

# MSO3000 Series Protocol + Logic Analyzer Manual



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



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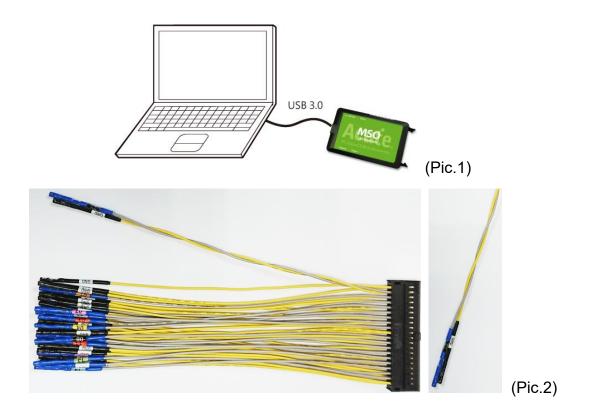
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### **Chapter 1 Installation and Settings**

### 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.



### 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



Acute

and the program set. User can select either one to start MSO (

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

👼 Acute MSO	(Ver:1.6.94)	_	$\times$
	Protocol Analyzer Logic Analyzer		_
	pen File bad Last Setting		
Recent	Files		_

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.



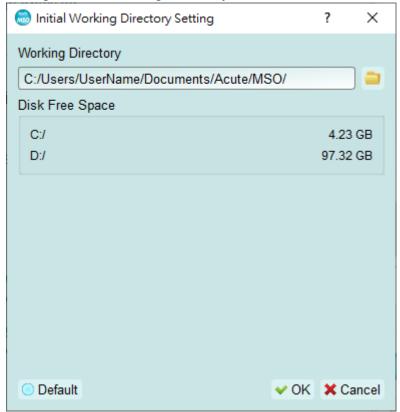
The warning window as shown below will appear before the intro screen if the remaining space of the working directory is too low (< 50G).



Detecting Low Disk Space ×
 The selected disk drive space for the working directory is lower than minimum suggested value, do you wish to change the working directory?
 Yes XNO

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: <u>https://github.com/acute-technology-inc/aqvisa-grpc</u>. Or find the label: Download→SDK(DLL)→[Logic Analyzer]AqLAVISA SDK, in our official website. Or contact us with e-mail.



👵 AqLAVISA Manag	jer				×
Host					
TCP Server	○ gRPC				Start
IP:	192.168.1.2	05	Port:	5025	
Command					
Template	*STB?				-
Command	*STB?				-
	Query				
					Clear
Timestam	p	Command		Return	
Command / Retur	m Data				

### gRPC

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



### Specification table: MSO1000 series

Model		MSO1008E	MSO1116E	MSO2116B	MSO2216B	MSO2216B+		
	Power Source			USB bus-power (+	+5V)			
	Static Power		0.9W					
Power	Consumption	0.877						
	Max Power Consumption	< 3.9W						
Hardware Inter	rface			USB3.0				
Channels (Dat	a / Clock / Ground)	8 / 1 / 23		16	6/1/23			
Total Memory	· · · ·	2Gb	40	Gb	8	3Gb		
	Channels	Group I (CH0~7)		Group I, II (	CH0~7, CH8~15)			
	Sample Rate(Group I or II)		200MHz / 1CH, 1	100MHz / 2CH, 50M	Hz/4CH, 25MHz / 8Cl	Н		
Analog Input	Sample Rate(Group I or II)		The mini	imum value of Group	o I or II settings			
	Bandwidth			40MHz	-			
	ADC Bits			12				
	Timing Analyzer (Asynchronous)	Availa	ble channels (Conv	entional / Transitiona	al Timing) - Memory p	er channel		
	2 GHz	(4 / 3)– 512 Mb	(4 / 3)– 1 Gb	(8 / 7)– 512 Mb		7)– 1 Gb		
	1 GHz	(8 / 6)– 256 Mb	(8 / 6)– 512 Mb	(16 / 14)– 256 Mb		4)– 512 Mb		
Digital	500 MHz	(8 / 6)– 256 Mb	(16 / 12)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16	6)– 512 Mb		
Input	250 MHz and lower	(8 / 6)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16	6)– 512 Mb		
	State Clock Rate (Synchronous, External Clock)	150	MHz		200 MHz			
	Storage		Conventional Timing, Transitional Timing					
Channel to cha	annel skew	< 1ns						
	Group	1 (CH0~7 & CKI) 2 (CH0~7 & CKI, CH8~15)						
	Range	+20V ~ -20V						
Threshold	Resolution	50mV						
	Accuracy			±100mV + 5%*\	/th			
	Non-Destructive		Over +/-42V DC & AC					
Input	Operation (Normal/High Division)		-	-20V ~ +20V / -10V ^	V ~ +10V			
Voltage	Sensitivity (0.5/0.75/1 Vpp)	100 MHz / 120	MHz / 150 MHz	18	0 MHz / 200 MHz / 22	20 MHz		
	H/W Schmitt (On/Off)			560 mV / 80 m	V			
Impedance				1 mΩ / 2 pF				
Temperature	Operating / Storage		5°C~45°C (4	1°F~113°F) / -10°C~	65°C (14°F~149°F)			
	Trig-In			TTL 3.3V (Rising / F	alling)			
	Trigger pulse approval			> 8 ns				
1/O port	Trig-Out			TTL 3.3V, Pulse V	/idth			
I/O port	Ref. Clock Input			10MHz, Vpp=3.3 t	o 5V			
	Ref. Clock Output			10MHz, TTL 3.3	3V			
	Connector type			MCX jack / fema	ale			
	Resolution			500ps				
	Channels	8			16			
	States			16				
	Events			16				
Triager	Pre / Post			Yes				
Trigger	Pass Counter			Yes (0~1048575 ti	mes)			
	Digital		Channel, Pattern, S	Single / Multi Level, V	Width, Time-out, Exte	rnal		
	Analog			Rising / Falling	)			
	Bus I			I2C, SPI, UAR	Т			
	Bus II		BiSS-C, CAN2.	0B/CAN FD, DP Au	x <sup>1</sup> , HID over I2C, I2S,	LIN2.2, USB PD 3.0		



	Bus III		-	DALI, I3C, LPC, MDIO, M SPMI 2, Modbus, PMBus,		, , ,		
	Bus IV		eMMC 4.5, eSPI, MII, RGMII, RM SD 2.0 (SDIO 2.0), Serial Flas NAND)					
	1			I2C, SPI, UART				
<b>D</b> ( )	11		BiSS-C, CAN2.	0B/CAN FD, DP_Aux <sup>1</sup> , HID ov	er I2C, I2S	, LIN2.2, USB PD 3.0		
Protocol Analyzer			-	DALI, I3C, LPC, MDIO, M SPMI 2, Modbus, PMBus,				
	IV			eS	SPI, MII, R	GMII, RMII, SVID <sup>3</sup>		
	Power Sequence		Input setup .CS			uence and H/W Strap		
	Measurement		[	Digital or Analog waveforms				
	Zoom / Report Window			YES				
	Note editor		Ed	t notes on Waveform Window				
	Quick Bus Decode Setup			YES				
	Trigger / Auxiliary cursors		1/25					
	Data Logger			Saved to Hard Disk Drive				
Software Features	Bus Decode	CAN 2.0B/FD, Clo FlexRay, HD Aud BT.656 (CCIR6 Lissajous, LPC, LF MIPI DSI LP, MIP QEI, QI, RC-5, RC	<ul> <li>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<sup>1</sup>, EDID, eMMC 5.1/MMC, eSPI, FlexRay, HD Audio, HDLC, HDQ, HID over I<sup>2</sup>C, I<sup>2</sup>C, I<sup>2</sup>C EEPROM, I<sup>2</sup>S (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<sup>2</sup>, SWD, SWIM, SWP, UART, ULPI, UNI/O, USB 1.1, USB PD 3.0, Wiegand,</li> </ul>					
	Line Decoding	Biphase Mark, I	Differential-Manches	ster, Manchester (Thomas, IEE NRZI, …	E802.3), I	Ailler, Modified Miller,		
	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 <sup>3</sup> )			123 x 76 x 21(mm <sup>3</sup> )				
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		
	•							

<sup>1</sup>Optional DP AUX adapter needed.

<sup>2</sup> Upon request ONLY by users who have signed CNDA with Intel, SVID decode supported by all MSO models

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



### Specification table: MSO2000 series (International & Microchip)

	International	MSO2008W	MSO2116W	MSO2116B	MSO2216B	MSO2216B+		
	Microchip	MSO2008N	MSO2116N	MSO2116M	MSO2216M	MSO2216M+		
Power Source				USB bus-power (+5)	/)			
Power	Static Power Consumption	0.9W						
	Max Power Consumption	< 3.9W		<	6W			
Interface				USB3.0				
Channel (Data	a / Clock / Ground)	8 / 1 / 23		16,	/ 1 / 23			
Total Memory		2Gb	4G	b		8Gb		
	Channels	Group I (CH0~7)		Group I, II (C	H0~7, CH8~15)			
	Sample Rate (Group I or II)		200MHz / 1CH, 10	0MHz / 2CH, 50MHz	/4CH, 25MHz / 8CH			
Analog	Sample Rate (Group I or II)		The minim	um value of Group I	or II settings			
Input	Bandwidth			40MHz	-			
	ADC Bits			12				
	Timing Analysis (Asynchronous)	Availa	ble channels (Conver	tional / Transitional 1	Гiming) - Memory per	channel		
	2 GHz	(4 / 3)– 512 Mb	(4 / 3)– 1 Gb	(8 / 7)– 512 Mb	(8 / 7	7)– 1 Gb		
	1 GHz	(8 / 6)– 256 Mb	(8 / 6)– 512 Mb	(16 / 14)– 256 Mb	(16 / 14	4)– 512 Mb		
Digital Input	500 MHz	(8 / 6)– 256 Mb	(16 / 12)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16	6)– 512 Mb		
	250 MHz and lower	(8 / 6)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16)– 256 Mb	(16 / 16	6)– 512 Mb		
	State Clock Rate (Synchronous, External Clock)	150	MHz		200 MHz			
	Data Storage		Conventi	onal Timing, Transitio	onal Timing			
Channel to ch	annel skew			< 1ns				
	Group	1 (CH0~7 & CKI)		2 (CH0~7 &	CKI, CH8~15)			
Threshold	Range	+20V ~ -20V						
THESHOL	Resolution	50mV						
	Accuracy			±100mV + 5%*Vth				
	Non-Destructive			Over +/-42V DC & A	С			
Input	Operation (Standard / High Resolution)	-20V ~ +20V / -10V ~ +10V						
Voltage	Sensitivity (0.5/0.75/1 Vpp)	100 MHz / 120	MHz / 150 MHz	180	) MHz / 200 MHz / 22	20 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)			
	Trig-In		Т	ΓL 3.3V (Rising / Fall	ing)			
	Trigger pulse approval			> 8 ns				
1/0 port	Trig-Out			TTL 3.3V, Pulse Wid	th			
I/O port	Ref. Clock Input			10MHz, Vpp=3.3 to 5	5V			
	Ref. Clock Output			10MHz, TTL 3.3V				
	Connector type			MCX jack / female				
	Resolution			500ps				
	Channels	8			16			
	States			16				
Trigger	Events			16				
	Pre / Post			Yes				
	Pass Count		•	Yes (0~1048575 time	es)			
	Digital	Channel, Pattern, Single / Multi Level, Width, Time-out, External						



					PC-based I & IVI Inst	ruments	
	Analog			Rising / Falling			
	Bus I		I2C				
	Bus II		CAN 2.0B/CAN FD, LIN2.2, SPI, UART (RS232)			S232)	
				BiSS-C, DALI, DF	P_Aux <sup>1</sup> , HID over I2C	C, I2S, I3C, LPC, MDIO,	
	Bus III	-		Mini/Micro LED, N	MIPI RFFE, MIPI SP	MI 2, Modbus, PMBus,	
				Profibus,	SMBus, SVI2, USB1	.1, USB PD 3.0	
					eMMC 4.5, eSI	PI, MII, RGMII, RMII,	
	Bus IV				SVID <sup>3</sup> , SD 2.0 (S	DIO 2.0), Serial Flash	
					(SF	PI NAND)	
	1			I2C			
	П		C/	AN 2.0B/CAN FD, LI	N2.2, SPI, UART (R	S232)	
Protocol Analyzer		_				C, I2S, I3C, MDIO, MIPI WM, SMBus, USB1.1,	
					USB PD 3.0		
	IV				eSPI, MII, R	GMII, RMII, SVID <sup>3</sup>	
	Power Sequence	-		Input setup .CS	V file for Timing Seq check.	uence and H/W Strap	
	Measurement		Dig	jital or Analog wavef	orms		
	Zoom / Report Window			YES			
	Note editor		Edit r	notes on Waveform \	Window		
	Quick Bus Decode Setup			YES			
	Trigger / Auxiliary cursors			1/25			
	Data Logger		S	aved to Hard Disk D	rive		
Software Features	Bus Decode	2.0B/FD, Close Cap HD Audio, HDLC (CCIR656), JTAG, LPT, Math, M-Bus, I RFFE, MIPI SPMI S/PDIF, SD 2.0 (1	tion, CODEC_SSI, D/ C, HDQ, HID over I <sup>2</sup> C, JVC IR, LCD1602, LE MDDI, MDIO, MHL CB 2.0, Modbus, NEC IR, SDIO 2.0), Serial Flas SPI-NAND, SSI, ST766	ALI, DMX512, DP_A I <sup>2</sup> C, I <sup>2</sup> C EEPROM, I <sup>2</sup> D_Ctrl, LIN 2.2, Line US, Microwire, Mini, PECI 3.0, PMBus, F h, Serial IRQ, SGPI0	ux <sup>1</sup> , EDID, eMMC 5. <sup>2</sup> S (PCM, TDM), I3C <sup>2</sup> Decoding, Line End (Micro LED, MIPI CS Profibus, PS/2, PWM O, Smart Card, SMB (D, SWIM, SWP, UA	coding, Lissajous, LPC, SI LP, MIPI DSI LP, MIPI I, QEI, QI, RC-5, RC-6,	
	Line Decoding	Biphase Mark, Diffe	rential-Manchester, Ma	anchester (Thomas,	IEEE802.3), Miller, I	Modified Miller, NRZI,	
	Line Encoding		38ZS, HDB3), Biphase EEE802.4), MLT-3, M				
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	

<sup>1</sup>Optional DP AUX adapter needed.

