MSO3000 Series
Protocol + Logic Analyzer
Manual



MSO1000/2000 Series 3 in 1 Analyzer
(Protocol + Logic + Simple DSO)
Manual



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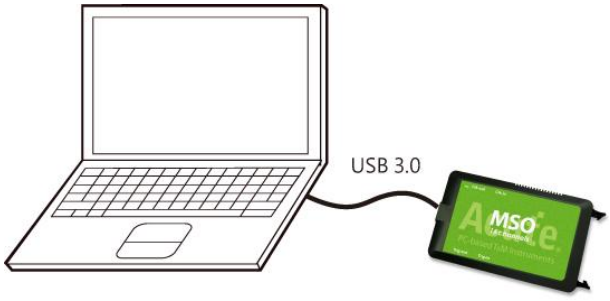
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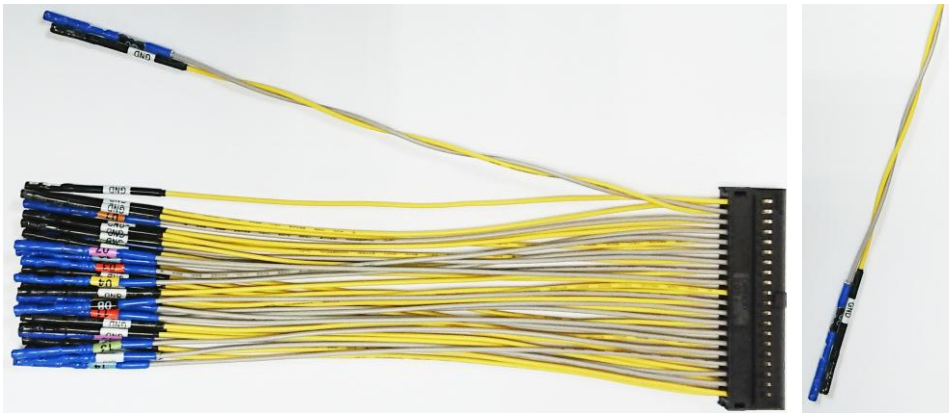
Chapter 1 Installation and Settings

Hardware installation

Connect the device to the computer with USB 3.0 cable (Pic.1). After confirming that the connection is complete, User can turn on the software and connect the signal cable to the object to be tested for observation. Before User start measuring, please make sure the GND is correctly connected. If possible, we suggest twisted pair the Data Pin and GND to improve the signal quality (Pic.2). Also, we recommend using the short cable for measurement when the signal speed is over 150MHz.



(Pic.1)



(Pic.2)

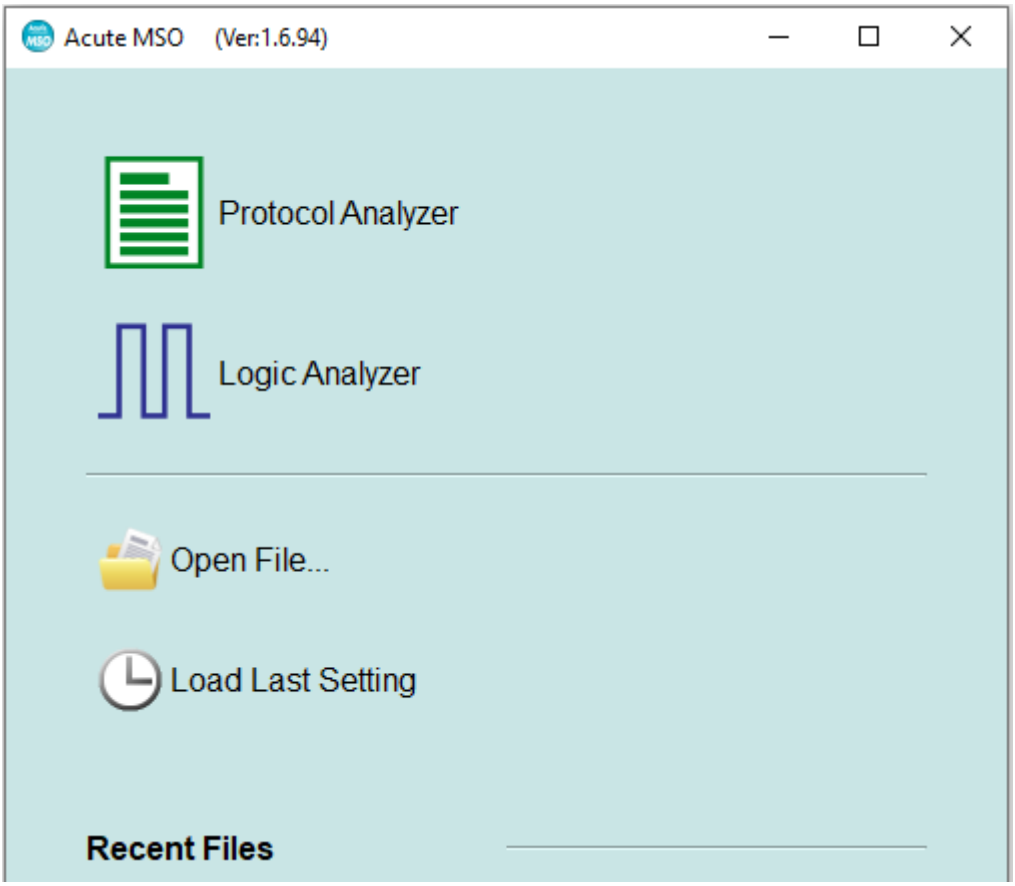
Software installation

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 ***[Mixed Signal Oscilloscope] MSO2000 series*** or ***[Mixed Signal Oscilloscope] MSO3000 series*** to download the MSO series. After completion of installation, the “start icon” of MSO series will appear on the desktop

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and the program set. User can select either one to start MSO ( ). After starting the software, the main menu screen will show up. User can choose to enter logic Analyzer or protocol Analyzer.



User may add a Logic Analyzer or Protocol Analyzer window later after entering the main window by selecting the icon below,

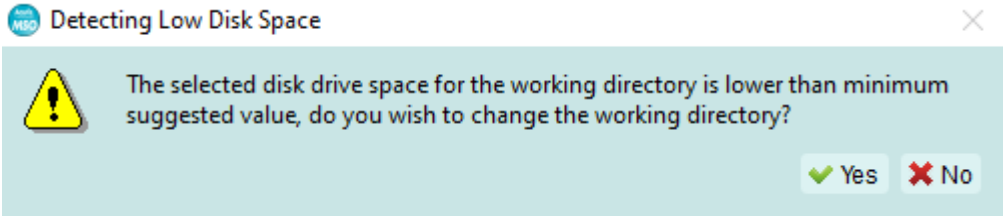


or click Add Logic Analyzer (LA) or Add Protocol Analyzer (PA) icon within the file menu.

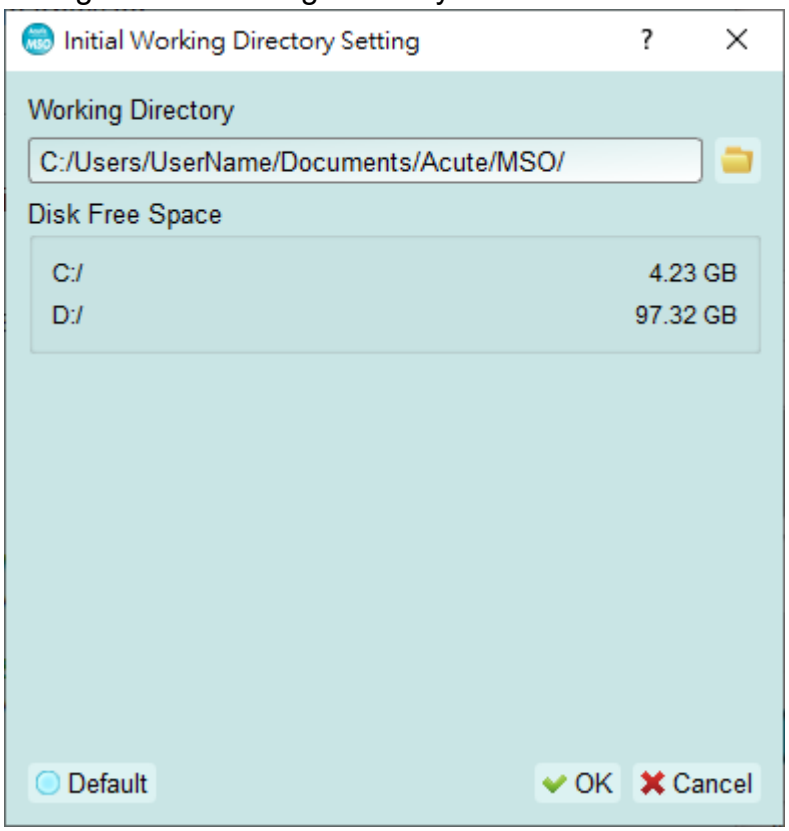


The warning window as shown below will appear before the intro screen if the remaining space of the working directory is too low (< 50G).

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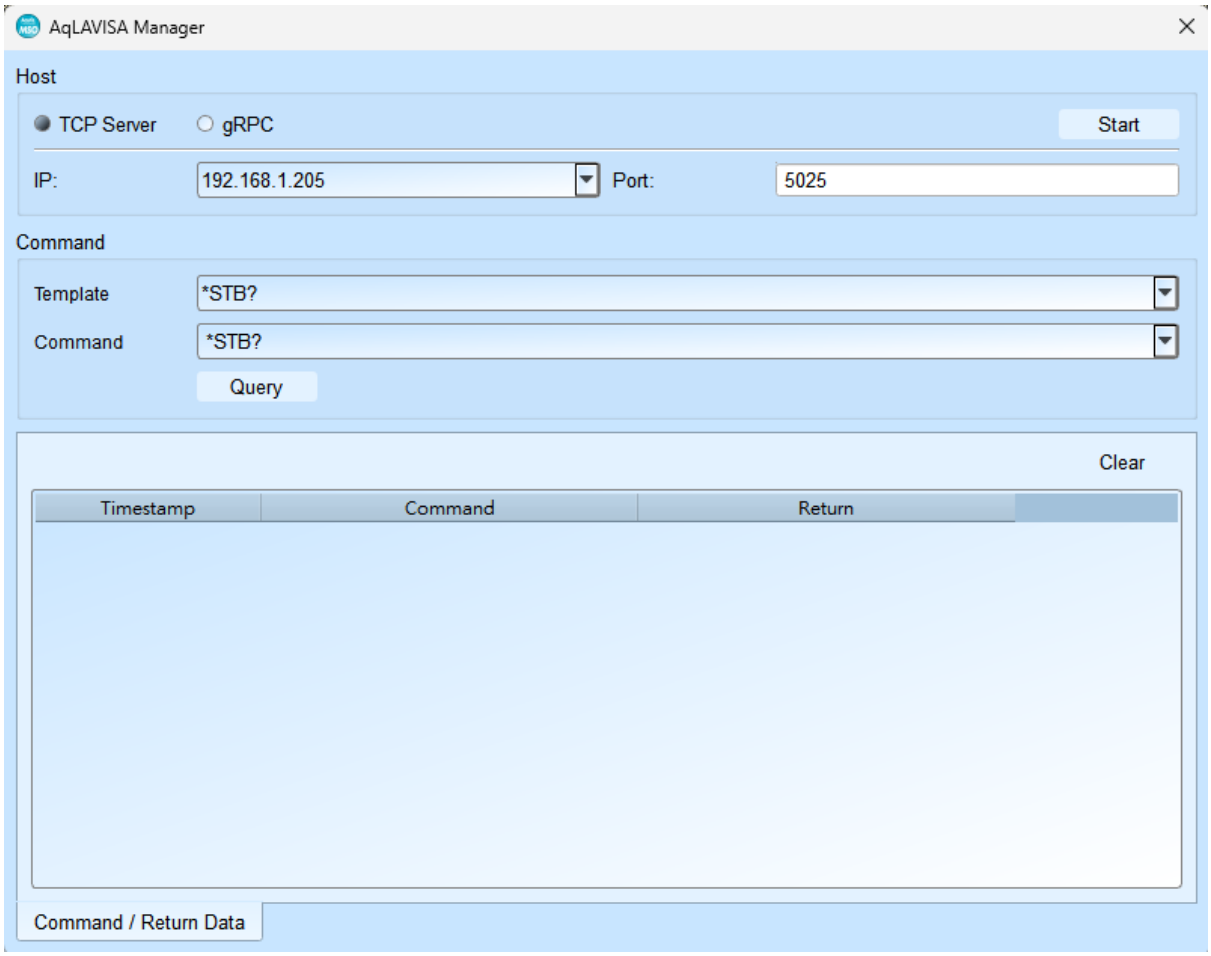
It is recommended to choose the hard disk with larger remaining space for the storage of the working directory.



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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Specification table: MSO1000 series

Model		MSO1008E	MSO1116E	MSO2116B	MSO2216B	MSO2216B+
Power	Power Source	USB bus-power (+5V)				
	Static Power Consumption	0.9W				
	Max Power Consumption	< 3.9W	< 6W			
Hardware Interface		USB3.0				
Channels (Data / Clock / Ground)		8 / 1 / 23	16 / 1 / 23			
Total Memory		2Gb	4Gb		8Gb	
Analog Input	Channels	Group I (CH0~7)	Group I, II (CH0~7, CH8~15)			
	Sample Rate(Group I or II)	200MHz / 1CH, 100MHz / 2CH, 50MHz/4CH, 25MHz / 8CH				
	Sample Rate(Group I or II)	The minimum value of Group I or II settings				
	Bandwidth	40MHz				
	ADC Bits	12				
Digital Input	Timing Analyzer (Asynchronous)	Available channels (Conventional / Transitional Timing) - Memory per channel				
	2 GHz	(4 / 3)– 512 Mb	(4 / 3)– 1 Gb	(8 / 7)– 512 Mb	(8 / 7)– 1 Gb	
	1 GHz	(8 / 6)– 256 Mb	(8 / 6)– 512 Mb	(16 / 14)– 256 Mb	(16 / 14)– 512 Mb	
	500 MHz	(8 / 6)– 256 Mb	(16 / 12)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 512 Mb	
	250 MHz and lower	(8 / 6)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 512 Mb	
	State Clock Rate (Synchronous, External Clock)	150 MHz		200 MHz		
	Storage	Conventional Timing, Transitional Timing				
Channel to channel skew		< 1ns				
Threshold	Group	1 (CH0~7 & CKI)	2 (CH0~7 & CKI, CH8~15)			
	Range	+20V ~ -20V				
	Resolution	50mV				
	Accuracy	±100mV + 5%*Vth				
Input Voltage	Non-Destructive	Over +/-42V DC & AC				
	Operation (Normal/High Division)	-20V ~ +20V / -10V ~ +10V				
	Sensitivity (0.5/0.75/1 Vpp)	100 MHz / 120 MHz / 150 MHz		180 MHz / 200 MHz / 220 MHz		
	H/W Schmitt (On/Off)	560 mV / 80 mV				
Impedance		1 mΩ / 2 pF				
Temperature	Operating / Storage	5°C~45°C (41°F~113°F) / -10°C~65°C (14°F~149°F)				
I/O port	Trig-In	TTL 3.3V (Rising / Falling)				
	Trigger pulse approval	> 8 ns				
	Trig-Out	TTL 3.3V, Pulse Width				
	Ref. Clock Input	10MHz, Vpp=3.3 to 5V				
	Ref. Clock Output	10MHz, TTL 3.3V				
	Connector type	MCX jack / female				
Trigger	Resolution	500ps				
	Channels	8	16			
	States	16				
	Events	16				
	Pre / Post	Yes				
	Pass Counter	Yes (0~1048575 times)				
	Digital	Channel, Pattern, Single / Multi Level, Width, Time-out, External				
	Analog	Rising / Falling				
	Bus I	I2C, SPI, UART				
	Bus II	---	BiSS-C, CAN2.0B/CAN FD, DP_Aux[1], HID over I2C, I2S, LIN2.2, USB PD 3.0			

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	Bus III	---	DALI, I3C, LPC, MDIO, Mini/Micro LED, MIPI RFFE, MIPI SPMI 2, Modbus, PMBus, Profibus, SMBus, SVI2, USB1.1	
	Bus IV	---		eMMC 4.5, eSPI, MII, RGMII, RMII, SVID[3], SD 2.0 (SDIO 2.0), Serial Flash (SPI NAND)
Protocol Analyzer	I	I2C, SPI, UART		
	II	---	BiSS-C, CAN2.0B/CAN FD, DP_Aux[1], HID over I2C, I2S, LIN2.2, USB PD 3.0	
	III	---	DALI, I3C, LPC, MDIO, Mini/Micro LED, MIPI RFFE, MIPI SPMI 2, Modbus, PMBus, Profibus, SMBus, SVI2, USB1.1	
	IV	---		eSPI, MII, RGMII, RMII, SVID[3]
Software Features	Power Sequence	---	Input setup .CSV file for Timing Sequence and H/W Strap check.	
	Measurement	Digital or Analog waveforms		
	Zoom / Report Window	YES		
	Note editor	Edit notes on Waveform Window		
	Quick Bus Decode Setup	YES		
	Trigger / Auxiliary cursors	1/25		
	Data Logger	Saved to Hard Disk Drive		
	Bus Decode	1-Wire, 3-Wire, 7-Segment, A/D Mux Flash, AccMeter, ADC, APML, AVSBus, BiSS-C, BSD, BT1120, CAN 2.0B/FD, Close Caption, CODEC_SSI, DALI, DMX512, DP_Aux[1], EDID, eMMC 5.1/MMC, eSPI, FlexRay, HD Audio, HDLC, HDQ, HID over I²C, I²C, I²C EEPROM, I²S (PCM, TDM), I3C, IrDA, ITU-R BT.656 (CCIR656), JTAG, JVC IR, LCD1602, LED_Ctrl, LIN 2.2, Line Decoding, Line Encoding, Lissajous, LPC, LPT, Math, M-Bus, MDDI, MDIO, MHL CBUS, Microwire, Mini/Micro LED, MIPI CSI LP, MIPI DSI LP, MIPI RFFE, MIPI SPMI 2.0, Modbus, NEC IR, PECI 3.0, PMBus, Profibus, PS/2, PWM, QEI, QI, RC-5, RC-6, S/PDIF, SD 2.0 (SDIO 2.0), Serial Flash, Serial IRQ, SGPIO, Smart Card, SMBus (SBS, SPD), SMI, SoundWire, SPI, SPI-NAND, SSI, ST7669, SVI2, SVID[2], SWD, SWIM, SWP, UART, ULPI, UNI/O, USB 1.1, USB PD 3.0, Wiegand, ...		
	Line Decoding	Biphase Mark, Differential-Manchester, Manchester (Thomas, IEEE802.3), Miller, Modified Miller, NRZI, …		
	Line Encoding	AMI(Standard, B8ZS, HDB3), Biphase Mark, CMI, Differential-Manchester, Manchester (Thomas, IEEE802.4), MLT-3, Miller, Modified Miller, NRZI, Pseudoternary, …		
Dimension	L x W x H (mm^3)	123 x 76 x 21(mm^3)		
Lead Cable	Data / CLK / NC / GND	8 / 1 / 8 / 23	16 / 1 / 0 / 23	
Grippers		10	20	
Stack Cable	MCX to MCX (30cm)	1		2

[1]Optional DP AUX adapter needed.

[2] Upon request ONLY by users who have signed CNDA with Intel, SVID decode supported by all MSO models

[3]Upon request ONLY by users who have signed CNDA with Intel, SVID trigger & PA supported by MSO2216B / B+ ONLY.

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Specification table: MSO2000 series (International & Microchip)

International		MSO2008W	MSO2116W	MSO2116B	MSO2216B	MSO2216B+
Microchip		MSO2008N	MSO2116N	MSO2116M	MSO2216M	MSO2216M+
Power	Power Source	USB bus-power (+5V)				
	Static Power Consumption	0.9W				
	Max Power Consumption	< 3.9W	< 6W			
Interface		USB3.0				
Channel (Data / Clock / Ground)		8 / 1 / 23	16 / 1 / 23			
Total Memory		2Gb	4Gb		8Gb	
Analog Input	Channels	Group I (CH0~7)	Group I, II (CH0~7, CH8~15)			
	Sample Rate (Group I or II)	200MHz / 1CH, 100MHz / 2CH, 50MHz/4CH, 25MHz / 8CH				
	Sample Rate (Group I or II)	The minimum value of Group I or II settings				
	Bandwidth	40MHz				
	ADC Bits	12				
Digital Input	Timing Analysis (Asynchronous)	Available channels (Conventional / Transitional Timing) - Memory per channel				
	2 GHz	(4 / 3)– 512 Mb	(4 / 3)– 1 Gb	(8 / 7)– 512 Mb	(8 / 7)– 1 Gb	
	1 GHz	(8 / 6)– 256 Mb	(8 / 6)– 512 Mb	(16 / 14)– 256 Mb	(16 / 14)– 512 Mb	
	500 MHz	(8 / 6)– 256 Mb	(16 / 12)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 512 Mb	
	250 MHz and lower	(8 / 6)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 512 Mb	
	State Clock Rate (Synchronous, External Clock)	150 MHz		200 MHz		
	Data Storage	Conventional Timing, Transitional Timing				
Channel to channel skew		< 1ns				
Threshold	Group	1 (CH0~7 & CKI)	2 (CH0~7 & CKI, CH8~15)			
	Range	+20V ~ -20V				
	Resolution	50mV				
	Accuracy	±100mV + 5%*Vth				
Input Voltage	Non-Destructive	Over +/-42V DC & AC				
	Operation (Standard / High Resolution)	-20V ~ +20V / -10V ~ +10V				
	Sensitivity (0.5/0.75/1 Vpp)	100 MHz / 120 MHz / 150 MHz		180 MHz / 200 MHz / 220 MHz		
	H/W Schmitt (On/Off)	560 mV / 80 mV				
Impedance		1 MΩ / 2 pF				
Temperature	Operating / Storage	5°C~45°C (41°F~113°F) / -10°C~65°C (14°F~149°F)				
I/O port	Trig-In	TTL 3.3V (Rising / Falling)				
	Trigger pulse approval	> 8 ns				
	Trig-Out	TTL 3.3V, Pulse Width				
	Ref. Clock Input	10MHz, Vpp=3.3 to 5V				
	Ref. Clock Output	10MHz, TTL 3.3V				
	Connector type	MCX jack / female				
Trigger	Resolution	500ps				
	Channels	8	16			
	States	16				
	Events	16				
	Pre / Post	Yes				
	Pass Count	Yes (0~1048575 times)				
	Digital	Channel, Pattern, Single / Multi Level, Width, Time-out, External				

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	Analog	Rising / Falling			
	Bus I	I2C			
	Bus II	---	CAN 2.0B/CAN FD, LIN2.2, SPI, UART (RS232)		
	Bus III	---	BiSS-C, DALI, DP_Aux[1], HID over I2C, I2S, I3C, LPC, MDIO, Mini/Micro LED, MIPI RFFE, MIPI SPMI 2, Modbus, PMBus, Profibus, SMBus, SVI2, USB1.1, USB PD 3.0		
	Bus IV	---	eMMC 4.5, eSPI, MII, RGMII, RMII, SVID[3], SD 2.0 (SDIO 2.0), Serial Flash (SPI NAND)		
Protocol Analyzer	I	I2C			
	II	---	CAN 2.0B/CAN FD, LIN2.2, SPI, UART (RS232)		
	III	---	BiSS-C, DALI, DP_Aux[1], HID over I2C, I2S, I3C, MDIO, MIPI RFFE, Modbus, PMBus, Profibus, PWM, SMBus, USB1.1, USB PD 3.0		
	IV	---	eSPI, MII, RGMII, RMII, SVID[3]		
Software Features	Power Sequence	---	Input setup .CSV file for Timing Sequence and H/W Strap check.		
	Measurement	Digital or Analog waveforms			
	Zoom / Report Window	YES			
	Note editor	Edit notes on Waveform Window			
	Quick Bus Decode Setup	YES			
	Trigger / Auxiliary cursors	1/25			
	Data Logger	Saved to Hard Disk Drive			
	Bus Decode	1-Wire, 3-Wire, 7-Segment, A/D Mux Flash, AccMeter, ADC, APML, AVSBus, BiSS-C, BSD, BT1120, CAN 2.0B/FD, Close Caption, CODEC_SSI, DALI, DMX512, DP_Aux[1], EDID, eMMC 5.1/MMC, eSPI, FlexRay, HD Audio, HDLC, HDQ, HID over I²C, I²C, I²C EEPROM, I²S (PCM, TDM), I3C, IrDA, ITU-R BT.656 (CCIR656), JTAG, JVC IR, LCD1602, LED_Ctrl, LIN 2.2, Line Decoding, Line Encoding, Lissajous, LPC, LPT, Math, M-Bus, MDDI, MDIO, MHL CBUS, Microwire, Mini/Micro LED, MIPI CSI LP, MIPI DSI LP, MIPI RFFE, MIPI SPMI 2.0, Modbus, NEC IR, PECI 3.0, PMBus, Profibus, PS/2, PWM, QEI, QI, RC-5, RC-6, S/PDIF, SD 2.0 (SDIO 2.0), Serial Flash, Serial IRQ, SGPIO, Smart Card, SMBus (SBS, SPD), SMI, SoundWire, SPI, SPI-NAND, SSI, ST7669, SVI2, SVID², SWD, SWIM, SWP, UART, ULPI, UNI/O, USB 1.1, USB PD 3.0, Wiegand, ...			
	Line Decoding	Biphase Mark, Differential-Manchester, Manchester (Thomas, IEEE802.3), Miller, Modified Miller, NRZI, …			
	Line Encoding	AMI(Standard, B8ZS, HDB3), Biphase Mark, CMI, Differential-Manchester, Manchester (Thomas, IEEE802.4), MLT-3, Miller, Modified Miller, NRZI, Pseudoternary, …			
Dimension	L x W x H (mm3)	123 x 76 x 21			
Lead Cable	Data / CLK / NC / GND	8 / 1 / 8 / 23	16 / 1 / 0 / 23		
Grippers		10	20		
Stack Cable	MCX to MCX (30cm)	1		2	

[1]Optional DP AUX adapter needed.

