DSO5000 Series Digital Phosphor Oscilloscope

Data Sheet

Saluki Technology Inc.

The document applies to following models:

- DSO5034 Digital Phosphor Oscilloscope (350MHz, 4CH).
- DSO5054 Digital Phosphor Oscilloscope (500MHz, 4CH).
- DSO5104 Digital Phosphor Oscilloscope (1GHz, 4CH).
- DSO5034S Digital Phosphor Oscilloscope (350MHz, 4CH).
- DSO5054S Digital Phosphor Oscilloscope (500MHz, 4CH).
- DSO5104S Digital Phosphor Oscilloscope (1GHz, 4CH).

Standard Package of DS05000 series Digital Phosphor Oscilloscope:

- 1x Main Machine
- 4x Passive Voltage Probes
- 1x Power Cord
- 1x U Disk (for documents)

Options of DS05000 series Digital Phosphor Oscilloscope:

Option No.	Item	Function	Remarks
H01	Logical analyzer option	Necessary for the mixed signal oscilloscope, 16 digital channels, including 1 logic probe	
H02	Function generator option	1 channel and 25MHz function generator	
H03	P9558 Passive voltage probe	Bandwidth: DC - 250MHz Attenuation: 100:1 Max. Voltage: 3000V Length: 200cm	
H04	P3258 Passive voltage probe	Bandwidth: DC - 100MHz Attenuation: 100:1 Max. Voltage: 1500V Length: 130cm	
H05	P8050High voltage differential probe	Bandwidth: DC - 50MHz Attenuation: 50:1, 500:1 Accuracy: ±2% Max. Voltage: 1300 (DC+ACpk) Power: 9VDC	

H06	P8100 High voltage differential probe	Bandwidth: DC - 100MHz Attenuation: 50:1, 500:1 Accuracy: ±2% Max. Voltage: 1300 (DC+ACpk) Power: 9VDC	
H07	A622 Current probe	Bandwidth: DC - 100kHz Scale: 50mA - 100A peak Range: 10mV/A, 100mV/A Supply: 9V alkaline batteries	
H08	AP202 Current probe	Bandwidth: DC - 25MHz Accuracy: ±3% Max. Current: 20A (DC+ACpk) Range: 100mV/A Power: 9VDC	
H09	Rack mount kit	Rack mount kit	
H10	Hard transit case	Hard transit case	
H12	P9550A Passive voltage probe	Bandwidth: DC - 500MHz Attenuation: 10:1 Input impedance: 10MΩ//10pF±2pF Maximum voltage: 300V (DC+ACpk) Automatic identification functions	
H13	P9551Passive voltage probe	Bandwidth: DC - 500 MHz Attenuation: 10:1, 1:1 Input impedance: 10MΩ//10pF±2pF Maximum voltage: 300V (DC+ACpk)	
H14	P9350A Passive voltage probe	Bandwidth: DC - 350MHz Attenuation: 10:1 Input impedance: 10Ω//10pF±2pF Maximum voltage: 300V (DC+ACpk) Automatic identification functions	
H15	P9600A Passive voltage probe	Bandwidth: DC - 600MHz Attenuation: 10:1 Input impedance: 10MΩ//12pF±2pF Maximum voltage: 300V (DC+ACpk) Automatic identification functions	

H16	LAP500 Logic probe	Number of channels: 16 Input impedance: 100kΩ±2% Maximum voltage: ±40Vpk	
H17	P5020 High voltage differential probe	Bandwidth: DC - 20MHz Attenuation: 500:1, 5000:1 Precision: ±2% Maximum voltage: 40kV (DC+ACpk-pk)	
H18	P6100 High voltage differential probe	Bandwidth: DC - 100MHz Attenuation: 100:1, 1000:1 Precision: ±1% Maximum voltage: 14Vpp	
H19	P7100 High voltage differential probe	Bandwidth: DC - 100MHz Attenuation: 100:1, 1000:1 Precision: ±1% Maximum voltage: 7000Vpp	
H20	P4220 High voltage single end probe	Bandwidth: DC - 220MHz Attenuation: 1000:1 Precision: ±3% Maximum voltage: 39kV (DC+ACpk)	
H21	AP621 Current probe	Bandwidth: 10 Hz - 100 kHz Measurement range: 2,000A peak Range: 100mV/A, 10mV/A, 1mV/A	
H22	AP622D Current probe	Bandwidth: DC - 1.5MHz Measurement range: 1mA - 40A peak Range: 100mV/A, 1V/A	
H23	AP204A Current probe	Bandwidth: DC - 50MHz Precision: ±3% Maximum current: 40A (DC+ACpk) Range: 50mV/A	
H24	PL-50 Matcher	Impedance: 50Ω±1% Bandwidth: DC - 2GHz	
H25	PL-75 Matcher	Impedance: 75Ω±1% Bandwidth: DC - 1GHz	
H26	PL-93 Matcher	Impedance: 93Ω±1% Bandwidth: DC - 1GHz	

