

# MSO3124シリーズ

## Acute MSO3000

### 6-in-1 Instrument

DAQ, DSO, DVM, Frequency Counter,  
Logic Analyzer, Protocol Analyzer

- PC-based, USB3.0 interface / bus powered
- Record length : 128 (256) Mpts / Analog (Digital) CH

① Data Logger : HDD / SSD Storage

② DSO : 4 Channels, 1 GS/s S/R, 200 MHz bandwidth

③ Digital Voltmeter : 3 digits

④ Frequency Counter : 5 digits

⑤ Logic Analyzer : 16 Channels, 2 GS/s Timing Analysis, 250 MHz State Analysis

Protocol Decode : CAN 2.0B/CAN FD, DP\_Aux<sup>[1]</sup>, eSPI, I<sup>2</sup>C, I<sup>2</sup>S, MII, MIPI I3C 1.1, MIPI SoundWire, MIPI SPMI 2, SPI Flash, SVI3<sup>[2]</sup>, SVID<sup>[3]</sup>, UART, USB PD 3.1, ... (100+)

Protocol Trigger : CAN2.0B/CAN FD, eSPI, MII, MIPI I3C 1.1, RGMII, SVI3<sup>[2]</sup>, SVID<sup>[3]</sup>, ... (30+)

⑥ Protocol Analyzer: CAN2.0B/CAN FD, eSPI, MII, MIPI I3C 1.1, RGMII, SVI3<sup>[2]</sup>, SVID<sup>[3]</sup>, ... (20+)



150 x 123 x 33 mm<sup>3</sup>  
Device Weight: 400g

Model	Vertical Resolution (DSO)	DSO Trigger / Protocol Trigger (DSO)	Protocol Trigger (Logic Analyzer)	Electrical Validation <sup>[*]</sup>
MSO3124E	8 bits	I / -	I	-
MSO3124B	8 bits	I, II / I	I, II	-
MSO3124H	8, 12~16 bits	I, II / I	I, II, III	-
MSO3124V	8, 12~16 bits	I, II / I, II	I, II, III	I2C, I3C, SPI, UART, ...

### Software Window



### System Requirements

- USB 3.0 port
- Windows 10/11 (64-bit)
- PC RAM 16GB (recommended) or 8GB at least



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URL <http://www.dsp-tdi.com/>

