SDS1000X-E Series Digital Oscilloscope

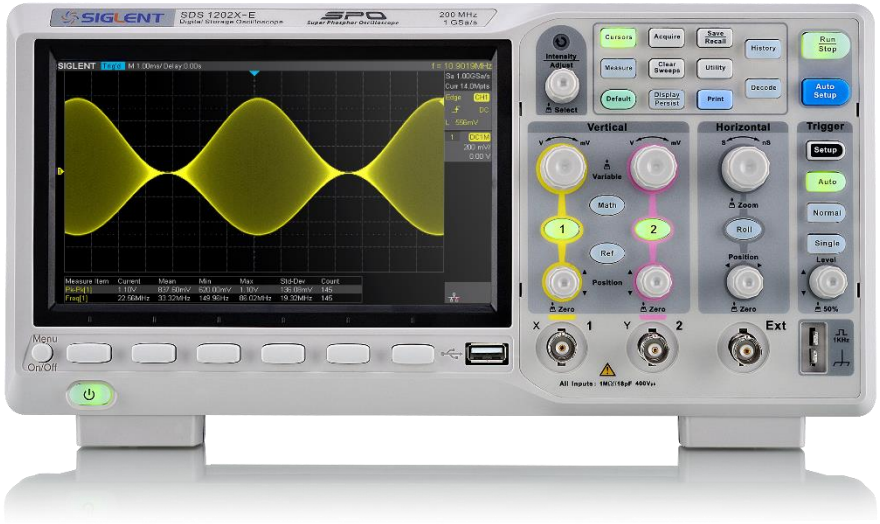
April 2017

Questions:

- What do you need in your oscilloscope?
  - Low background noise
  - Small channel crosstalk
  - Easy to operate
  - Large waveform record length
  - Useful in capturing intermittent, abnormal signals
  - Segmented acquisition (Increases storage depth utilization)
  - High spectral resolution
  - History waveform record function
  - High resolution mode
  - Serial bus triggering and decode
  - …..

Siglent's SDS1000X-E Provides You with the Most Economical Solution

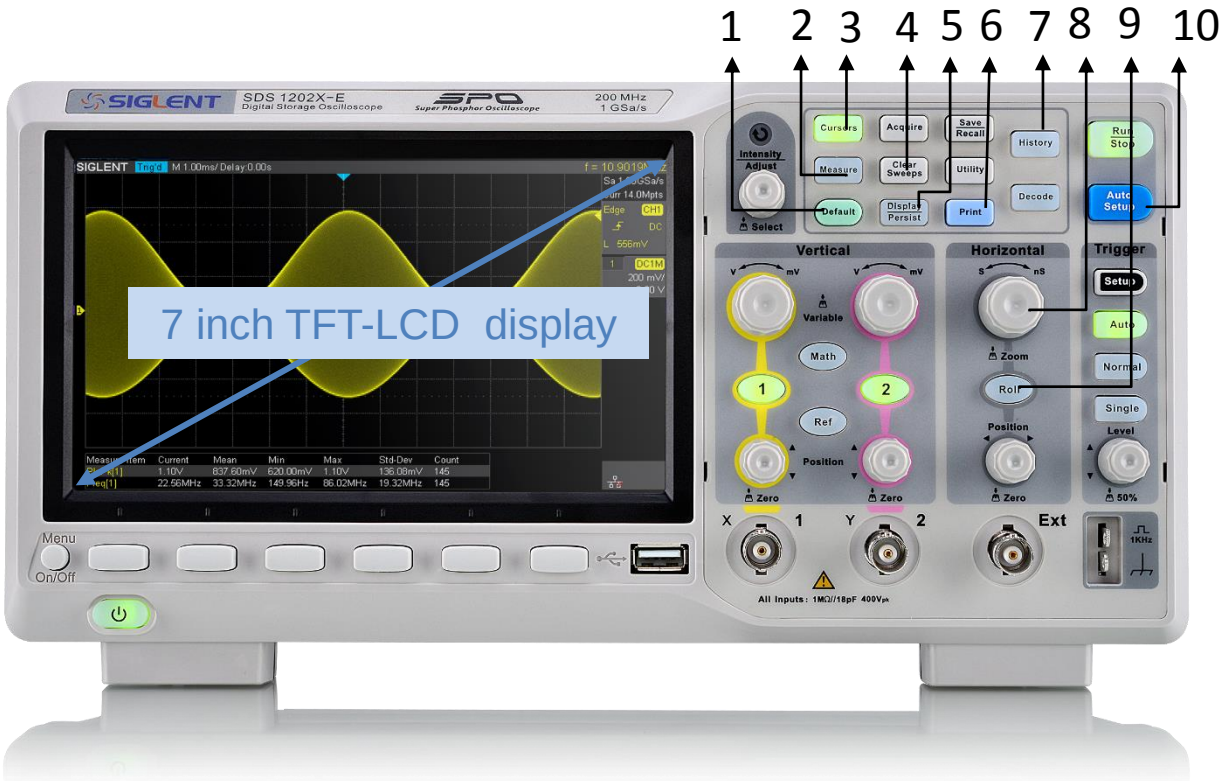
- The newest generation of SPO technology
  - Waveform capture rate up to 100,000 wfm/s (normal mode), and 400,000 wfm/s (sequence mode)
  - Supports 256-level intensity grading and color display
  - Record length up to 14 Mpts
  - Digital trigger system
- Analog front end design
- Intelligent triggers
- Automatic measurement function on 38 parameters
- Advanced debugging toolkit
- Serial trigger and decode (Standard)
- ……



SDS1000X-E Model and Main Features

Model	SDS1202X-E
Bandwidth	200 MHz
Channels	2 + Ext
Max Sampling Rate	1 GSa/s
Record Length	14 Mpts
Data Processing	True measurements on all 14 Mpoints
Vertical Resolution	8 bit (Eres mode, up to 3 bits equivalent ENOB)
Max Waveform Capture Rate	400,000 wfm/s (Sequence mode)
Vertical Sensitivity	500 uV/div ~ 10 V/div
Trigger Type	Edge, Slope, Pulse Width, Window, Runt, Interval, Dropout, Pattern, Video
Serial Trigger and Decode Type (Standard)	IIC, SPI, UART/RS232, CAN, LIN
Sequence Mode	Up to 80,000 segments
History Mode	Up to 80,000 segments
FFT Data Processing Capacity	1 Mpts
Automatic Measurement	38 types, supports Statistics, Zoom measurement, Gating measurement, Math measurement, History measurement and Ref measurement
Interface	USB Host, USB Device (USBTMC), LAN (VXI-11), Pass/Fail, Trigger Out
Display	7 inch TFT-LCD display, 8*14 grid

7 Inch Display and 10 Types of One-Button Shortcuts

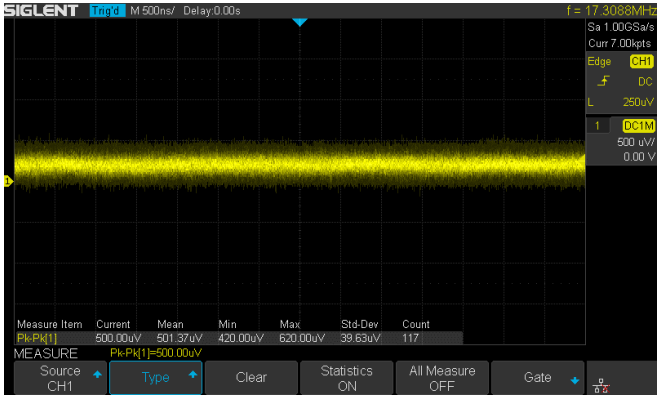


- 7 inch TFT-LCD display, 800*480 resolution
- Places the user's most commonly used functions into a convenient one-button shortcuts, a total of 10 species