[2] Upon request ONLY by users who have signed CNDA with Intel, SVID decode supported by all MSO models

[3]Upon request ONLY by users who have signed CNDA with Intel, SVID trigger & PA supported by MSO2216B / B+ ONLY.

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Specification table: MSO3000 series

Device LA POD		MSO3124E LA16E	MSO3124B LA16B	MSO2134H LA16H	MSO3124V LA16V
Timing analysis(Asynchronous, Max. sample rate)		2 GS/s			
State clock rate (Synchronous, external clock)		250 MHz			
Storage		Conventional Timing, Transitional Timing			
Channels		16			
Record length		256 Mpts per channel			
Timing vs. Channels vs. Memory	Timing analysis	Available channel (Conventional / Transitional Timing) - Memory per channel			
	2 GS/s	(8/7) - 512 Mpts			
	1 GS/s	(16/14) - 256 Mpts			
	500 MS/s	(16/16) - 256 Mpts			
	250 MS/s	(16/16) - 256 Mpts			
Channel to channel skew		< 1 ns			
Input	Input Channels	16			
	Input impedance	75KΩ || < 2pF			
	Maximum (Non-desctructive)	±50V			
	Operation	±30V			
	Sensitivity	0.25Vpp @ 50MHz, 0.5Vpp @ 150MHz, 0.8Vpp @ 250MHz			
Threshold	Group	2(D0 ~ D7, D8 ~ D15 & CK0)			
	Range	±30V			
	Resolution	50mV			
	Accuracy	±100mV + 5%*Vth			
Trigger	Resolution	500ps			
	Channels	16			
	States	8			
	Events	8			
	Pre/Post	Yes			
	Pass counter	Yes(0 ~ 1048575 times)			
	Types	External, Manual, Multi Level, Setup/Hold Violation, Single Level, Timeout, Width			
	Protocol I	10BASE-T1S*1, BiSS-C, CAN2.0B/CAN FD, DP_Aux*1, HID over I2C, I2C, I2S, LIN2.2, MIPI I3C, SENT, SPI, UART, USB PD 3.1			
	Protocol II	---	DALI, LPC, MDIO, Mini/Micro LED, MIPI RFFE 3, MIPI SPMI 2, Modbus, PMBus, Profibus, SMBus, SVI2, USB1.1		

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	Protocol III	---	eMMC 4.5, eSPI, MII, RGMII, RMII, SD 3.0 (SDIO 2.0), Serial Flash (SPI NAND), SVI3*2, SVID*3
Protocol Analyzer	I	10BASE-T1S*1, BiSS-C, CAN2.0B/CAN FD, DP_Aux*1, HID over I2C, I2C, I2S, LIN2.2, MIPI I3C, SENT, SPI, UART, USB PD 3.1	
	II	---	DALI, MDIO, MIPI RFFE 3,Modbus, PMBus, Profibus, SMBus, USB1.1
	III	---	eSPI, MII, RGMII, RMII, SIV3*2, SVID*3
Protocol Decode		1-Wire, 3-Wire, 7-Segment, 10BASE-T1S*1, AccMeter, ADC, APML, AVSBus, BiSS-C, BSD, BT1120, CAN2.0B/FD, Close Caption, CODEC_SSI, DALI, DMX512, DP_Aux*1, EDID, eMMC5.1/MMC, eSPI, FlexRay, HD Audio, HDLC, HDQ, HID over I2C, HTSensor, Hyperbus, I2C EEPROM, I2C,I2S(PCM, TDM), I80, IDE, IrDA, ITU-R BT.656(CCIR656), JTAG, JVC IR, LCD1602, LED_Ctrl, LIN2.2, Line Decoding, Line Encoding, Lissajous, LPC, LPT, Math, M-Bus, MDDI, MDIO, MHL CBUS, Microwire, MII, Mini/Micro LED, MIPI CSI LP, MIPI DSI LP, MIPI I3C 1.1, MIPI RFFE 3, MIPI SoundWire 1.2, MIPI SPMI 2, Modbus, NAND Flash, NEC IR, PDM, PECI 3.0, PMBus, Profibus, PS/2, PWM, QEI, QI, QSPI, RC-5, RC-6, RGB Interface, RGMII, RMII, S/PDIF, SD 3.0 (SDIO 2.0), SENT, Serial Dlash, Serial IRQ, SGPIO, Smart Card, SMBus (SBS, SPD), SMI, SPI, SPI-NAND, SSI, ST7669, SVI2, SVI3*2, SVID*3, SWD, SWIM, SWP, UART, ULPI, UNI/O, USB1.1, USB PD 3.1, Wiegand,...	
Line Decoding		Biphase Mark, Differential-Manchester, Manchester(Thomas, IEEE802.3), Miller, Modified Miller, NRZI, …	
Line Encoding		AMI(Standard, B8ZS, HDB3), Biphase Mask, CMI, Differential-Manchester, Manchester(Thomas, IEEE802.4), MLT-3, Miller, Modified Miller, NRZI, Pseudoternary, …	
Packing List	LA POD	1	
	Flying lead cables (LA20P)	2	
	Gripper	20	

1 Optional 10BAST-T1S / DP_Aux adapter needed.

2 Upon request by user who is approved by AMD. SVI3 decode, trigger and protocol analyzer are supported ONLY by MSO3124H or MSO3124V.

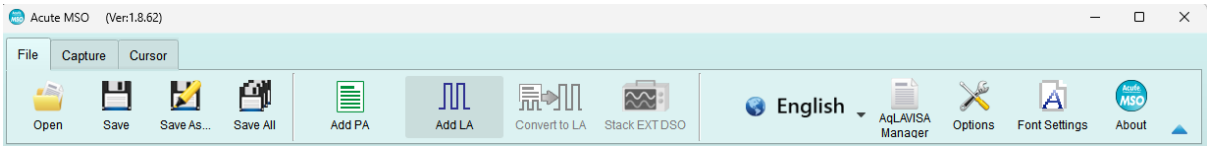
3 Upon request by user who has signed CNDA with Intel. SVID decode, trigger and protocol analyzer are supported ONLY by MSO3124H or MSO3124V

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Chapter 2 Function list and operation

Protocol Analyzer

File



 **Open:** Load the file.

 **Save:** Save the current window.

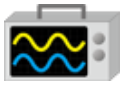
 **Save as:** Save as new file with specified range.

 **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.

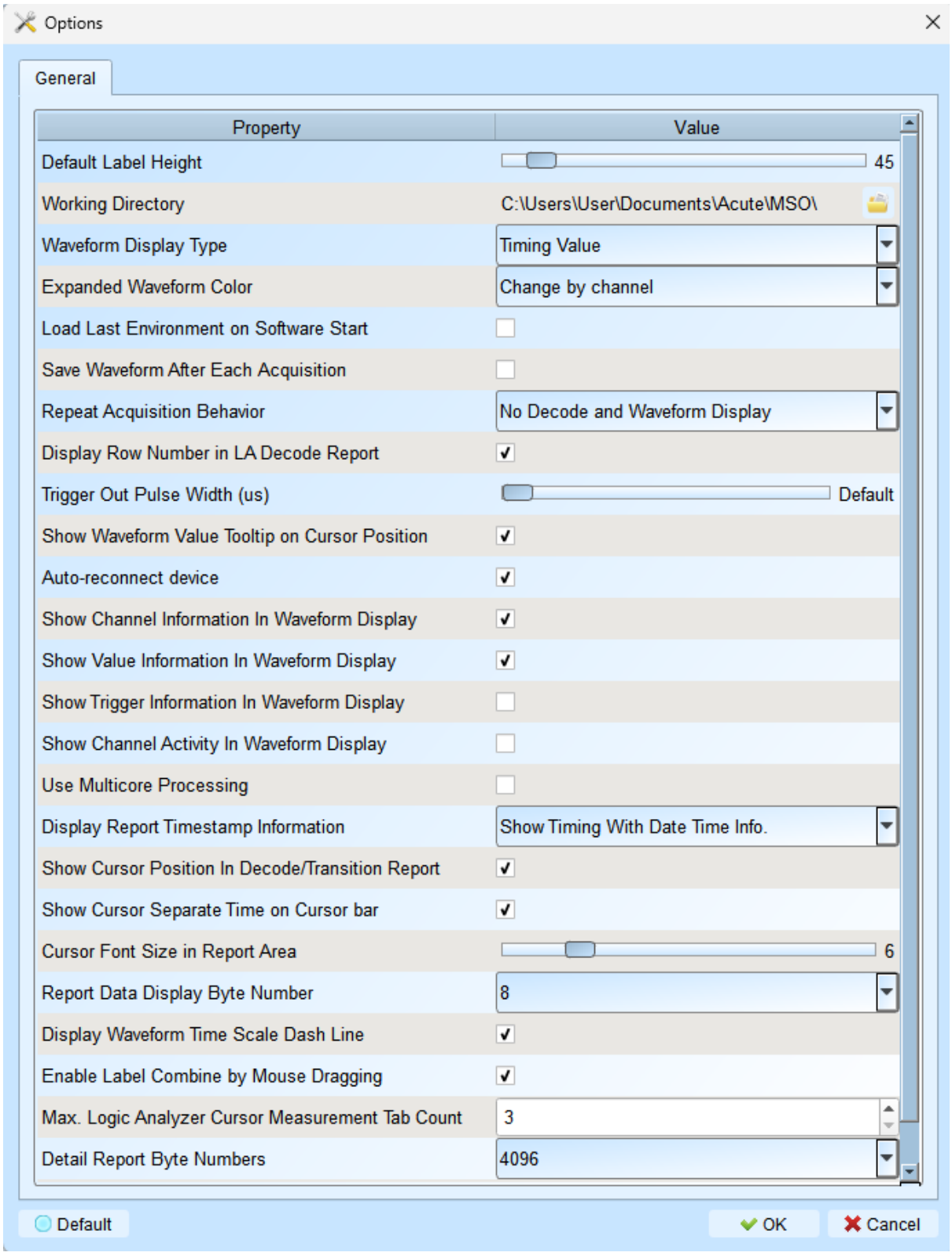
 **Convert to Logic Analyzer:** When the “show waveform” capture mode is enabled; User can click this function to transfer the waveform and setting parameters into the Logic Analyzer window and continue to use the Logic Analyzer window to capture signals.

 **Stack Oscilloscope:** Currently not supported in Protocol Analyzer mode.

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

 **Options:** Here user 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

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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) / sample count format.

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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.

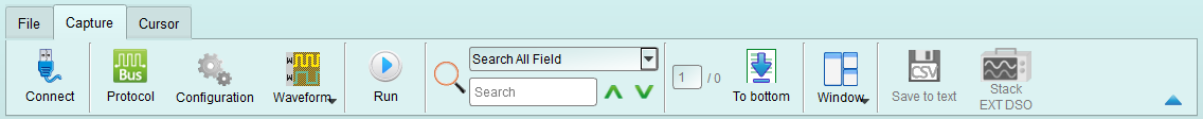
Font Settings: User can set the font type and font size that used in display the text in waveform area, note and label.

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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 -

Capture

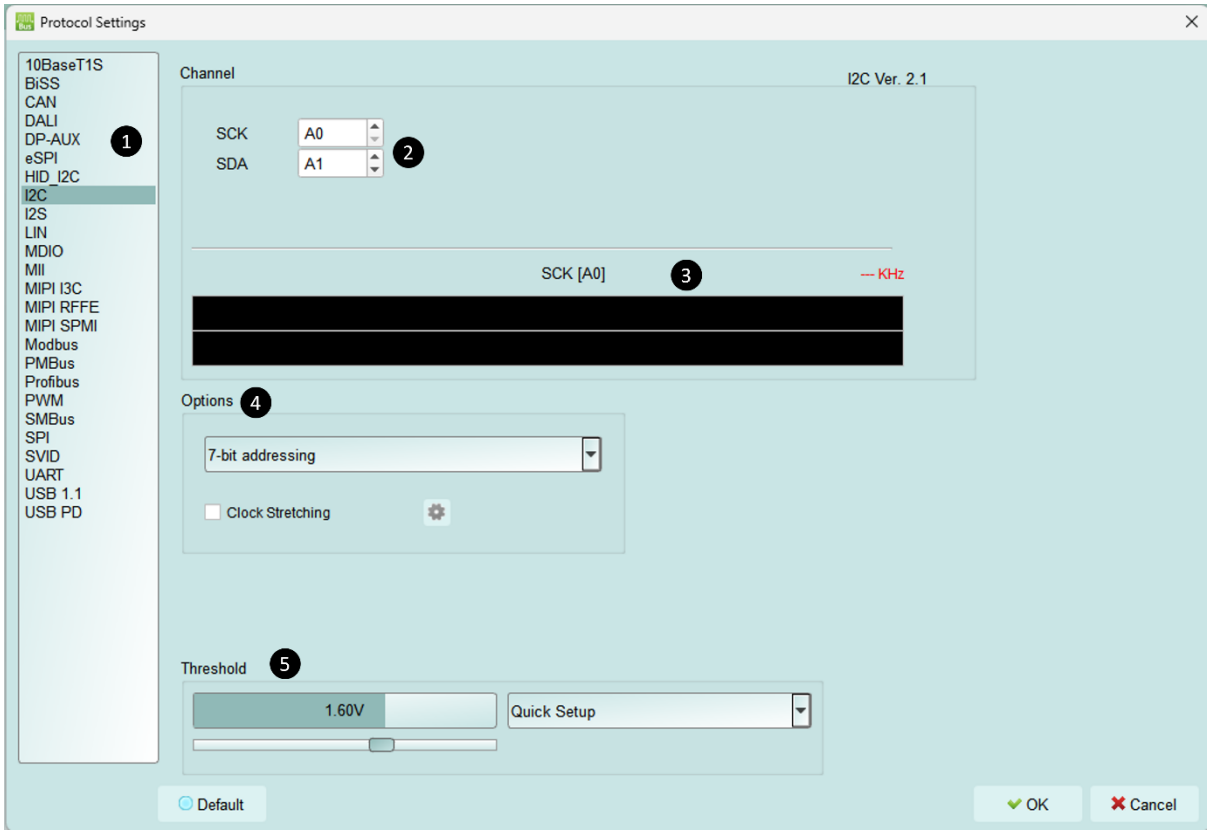


Protocol Settings



Pattern 1

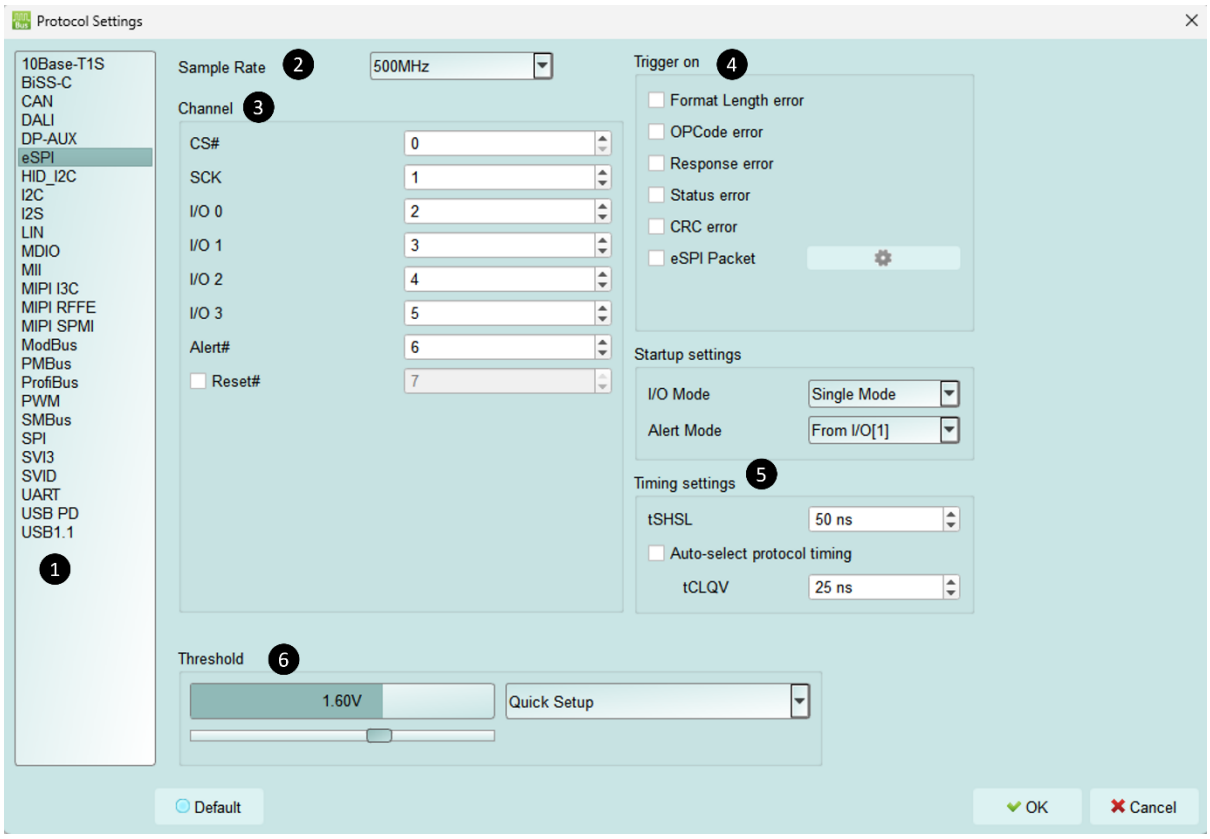
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1. **Select the Protocol**
2. **Channel setting**
3. **Waveform Preview:** The signal's waveform and frequency are automatically detected.
4. **Options:** You can set the capture and decoding parameters for Protocol
5. **Threshold:** It can be set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

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Pattern 2



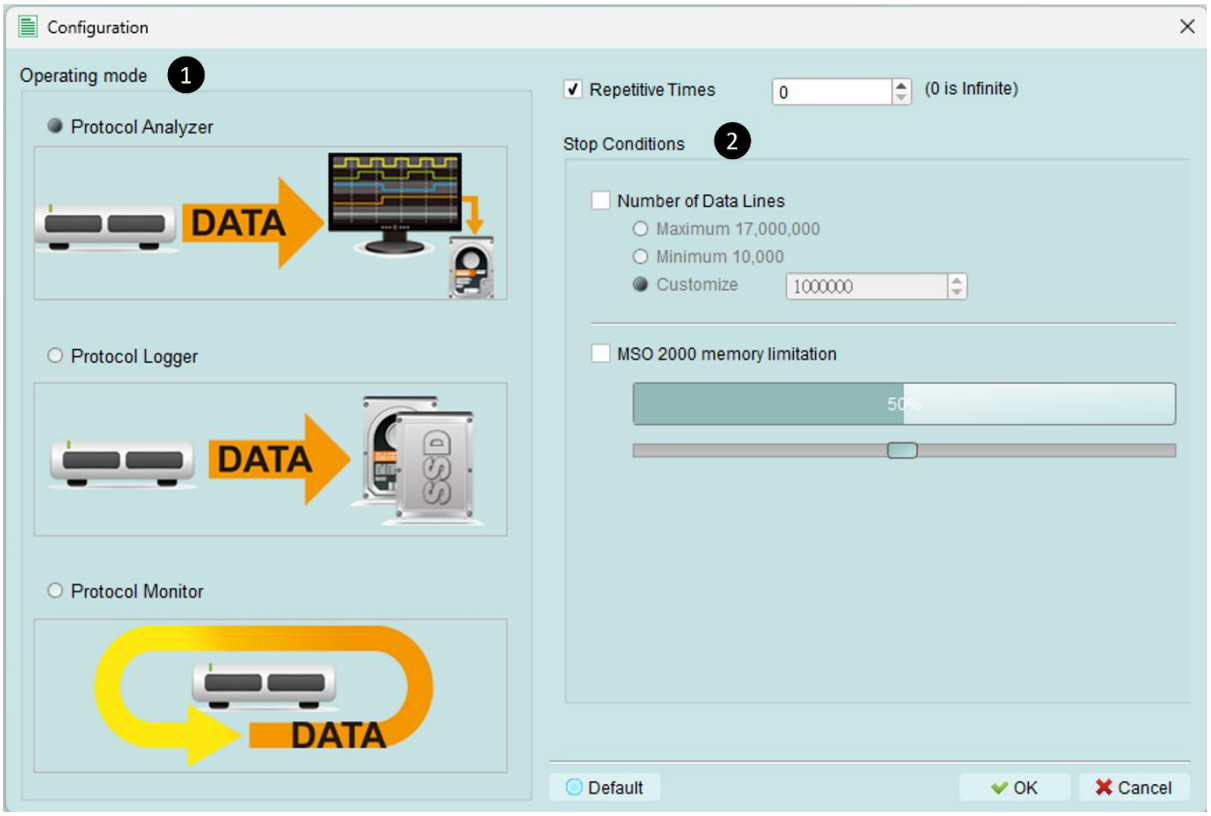
1. **Select the protocol**
2. **Set the sample rate**
3. **Channel settings**
4. **Trigger on**
5. **Options:** User can set the capture and decoding parameters for protocol.
6. **Threshold:** It can be set according to the voltage level of the signal.

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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

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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.
  - 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

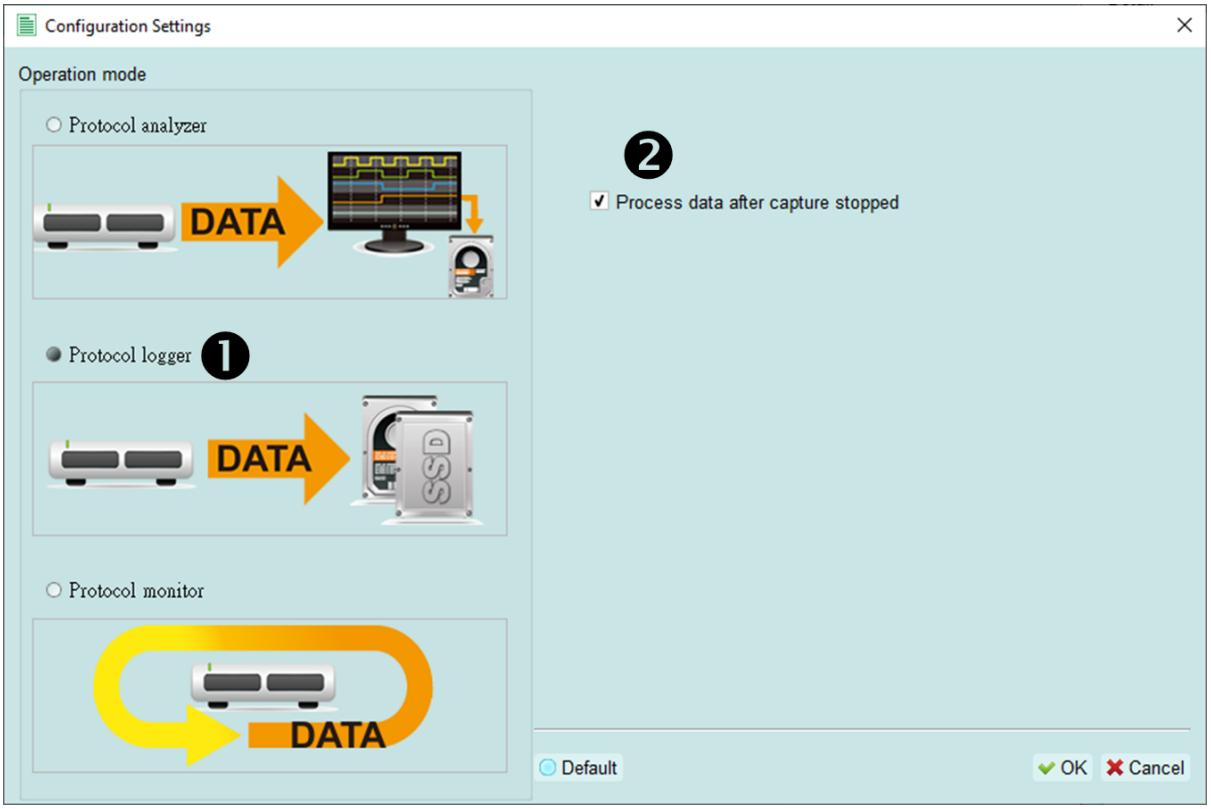
    Stop the capture when the stored data line number matched the setup data line number, you can select this function if you need only sufficiently number of data lines without capturing data for a long time. This function is set to OFF by default.

  - 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 their capture

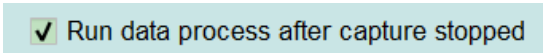
Notice for use:

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.