Option No.	Item	Function
S01	Limit mask test module	Support ITU-T、ANSI T1.102、USB and other standard mask or user creation.

S02	Power measurement and analysis module	It supports power supply quality, switching loss, harmonic wave, ripple and modulation tests
S03	HD video trigger module	Support 480p, 576p, 720p, 1080p, 1080i and other formats
S04	I2C trigger and analysis module	Signal rate: ≤10Mbps Protocol type: 7 digits/10 digits address Signal type: single-ended
S05	RS232 trigger and analysis module	Signal rate: 50 - 2Mbps Signal type: single-ended
S06	SPI trigger and analysis module	Signal rate: ≤10Mbps Signal type: single-ended
S07	CAN trigger and analysis module	Signal rate: 10kbps - 1Mbps Signal type: single-ended, differential CAN_L, CAN_H
S08	LIN trigger and analysis module	Signal rate: 800bps - 100kbps Protocol standard: 1.X, 2.X Signal type: single-ended
S09	FlexRay trigger and analysis module	Signal rate: 2.5Mbps, 5Mbps, 10Mbps Signal type: BP, BM, TX/RX
S10	Audio trigger and analysis module	Signal rate: ≤10Mbps Protocol standard: I2S, LJ, RJ, TDM Signal type: single-ended
S11	USB trigger and analysis module	Signal rate: 1.5Mbps, 12Mbps Signal type: single-ended, differential
S12	MIL-STD-1553 trigger and analysis module	Signal rate: 1 Mbps Signal type: Single end and differential

Preface

Thank you for choosing Saluki Technology Products.

We devote ourselves to meeting your demands, providing you high-quality measuring instrument and the best after-sales service. We persist with “superior quality and considerate service”, and are committed to offering satisfactory products and service for our clients.

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Document Authorization

The information contained in this document is subject to change without notice. The power to interpret the contents of and terms used in this document rests with Saluki.

Product Quality Assurance

The warranty period of the product is 36 months from the date of delivery. The instrument manufacturer will repair or replace damaged parts according to the actual situation within the warranty period.

Product Quality Certificate

The product meets the indicator requirements of the document at the time of delivery. Calibration and measurement are completed by the measuring organization with qualifications specified by the state, and relevant data are provided for reference.

Quality/Settings Management

Research, development, manufacturing and testing of the product comply with the requirements of the quality and environmental management system.

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1 Overview

DSO5000 Series Digital Phosphor Oscilloscope integrates functionalities of

- A digital oscilloscope,
- A logic analyzer,
- A function generator,
- A protocol analyzer
- A digital voltmeter,

DSO5000 Series Digital Phosphor Oscilloscope has six models, 350MHz - 1GHz bandwidth, 5GSa/s sample rate, up to 500Mpts/CH memory depth, up to 1,000,000wfms/s waveform capture rate. The originally developed Any Acquire Phosphor technique provides brand-new use experiences of oscilloscope for clients.

DSO5000 series oscilloscope integrates Digital Oscilloscope, logic analyzer, function generator, protocol analyzer and digital voltmeter, has many functions including waveform autoset, automatic measurement of waveform parameter, cursor measurement, histograms measurement, arithmetic operation, FFT analysis, serial protocol trigger and analysis, limit and mask test, power measurement and analysis, waveform record and replay, mixed signal analysis, arbitrarily function generator and so on. To supporting Ethernet remote control, integrated development and application are easy and convenient.