<sup>2</sup> Upon request ONLY by users who have signed CNDA with Intel, SVID decode supported by all MSO models

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



### Specification table: MSO3000 series

	Device LA POD		MSO3124B LA16B	MSO2134H LA16H	MSO3124V LA16V		
Timing analysis(Asynchro	nous, Max. sample rate)	2 GS/s					
State clock rate (Synchr	ronous, external clock)			250 MHz			
Stora	age		Conventio	nal Timing, Transitional	Timing		
Chan	nels			16			
Record	length		2	56 Mpts per channel			
Timing vs.	Timing analysis	Availab	le channel (Conventio	onal / Transitional Timing	g) - Memory per channel		
Channels vs.	2 GS/s			(8/7) - 512 Mpts			
Memory	1 GS/s			(16/14) - 256 Mpts			
	500 MS/s			(16/16) - 256 Mpts			
	250 MS/s			(16/16) - 256 Mpts			
Channel to ch	nannel 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		Ye	s(0 ~ 1048575 times)			
	Types	External,	Manual, Multi Level,	Setup/Hold Violation, Si	ngle Level, Timeout, Width		
	Protocol I	10BASE-T1S <sup>*1</sup> , E	BISS-C, CAN2.0B/CAI	N FD, DP_Aux <sup>*1</sup> , HID ov , SPI, UART, USB PD 3.	er I2C, I2C, I2S, LIN2.2, MIPI I3C, 1		
	Protocol II			MDIO, Mini/Micro LED, bus, PMBus, Profibus, \$	MIPI RFFE 3, MIPI SPMI 2, SMBus, SVI2, USB1.1		



				FG-based F&W Thsti unrents	
	Protocol III	-		eMMC 4.5, eSPI, MII, RGMII, RMII, SD 3.0 (SDIO 2.0), Serial Flash (SPI NAND), SVI3' <sup>2</sup> , SVID <sup>*3</sup>	
Protocol Analyzer	I	10BASE-T1S <sup>*1</sup> , BiSS		D, DP_Aux <sup>*1,</sup> HID over I2C, I2C, I2S, LIN2.2, MIPI I3C, SENT, I, UART, USB PD 3.1	
	II			DALI, MDIO, MIPI RFFE 3,Modbus, PMBus, Profibus, SMBus, USB1.1	
		-		eSPI, MII, RGMII, RMII, SIV3 <sup>*2</sup> , SVID <sup>*3</sup>	
	Protocol Decode 1-Wire, 3-Wire, 7-Segment, 10BASE-T1S <sup>11</sup> , AccMeter, ADC, APML, AVSBus, BiSS-C, BSE CAN2.0B/FD, Close Caption, CODEC_SSI, DALI, DMX512, DP_Aux <sup>11</sup> , EDID, eMMC5.1/MMC, eSPI, Fle Audio, HDLC, HDQ, HID over 12C, HTSensor, Hyperbus, 12C EEPROM, 12C,12S(PCM, TDM), 180, ITU-R BT.656(CCIR656), JTAG, JVC IR, LCD1602, LED_Ctrl, LIN2.2, Line Decoding, Line Lissajous, LPC, LPT, Math, M-Bus, MDDI, MDIO, MHL CBUS, Microwire, MII, Mini/Micro LED, MIPI C DSI LP, MIPI 13C 1.1, MIPI RFFE 3, MIPI SoundWire 1.2, MIPI SPMI 2, Modbus, NAND Flash, NEC PECI 3.0, PMBus, Profibus, PS/2, PWM, QEI, QI, QSPI, RC-5, RC-6, RGB Interface, RGMII, RMII, SD 3.0 (SDIO 2.0), SENT, Serial Diash, Serial IRQ, SGPIO, Smart Card, SMBus (SBS, SI SPI, SPI-NAND, SSI, ST7669, SVI2, SVI3 <sup>2</sup> , SVID <sup>3</sup> , SWD, SWIM, SWP, UART, ULPI, UNI/O, USB1.1, USI Wiegand,				
Line Dec	coding	Biphase Mark, Differential-Manchester, Manchester(Thomas, IEEE802.3), Miller, Modified Miller, NRZI,			
Line End	coding			), Biphase Mask, CMI, Differential-Manchester, MLT-3, Miller, Modified Miller, NRZI, Pseudoternary, …	
Packing List	LA POD			1	
	Flying lead cables (LA20P)			2	
	Gripper			20	

<sup>1</sup> Optional 10BAST-T1S / DP\_Aux adapter needed.

<sup>2</sup> Upon request by user who is approved by AMD. SVI3 decode, trigger and protocol analyzer are supported ONLY by

MSO3124H or MSO3124V.

<sup>3</sup> Upon request by user who has signed CNDA with Intel. SVID decode, trigger and protocol analyzer are supported ONLY by

MSO3124H or MSO3124V



## **Chapter 2 Function list and operation**

### **Protocol Analyzer**

File														
👼 Acute MSO	(Ver:1.8.62	2)										-		×
File Capt	ure Curs	or												
Open	Save	Save As	Save All	Add PA	Add LA	Convert to LA	Stack EXT DSO	🌏 Er	nglish 🖕	AqLAVISA Manager	) Options	Font Settings	About	
	Open: Load the file.													
	Sav	<b>e</b> : Sa	ave the	e currer	nt wind	OW.								
X	Sav	e as:	Save	as nev	v file w	ith spe	cified ra	ange.						
	Sav	e all:	Save	all Pro	tocol A	nalyze	r / Logi	c Analy	/zer w	vindo	ws to	o files.		
	Add Protocol Analyzer: Add a Protocol Analyzer window.													
Add Logic Analyzer: Add a Logic Analyzer window.														
<b>Convert to Logic Analyzer:</b> 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.



 $\times$ 

🔀 Options

Property	Value	
Default Label Height		45
Working Directory	C:\Users\User\Documents\Acute\MSO\	<u> </u>
Waveform Display Type	Timing Value	-
Expanded Waveform Color	Change by channel	-
Load Last Environment on Software Start		
Save Waveform After Each Acquisition		
Repeat Acquisition Behavior	No Decode and Waveform Display	-
Display Row Number in LA Decode Report	<b>v</b>	
Trigger Out Pulse Width (us)		efault
Show Waveform Value Tooltip on Cursor Position	<b>v</b>	
Auto-reconnect device	<b>V</b>	
Show Channel Information In Waveform Display	<b>v</b>	
Show Value Information In Waveform Display	V	
Show Trigger Information In Waveform Display		
Show Channel Activity In Waveform Display		
Use Multicore Processing		
Display Report Timestamp Information	Show Timing With Date Time Info.	-
Show Cursor Position In Decode/Transition Report	<b>v</b>	
Show Cursor Separate Time on Cursor bar	V	
Cursor Font Size in Report Area		6
Report Data Display Byte Number	8	•
Display Waveform Time Scale Dash Line	✓	
Enable Label Combine by Mouse Dragging	V	
Max. Logic Analyzer Cursor Measurement Tab Count	3	
Detail Report Byte Numbers	4096	

- 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 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.
- 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.
- 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.
- 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.

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



### **Keyboard Shortcuts**

Function	Кеу
Move to cursor position	A-Z
Add a cursor to the mouse	Shift + A-Z
position	
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



Rotocol Settings			×
10BaseT1S BISS CAN DALI DP-AUX eSPI HID_I2C I2S LIN MIPI I2C I2S LIN MIPI I3C MIPI RFFE MIPI SPMI Modbus	Channel 12C Ver. 2.1		
PMBus Profibus PWM SMBus SPI SVID UART USB 1.1 USB PD	Options 4  7-bit addressing  Clock Stretching		
	Threshold 5		
	O Default	✓ OK	× Cancel

- 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.



Pattern 2						
Reprotocol Settings						×
10Base-T1S BiSS-C CAN DALI DP-AUX eSPI HID_I2C I2S LIN MDIO MIII MIPI ISC MIPI RFFE MIPI SPMI ModBus PMBus ProfiBus PWM SMBus SPI SVI3 SVID UART USB PD USB1.1		500MHz	Trigger on 4 Format Length error OPCode error Status error CRC error eSPI Packet Startup settings I/O Mode Alert Mode Timing settings tSHSL Auto-select protoco tCLQV	Single Mode       ▼         From I/O[1]       ▼         50 ns       \$         50 itiming       25 ns       \$		
	Default				✓ OK	× Cancel

- 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.



#### Operating mode and memory setting

There are three modes for operating mode and memory setting (

Configuration	
Operating mode 1	✓ Repetitive Times 0
Protocol Analyzer	Stop Conditions 2
	Number of Data Lines Maximum 17,000,000 Minimum 10,000 Customize 1000000
O Protocol Logger	MSO 2000 memory limitation
	50
O Protocol Monitor	
DATA	
	O Default V OK X Cance

#### Mode 1 Protocol Analyzer

#### **Functional description**

Captured data will be sent back to the PC for real time display. You can

immediately

see the protocol data right away.

Rule:

1. Data can be seen immediately.

2. If the amount of captured data is not big, you do not have to set the amount of memory.

Notice for use:

As data will be captured and displayed at the same time the

performance requirement for the USB and the computer will be higher.

If the computer cannot handle the data in time, the device may

automatically stop due to full memory.

If software is in operation during the capture period the computer will



respond more slowly.

Rules for repetitive times and automatic stop

**Repetitive Times** 

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

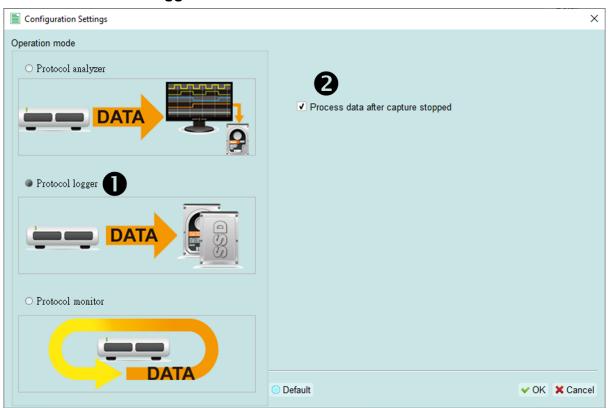
Number of Data Lines

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.





#### 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.



✓ Run data process after capture stopped

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

MSO files (\*.MSW | \*LOG)  $\sim$ 

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



Configuration	×
Operating mode	
O Protocol Analyzer	2
	MSO 2000 memory limitation
O Protocol Logger	O Wait for Stop
	Wait for Trigger Trigger Position When Triggered
Protocol Monitor	<ul> <li>Fill device memory then stop</li> <li>Stop immediately</li> <li>Wait for 1 = seconds then stop</li> </ul>
DATA	◯ Default

#### 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:

- If the trigger is not set or you have set the trigger but want to retrieve the data before the memory is full, you must manually press "Stop" to send data back to the computer.
- Work options



• Maximum Device memory limit

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

- Data capture will continue until "Stop" is pressed (Wait for stop)
   Data capture will continue. If memory is full the new data will be still captured to replace the old data, until "Stop" is pressed Then the newest data will be sent back to the computer.
- Data capture will continue until the trigger condition is met (Wait for Trigger)
   If the trigger condition is not set, there will be no Pre/Post Trigger
   relationship and only the Capturing will be shown until the device memory is
   full.

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

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

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



#### Show Waveforms / Hide Waveforms

Show 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.

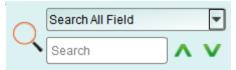
2. Stop the bus decode  $\overleftarrow{k}$ 

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.



	'CMD' 5556 Packets found
It will show the total number of packets found with green	

background. If no data is found, it will show an Search text 'CMD99' not found! 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.

🖰 Report List	
Show Both Report	
🔣 Show Show Main Report Report	
Show Show Secondary Report Report	
Search List Trigger List Statistics Li	ist Bookmark List 1
Statistics List 2	3
₩ ⊼ ∧ 1 / 1650 ∨ ⊻ 🖬 🛛	

- 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.



#### Saved as text file



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

🛃 Save to TXT/CSV	×
Total number of lines: 1399	
<ul> <li>Save all in one file</li> <li>Save each file within 32000</li> <li>Save selected range</li> </ul>	lines
Select Row Number	
From 1	
To 1399	
Select Column Number	
From 1	
To 6	
Advance report Use nanosecond(ns) as duration unit Splitting timestamp into separate timesta Maximum saving byte per column 64	amp and duration columns
Save Location	•
.CSV	-
	V Save X Cancel

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.
- Splitting timestamp into separate timestamp and duration columns: If it was checked, the timestamp column would be separated into to two columns, timestamp and duration time. (It was combined together by default).
- 4. Maximum saving byte per column: Set the limitation of byte numbers in one column.



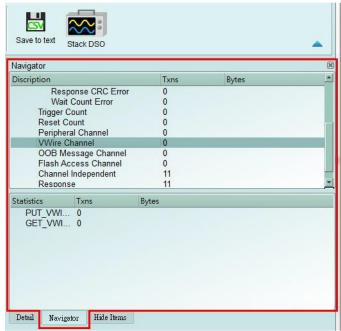
#### **Detail window**

Many protocols 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.

Save to text Stack DSO	
Detail	
CS: 00 (Single I/O)	
OP Code: SET CONFIGURATION(22)	
Address: 0008	
Data: OF 00 40 88	
Response: ACCEPT(08)	
Status: 0107	
(Bit 8) FLASH_C_FREE	
(Bit 2) VWIRE FREE	
(Bit 1) NP_FREE	
(Bit 0) PC_FREE	
General Capabilities and Configurations	
CRC Checking Enable 0	
Response Modifier Enable 0	
Alert Mode 0	
Detail Navigator Hide Items	

#### **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.





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.

Save to text Stack DSO
Hide Items @ 8
7-bit Address (Hex):
Not
10-bit Address (Hex):
Not
Data (Hex, First at most 8 bytes after the Address, e.g., 1A 2B 3C):
Address ACKed
Address NACKed
_ Read
Clear Apply
Detail Navigator Hide Items

### Stack external oscilloscope



Convert to Logic Analyzer to stack with DSO

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.





Curso	or			
👼 Acut	te MSO (\	/er:1.8.62)		
File	Capture	Cursor		
	<u>e</u>			
Add C	Cursor D	elete Cursor	Move To_	

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

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

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



### Logic Analyzer

Window

Acute MSO (Ver:1.4.6) File Capture Adv. Capture Cursor													
Connect Quick Setting	z 900mV z 580mV 2000 Mb	<b>₽</b>	Run Rep	-				Dom Zoom	Stack D	Demo SO Phase Dela 0 ns -			
lime/Div = 200 ns	7.5ms												
:quired: 11:40:41. 53 -747	8 ns 353.9 ns 1	) ps	353.9 ns	70	17.8 ns	1. 1.	.06 us	1.42	15	1.77 us	2.12 us	2.4	18 us
C30-5 0 SCK-0 0 I/0 0-1 0 I/0 1-2 1 I/0 2-3 1 I/0 3-4 1			600 ns		300 ns		200 ns 15	0 ns 200 n:		50 ns 200			m
esp 80 CH0 20 1 5 5 5 5 5 5 5 5 5 5 5 5 5	NWW	ww	www		WM		6)  /////	NNN	NNN	MMM	MM	MW	500 mV/Di Iffset -2 Scale
SO CHO DSO CHO 27%V	NWWW		www	NN	WM		1	VUUV	MM	MMM	WW	MW	Hiset -2 Scale
SO CHO DSO CHO DSO CHO ZA INI Abel Channel Value	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	WW	www		WM		1		Search All	Fields <b>T</b> tex	t includes	MW	Hiset -2 Scale
SO CHO DSO CHO 27=7 Abel Channel Value	6	Tag LEN	Address				WWW			Fields Tex Status	t includes	MW	rffset 2 Scale
CCH0 Channel Value Channel Value Channel Value Channel Value Channel Value	<b>3</b>		Address				WWW	C	Search All		CRC	MW	re v
CH0 CH0 Channel Value Channel Value Channel Value Channel Value Channel Value Channel Value	<b>3</b>			D0 I	D1 D2	D3 C	WWW	C	Search All ASCII	Status	CRC	NWV I	Priset -2 Scal
0 CH0         050 CH0         27±V           0 CH0         050 CH0         050 CH0           1 CH0         1 25±         050 CH0           1 1 400-41.295         050 CH0         050 CH0           1 1 400-41.295         050 CH0         050 CH0	<b>3</b>		Address 0008		D1 D2		WWW	C	Search All		CRC 10 24	NWV I	re v
0 CH0         DS0 CH0         27±7           0 CH0         27±7         27±7           1 Ch0         DS0 CH0         27±7           1 Store         Ch1         27±7           1 Store         CPEC         CPEC           2 Store<	<b>3</b>		Address	D0 1	D1 D2	D3 [	WWW	C	Search All ASCII	Status 0104	CRC 10 24 C8	NWV I	Hfaet -2 Sea
0 CH0         0 S0 CED         27±7           10 Channel         Value         100 Channel         Value           10 Channel         Value         100 Channel         Value           10 Channel         Value         100 Channel         Value           10 Channel         Value         100 Channel         100 Channel           11 Channel         100	<b>3</b>		Address 0008	D0 I	D1 D2 0 08 7 00	D3 C	WWW	C	Search All ASCII	Status	CRC 10 24	NWV I	Priset -2 Scal
0 CH0         050 CH0         27±7           2         2         2         2           101         Velue         Channel         Value           4400         Xess         BUS_eSPI(eSPI)         Image           11:40:41.256.         RESET         11:40:41.258.         Get_configuration (21)           11:40:41.258.         Set_configuration (21)         11:40:41.258.         Set_configuration (21)           11:40:41.258.         Set_configuration (21)         11:40:41.258.         Set_configuration (21)	<b>3</b>		Address 0008 0020	D0 1 0F 0 00 0	D1 D2 0 08 7 00	D3 C 03	WWW	C	Search All ASCII	Status 0104	CRC 10 24 C8	NWV I	re v
Coche         DS0         FH0         27±V           Image: State of the	<b>3</b>		Address 0008 0020 0020 0020	D0 1 0F 0 00 0 01 0	D1 D2 0 08 7 00 0 07	D3 C 03 00	WWW	C	Search All ASCII	Status 0104 0104 0104	CRC 10 24 C8 90 01	NWV I	re A
SO CH0         DS0 CH0         2727           2010         DS0 CH0         2727           abel         Channel         Value           H:00         BUS_ESP(ESP)         Image: Channel           1:40:41.256.         77 EST           1:40:41.256.         77 EST           1:40:41.256.         77 EST           1:40:41.258.         ACCEPT (08)           1:40:41.258.         SET_CONFIGURATION (21)           1:40:41.258.         ACCEPT (08)           1:40:41.258.         SET_CONFIGURATION (21)           1:40:41.258.         GET_CONFIGURATION (21)           1:40:41.258.         GET_CONFIGURATION (21)           1:40:41.258.         ACCEPT (08)           1:40:41.258.         GET_CONFIGURATION (21)           1:40:41.258.         ACCEPT (08)	<b>3</b>		Address 0008 0020 0020	D0 1 0F 0 00 0 01 0	D1 D2 0 08 7 00	D3 C 03 00	WWW	C	Search All ASCII	Status 0104 0104	CRC 10 24 C8 90 01	NWV I	re A
Control         DS0         CH0         S727           S0         Channel         Value         Value           abbel         Channel         Value         Value           istre         Channel         Value         Value           <	<b>3</b>		Address 0008 0020 0020 0020	D0 1 0F 0 00 0 01 0	D1 D2 0 08 7 00 0 07		WWW	C	ASCII	Status 0104 0104 0104	CRC 10 24 C8 90 01 02 C8	NWV I	re A
Box         Channel         Value           abel         Channel         Value           intervention         Bus         espr(espr)         Image           intervention         Bus         espr(espr)         Image         Image           intervention         Bus         espr(espr)         Image         Image           intervention         Set         construction         (21)           intervention         Accept (08)         Intervention(21)         Intervention(21)           intervention         Accept (08)         Intervention(21)         Intervention(21)           intervention         Accept (08)         Intervention(21)         Intervention(21)	<b>3</b>	Tag LEN	Address 0008 0020 0020	D0 1 0F 0 00 0 01 0	D1 D2 0 08 7 00 0 07 7 07		WWW	C	Search All	Status 0104 0104 0104 0104	CRC 10 24 C8 90 01 02 C8 89 89 B8	RESET	

