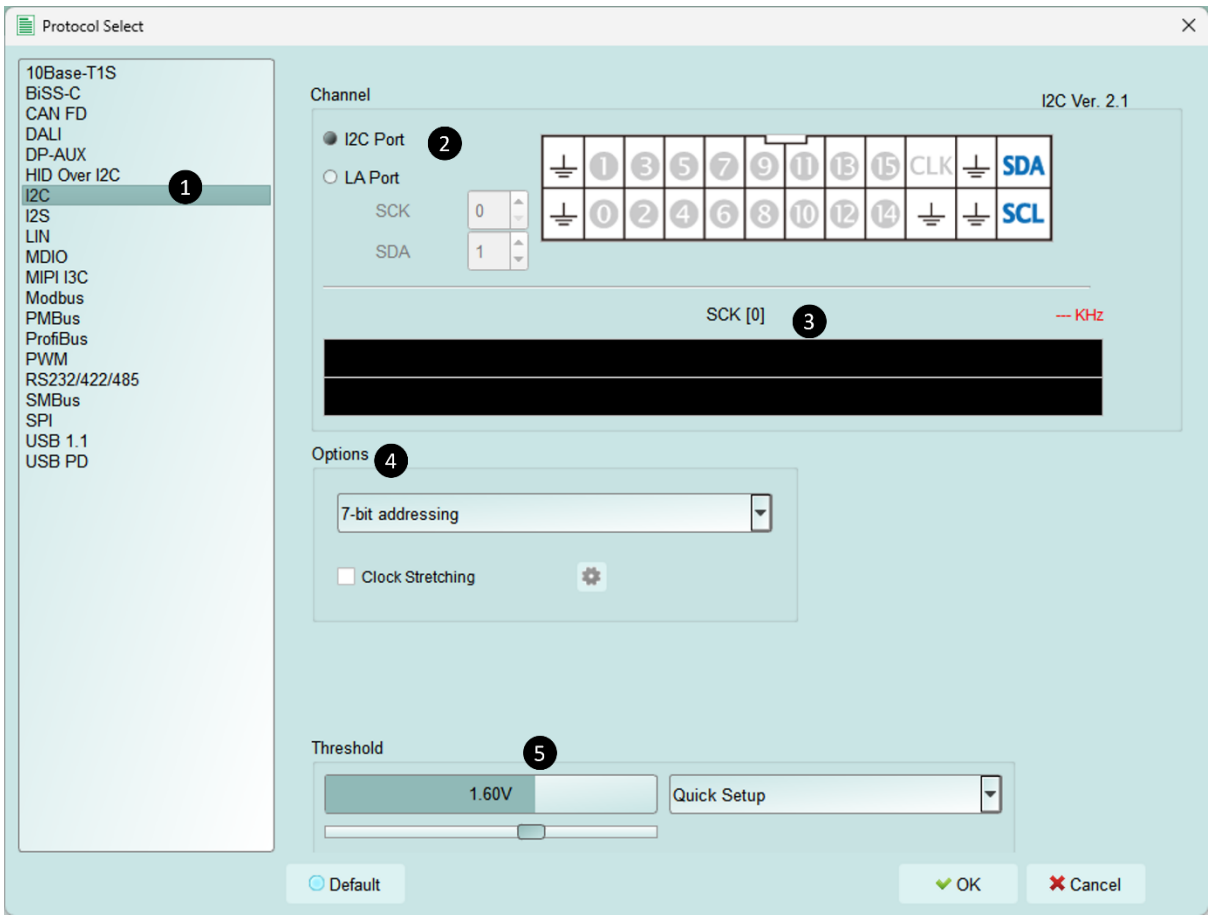
Protocol Select ( )



1. **Select different protocol.**
2. **Channel:**

   Choose either LA ports or Dedicated ports. LA ports (channel 0~15) are used for normal LA usage; for more dedicated ports information, please check **Dedicated Channel Description.**
3. **Waveform**：

   The TravelBus auto-detects the signal frequency and displays the real-time waveform.
4. **Options**：Choose the address mode.
5. **Threshold**：The threshold is provided by default for each protocol or can be set manually.

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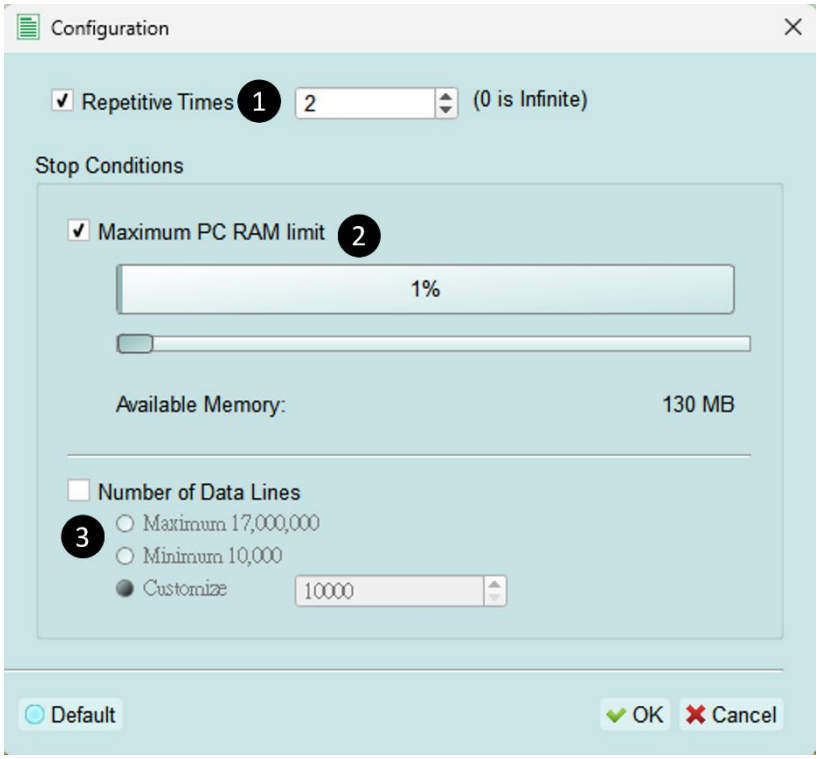
Memory Usage ( )



1. Repetitive Times: If it was checked, user can set the number of times to capture; after the number of times is completed, all the retrieved data would be saved.
2. RAM limit: User can set the limitation of memory usage. When the memory is full, stop capturing.
3. Number of Data Lines: If it was checked, user can set the number of data lines. When the number of lines reach the user setting, stop capturing.

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Stack with the DSO

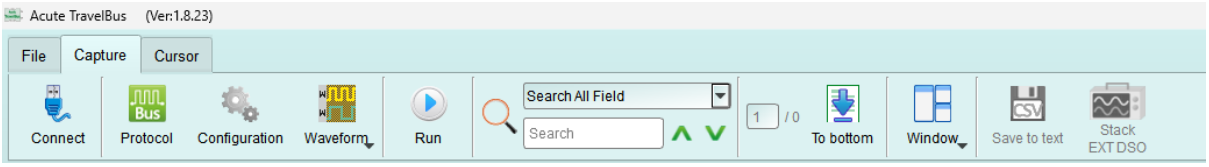
The TravelBus can be stacked with Acute DSO as MSO, but only in Logical Analysis mode.
In Protocol Analysis Mode, user must turn on the Show Waveforms and capture data before convert Trigger and Decode settings to Logical Analysis Mode for stacking with the oscilloscope. After extracting data, select Convert to Logical Analysis and

Stack Oscilloscope () in the File field of the toolbar to convert all settings to Logical Analysis mode, see Stacking Oscilloscopes in Logical Analysis Mode for details. Alternatively, you can keep only the settings and data and convert them to

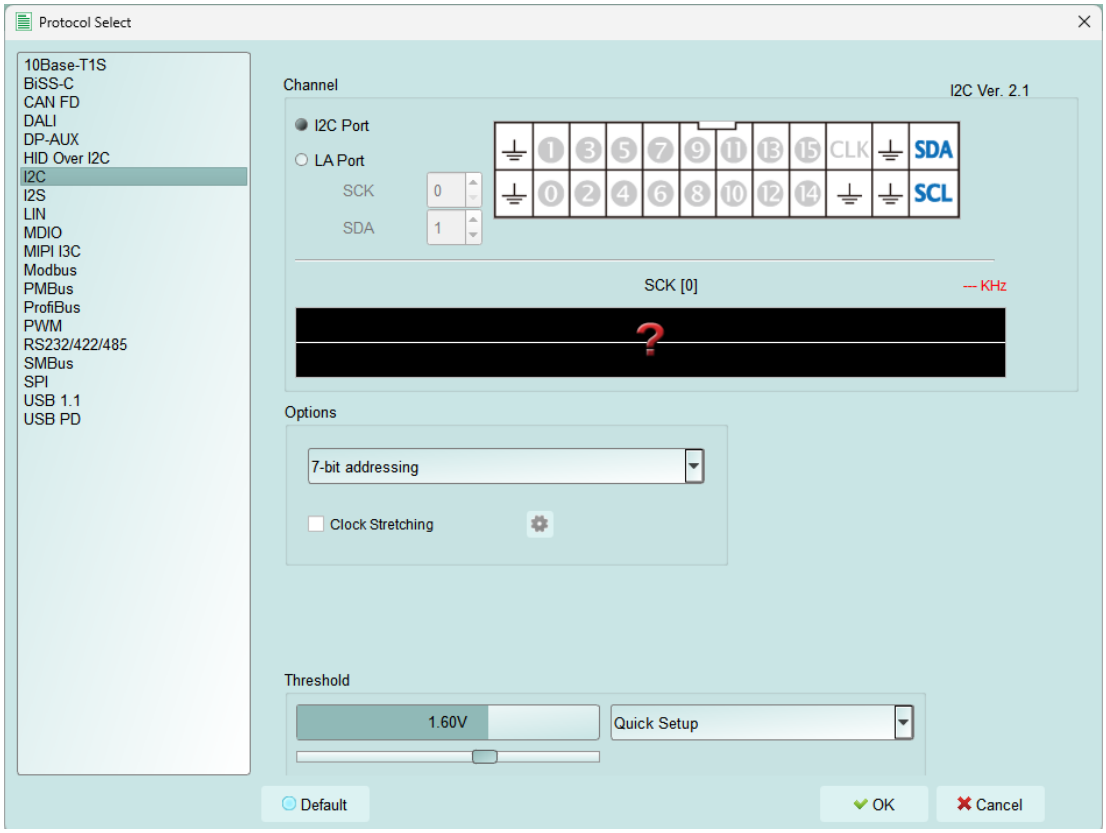
Logical Analysis mode by clicking Convert to Logical Analysis ().

Example:

Click **Waveform** to store the protocol data with waveform.



Choose **I²C** for protocol settings, click **OK** by default settings or reset manually.



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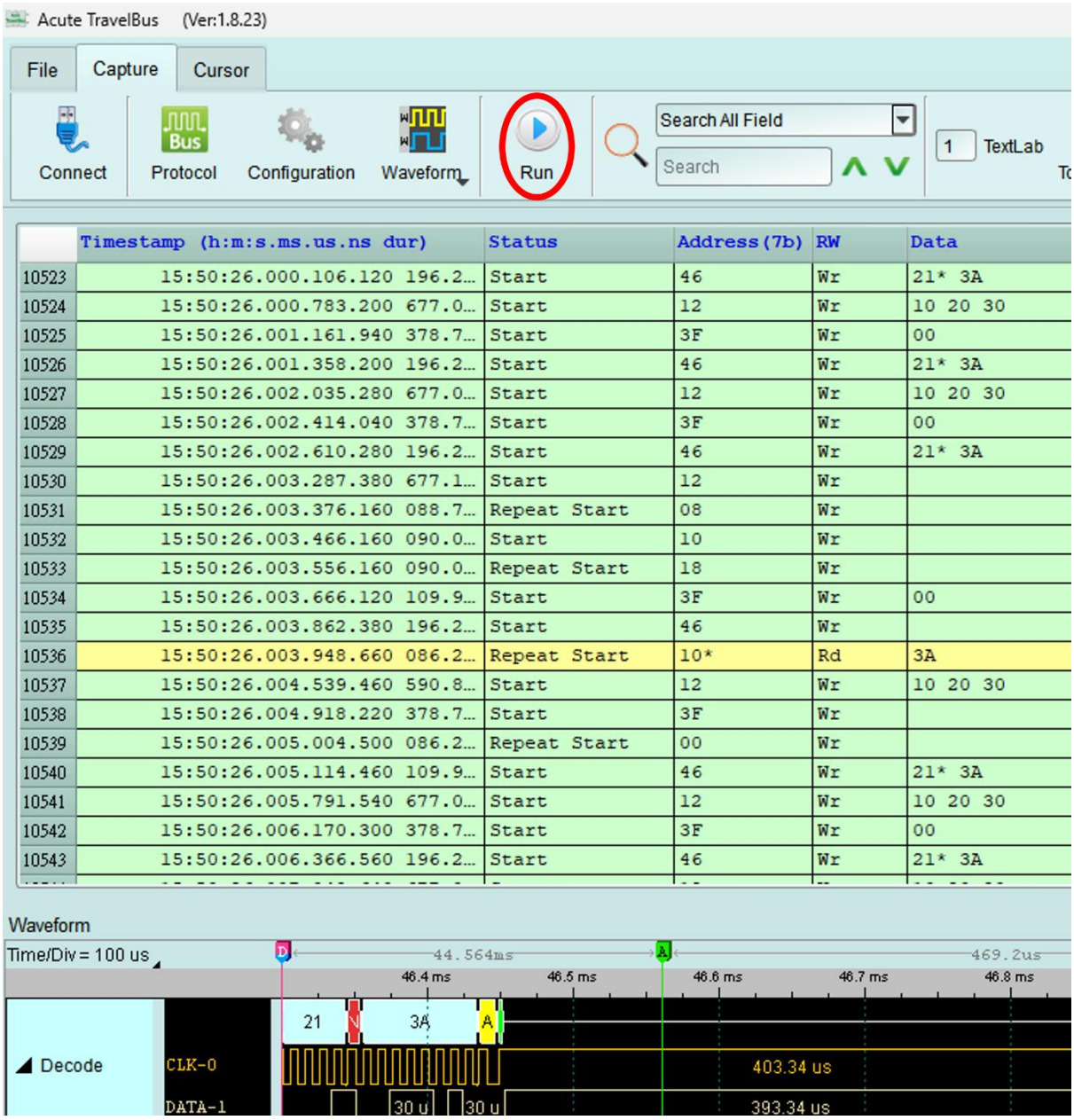
Click **Run** ( ) to capture the data.