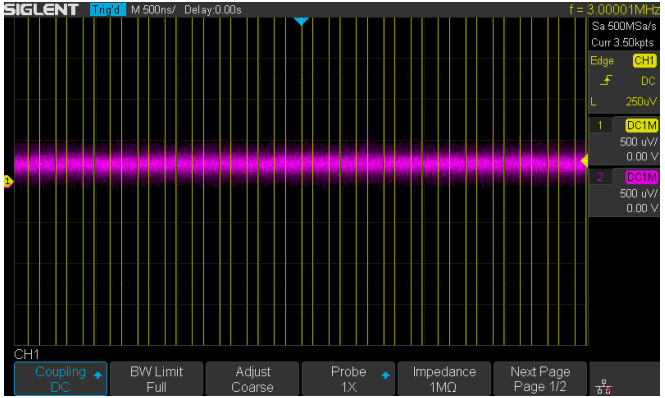
Default	Measure
Cursors	Clear
Persist	Print
History	Zero
Roll	Auto

Excellent Analog Front End Design

- Sensitive to 500 μV/div voltage scale
  - Without limiting the bandwidth
  - Without software to enlarge the display
  - Background noise lower to 500 μV



- High channel isolation
  - Full bandwidth, channel isolation greater than 35 dB
  - Low channel crosstalk

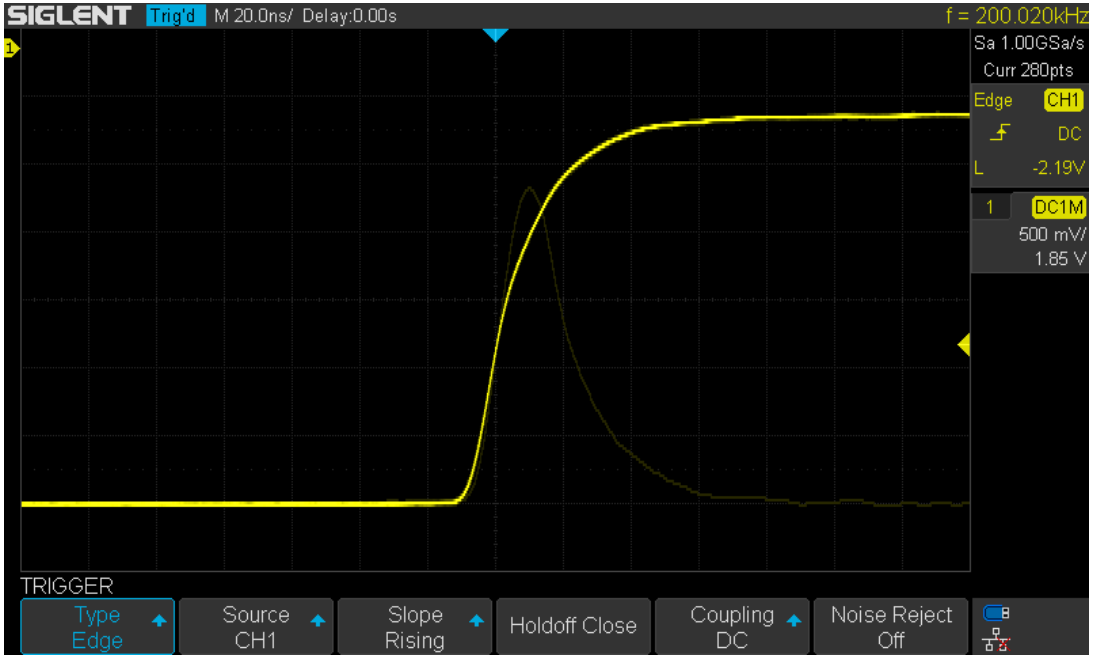


New Generation of SPO Technology

- Waveform capture rate up to 400,000 wfm/s
- Supports 256-level intensity grading and color display
- Record length up to 14 Mpts
- Digital trigger system

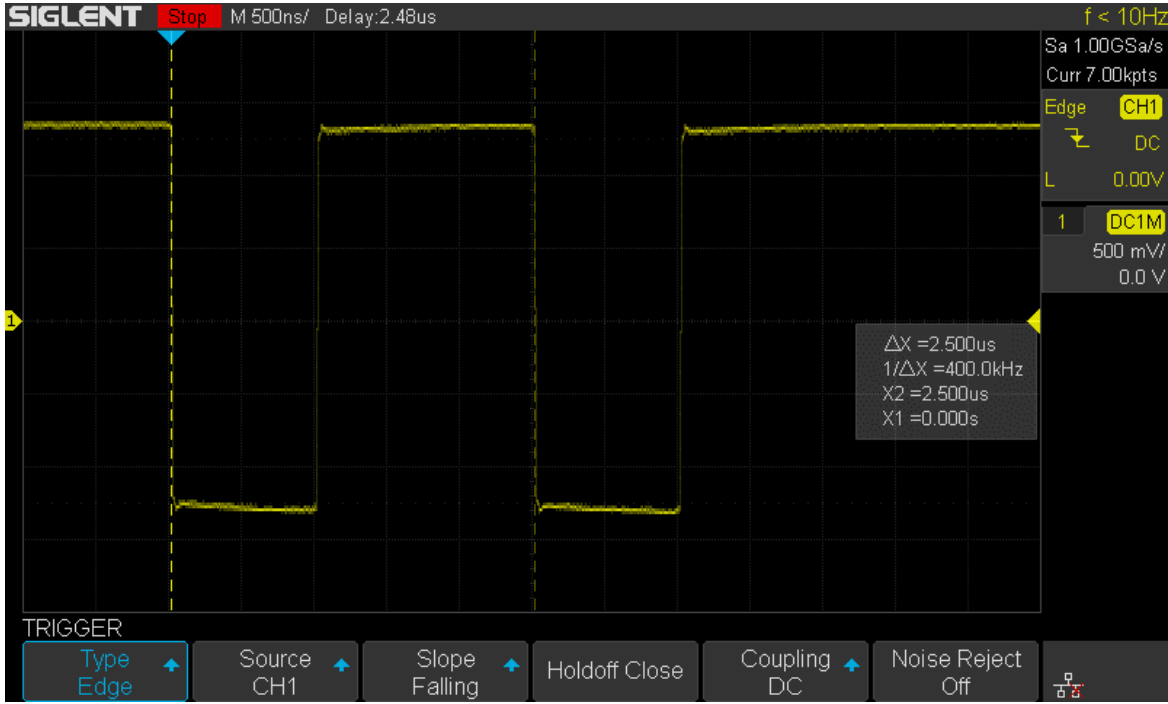
New Generation of SPO Technology

- Waveform capture rate up to 400,000 wfm/s
  - The minimum dead time is as small as 2.5 μs
  - Easily capture glitches or low probability events



New Generation of SPO Technology

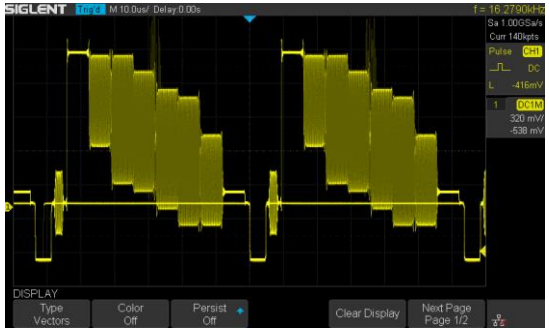
- Waveform capture rate to 400,000 wfm/s
  - Real-time measurement trigger output (Trigger Out), minimum trigger interval of 2.5 μs