- 1. Toolbar: Including trigger, sampling rate, threshold and other capture parameters.
- 2. Channel Label: User can use the icon ( I 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 (CH-00) or decode result (NewX), waveform statistics (IIII), and

report the result as .CSV and .TXT output (

- 4. Status Bar: Show connection status of the device.
- 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 <u>cursor</u> section below for the



#### cursor usage.

Г	116	5															
۲	Acute	MSO (V	/er:1.8.6	52)											-		×
Fi	ile	Capture	Adv	c Capture	Cursor												
	() Oper		<b>1</b> ave	Save As	Save All	Save Report	Sava Analog Data	DGNN TDNN PGNN Save DG File	Batch Rpt. Save	Add PA	Add LA	🌏 English 🖵	AqLAVISA Manager	Options	Font Settings	About	



Open: Load the file.

Save: Save the current file.

1

Save as: Save as new file with specified range.



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.

😁 Save	e Analo	g Data				X			
C: Select	Users\F t channe Save se		\123.CSV	▼ 🚔	Summary Data column count: 2 Time unit: s Voltage unit: V File 1 Timestamp,DSO CH0.				
		Timestamp i			File 2	Timestamp,DSO CH1,			
1	✓ ✓	DSO CH0 DSO CH1	123_DSO CH0.CSV 123_DSO CH1.CSV						
3		DSO CH2 DSO CH3							
5		DSO CH4		•					
	lect All range	Clear All	From Cursor A To Cursor B	<b>•</b>					
						✓ OK X Cancel			

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".
- 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.



- 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.
- Data selection list: Select channels need to be stored, the list will also show data store column or file name at the 3<sup>rd</sup> column of the list if the channel is selected for output.
- 5. Save Range: Choose to change the data save range.

#### 

**PG**M 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.

DG/PG File Export Setting Wizard	×	DG/PG File Export Setting Wizard				
Select DG/PG Model TD3216B(256M, DGW Format)	Max. Operating Clock: 200MHz Memory Depth: 256000k	DG/PG Working Frequency Current LA Sampling Rate DG/PG Working Frequency 50MHz				
Enter a file name or browse Save range From	Buffer Start	Idle Convert Method Conventional format Convert to Hold Command when idle time >= 10 Command resource limitation: 8000 resources				
✓ Repeat output	< Previous Next > X Cancel	Waveform Convert Method  Real time sampling by Working Frequency O Convert waveform to slower speed  Previous Finish X Cancel				

- 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 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↓



M Batch Report Save Dialog	X							
G:/WaveformFile/File (1).law	Select Directory							
G:/WaveformFile/File (2).law G:/WaveformFile/File (3).law	Select File(s)							
G:/WaveformFile/File (4).law G:/WaveformFile/File (5).law G:/WaveformFile/File (6).law	★ Remove Selected							
	📥 Move Up							
	Vert Move Down							
Report Output Directory								
G:/WaveformFile								
Report Save Options								
File Ext.: • .CSV <b>3</b> • .T	ХТ							
<ul> <li>Save decode report using file native decode settings</li> <li>Save decode report using template file decode settings</li> </ul>								
G:/WaveformFile/File_WithDecodeSettings.law	-							
5 ✓ Save all reports in 1 file								
File Separate by //======%FileName%								
6 ✓ Save Timestamp Information								
Save Header Information								
0% 🗸 🗸	art Convert O Close							

- 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.
- 3. Select the saved file extension to .CSV or .TXT.
- 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.

Property	Value
Default Label Height	45
Norking Directory	C:\Users\User\Documents\Acute\MSO\
Waveform Display Type	Timing Value
Expanded Waveform Color	Change by channel
Load Last Environment on Software Start	
Save Waveform After Each Acquisition	
Repeat Acquisition Behavior	No Decode and Waveform Display
Display Row Number in LA Decode Report	V
Trigger Out Pulse Width (us)	Default
Show Waveform Value Tooltip on Cursor Position	V
Auto-reconnect device	<b>v</b>
Show Channel Information In Waveform Display	V
Show Value Information In Waveform Display	
Show Trigger Information In Waveform Display	
Show Channel Activity In Waveform Display	
Use Multicore Processing	✓
Display Report Timestamp Information	Show Timing With Date Time Info.
Show Cursor Position In Decode/Transition Report	<b>v</b>
Show Cursor Separate Time on Cursor bar	<b>v</b>
Cursor Font Size in Report Area	6
Report Data Display Byte Number	8
Display Waveform Time Scale Dash Line	V
Enable Label Combine by Mouse Dragging	✓
Max. Logic Analyzer Cursor Measurement Tab Count	3
Detail Report Byte Numbers	4096



- 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 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.
- 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.
- 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.
- 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.

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



# Keyboard Shortcuts

Function	Кеу
Move to cursor position	A-Z
Add a cursor to the mouse	Shift + A-Z
position	
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

G Acute MSO (Ver:1.4.0.17)		-	×
File Capture Adv. Capture Cu	sor $ \begin{array}{c c}  & & & & & & \\  & & & & & & \\  & & & & $		

## **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.



#### • Manual Trigger

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

#### • Single Level Trigger

∭ Single Leve	el Trigger S	Settings					×
Channel	Label						
7 <b>X</b> ,	6 X,	5 <b>X</b> ,	4 X,	3 <b>X</b>	2 X	1 X,	0 <b>X</b> ,
15 <b>X</b> ,	14 <b>X</b>	13 🗙	12 <b>X</b>	11 <b>X</b>	10 <b>X</b>	9 <b>X</b> ,	8 <b>X</b>
					Pass Cour	nt (	)
<ul> <li>Default</li> </ul>	:				🗸 ОК	•	Cancel

1. **Channel/Label:** User can select Don't care(X)  $\$  Rising Edge( $\uparrow$ )  $\$  Falling Edge( $\downarrow$ )  $\$ 

Low(0)  $\cdot$  High(1)  $\cdot$  Either(  $\updownarrow$ ) or specified value as trigger conditions.



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.

M Multi	-Level Trigger	Settings															×
	IF																
Patterr	n (P	P1 (P2)(P3 (P4)	P5 P6	1													
Sample Clock	e																
Trigger	r		t														
IF	P1	+ *			-	P2				•							
	Next IF	P2	×			Channel	Labe	I		3							
	Then IF	P3	* 2			7 X,	6	<b>X</b> , 5	X,	4 X,	3 X	2	X,	1	X,	0	X,
	Next IF	P4	*			15 X,	14	<b>X</b> 13	x,	12 X,	11 X	10	x,	9	X,	8	x,
	Next IF	P5	*														
	Next IF	P6	×														
+ OR	F 4																
Seque	-	5															
Sa	ample Clock	▼ on		CH 0		Default											
	efault	Trioger	Delay 0	ns 🔻			Pass	Count 0		<b>*</b>			<b>~</b> (	ж		Ca	ncel

Difference between continuous trigger and non-continuous trigger:

Continuous trigger: The signal captured by two adjacent sample clocks must meet

the conditions to trigger.



Non-continuous trigger: It is triggered only when both the first condition and the second condition 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.



M Width Trigger Settings   Channel Label   CH-00   Match   0   Match Time   10.000   us     Pass Count   0   ● Default     ✓ OK				
Match 0 Match Time Time = 10.000 us United Time = 10us Pass Count 0 United Time = 10us	📶 Width Trigger	Settings		×
Match Time Time =	Channel Label	CH-00	-	]
10.000 us 0 ↓ Time = 10us Pass Count 0 ↓	Match	0	-	]
0 Time = 10us Pass Count 0	Match Time	Time =	-	]
Time = 10us		10.000		us
Pass Count 0		0		
	k	Time =	10us —	<del>`</del>
○ Default			Pass Count	
	<ul> <li>Default</li> </ul>		✓ OK	X Cancel

#### • 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.

∭ Timeout Trigger	Settings			×
Channel Label	CH-00		-	]
✓ Match	0		-	]
Match Time >	10.000			us
		0		
ķ		Time > 10us		——
			Rang	e: 1us to 5min
			Pass Count	0
<ul> <li>Default</li> </ul>			✓ OK	X Cancel

#### • External Trigger

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



## • Analog Trigger - Edge

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

∭ AnalogTrigger Settings	$\times$
Channel	
DSO CH0	•
Trigger on	
Rising Edge	
O Falling Edge	
Value	
1.60 V	
V OK 🗙 Can	col
	cer

## Analog Trigger – Activity

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

III Analog - ActivityTrigger Settings						<		
Channel								
✓ CH-00	✔ CH-01	✔ CH-02	✔ CH-03	✔ CH-04	✔ CH-05	✔ CH-06	✔ CH-07	
✔ CH-08	✔ CH-09	✔ CH-10	✔ CH-11	✔ CH-12	✔ CH-13	✔ CH-14	✔ CH-15	
Voltage Activity	/ Settings							
Trigger whe	Trigger when voltage changes > 1.00 V							
Default						×	OK 🗙 Cancel	

## **Protocol trigger**

Please refer to LA Decode & Trigger manual.



Channels, Threshold, Sample Rate,	, Device Memory Usage
1.6V 2CH@50MHz 2048 M	
∭ Capture Parameter Settings	×
Image: Digital Channel       Quick Setup         CH-00       CH-01       CH-02       CH-03       CH-04       CH-05       CH-06       CH-07         CH-08       CH-09       CH-10       CH-11       CH-12       CH-13       CH-14       CH-15         Image: Provide the strate of t	Ilip     Operating Mode     Image: Constraint of the synce in
Analog Channel         Q         Quick Setup           CH-00         CH-01         CH-02         CH-03         CH-04         CH-05         CH-06         CH-07           CH-08         CH-09         CH-10         CH-11         CH-12         CH-13         CH-14         CH-15           Input Sensitivity         CH 00 - 07         10 mv/Div 0 5 mv/Div           CH 08 - 15         10 mv/Div 0 5 mv/Div	Memory S Memory Store to Device RAM Stream to PC RAM Stream to PC HDD Enable Transitional Storage (Long Time Recording) 2000 Mb (24%) Recordable Time 1.498s Trigger Position 50%
✓ Automatic Update Channel Labels in Waveform Area	V OK 🗶 Cancel

С

MSO1000, MSO2000 series interface

M Capture Parameter Settings		×
III Digital Channel	III Operating Mode	
16-Channel	CLK Async. Mode (E	)efault)
Threshold Quick Setup	III Sample Rate	
CH 00 - 07	Digital 50MHz Analog 50MHz	(16 Ch)
CH 08 - 15	-	
	Memory 5	
	Store to Device RAM      Stream to PC RAM	0
	Stream to PC HDD (Logger)	0
Analog Channel Quick Setup	Transitional Storage Disabled When Sel	
V · U	2048 Mb (50%)	
1 1V BW 2 1V BW 3 1V BW 4 1V BW +0.00 DC 2 +0.00 DC 3 +0.00 DC 4 +0.00 DC	Recordable Time	671.089ms
	Trigger Position 50%	<b>~</b>
✔ Automatic Update Channel Labels in Waveform Area		V OK X Cancel

## MSO3000 series interface



- 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:

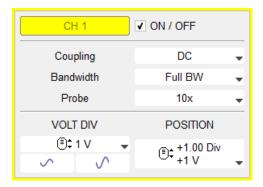
#### For MSO1000, MSO2000

- 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.

CouplingThe input signal is DC/AC coupled. DC coupling does not<br/>process the signal, while AC coupling removes the DC<br/>level from the signal.

BandwidthThe bandwidth limit can be set to Full bandwidth / 100MHz / 20 MHz. Full bandwidth means that there is no



	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:

	Operating Mode	
	CLK Async. Mode (Defa	ult)
ılı,	Async. Mode (Default)	
- Th	Async. Mode (Record When CKI = 1)	
	Async. Mode (Record When CKI = 0)	) –
	Sync. Mode (Latch on CKI Rising)	~
	Sync. Mode (Latch on CKI Falling)	
'گ	Sync. Mode (Latch on CKI Changing)	

#### 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



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)	



16

25 MHz below

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

#### 5. Memory Settings:

Memory				
Store to Device R/	AM			
O Stream to PC RAM	Stream to PC RAM			
O Stream to PC HDI	D			
Enable Transitional St	orage (Long Time Recording)			
	2000 Mb (24%)			
Recordable Time	1.498s			
Trigger Position	50%			

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

LA Storage mode			Conven	tional	
Conventional Storage	Signal	Rate 200MHz	••••	•	
Transitional Storage		Signal Rate 200MHz	Transit	ional	LA Device RAM
Streaming to PC RAM			Rate 200MHz on PC's performance)		PC RAM
Streaming to PC HDD	Short time — — —				Il Rate 200MHz ds on PC's performance) <b>PC HDD</b>

- 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.



🕅 LA Logger						×
	C:\Users\sam18\Doc	cuments\Acute\MSO	LogLA_221212_165852.LC	G		
File name:	File name:					
Elapsed time:						
File size: Transfer rate:						
Device RAM usage:			0%			
Disk space usage:			88%			$\overline{}$
	27 GB free of 237 GB	}				
				Stop	X Ca	ancel
👼 Load LA Logger file	e (*.log)				?	×
Logger file information						
C:\Users\Ray\Docum	nents\Acute\MSO\LogLA_	_210202_161710.LOG				
Start time	2021-02-02 16:17:10					
End time Record Size	2021-02-02 16:17:37 3.336GB	7				
Output Directory						
	ocuments\Acute\MSO\				◄	-
Select conversion rang	ge from Logger file (*.log)	)				
		End Time	檔名			
1 🗸 🔹	2021-02-02 16:17:10	2021-02-02 16:17:29	LogLA_210202_161710			
2 🗸 📀	2021-02-02 16:17:29	2021-02-02 16:17:37	LogLA_210202_161710_1			

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.