# DSO Specifications (Main Device) アナログ部仕様 (本体部)

Model	MSO3124E	MSO3124B	MSO3124H	MSO3124V		
Power	Power source	USB bus-power (+5V)				
	Static power consumption	4.5W				
	Max power consumption	7.7W				
Acquisition	Mode	Sample, Average, Envelope <sup>[*]</sup> , Peak detect <sup>[*]</sup> , High resolution <sup>[*]</sup>				
	Sampling @ 1Ch	1 GS/s	1 GS/s   500 MS/s   100 MS/s			
	Sampling @ 2Ch (8   12   ≥14 bits)	500 MS/s	500 MS/s   250 MS/s   100 MS/s			
	Sampling @ 4Ch	250 MS/s	250 MS/s   125 MS/s   100 MS/s			
	Record length @ 1Ch	512 Mpts	512 Mpts   256 Mpts			
	Record length @ 2Ch (8   ≥12 bits)	256 Mpts	256 Mpts   128 Mpts			
	Record length @ 4Ch	128 Mpts	128 Mpts   64 Mpts			
Input	Input channels	4				
	Input coupling	AC/DC				
	Input impedance	1 MΩ    <19 pF				
	Overshoot protection	± 100 V (DC+AC peak)				
	Ch-Ch isolation	50dB @ DC to 100MHz; 40dB @ 100MHz to 200MHz				
Temperature	Ch-Ch skew	100 ps between two channels with the same scale & coupling settings				
	Operating / Storage	5°C~40°C (41°F~104°F) / -10°C~65°C (14°F~149°F)				
I/O port	Trig-In	Workable : 2.5V to 5V / Typical : TTL 3.3V (Rising/Falling)				
	Trigger pulse approval	> 8 ns				
	Trig-Out	TTL 3.3 V				
	Ref. Clock input	10MHz, Vpp=3.3 to 5V				
	Ref. Clock output	10MHz, TTL 3.3V				
Vertical	Connector type	MCX jack / female				
	Bandwidth	200 MHz				
	Rise time	1.75 ns @ 200 MHz; 3.5 ns @ 100 MHz; 7 ns @ 50 MHz				
	Resolution	8 bits	8, 12, 14, 15, 16 bits			
	Input sensitivity	2 mV/div to 10 V/div (Full-Scale: ±4 div/screen, ±1 div beyond screen)				
Horizontal	Offset range	±150 V @ 2, 5, 10 V/div; ±1.5 V @ 0.2, 0.5, 1 V/div; ±1.5 V @ 2, 5, 10, 20, 50, 100 mV/div				
	DC accuracy	±3% of Full-Scale				
	Bandwidth limit	20 MHz, 100 MHz or Full				
	Time scale	1 ns/div to 100 s/div (10 div/screen)				
Trigger	Time resolution	125 ps				
	Time accuracy	±10 ppm				
	Delay range	Pre-trigger: 0 to 100% of 1 screen; Post-trigger up to 50 sec.				
	Trigger mode	Auto, Normal, Single, Roll <sup>*</sup>				
Protocol Trigger / Decode	Source	Ch1, Ch2, Ch3, Ch4, Ext. (TTL only)				
	Coupling	DC, LF reject (50kHz), HF reject (50kHz), Noise reject				
	Trigger range	±4 div from window center				
	Vertical sensitivity	1 div or 5 mV @ <10 mV/div; 0.6 div @ ≥ 10 mV/div				
	Hold off range	~60 ns to 10 sec.				
Measurement/ Processing	DSO I	Edge, Either, External, Falling, Rising, Video, Width				
	DSO II	Runt, Pattern/State, Timeout, Transition, Setup/Hold, B-Trigger, B-Event, Window				
Electrical Validation (Protocol) <sup>[*]</sup>	Measurement	Frequency, Period, ±Duty, ±Period, Rise/ Fall Time, Delay, Phase; VMax, VMin, VHigh, VLow, Vpp, VAmp, VMid, VMean, VRMS, ±Overshoot, Rise/ Fall Preshoot; Edge Count, ±Pulse Count				
	Cursor	Time difference, Voltage difference				
	Math	+, -, ×, ÷, XY, IAI, √A, Log(A), Ln(A), ∫Adt, e <sup>A</sup>				
	FFT	Rectangular, Blackman, Hann, Hamming, Harris, Triangular, Cosine, Lanczos, Gaussian. (Vertical Scale: dBm RMS, dBV RMS, Linear RMS)				
	Export data	WORD, EXCEL, CSV, TEXT, HTML, MATLAB				
Cascade	Max. channels expand	16 Ch (4x Device, 1 Master & 3 Slaves)				
	Trigger source	Main device only				
	Skew between Master & Slave	±2ns @ 1 GS/s ; ±4ns @ 500 MS/s ; ±8ns @ 250 MS/s				
Packing List	Device (150 x 123 x 33 mm <sup>3</sup> )	1				
	USB3.0 Y cable (1.8M)	1				
	Type-C OTG Adapter	1				
	250 MHz Probe	4				
	Stack cable (30cm)	2				
	Handbag	1				
	Total Weight	1200g				

[1] Optional DP\_Aux adapter needed.