User can stack Oscilloscopes ( ) in the File field of the Toolbar to convert all settings to Logical Analysis mode, see Stacking Oscilloscopes in Logical Analysis Mode for instructions.

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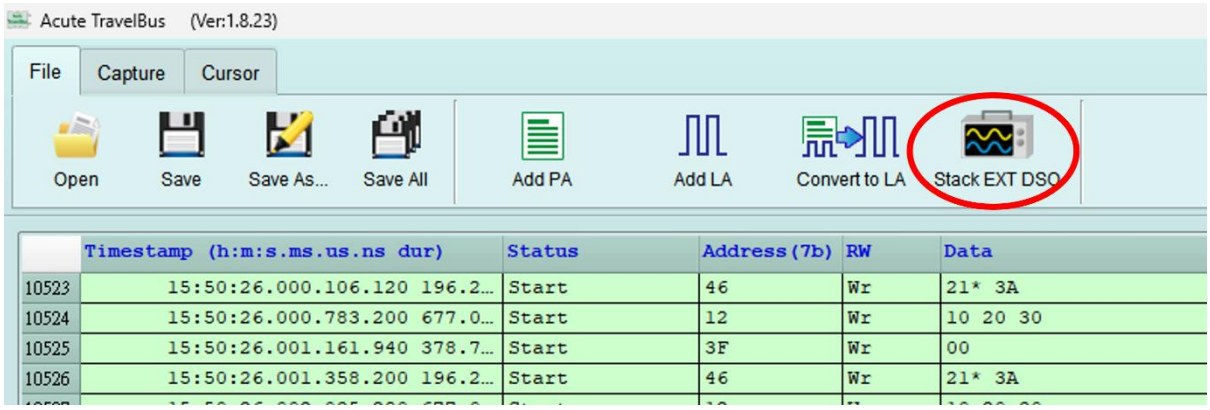

Show Waveforms / Hide Waveforms

If User select “Show Waveforms”, the device will capture the waveform data. It requires more device memory. Please decide show or hide waveform before capture.

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

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 

4. Waveform zoom in/out 

   User can use these buttons or mouse wheel to zoom in or out the waveforms.

Search

Search function can search data in the report window.

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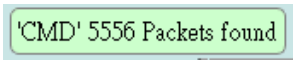
1. Enter search criteria in the text field.

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

2. Search the previous / next piece of data.
3. Specify all fields or target fields to search.
   Specifiy fields to narrow the search range, to search faster.

It will show the total number of packets found with green 

background. If no data is found, it will show an 

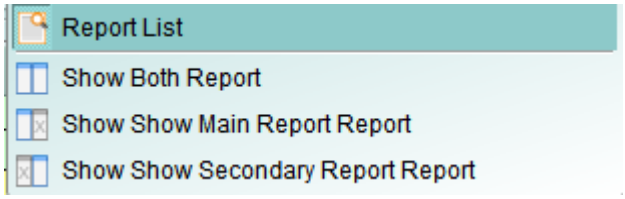
orange background.

To bottom

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

Window

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



1. Select different display list.
2. Use the control buttons to move the current position, or input row number to jump to specified row.

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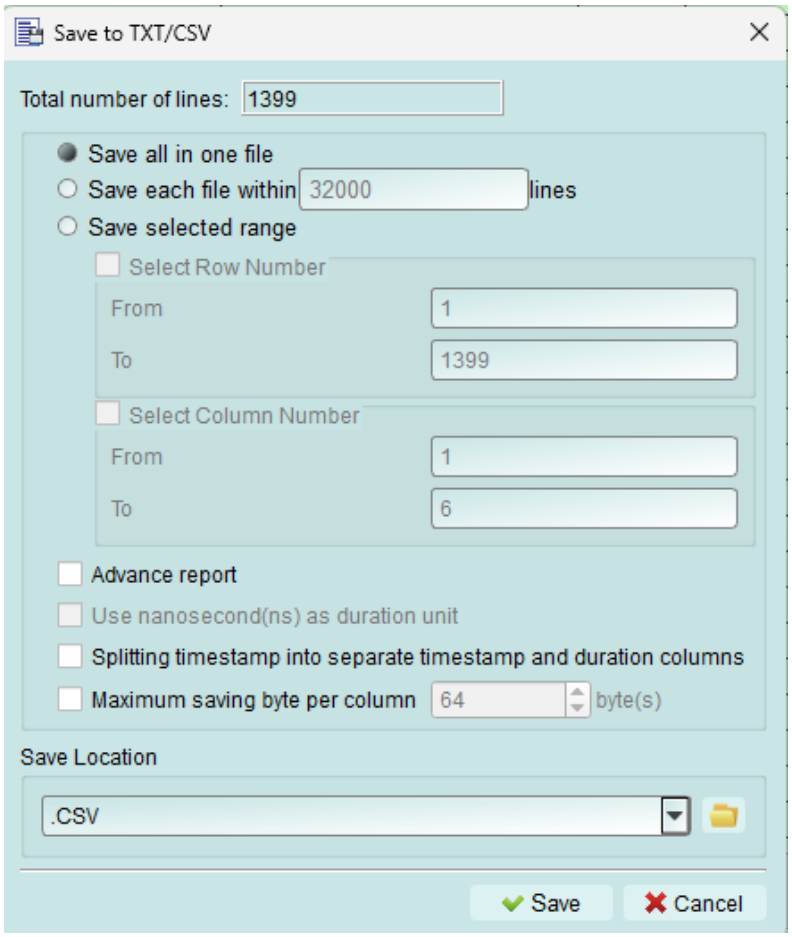
3. Use the control buttons to add /remove selected row to Bookmark List.

For detailed usage steps, please refer to Appendix 1: Report List Advanced Instructions.

Saved as text file

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.

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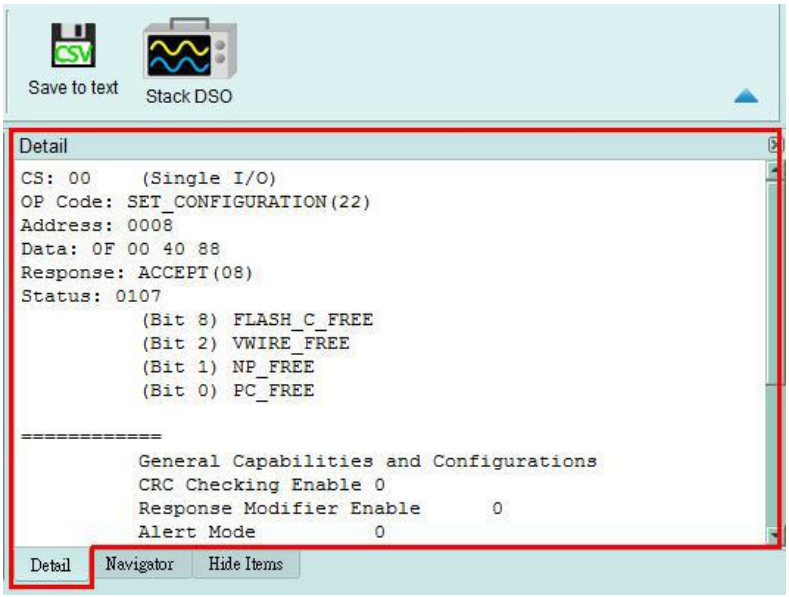
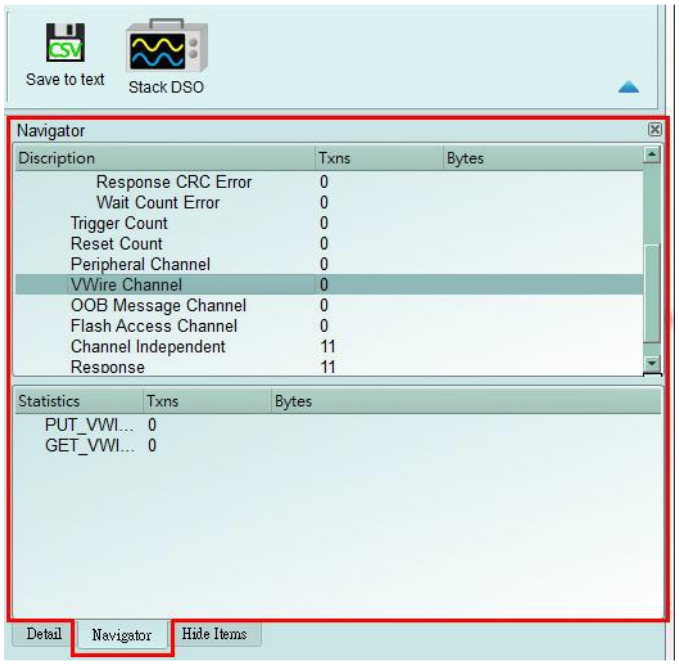
Detail window

Many protocols contain a large number of numerical data, it is not suitable to display in the report window at one time, so User can click the Data column of the report window with the mouse first, and the data will be displayed in the detail window.



Statistics window

According to protocols' different characteristics, statistics are made to understand the entire transmission situation, User may also click on the statistic trace to summarize all records of the selected trace into the statistic list window.



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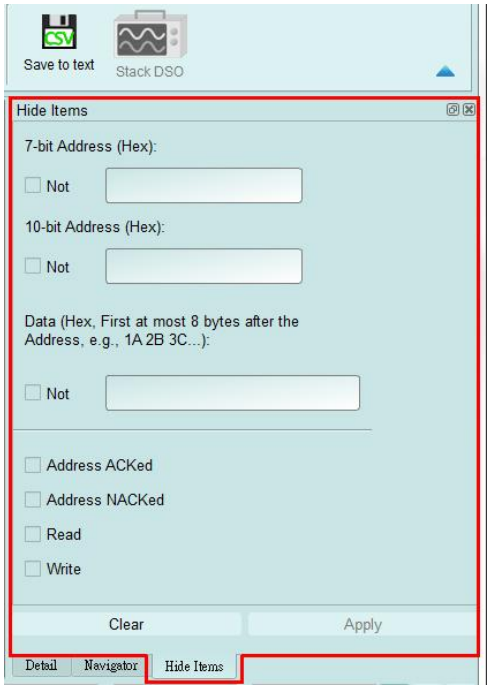
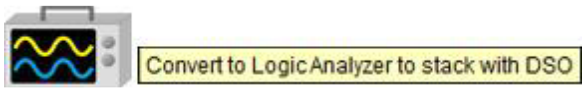
For detailed usage steps, please refer to Appendix 1: Report List Advanced Instructions.

Hide Data window

Select item to hide certain data, click “Clear” to restore.