## 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 <b>TEKVISA CONNECTIVITY SOFTWARE</b> from the Tektronix website.		
Agilent Keysight	Please download the <b>KEYSIGHT IO LIBRARIES SUITE</b> from the Keysight website.		
LeCroy	Please download the <b>NI-VISA</b> and Drivers from the <b>NI</b> website.		
HAMEG	Please download the <b>NI-VISA</b> and Drivers from the <b>NI</b> website.		
Rohde & Schwarz	Please download the <b>NI-VISA</b> and Drivers from the <b>NI</b> website.		

Oscilloscope-supportive models:

DSO brand	Model	USB	TCP/IP
Acute	<ul> <li>DS-1000</li> <li>MSO3000</li> <li>TravelScope2000/3000</li> </ul>		
Gwinstek	• GDS-1000A/2000/2000E/3000	$\checkmark$	
Tektronix	TravelScope2000/3000		$\checkmark$



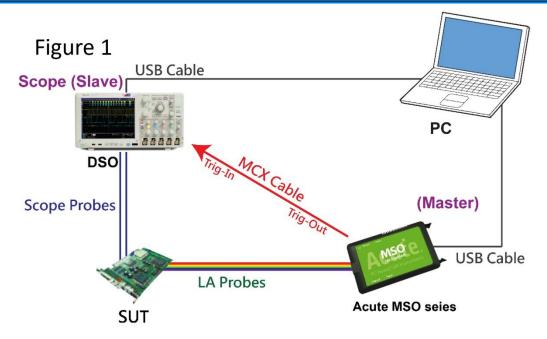
	F C-Ja	seu rouvi mis	su unients
Keysight(Agilent)	<ul> <li>PC-base</li> <li>DSO1000A/5000A/6000A/6000L 7000A/7000B/9000A</li> <li>MSO6000A/7000A/7000B/9000A</li> <li>DSO-X 2000A/3000T/3000G/4000A/6000A/ 9000A</li> <li>DSA 9000A</li> <li>DSA 9000A</li> <li>DSA-X 9000A/9000Q</li> <li>MSO-X 2000A/3000T/3000G/4000A/6000A</li> <li>EXR 100A/400A</li> <li>DSAZ634A, DSOZ634A, DSAZ632A, DSOZ632A, DSAZ594A, DSOZ594A, DSAZ594A, DSOZ594A, DSAZ594A, DSOZ594A, DSAZ504A, DSOZ594A, DSAZ204A, DSOZ254A, DSAZ204A, DSOZ204A, DSOS054A, DSOS204A, DSOS054A, DSOS254A, DSOS054A, DSOS254A, DSOS404A, DSOS204A, MSOS204A, MSOS054A, MSOS104A, MSOS054A, MSOS104A, MSOS0404A, MSOS254A, MSOS404A, MSOS604A, MSOS804A</li> <li>WaveRunner / WaveSurfer / HDO4000 / HDO6000 / SDA 8 Zi-A / DDA 8 Zi-A</li> <li>HMO3000/2000/1000</li> <li>RTO1000 / 2000 / 3000</li> <li>RTE1000</li> </ul>		$\checkmark$
LeCroy	WaveRunner / WaveSurfer / HDO4000 / HDO6000 / SDA 8 Zi-A /		
HAMEG	• HMO3000/2000/1000		$\checkmark$
R & S			$\checkmark$

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)

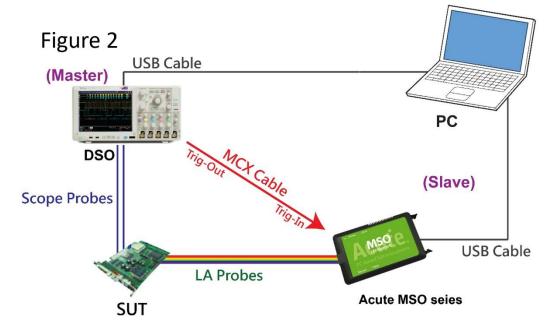




In Figure 1, the USB or Ethernet (TCP / IP) interface is connected to the computer, and then connect the BNC-MCX cable to the MSO Trig-Out and the trigger input interface (Ext-Trig, Aux-In or Trig-In) of the oscilloscope. MDO4000 series is fixed in the analog channel CH4.

#### 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).



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,



#### press the

"Stack Oscilloscope" button, as shown below:

Stack DSO Demo Phase Delay 0 ps •		
Stack External DSO Settings X	Stack External DSO Settings	<
Select the DSO	Select the DSO	
Select DSO Brand Emulation Connection Type USB O TCP / IP Connect IP: 192.168.1.3	Select DSO Brand Emulation Emulation Acute Agilent Gwlnstek HAMEG Keysight LeCroy Rohde & Schwarz Tektronix	
Connection Status Connection:	Connection Status Connection:	
Test Connection VK X Cancel	Test Connection VOK X Cancel	

#### 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**



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

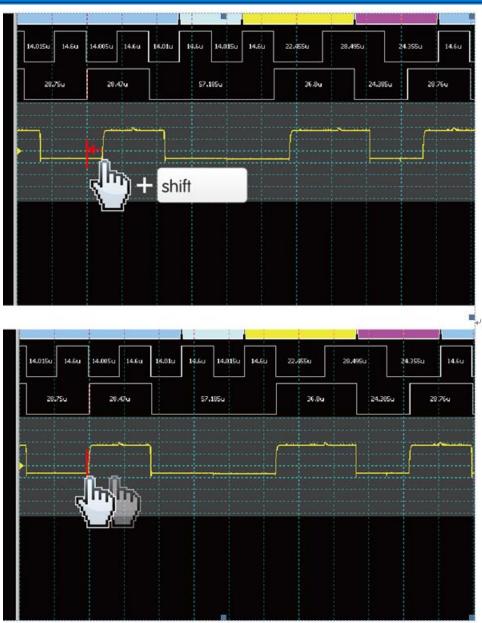
If the stack is composed of the oscilloscope as the master and MSO as the slave, User must not only complete the above-mentioned basic settings but also set the external trigger signal. For the hardware wiring, please refer to Figure 2. Press "Trigger Condition"  $\rightarrow$  "External Trigger", as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





## Stack Cable: BNC-MCX cable

MCX-MCX line for Acute DSO







## **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.

∭ Glitch Filter Settings		×
Ch 0 Ch 1 Ch 2 Ch 3 Ch 4 Ch 5	Ch 6	Ch 7
Ch 8 Ch 9 Ch 10 Ch 11 Ch 12 Ch 13	Ch 14	Ch 15
Filter signal width < 4 ns		
Reset All On	🗸 OK	X Cancel

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.



Software Glitch filter settings

∭ SWFilter		×
Ch 0       Ch 1       Ch 2       Ch 3       Ch 4       Ch 5         Ch 8       Ch 9       Ch 10       Ch 11       Ch 12       Ch 13         Filter signal width < 1	Ch 6 Ch 14	Ch 7
Reset All On	🗸 ОК	X Cancel

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.



## Cursor

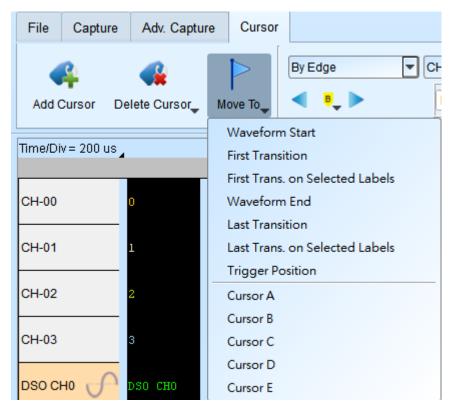
This function includes the cursor setting and the waveform search function matching

the cursor.

Contemporal (Ver:1.4.6)		
File Capture Adv. Capture Cursor		
Add Cursor Delete Cursor Move To	By Edge BUS_eSPI(CH 5) X 8 Rising Move x 3 Cursor(s)	

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.



**Trigger Position:** Move to the trigger position.

Cursor A-Z: Move to the Cursor position.

Waveform search is divided into four modes:

File	Captu	re Adv. Captu	re Cursor		
Add	Cursor	Gelete Cursor	Move To	By Edge  By Edge By Time By Value Match Search Pulse Width	Decode(CH 4) 💌 x 8 💌 Rising 🔍 Move x 3 Cursor(s) 🗘 🌗 🧼

1. By Edge: Move the specified cursor according to the number of

Rising/Falling/Either edges (x1 ~ x4096) of the specified channel.

File	e Captu	ure Adv. Captur	re Cursor				
Ado	4 Id Cursor	Celete Cursor		By Edge	eSPI_Decod	e(CH 4) 🔍 x 8 🔍 R Move x 3 Cursor(s) 🔹	

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

File	Captu	re Adv. Captur	e Cursor		
Add	<b>G</b> Cursor	Celete Cursor	Move To	By Time	▼ 10 us ▼ Move x 3 Cursor(s) \$ ◆

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.

File	Captu	re Adv. Captur	e Cursor		
Add	Cursor	Celete Cursor	Move To	By Value Match	esPI_Decode XXh

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

All of the above operations can be used to move a single cursor on the left or multiple cursors on the right.





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

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.

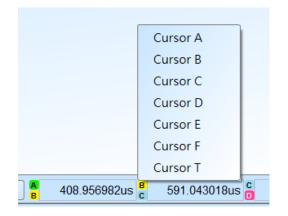
Cursor movement method:

- 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.
- 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.

**C N T** 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.





## Waveform and Report

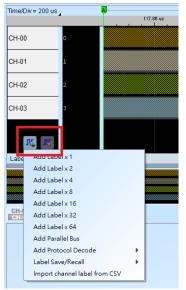
Waveform

- 1. Use the left mouse button to drag the waveform in the wave form display area.
- 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.

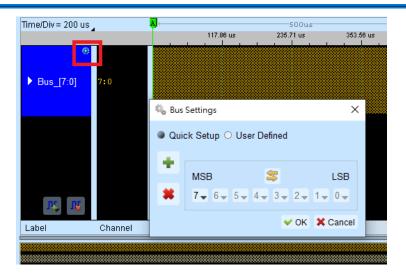
<u>इ</u>	<b>U</b>	F					
ime Div = 1 us	0 0 0	1 us	2 us	3 us	4 us	6 us	6 us
			GET_CO	NFIGURATION(21	)		ADDR (00)
CS#-4							1
SCK-5				اد <mark>کمک</mark> ر د د د د د	eSPI_C	ecode(SCK)	
▲ eSPI_Decode I/0 0-0	395 ns 400 n	s 800 ns	400 ns	1.6 us		=3.280us	
I/O 1-1							
I/O 2-2							
I/0 3-3 eSPI							

- 5. Add/Delete the waveform label.
- Add labels



Add parallel bus





• Add protocol decode

Time/Div = 200 us BUS_12C SDA-1 RC Add Label x 1 Add Label x 2 Add Label x 2 Add Label x 4 Add Label x 4 Add Label x 32 Add Label x 64 Add Label x 64 Add Protocol Decode Label Save/Recall Import channel label from CSV	AD-Mux Flash APML AVSBus B BISS-C BSD BT1120 C CAN/CAN FD Closed Caption CODEC_SSI CvtTxtTab D DALI2 DDC(EDID) DMX512 DP_AuxCh E = eSPI F FlexRay H	LCD1602 LED_CTRL LIN Line Decoding Lissajous LPC LPT M Math MBus MDDI MDIO MHL-CBUS MICROWIRE MIL RMII Mini/Micro LED MIPI CSI MIPI SSI MIPI SSI MIPI SSUNDWIRE MIPI SSUNDWIRE MIPI SSUNDWIRE MIPI SPMI MIPI SPMI MIPI SPMI MIPI SPMI	S/PDIF SDIO/SD3.0 SDQ SENT Serial Flash Serialized IRQ SGPIO Smart Card (ISO7816) SMBus SMI SPI SPI NAND SSI ST7669 SV12 SWD SWIM SWP U UART(RS232) ULPI UNI/O USB PD 3.0 USB1.1
---	---	--	---

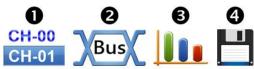
- Label Save/Recall: Save the current channel settings or load the saved channel label.
- Import channel label from CSV file. The file format is as follows,

	А	В	
1	name1	1	
2	name2	2	
3	name3	3	
4	name4	4	
5			

Notice: The feature can only import channel name and number. It cannot import parallel bus or protocol decode.



## **Report Area**



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

Select measurement type and channels. The default measurement range is the entire waveform area, User can specify a certain range between two cursors. Digital Measurement:

Туре	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



Analog N	leasurement:
----------	--------------

Туре	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

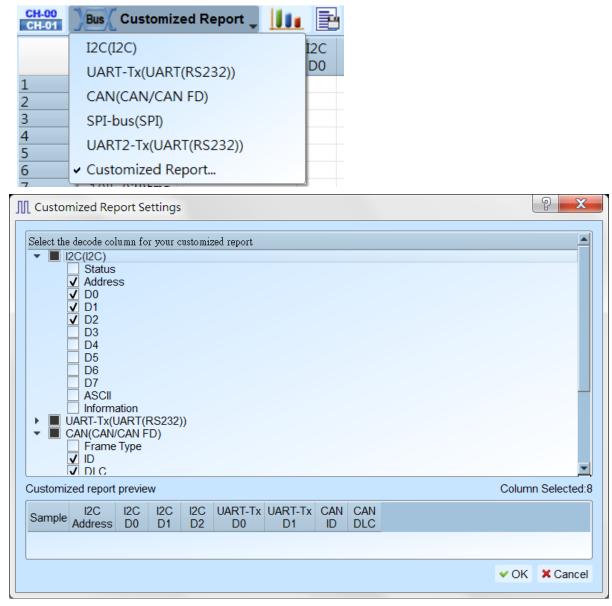
Save the report area as text files.



## **Bus Decode Settings**

Please refer to the bus trigger and Analyzer manual.

## **Customized Report Settings**



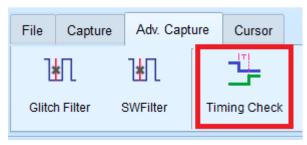
All bus decodes enabled in waveform area will be listed in the settings window, select columns wanted from each reports, the preview window will show selected column and combine them to create Userr customized report.

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



# **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.

Feature select	
<ul> <li>Use Timing Check features</li> <li>Use H/W Strap features</li> </ul>	
OK Cancel	

#### Column Items:

• [SampleRate]

## Only accept single line input.

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



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.

	[SampleRate]
Example	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.

	[AnalogSampleRate]
Example	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.

	[DigitalSampleRate]
Example	25MHz

• [RecordLength]



## 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.

	[RecordLength]
Example	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.

	[TransitionalMode]
Example	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.

		[Threshold]
		1.6V //Ch 00-07
	Evenable	1.5V //Ch 08-15
	Example	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



#### 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.

	[Threshold]
	1.6V //Ch 00-07
	1.5V //Ch 08-15
Example	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.

	[UseSchmittCircuit]
Example	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.



• [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.

	[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	
Example	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



	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.
- (Option) Enter the probe attenuation setting, ONLY for MSO3K series, MSO2K series will ignore this setting.
- (Option) Enter the bandwidth limitation setting, 20MHz, 100MHz or FULL,
   ONLY for MSO3K series, MSO2K series will ignore this setting.
- (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.

	[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
Example	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



[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)
Example	
	;



[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%

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

[RangeStart]

#### Only accept single line input.

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

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

• [RangeEnd]

#### Only accept single line input.

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

	[RangeStart]
Example	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.



- 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.
	СНА
CHA_RISE_TO_CHB_FALL	Time difference from:
	First CH A Rising Edge TO
	First CH B Falling Edge.
	СНА
	СН В
CHA_FALL_TO_CHB_RISE	Time difference from:
	First CH A Falling Edge TO
	First CH B Rising Edge.
	СНА
	СНВ
CHA_FALL_TO_CHB_FALL	Time difference from:
	First CH A Falling Edge TO
	First CH B Falling Edge.
	CH A
	снв
CHA_RISE_TO_NEXT_CHB_RISE	Time difference from:
	First CH A Rising Edge TO



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



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



	Farthest CH B Rising Edge.
	СН А
CHA_FALL_TO_	Time difference from:
FAREST_CHB_FALL	First CH A Falling Edge TO
	Farthest CH B Falling Edge.
	СНА
	снв
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 <sup>*1</sup>	
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.