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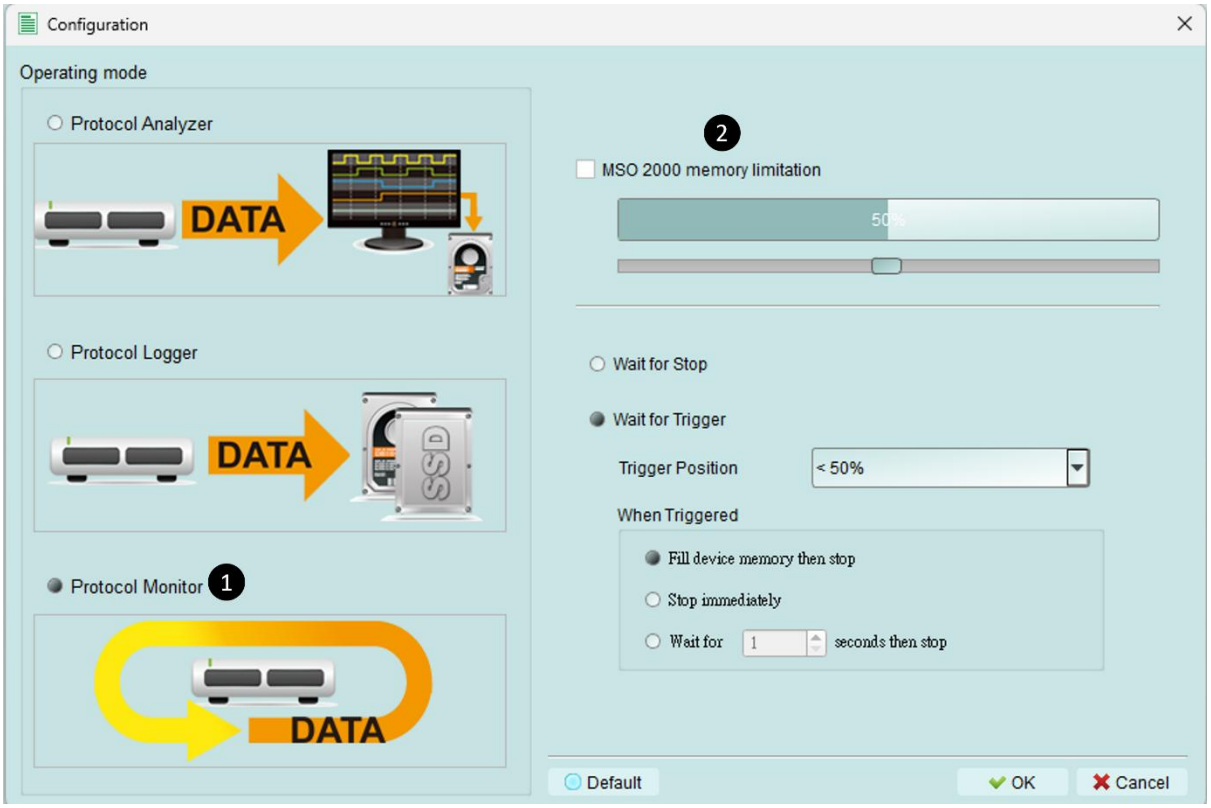
You can reload the .LOG file from Load file to reanalyze the data.



Whether you check the results immediately or load them into the file, the file name will be converted from LOG to MSW.

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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 matches 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**

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• Maximum Device memory limit

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

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.

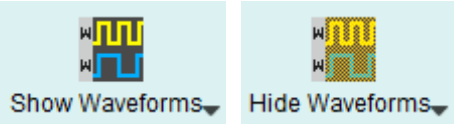
If the trigger condition is set, user can do more detail setting of software behavior after triggered.

- 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.

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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 

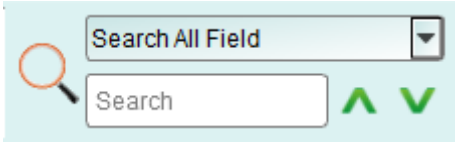
   This button can stop the bus decode right away.

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.

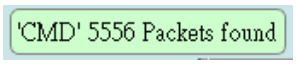
1. Enter search criteria in the text field.

   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.

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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

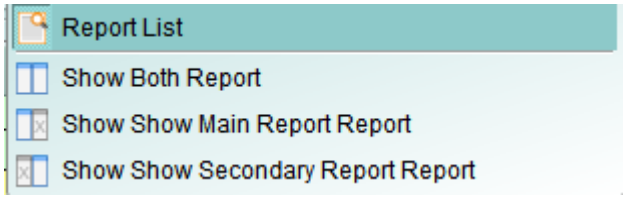


When viewing data, user press this button to move directly to the last end of data if user press this button while the device is capturing data, the most up to data will be displayed.

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

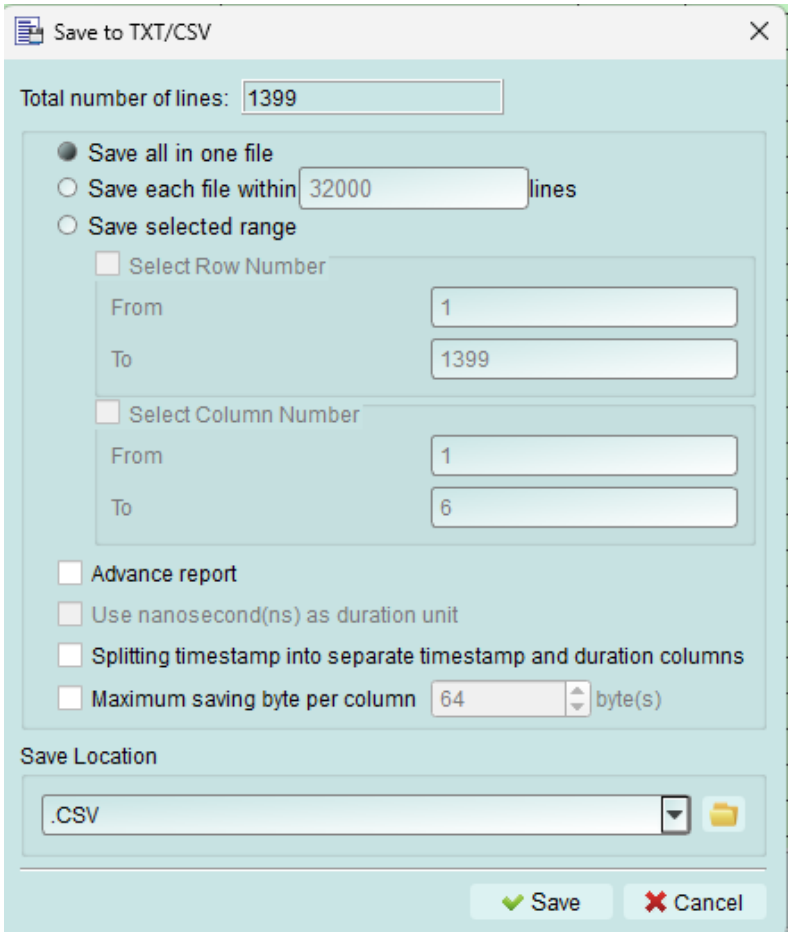
For detailed usage steps, please refer to Appendix 1: Report List Advanced Instructions.

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Saved as text file



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



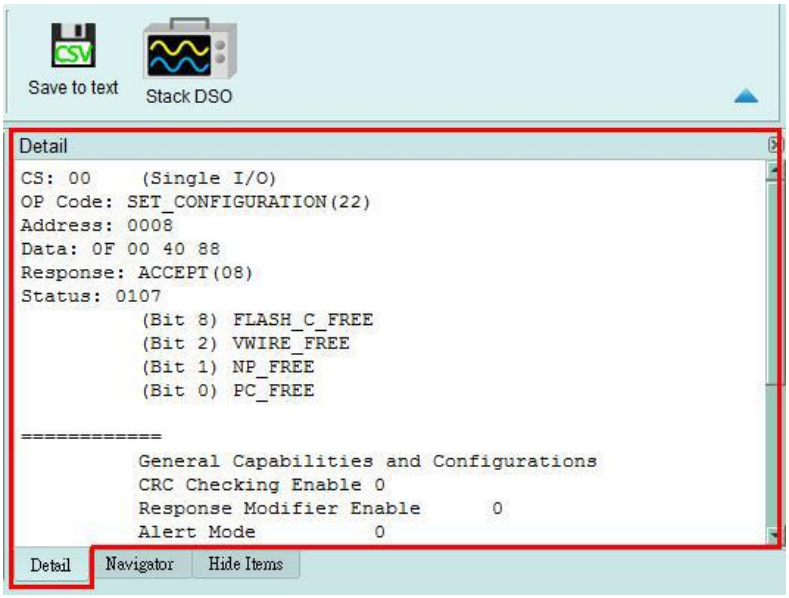
Save options:

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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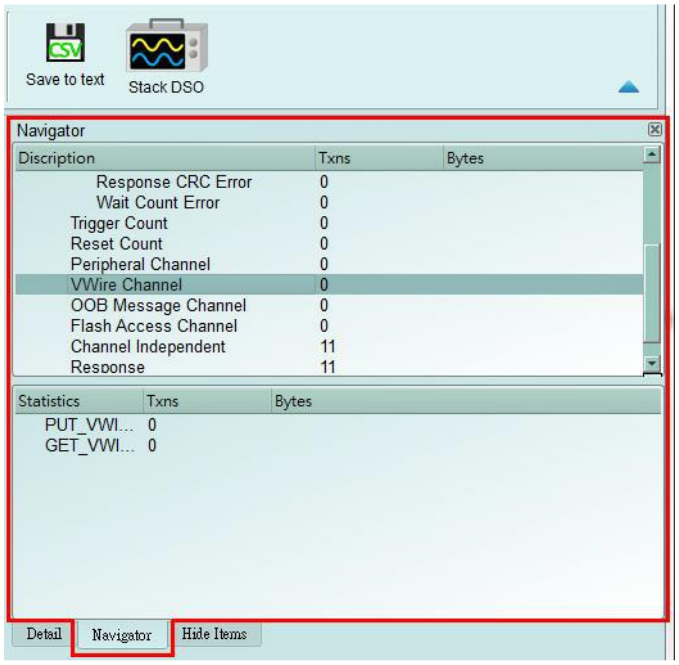
Detail window

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.

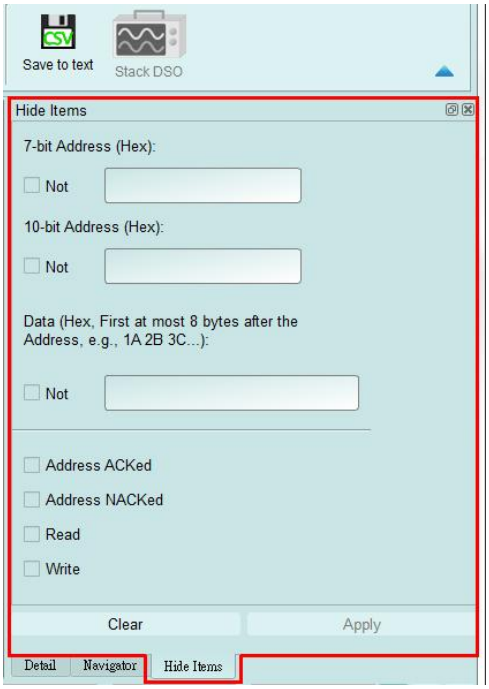


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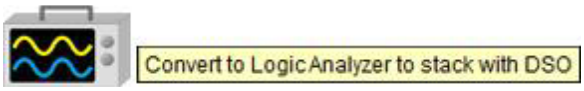
For detailed usage steps, please refer to Appendix 1: Report List Advanced Instructions.

Hide Data window

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



Stack external oscilloscope

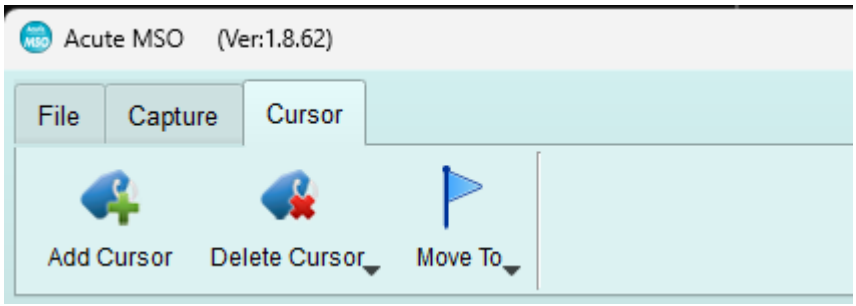


The stack oscilloscope can only be enabled in the Logic Analyzer mode. If you want to enable the stack oscilloscope in the protocol Analyzer mode, you must first press the "Convert to Logic Analyzer and Stack Oscilloscope" button to switch to the Logic Analyzer mode to enable this function. It should 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.

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Logic Analyzer

Window

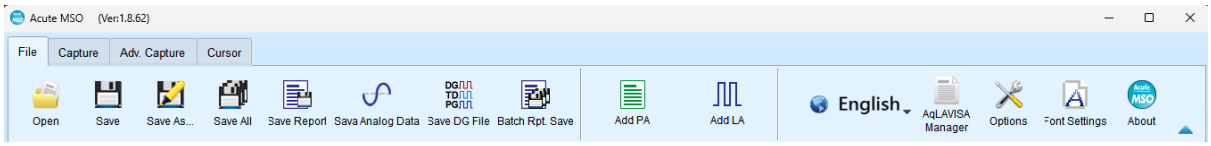


1. **Toolbar:** Including trigger, sampling rate, threshold and other capture parameters.
2. **Channel Label:** User can use the icon () below to add and delete the channel. Press left mouse button on the channel label to change the channel parameter settings; Click the gear button on the upper right corner of the Bus channel to change the advanced parameter settings; Select and drag a channel label to another channel label to combine two or more channel labels.
3. **Report Window Toolbar:** In the report window, User can choose to display the channel data () or decode result (), waveform statistics (), and report the result as .CSV and .TXT output ().
4. **Status Bar:** Show connection status of the device.
5. **Info:** Display channel, value and trigger information, they can be changed in File -> Settings.
6. **Waveform Area:** Use mouse wheel to zoom in/out the waveform; use cursors to see the time interval or frequency. Please refer to the cursor section below for the

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cursor usage.

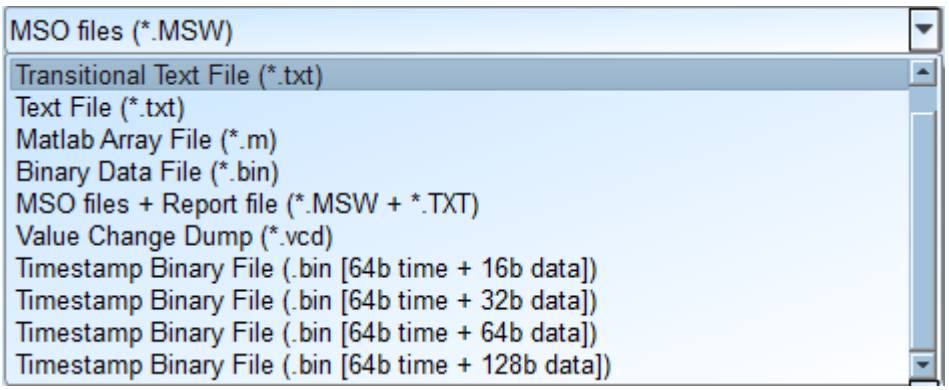
File



 Open: Load the file.

 Save: Save the current file.

 Save as: Save as new file with specified range.

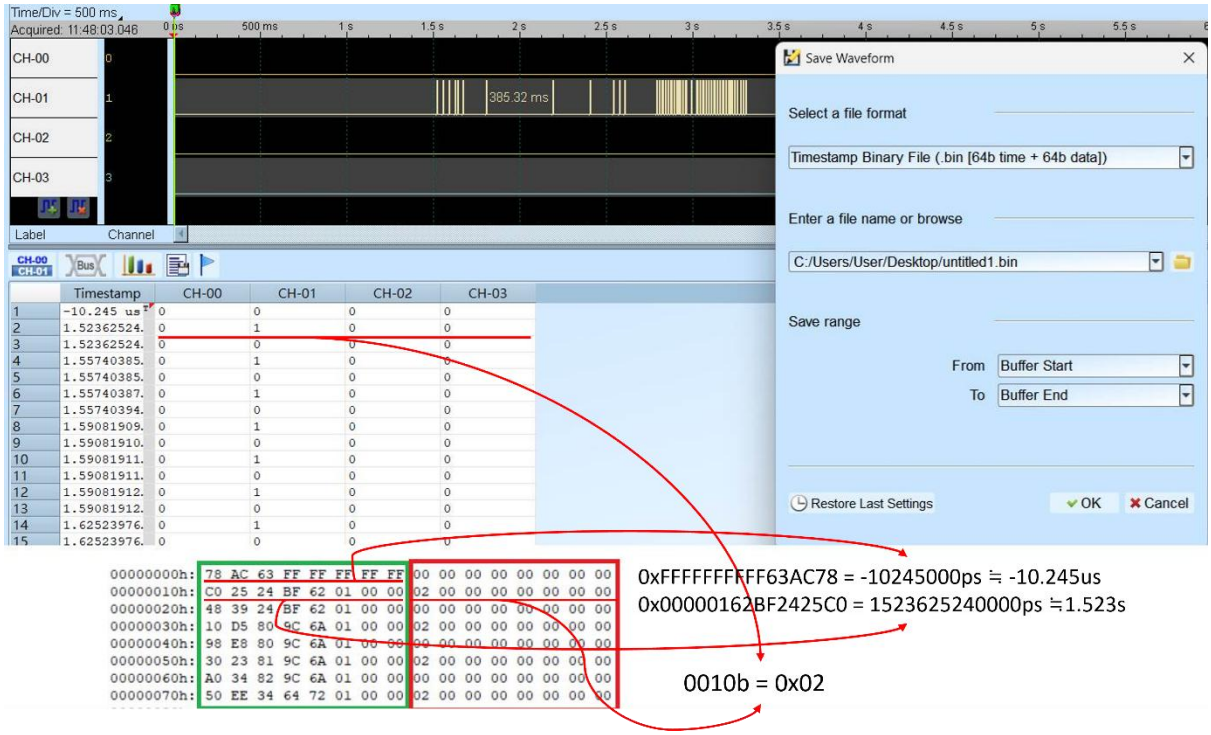


User can save file as:

1. MSO files (*.MSW)
2. Transitional Text File(*.txt)
3. Text File(*.txt)
4. Matlab Array File(*.m)
5. Binary Data File(*.bin)
6. MSO files + Report file (*.MSW + *.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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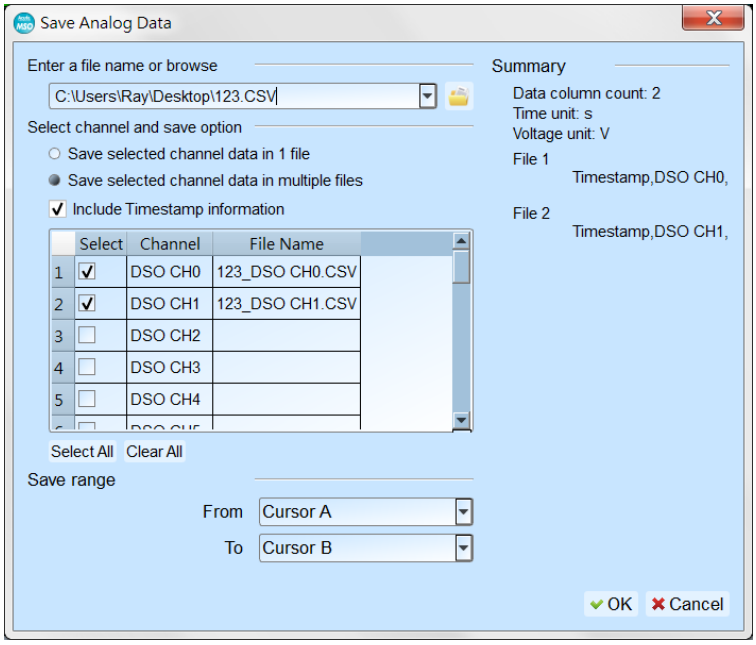
In this figure, the green block represents time, the red block means data. Take the values shown in this figure as an example, the data from left to right represents the direction from lsb to msb, so for the second line of data, the archive value is 0010b = 0x02. Note that if you choose a data bit archive format that is less than the number of channels, the extra bits will be discarded.


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


Save report: Save the bus decode report.


Save Analog Data: Save MSO captured analog data to .CSV or .TXT file.

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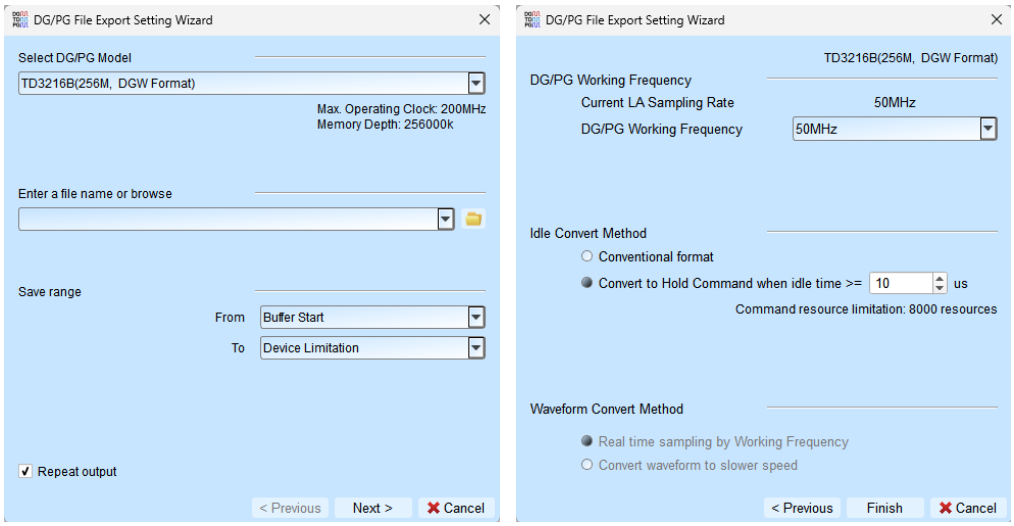
Store the captured analog data into text format file, the available options are:

1. Save selected channel data in 1 file: The analog data will be stored into a single file, data of each channel will be separated by “comma”.
2. Save selected channel data in multiple files: The analog data of each channel will be stored into individual files respectively with user input file name appended with channel name.
3. Include Timestamp information: Choose to store the timestamp information into the first column of each file, the Timestamp information will be stored with time unit of seconds.
4. Data selection list: Select channels need to be stored, the list will also show data store column or file name at the 3rd column of the list if the channel is selected for output.
5. Save Range: Choose to change the data save range.

DG
TD
PG Saved as a DG / PG file:

Convert captured waveform to DGW / PGV 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/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

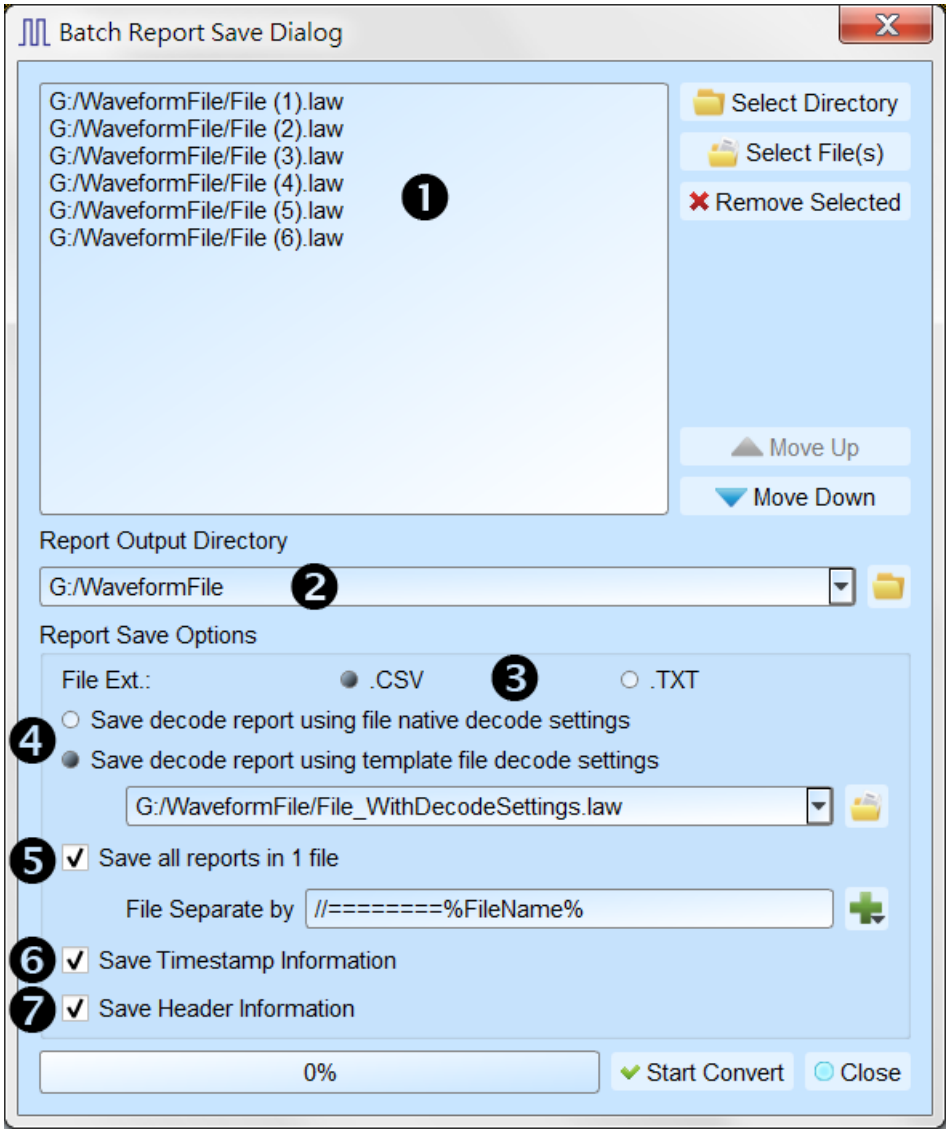
   When the LA's sampling frequency is faster than the DG/TD/PG's working frequency, the software provides two different ways to convert the DGW/PGV wave form, one is the real time sampling mode with DG/TD/PG's maximum

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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)

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

Batch Report Save Dialog↓



1. Select the source waveform files, accepting file formats including Acute Logic Analyzer Waveform File .MSW 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.

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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.