[\*] Free update by year end

# Logic Analyzer Specifications (LA POD) デジタル部仕様(本体+各LA Pod)

Device LA POD	MSO3124E LA16E	MSO3124B LA16B	MSO3124H LA16H	MSO3124V LA16V
Timing analysis (Asynchronous, Max. sample rate)			2 GS/s	
State clock rate (Synchronous, external clock)			250MHz	
Storage		Conventional Timing, Transitional Timing		
Channels		16		
Record length		256 Mpts per channel		
Timing vs. Channels	Timing analysis 2 GS/s 1 GS/s	Available channels (Conventional / Transitional Timing) - Memory per channel (8/7)-512 Mpts (16/14)-256 Mpts		
vs. Memory	500 MS/s 250 MS/s	(16/16)-256 Mpts (16/16)-256 Mpts		
Channel to channel skew		< 1ns		
Input	Input channels Input impedance Maximum (Non-destructive) Operation Sensitivity	16 75kΩ    <2pF ±50V ±30V 0.25Vpp @50MHz, 0.5Vpp @150MHz, 0.8Vpp @250MHz		
Threshold	Group Range Resolution Accuracy	2 (D0~D7, D8~D15 & CK0) ±30V 50mV ±100mV + 5%*Vth		
Trigger	Resolution Channels States Events Pre / Post Pass counter	500ps 16 8 8 Yes Yes (0~1048575 times)		
Protocol Analyzer	Types Protocol I Protocol II Protocol III	External, Manual, Multi Level, Setup/Hold Violation, Single Level, Timeout, Width BiSS-C, CAN2.0B/CAN FD, DP_Aux <sup>[1]</sup> , HID over I2C, I2C, I2S, LIN2.2, MIPI I3C 1.1, SENT, SPI, UART, USB PD 3.1 DALI, LPC, MDIO, Mini/Micro LED, MIPI RFFE 3, MIPI SPMI 2, Modbus, PMBus, Profibus, SMBus, SVI2, USB1.1 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 Decode	I II III	BiSS-C, CAN2.0B/CAN FD, DP_Aux <sup>[1]</sup> , HID over I2C, I2C, I2S, LIN2.2, MIPI I3C 1.1, SPI, UART, USB PD 3.1 DALI, MDIO, MIPI RFFE 3, Modbus, PMBus, Profibus, SMBus, USB1.1 eSPI, MII, RGMII, RMII, SVI3 <sup>[2]</sup> , SVID <sup>[3]</sup>		
Line Decoding	Biphase Mark, Differential-Manchester, Manchester (Thomas, IEEE802.3), Miller, Modified Miller, NRZI, ...			
Line Encoding	AMI(Standard, B8ZS, HDB3), Biphase Mark, CMI, Differential-Manchester, Manchester (Thomas, IEEE802.4), MLT-3, Miller, Modified Miller, NRZI, Pseudoternary, ...			
Packing List	LA POD Flying lead cables (LA20P) Gripper	1 2 20		

[1] Optional DP\_Aux adapter needed.

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

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

Packing Listがアナログ部とデジタル部で分けて書いてありますが本体とLA PODが機種ごとに異なるだけです。アクセサリ類の内容は4機種共通で、すべて含まれています。

発注型番は、MSO3124E、MSO3124B、MSO3124H、MSO3124V の4種類のみ。複雑なオプションはありません。

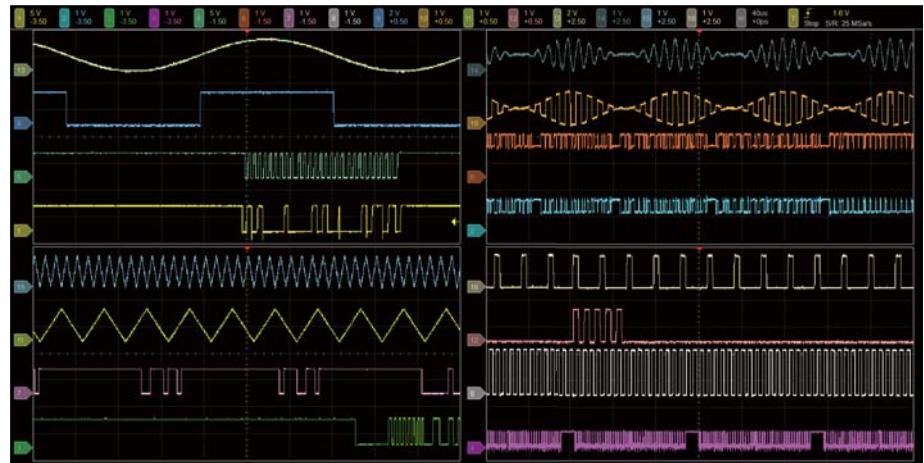
## DAQ

For real-time signal data monitoring.

## DSO

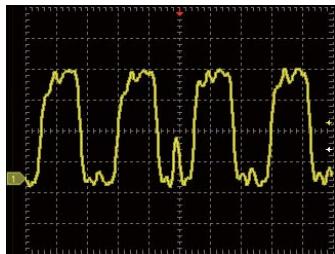
### Multiple Devices Stack Mode :

Support DSO stack mode, up to 4 devices (16 channels) can be stacked together in the same time.

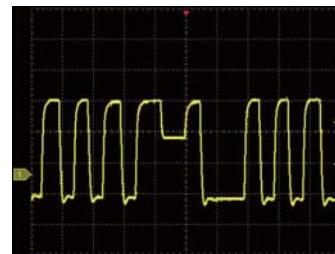


### Functions :

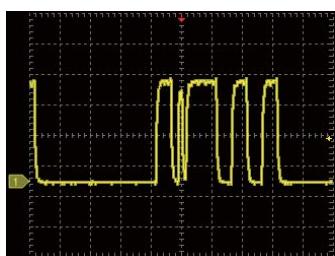
- **Edge Trigger** : Trigger on a rising/falling/either.
- **Pattern Trigger** : Trigger when logic inputs cause the selected function goes true.
- **Trigger Hold off** : Hold off time adjustable up to 10s.
- **Runt Trigger** : Use 2 voltage thresholds and pulse width to trigger on either/ positive or negative runt signals.