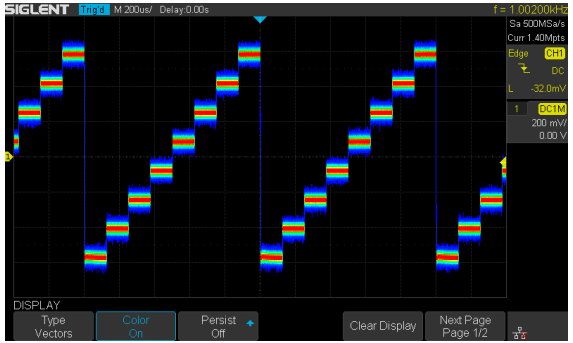


New Generation of SPO Technology

- 256-level intensity grading and color display modes
  - The more often (or longer) a pixel is illuminated in a given time period, the brighter that pixel will appear
- Color temperature display mode is similar to the intensity grading mode except that , instead of the intensity getting brighter, the pixel color becomes “hotter”
- Buy using brightness and color temperature display modes, you can quickly find abnormal or occasional signals

Brightness level display

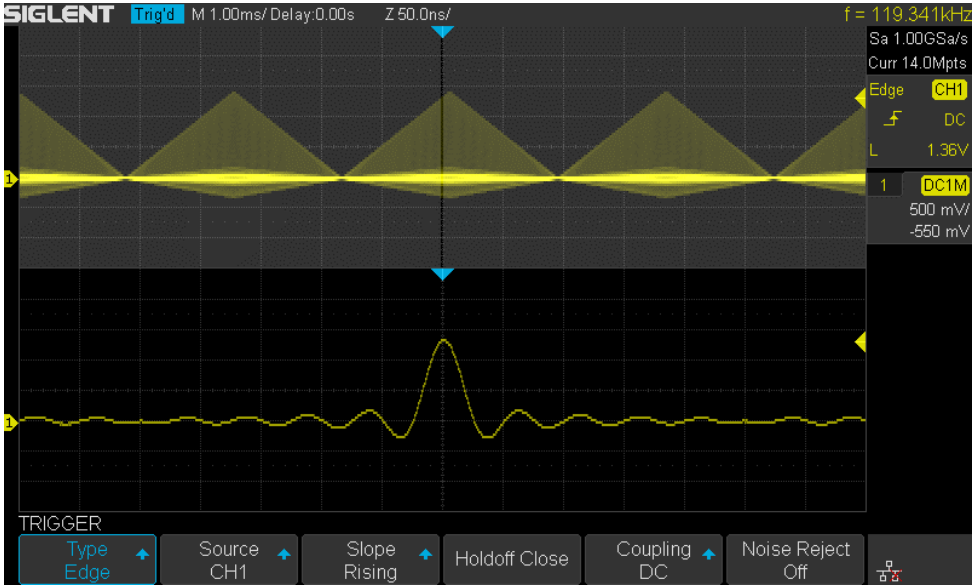




Color temperature display

New Generation of SPO Technology

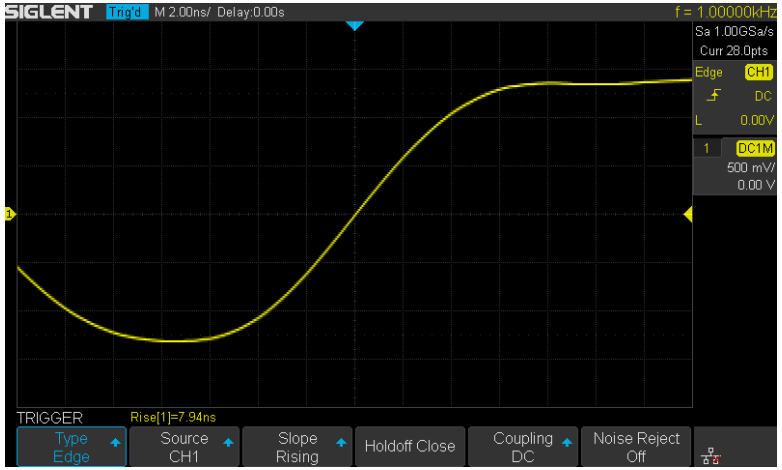
- Record length up to 14 Mpts
  - Improve the measurement accuracy when using a large time base setting
  - The sampling rate can still reach to 1 GSa/s when the time base is 1 ms/div
  - Both the overall waveform and a detailed view can be analyzed simultaneously using the ZOOM function



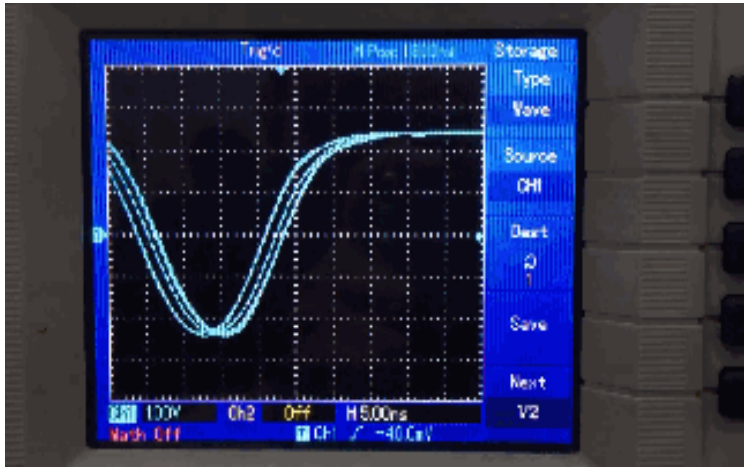
New Generation of SPO Technology

- Digital Trigger System

SDS1000X-E (Digital Trigger)



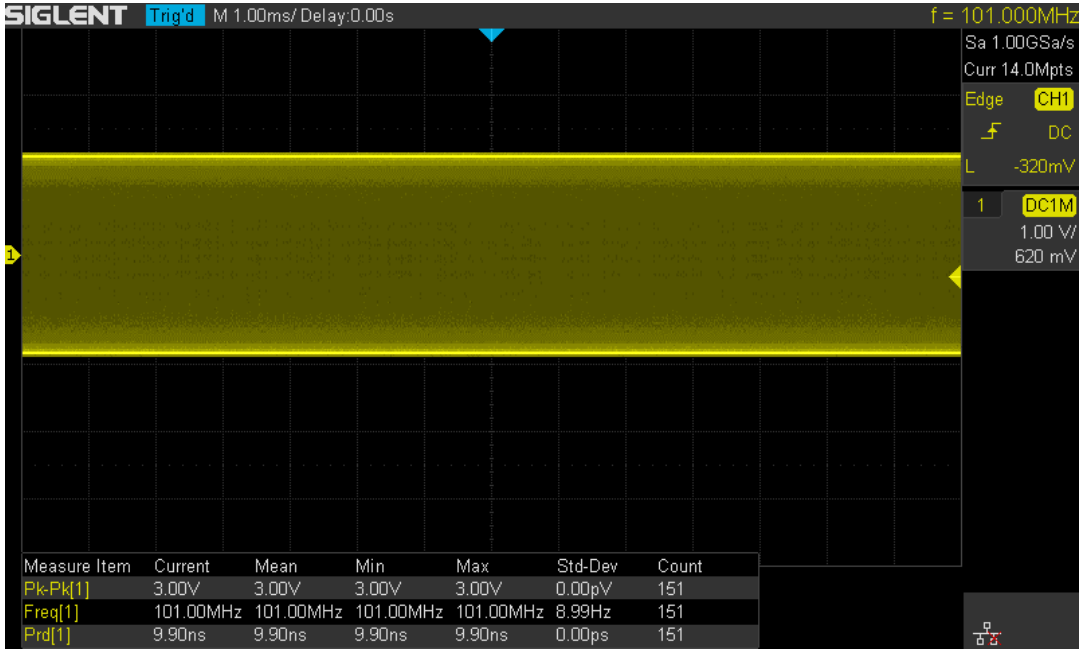
DSO (Analog Trigger)