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 pointEx: 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 pointEx: 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.

	[TimingCheck]
	Spec_00, Desc_00, MyData0, MyData1, CHA_RISE_TO_CHB_RISE, 1ns, 10ms
Example	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
	·



[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	Туре	Min. Limit	Max. Limit	Value	Pass/Fail	Label A Rule	Label B Rule	Label A Pass Count	Label B Pass Count
PowerDelay01	хххх	CH1 (1.8V)	CH0 (3.3V)	CH A Rise to CH B Rise	10ms	20ms	9us	Fail.	90.0% (1.502∀)	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)	CHO (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% (2.75∀)	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.* 



le Capture	Adv. Capture Cursor													
Connect Quici	K Setting	16CH@500KHz	1.7V, 1.6V 1.7V, 1.6V	😨 800 Mb 🔂 💽 Run	() Repeat					Zoom Stack DS	Demo O Phase Delay 0 ps 👻			
e/Div = 5 s _ uired: 14:17:57.8		8.723 <i>s</i> <b>0</b> pc	6 :	10 z 15 z	20 s	25 :	30 s	35 s	40 z	46 :	50 s 55 s	60 z	65 s 70 s	71
RST#	рао сно													Orton 0
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C10_GATE	DSO CH1													
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VR_QN	DSO CH5													
PWROK	DSO CH6													
ST# 🕜	DSO CH7													Officer.
	DS0 CH8		1											Offzet 0
0														
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	Channel													
Bus(	111 🕹 🗟											Q Search All Fields	Text includes	R
ning Spec.	Description	Label Name A	Label Name B	Туре	Min. Limit	Max. Limit	Value	Pass/Fail	Label A Rule	Label B Rule	Label A Pass Count	Label B Pass Count		
ec00	Only for testing	VCCSTG	VccST_PWRGD	CH A Rise to CH B Rise	lms		-8.724s	Fail	90.0% (1.607	90.0% (5mV)				
ec01	Only for testing	VDDQ	VccST_PWRGD	CH A Rise to CH B Rise	lms		-8.028s	Fail	80.0% (2.634	80.0% (3mV)				
ec03	Only for testing	VDDQ	VCCSTG	CH A Rise to CH B Rise		25ms	786.289ms	Fail	1.2V	1.25V				
ec04	Only for testing	VCCST	VCCSTG	CH A Rise to CH B Rise	0ps		8.724s	Pass	90.0% (16mV)	90.0% (1.607	l time(s)			
ec05	Only for testing	VDDQ	VCCSA	CH A Rise to CH B Rise	100ns		-8.027s	Fail	90.0% (2.963	90.0% (13mV)	l time(s)	l time(s)		
ec06	Only for testing	VCCSTG	VCCSA	CH A Rise to CH B Rise	100ns		-8.724s	Fail						
ec00	Only for testing	VCCSA	PROCPWRGD	CH A Rise to CH B Rise	lms		7.880s	Pass						
ec01	Only for testing	VCCTO	PROCEWRGD	CH & Rise to CH B Rise	lma		-843.650mg	Fail					1	
WCCU I														

#### **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



		or norme
Save as Html/CSV		×
Save File Type: Html  Total number of lines: 37 Save Location C:\Users\User\Downloads\PowerSeq_INTEL_MB\Power	Seq_INTEL_MB.htm	
Report Information		
Simple settings		
Save Report: As uncombined files		
Report Title: Power Sequence Report		
Open Html Report After Created		
Add User Image:	B	rowse
Include all waveform		
Include overlapping waveform		
Additional User Info		
O Load advanced settings from csv file		
C:\Users\User\DocumentsDefaultHtmlSettings.csv		
	✓ Save	X Cancel

#### 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.



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	
3		
[AllWaveform.DrawSize]		
900	100	
3		
[AllWaveform.ShowSelectLabel]		
DATA_1	FALSE	
#Default	TRUE	
• •		
[TestItem.DrawTimeRange]		
MySpec01	100ms	100ms
MySpec03	50ms	50ms
#Default	#Default	#Default
;		

A. Report Info:



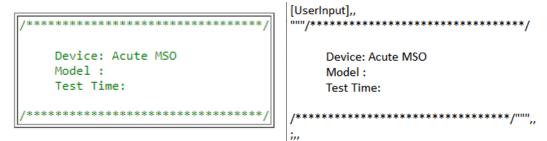
1. [ReportTitle]: Html report title name



2. [UserInput]: Html report user info format:

For Excel: "....."(in Excel)

For Other Text Editor: """......"""



#### 3. [SaveHtmlType]:

Combined: Create html report with embedded waveform image.

**Uncombined:** Create html report & waveform image files.

#### **B. Channel Waveform Settings:**

[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) 1<sup>st</sup> parameter = Extend to the left from the Ref. center.

 $2^{nd}$  parameter = Extend to the Right from the Ref. center.

Ex:

[AllWaveform.DrawTimeRange]		
1s	800ms	3
,		
[AllWaveform.DrawTimeRange]		
Begin		End
Degin		Liiu



#### 4. [AllWaveform.DrawSize]: Image Size

 $1^{st}$  parameter: Picture width (0 < width < 3000)

```
2<sup>nd</sup> parameter: Picture height for each channel (0 < height < 200)
Ex:
```



#### 5. [AllWaveform.ShowSelectLabel]:

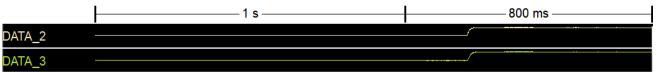
1<sup>st</sup> parameter: Select Label Name. (#Default -> For other labels which not included in the csv file)

```
2<sup>nd</sup> parameter: True/False(True = Show / False = Hide )
```

#### EX:

[AllWaveform.ShowSelectLabel]	
DATA_1	FALSE
#Default	TRUE

#### Ex:



#### C. Test Items Waveform Settings:

#### 1. [TestItem.DrawTimeRange]:

1<sup>st</sup> parameter: Spec Name (#Default -> For other labels which not included in the csv file)

2<sup>nd</sup> parameter: Extend to the left from the CHA & CHB center.

(#Default ->Keep the original settings)

3<sup>rd</sup> parameter: Extend to the Right from the CHA & CHB center.

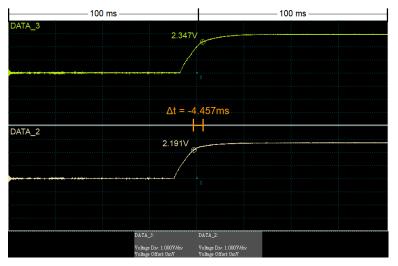
(#Default ->Keep the original settings)

(Time Range Format: 50(s, ms, us, ns, ps), Begin, End, #Default) EX:

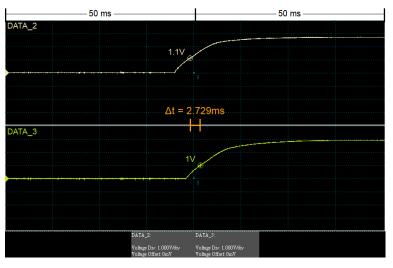
[TestItem.DrawTimeRange]		
MySpec01	100ms	100ms
MySpec03	50ms	50ms
#Default	#Default	#Default
• • •		



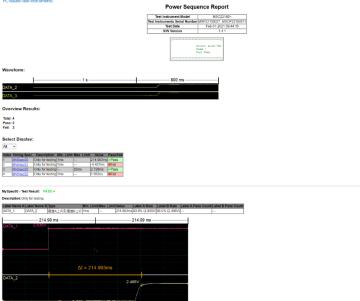
#### MySpec01, 100ms, 100ms



#### MySpec03, 50ms, 50ms



# Acute.





# **Chapter 3 Technical Support**

#### **Contact information**

Acute website: <u>https://www.acute.com.tw</u> E-Mail: <u>service@acute.com.tw</u> Tel: +886-2-29993275 Fax: +886-2-29993276

If <u>Device not found</u> <u>Demo mode</u> 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.



Device Manager		
Action View Help		
🔿   📰   😰 🗊   💯		
> _ Disk drives	 	_
> Display adapters		
Firmware		
> Im Human Interface Devices		
> m IDE ATA/ATAPI controllers		
> 💦 Imaging devices		
> tai Intel(R) Dynamic Platform and Thermal Framework		
> Keyboards		
> 🛄 Memory technology devices		
> 🕒 Mice and other pointing devices		
> 🛄 Monitors		
> 🛃 Network adapters		
> 🖻 Print queues		
> Processors		
Security devices		
Software devices		
> 📢 Sound, video and game controllers		
> 🍰 Storage controllers		
> 🖵 SV drivers		
> 🏣 System devices		
Universal Serial Bus controllers		
Acute USB BootLoader		
Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)		
USB Composite Device		
USB Root Hub (xHCI)		

- (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.

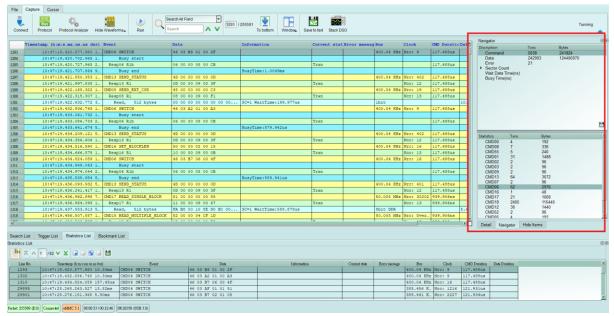


## Appendix 1 Report List Advanced Instructions

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.