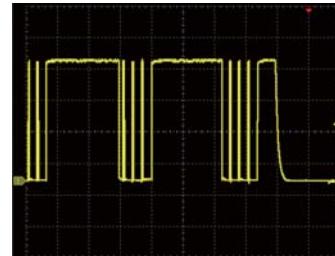
Positive Runt



Negative Runt

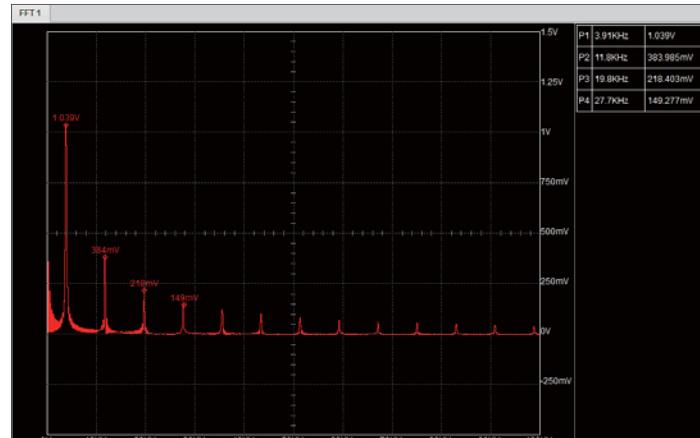


- **Pulse Width Trigger**  
Pulse width range from 8ns to 50s.



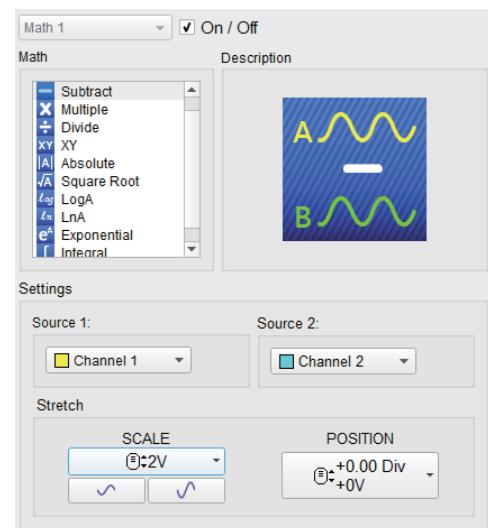
- **Timeout Trigger**  
Trigger when no pulse is detected within a specified time, range from 8ns to 50s.

- **Spectrum analysis**  
**(Fast Fourier transform, FFT)**  
Apply FFT to the selected channel.



## • Math

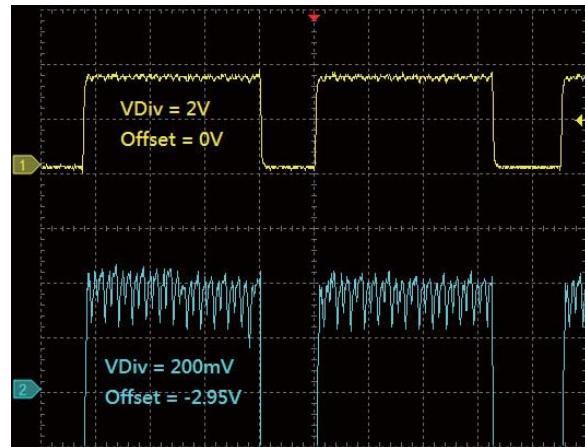
Add, Subtract, Multiple, Divide, XY, Absolute, Square Root, LogA, LnA, Exponential, Integral



## • Vertical Offset

Right-press the mouse to offset the voltage vertically with the resolution from 2mV/Div to 10V/Div for both channels.

The 16-bits resolution MSO3124H provides more noise details for this vertical offset function.