- The SDS1000X-E utilizes an innovative digital triggering system with higher triggering sensitivity and trigger jitter of less than 100 ps

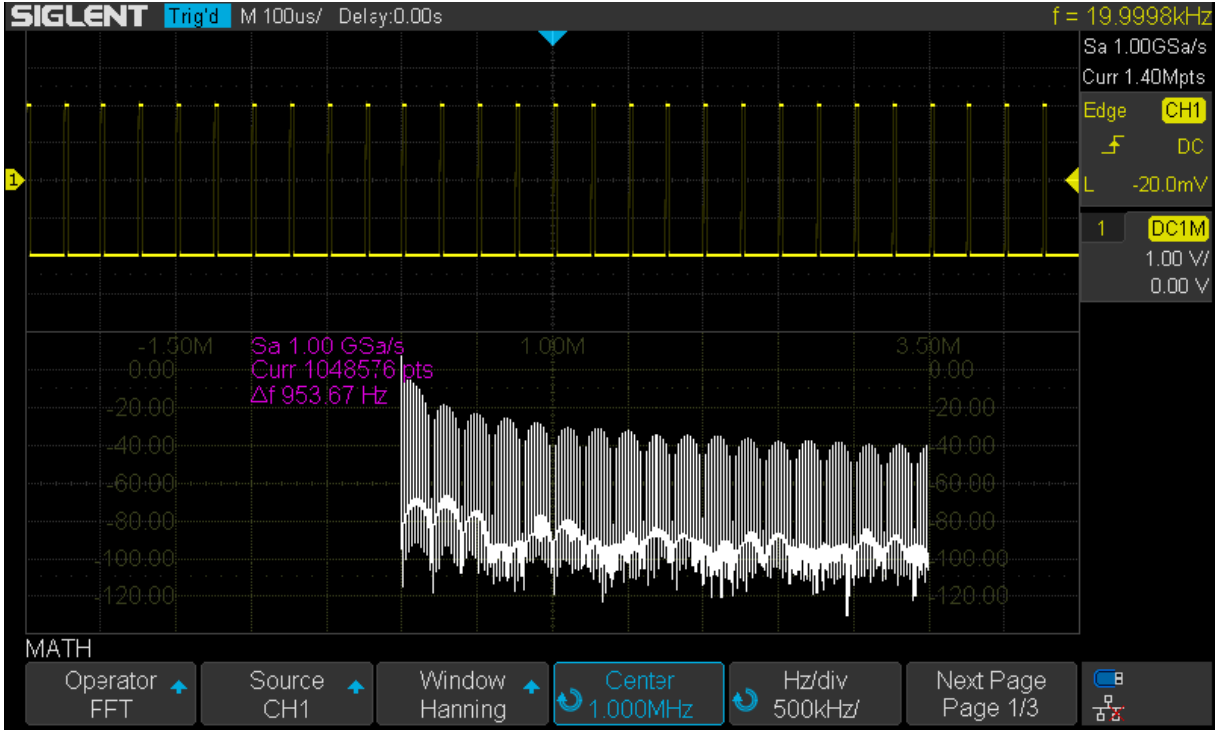
True Measurements Using 14 M Points

- Higher measurement accuracy
- The data sampled under the Nyquist theorem can be accurately measured to avoid the inaccurate measurement of the compression algorithm
- Meets the requirements of high sampling, deep storage and high accuracy
- Maintains very fast response speed while capturing and analyzing 14 Mpts of data



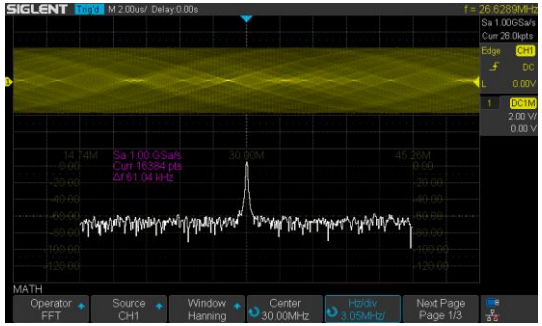
1 MPts of FFT Data

- High frequency resolution with a fast refresh rate

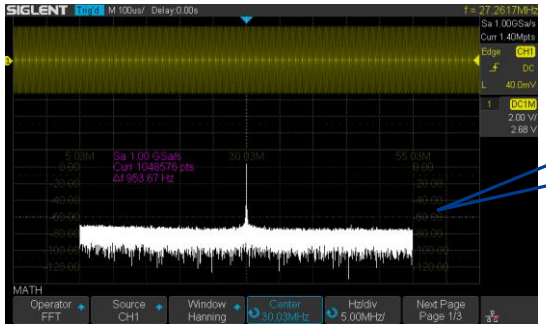


1 MPts of FFT Data

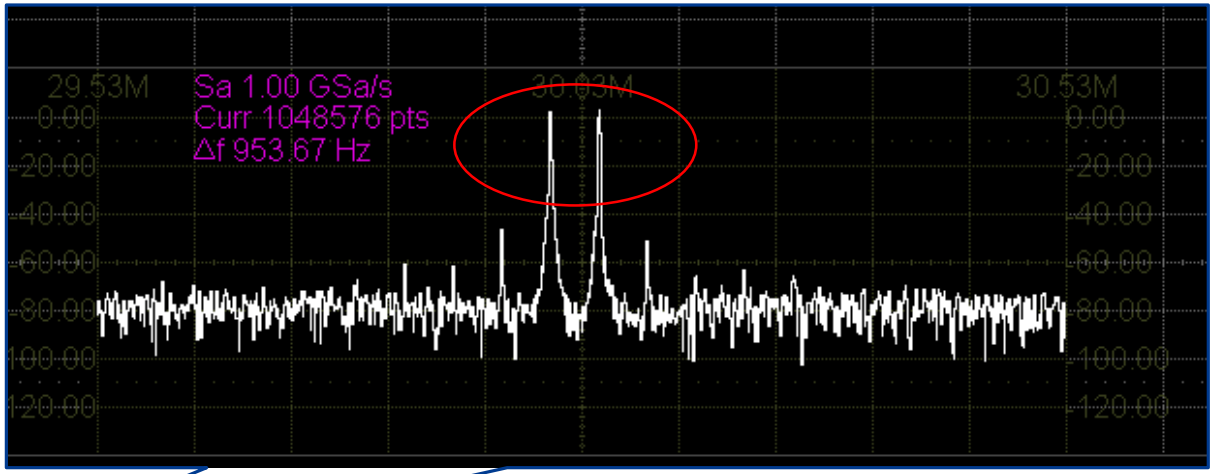
When we input a dual-tone signal with frequency at 30 MHz and 30.5 MHz……