00000000000000000000000000000000000000	19.421.997.838           19.422.165.322           19.422.165.307           19.422.455.307           119.422.452.772           119.432.936.748           119.433.061.732           119.433.066.733           119.433.066.733           119.433.066.732           119.433.066.732           119.433.066.733           119.433.066.733           119.434.56.506           119.434.56.506           119.434.56.506           119.434.56.506           119.434.56.506		Data 44 0 0 80 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 45 0 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 0 45 0 0 0 0 45 0 0 0 0 45 0 0 0 0 45 0 0 0 45 0 0 0 45 0 0 0 45 0 0 0 45 0 0 0 45 0 0 45 0 0 45 0 0 45 0 0 45 0 45	Information BusyTime:1.0049 SC=1 WaitTime:5 BusyTime:579.94	Show Show Some	epot Jain Repot Repot Secondary Repot Tran Tran Tran Tran Tran		400.04 KHz	Nrc: 402 Ncr: 12 Nrc: 19 Nrc: 13 Nrc: 9 Nrc: 402 Nrc: 402 Nrc: 16 Nrc: 13	CMD Duratic 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us	Dat #	Navigator Discription Command Data Error Sector Coo Waki Data Busy Time Statistics CMD00 CMD08 CMD05 CMD01	unt Time(ns)	Txns 5038 242993 21 Bytes 192 192 192 193 240 1488	Bytes 241824 124406970
00000000000000000000000000000000000000	119 + 320 + 377 + 360 - 1 119 + 320 + 727 + 581 - 2 119 + 320 + 727 + 581 - 2 119 + 321 + 727 + 581 - 2 119 + 321 + 727 + 581 - 2 119 + 322 + 327 + 581 - 581	CHORD BUTCH Buty start Buty end CHO1 SDD_TATUS Buty end CHO1 SDD_TATUS Buty end CHO1 SDD_TATUS Buty start Dery start Dery end CHO1 SDD_TATUS Buty end CHO1 SDD_TATUS Buty end CHO1 SDD_TATUS Buty end CHO1 SDT_SLOCKER Buty start CHO1 SDT_SLOCKER Buty start	4         0         10         02         17           4         0         00         00         00         00           4         0         00         00         00         00         00           4         0         00         00         00         00         00         00           4         0         00         <	BusyTime:1.0049 SC=1 WaitTime:1	Show Show 1 Show Show 5 Sms	ain Report Report Secondary Report Tran Tran Tran Tran		400.04 KHz 400.04 KHz 1bic 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 9 Nrc: 402 Ncr: 12 Nrc: 19 Nrc: 19 Nrc: 9 Nrc: 402 Nrc: 402 Nrc: 12 Nrc:	117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us 117.480us		Discription Command Error Is Sector Cou Wat Data Busy Time Statistics CMD00 CMD08 CMD05 CMD01	unt Time(ns) (ns) Txns 4 7 5	5038 242993 21 Bytes 192 336 240	241824
1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711	121-50-702-561 1 121-502-727-564 2 121-502-727-564 5 121-502-707-564 9 121-502-707-564 9 121-502-707-50 121-502-50 121-502-50 121-	Bary start           Bary start           Bary end           OD13 SED_TATUS           Bergin 3.1           OD06 SED_TATUS           Bergin 3.1           OD06 SED_TATUS           Bergin 8.1           OD06 SED_TATUS           Bergin 8.1           OD06 SED_TATUS           Bergin 8.1           Bergin 8.1           OD14 SED_TATUS           Bergin 8.1           OD14 SED_TATUS           Bergin 8.1           OD14 SED_TATUS           Bergin 8.1           OD15 SED_TATUS           Bergin 8.1           OD15 SED_TATUS           Bergin 8.1           OD15 SED_TATUS	0         0	SC=1 WeitTime;)	Show Show Some	Secondary Report		400.04 KHz 400.04 KHz 1bic 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 402 Ncr: 12 Nrc: 19 Nrc: 13 Nrc: 9 Nrc: 402 Nrc: 402 Nrc: 16 Nrc: 13	117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us	10.	Command Data Error > Sector Coc Wak Data Busy Time Statistics CMD00 CMD08 CMD05 CMD01	unt Time(ns) (ns) Txns 4 7 5	5038 242993 21 Bytes 192 336 240	241824
1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711 1004711	121-50-702-561 1 121-502-727-564 2 121-502-727-564 5 121-502-707-564 9 121-502-707-564 9 121-502-707-50 121-502-50 121-502-50 121-	Bary start           Bary start           Bary end           OD13 SED_TATUS           Bergin 3.1           OD06 SED_TATUS           Bergin 3.1           D006 SED_TATUS           Bergin 8.1           OD06 SED_TATUS           Bergin 8.1           OD06 SED_TATUS           Bergin 8.1           Bergin 8.1           OD14 SED_TATUS           Bergin 8.1           OD14 SED_TATUS           Bergin 8.1           OD14 SED_TATUS           Bergin 8.1           OD15 SED_TATUS           Bergin 8.1           OD15 SED_TATUS           Bergin 8.1           OD15 SED_TATUS	10         00         00         00         00         10           00         00         00         97         44           00         00         00         00         00         10           00         00         00         00         00         00         10         10           00         00         00         00         00         00         10	SC=1 WeitTime;)	Show Show Some	Secondary Report		400.04 KHz 1bit 400.04 KHz 400.04 KHz 400.04 KHz	Ncr: 12 Nrc: 19 Nrc: 13 Nrc: 9 Nrc: 402 Nrc: 12 Nrc: 16 Nrc: 13	117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us	10.	Data Error Sector Cota Busy Time Statistics CMD00 CMD08 CMD05	unt Time(ns) (ns) Txns 4 7 5	242993 21 Bytes 192 336 240	
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10:471 10:471	119.422.165.322           119.422.315.307           119.422.432.772           319.432.936.783           119.432.041.732           119.433.041.732           119.433.041.732           119.433.041.732           119.433.041.732           119.433.041.747           119.433.041.747           119.433.041.747           119.434.56.006           119.434.56.006           119.434.56.006           119.434.436.005           119.434.436.405           119.434.436.405           119.434.924.015           119.434.924.015           119.434.94.043           119.434.94.94.043	CHOPS REND_EXT_CSD Resp08 21 Resp0 812 Dary start Resp06 R1b Bury start CHOPS STICE Bury end CHOPS STICE Resp13 R1 CHOPS STT_BLOCKLEN Resp16 R1 CHOPS STT_BLOCKLEN Resp16 R1 CHOPS STTCH Bury start	45 00 00 00 00 00 00 00 00 00 00 00 00 00		199.977us	Tran Tran Tran		1bit 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 19 Ncr: 13 Nrc: 9 Nrc: 402 Ncr: 12 Nrc: 16 Ncr: 13	117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us	10.	Statistics CMD00 CMD05 CMD05 CMD01	Txms 4 7 5	192 336 240	_
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	119.422.315.307 1 119.422.302.772 3 119.422.302.778 1 119.432.306.788 1 119.433.306.738 1 119.433.061.732 1 119.433.3641.674 5 119.434.366.664 1 119.434.366.667 1 119.434.466.875 1 119.434.466.875 1 119.434.464.047 1 119.434.464.044 2	Resp0 R1 Read, 512 bytes CMD06 SWITCH Bary start Bary start Bary R1 Bary R1 Resp16 R1 CMD16 SHIP SHOCKLEN Resp16 R1 CMD06 SWITCH Bary start	05 00 00 05 00 F1 00 00 00 00 00 00 00 00 00 40 03 A2 01 00 A3 06 00 00 08 00 CB 40 00 00 08 00 CB 10 00 00 09 00 JF 50 J			Tran		1bit 400.04 KHz 400.04 KHz 400.04 KHz	Ncc: 13 Nrc: 9 Nrc: 402 Ncc: 12 Nrc: 16 Ncc: 13	117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us	10.	CMD00 CMD08 CMD55 CMD01	4 7 5	192 336 240	
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10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	19.432.936.748         1.           119.433.061.732         1.           119.433.061.732         1.           119.433.061.732         1.           119.433.061.732         1.           119.433.061.732         1.           119.434.061.732         1.           119.435.061.732         1.           119.434.056.761         1.           119.434.56.061         1.           119.434.666.575         1.           119.434.064.059         1.           119.434.064.031         1.           119.434.044         1.           119.434.044         1.           119.434.044         1.           119.434.044         1.           119.434.044         1.           119.434.974.043         1.	CHD06 SWITCH Busy start Resp06 Rlb Busy end CHD13 SED_STATUS Resp13 Rl CHD16 SET BLOCKLEN Resp16 Rl CHD16 SWITCH Busy start	46         03         A2         01         00         A3           06         00         00         00         05         C5           4D         00         00         00         00         D0           00         00         00         00         D0         00         D0           00         00         00         00         00         3F         50         00         00         20         15           10         00         00         09         00         0B         46         3B         77         06         04         4F			Tran		400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 402 Nor: 12 Nrc: 16 Nor: 13	117.400us 117.400us 117.400us 117.400us 117.400us 117.400us 117.400us	10.	CMD00 CMD08 CMD55 CMD01	4 7 5	192 336 240	
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	119.433.061.732         1.           119.433.066.733         2.           119.433.61.674         3.           119.434.1674         5.           119.434.56.606         1.           119.434.666.575         1.           119.434.666.575         1.           119.434.666.575         1.           119.434.949.043         1.           119.434.974.044         2.	Busy start Resp06 Rib Busy end CHD13 SEND_STATUS Resp13 Ri CHD16 SET_BLOCKLEN Resp14 Ri CHD06 SWITCH Busy start	06 00 00 08 00 CB 4D 00 00 00 00 0D 0D 00 00 09 00 3F 50 00 00 02 00 15 10 00 00 09 00 0B 46 03 B7 06 00 4F	BusyTime:579.94	42us	Tran		400.04 KHz 400.04 KHz	Nrc: 402 Nor: 12 Nrc: 16 Nor: 13	117.488us 117.488us 117.488us 117.488us 117.488us 117.488us		CMD00 CMD08 CMD55 CMD01	4 7 5	192 336 240	_
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10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	19.434.209.121 S 19.434.356.606 1 19.434.666.590 1 19.434.666.575 1 19.434.824.059 1 19.434.949.043 1 19.434.974.044 2	CMD13 SEND_STATUS Resp13 R1 CMD16 SET_BLOCKLEN Resp16 R1 CMD06 SWITCH Busy start	0D 00 00 09 00 3F 50 00 00 02 00 15 10 00 00 09 00 08 46 03 B7 06 00 4F	BusyTime: 579.94	12us			400.04 KHz	Nor: 12 Nrc: 16 Nor: 13	117.488us 117.488us 117.488us		CMD00 CMD08 CMD55 CMD01	4 7 5	192 336 240	
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	19.434.356.606 1_ 19.434.516.590 1_ 19.434.666.575 1_ 19.434.824.059 1_ 19.434.949.043 1_ 19.434.974.044 2_	Resp13 R1 CMD16 SET_BLOCKLEN Resp16 R1 CMD06 SWITCH Busy start	0D 00 00 09 00 3F 50 00 00 02 00 15 10 00 00 09 00 08 46 03 B7 06 00 4F					400.04 KHz	Nor: 12 Nrc: 16 Nor: 13	117.488us 117.488us 117.488us		CMD00 CMD08 CMD55 CMD01	4 7 5	192 336 240	
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	19.434.516.590 1 19.434.666.575 1 19.434.824.059 1 19.434.949.043 1 19.434.974.044 2	CHD16 SET BLOCKLEN Resp16 R1 CHD06 SWITCH Busy start	50 00 00 02 00 15 10 00 00 09 00 08 46 03 B7 06 00 4F					400.04 KHz	Nrc: 16 Ncr: 13	117.488us 117.488us		CMD00 CMD08 CMD55 CMD01	4 7 5	192 336 240	
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10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	:19.434.824.059 1 :19.434.949.043 1 :19.434.974.044 2	CHD06 SWITCH Busy start	46 03 B7 06 00 4F			Tran						CMD01		240 1488	
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	:19.434.949.043 1 :19.434.974.044 2	Busy start						400.04 201-	Nrct 16	117.488us		CMD01			
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1	:19.434.974.044 2		06.00.00.08.00.08									CMD02	2	96	
10:47:1 10:47:1 10:47:1 10:47:1 10:47:1 10:47:1		Resp06 R1b	06 00 00 08 00 CB									CMD02 CMD03	2	96	
10:47:1 10:47:1 10:47:1 10:47:1	:19.435.538.984 5					Tran				117.488us		CMD09	2	96	
10:47:1 10:47:1 10:47:1		Busy end		BusyTime:589.94	4lus							CMD13	64	3072	
10:47:1	:19.436.093.932 5	CMD13 SEND_STATUS	4D 00 00 00 00 0D					400.04 KHz	Nrc: 401	117.488us		CMD07 CMD06	2	96 2976	_
10:47:1	:19.436.241.417 1	Resp13 R1	OD 00 00 09 00 3F			Tran			Nor: 12	117.488us		CMD16	1	48	
	:19.436.962.895 7_	CMD17 READ_SINGLE_BLOCK	51 00 00 00 00 55					50.005 MHz	Nrc: 30202	939.906ns		CMD17	21	1008	
10:47:1	:19.436.964.095 1	Resp17 R1	11 00 00 09 00 67			Tran			Nor: 13	939.906ns		CMD18	2405	115440	
	:19.437.553.913 5	Read, 512 bytes	FA B8 00 10 8E D0 BC 00	SC=1 WaitTime:5	588.878us			Sbit DDR			5.4	CMD12 CMD52	30	1440 96	
			52 00 00 04 CF 1D						Nrc: Over		_	CMD05	4	192	
			100 00 00 00 00 <b>00</b>	1		1-	1		1	1000 000		Detail Nav	vicator	Hide Items	
s List	st Statistics List Bo														
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	:19.420.577.980 10.3		46 03 B9 01 00 2F						400.04 KH			400us			
	:19.432.936.748 10.3		46 03 A2 01 00 A3						400.04 KH			488us			
	:19.434.824.059 157.		46 03 B7 06 00 4F						400.04 KH			400us			
	28.268.263.527 13.8		46 03 AF 01 01 51						385.456 K			931us			
901 10:47:2	:28.276.151.368 5.90	Oms CMD06 SWITCH	46 03 B7 02 01 05						305.441 K	Nrc: 2227	121.	934118			

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





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.

File Ca	apture Cursor									
		earch All Field	💽 🛛 🗖 🚺							
Connect	Protocol Protocol Analyzer Hide Waveforms, Run	earch		e to text Stack DS	0					Tunning
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	manhama (hanan na na dan) Wasah	Data	Information	Current stat		Dura	Clock	CMD Duratic Da	Navigator	8
	mestamp (h:n:s.ms.us.ns dur) Event		Information	Current stat					Discription Txns	Bytes
1293	10:47:19.420.577.980 1 CMD06 SWITCH	46 03 B9 01 00 2F				400.04 KHz	Nrc: 9	117.488us	Command 5038 Data 242993	241824 124406970
1294	10:47:19.420.702.965 1 Busy start 10:47:19.420.727.965 2 Resp06 Rlb	06 00 00 08 00 CB		Tran				117.488us	Data 242993 Error 21	124400970
1295	10:47:19.421.707.864 9 Busy end	06 00 00 08 00 CB	BusyTime:1.0049ms	IIan				11/.40003	Sector Count	
1290	10:47:19.421.850.353 1. CMD13 SEND STATUS	4D 00 00 00 00 0D	Busyline 11.004 ana			400.04 KHz	Nrc: 402	117.488us	Wait Data Time(ns)	
1298	10:47:19.421.997.838 1 Resp13 R1	0D 00 00 09 00 3F		Tran		TOOTOT THE	Nor: 12	117,488us	Busy Time(ns)	
1299	10:47:19.422.165.322 1_ CMD08 SEND ENT CSD	48 00 00 00 00 C3				400.04 KHz	Nrc: 19	117.488us		
1300	10:47:19.422.315.307 1_ Resp08 R1	08 00 00 09 00 F1		Tran			Nor: 13	117.488us		
1301	10:47:19.422.632.772 3. Read, 512 bytes	00 00 00 00 00 00 00 00 00	SC=1 WaitTime:199.977us			lbit		10	0.	
1302	10:47:19.432.936.748 1_ CMD06 SWITCH	46 03 A2 01 00 A3				400.04 KHz	Nrc: 9	117.488us		
1303	10:47:19.433.061.732 1. Busy start									
1304	10:47:19.433.086.733 2 Resp06 R1b	06 00 00 08 00 CB		Tran				117.488us		
1305	10:47:19.433.641.674 5 Busy end		BusyTime: 579.942us							8
1306	10:47:19.434.209.121 5 CMD13 SEND_STATUS	4D 00 00 00 00 0D				400.04 KHz		117.488us	Statistics Txns Bytes	
1307	10:47:19.434.356.606 1 Resp13 R1	0D 00 00 09 00 3F		Tran			Nor: 12	117.488us	CMD00 4 192	1
1308	10:47:19.434.516.590 1. CMD16 SET_BLOCKLEN	50 00 00 02 00 15				400.04 KHz	Nrc: 16	117.488us	CMD08 7 336	
1309	10:47:19.434.666.575 1 Resp16 R1	10 00 00 09 00 0B		Tran			Nor: 13	117.488us	CMD55 5 240 CMD01 31 1488	
1310	10:47:19.434.824.059 1. CND06 SWITCH	46 03 87 06 00 48				400.04 KHz	Nrc: 16	117.488us	CMD01 31 1400 CMD02 2 96	
1311	10:47:19.434.949.043 1 Busy start								CMD03 2 96	
1312	10:47:19.434.974.044 2 Resp06 R1b	06 00 00 08 00 CB		Tran				117.488us	CMD09 2 96	
1313	10:47:19.435.538.984 5 Busy end		BusyTime:589.94lus						CMD13 64 3072 CMD07 2 96	
1314	10:47:19.436.093.932 5 CMD13 SEND_STATUS	4D 00 00 00 00 0D		-		400.04 KHz		117.488us	CMD06 62 2976	
1315	10:47:19.436.241.417 1 Resp13 R1	0D 00 00 09 00 3F		Tran		50.005 MHz	Ncr: 12	117.488us	CMD16 1 48	
1316	10:47:19.436.962.895 7 CMD17 READ_SINGLE_BLOCK 10:47:19.436.964.095 1 Resp17 R1	51 00 00 00 00 55 11 00 00 09 00 67		Tran		50.005 MHZ	Nrc: 30202 Ncr: 13	939.906ns	CMD17 21 1008 CMD18 2405 11544	
1317	10:47:19.437.553.913 5 Read, 512 bytes	FA BS 00 10 SE D0 BC 00	SC=1 WaitTime:588.878us	Iten		Sbit DDR	NCI: 13	939.906h8	CMD12 30 1440	
1319	10:47:19.456.507.587 1_ CMD18 READ MULTIPLE BLOCK	52 00 00 04 CF 1D	SC-1 Walclimersoos.o/ous			50.005 MHz	Nrc: Over	020 00688	CMD52 2 96	
1319	10.17.19.19.190.307.307 1. CRD10 KERD HOLTTEL BLOCK					30.003 Hitz		535.500118	CME05 4 192	
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Search List	t Trigger List Statistics List Bookmark List									
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Line No	o. Timestamp (h:m: s ma us na dur) Event	Deta	Information		Current state	Error message	Bus	Clock	CMD Duration Data Duration	-
1293	10:47:19.420.577.980 10.30ms CHD06 SWITCH	46 03 B9 01 00 2F					400.04 KH:	Nrc: 9 3	117.488us	
1302	10:47:19.432.936.748 10.30ms CHD06 SWITCH	46 03 A2 01 00 A3					400.04 KHz		117.488us	
1310	10:47:19.434.824.059 157.48us CHD06 SWITCH	46 03 B7 06 00 4F					400.04 KH:		117.488us	
29895	10:47:28.268.263.527 13.82ms CMD06 SWITCH	46 03 AF 01 01 51					385.456 K	Nrc: 1216 1	121.931us	
29901	. 10:47:28.276.151.368 5.90ms CMD06 SWITCH	46 03 87 02 01 05					305.441 K.	Nrc: 2227 1	121.934us	
						_				
Packet: 255569	9 (E 0) Connected eMMC 5.1 00:00:53 / 00:12:46 SN 20358 (03E 3.0)									