## • Trigger Coupling Mode

Provide DC Coupling, Low Frequency (LF) Reject, High Frequency (HF) Reject and Noise Reject function:

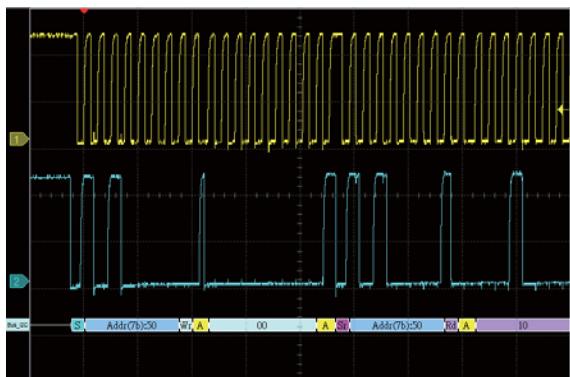
**LF Reject:** Apply 50 kHz high pass filter to the signal before entering the Trigger circuit.

**HF Reject:** Apply 50 kHz low pass filter to the signal before entering the Trigger circuit.

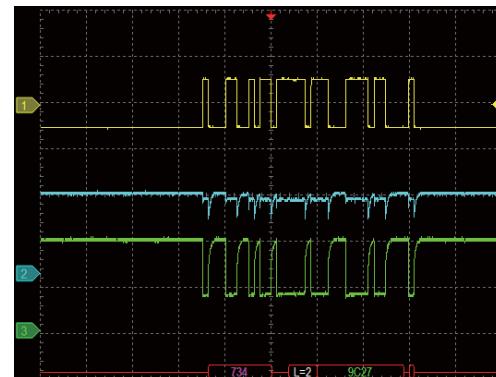
**Noise Reject:** Lower the Trigger sensitivity to avoid false triggering.

## • Protocol Decode & Trigger Function

Provides, CAN/CAN-FD, I<sup>2</sup>C, LIN, MIPI I3C 1.1, ProfiBus, SPI, UART(RS232), USB1.1,... protocol decode and trigger function, which is able to trigger and decode on the specified Command/Address/Data...

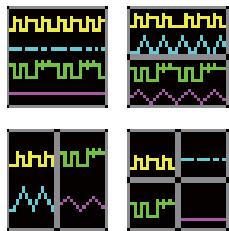


Decode the I<sup>2</sup>C waveforms



Decode the differential CAN signals with a differential probe.  
(CH1: Differential Probe, CH2: CAN H, CH3: CAN L)  
※ Supports CAN-FD, CAN2.0

## • Multiple Windows

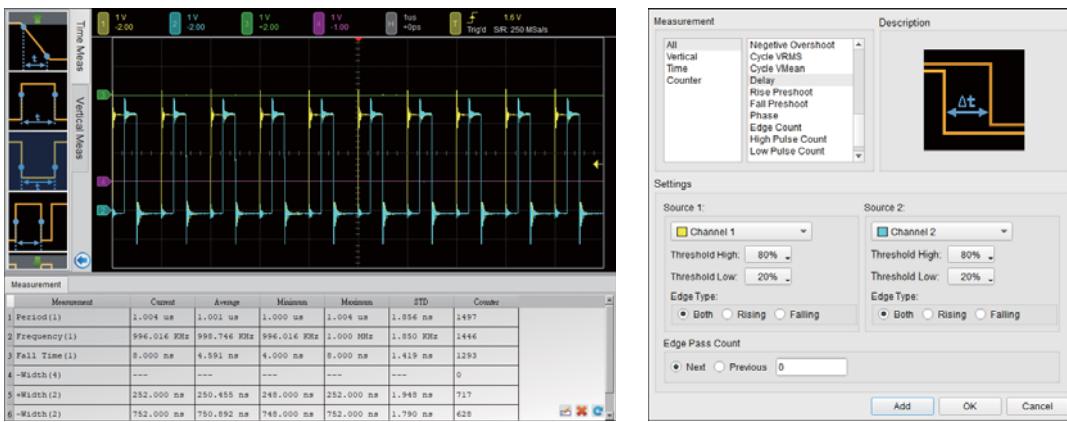


Multiple Window feature provides 4 display types (1x1, 2x1, 1x2, 2x2), which could displays 16 channels in maximum 4 different windows, provides clear waveform readability without lower the vertical resolution.