Stack external 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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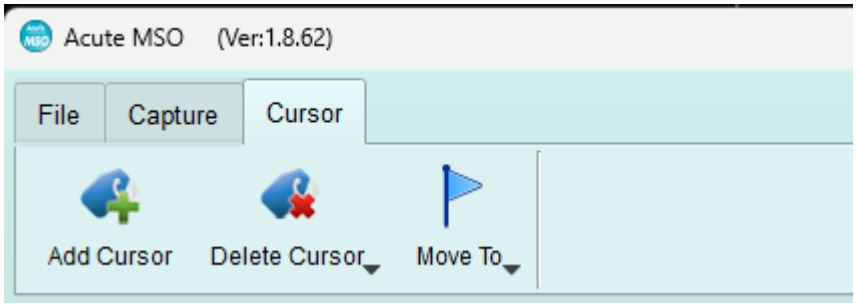
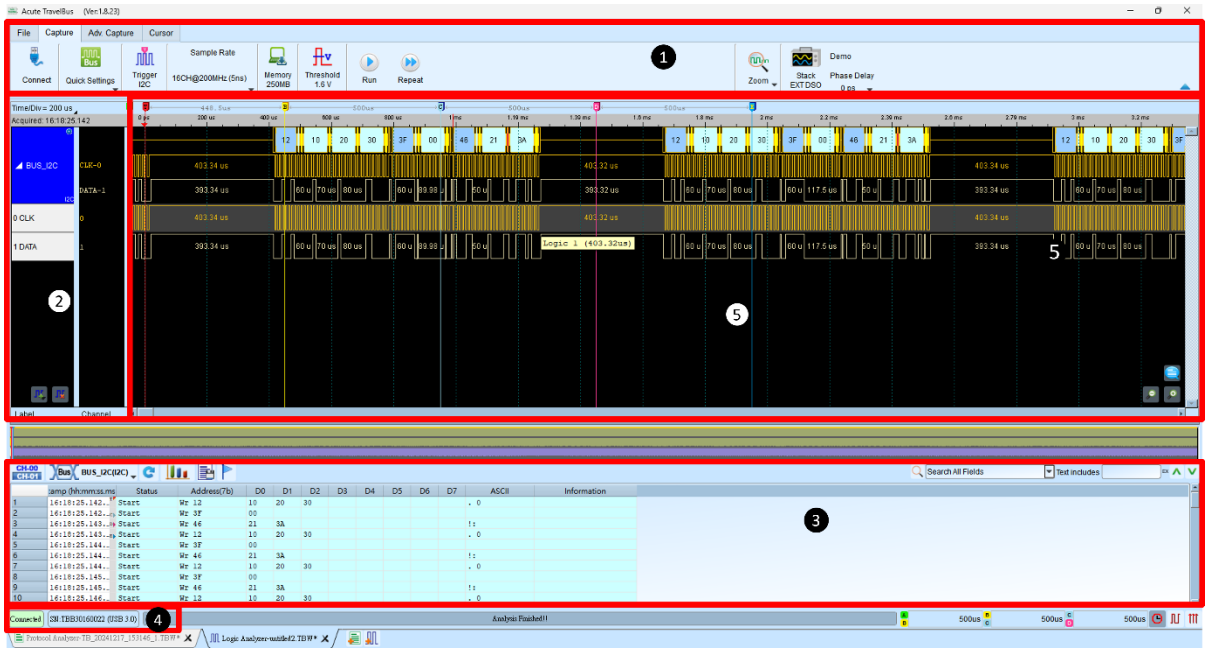
Cursor



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.

Logic Analyzer

Main Window



1. **Toolbar** includes Trigger, Sample Rate, Threshold and Run.
2. **Label Field** is to add or to delete the channel(s) by pressing the icons (,). You may modify the channel settings by clicking its label.
3. **Report Window** displays either the data ( ) or decode ( ) which can be exported text file in .csv or .txt ( ).

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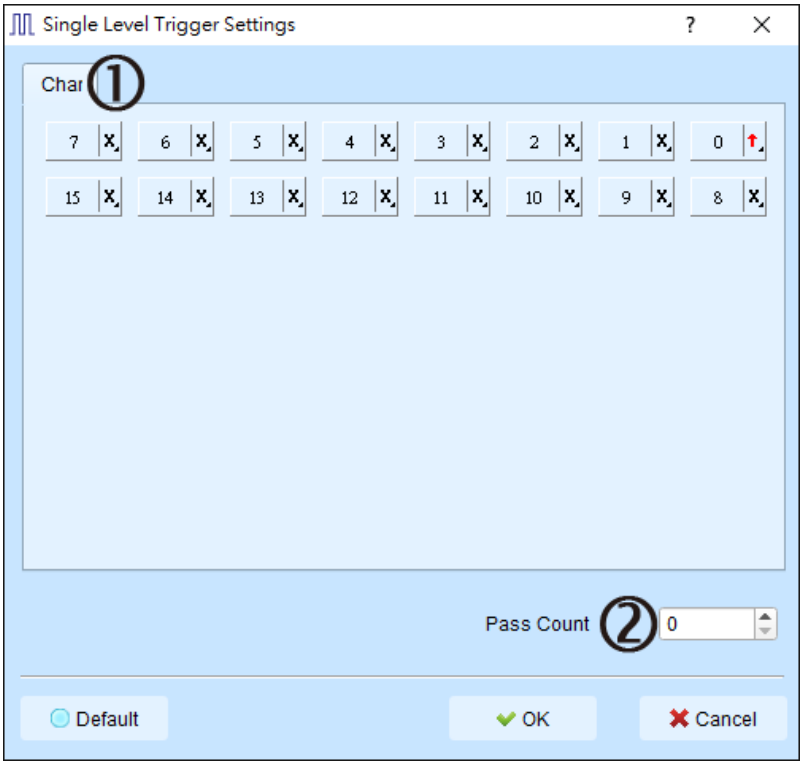
4. **Status Bar** shows if the TravelBus is connected to the PC.
5. **Waveform Window**：

   You may roll the mouse wheel to zoom in/out the waveforms and see the time difference between cursors.

Trigger ()

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

Single Level Trigger Settings



1. **Channel** is to choose the trigger event as any (x), rising (↑), ….
2. **Pass Count** is to pass the trigger event(s) for the number of times you input.

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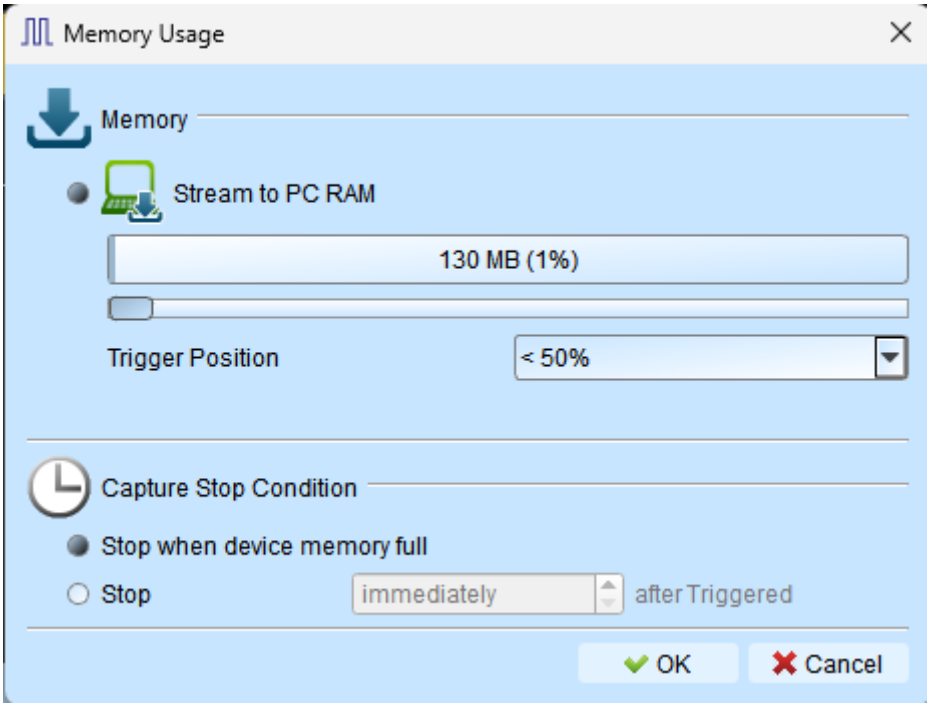
Memory Usage ( )



1. **Available Memory** is to set the percentage of the available PC RAM for use.
2. **Trigger Position** is to set the trigger position at the percentage of the memory used.

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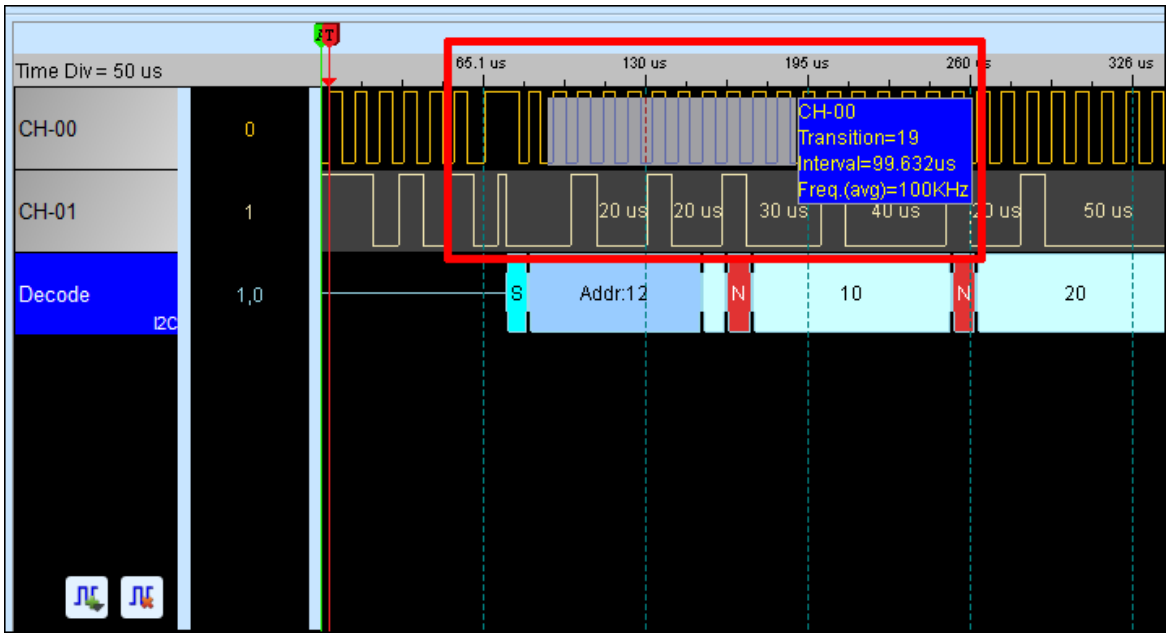
Waveform Window

In the Waveform Window, right-click and drag the mouse on the waveform to show the number of transitions, the interval and average frequency of the waveform. The Protocol Analyzer supports this function too.



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Stack with DSO

Using TravelBus 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, MDO4054C, MDO4104C	√	√
Keysight(Agilent)	• DSO1000A/5000A/6000A/6000L	√	√

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	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:

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

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

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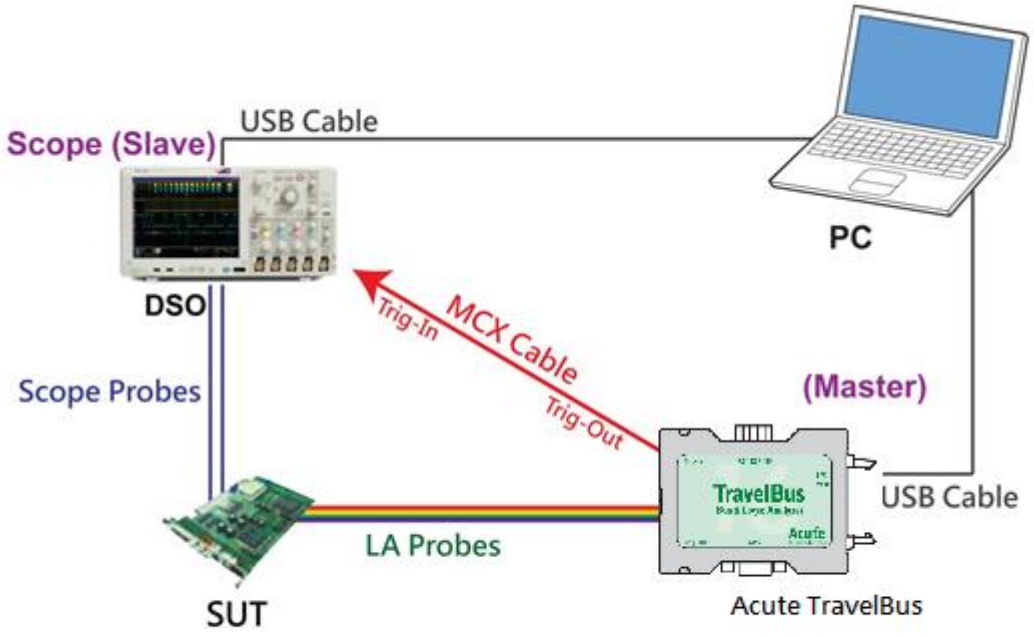

Figure 1

In Figure 1, the USB or Ethernet (TCP / IP) interface is connected to the computer, and then connect the BNC-MCX cable to the TravelBus 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 TravelBus is the Slave.
Wiring direction is from the oscilloscope's Trig-Out ➔ TravelBus's Trig-In (see Figure 2).