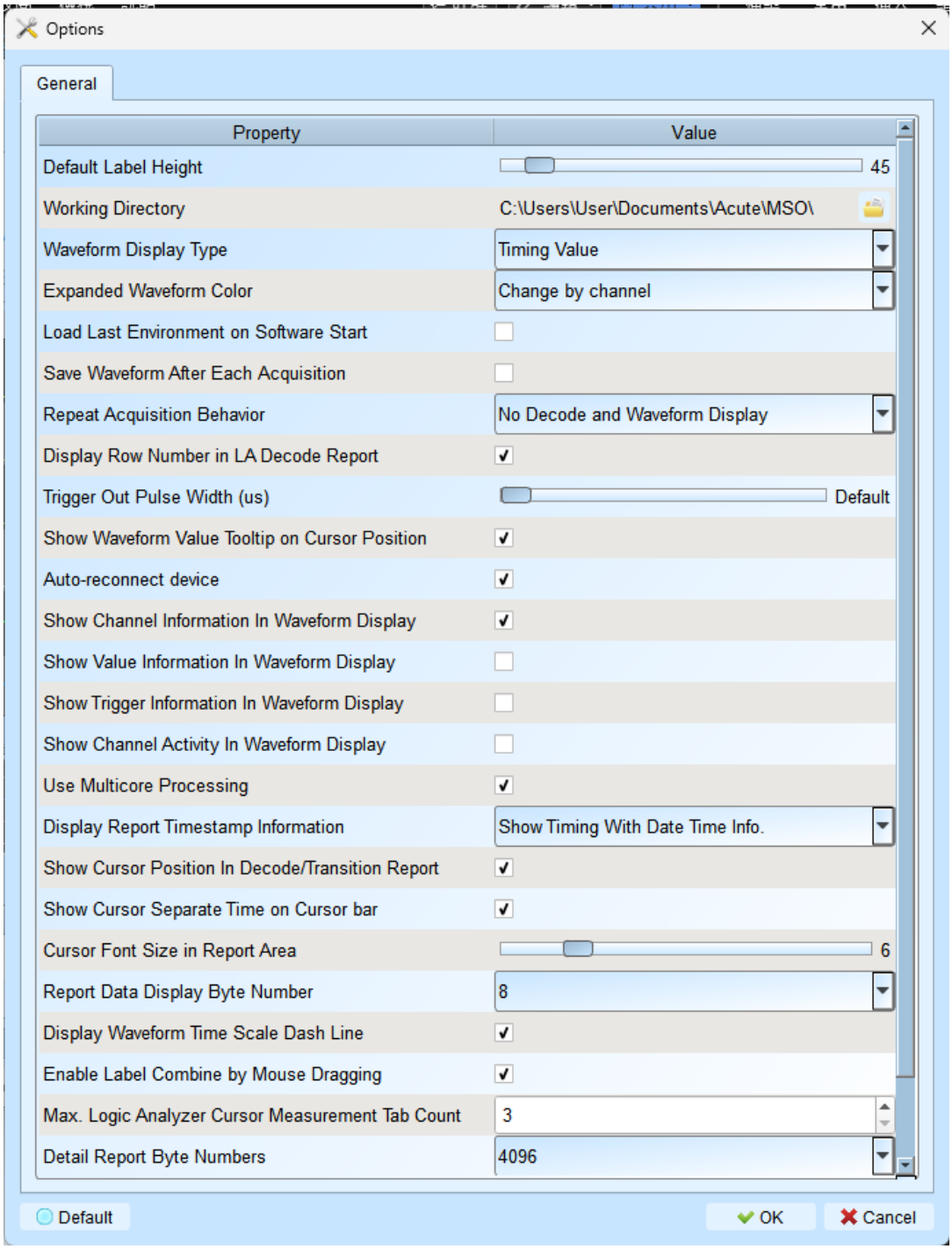
 Add Protocol Analyzer: Add a protocol analyzer window.

 Add Logic Analyzer: Add a logic analyzer window.

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

 Settings: Here User 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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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



Operating Steps: Quick Setting→Trigger→Sample Rate→Memory→Threshold

Quick Settings



Immediately configure required channels and related settings. When configuring specific bus decode, the sampling rate and threshold will also be set according to the default conditions.

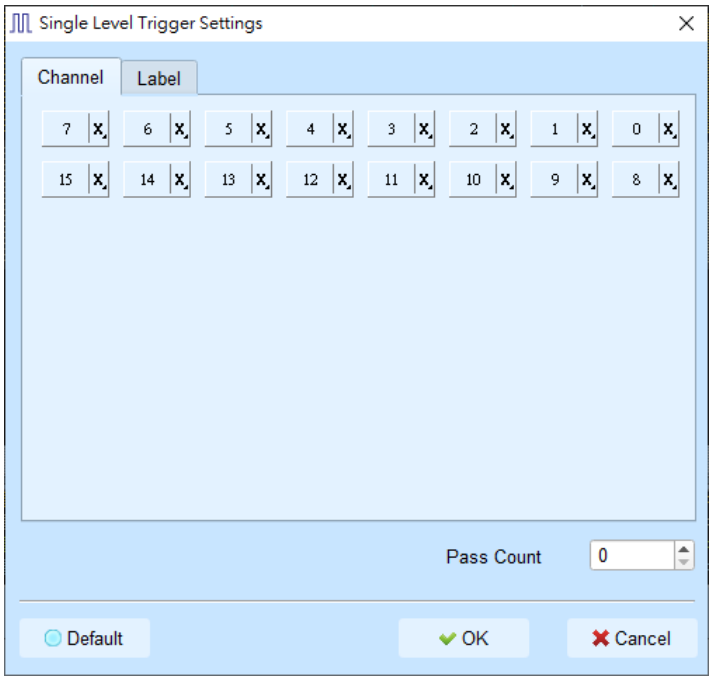
Trigger Parameter Setting



• Manual Trigger

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

• Single Level Trigger



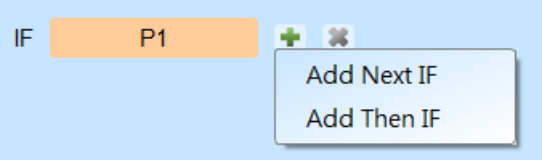
1. **Channel/Label:** User can select Don’t care(X)、Rising Edge(↑)、Falling Edge(↓)、Low(0)、High(1)、Either(↕) or specified value as trigger conditions.

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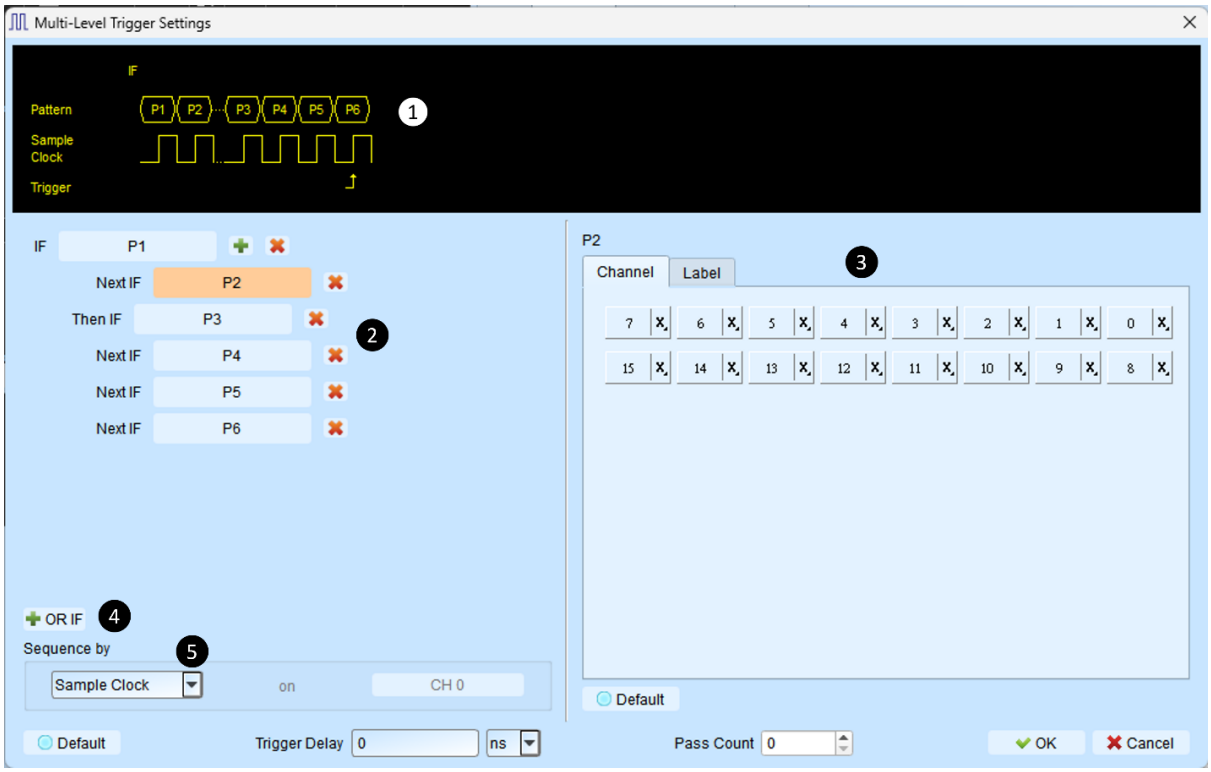
2. **Pass Count:** The number of times to ignore triggering signals that match the trigger parameters. It is set to 0 by default to indicate that it is not ignored.

• Multi-Level Trigger

Multi-level trigger is composed of multiple single level trigger. This function has maximum 16 levels, each level must be set separately and set in the same way as the single level trigger. When adding a new level, press the button on the top to select the relationship between each level. 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 picture below, 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.



Difference between continuous trigger and non-continuous trigger:

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

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Non-continuous trigger: It is triggered only when both the first condition and the second condition is 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, the signal usually meet the continuous trigger condition only at edges, while it is difficult for most of the signals to meet the conditions of continuous triggering, it is suitable to set non-continuous trigger as a condition.

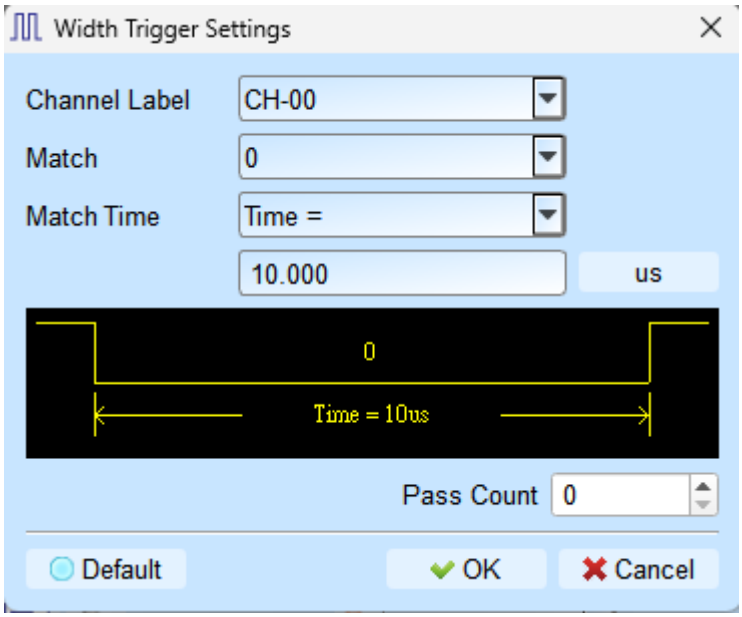
3. **The area to set the trigger condition for each class.**
4. **OR IF** is to establish a parallel trigger condition. It will trigger when either condition is met.
5. **Sequence by**

   The user can also set incidental conditions for triggering. In general, the trigger setting uses the data captured by the sampling point as the condition. If User only want to trigger at the edge of a specific channel, User should use the “Sequence by” setting. With this function, the user does not have to set trigger conditions for each 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, User can set the Sequence by as Custom Rising, and then select the Clock pin as the valid condition for the data. Then, User can set the conditions for other data lines in accordance with Multi Level triggering conditions.

- **Width Trigger**

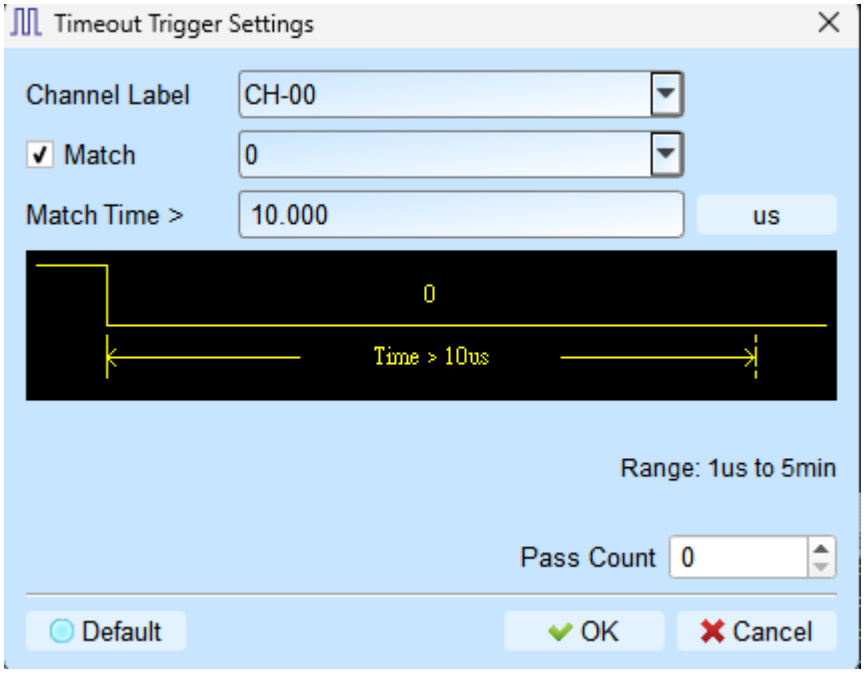
  The width trigger can set the trigger signal when the channel meets the trigger conditions and the length of the full pulse width.

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- **Timeout Trigger**

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



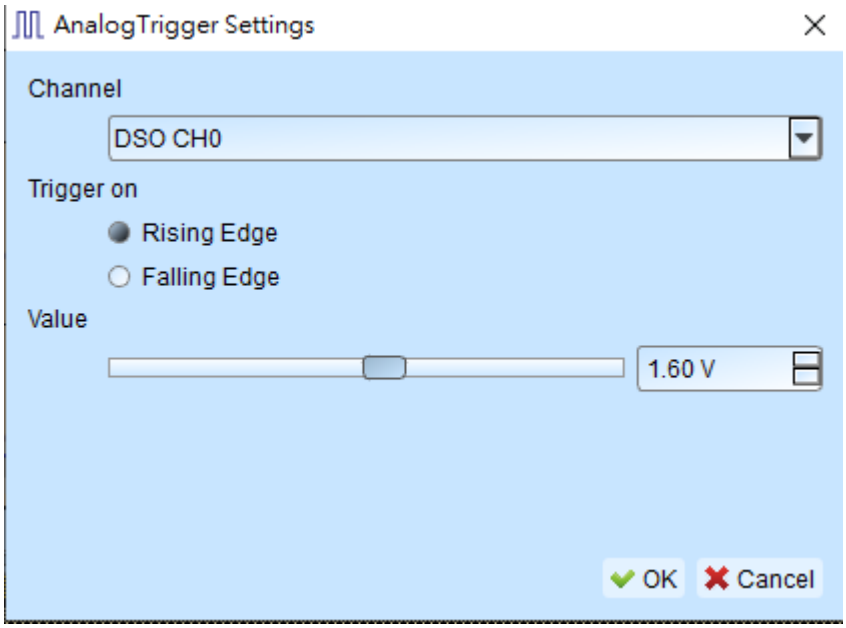
- **External Trigger**

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

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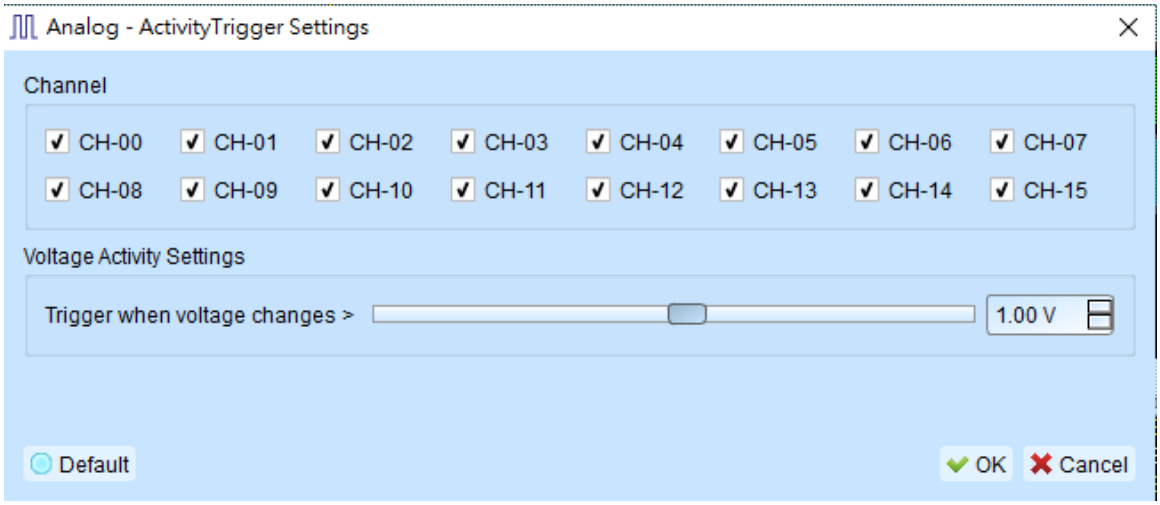
• Analog Trigger - Edge

Use the rising/falling edge of the MSO analog channel as the trigger condition.



Analog Trigger – Activity

Use the voltage change of the MSO analog channel as the trigger condition.

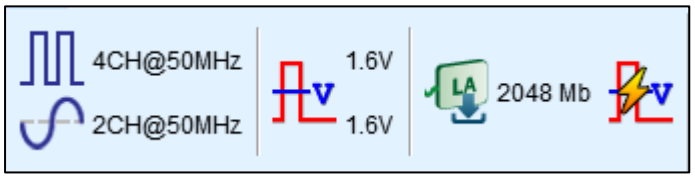


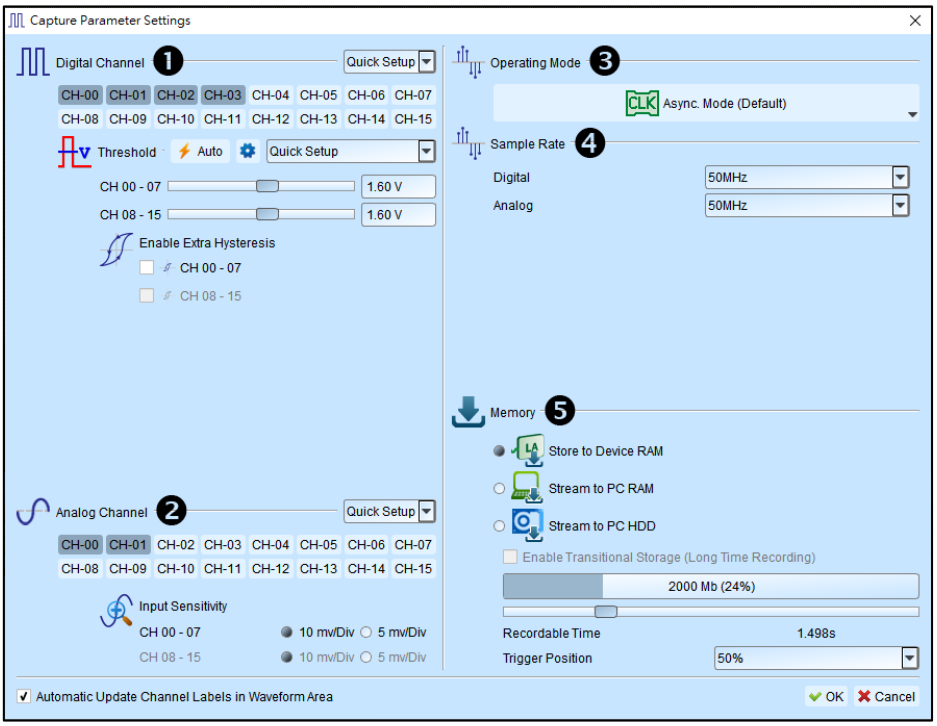
Protocol trigger

Please refer to LA Decode & Trigger manual.

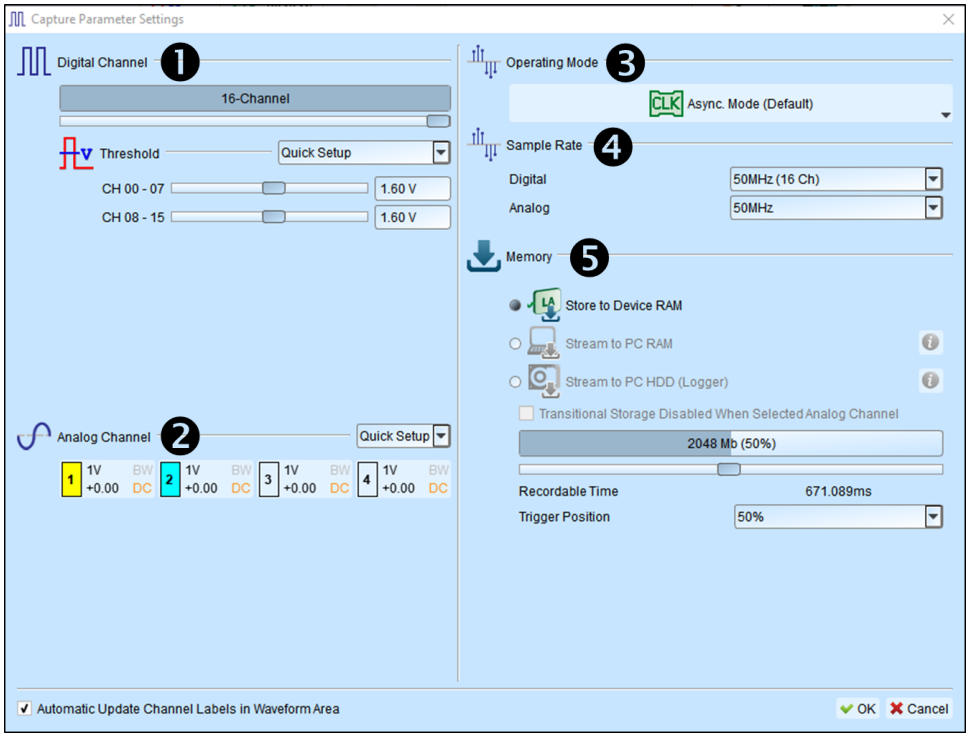
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Channels, Threshold, Sample Rate, Device Memory Usage





MSO1000, MSO2000 series interface



MSO3000 series interface

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1. Digital Channel Settings:

   a. Choose the channel User want to measure, it sets threshold automatically, User can adjust manually. 8 channels are a set of adjustable units, there are two sets.

   b. **(MSO1000, MSO2000 series only)** Provide Extra Hysteresis function, turn on to reduce noise, turn off to increase sensitivity, replacing the past Schmitt function.

   c. The number of usable channels will vary depending on the trigger function setting or sampling rate.

2. Analog Channel Settings:

For MSO1000, MSO2000

a. User can choose the channel User want to measure.

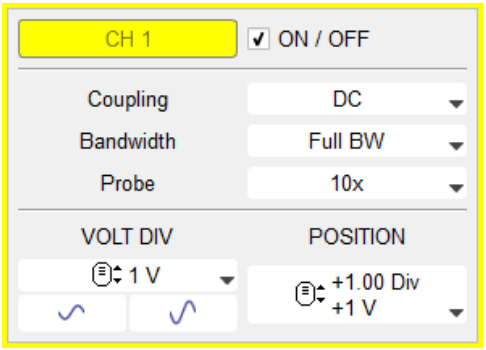
b. Input Sensitivity provides two different revolutions

(1). Voltage Range: +-10V, Minimum Scale: 5mV/Div.

(2). Voltage Range: +-20V, Minimum Scale: 10mV/Div.

For MSO3000

The number of available channels will be displayed in the analog setting column, each channel is set separately.

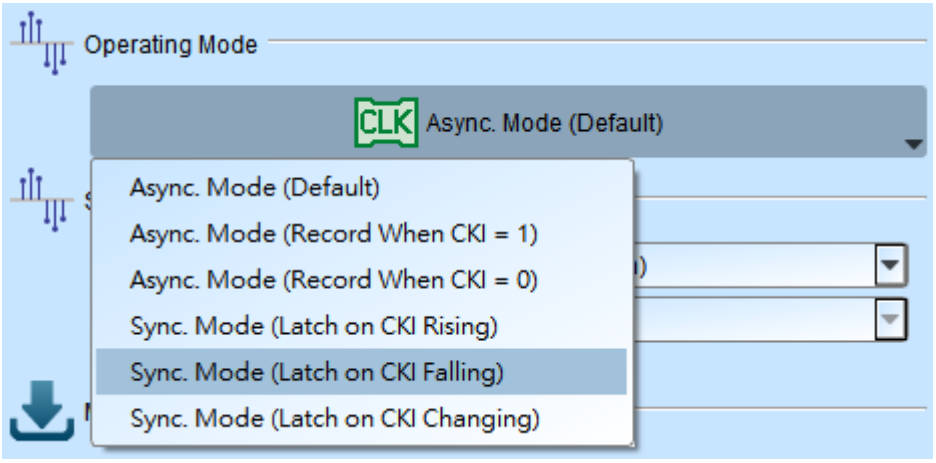


ON / OFF	Enable/disable the channel.
Coupling	The input signal is DC/AC coupled. DC coupling does not process the signal, while AC coupling removes the DC level from the signal.
Bandwidth	The bandwidth limit can be set to Full bandwidth / 100 MHz / 20 MHz. Full bandwidth means that there is no

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	additional bandwidth limit, when the limit is 20 MHz or 100 MHz, it means that the set value will be used as the upper limit of the bandwidth.
Probe	Probe parameter settings. It can be set as a current probe or a voltage attenuation probe. If User use a voltage attenuation probe, please check the attenuation. The voltage value displayed on the screen will be correct only after it is consistent with the software screen setting.
Volt Div	Set the voltage value of each large division in the vertical direction.
Position	Set channel level. User can drag the channel label on the left side of the waveform area to change the level.