16 kpts FFT



1 Mpts FFT

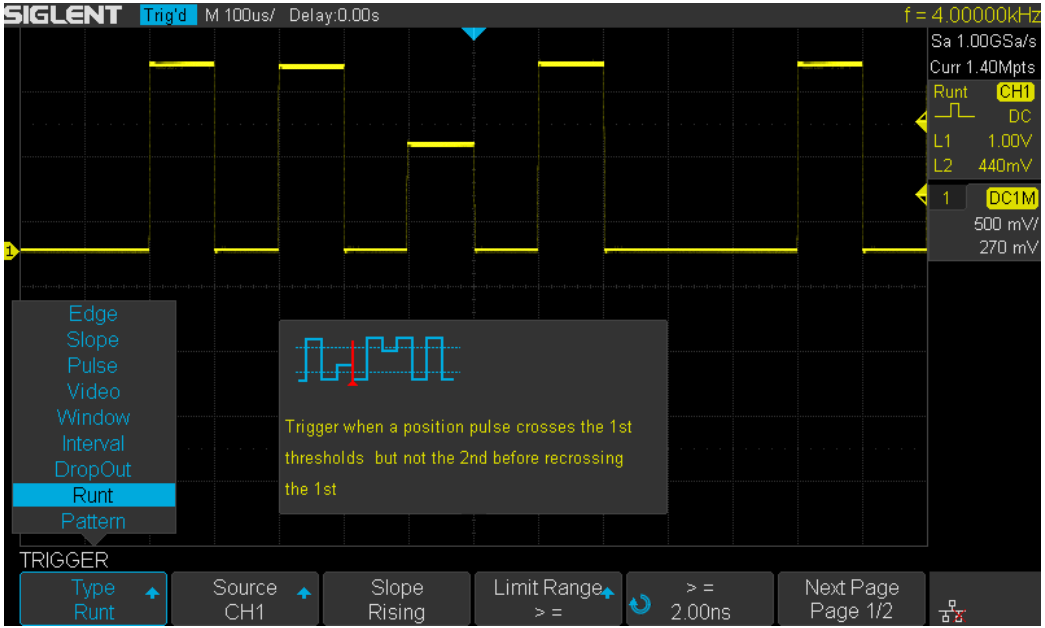


The difference is only 0.05 MHz of the two frequencies of the dual-tone signal is clearly distinguished when 1 Mpts FFT

— **SDS1000X-E can get very high spectral resolution**

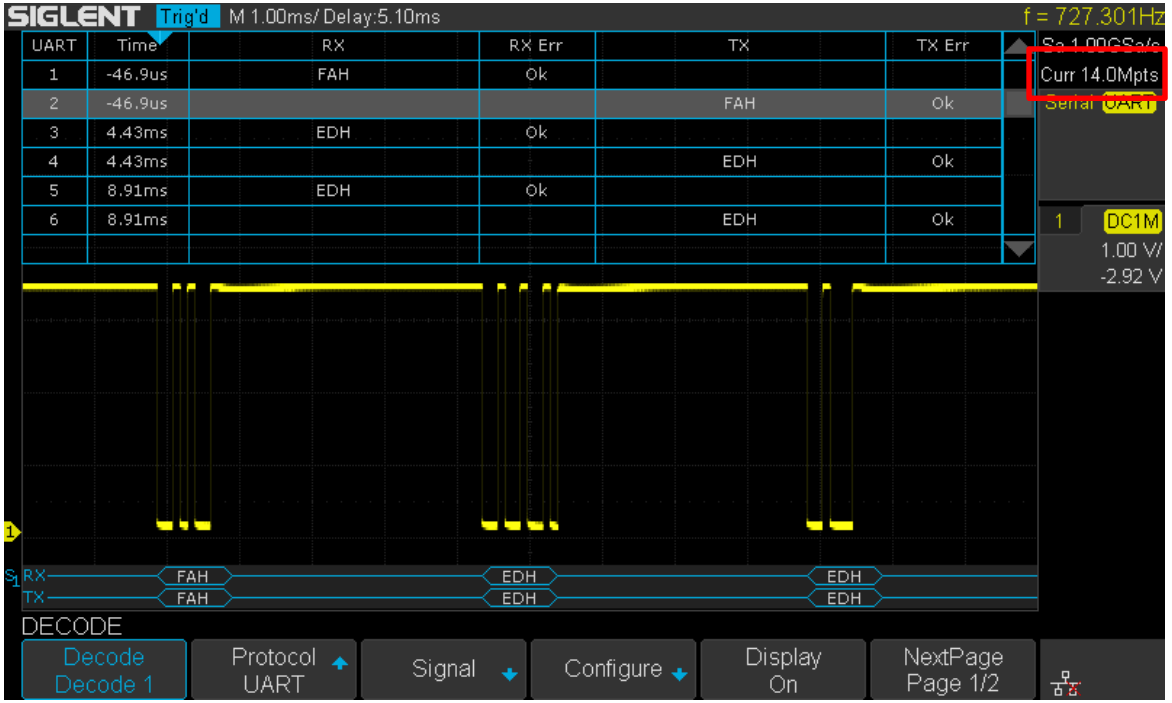
Intelligent Digital Trigger System

- Trigger Types
  - Edge
  - Slope
  - Pulse Width
  - Video (Supports HDTV)
  - Window
  - Runt
  - Interval
  - Dropout
  - Pattern
- Interactive user-interface design. Each triggering choice displays a definition of that trigger type



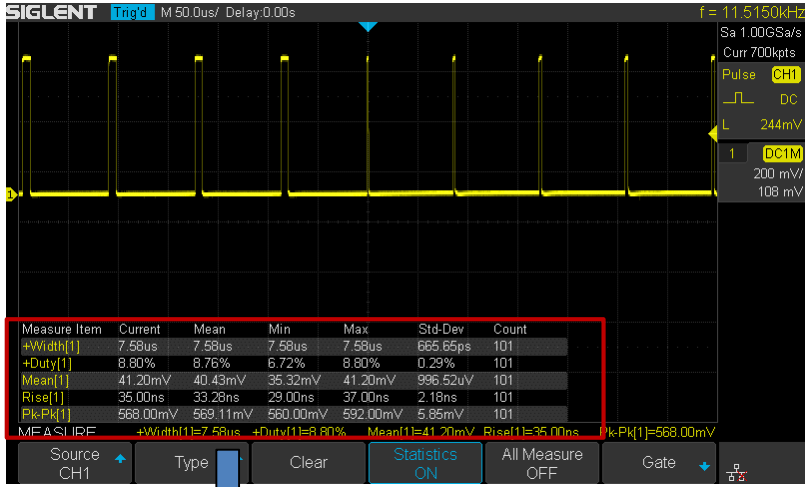
Serial Bus Triggering and Decode (Standard)

- Supports bus types
  - IIC
  - SPI
  - UART/RS232
  - LIN
  - CAN
- **Up to 14 M points trigger and decode**
- Supports for event list display
- **All types free**



Comprehensive Measurement and Statistical Functions

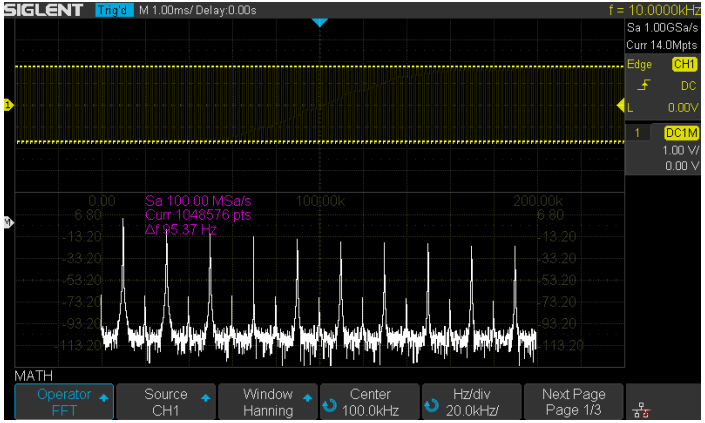
- Automatic measurement function on 38 parameters
- Supports Gating measurement, Math measurement, History measurement and Ref measurement
- Supports Statistics: Current, average, minimum, maximum, standard deviation, and the number of statistical samples