## • Measurement :

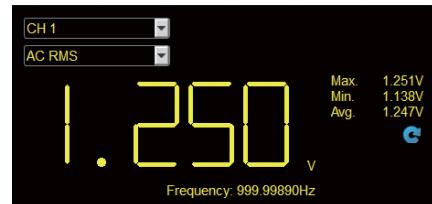
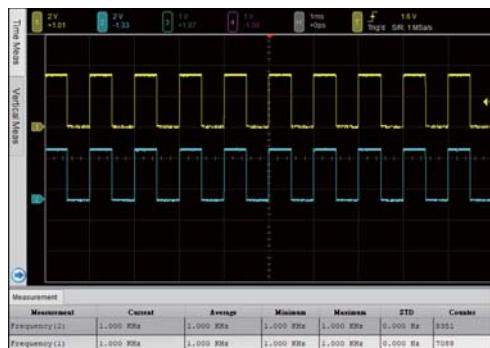
More than 20 types of waveform measurements with customized threshold settings features, provides real-time update for vertical, time and channel to channel timing measurements with statistic features.

- Time: Frequency, Period,  $\pm$ Duty,  $\pm$ Period, Rise /Fall Time, Delay, Phase
- Vertical: VMax, VMin, VHigh, VLow, Vpp, VAmp, VMid, VMean, VRMS,  $\pm$ Overshoot, Rise /Fall Preshoot
- Counter: Edge Count,  $\pm$ Pulse Count



## Digital Voltmeter (DVM) & Frequency Counter

Provides voltage root-mean-square, voltage average and frequency counter function for the selected channel.



Measure 1 KHz, 2.5 Vpp square waveforms by the DVM function.

Measure 1 KHz, 2.5 Vpp square waveforms by the measurement function.

## Packing List 1/2 (本体とLA POD以外の同梱アクセサリは4機種で共通です。)



Device



USB3.0 Y cable (1.8M)  
Type-C OTG Adapter



250 MHz Probe  
4個



Stack cable



Handbag

# Logic Analyzer

Built-in DSO to capture analog waveforms to compare with the digital waveforms.

Provides multiple storage modes, users could select to have long time recording or precision acquisition.

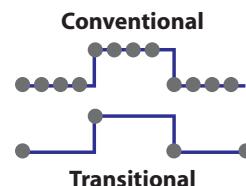
## LA Storage mode

Conventional Storage  Signal Rate 200MHz

Transitional Storage  Signal Rate 200MHz

Streaming to PC RAM  ≤ Signal Rate 200MHz  
(Depends on PC's performance)

Streaming to PC HDD  ≤ Signal Rate 200MHz  
(Depends on PC's performance)



LA Device RAM

PC RAM

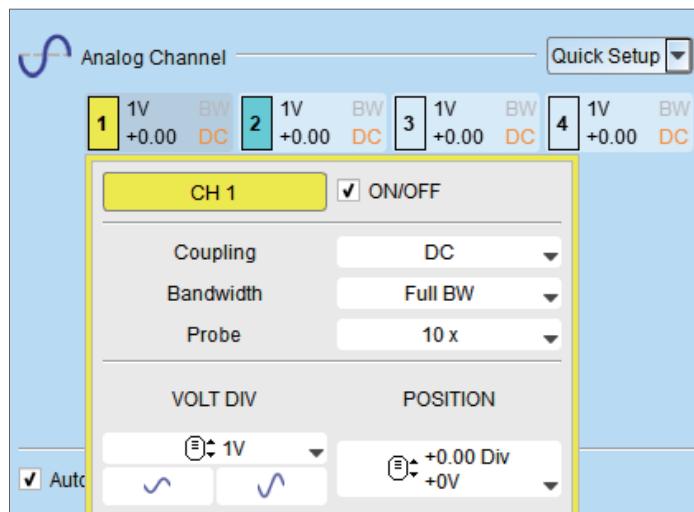
PC HDD

Short time ——————> Long time

## Analog waveform

Input Sensitivity: 2mV/div to 10V/div; Max. Sampling Rate: 1GS/s @ 1Ch

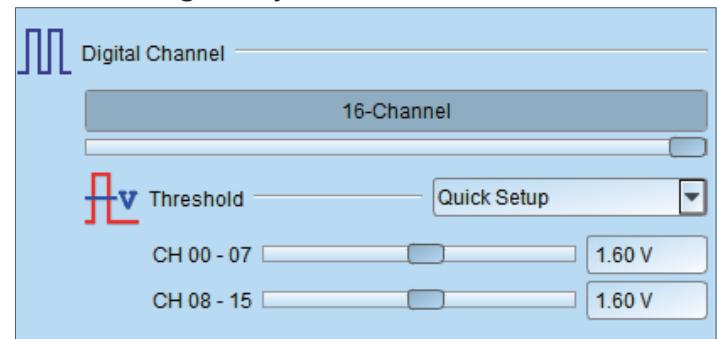
Can be used with High Voltage probe, Differential probe or Current probe.