3. Operating Mode Settings:



Asynchronous Mode:

Asynchronous mode, also known as timing analysis, is based on the internal clock as a sample rate. It is recommended that the sample rate to be 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 sample rate.

The default mode is to capture the signal at the sampling frequency. If User want to increase the time of signal capture, User can add a qualifier by selecting CKI and setting a channel to be 0 or 1. For example, when Chip Select is 0 to allow to

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capture the signal, User can select the asynchronous mode (recorded when CKI = 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 state analysis, uses the external input clock as the sample rate. The channel marked with CK1 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.

4. Sample Rate:

MSO 3000 series

Digital Available Channel	
Sample Rate	Conventional/Transitional
2 GS/s (Max)	8 / 7
1 GS/s	16 / 14
500 MS/s	16 / 16
250 MS/s	16 / 16

Analog Available Channel	
Sample Rate	
1 GS/s (Max)	1
500 MS/s	2
250 MS/s	4

MSO 2000 series

Digital Available Channel	
Sample Rate	Conventional/Transitional
2 GHz (Max)	8 / 7
1 GHz	16 / 14
500 MHz	16 / 16
250 MHz	16 / 16
200 MHz below	16 / 16

Analog Available Channel	
Sample Rate	
200 MHz (Max)	2 (Ch0, Ch8)
100 MHz	4 (Ch0-1, Ch8-9)
50 MHz	8 (Ch0-3, Ch8-11)
25 MHz below	16

MSO 1000 series

Digital Available Channel		
	Conventional/Transitional	
Sample Rate	1008E	1116E
2 GHz (Max)	4 / 3	4 / 3
1 GHz	8 / 6	8 / 6

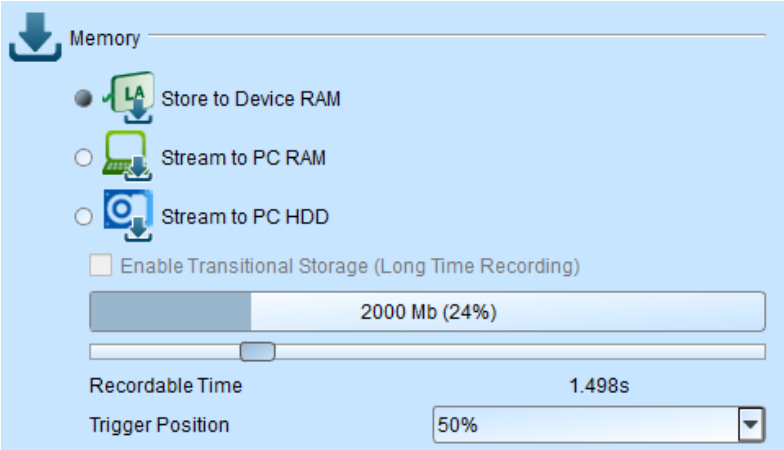
Analog Available Channel	
Sample Rate	
200MHz (Max)	2 (Ch0, Ch8)
100 MHz	4 (Ch0-1, Ch8-9)
50 MHz	8 (Ch0-3, Ch8-11)

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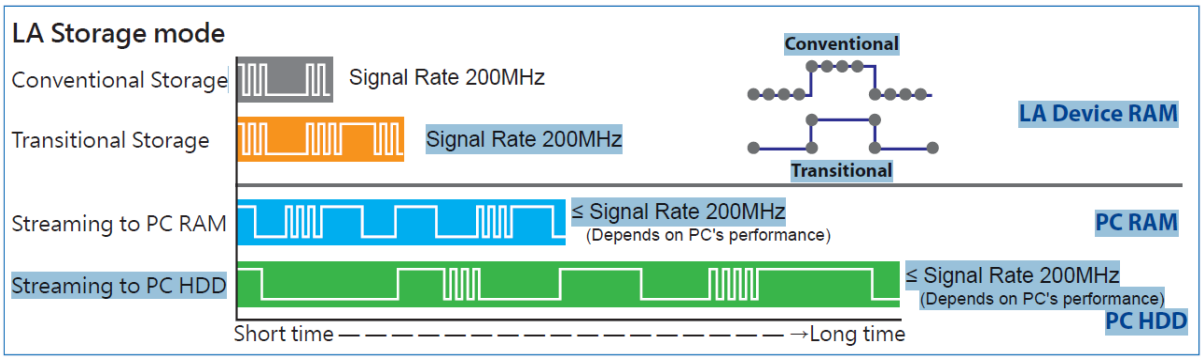
500 MHz	8 / 6	16 / 12
250 MHz	8 / 6	16 / 16
200 MHz below	8 / 6	16 / 16

25 MHz below	16

5. Memory Settings:

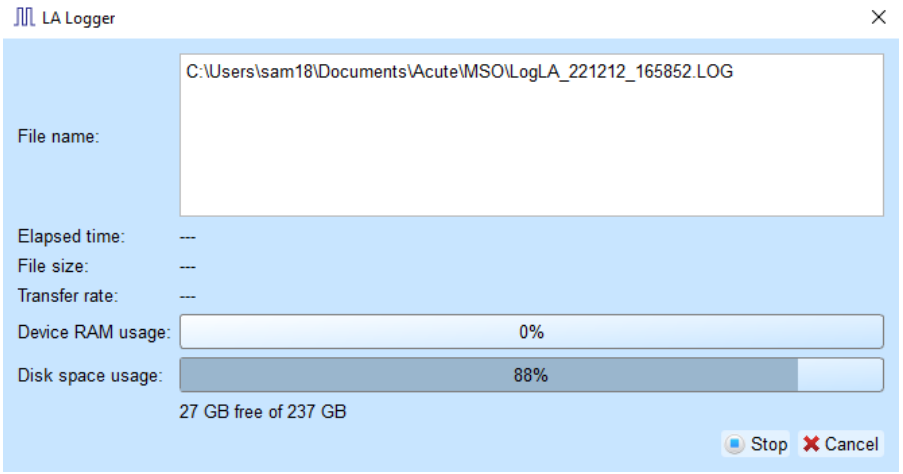


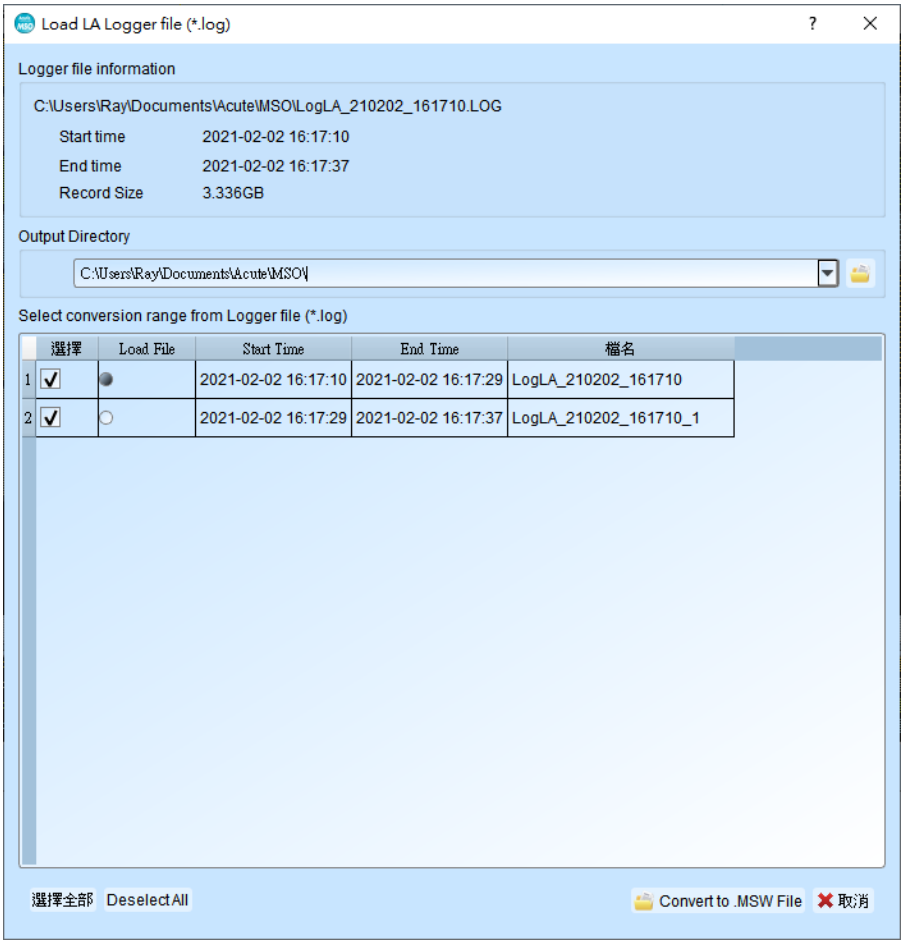
a. Storage Mode: Store to Device RAM, Stream to PC RAM, Stream to PC HDD



- Conventional Storage: The data of each sampling point is recorded according to the sampling rate.
- Transition Storage: Record the time intervals between edges. If the signal does not change frequently, the recording time can be greatly increased. When MSO analog channels are enabled, it doesn't support transition storage mode.
- Stream to PC RAM: Use transitional storage to stream data to PC RAM. The record length that can be captured depends on the performance of the computer. If the device memory or the PC RAM is insufficient, it will automatically stop.
- Stream to PC HDD: Use transitional storage and use device memory as buffer, then stream the data to PC HDD. The record length that can be captured depends on the performance of the computer. If the device memory or the PC RAM is insufficient, it will automatically stop.

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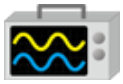
This function will keep saving the original data .log to PC HDD. After the capture stopped, the files will be cut automatically, each file is about 3GB, and User can choose the file to be converted to .msw or the file to be opened. It takes about 9GB of PC RAM to convert the file, please make sure the PC RAM is sufficient.

b. Record time: According to the current settings, we can estimate the time the waveform was captured. If enable transition storage, this function will be disabled.

c. Trigger Position：Set the position of the trigger point in the used memory in percentage. For example, set to 50%. Means that the device memory will retain up to 50% to store pre-trigger data.

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Stack DSO (Oscilloscope)



Using MSO 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	√	√

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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		√

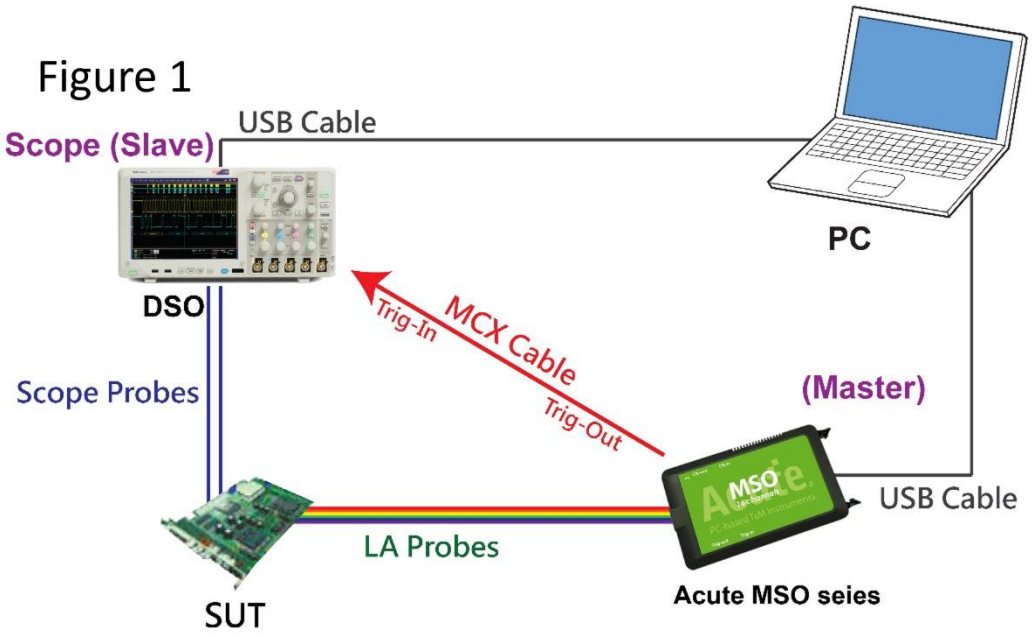
There are two methods for hardware wiring:

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

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

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Figure 1

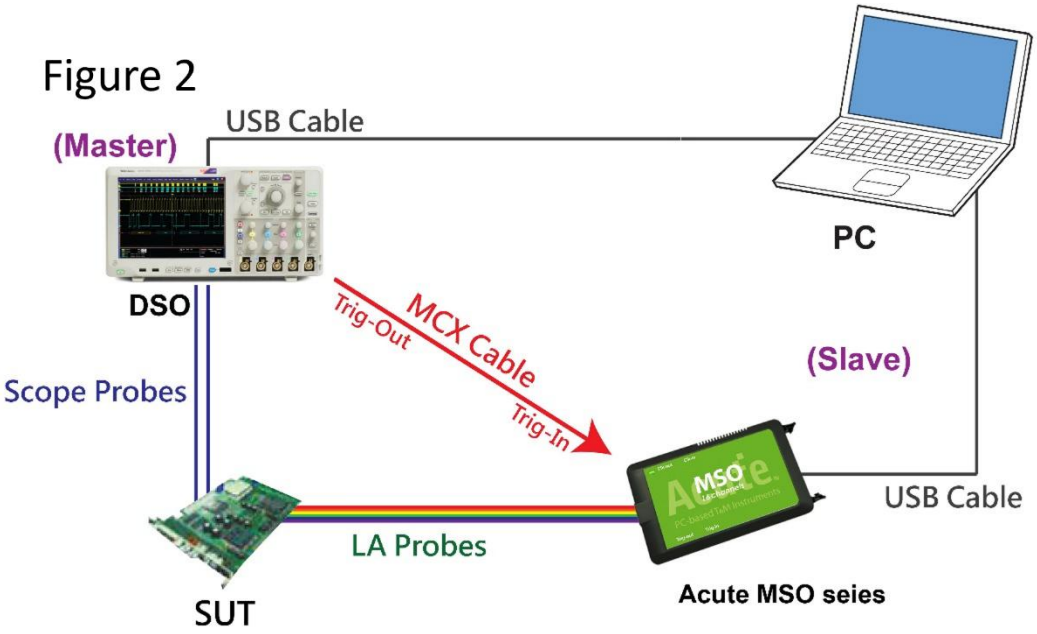


In Figure 1, the USB or Ethernet (TCP / IP) interface is connected to the computer, and then connect the BNC-MCX cable to the MSO Trig-Out and the trigger input interface (Ext-Trig, Aux-In or Trig-In) of the oscilloscope. MDO4000 series is fixed in the analog channel CH4.

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

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

Figure 2



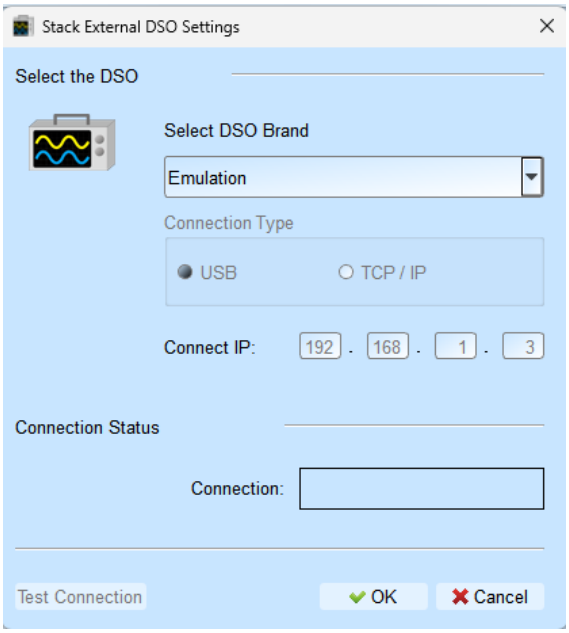
In Figure 2, the BNC-MCX cable is connected to the MSO Trig-In and the trigger output interface (Trig-Out) of the oscilloscope. After completing the above actions,

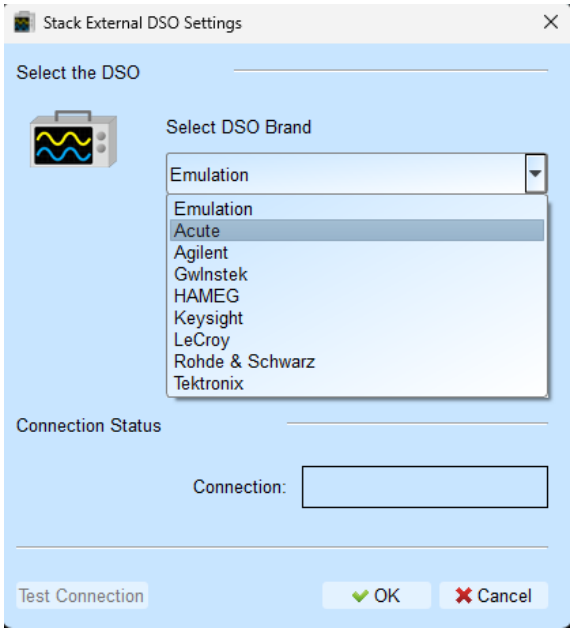
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press the

"Stack Oscilloscope" button, as shown below:







Select the DSO

Select the DSO brand to stack. When there is no DSO to stack, emulation is the mode to read back the storage files of DSO stacked.

Connection Type

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

Connect IP

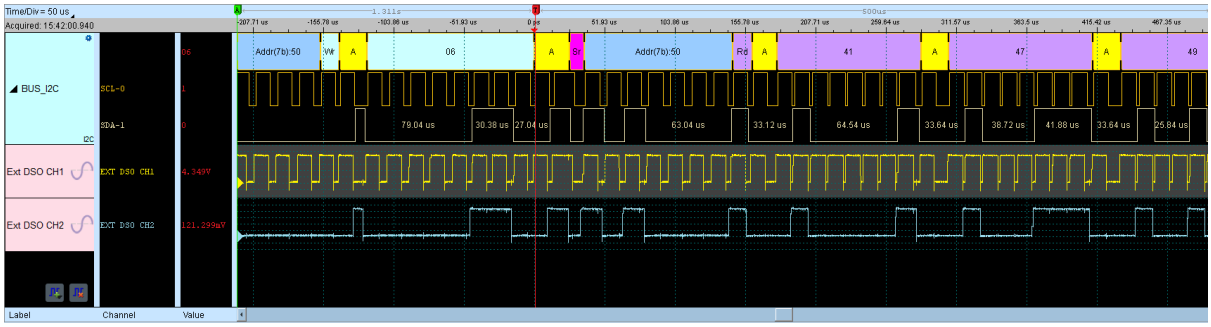
Select TCP / IP for the connection mode and enter IP address. When using the Ethernet crossover cable, it is recommended that the IP settings of the two machines to be 192.168.1.2 and 192.168.1.3 respectively. Gateway is the same, set to 192.168.1.1, and DHCP is set to OFF. If the IP setting does not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

Test Connection / Connection Status

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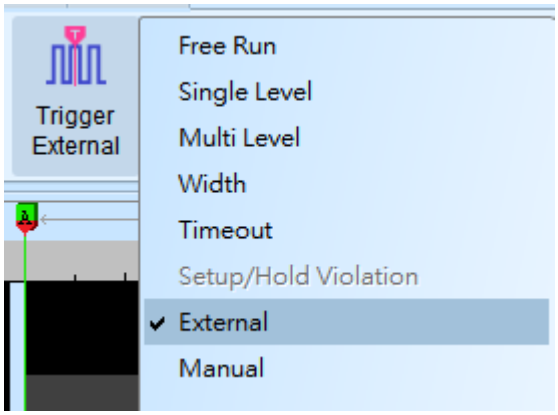
Connect the oscilloscope, it will show the current stacked oscilloscope model and automatically add the oscilloscope channel to the waveform window.

Screen of oscilloscope stack



Set oscilloscope as master, MSO as slave

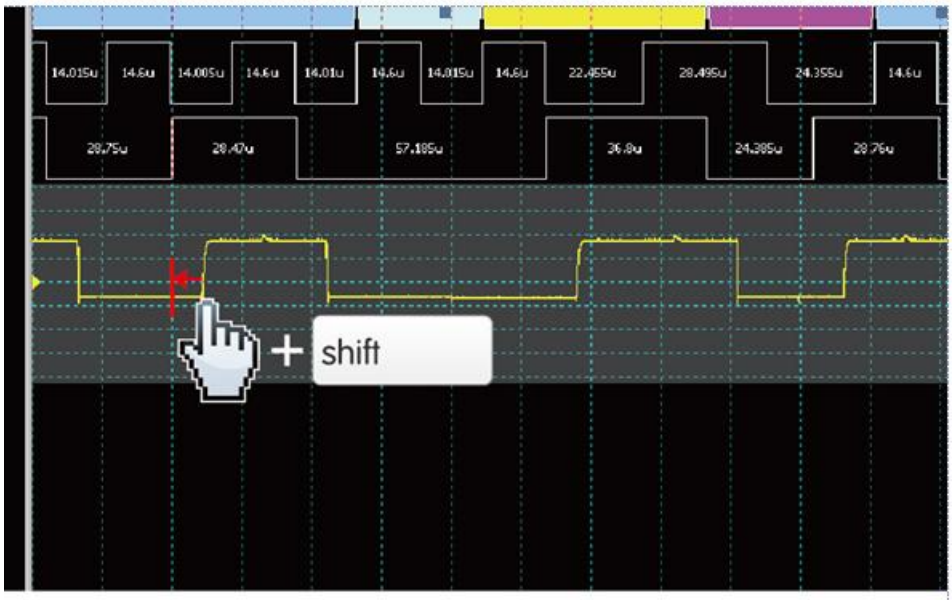
If the stack is composed of the oscilloscope as the master and MSO as the slave, User must not only complete the above-mentioned basic settings but also set the external trigger signal. For the hardware wiring, please refer to Figure 2. Press "Trigger Condition" → "External Trigger", as shown below

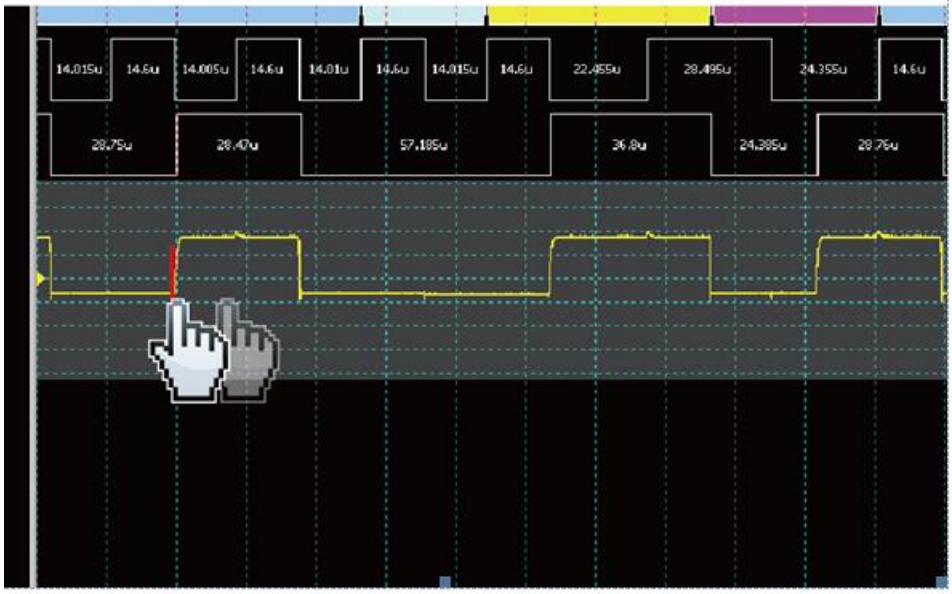


Stack Delay

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

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Stack Cable:

BNC-MCX cable MCX-MCX line for Acute DSO





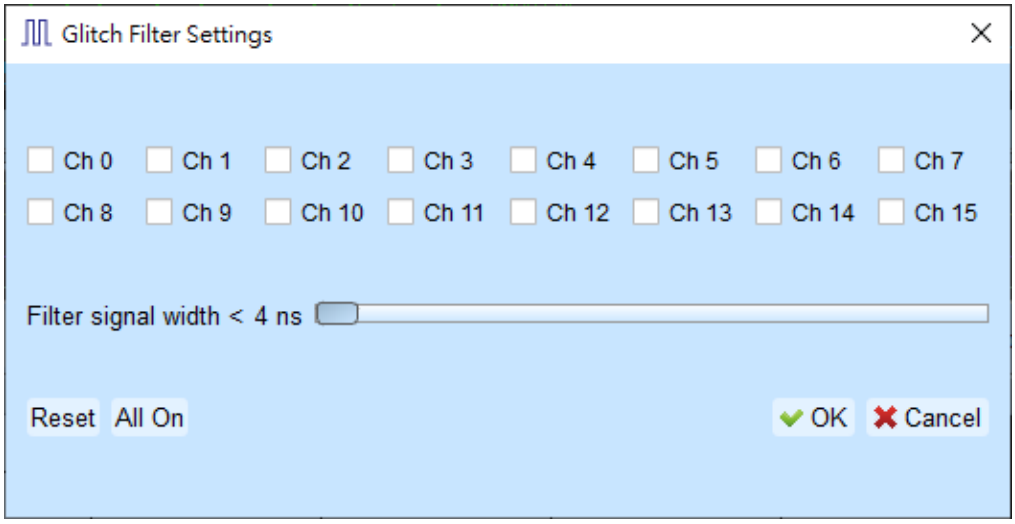
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Advanced Capture Settings

• 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.