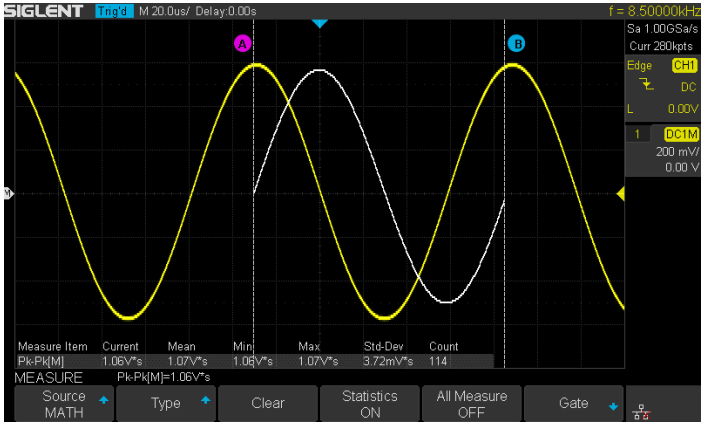


Measure Item	Current	Mean	Min	Max	Std-Dev	Count
+Width[1]	7.58us	7.58us	7.58us	7.58us	665.65ps	101
+Duty[1]	8.80%	8.76%	6.72%	8.80%	0.29%	101
Mean[1]	41.20mV	40.43mV	35.32mV	41.20mV	996.52uV	101
Rise[1]	35.00ns	33.28ns	29.00ns	37.00ns	2.18ns	101
Pk-Pk[1]	568.00mV	569.11mV	560.00mV	592.00mV	5.85mV	101

Advanced Math Functions

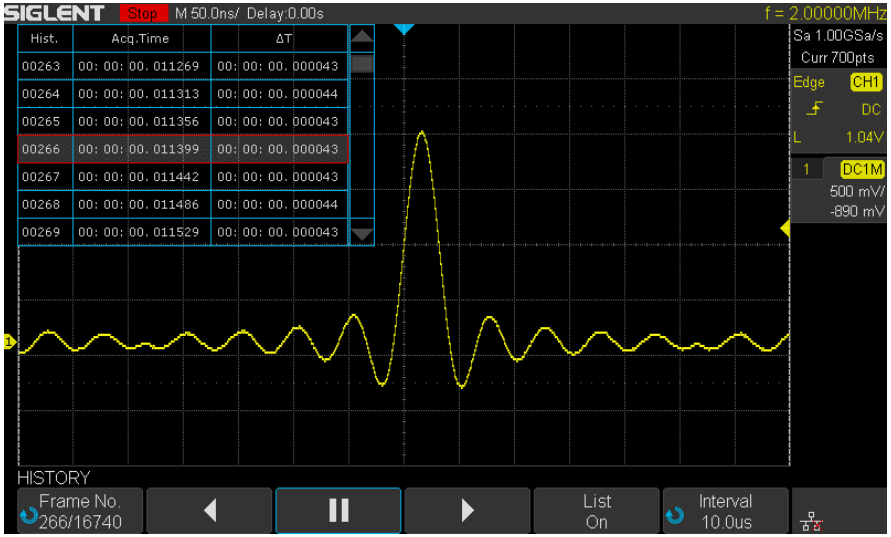
- Supports not only common functions such as addition, subtract, multiply and divide, but also more complex functions including FFT, integration, differential, and square root functions
- Supports Gated Integration
  - Use the cursor to set the time period for the integration
  - Easily calculate the area under the curve. Measure and calculate parameters such as energy





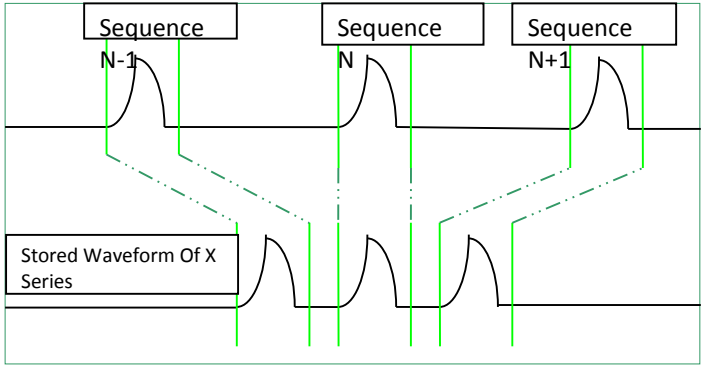
Advanced Debugging and Analysis Toolkit

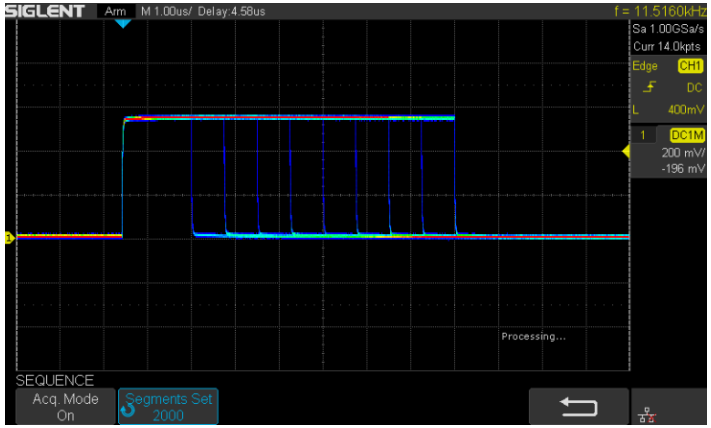
- History Mode
  - Resident in the Backstage, one-button to start
  - Record up to 80,000 historical frames
  - Equipped with a dedicated waveform navigation bar. Waveform can be analyzed frame by frame
  - The trigger time for each frame is displayed in a time list
  - Users can analyze the regularity of the abnormal waveform, so as to quickly locate the root of the problem with the Sequence pattern



Advanced Debugging and Analysis Toolkit

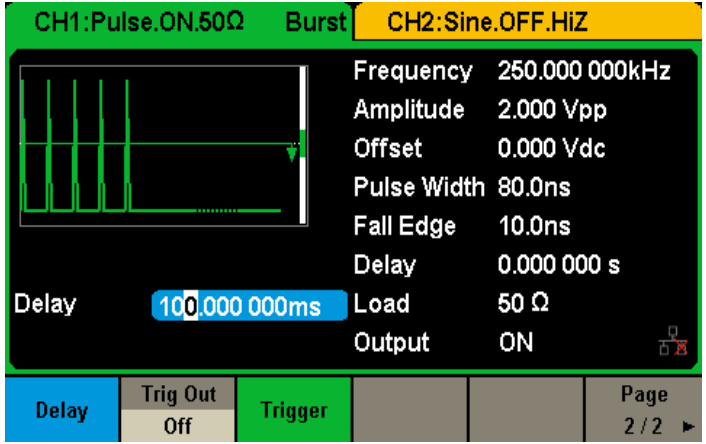
- Sequence Mode
  - The oscilloscope's storage is divided into multiple segments. Each trigger event saves a segment of data
  - Remove the “relatively redundant” information segments to improve the valuable storage depth utilization
  - The minimum dead time is 2.5 μs and the equivalent waveform capture rate is as high as 400,000 wfm/s
  - Using the History mode, the user can calculate the interval of the trigger frame