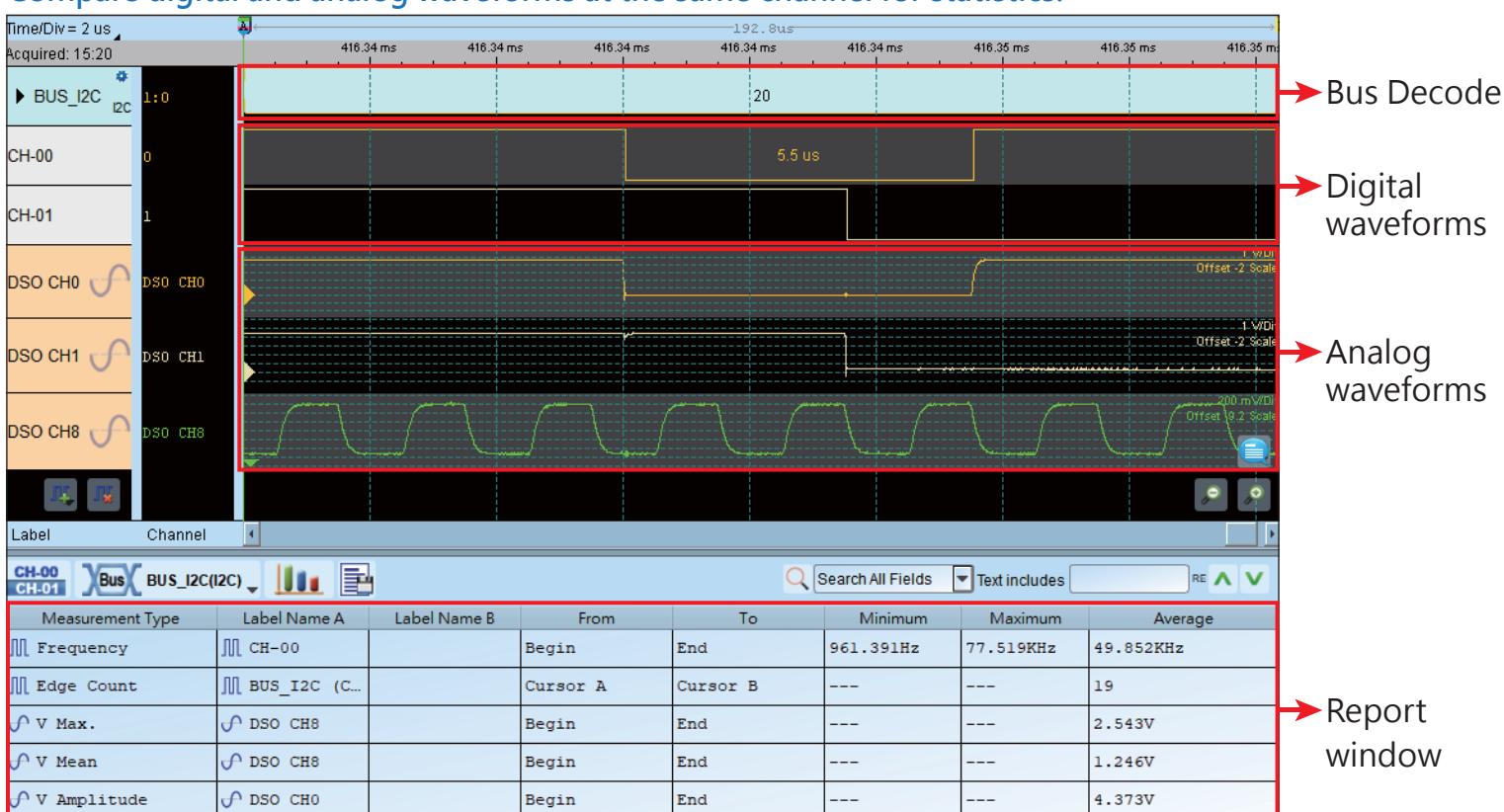
## Digital waveform

Operation Range: ±30V

Max. Timing Analysis: 2GS/s @ 8Ch



Compare digital and analog waveforms at the same channel for statistics.