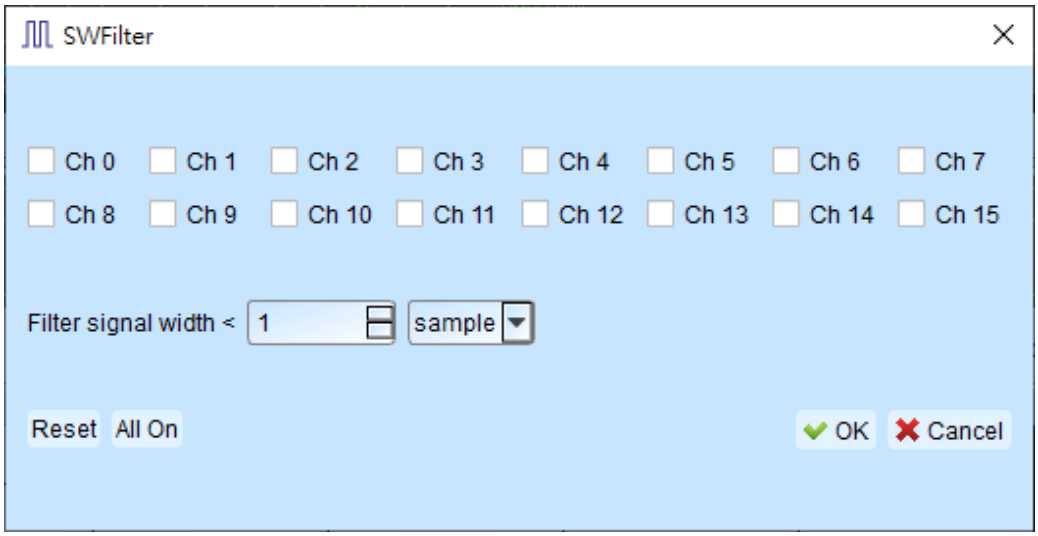


This filter can filter the signals of less than 5 ns - 35 ns wide. If this filter function is enabled, it will filter before the hardware is triggered. Channels that use the glitch filter function are marked with a red dot on the channel label for identification.

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- **Software Glitch filter settings**



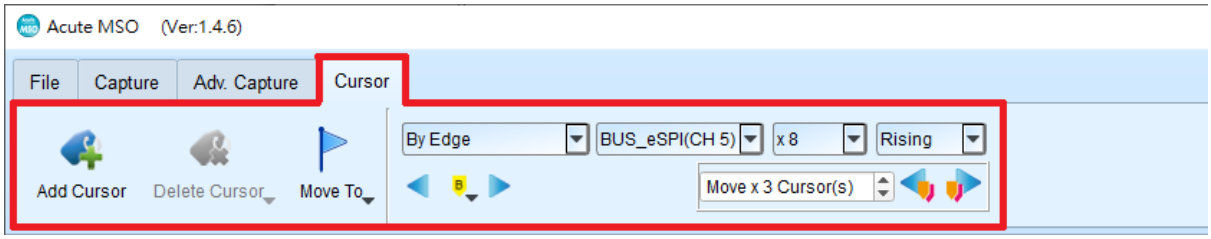


This filter function can be set to filter the signals with pulse width range from 1 ps to 1ms. Enable this filter function will only change the display and decode contents, the trigger and recordable time will remain not effected. Disable this filter function will restore all waveform contents back to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

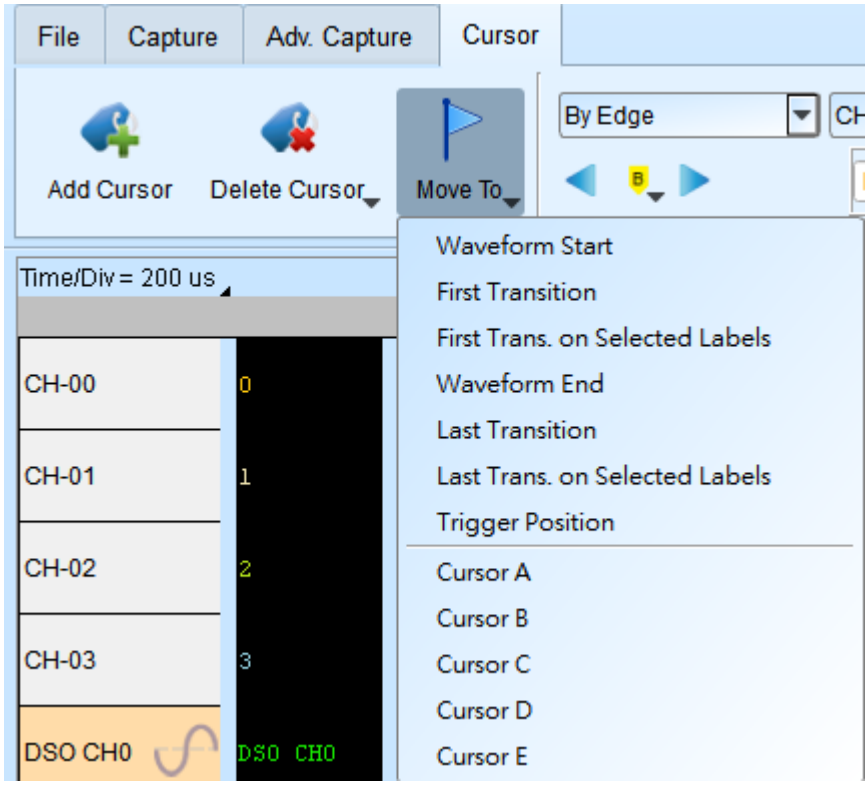
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Cursor

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.

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 last waveform transition.

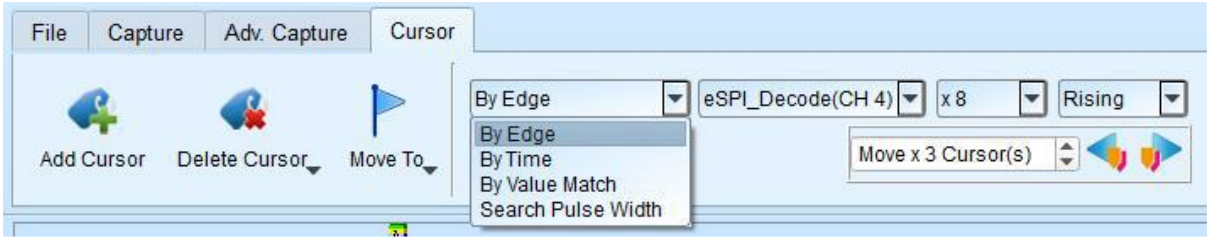
Last Transition on selected channel: Move to the last waveform transition of selected label.

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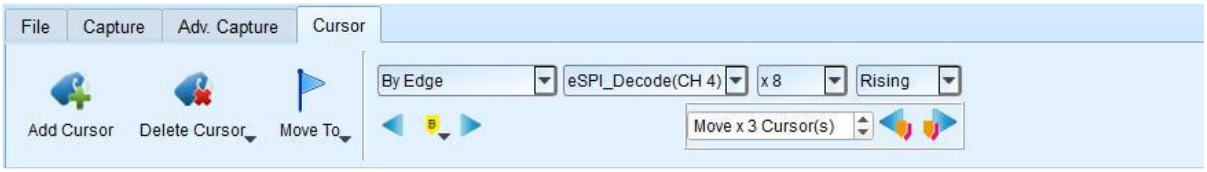
Trigger Position: Move to the trigger position.

Cursor A-Z: Move to the Cursor position.

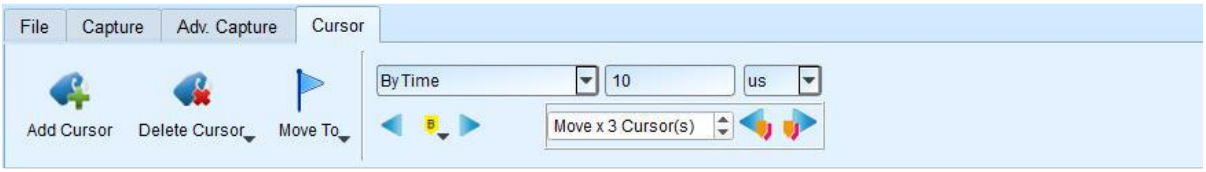
Waveform search is divided into four modes:



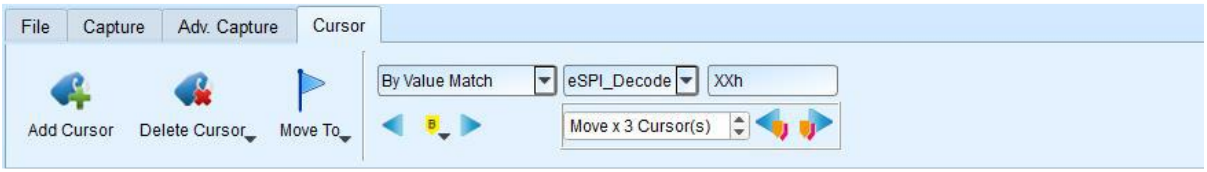
1. By Edge: Move the specified cursor according to the number of Rising/Falling/Either edges (x1 ~ x4096) of the specified channel.



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.



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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, 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.

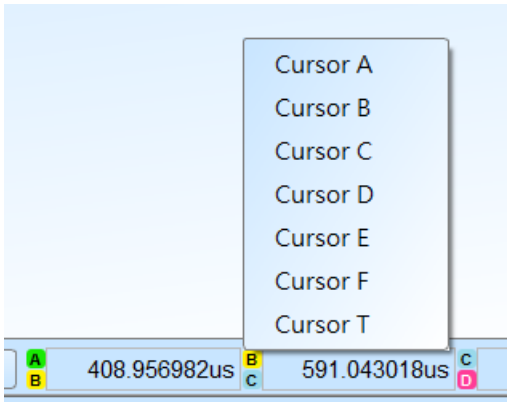
Cursor movement method:

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.



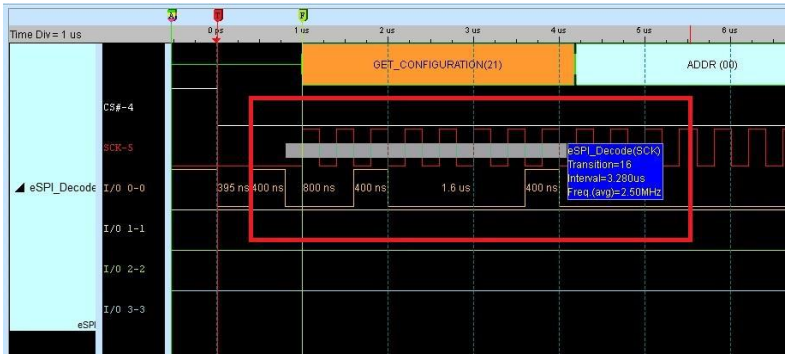
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Waveform and Report

Waveform

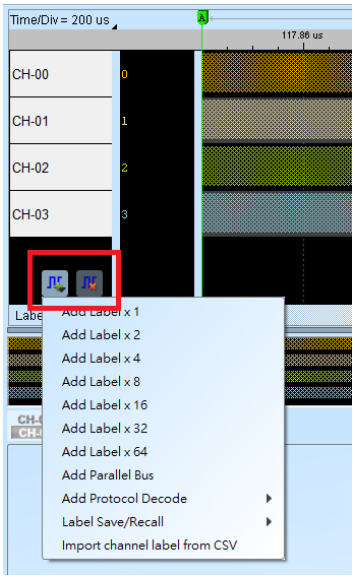
1. Use the left mouse button to drag the waveform in the wave form display area.
2. User can use the mouse wheel or click the zoom in button on the screen  to zoom in/out the waveform.
3. To add text/graphic annotation , User can add text or graphic annotation data in the waveform area.
4. Quick calculation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



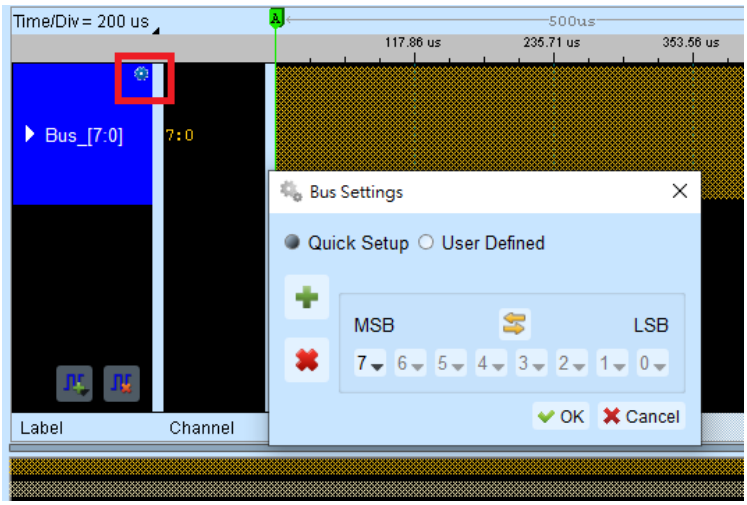
5. Add/Delete the waveform label.

- Add labels

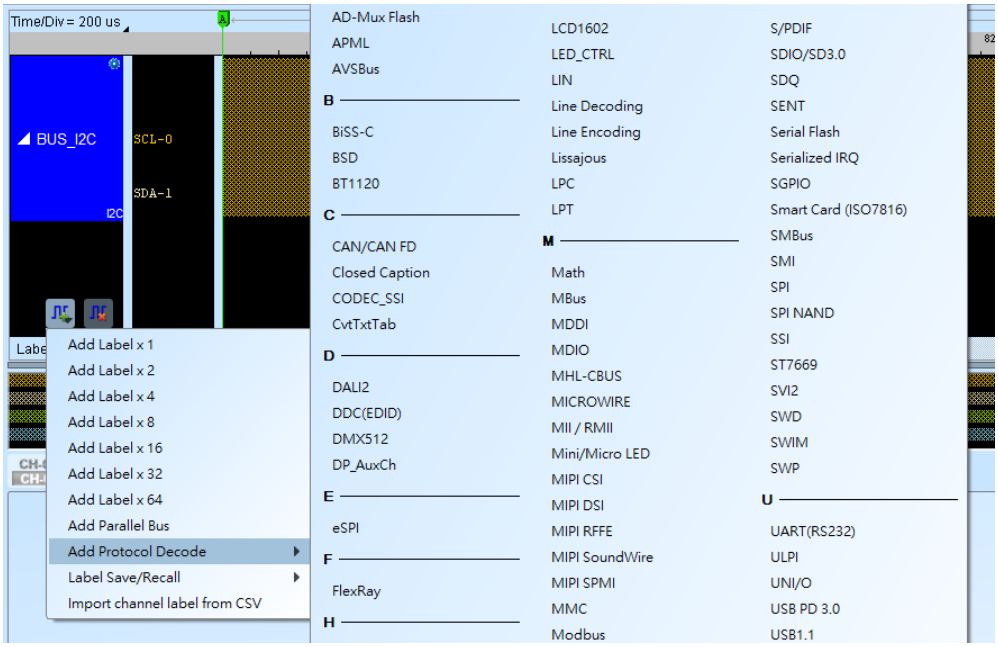


- Add parallel bus

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- Add protocol decode



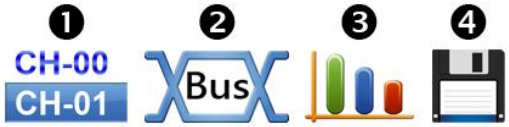
- Label Save/Recall: Save the current channel settings or load the saved channel label.
- Import channel label from CSV file. The file format is as follows,

	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.

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

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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

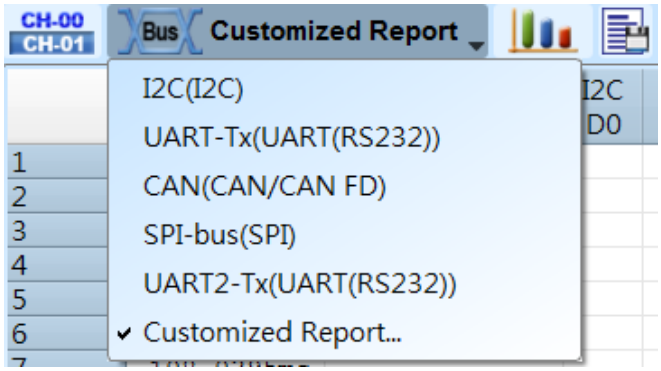
   Save the report area as text files.

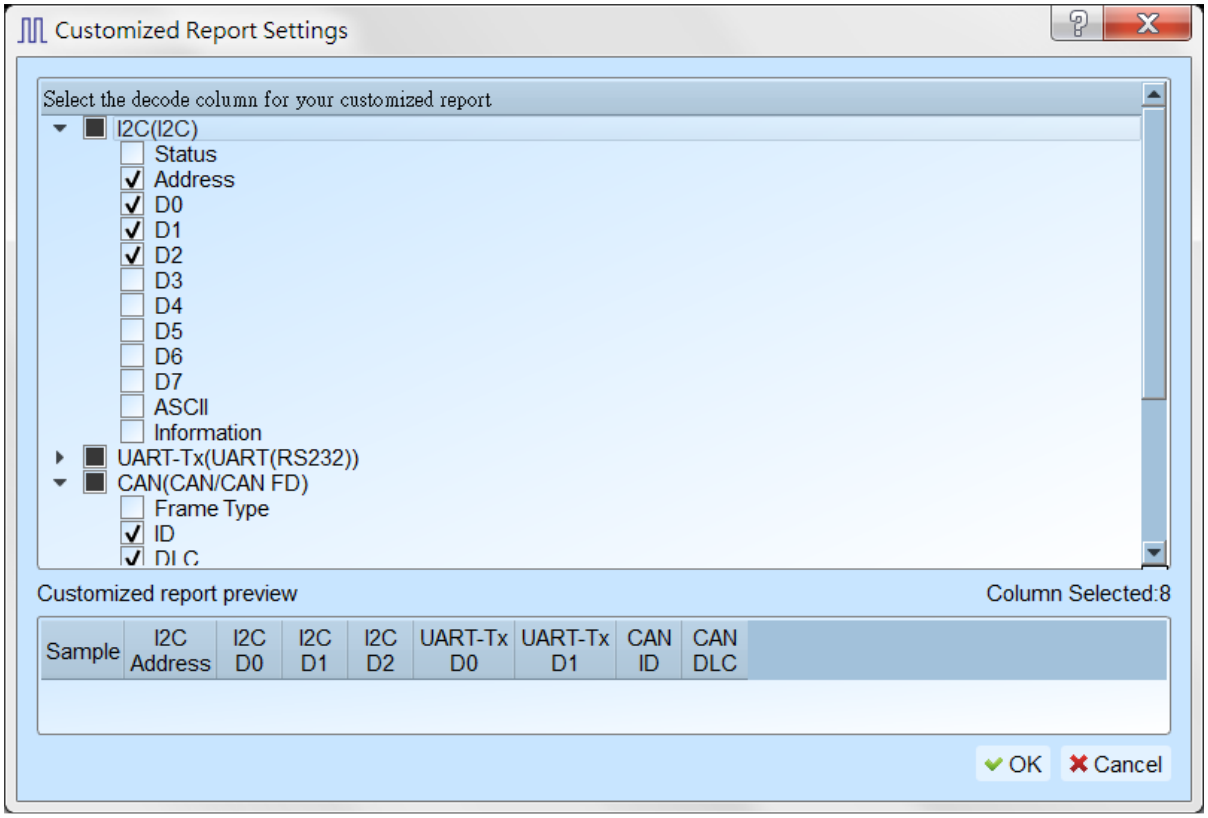
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Bus Decode Settings

Please refer to the bus trigger and Analyzer manual.

Customized Report Settings





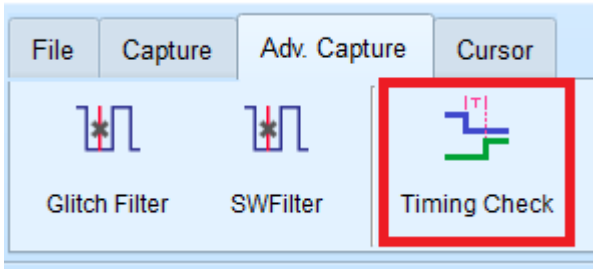
All bus decodes enabled in waveform area will be listed in the settings window, select columns wanted from each reports, the preview window will show selected column and combine them to create Userr customized report.

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

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Timing Check

Time Sequence



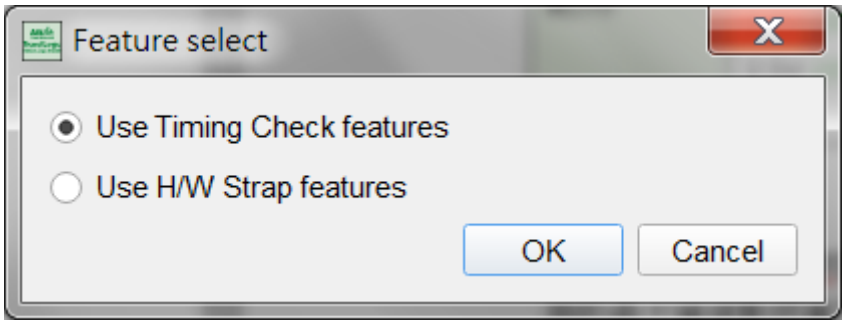
This function can import a CSV file containing the parameters and measurement items. The logic analyzer will adjust the parameters, channel names and measurement types according to the settings in this file.

The CSV file compilation rules need to be based on the field names at the beginning, then separate the values in different fields with a comma. and it need to end with a semicolon (;).

The text after the double slash (//) will be regarded as a comment and ignored.
(For sample files, Please contact us.)

Feature Select

The LA software will ask user which function that user want to apply while reading the configure file. Set the trigger condition according to the configure file, and hide the channels which are not in use.



Column Items:

- [SampleRate]

  Only accept single line input.

  Input the sample rate value, Units: MHz, KHz, Hz.

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The maximum sampling rate range that can be used will be affected by the number of channels and trigger types, and the minimum sampling rate cannot be lower than 100KHz.

This item will affect both Analog and Digital Sample Rate settings, use [AnalogSampleRate] and [DigitalSampleRate] items to change the Sample Rate settings separately.

Example	[SampleRate] 200MHz ;

- [AnalogSampleRate]

  Only accept single line input. ONLY for MSO series.

  Input the analog sample rate value, Units: MHz, KHz, Hz.

  The maximum analog sampling rate range that can be used will be affected by the number of channels and trigger types, and the minimum sampling rate cannot be lower than 100KHz.

Example	[AnalogSampleRate] 25MHz ;

- [DigitalSampleRate]

  Only accept single line input.

  Input the digital sample rate value, Units: MHz, KHz, Hz.

  The maximum digital sampling rate range that can be used will be affected by the number of channels and trigger types, and the minimum sampling rate cannot be lower than 100KHz.

Example	[DigitalSampleRate] 25MHz ;

- [RecordLength]

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Only accept single line input.

Input the recording memory. Unit: MB, Mb.

The maximum of the recording memory depends on the different models. The minimum recording memory value be lower than 16Mb.

Example	[RecordLength] 100Mb ;

- [TransitionMode]

  Only accept single line input.

  Transitional Mode setup. Unit: None.

  For Acute MSO series, Transitional storage mode is not available when analog channel is on.

Example	[TransitionalMode] 1 //Transitional storage mode ON ;

- [Threshold]

  Available to input multiple line for adjust different threshold for the channels. Enter the threshold level in each row, Unit: mV, V.

  For different model, it has different range of threshold level.

  MSO series threshold voltage range : ±20V

  ***For TL series, when the Schmitt circuit function is enabled, Channel 16-31 will turn into the secondary Ref. threshold voltage. Acute MSO series are unaffected.**

Example	[Threshold] 1.6V //Ch 00-07 1.5V //Ch 08-15 1.2V //Ch 16-23 or the secondary of input for Ch00-07 2.5V //Channel 24-31 or the secondary of input for Ch08-15

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	;

Available to input multiple line for adjust different threshold for the channels. Enter the threshold level in each row, Unit: mV, V.

For different model, it has different range of threshold level.

MSO series threshold voltage range : ±20V

***For TL series, when the Schmitt circuit function is enabled, Channel 16-31 will turn into the secondary Ref. threshold voltage. Acute MSO series are unaffected.**

Example	[Threshold] 1.6V //Ch 00-07 1.5V //Ch 08-15 1.2V //Ch 16-23 or the secondary of input for Ch00-07 2.5V //Channel 24-31 or the secondary of input for Ch08-15 ;

- [UseSchmittCircuit]

  Only accept single line input.

  Enter whether to enable the hardware Schmitt circuit hysteresis function to reduce the received digital signal noise, and the number of available channels will not be affected.

Example	[UseSchmittCircuit] 1 //Input 1 to enable Schmitt circuit ;

- [Hysteresis]

  Only accept single line input.

  Enter whether to enable the hardware Schmitt circuit hysteresis function to reduce the received digital signal noise.

Example	[Hysteresis] 1 //Input 1 to enable extra Hysteresis feature.

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	;

- [Channel]

  Available to enter multiple lines of settings to add different channels, each line is entered in sequence:

  1. Select Channel. CH0 -> Digital CH0, CH(A)0 -> Analog CH0
  2. Label for Channel. It is available to enter less than 31 alphabets or numbers.
  3. (Option)Select TimingCheck or HwStrap (TimingCheck+HwStrap means enable both)
  4. (Option)Enter the expect maximum voltage for auto calculate the voltage division for analog channel.
  5. (Option) Enter the expect minimum voltage for auto calculate the voltage division for analog channel.

  The available channels will vary according to different models and the selected sampling rate.

Example	[Channel]
	CH20, MyData0, HwStrap
	CH22, MyData1, TimingCheck
	CH24, MyData2, TimingCheck+HwStrap
	// (Analog Channel settings. ONLY for MSO series)
	CH(A)1, VCC (1.8V) //Analog CH1, Using the default voltage division and offset
	CH(A)2, VDD (1.5V) //Analog CH2, Using the default voltage division and offset
	CH(A)3, AAA, TimingCheck, 1.5V // Analog CH3, Set up the max voltage division
	CH(A)4, BBB,, 1.0V // Analog CH4, Set up the max voltage division
	CH(A)5, CCC,, 2.0V, 1.0V // Analog CH5, Set up the max & min voltage division
	;

Check Mode	Description
HwStrap	CH is only for H/W Strap. It will be hidden while in

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	Timing Check.
TimingCheck	CH is only for Timing Check. It will be hidden while in H/W Strap.
TimingCheck+HwStrap	For both mode.