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

(	1). Search List													
Captu	Cursor													
innect	Protocol Analyzer Hide Waveforms.	Search All Field  resp06  O   V	200001 1	ve to text Stack D									Tunn	ning
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Times	stamp (h:m:s.ms.us.ns dur) Event	Data	Information		t Error messag	Bus	Clock	CMD Durati	c Dat *	Discription	Txm		Bytes	
0	10:47:19.420.727.965 2 Resp06 R1b	06 00 00 08 00 CB		Tran				117.488us		Command	503		241824	
	10:47:19.421.707.864 9 Busy end		BusyTime:1.0049ms							Data	242	993	124406970	
	10:47:19.421.850.353 1 CMD13 SEND_STATUS	4D 00 00 00 00 0D				400.04 KHz		117.488us		Error     Sector Count	21			
	10:47:19.421.997.838 1 Resp13 R1	OD 00 00 09 00 3F		Tran			Ncr: 12	117.488us		Wait Data Tim	ne(ns)			
	10:47:19.422.165.322 1 CMD08 SEND_ENT_CSD	48 00 00 00 00 C3				400.04 KHz	Nrc: 19	117.488us		Busy Time(ns				
	10:47:19.422.315.307 1 Resp08 R1	08 00 00 09 00 F1		Tran			Nor: 13	117.488us						
	10:47:19.422.632.772 3 Read, 512 bytes	00 00 00 00 00 00 00 00 00	SC=1 WaitTime:199.977us			lbit			10.					
	10:47:19.432.936.748 1 CMD06 SWITCH	46 03 A2 01 00 A3				400.04 KHz	Nrc: 9	117.488us						
	10:47:19.433.061.732 1 Busy start													
Q	10:47:19.433.086.733 2 Resp06 R1b	06 00 00 08 00 CB		Tran				117.488us						
	10:47:19.433.641.674 5 Busy end		BusyTime: 579.942us											
	10:47:19.434.209.121 5 CMD13 SEND_STATUS	4D 00 00 00 00 0D				400.04 KHz	Nrc: 402	117.488us						
	10:47:19.434.356.606 1 Resp13 R1	OD 00 00 09 00 3F		Tran			Nor: 12	117.488us						
	10:47:19.434.516.590 1. CMD16 SET_BLOCKLEN	50 00 00 02 00 15				400.04 KHz	Nrc: 16	117.488us		Statistics	Txns	Bytes		
	10:47:19.434.666.575 1 Resp16 R1	10 00 00 09 00 0B		Tran			Nor: 13	117.488us			4	192		_
	10:47:19.434.824.059 1. CMD06 SWITCH	46 03 B7 06 00 4F				400.04 KHz	Nrc: 16	117.488us		CMD08	7	336		
	10:47:19.434.949.043 1 Busy start										5	240		
Q	10:47:19.434.974.044 2 Resp06 R1b	06 00 00 08 00 CB		Tran				117.488us			31	1488		
	10:47:19.435.538.984 5 Busy end		BusyTime:589.941us							CMD02 CMD03	2	96 96		
	10:47:19.436.093.932 5. CMD13 SEND STATUS	4D 00 00 00 00 0D				400.04 KHz	Nrc: 401	117.488us			2	96		
	10:47:19.436.241.417 1 Resp13 R1	OD 00 00 09 00 3F		Tran			Nor: 12	117.488us		CMD13	64	3072		
	10:47:19.436.962.895 7. CMD17 READ SINGLE BLOCK	51 00 00 00 00 55				50.005 MHz	Nrc: 30202				2	96		
	10:47:19.436.964.095 1 Remp17 R1	11 00 00 09 00 67		Tran			Nor: 13	939,906n#			62	2976 48		
	10:47:19.437.553.913 5 Read, 512 bytes	FA B8 00 10 8E D0 BC 00	SC=1 WaitTime:588.878us			Sbit DDR			5.4		21	1008		
	10:47:19.456.507.587 1. CMD18 READ_MULTIPLE_BLOCK						Nrc: Over	939.906ns		CMD18	2405	115440		
	10:47:19,456,508,787 1 Resp18 R1	12 00 00 09 00 D3		Tran			Nor: 13	939.906ns			30	1440		
	10:47:19.458.755.802 2 Read, 512 bytes	00 00 00 00 00 00 00 00 00	SC=1 WaitTime:2.24608ms			Sbit DDR			5.4	CMD52 CMD05	2	96 192		
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Line No.	Timestamp (h:m:s ma us na dur) Event	Data	Information		Current state	Error message	Bas	Clock		Duration Data Durati	ion			
1295	10:47:19.420.727.965 25.00us Resp06 Rib	06 00 00 08 00 CB			Tran					48845				
1304	10:47:19.433.086.733 25.00us Resp06 Rlb	06 00 00 08 00 CB			Tran					488115				
1312	10:47:19.434.974.044 25.00us Resp06 Rib	06 00 00 08 00 CB			Tran					10015				
29897	10:47:28.268.419.185 25.94us Resp06 Rlb	06 00 00 08 00 CB			Tran					934115				
29903	10:47:28.276.307.026 25.94us Resp06 Rib	06 00 00 08 00 CB			Tran				121.	934us				



(2)	. Trigge	r List										
Protocol Settings eMMC 5.1 NAND Flash RS232 SD 3.0 SD 4.0 SPI	Sample Rate Primary Protocol Analy	2.4 GHz V	Filter Data Length > 512 bytes Number of blocks > 1 (SIC > 1)									
SPI	Custom eMMC	eUMC Probe	Trigger en     General     General     Gata	CRC7 error CRC16 error Erd bit error VCD Drop VDD Drop								
	<ul> <li>Secondary Protocol</li> <li>NAND Flash</li> </ul>	Analyzer or I/O NAND channel	Additional     Timeout	Setting O CRC Status Pattern Positive								
	O 10		BUS mode settings at BOOT HS400 DDR n BUS width 4 y bit Ne BOOTACK sent Retain BUS mode settings at Tuning settings	3 Pin mode (CMD, CLK, D0)	Y							
File Capture C	O Default			≪ 0К	Cancel							
Ū. 🛄			earch All Field	/ 31332 To bottom Window, Save to te	t Stack DS0						Tunnir	-
Tinestano	(h:m:s.ms.us.ns dur)	Event	Data	Information	Current stat	Error messag Bus	Clock	CMD Durat:	Navigator			ß
	13:13.920.485.741 1				- artene stat	and a starting but		117.488us	Discription	Txns	Bytes	
		Peap01 P3									1540	
	13:13.921.608.132 1	Resp01 R3 CMD01 SEND OP COND	3F 40 FF 80 80 FF 41 40 30 00 00 B7			400,023 8			Command	94	4512 15931131	
	13:13.921.608.132 1	CMD01 SEND_OP_COND	41 40 30 00 00 B7			400.023 K	Nrc: 401	117.492us	Data Error		4512 15931131	
1272 11:1	13:13.921.608.132 1 13:13.921.740.622 1 13:13.922.863.013 1	CMD01 SEND_OP_COND				400.023 K	Nrc: 401 Ncr: 6		Data Error Sector Count	94	4512 15931131	
1272 11:1 1273 11:1	13:13.921.608.132 1 13:13.921.740.622 1	CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND	41 40 30 00 00 B7 3F 40 FF 80 80 FF				Nrc: 401 Ncr: 6 Nrc: 402	117.492us 117.488us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
272 11:1 273 11:1 274 11:1	13:13.921.608.132 1 13:13.921.740.622 1 13:13.922.863.013 1 13:13.922.995.500 1	CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND Resp01 R3	41 40 30 00 00 B7 3F 40 FF 80 80 FF 41 40 30 00 00 B7 3F 40 FF 80 80 FF			400.04 KHz	Nrc: 401 Nor: 6 Nrc: 402 Nor: 6	117.492us 117.488us 117.488us 117.488us	Data Error Sector Count	94	4512 15931131	
11:1           1273           11:1           1274           11:1           1275	13:13.921.608.132 1 13:13.921.740.622 1 13:13.922.863.013 1 13:13.922.995.500 1 13:13.924.115.391 1	CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND	41 40 30 00 00 B7 3F 40 FF 80 80 FF 41 40 30 00 00 B7 3F 40 FF 80 80 FF 41 40 30 00 00 B7 41 40 30 00 00 B7				Nrc: 401 Nor: 6 Nrc: 402 Nor: 6	117.492us 117.408us 117.488us 117.488us 117.488us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
272 11:1 273 11:1 274 11:1 275 11:1 276 11:1 277 11:1	13:13.921.608.132 L 13:13.921.740.622 L 13:13.922.863.013 L 13:13.922.995.500 L 13:13.924.115.391 L 13:13.924.247.878 L 13:13.925.370.272 L	CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND Resp01 R3 CMD02 ALL_SEND_CID	41 40 30 00 00 87 3F 40 FF 80 80 FF 41 40 30 00 00 87 3F 40 FF 80 80 FF 41 40 30 00 00 87 3F C0 FF 80 80 FF 3F C0 FF 80 80 FF 42 00 00 00 7F			400.04 KHz	Nrc: 401 Nor: 6 Nrc: 402 Nor: 6 Nrc: 401 Nor: 5	117.492us 117.488us 117.488us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
1272 11:1 1273 11:1 1274 11:1 1275 11:1 1276 11:1 1277 11:1 1278 11:1	13:13.921.608.132 1. 13:13.921.740.622 1. 13:13.922.963.013 1. 13:13.922.995.500 1. 13:13.924.115.391 1. 13:13.924.247.878 1. 13:13.925.802.725 1.	CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND Resp01 R3 CMD01 SEND_OP_COND Resp01 R3 CMD02 ALL_SEND_CID Resp02 R2	41 40 30 00 00 87 3F 40 FF 80 80 FF 41 40 30 00 00 87 3F 40 FF 80 80 FF 41 40 30 00 00 87 3F C0 FF 80 80 FF 42 00 00 00 4D 3F 45 01 00 53 44 57 31			400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 401 Nor: 6 Nrc: 402 Nor: 6 Nrc: 401 Nor: 5 Nrc: 402 Nor: 6	117.492us 117.488us 117.488us 117.488us 117.488us 117.488us 117.492us 117.488us 337.466us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
272 11:1 273 11:1 274 11:1 275 11:1 276 11:1 277 11:1 278 11:1 278 11:1	13:13:921.608.132 1. 13:13:921.740.622 1. 13:13:922.863.013 1. 13:13:922.965.001 1. 13:13:924.115.391 1. 13:13:924.247.878 1. 13:13:925.502.759 1. 13:13:925.502.759 1. 13:13:925.852.21 3.	CHDO1 SEND OF_COND Resp01 R3 CHDO1 SEND OF_COND Resp01 R3 CHDO1 SEND OF_COND Resp01 R3 CHDO2 ALL_SEND_CID Resp02 R2 CHDO3 SEND RELATIVE ADDR	41 46 30 00 00 87 37 40 FF 80 80 FF 41 40 30 00 00 87 37 40 FF 80 80 FF 41 40 30 00 00 FF 41 40 30 00 00 FF 42 00 00 00 00 FF 42 00 00 00 00 4D 37 45 01 00 53 44 57 31			400.04 KHz	Nrc: 401 Nor: 6 Nrc: 402 Nor: 6 Nrc: 401 Nor: 5 Nrc: 402 Nor: 6 Nrc: 18	117.492us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 337.466us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
1272 11:1 1273 11:1 1274 11:1 1275 11:1 1276 11:1 1277 11:1 1278 11:1 1279 11:1 1280 11:1	13:13:921.608.132 1. 13:13:921.740.622 1. 13:13:922.653.013 1. 13:13:922.995.500 1. 13:13:924.115.381 1. 13:13:924.77.878 1. 13:13:925.870.727 1. 13:13:925.802.795 1. 13:13:925.605.221 3. 13:13:926.603.206 1.	CHDO1 SEND_OP_COND Resp01 R3 ChDO1 SEND_OP_COND Resp01 R3 CHDO1 SEND_OP_COND Resp01 R3 CHDO2 ALL_SEND_CTD Resp02 R2 CHDO3 SEND_RELATIVE_ADDR Resp03 R1	41         60         30         00         00         87           51         40         75         60         60         77           41         40         30         00         00         87           31         40         71         60         60         87           31         40         71         60         60         87           31         40         71         60         60         87           31         40         71         60         60         87           32         60         78         60         60         87           32         60         78         60         60         87           32         60         00         80         60         87           32         60         00         53         44         57         1           43         60         00         50         78         80         78		Ident	400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 401 Ncr: 6 Nrc: 402 Ncr: 6 Nrc: 401 Ncr: 5 Nrc: 402 Ncr: 6 Nrc: 18 Nrc: 12	117.492us 117.488us 117.488us 117.488us 117.488us 117.492us 117.488us 337.466us 117.488us 117.488us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
272 11:1 273 11:1 274 11:1 275 11:2 276 11:1 277 11:1 278 11:1 279 11:1 280 11:1 281 11:1	13:13:921.608.132 1. 13:13:921.740.622 1. 13:13:922.965.003 1. 13:13:922.995.500 1. 13:13:924.115.391 1. 13:13:924.247.078 1. 13:13:925.07.78 1. 13:13:925.07.78 1. 13:13:926.07.85 1. 13:13:926.07.95 1. 13:13:926.07.9	CMD01_SEMD_0P_COND Resp01_R3 CMD01_SEMD_0P_COND Resp01_R3 CMD01_SEMD_0P_COND Resp01_R3 CMD01_SEMD_0P_COND Resp01_R3 CMD03_SEMD_RELATIVE_ADDR Resp03_R1 CMD03_SEMD_CSD	41 40 30 00 00 87 57 40 FF 80 00 FF 41 40 30 00 00 87 41 40 30 00 00 87 51 40 07 80 00 FF 51 40 00 00 87 51 40 00 00 80 FF 51 40 00 00 80 7F 51 40 00 00 80 00 57 53 40 57 51 53 00 00 00 00 21 03 00 00 00 00 21 03 00 00 00 00 27 50 00 00 00 20 27 50 00 20 00 20 50 00 2		Ident	400.04 EEz 400.04 EEz 400.04 EEz 400.04 EEz 400.04 EEz 400.04 EEz	Nrc: 401 Nor: 6 Nrc: 402 Nor: 6 Nrc: 401 Nor: 5 Nrc: 402 Nor: 6 Nrc: 18 Nrc: 18 Nor: 12 Nrc: 16	117.492us 117.488us 117.488us 117.488us 117.488us 117.488us 337.468us 117.488us 117.488us 117.488us 117.488us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4512 15931131	
1272 11:1 1273 11:1 1274 11:1 1275 11:1 1276 11:1 1277 11:1 1278 11:1 1279 11:1 1280 11:1 1281 11:1 1281 11:1	13:13:921.608.132 1 13:13:921.740.622 1 13:13:922.653.013 1 13:13:922.955.500 1 13:13:924.115.391 1 13:13:924.74.767 1 13:13:925.370.272 1 13:13:925.502.759 1 13:13:925.602.759 1 13:13:926.035.206 1 13:13:926.035.206 1 13:13:926.035.206 1 13:13:926.035.206 1 13:13:926.035.206 1 13:13:926.035.206 1 13:13:926.035.759 1 13:13:926.	CMD01 ESED_OF_COND Resp01 R3 CMD01 SEND_OF_COND Resp01 R3 CMD01 SEND_OF_COND Resp01 R3 CMD02 AL2_ESED_CID Resp02 R2 CMD03 SEND_RELATIVE_ADDR Resp03 R2 CMD05 R2	41 40 30 00 00 87 57 40 7F 80 80 7F 41 40 30 00 00 87 37 40 F 80 80 7F 41 40 30 00 00 87 37 40 F 80 80 FF 42 00 00 80 00 87 37 40 F 80 80 FF 42 00 00 80 00 4D 37 40 10 83 44 73 31 43 00 00 00 00 4D 36 45 00 FF 45 00 00 80 00 FF 45 00 00 FF 45 00 00 FF 45 00 00 FF 45 00 FF		Ident	400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 401 Nc: 6 Nrc: 402 Nc: 401 Nrc: 401 Nrc: 402 Nrc: 10 Nrc: 18 Nrc: 12 Nrc: 16 Nrc: 9	117.492us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 337.466us 337.466us	Data Error Vasctor Count Wata Data Time(ns) Busy Time(ns)	94 31121 2	4512 15931131	
1272 11:1 1273 11:2 1274 11:1 1276 11:1 1276 11:1 1277 11:2 1278 11:1 1278 11:1 1279 11:1 1299 11:1	$\begin{array}{c} 313.8.921.+60.9.132 \\ \\ 1311.8.922.+663.013 \\ \\ 1311.8.922.+663.013 \\ \\ 1311.8.922.+663.013 \\ \\ 1311.8.924.+60.955.000 \\ \\ 1311.8.924947.077 \\ \\ 1311.8.926907.777 \\ \\ 1311.8.926007.756 \\ \\ 1311.8.926007.756 \\ \\ 1311.8.926008.766 $	CMD01 EEED_OF_COND Resp01 #3 CMD01 EEED_OF_COND Resp01 #3 CMD03 EEED_OF_COND Resp02 #3 CMD03 EEED_OF_COND Resp03 #3 CMD03 EEED_RELATIVE_ACC CMD03 SED_RELATIVE_ACC Resp03 #1 CMD05 SED_CSD Resp00 #2 CMD03 SED_CSD	41 40 00 00 00 87 57 40 FF 80 00 FF 41 40 30 00 00 87 41 40 30 00 00 87 57 40 FF 80 80 FF 41 40 30 00 00 87 57 60 FF 80 FF 42 60 00 00 00 40 57 40 F 00 00 00 40 57 40 50 100 53 44 57 31 43 00 00 00 00 21 63 00 00 00 01 57 40 00 21 50 00 21 50 00 17 50 00 17			400.04 EEz 400.04 EEz 400.04 EEz 400.04 EEz 400.04 EEz 400.04 EEz	Nrc: 401 Ncr: 6 Ncr: 402 Ncr: 401 Nrc: 401 Nrc: 402 Nrc: 10 Nrc: 12 Nrc: 16 Nrc: 16 Nrc: 16 Nrc: 16	117.492us 117.488us 117.488us 117.488us 117.488us 117.488us 337.468us 117.488us 117.488us 117.488us 117.488us 117.488us	Data Error Sector Count Wait Data Time(ns)	94	4612 15931131	P
272         11:1           273         11:1           274         11:1           275         11:1           276         11:1           277         11:1           278         11:1           279         11:2           280         11:1           281         11:1           282         11:1           283         11:1           284         11:1	1313.821.400.133 L. 1313.821.400.423 J. 1313.822.465.013 J. 1313.822.465.001 J. 1313.824.185.951 J. 1313.824.247.976 J. 1313.824.247.976 J. 1313.825.027.952 J. 1313.825.027.952 J. 1313.826.526.223 J. 1313.826.536.205 J. 1313.826.536.275 J. 1313.826.545.275 J. 1313.826.555 J. 1313.855 J. 1313.855 J. 1313.855 J. 1313.855 J.	CHED1 SEED_OF_COND           Resp01 R3           CHED1 SEED_OF_COND           Resp01 R3           CHED1 SEED_OF_COND           Resp01 R3           CHED1 SEED_OF_COND           Resp01 R3           CHED3 SEED_SEED_CED           Resp03 R5           Resp03 R5           CHE03 SEED_SEED_CED           Resp13 R5	41 40 30 00 00 87 57 40 7F 80 80 7F 41 40 30 00 00 87 37 40 F 80 80 7F 41 40 30 00 00 87 37 40 F 80 80 FF 42 00 00 80 00 87 37 40 F 80 80 FF 42 00 00 80 00 4D 37 40 10 83 44 73 31 43 00 00 00 00 4D 36 45 00 FF 45 00 00 80 00 FF 45 00 00 FF 45 00 00 FF 45 00 00 FF 45 00 FF		Ident Stby	400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 401 Ncr: 6 Ncr: 402 Ncr: 401 Ncr: 5 Nrc: 401 Ncr: 402 Ncr: 402 Ncr: 10 Ncr: 10 Nrc: 10 Nrc: 16 Nrc: 16 Ncr: 6	117.492us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us 117.488us	Data Error Vasctor Count Wata Data Time(ns) Busy Time(ns)	94 31121 2	4512 15931131	E
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2222 11:1: 2273 11:2: 2274 11:1: 2275 11:1: 2275 11:1: 2276 11:1: 2276 11:1: 2276 11:1: 2270 11:1: 2270 11:1: 229 11:1: 229 11:1: 229 11:1: 229 11:1: 229 11:1: 229 11:1: 220 11:1: 2	1313.521.460.332 1313.521.460.422 1313.522.463.033 1313.522.463.035 1313.522.463.035 1313.524.415.545 1313.524.415.545 1313.524.417.475 1313.524.505 1313.526.865.222 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.225 1313.526.865.212 1313.527.855.012 1313.527.855.012 1313.527.855.012 1313.527.855.012 1313.527.855.005 1313.527.055.005 1313.527.055.005 1313.527.055.005 1313.527.055.005 1313.527.055.005 1313.527.055.005 1313.527.055.005 1313.527.005 1315.527.005 1315	(200) SERD, 00 COND Emergia R3 (200) SERD, 00 COND Emergia R3 (200) SERD, 00 COND Emergia R3 (200) SERD, 00 COND Emergia R3 (200) SERD, 2007 SELCTOR Emergia R3 (200) SERD, 2007 SELCTOR Emergia R4 (2007) SELCTOR (2007) SEL	$\begin{array}{c} 4 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \$		Stby Stby	400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz 400.04 KHz	Nrc: 401 Nrc: 402 Nrc: 402 Nrc: 401 Nrc: 401 Nrc: 401 Nrc: 402 Nrc: 18 Nrc: 18 Nrc: 18 Nrc: 16 Nrc: 16 Nrc: 16 Nrc: 13 Nrc: 13 Nrc: 19	117.492us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us 117.498us	Data Error Vasctor Count Wata Data Time(ns) Busy Time(ns)	94 31121 2	4512 15931131	в
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11112220 1111 112220 1111 11	31:3:3:3:3:3:3:3:3:3:3:3:3:3:3:3:3:3	CIGOL: SERD, OF_COND           CIGOL: SERD, OF_COND           Remp0: R3           CIGOL: SERD, CFL           CIGOL: SERD, CFL           Remp0: R3           CIGOL: SERD, CFL           CIGOL: SERD, CFL           Remp0: R1           CIGOL: SERD, CFL           Remp0: R1           Remp0: R1           CIGOL: SERD, CFL           Remp0: R1           REmp1: R1	41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 07         37           41 40 30 00 00 00 07         37           42 00 00 00 00 00 07         37           50 00 00 00 00 00 07         37           50 00 00 00 00 00 00         37           50 00 00 00 00 00 00         37           50 00 00 00 00 00 00         37           50 00 00 00 00 00 00         38           50 00 00 00 00 00 00         37           50 00 00 00 00 00 00         38           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37           50 00 00 00 00 00         37 <t< td=""><td>SC=1 WeisTime:104.977us BuryTime:1.0049ime</td><td>Stby Stby Tran Tran Tran</td><td>400.04 FRE           400.04 FRE  </td><td>Beer 401.           Beer 4           Beer 402.           Beer 402.           Beer 402.           Beer 401.           Beer 401.           Beer 402.           Breer 402.           Breer 100.           Breer 100.</td><td>117.46000 117.460000 117.460000 117.460000 117.460000 117.4600000 117.4</td><td>Deta Inter Inter Ver Data Time(ns) Busy Time(ns) Busy Time(ns) Detail Nasigator Detail Nasigator</td><td>94 31121 2 9,145</td><td>4512 15531131</td><td></td></t<>	SC=1 WeisTime:104.977us BuryTime:1.0049ime	Stby Stby Tran Tran Tran	400.04 FRE	Beer 401.           Beer 4           Beer 402.           Beer 402.           Beer 402.           Beer 401.           Beer 401.           Beer 402.           Breer 402.           Breer 100.	117.46000 117.460000 117.460000 117.460000 117.460000 117.4600000 117.4	Deta Inter Inter Ver Data Time(ns) Busy Time(ns) Busy Time(ns) Detail Nasigator Detail Nasigator	94 31121 2 9,145	4512 15531131	
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2020 1111     2020 111     2020 11     2020 11	19:13 - 9:1 - 9:0 - 9:2 - 1 19:13 - 9:2 - 9:0 - 9:2 - 2 19:13 - 9:2 - 9:0 - 9:2 - 2 19:13 - 9:2 - 9:0 - 9:2 - 2 19:13 - 9:2 - 9:0 - 9:0 - 2 19:13 - 9:2 - 9:0 - 9:0 - 2 19:13 - 9:0 - 9:0 - 0:0 - 2 19:13 - 9:0 - 9:0 - 0:0 - 2 19:13 - 9:0 - 9:0 - 0:0 - 2 19:10 - 9:0 - 1:0 - 2 Tametang Areas must be 1 10:10 - 9:0 - 1:0 -	CHOL: SERD, OF_COND           CHOL: SERD, OF_COND           SERD: OF_COND           CHOL: SERD, OF_COND           SERD:	41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 00 07         78           41 40 30 00 00 00 07         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00 00         78           41 40 30 00 00 00 00 00         78           41 40 30 00 00 00 00 00         78	SC=1 WeisTime:104.977us BuryTime:1.0049ime	Stby Stby Tran Tran Tran		Bee:         401.           Necr:         402.           Necr:         12.           Necr:         402.           Necr:         13.           Necr:         13.           Necr:         13.           Necr:         13.           Necr:         14.           Necr:         13.           Necr:         13.           Necr:         14.           Necr:         14.           Necr:         15.           Necr:         14.           Necr:         14.           Necr:         15.           Necr:         14.           Necr:         15.           Necr:         14.           Necr:         15.           Necr:         15.           Necr:         15.	127.460us         117.460us           127.460us         127.460us           127.470us         127.470us           127.470us         127.470us           128.0         127.470us <td>Detai Error Ver Dota Transfer) Busy Transfer) Busy Transfer) Busy Transfer Busy Transf</td> <td>94 31121 2 9,145</td> <td>4512 15531131</td> <td>.0</td>	Detai Error Ver Dota Transfer) Busy Transfer) Busy Transfer) Busy Transfer Busy Transf	94 31121 2 9,145	4512 15531131	.0
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11112         11112           11112         11112           11112         11112           1111         1112	19:13 - 9:1 - 9:0 - 9:2 - 1 19:13 - 9:2 - 9:0 - 9:2 - 2 19:13 - 9:2 - 9:0 - 9:2 - 2 19:13 - 9:2 - 9:0 - 9:2 - 2 19:13 - 9:2 - 9:0 - 9:0 - 2 19:13 - 9:2 - 9:0 - 9:0 - 2 19:13 - 9:0 - 9:0 - 0:0 - 2 19:13 - 9:0 - 9:0 - 0:0 - 2 19:13 - 9:0 - 9:0 - 0:0 - 2 19:10 - 9:0 - 1:0 - 2 Tametang Areas must be 1 10:10 - 9:0 - 1:0 -	CHOL: SERD, OF_COND           CHOL: SERD, OF_COND           SERD: OF_COND           CHOL: SERD, OF_COND           SERD:	41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 07         77           41 40 30 00 00 00 07         78           41 40 30 00 00 00 07         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00         78           41 40 30 00 00 00 00 00         78           41 40 30 00 00 00 00 00         78           41 40 30 00 00 00 00 00         78	SC=1 WeisTime:104.977us BuryTime:1.0049ime	Stby Stby Tran Tran Tran		Bee:         401.           Necr:         602.           Necr:         12.           Necr:         13.           Necr:         13.           Necr:         13.           Necr:         13.           Necr:         13.           Necr:         13.           Necr:         14.           Necr:         13.           Necr:         14.           Necr:         14.           Necr:         15.           Necr:         14.           Necr:         15.           Necr:         15.           Necr:         16.           Necr:         16.           Necr:         17.           Necr:         18.           Necr:         18.           Necr:         14.           Necr:         15.           Necr:         15. <td< td=""><td>127.460us         117.460us           127.460us         127.460us           127.470us         127.470us           127.470us         127.470us           128.0         127.470us  <td>Detai Error Ver Dota Transfer) Busy Transfer) Busy Transfer) Busy Transfer Busy Transf</td><td>94 31121 2 9,145</td><td>4512 15531131</td><td><u>e</u></td></td></td<>	127.460us         117.460us           127.460us         127.460us           127.470us         127.470us           127.470us         127.470us           128.0         127.470us <td>Detai Error Ver Dota Transfer) Busy Transfer) Busy Transfer) Busy Transfer Busy Transf</td> <td>94 31121 2 9,145</td> <td>4512 15531131</td> <td><u>e</u></td>	Detai Error Ver Dota Transfer) Busy Transfer) Busy Transfer) Busy Transfer Busy Transf	94 31121 2 9,145	4512 15531131	<u>e</u>