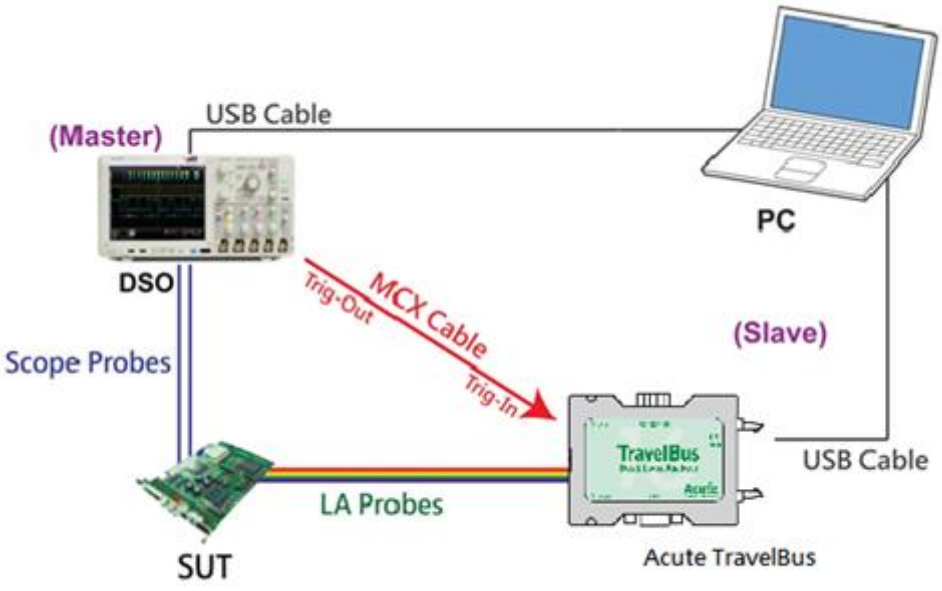

Figure2

In Figure 2, the BNC-MCX cable is connected to the TravelBus Trig-In and the trigger output interface (Trig-Out) of the oscilloscope. After completing the above actions,

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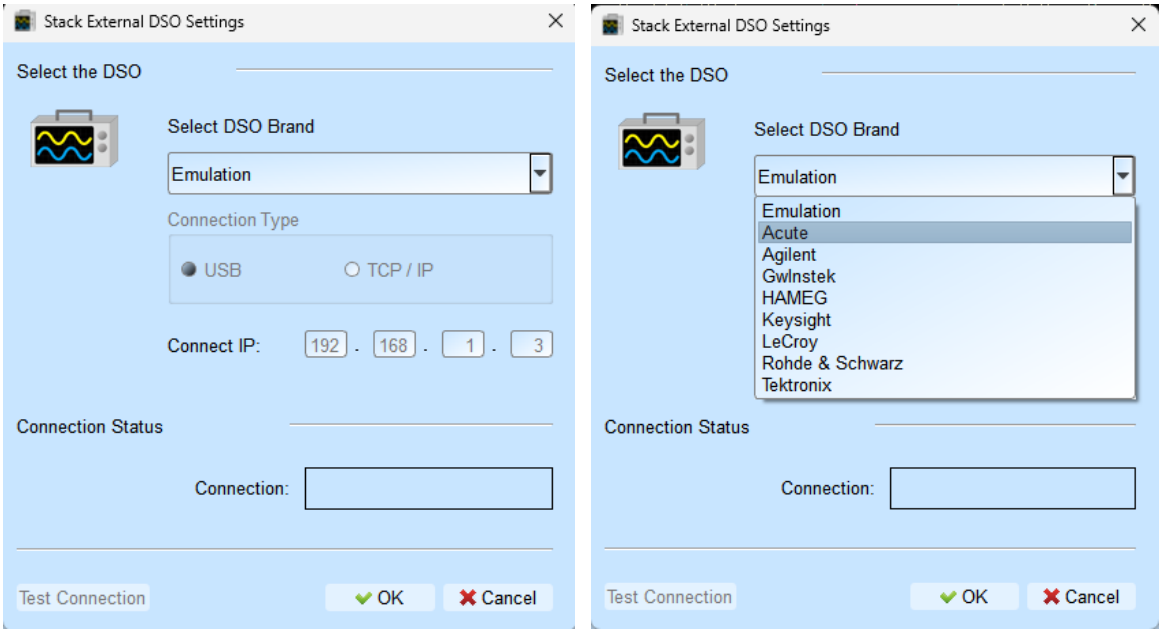
press the "Stack Oscilloscope" button, as shown below:



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.

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

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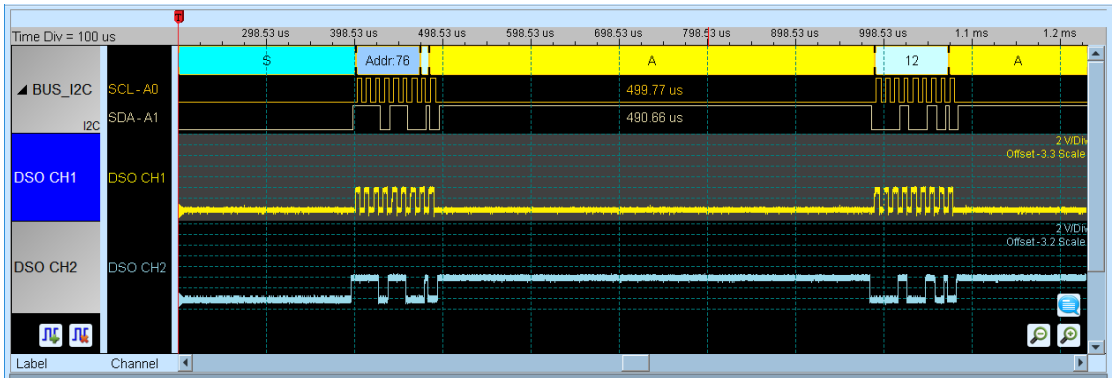
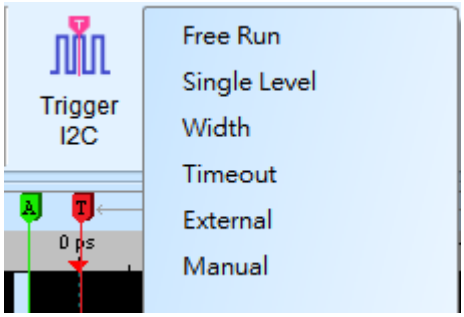


Oscilloscope is set as the master, while the TravelBus is set as the slave

If the stack is composed of the oscilloscope as the master and TravelBus 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 TravelBus 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 complete the stack delay correction.

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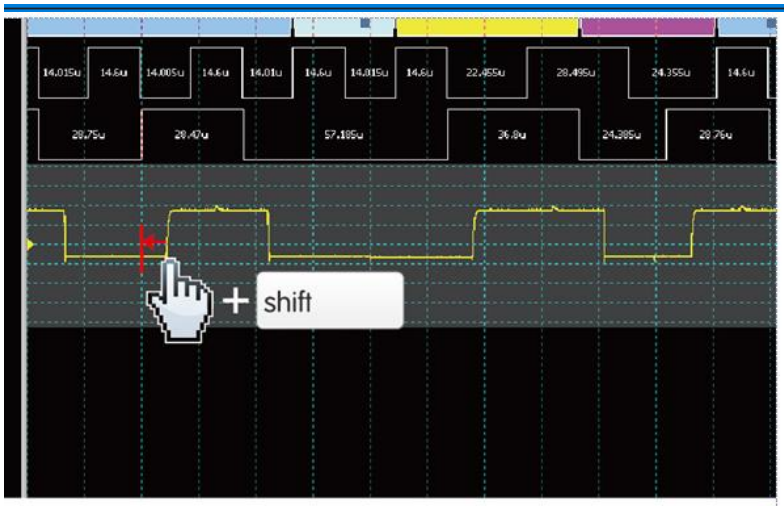

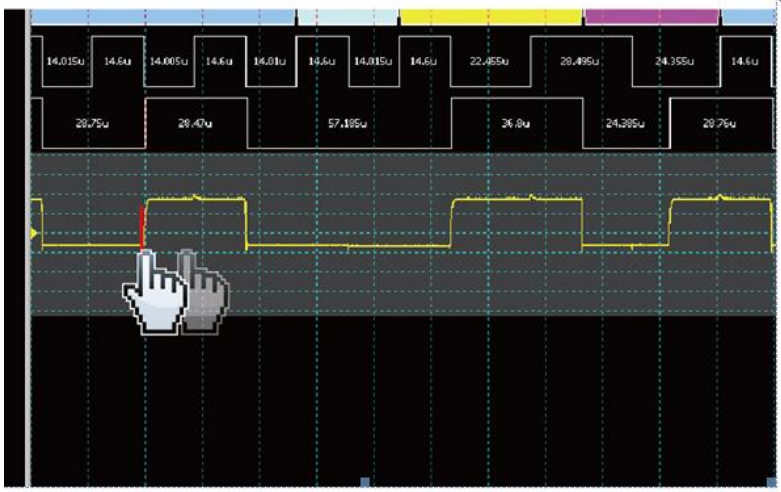

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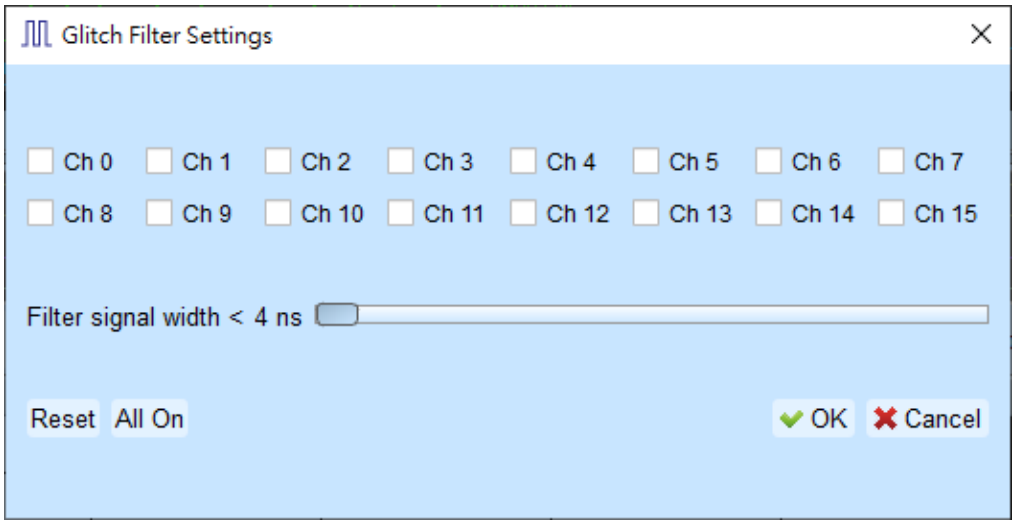
Advanced Capture Settings

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. Notice that the glitches may sometimes lead to poor quality of data transmission. User can stack a logic analyzer and an oscilloscope to check the signal integrity and whether there are unexpected glitches.



This filter can filter the signals of less than 5 ns - 35 ns wide. If 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.

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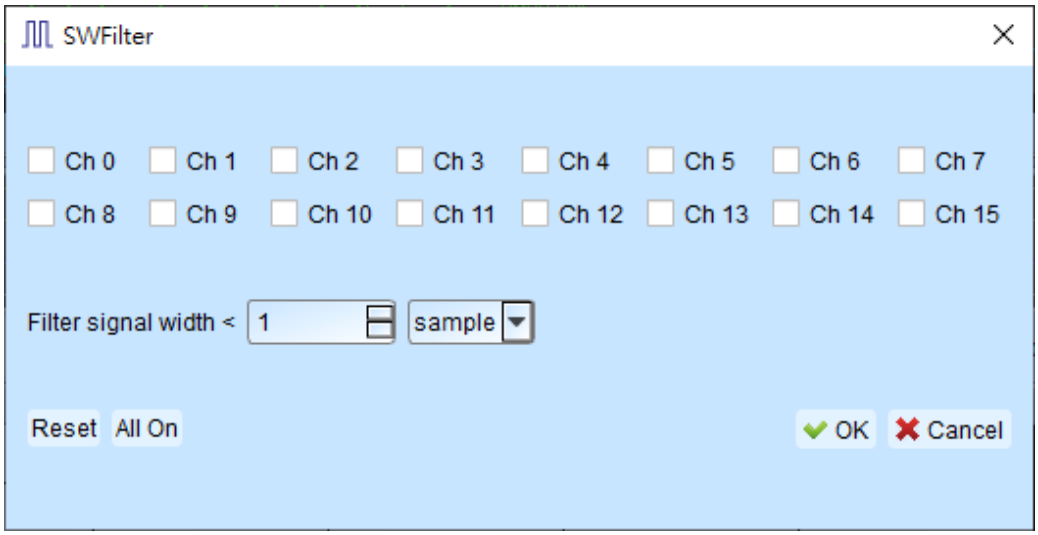
Software Glitch filter settings



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

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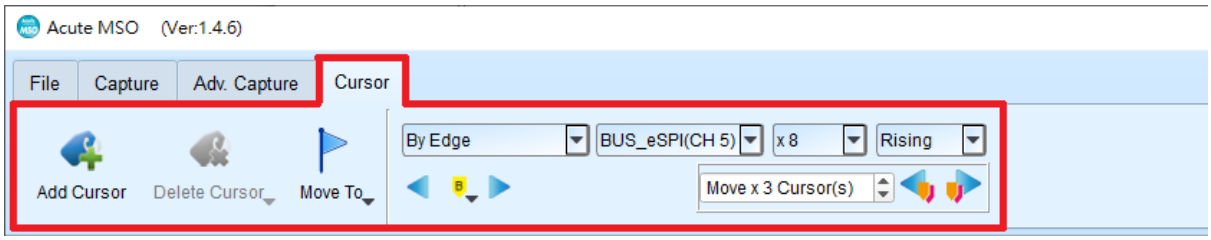
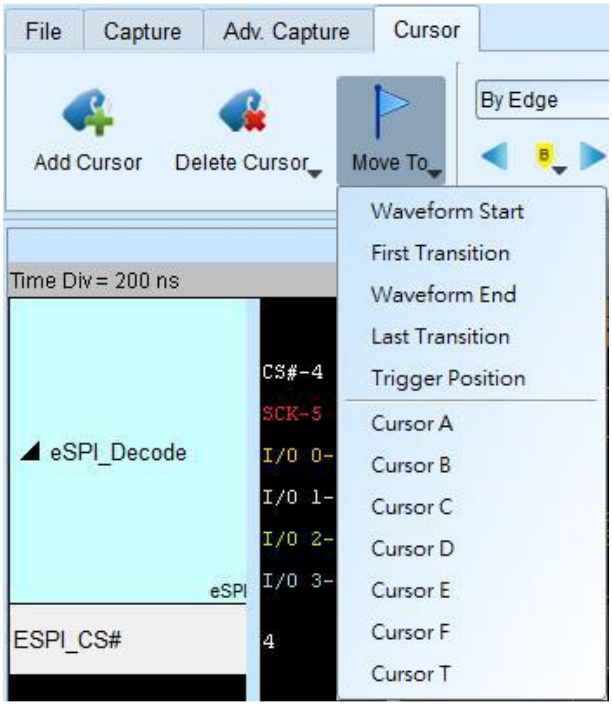
Cursor

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.
Waveform End: Move to the end of waveform.
Last Transition: Move to last waveform transition.
Last Transition on selected channel: Move to the last waveform transition of selected label.
Trigger Position: Move to the trigger position.
Cursor A-Z: Move to the Cursor position.