- [AnalogChannel]

  Available to enter multiple lines of settings to add different channels, each line is entered in sequence:

  1. Select Channel. For MSO3K series, input DSO CH1 to select Analog CH1; For MSO2K series, input CH(A)0 to select Analog CH0
  2. Label for Channel. It is available to enter less than 31 alphabets or numbers.
  3. Enter the voltage division setting. For MSO3K series, the input will effect both display and acquisition settings; For MSO2K series, the input will only effect display settings.
  4. Enter the voltage offset setting. For MSO3K series, the input will effect both display and acquisition settings; For MSO2K series, the input will only effect display settings.
  5. (Option) Enter the probe attenuation setting, **ONLY for MSO3K series**, MSO2K series will ignore this setting.
  6. (Option) Enter the bandwidth limitation setting, 20MHz, 100MHz or FULL, **ONLY for MSO3K series**, MSO2K series will ignore this setting.
  7. (Option) Enter the channel coupling setting, DC or AC, **ONLY for MSO3K series**, MSO2K series will ignore this setting.

  The available channels will vary according to different models and the selected sampling rate.

Example	[AnalogChannel] //MSO3K settings sample DSO CH1, MyVolt1, 1V, 1.0, 10, FULL, DC //Analog CH1, display name is MyVolt1, voltage division 1V, voltage offset +1.0 division, x10 probe attenuation, FULL bandwidth, DC coupling DSO CH4, MyVolt2, 500mV, -3.0, 1, 20MHz, AC //Analog CH4, display name is MyVolt2, voltage division 500mV, voltage offset -3.0 division, x1 probe attenuation, bandwidth limited to 20MHz, AC coupling

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	[AnalogChannel] //MSO2K settings sample CH(A)3, MyVolt5, 1V, 1.0 //Analog CH3, display name is MyVolt5, voltage division 1V, voltage offset +1.0 division;

- [Trigger]

  Only accept single line input. Enter in order:

  1. Trigger Channel Label: Reference to the Label in [Channel] settings for trigger settings.
  2. Trigger Type:

Trigger Type
CHANNEL_LOW
CHANNEL_HIGH
CHANNEL_ANY
CHANNEL_RISING
CHANNEL_FALLING
CHANNEL_CHANGING
ANALOG_CH_RISING (ONLY for MSO series)
ANALOG_CH_FALLING (ONLY for MSO series)

  3. (Optional)Select TimingCheck or HwStrap (TimingCheck+HwStrap for both)
  4. (Optional)Analog Trigger Voltage, Unit: mV、V. (Only when selecting analog CH in MSO series.

Example	[Trigger]
	// For H/W Strap, selecting MyData1 (Triggered when Ch22 Rise)
	MyData1, CHANNEL_RISING, HwStrap
	//For Timing Check, selecting MyData2 (Triggered when Ch24 Rise)
	MyData2, CHANNEL_RISING, TimingCheck
	;

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	[Trigger] //Analog Trigger (Only for MSO series) //For Example: Timing Check VCC (1.8V) (Triggered when Analog Ch1 rising equal or more than 1.5V) VCC (1.8V), ANALOG_CH_RISING, TimingCheck, 1.5V ;

- [TriggerPosition]

  Only accept single line input.

  Entering the trigger position in percentage. Input Range: 1% to 99%

Example	[TriggerPosition] 20% //Set the trigger position to 20% ;

- [RangeStart]

  Only accept single line input.

  Set measurement start position, available input from CursorA to CursorZ.

Example	[RangeStart] CursorS //Set measurement starts from Cursor S ;

- [RangeEnd]

  Only accept single line input.

  Set measurement end position, available input from CursorA to CursorZ.

Example	[RangeStart] CursorE //Set measurement ends at Cursor E ;

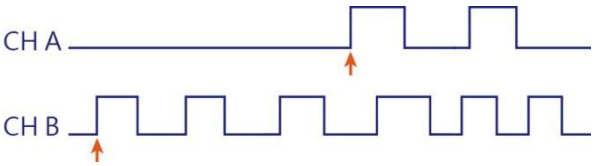
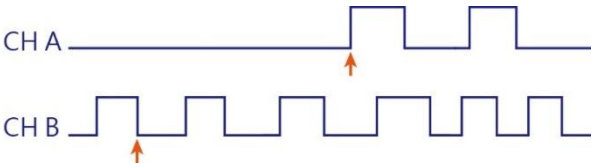
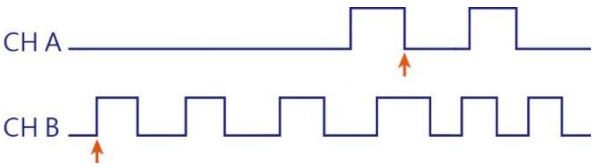
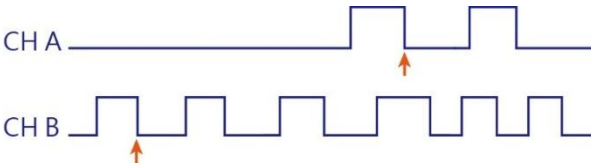
- [TimingCheck]

  Available to enter multiple lines of settings to add different settings, Enter in order:

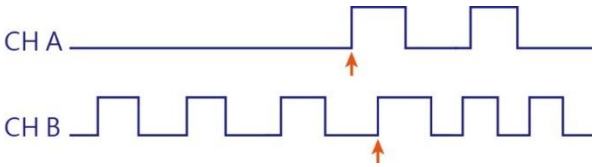
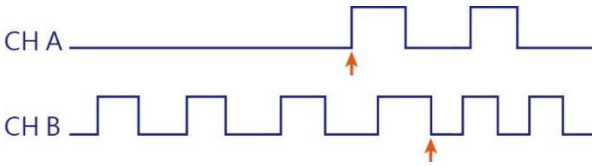
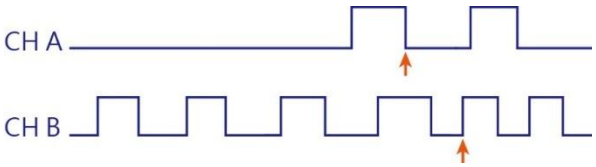
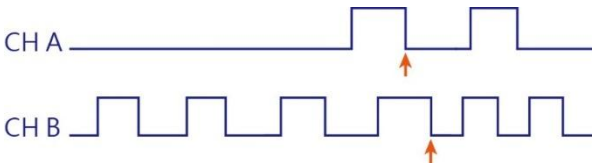
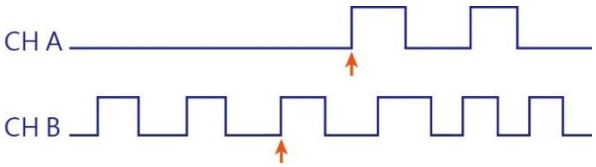
  1. Timing Check Spec, Only for display.

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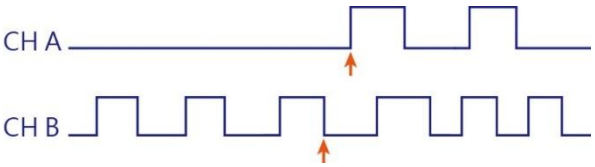
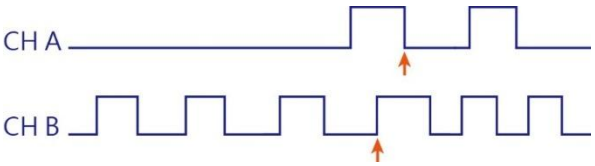
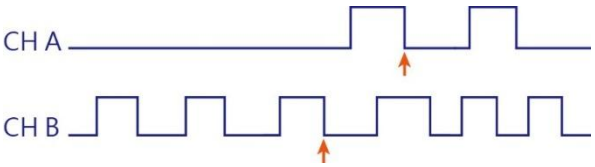
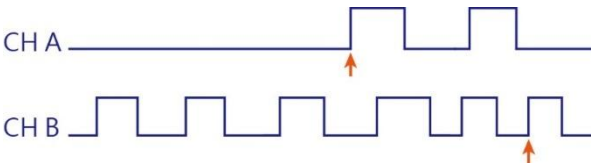
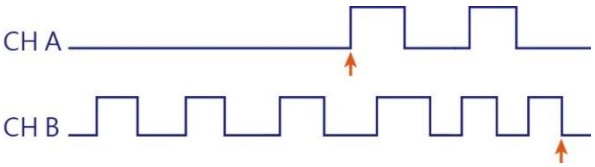
2. Timing Check Description, Only for display.
3. Target CH A: Need reference [Channel] label name.
4. Target CH B: Need reference [Channel] label name.
5. Timing Check Type, **items marked in orange are for MSO series only.**

Item	Remark
CHA_RISE_TO_CHB_RISE	Time difference from: First CH A Rising Edge TO First CH B Rising Edge. 
CHA_RISE_TO_CHB_FALL	Time difference from: First CH A Rising Edge TO First CH B Falling Edge. 
CHA_FALL_TO_CHB_RISE	Time difference from: First CH A Falling Edge TO First CH B Rising Edge. 
CHA_FALL_TO_CHB_FALL	Time difference from: First CH A Falling Edge TO First CH B Falling Edge. 
CHA_RISE_TO_NEXT_CHB_RISE	Time difference from: First CH A Rising Edge TO

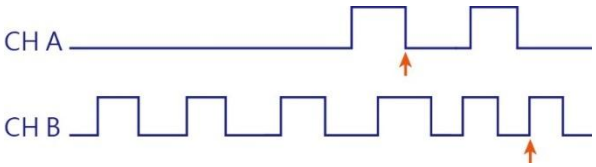
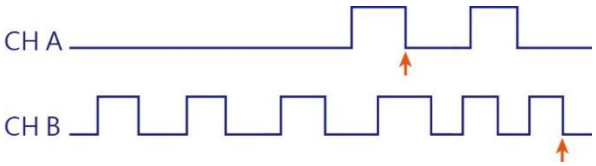
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	Next CH B Rising Edge. 
CHA_RISE_TO_NEXT_CHB_FALL	Time difference from: First CH A Rising Edge TO Next CH B Falling Edge. 
CHA_FALL_TO_NEXT_CHB_RISE	Time difference from: First CH A Falling Edge TO Next CH B Rising Edge. 
CHA_FALL_TO_NEXT_CHB_FALL	Time difference from: First CH A Falling Edge TO Next CH B Falling Edge. 
CHA_RISE_TO_PREV_CHB_RISE	Time difference from: First CH A Rising Edge TO Previous CH B Rising Edge. 
CHA_RISE_TO_PREV_CHB_FALL	Time difference from: First CH A Rising Edge TO

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	Previous CH B Falling Edge. 
CHA_FALL_TO_PREV_CHB_RISE	Time difference from: First CH A Falling Edge TO Previous CH B Rising Edge. 
CHA_FALL_TO_PREV_CHB_FALL	Time difference from: First CH A Falling Edge TO Previous CH B Falling Edge. 
CHA_RISE_TO_FAREST_CHB_RISE	Time difference from: First CH A Rising Edge TO Farthest CH B Rising Edge. 
CHA_RISE_TO_ FAREST_CHB_FALL	Time difference from: First CH A Falling Edge TO Farthest CH B Rising Edge. 
CHA_FALL_TO_ FAREST_CHB_RISE	Time difference from: First CH A Falling Edge TO

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	Farthest CH B Rising Edge. 
CHA_FALL_TO_ FAREST_CHB_FALL	Time difference from: First CH A Falling Edge TO Farthest CH B Falling Edge. 
CHA_HIGH_TIME	
CHA_LOW_TIME	
CHA_HIGH_PULSE_COUNT	
CHA_LOW_PULSE_COUNT	
CHA_RISE_EDGE_COUNT	
CHA_FALL_EDGE_COUNT	
CHA_EDGE_COUNT	
CHA_SLEW_RATE*1	
CHA_V_MAX	
CHA_V_MIN	
CHA_V_PP	
CHA_V_HIGH	
CHA_V_LOW	
CHA_V_AMPLITUDE	
CHA_V_MEAN	
CHA_RISE_TIME	
CHA_FALL_TIME	

6. Min. Limit:
   I. For Timing Measurement, Unit: ns, us, ms, s.
   II. For Voltage Measurement, Unit: mV, V.

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III. For SLEW_RATE, available units: mV/us, mV/ms, V/us, V/ms. mV/us or V/us will be the default units.

Input X stands for don't care.

7. Max. Limit:
   I. For Timing Measurement, Unit: ns, us, ms, s.
   II. For Voltage Measurement, Unit: mV, V.
   III. For SLEW_RATE, available units: mV/us, mV/ms, V/us, V/ms. mV/us or V/us will be the default units.

   Input X stands for don't care.

8. (Option)CH A Ref. Voltage: (MSO Series Only)
   I. The percentage of the amplitude.
      Ex: Entered "90%" for the position of amplitude;
   II. The voltage value for reference point
      Ex: Entered "1.25V" for the 1.25V position.

9. (Option) CH B Ref. Voltage: (MSO Series Only)
   I. The percentage of the amplitude.
      Ex: Entered "90%" for the position of amplitude;
   II. The voltage value for reference point
      Ex: Entered "1.25V" for the 1.25V position.

10. (Option) CHA pass counts: Available to ignore N times when the condition matches. (MSO Series Only)

11. (Option) CHB pass counts: Available to ignore N times when the condition matches. (MSO Series Only)

*1: Slew Rate will decide whether it is rise or fall edge by Ref. voltage.

Example	[TimingCheck] Spec_00, Desc_00, MyData0, MyData1, CHA_RISE_TO_CHB_RISE, 1ns, 10ms Spec_01, Desc_01, MyData1, MyData2, CHA_FALL_TO_CHB_RISE, X, 100ms Spec_02, Desc_02, MyData2, MyData3, CHA_FALL_TO_CHB_FALL, 100us, X ;

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[TimingCheck] //Analog Channel (MSO series ONLY)

Spec_00, Desc_00, VDD (1.5V), VCC

(1.8V),CHA_RISE_TO_CHB_RISE,10ms,20ms,90%,90%,0,0

Spec_01, Desc_01, VDD (1.5V), VCC

(1.8V),CHA_RISE_TO_CHB_RISE,1ms,5ms,80%,80%,0,0

Spec_02, Desc_02, CH0 (3.3V), CH0 (3.3V), CHA_SLEW_RATE, 20mV/ms, 50mV/us

//Rising

Spec_03, Desc_03, CH0 (3.3V), CH0 (3.3V), CHA_SLEW_RATE, 50mV/ms, 20mV/us

//Falling

Spec_04, Desc_04, CH0 (3.3V), , CHA_V_HIGH, 500mV, 600mV //V High

Spec_05, Desc_05, CH0 (3.3V), , CHA_RISE_TIME, 50ms, 100ms //Rise Time

;

Timing Check Report Area

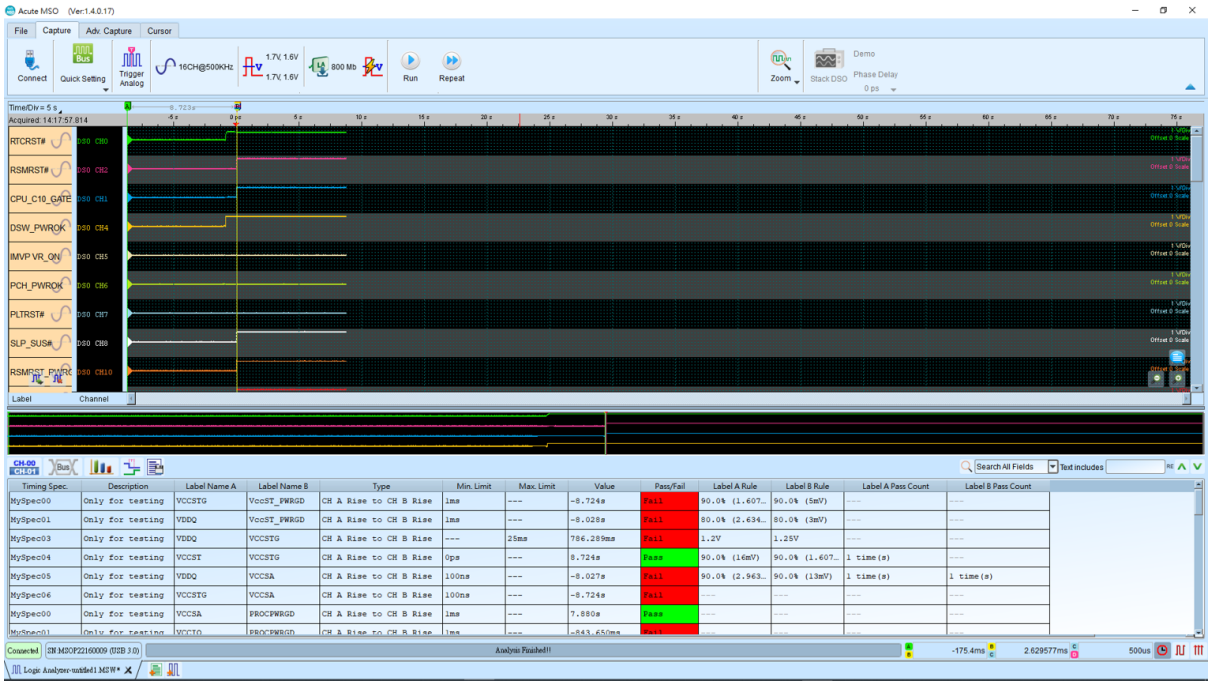
Timing Spec.	Description	Label Name A	Label Name B	Type	Min. Limit	Max. Limit	Value	Pass/Fail	Label A Rule	Label B Rule	Label A Pass Count	Label B Pass Count
PowerDelay01	XXXX	CH1 (1.8V)	CH0 (3.3V)	CH A Rise to CH B Rise	10ms	20ms	9us	Fail	90.0% (1.502V)	90.0% (2.75V)	---	---
PowerDelay02	XXXX	CH2 (1.3V)	CH1 (1.8V)	CH A Rise to CH B Rise	1ms	5ms	3.006ms	Pass	80.0% (986.024mV)	80.0% (1.323…	---	---
PowerDelay01	XXXX	CH2 (1.3V)	CH0 (3.3V)	CH A Rise to CH B Rise	10ms	20ms	2.596ms	Fail	1.2V	1.25V	---	---
PowerDelay01	XXXX	CH1 (1.8V)	CH0 (3.3V)	CH A Rise to CH B Rise	10ms	20ms	---	---	90.0% (1.502V)	90.0% (2.75V)	1 time(s)	---
PowerDelay01	XXXX	CH1 (1.8V)	CH0 (3.3V)	CH A Rise to CH B Rise	10ms	20ms	---	---	90.0% (1.502V)	90.0% (2.75V)	1 time(s)	1 time(s)

While the waveform finished capture, the software will do the result(Pass/Fail) analysis and display it.

Double click the report data for positioning the CHA & the CHB referenced location in waveform area.

Timing sequence: Measuring power-on(off) sequence.

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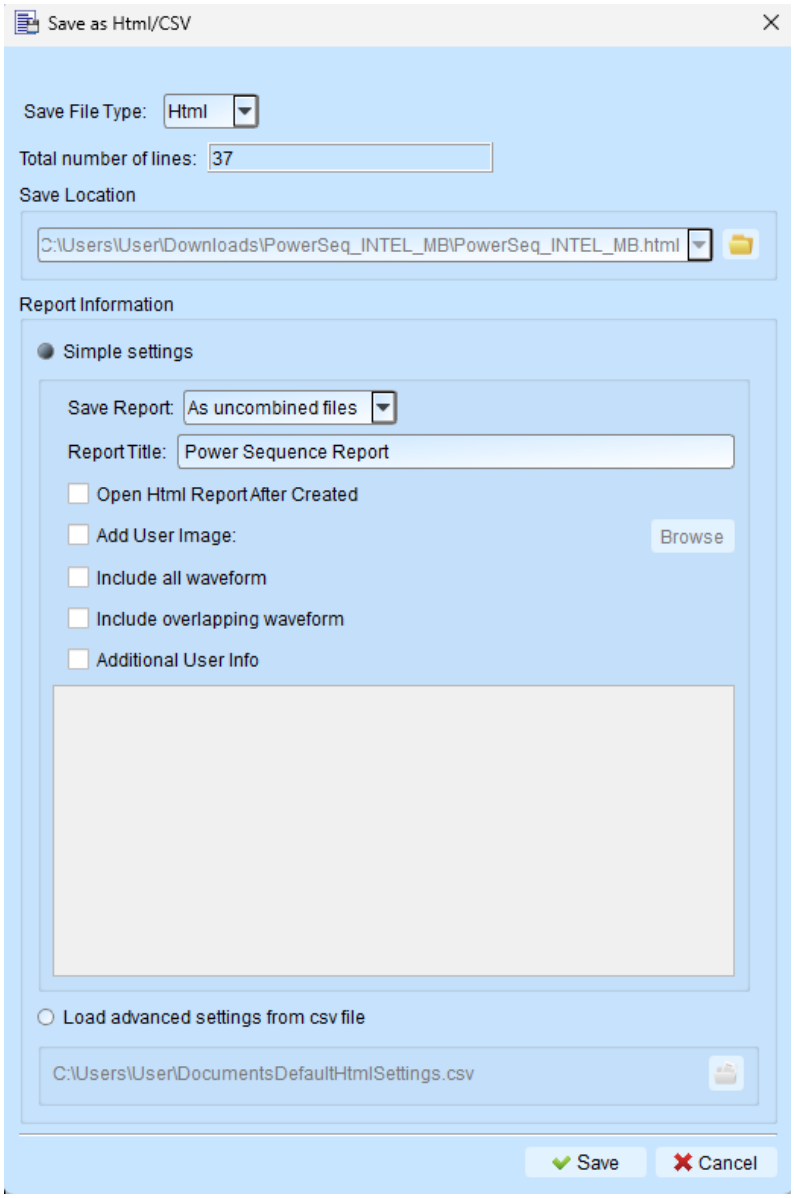


Generating Power Sequence html format report

The power sequence report provides with waveform screenshots and testing results, and it is available to edit the report title and user-defined information. It also allows

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user to adjust the picture time range for each test items.



1. Save Report:
    I. As uncombined files: All the waveform screenshots would be saved as .jpg respectively.
    II. As combined files: All the waveform screenshots would be embedded in html report.
2. Open Html Report After Created: If it was checked, the html report would be opened after saved.
3. Add User Image: User can add image in the html report, For instance, company logo.
4. Include all waveform: Putting all the waveforms screenshot in the html report.
5. Include overlapping waveform: Putting all the waveforms screenshot, but overlap them in one picture, in the html report.
6. Additional User Info: Adding user defined information. For instance, date and testing target.

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7. Load advanced settings from csv file: Load the .csv configure file to set the format of html report.

Advanced Settings Instructions:

[ReportTitle]		
Power Sequence Report		
;		
[UserInput]		
"/**********/		
Device: Acute MSO		
Model :		
Test Time:		
/**********/"		
;		
[SaveHtmlType]		
Uncombined		
;		
[AllWaveform.Enable]		
TRUE		
;		
[AllWaveform.RefWaveformCenter]		
TriggerPosition		
;		
[AllWaveform.DrawTimeRange]		
1s	800ms	
;		
[AllWaveform.DrawSize]		
900	100	
;		
[AllWaveform.ShowSelectLabel]		
DATA_1	FALSE	
#Default	TRUE	
;		
[TestItem.DrawTimeRange]		
MySpec01	100ms	100ms
MySpec03	50ms	50ms
#Default	#Default	#Default
;		

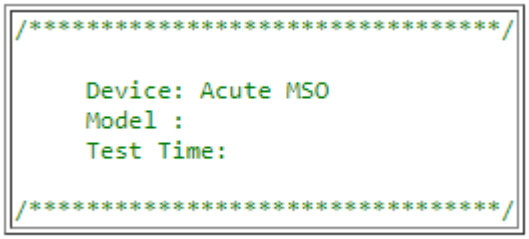
A. Report Info:

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1. **[ReportTitle]**: Html report title name



2. **[UserInput]**: Html report user info format:
   For Excel: ”……”(in Excel)
   For Other Text Editor: “””……”””




```
[UserInput],,
"""/*********************************/

        Device: Acute MSO
        Model :
        Test Time:

/*********************************/""",,
;,,
```

3. **[SaveHtmlType]:**
   Combined: Create html report with embedded waveform image.
   Uncombined: Create html report & waveform image files.

B. Channel Waveform Settings:

1. **[AllWaveform.Enable]**: Enable to create waveform. (True = Enable, False = Disable)

[AllWaveform.Enable]
TRUE
;

2. **[AllWaveform.RefWaveformCenter]**: Ref. center position for drawing.
   Format: TriggerPosition, Spec. name in timing sequence csv settings.