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

File Captu	. 4		Search All Field		ve to text Stack DSD							Tu	inning
Connect	Protocol Protocol Analyzer Hide Way	eforms- Run		To bottom Window, Sa	ve to text Stack DSO					Naviantes			6
Times	stamp (h:m:s.ms.us.ns dur) Even	t	Data	Information	Current s	stat Error mes	ssag Bus	Clock	CMD Durat:	Navigator Discription	Txns	Bytes	
270	11:13:13.920.485.741 1 Re	sp01 R3	3F 40 FF 80 80 FF					Nor: 6	117.488us	Command	94	4512	_
271	11:13:13.921.608.132 1 CMD0	1 SEND_OP_COND	41 40 30 00 00 B7				400.023 K.	Nrc: 401	117.492us	Data	31121	15931131	
272	11:13:13.921.740.622 1 Re	sp01 R3	3F 40 FF 80 80 FF					Nor: 6	117.488us	Error	2		
273	11:13:13.922.863.013 1 CMD0	1 SEND_OP_COND	41 40 30 00 00 B7				400.04 KHz	Nrc: 402	117.488us	<ul> <li>Sector Count Wait Data Time(ns)</li> </ul>			
274	11:13:13.922.995.500 1 Re	sp01 R3	3F 40 FF 80 80 FF					Nor: 6	117.488us	Busy Time(ns)			
275	11:13:13.924.115.391 1 CMD0	1 SEND_OP_COND	41 40 30 00 00 B7				400.04 KHz	Nrc: 401	117.488us	,			
276	11:13:13.924.247.878 1 Re	sp01 R3	3F C0 FF 80 80 FF					Nor: 5	117.492us				
277	11:13:13.925.370.272 1 CMD0	2 ALL_SEND_CID	42 00 00 00 00 4D				400.04 KHz	Nrc: 402	117.488us				
278	11:13:13.925.502.759 1 Re	sp02 R2	3F 45 01 00 53 44 57 31					Nor: 6	337.466us				
279	11:13:13.925.885.221 3 CMD0	3 SEND_RELATIVE_ADDR	43 00 00 00 00 21				400.04 KHz	Nrc: 18	117.488us				
280	11:13:13.926.035.206 1 Re	sp03 R1	03 00 00 05 00 FB		Ident			Nor: 12	117.492us				
281	11:13:13.926.192.693 1 CMD0	9 SEND_CSD	49 00 00 00 00 AF				400.04 KHz	Nrc: 16	117.488us				
282	11:13:13.926.335.179 1 Re	ap09 R2	3F DO OF OO 32 OF 59 03					Nor: 9	337.466us				E
283	11:13:13.926.712.641 3 CMDI	3 SEND_STATUS	4D 00 00 00 00 0D				400.04 KHz	Nrc: 16	117.488us	Statistics Txns	Bytes		
184	11:13:13.926.845.128 1 Re	ap13 R1	0D 00 00 07 00 FB		Stby			Nor: 6	117.400us	statustics Txris	oytes	_	_
285	11:13:13.927.005.112 1 CMD0	7 SELECT/DESELECT_CARD	47 00 00 00 00 83				400.04 KHz	Nrc: 16	117.492us				
296	11:13:13.927.155.101 1 Re	ap07 R1	07 00 00 07 00 75		Stby			Nor: 13	117.488us				
287	11:13:13.927.320.084 1 CMD0	8 SEND EXT_CSD	48 00 00 00 00 C3				400.04 KHz	Nrc: 19	117.488us				
298	11:13:13.927.470.069 1 Re	ap08 R1	08 00 00 09 00 F1		Tran			Nor: 13	117.488us				
289	11:13:13.931.837.146 4	Read, 512 bytes	00 00 00 00 00 00 00 00 00	SC=1 WaitTime:4.24959ms			lbit						
290	11:13:13.942.153.654 1 CMD0	8 SEND_EXT_CSD	48 00 00 00 00 C3				400.023 K.	Nrc: 13	117.492us				
291	11:13:13.942.303.642 1 Re	sp08 R1	08 00 00 09 00 F1		Tran			Ncr: 13	117.488us				
292	11:13:13.942.616.108 3	Read, 512 bytes	00 00 00 00 00 00 00 00 00	SC=1 WaitTime:194.977us			lbit						
293	11:13:13.952.920.117 1 CMD0	6 SWITCH	46 03 B9 01 00 2F				400.04 KHz	Nrc: 9	117.492us				
294	11:13:13.953.045.101 1	Busy start											
295	11:13:13.953.070.105 2 Re	sp06 R1b	06 00 00 08 00 CB		Tran				117.488us				
96	11:13:13.954.050.007 9	Busy end		BusyTime:1.00491ms									
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Line No.	Timestamp (h:m:s ms.us no dur)	Event	Data	Informatio	a	Corrent state	Error message	Bas	Clock CMD	Duration Data Duration			
1236	11:13:13.898.172.889 2.07ms	CMD08 SEND_EXT_CSD	48 00 00 01 AA 87				400	.04 KHz N	cc: 784 117.	492us			
1287	11:13:13.927.320.084 164.98	S CMD08 SEND EXT_CSD	48 00 00 00 00 C3				400	.04 KHz N:	rc: 19 117.	488us			
1290	11:13:13.942.153.654 10.31m	CHDO8 SEND_EXT_CSD	48 00 00 00 00 C3				400	.023 K. N	rc: 13 117.	492us			
1299	11:13:13.954.507.465 167.48	S CMD08 SEND EXT_CSD	48 00 00 00 00 C3				400	.04 KHz N	rc: 19 117.	488us			
1												_	_