Waveform search is divided into four modes:

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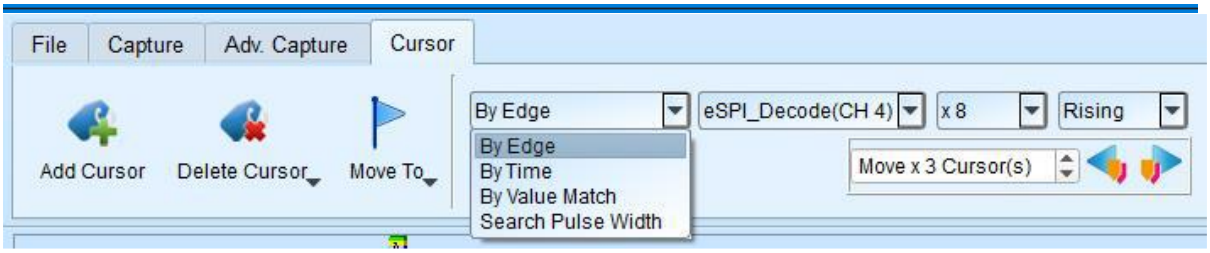
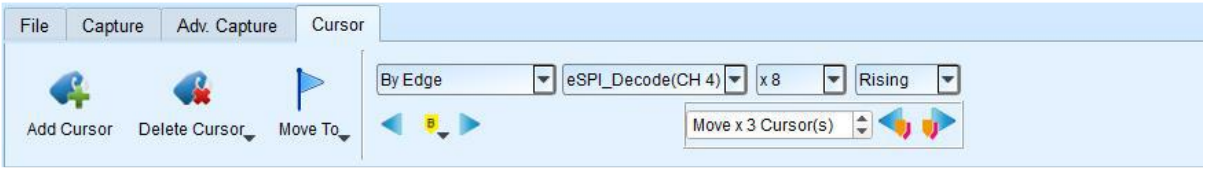
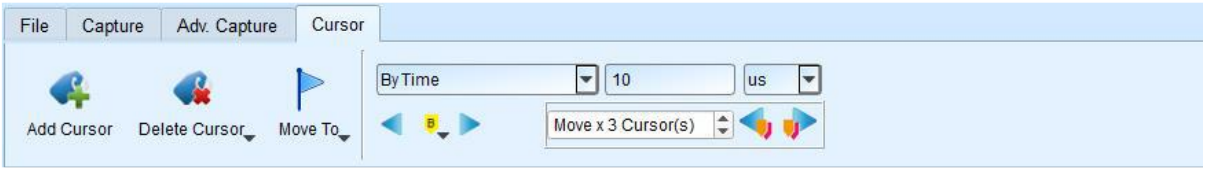


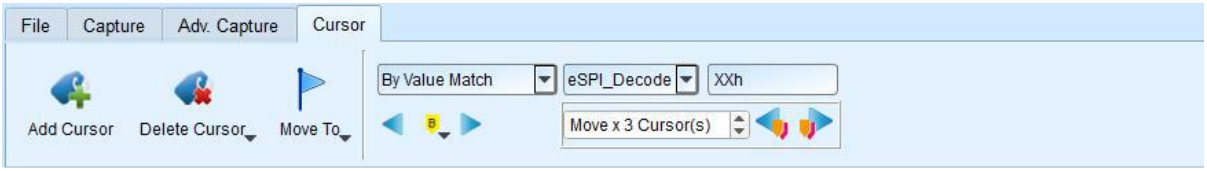
1. By Edge: Move the specified cursor according to the number of Rising/Falling/Either edges (x1 ~ x4096) of the specified channel.



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



3. By Value Match: In search of displayed value content of the specified channel, if the specified channel is a 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.
   All of the above operations can be used to move a single cursor on the left or multiple cursors on the right.

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

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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, User can click the “Add Cursor Button” () on the top or press the Shift+ letter key. To delete a cursor, User can click the “Delete Cursor Button” () on the top.

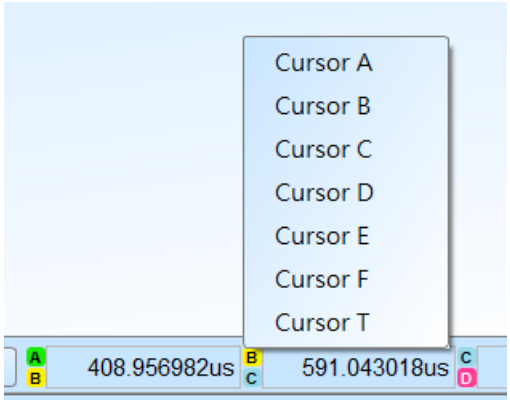
Cursor movement method:

1. Drag the cursor sign or cursor line to move the cursor.
2. Use the keyboard A-Z to quickly navigate to the cursor’s 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, it will add the cursor to the mouse cursor’s location; this could save User time dragging the cursor.

At the bottom right of the screen shows the frequency / time, the value will change as the cursor moves.

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

Clicking the cursor name, User can switch the cursor.



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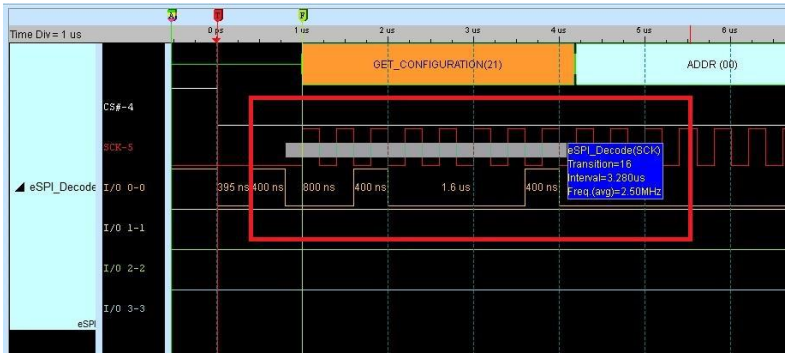
Waveform and Report

Waveform

1. Use the left mouse button to drag the waveform in the wave form display area.
2. User can use the mouse wheel or click the zoom in button on the screen  to zoom in/out the waveform.
3. To add text/graphic annotation  , User can add text or graphic annotation data in the waveform area.
4. Quick calculation function
   Use the right mouse button to box out an area in the waveform display area, it will 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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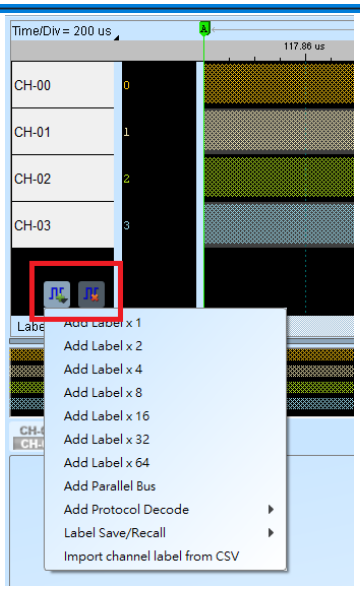
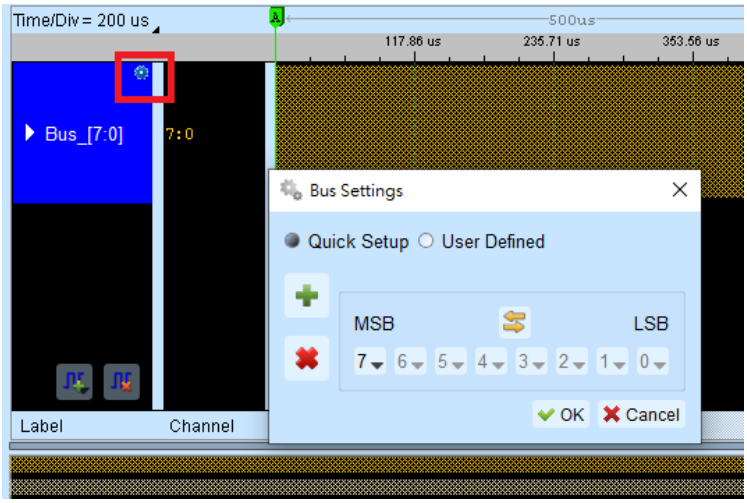
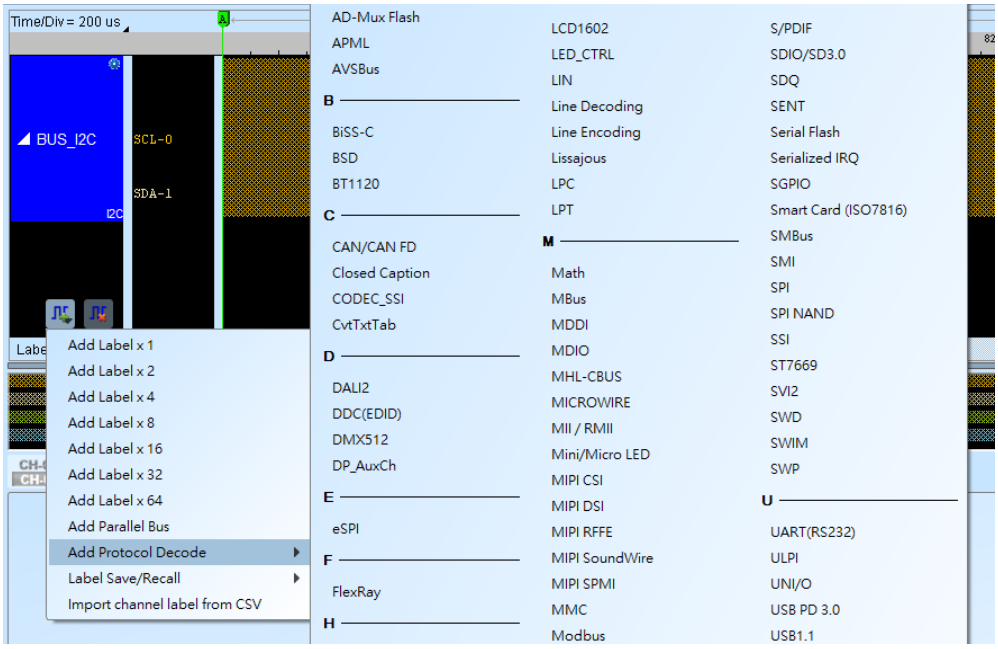


- Add parallel bus



- Add protocol decode



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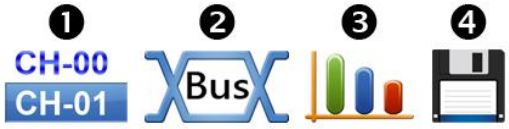
- Label Save/Recall: Save the current channel settings or load the saved channel label.
- Import channel label from CSV file. The file format is as follows,

	A	B
1	name1	1
2	name2	2
3	name3	3
4	name4	4
5		

Notice: The feature can only import channel name and number. It cannot import parallel bus or 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
   Select measurement type and channels. The default measurement range is the entire waveform area, User can specify a certain range between two cursors.
   Digital Measurement:

Type	Channels
Period	1
Frequency	1
Edge Count	1
Cycle Count	1
Positive Cycle Count	1
Negative Cycle Count	1
Positive Pulse count	1
Negative Pulse count	1
Positive Pulse Width	1
Negative Pulse Count	1
Channel-to-Channel Rising Delay	2
Channel-to-Channel Falling Delay	2

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Channel Rising to Channel Falling Delay	2
Channel Falling to Channel Rising Delay	2
Phase Delay	2

Analog Measurement:

Type	Channels
Frequency	1
Period	1
V Max.	1
V Min.	1
V High	1
V Low	1
V Peak to Peak	1
V Amplitude	1
V RMS.	1
V Mean	1
V Mid	1
High Duty	1
Low Duty	1
High Period	1
Low Period	1
Rise Time	1
Fall Time	1
V Pos. Overshoot	1
V Neg. Overshoot	1
V Rising Pre-shoot	1
V Falling Pre-shoot	1
Ch to Ch Rising Delay	2
Ch to Ch Falling Delay	2
Ch Rising to Ch Falling Delay	2
Ch Falling to Ch Rising Delay	2
Phase Delay	2
Rising Edge Count	1
Falling Edge Count	1
Edge Count	1

4. Save report area

   Save the report area as text files.