[AllWaveform.RefWaveformCenter]
TriggerPosition
;

3. **[AllWaveform.DrawTimeRange]:**
   Format: Begin, End or time format (s, ms, us, ns, ps) with numbers (Ex: 100ms)
   1st parameter = Extend to the left from the Ref. center.
   2nd parameter = Extend to the Right from the Ref. center.
   Ex:

[AllWaveform.DrawTimeRange]	
1s	800ms
;	

[AllWaveform.DrawTimeRange]	
Begin	End
;	

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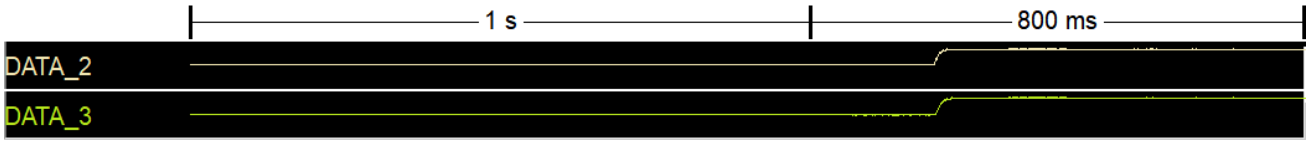
4. **[AllWaveform.DrawSize]:** Image Size
   1st parameter: Picture width (0 < width < 3000)
   2nd parameter: Picture height for each channel (0 < height < 200)
   Ex:

[AllWaveform.DrawSize]	
900	100
;	

5. **[AllWaveform.ShowSelectLabel]:**
   1st parameter: Select Label Name. (#Default -> For other labels which not included in the csv file)
   2nd parameter: True/False(True = Show / False = Hide)
   EX:

[AllWaveform.ShowSelectLabel]	
DATA_1	FALSE
#Default	TRUE
;	

Ex:



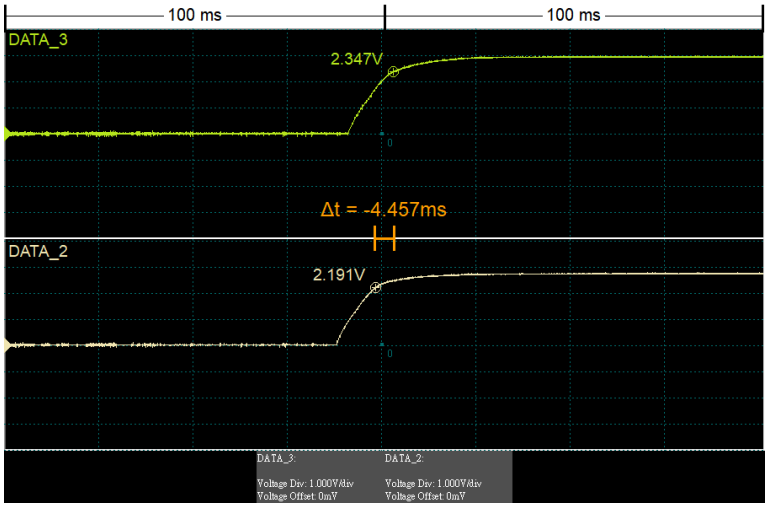
C. Test Items Waveform Settings:

1. **[TestItem.DrawTimeRange]:**
   1st parameter: Spec Name (#Default -> For other labels which not included in the csv file)
   2nd parameter: Extend to the left from the CHA & CHB center.
   (#Default ->Keep the original settings)
   3rd parameter: Extend to the Right from the CHA & CHB center.
   (#Default ->Keep the original settings)
   (Time Range Format: 50(s, ms, us, ns, ps), Begin, End, #Default)
   EX:

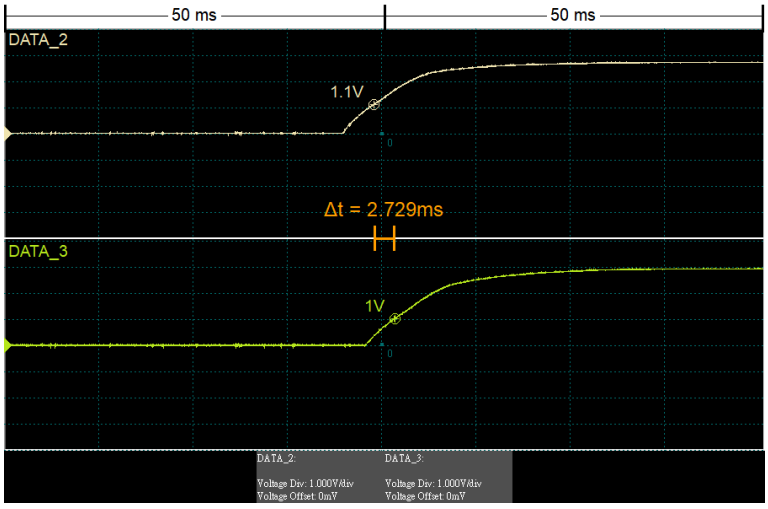
[TestItem.DrawTimeRange]		
MySpec01	100ms	100ms
MySpec03	50ms	50ms
#Default	#Default	#Default
;		

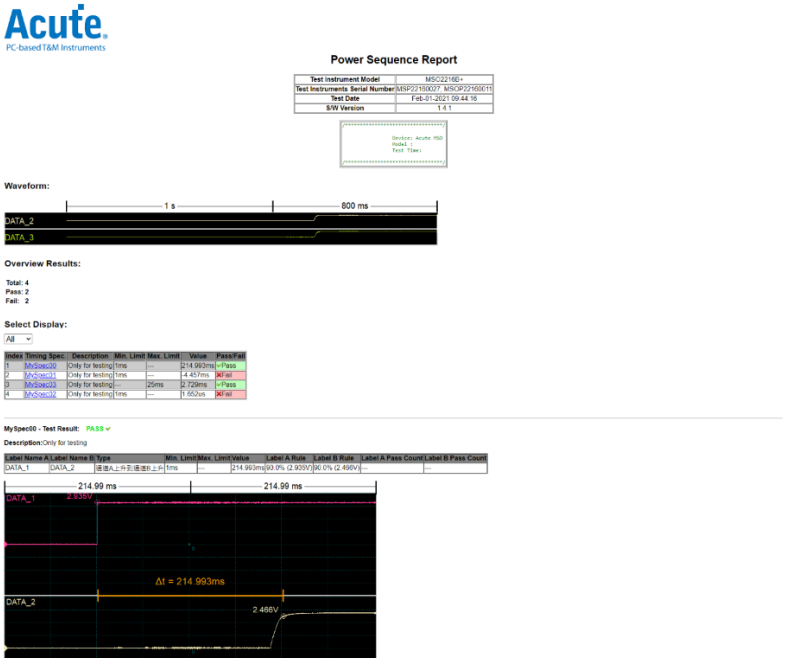
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MySpec01, 100ms, 100ms



MySpec03, 50ms, 50ms





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Chapter 3 Technical Support

Contact information

Acute website: https://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 MSO software, please try the following steps to solve the issue:

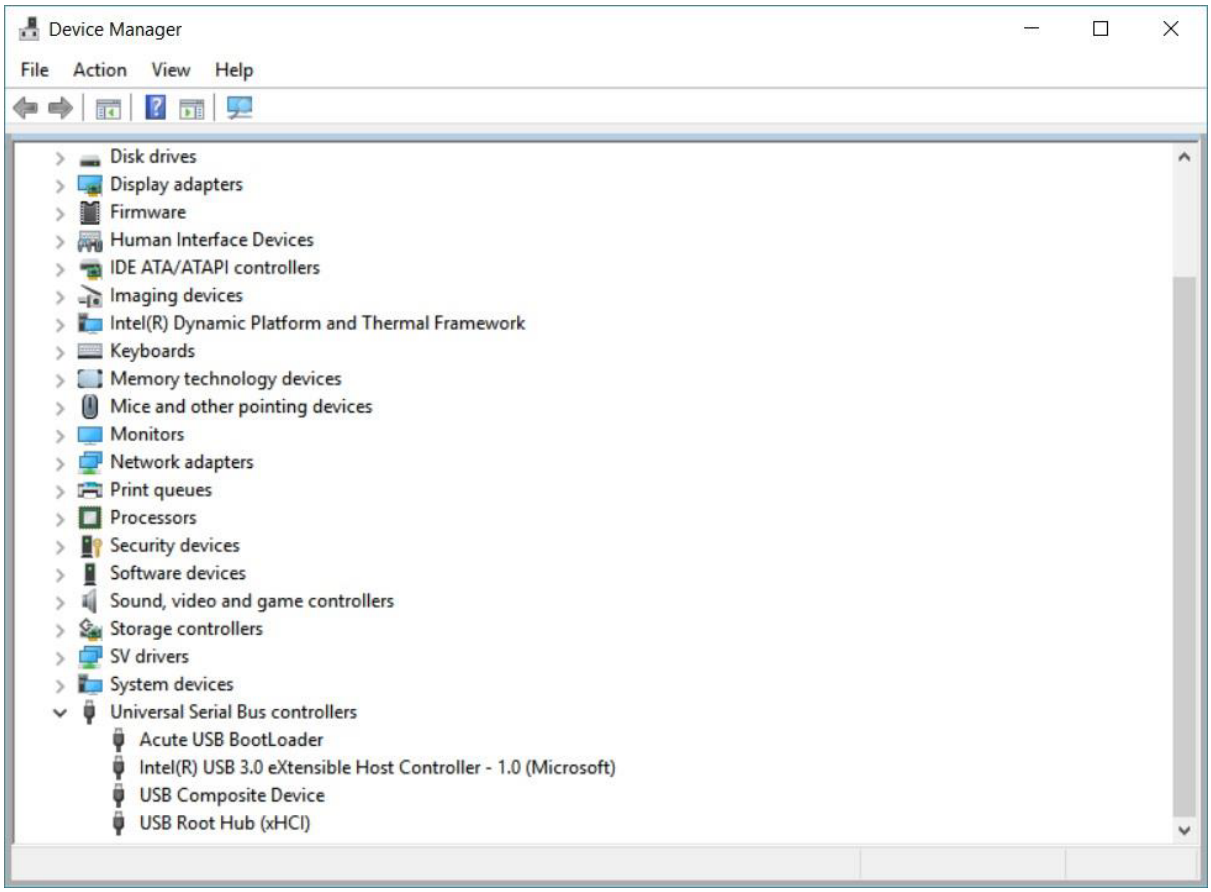
(1) Install the latest version of the MSO software, please go to the official website of Acute Technology Inc. – Download - Software, and then select the ***[Mixed Signal Oscilloscope] MSO2000 series*** or ***[Mixed Signal Oscilloscope] MSO3000 series*** to download and install.

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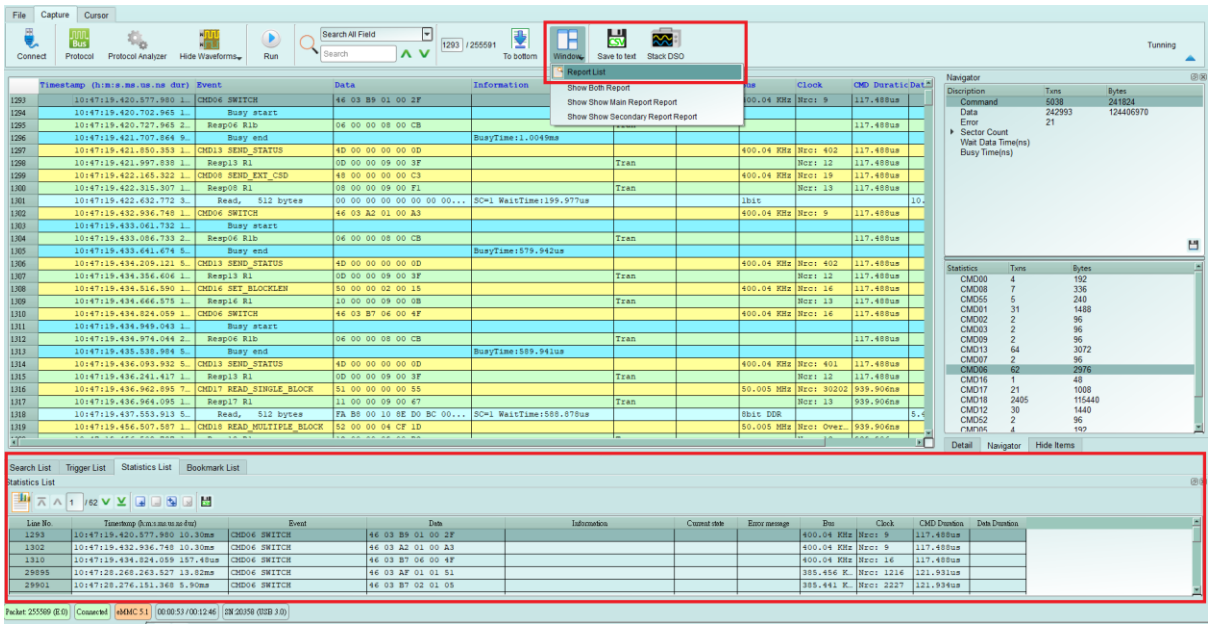
(4) Remove all probes and re-plug the USB3.0 Cable or restart the computer to check whether the driver appears.

(5) After User take the above steps but the problem is still unsolved, please contact us.

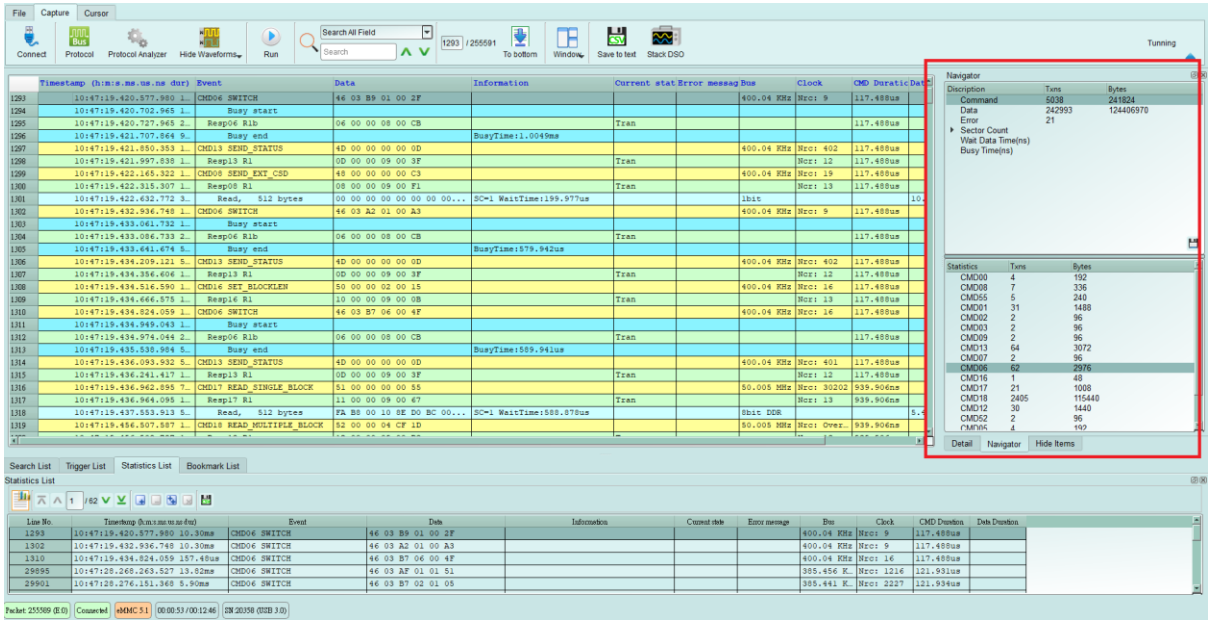
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Appendix 1　Report List Advanced Instructions

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.

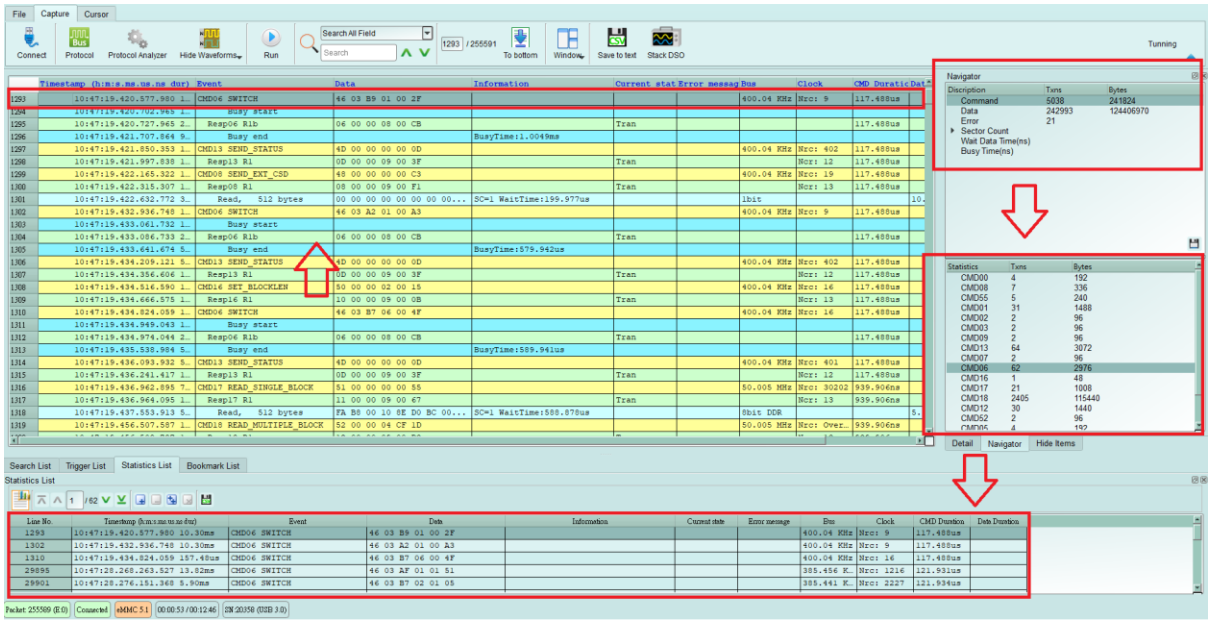


2. This function can be combined with the statistics function, please click the Navigator tab on the right side of the main window.



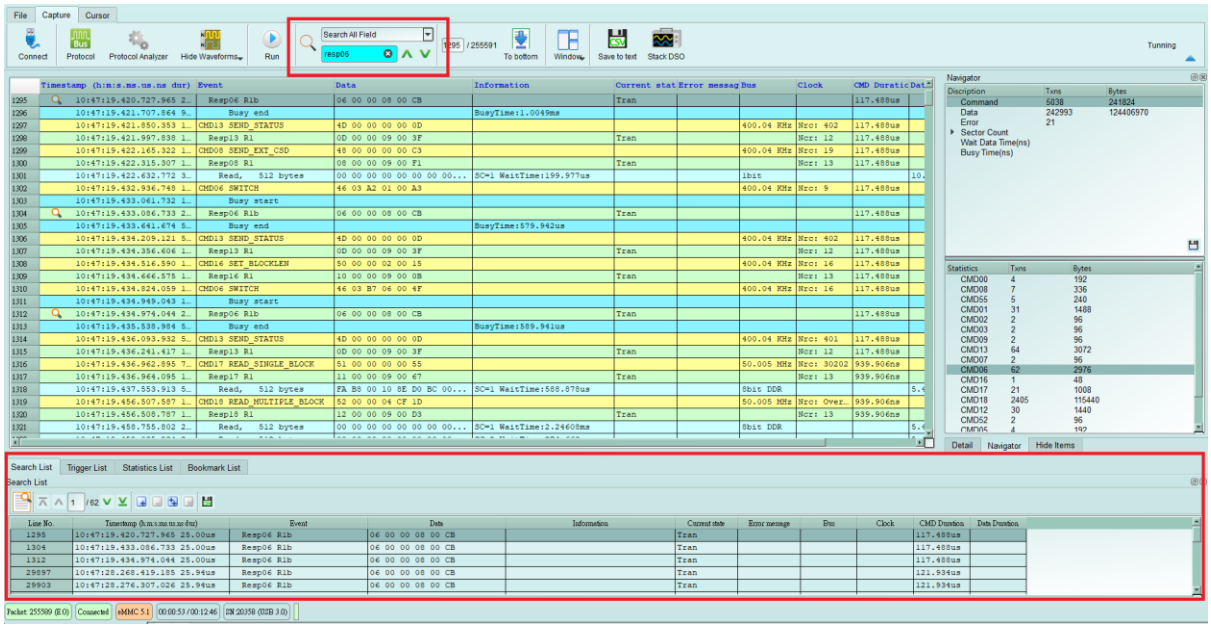
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3. Click the items of the statistical function in sequence, the statistical results will be presented in the Statistic List in the report list, and can be clicked on this table to track the position of this data in the main report area.



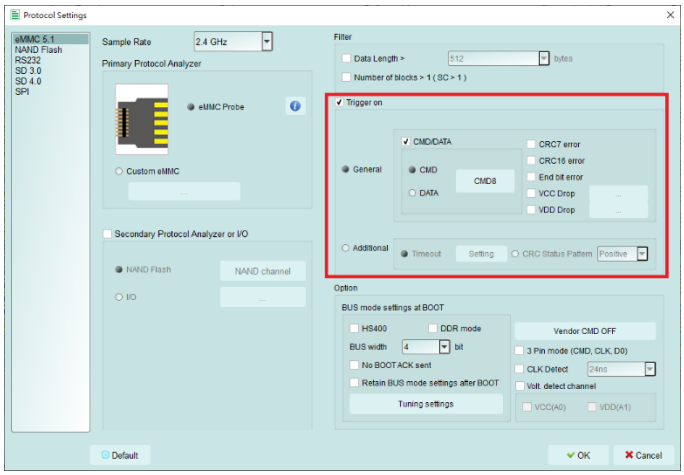
4. This function also provides Search, Trigger and Bookmark List can be used,

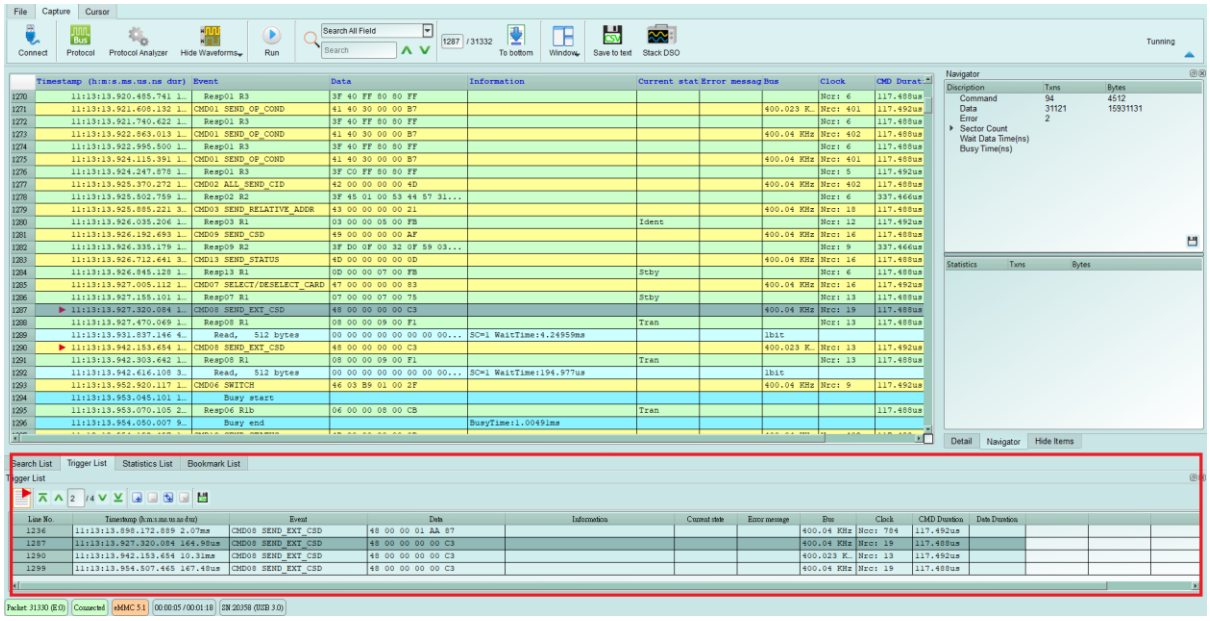
(1). Search List



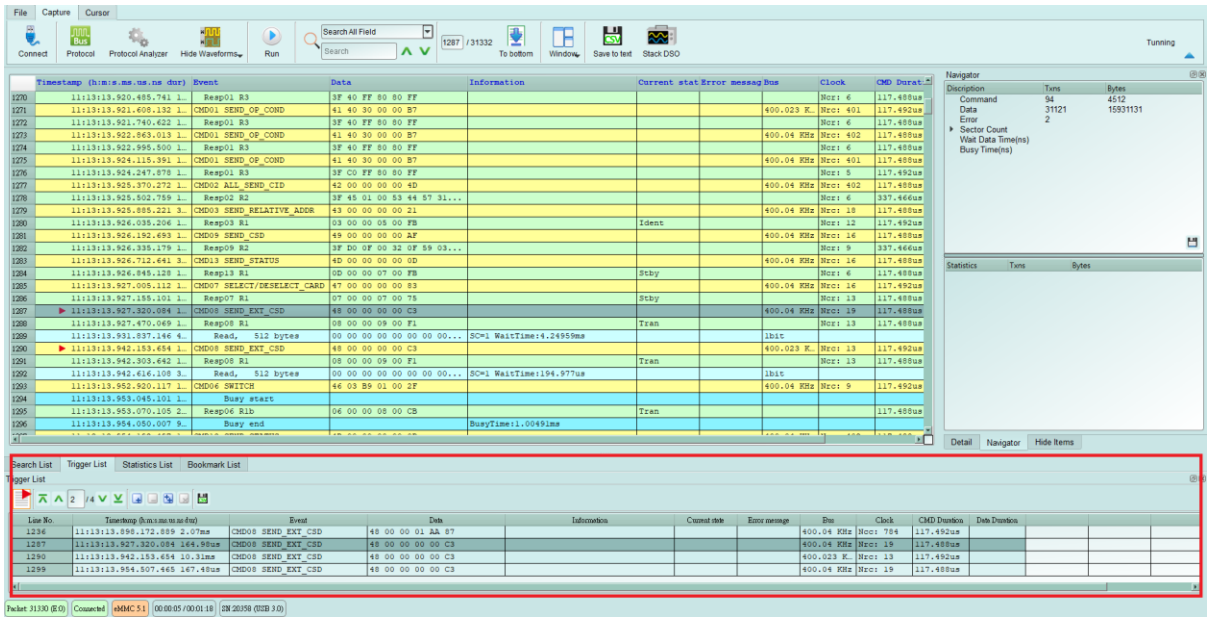
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(2). Trigger List





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



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