Bus Decode

Digital waveforms

Analog waveforms

Report window

## Protocol Analyzer

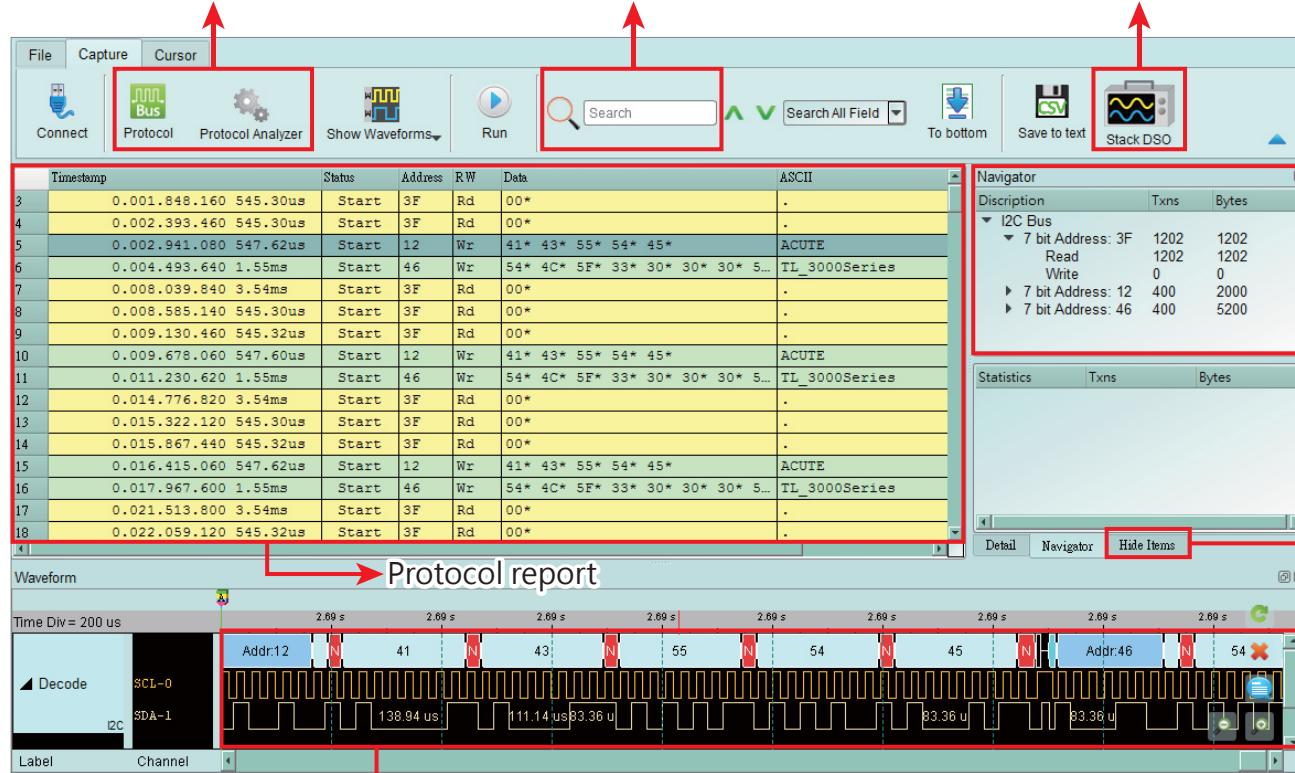
It is hardware decoding, may log protocol data very long time if without waveforms.

Application timing: Preliminary protocol debug.

Support multiple protocols with different operating modes

Real-time data search

Stack with a DSO as an MSO in logic analyzer mode



Real-time data statistics

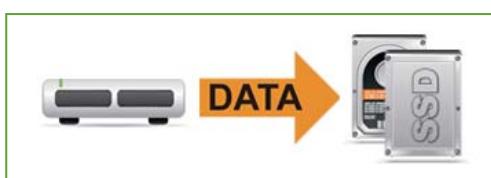
Hide items for easy view



### Protocol Analyzer

Show real-time protocol data

Application timing: massive protocol data with some idles in between



### Protocol Logger

Like data logger, save massive data into SSD hard drive

Application timing: massive protocol data



### Protocol Monitor

Like dash cameras, record protocol data by the device's memory only

Application timing: trigger event only happens in very long time

## Packing List 2/2 (対応するLA PODと以下のアクセサリも含まれています)



LA POD: LA16E / B / H / V



Flying lead cables (LA20P) 2個



Gripper 20個