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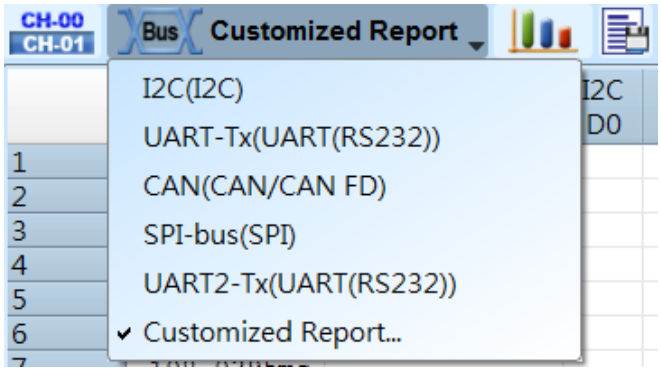
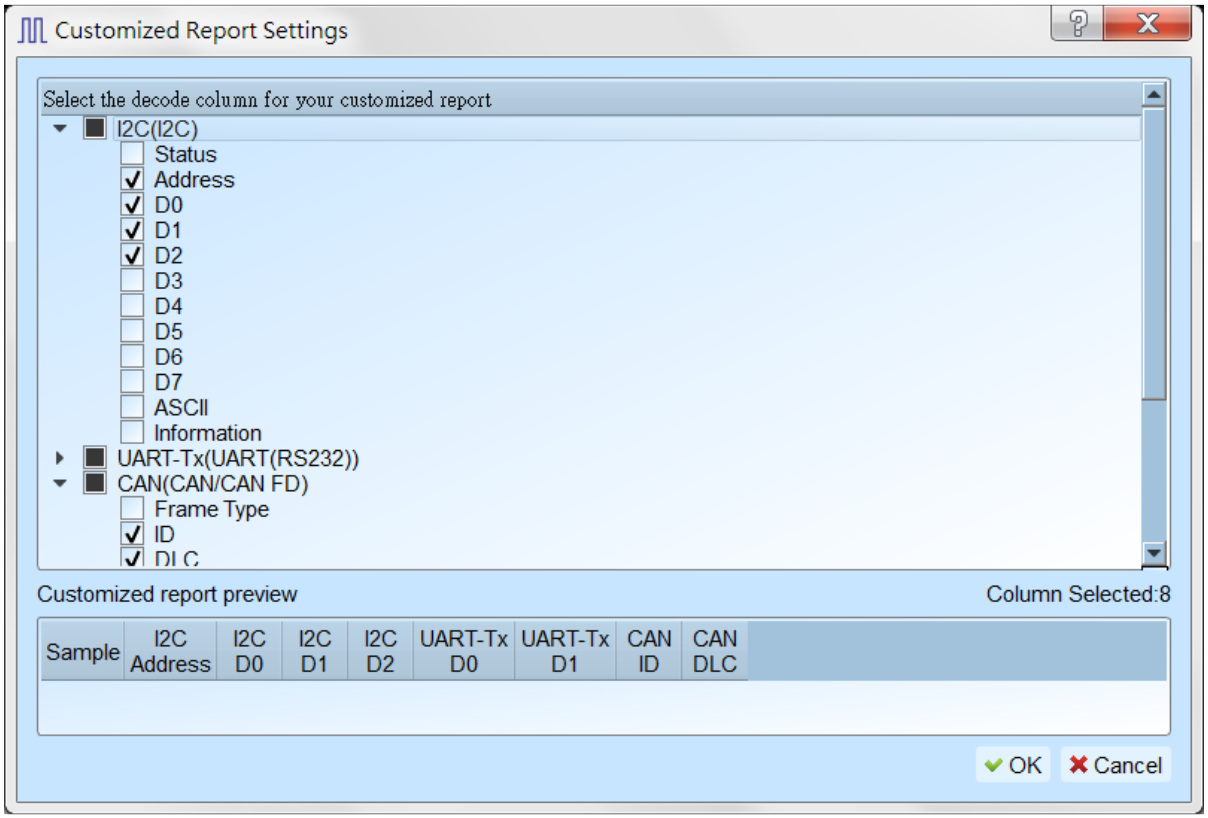
Bus Decode Settings

Please refer to the bus trigger and Analyzer manual.

Customized Report Settings





All bus decodes enabled in waveform area will be listed in the settings window, select columns wanted from each reports, the preview window will show selected column and combine them to create Userr 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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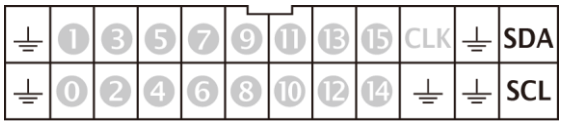
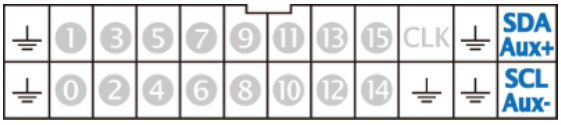
Chapter 3 Dedicated Channel Description

I2C、DP AUX, 10 BASE-T1S port are supported on the TB2000/TB3000 series

I2C

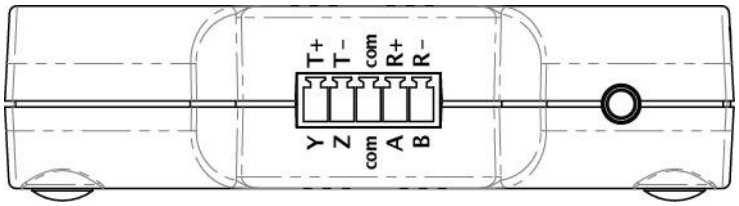


DP AUX / 10BASE-T1S

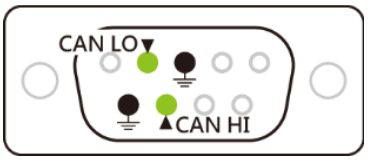


There are additional RS422 / 485、CAN / CAN-FD port supported on the TB2016B/TB3016B,

RS422 / 485



CAN / CAN-FD



(DP AUX, 10BASE-T1S, RS485, CAN / CAN-FD are differential signal. Since TB2000/TB3000 series have the converter inside, there is no need to set the threshold before measure)

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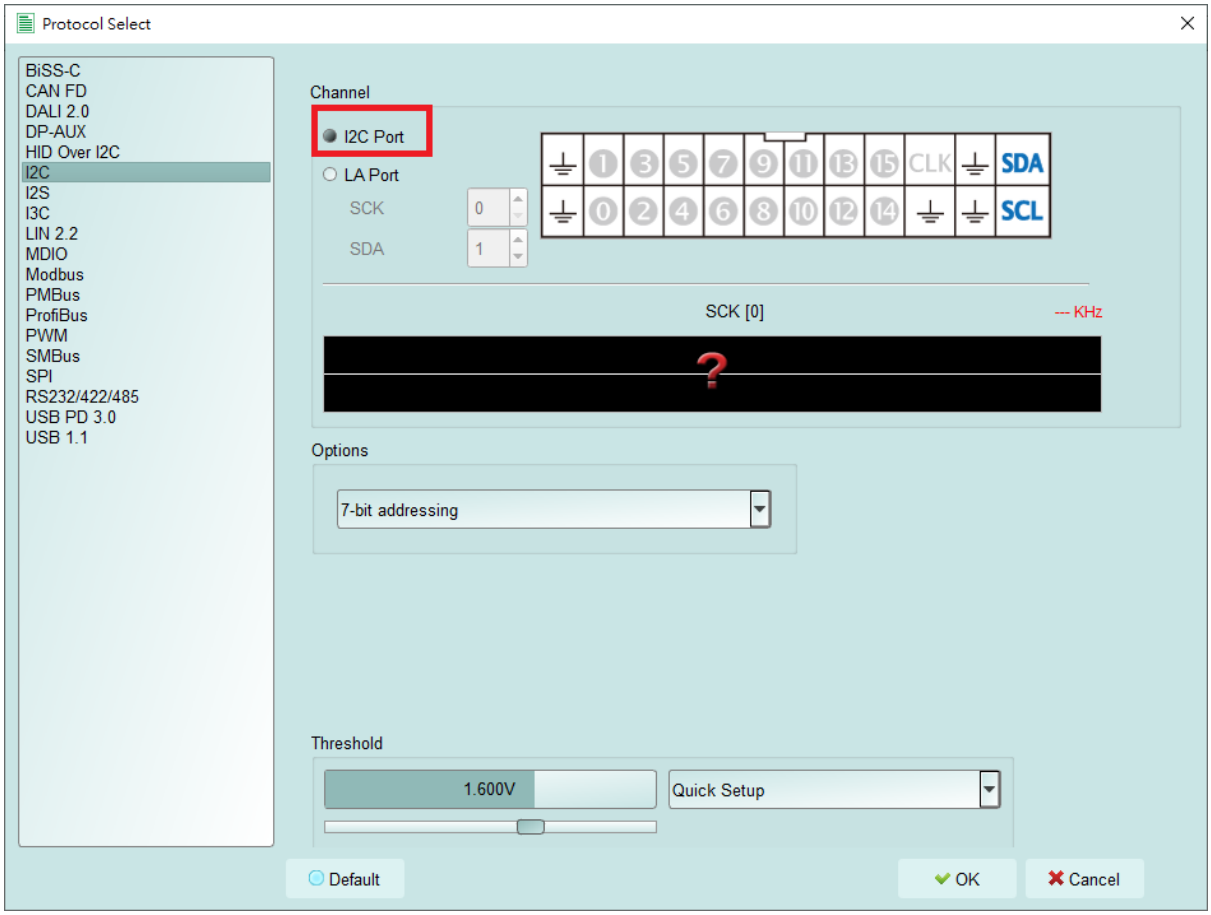
Protocol Analyzer mode

Please modify the channel settings in the Protocol Setting.



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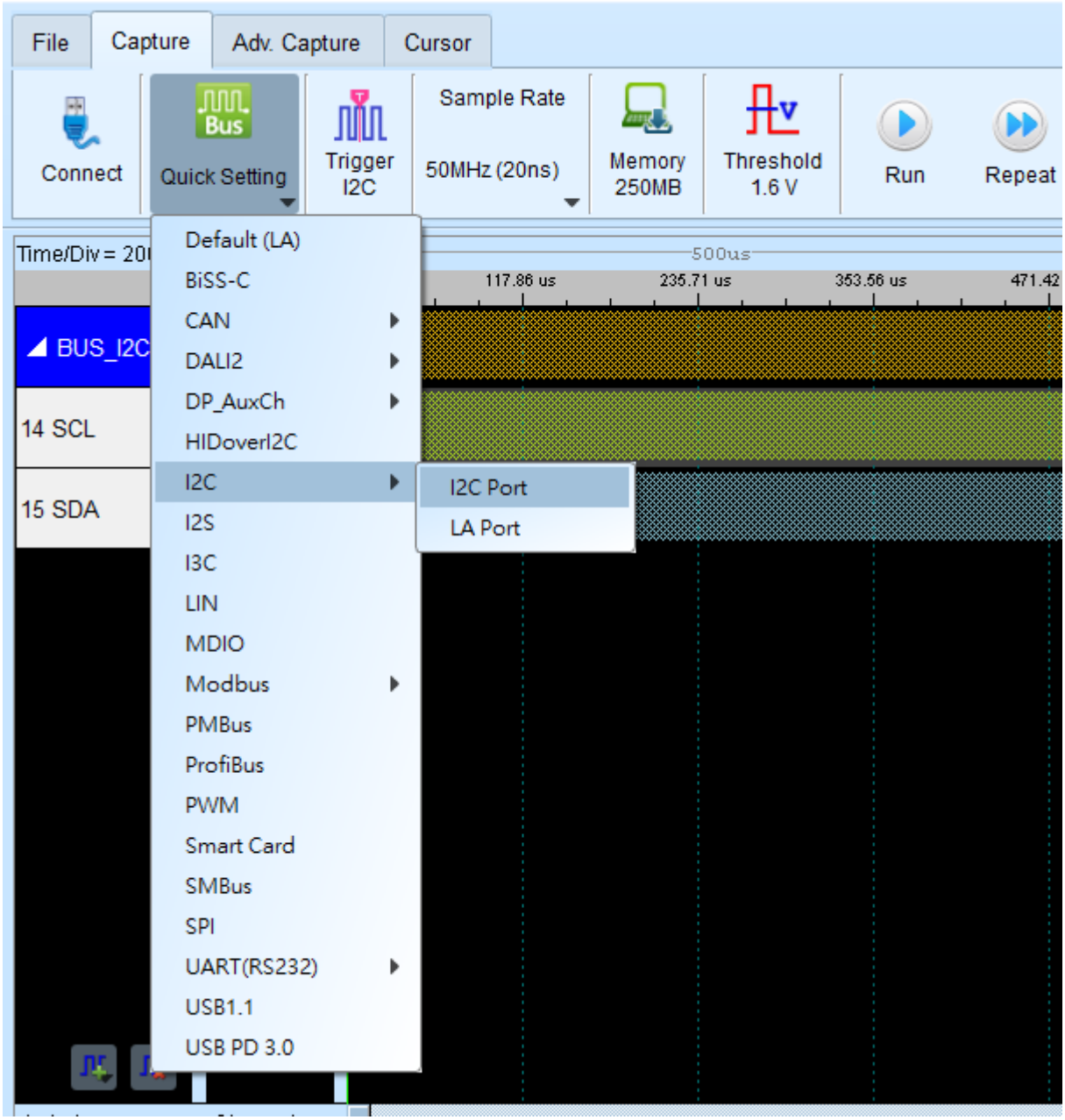
Logic Analyzer mode

Use Quick Setting to change channel settings. Warning: Don’t change the trigger type after quick setting, or the dedicated channel can’t not use.