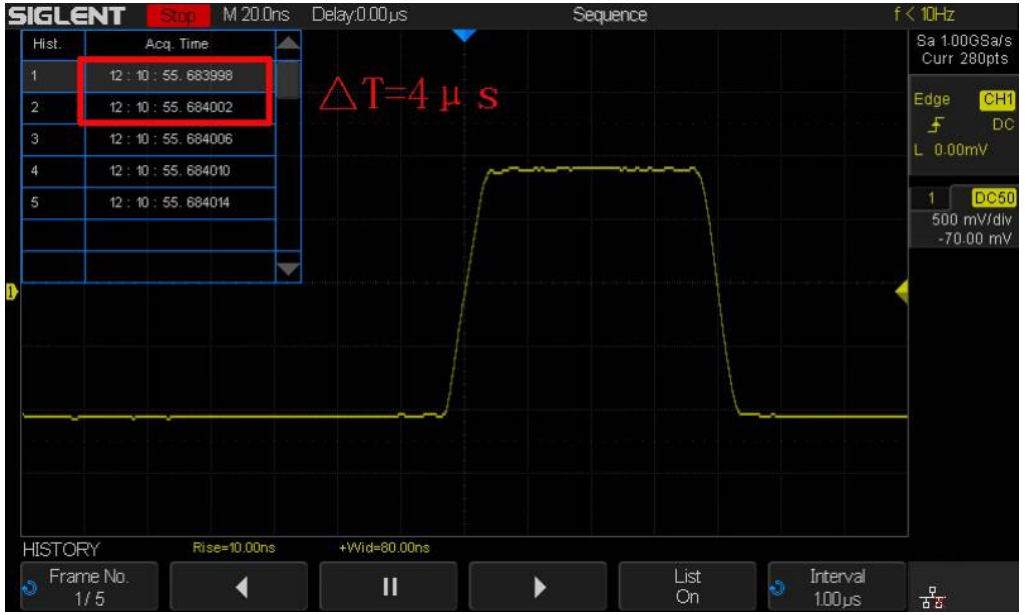




Advanced Debugging and Analysis Toolkit

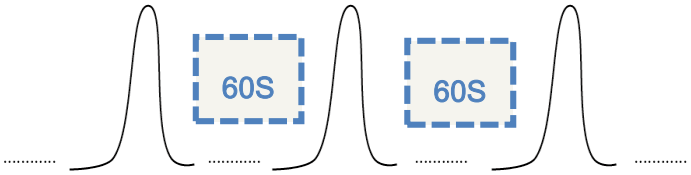
- Typical application of Sequence Mode
  - SDS1000X-E series oscilloscopes can capture fast changing waveforms, to compensate for the low real-time waveform capture rate in signal analysis



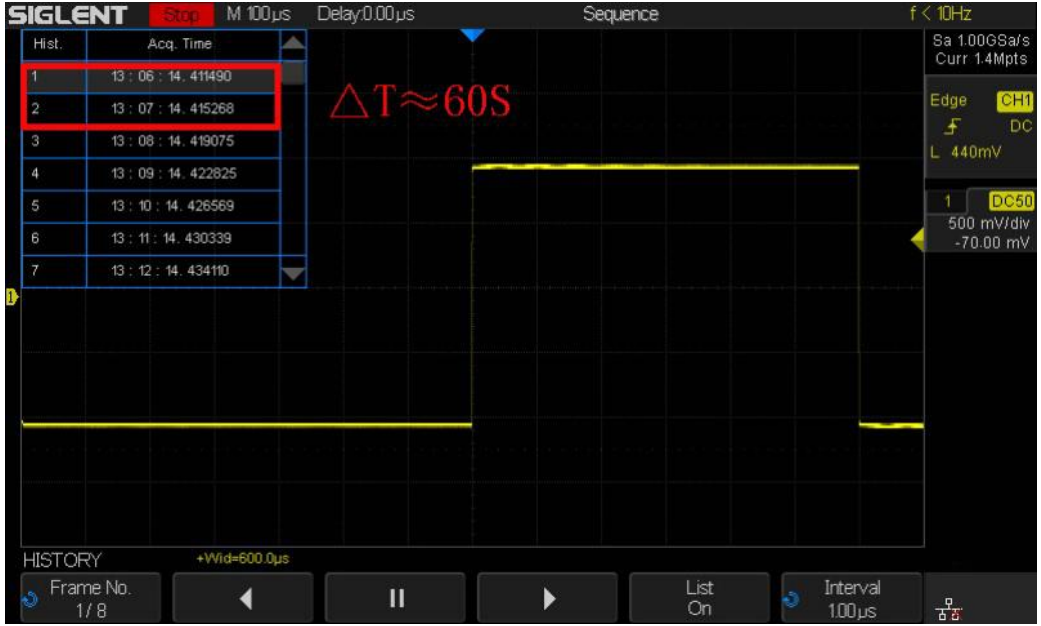


Advanced Debugging and Analysis Toolkit

- Typical application of Sequence Mode
  - Capture long periods of interest signals or low occurrence

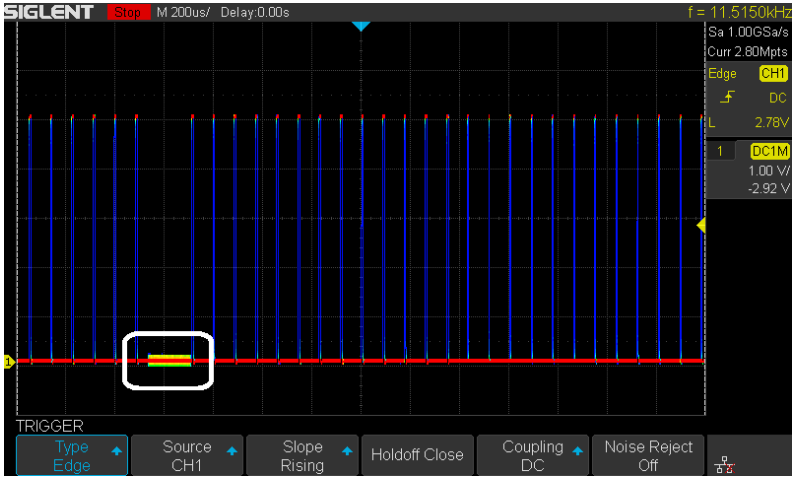


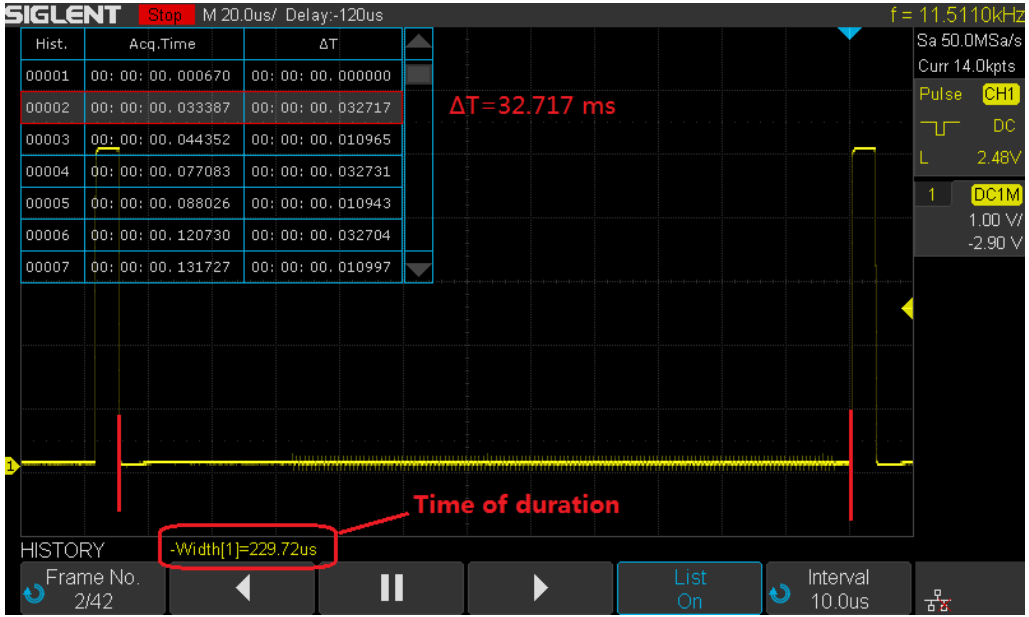
If users want to increase the sampling time using traditional oscilloscopes, because of limited storage depths, that will resulting in expense of lower sampling rates, a lower sampling rate will be required. However, a lower sampling rate will reduce the horizontal resolution