(If the I2C port is on, only the I2C Clause Trigger can use. If change to the other trigger mode, the I2C port can’t use. Unless re-Quick Setting.)

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Chapter 4 Specifications

Model		TB3016F	TB3016E	TB3016B
Power	Power Source	USB bus-power (+5V)		
	Static Power Dissipation	0.75W		
	Max Power Dissipation	< 2.5W		
Hardware Interface		USB 3.0		
Timing Analysis (Asynchronous, Max. Sample Rate)		800MHz*		
State Clock Rate (Synchronous, External Clock)		200MHz*		
Channels (Data / CLK / I^2C / DP_Aux / CAN / RS485)		16 / 1 / 2 / - / -		16 / 1 / 2 / 2 / 4
Timing Vs Channels	Timing Analysis	Available channels		
	800 MHz	8		
	400 MHz	16		
	200 MHz	16		
Threshold	Group	2 (ch0~7, ch8~15 & clk0)		
	Range	±6V		
	Resolution	50mV		
	Accuracy	±100mV + 5%*Vth		
Trigger	Time resolution	5 ns		
	Channels	16 (Max.)		
	Pre/Post Trigger Setting	Yes		
	Pass Counter	Yes (0~65536 times)		
	Event Types	Channel, Pattern, Single, Width, Time-out, External		
	Module I	I^2C, MIPI I3C 1.1, SPI, UART (RS232)		
	Module II	---	HID over I^2C , I^2S , LIN2.2, MDIO, PMBus, SMBus, USB1.1	
	Module III	---		BiSS-C, CAN2.0B, CAN-FD, DALI2.0, DP_AUX, SENT, Modbus, ProfiBus, RS422, RS485, USB PD 3
	Input port (for Stack)	---		TTL 3.3V
	Output port (for Stack)	---		TTL 3.3V

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Input Voltage	Maximum	±40V DC, 15Vpp AC		
	Sensitivity	0.5Vpp @150MHz		
Impedance		200KΩ // < 5pF		
Maximum target signal speed		Data Port: 14 MHz, CAN Port: 10 Mbps, I²C Port: 400 KHz 3.3V, RS485 Port: Baud rate 20 Mbps		
Temperature	Operating / Storage	5°C ~ 45°C (41°F ~ 113°F)) / -10°C ~ 65°C (-14°F ~ 149°F)		
Protocol Analyzer	Module I	I²C, MIPI I3C 1.1, SPI, UART (RS232)		
	Module II	---	HID over I²C, I²S, LIN2.2, MDIO, PMBus, SMBus, USB1.1	
	Module III	---	---	BiSS-C, CAN2.0B, CAN-FD, DALI2.0, DP_Aux, Modbus, Profibus, PWM, RS422, RS485, USB PD 3
Software features	Bus decode	1-Wire, 3-Wire, 7-Segment, AccMeter, ADC, APML, BiSS-C, BSD, CAN2.0, CAN FD, Close Caption, CODEC_SSI, DALI2.0, Digital LED, DMX512, DP_Aux, EDID, FlexRay, HDLC, HDQ, HID over I²C, I²C, I²C EEPROM, I²S, ITU656, IrDA, JTAG, JVC IR, LCD1602, LIN2.2, Line Decoding, Line Encoding, LPT, M-Bus, Math, MDIO, MHL Cbus, Microwire, Mini/Micro LED, MIPI CSI LP, MIPI DSI LP, MIPI I3C 1.1, MIPI SoundWire, Modbus, NEC IR, PECI, PMBus, Profibus, PS/2, PWM, QEI, QI, RC-5, RC-6, RT_SWI, SDQ, SENT, SGPIO, Smart Card (ISO7816), SMBus, SMI, SPI, SSI, ST7669, SWD, SWIM, SWP, UART, UNI/O, USB1.1, USB PD 3, Wiegand		

* Measure signal under 14 MHz ONLY due to data transmission limitation.

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Model		TB2016F	TB2016E	TB2016B
Power	Power Source	USB bus-power (+5V)		
	Static Power Dissipation	0.75W		
	Max Power Dissipation	< 2.5W		
Hardware Interface		USB 3.0		
Timing Analysis (Asynchronous, Max. Sample Rate)		200MHz*		
State Clock Rate (Synchronous, External Clock)		200MHz*		
Channels (Data / CLK / I^2C / CAN / RS485)		16 / 1 / 2 / - / -		16 / 1 / 2 / 2 / 4
Trigger	Time resolution	5 ns		
	Channels	16 (Max.)		
	Conditions	Yes (4)		
	Pre/Post Trigger Setting	Yes		
	Pass Counter	0~65536 times		
	Event Types	Channel, Pattern, Single, Width, Time-out, External		
	Module I	I^2C, RS232, SPI		
	Module II	---	HID over I^2C , I^2S , LIN2.2, MDIO, PMbus, SMBus, USB1.1	
	Module III	---		BiSS-C, CAN2.0B, CAN-FD, DALI2.0, DP_AUX, SENT, Modbus, ProfiBus, RS422, RS485, USB PD3.0
	Input port (for Stack)	---		TTL 3.3V
	Output port (for Stack)	---		TTL 3.3V
	Range	-6V ~ +6V		
	Voltage resolution	50mV		
Threshold	Accuracy	±100mV + 5%*Vth		
Input Voltage	Maximum	±40V DC, 15Vpp AC		
	Sensitivity	0.5Vpp @150MHz		
Impedance		Impedance		
Temperature	Operating	5°C ~ 45°C (41°F ~ 113°F)		

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	Temperature			
	Storage Temperature	-10°C ~ 65°C (14°F ~ 149°F)		
Bus Decode	Module I	DALI, HID over I^2C, I^2C, I^2S, LIN, MDIO, PMBus, RS232, SMBus, SPI, USB1.1		
	Module II	---	CAN, Modbus, ProfiBus, RS422, RS485	
	Module III	---	---	BiSS-C, PWM

*Measure signal under 14MHz ONLY due to data transmission limitation

Model		TB1016E	TB1016B	TB1016B+
Power	Power Source	USB bus-power (+5V)		
	Static Power Dissipation	0.75W		
	Max Power Dissipation	< 2.5W		
Hardware Interface		USB 3.0 (USB 2.0 Compatible)		
Timing Analysis (Asynchronous, Max. Sample Rate)		200MHz*		
State Clock Rate (Synchronous, External Clock)		200MHz*		
Channels (Data / CLK / I^2C / CAN / RS485)		16 / 1 / 2 / - / -	16 / 1 / 2 / 2 / 4	
Trigger	Time resolution	5 ns		
	Channels	16 (Max.)		
	Conditions	Yes (4)		
	Pre/Post Trigger Setting	Yes		
	Pass Counter	0~65536 times		
	Event Types	Pattern, Channel, Transition, Width		
	Module I	DALI, HID over I^2C, I^2C, I^2S, LIN, MDIO, PMBus, RS232, SMBus, SPI, USB1.1		
	Module II	---	CAN, Modbus, ProfiBus, RS422, RS485	
	Module III	---	---	BiSS-C
	Input port (for Stack)	---	TTL 3.3V	
	Output port (for Stack)	---	TTL 3.3V	
	Range	-6V ~ +6V		
	Voltage resolution	50mV		
Threshold	Accuracy	±100mV + 5%*Vth		
Input Voltage	Maximum	±40V DC, 15Vpp AC		
	Sensitivity	0.5Vpp @150MHz		
Impedance		200KΩ // < 5pF		

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Temperature	Operating Temperature	5°C ~ 45°C (41°F ~ 113°F)		
	Storage Temperature	-10°C ~ 65°C (14°F ~ 149°F)		
Bus Decode	Module I	DALI, HID over I^2C, I^2C, I^2S, LIN, MDIO, PMBus, RS232, SMBus, SPI, USB1.1		
	Module II	---	CAN, Modbus, ProfiBus, RS422, RS485	
	Module III	---	---	BiSS-C, PWM

*Measure signal under 14MHz ONLY due to data transmission limitation

Chapter 5 Service

Contact information:

Website: http://www.acute.com.tw

E-Mail: service@acute.com.tw

Phone: +886-2-2999 3275

Fax: +886-2-2999 3276

Troubleshooting:

If the TravelBus is in "Demo mode", please follow the steps below:

(1) Use the USB3.0 cable (only) in the product package.

(2) Check if the USB driver is in the Device Manager.

(3) Install the latest version software from the official website of Acute Technology Inc., go to the Download page->Software, and then select ***[Logic Analyzer] TravelBus series*** to download the TBA series.

(4) Re-plug the USB3.0 cable or reboot the OS to check if the USB driver exists.

(5) Contact us for further help if above procedures do not work.

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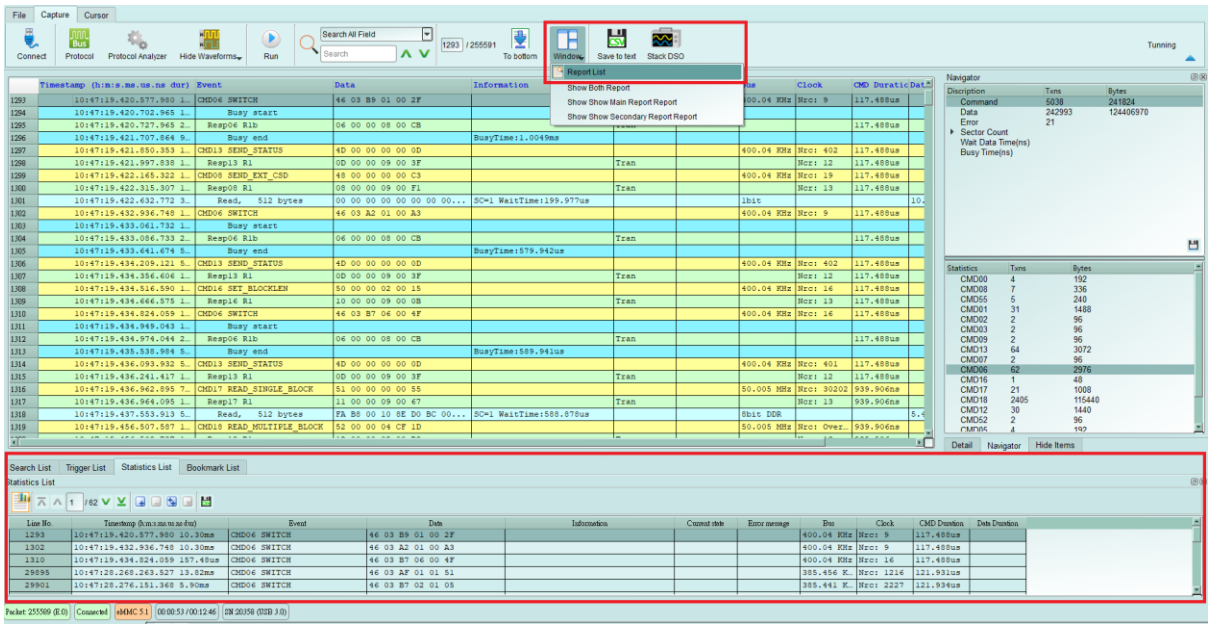
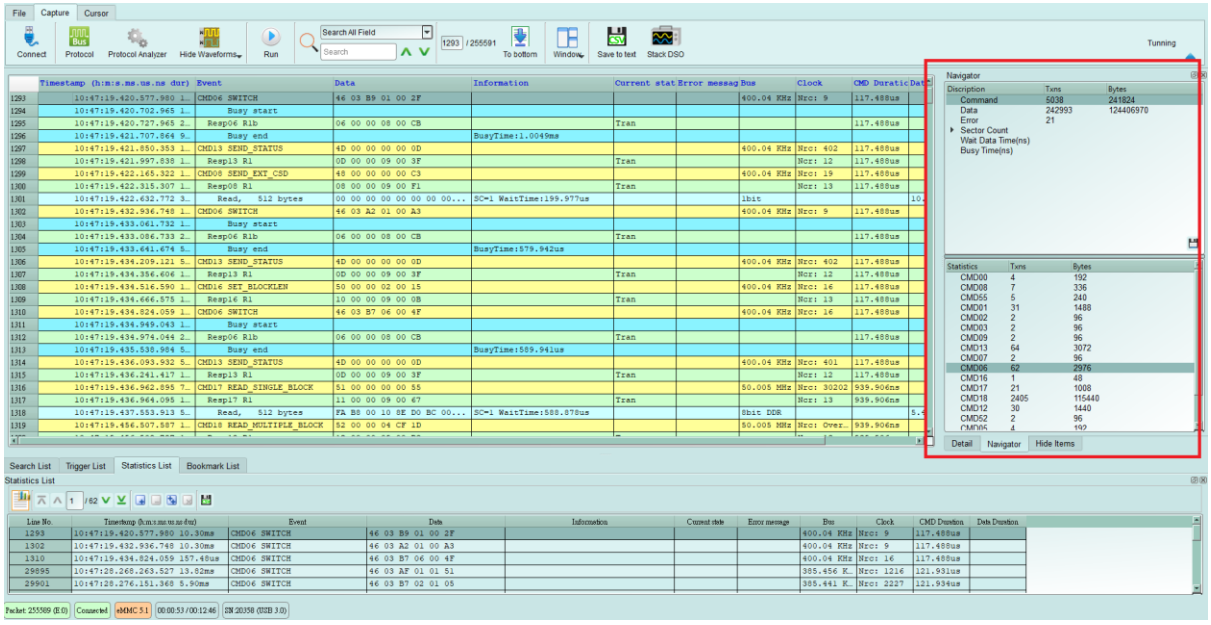
Appendix 1 Report List Advanced Instructions

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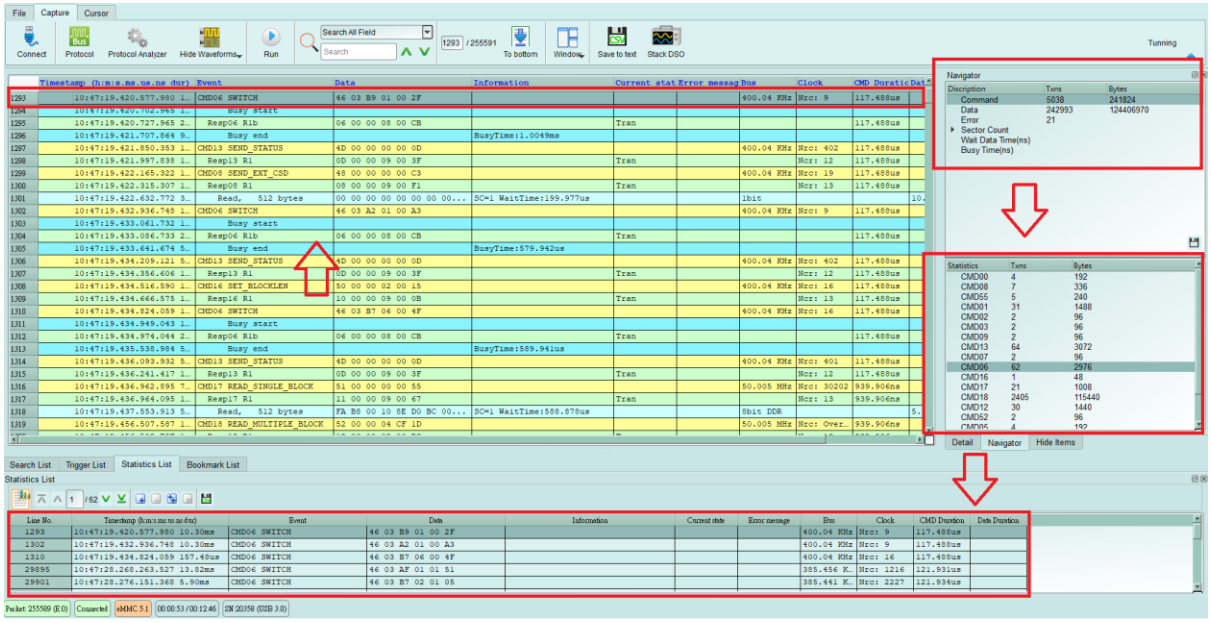
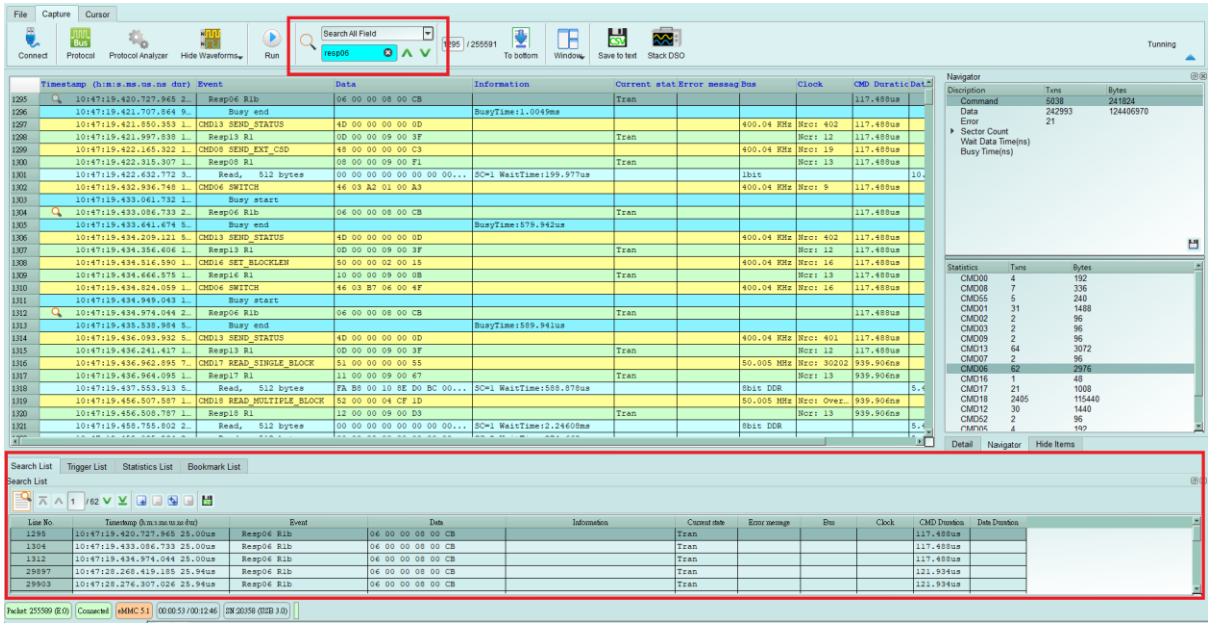
3. Click the items of the statistical function in sequence, the statistical results will be presented in the Statistic List in the report list, and can be clicked on this table to track the position of this data in the main report area.



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

(1). Search List



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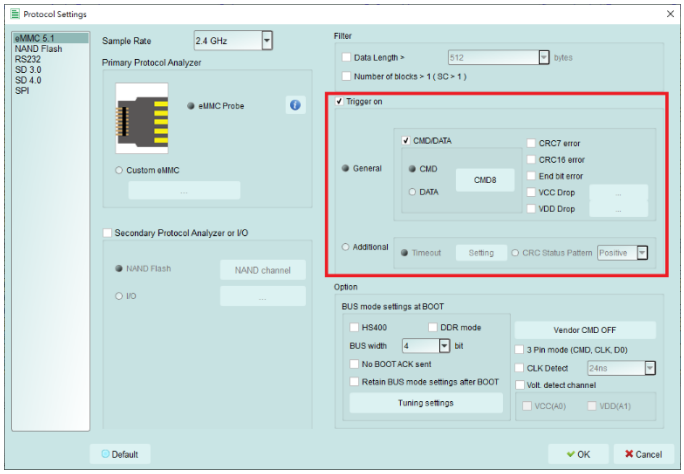
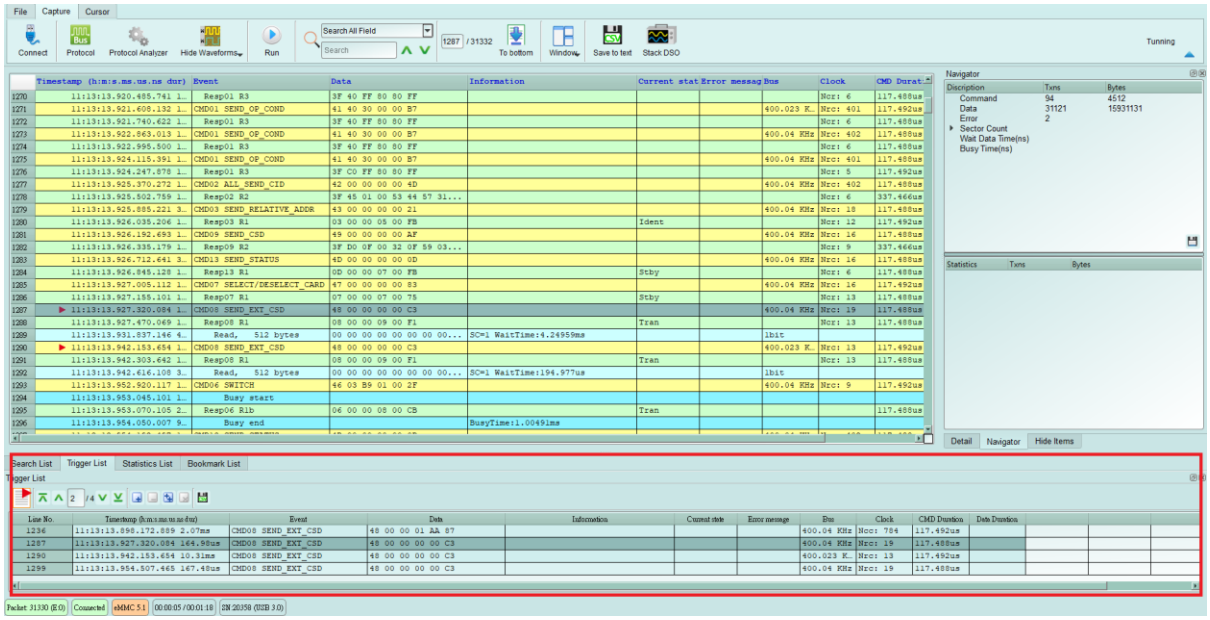
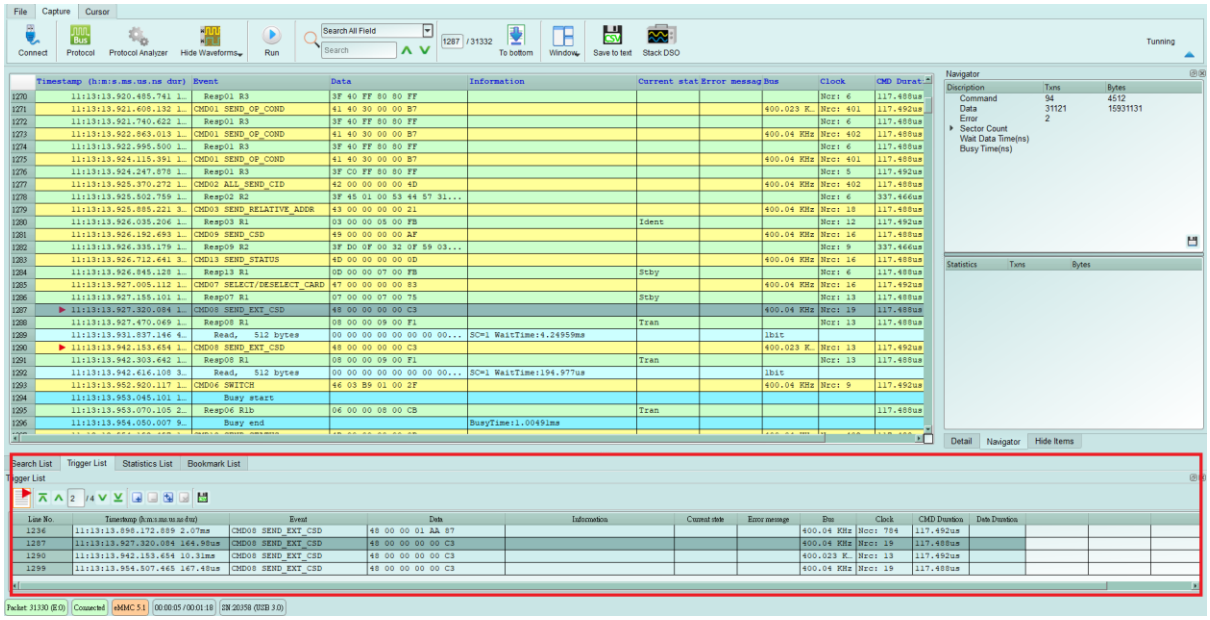
(2). Trigger List





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



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