Advanced Debugging and Analysis Toolkit

- Typical application of Sequence Mode
  - Look for unusual events in the signal

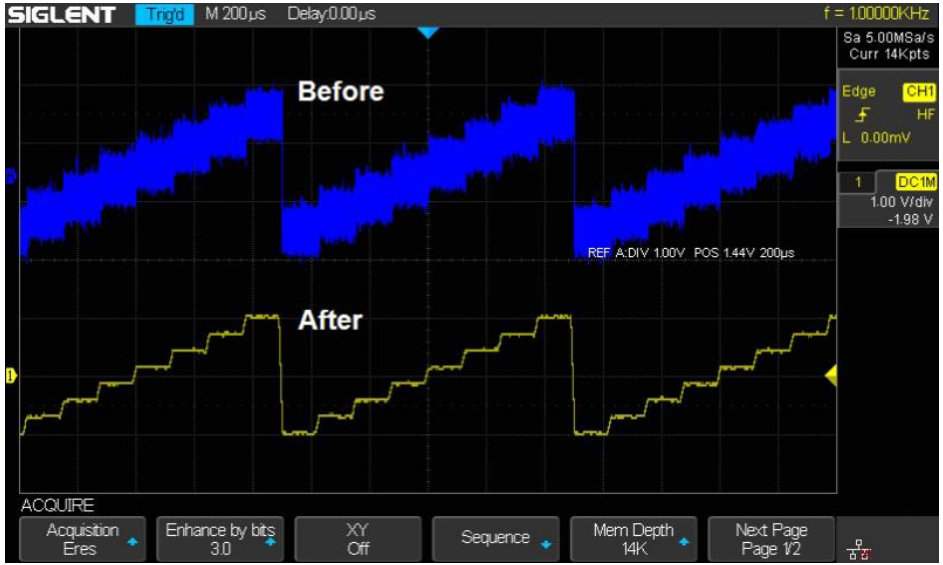




We find an abnormal signal in real-time sampling mode (the negative pulse signal with glitch in the below figure). We can determine the probability of the glitch using SDS1000X-E series oscilloscopes

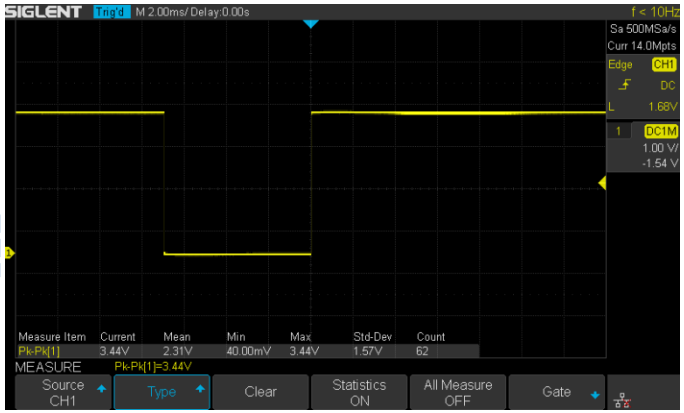
Advanced Debugging and Analysis Toolkit

- Eres Mode
- The SDS1000X-E provides real-time sampling, sequential sampling, roll mode, average sampling, and enhanced resolution mode (Eres acquisition mode)
- Eres acquisition mode reduces the noise bandwidth through the digital filter, effectively improving the signal to noise ratio. The maximum equivalent of enhancement is 3 Bit ENOB. This results in effectively improving the vertical resolution of the oscilloscope without effecting the trigger point actability



Advanced Debugging and Analysis Toolkit

- High speed Pass/Fail test
  - Custom templates
  - High speed - High output - Accurate measurement
    - Based on the hardware implementation, the maximum executable Pass/Fail decision rate is up to 60,000 times/s
  - Build unattended testing environment
    - Data collection stops
    - Buzzer alarm
    - 3.3V TTL output, which can be used as external excitation source (Pass/Fail Out)



3.3V TTL output

Competitor Analysis

Model	 SIGLENT SDS1202X-E	 KEYSIGHT EDUX1002A	 TEK TBS2072	 RIGOL DS1054Z
Bandwidth	200 MHz	50 MHz	70 MHz	50 MHz
Analog channels	2 CH	2 CH	2 CH	4 CH
Max. real-time sample rate	1 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s
Max. memory depth	14 Mpts	100 Kpts	20 Mpts	12 Mpts, 24 Mpts (Option)
FFT data	1 Mpts	64 Kpts	Less than 512 Kpts	Less than 512 Kpts
Waveform capture rate (Normal mode)	100,000 wfm/s	50,000 wfm/s	No Support	30,000 wfm/s
Max. waveform capture rate (Sequence mode)	400,000 wfm/s	No Support	No Support	No Support
Serial trigger and decode	I²C, SPI, UART/RS232, CAN, LIN (Standard)	I²C, UART/RS232 (Optional)	No Support	I²C, SPI, UART/RS232 (Optional)

Competitor Analysis

Model	SIGLENT SDS1202X-E	KEYSIGHT EDUX1002A	TEK TBS2072	RIGOL DS1054Z
256-level intensity grading and color temperature display	Support	Only 256-level intensity grading	No Support	Only 256-level intensity grading
Vertical sensitivity	500 uV-10 V/div	1 mV-10 V/div 500 uV/div (20 MHz limited)	2 mv/div-5 V/div	1 mV-10 V/div
Timebase	1 nS-100 S/div	5 nS-50 S/div	2 nS-100 S/div	5 nS-50 S/div
Sequence function	Support, minimum dead time low to 2.5 μS	No Support	No Support	No Support
History function	Support, maximum of 80,000 frames can be recorded	No Support	No Support	Support, maximum of 60,000 frames can be recorded
Enhanced/high resolution mode	Support	Support	No Support	Support
Trigger type	Edge , Slope, Pulse width, Window , Runt, Interval, Dropout, Pattern , Video (support HDTV)	Edge, Pulse width, Video((NTSC, PAL, SECAM and PAM-M), Rise/Fall time, Setup and hold, Pattern/state	Edge, Pulse Width, Runt	Edge, Pulse width, Runt, Window, Nth Edge, Slope, video (NTSC, PAL, SECAM and 480P,576P), Pattern, Delay, Time out, Setup and hold, Pattern/state

Competitor Analysis

Model	SIGLENT SDS1202X-E	KEYSIGHT EDUX1002A	TEK TBS2072	RIGOL DS1054Z
Auto measurement and statistics	Support 38 Types, 6 Types statistics info: value, mean, min, max, stev, num	Support 28 Types	Support 32 Types	Support 33 Types
Pass/Fail (Mask test)	Pass/Fail	No Support	Software-Based	Pass/Fail
Interface	USB Host & Device, LAN, AUX (Pass/Fail, Trigger Out)	USB Host & Device	USB Host & Device, LAN, WIFI	USB Host& Device, LAN, AUX (Pass/Fail, Trigger Out)
Display	7 inch (800*480),8*14 grid display	7 inch WVGA, 8*10 grid display	9 inch (800*480), 8*15 grid	7 inch WVGA, 8*12 grid display
Price	**$379**	$448	$1,200	$399

SDS1000X-E Order Information

Description	Order Num.
200 MHz, 2 CH, 1 GSa/s (max.) 14 Mpts, 7 inch color display	SDS1202X-E

Accessories		
Standard Accessories	USB Cable -1	
	Quick Start -1	
	Passive Probe - 2	
	Certification -1	
	Power Cord -1	
	CD (Included User Manual and EasyScopeX software)-1	
Optional Accessories	Isolated Front End	ISFE
	STB Demo Source	STB-3
	High Voltage Probe	HPB4010
	Current Probe	CP4020/CP4050/CP4070/ CP4070A/CP5030/CP5030A/ CP5150/CP5500
	Differential Probe	DPB4080/DPB5150/DPB5150A /DPB5700/DPB5700A

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