DSO5000 series oscilloscope includes the standard type DSO5034/5054/5104 and the economical type DSO5034S/5054S/5104S. The oscilloscope and digital voltmeter are standard, and the logical analyzer, function generator and protocol analyzer are optional.

2 Main Characteristics

- **Five-in-one instrument**

This instrument integrates oscilloscope, logical analyzer, function generator, protocol analyzer and digital voltmeter, and will help you cope with all kinds of challenges easily.

- **Any Acquire Phosphor technology**

The unique Any Acquire Phosphor technology can provide you with higher sampling rate, faster waveform capture rate, more glaring display, deeper memory depth, more precise digital trigger and more comprehensive analysis.

- **Rich probe options**

It supports passive voltage probe, high voltage single end probe, high voltage differential probe, current probe, logic probe and active probe to satisfy the test requirements of probes in different cases.

- **Color display and capacitive touch screen**

10.4-inch color square LCD with resolution up to 1,024×768. The capacitive touch screen supports single-touch and multi-touch, which can realize waveform and menu operation quickly.

- **Small size, light weight, portability**

Portable structure, 6U standard frame installation, rich external interfaces, maximum weight of 6 kg.

3 Main Function Modules

3.1 Oscilloscope

- **1000,000 wfms/s waveform capture rate, fast identify and capture accidental events.**

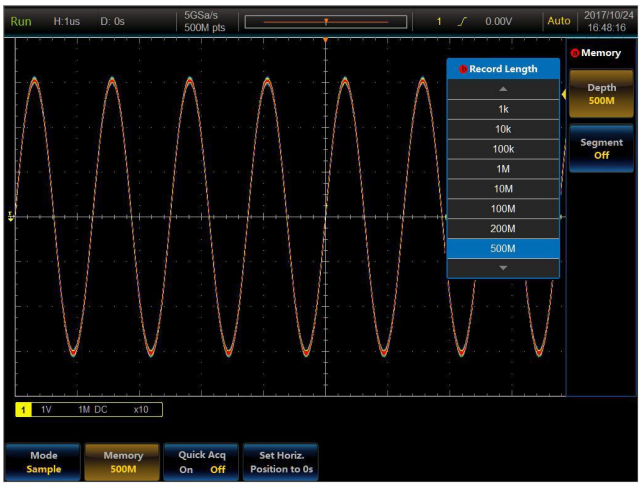
1000,000 wfms/s waveform capture rate and 5GSa/s sample rate, glitches and contingency capture rate can be greatly improved. Users can review more waveform details in a longer sample period.

1000,000 wfms/s waveform capture rate, fast identification of contingency.

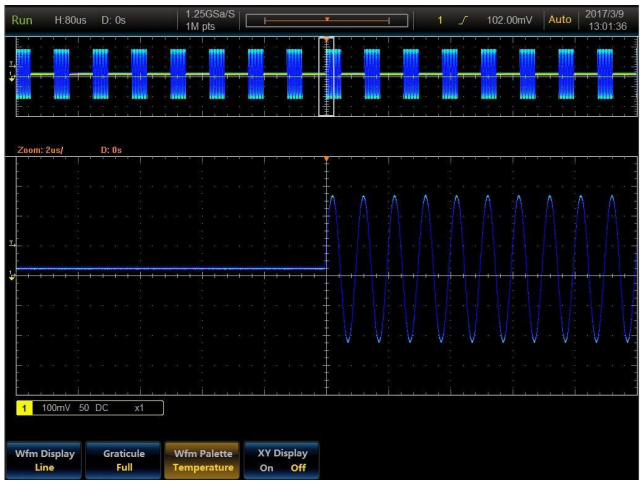
5GSa/s sample rate, precisely rebuilt waveform.

- **500Mpts/CH deep storage, window expansion based on hardware, synchronous display of overall situations and details.**

500Mpts/CH deep storage maintains high sample rate in a long sample period. Window expansion based on hardware can partially zoom in on waveform details under review; offer you synchronous display of overall situations and details.



500Mpts/CH deep storage, maintains high sample rate in a long sample period.



Window expansion based on hardware; zoom in on waveform details under review.

- **With standard segmented memory acquisition, it can capture and store important signals more efficiently.**

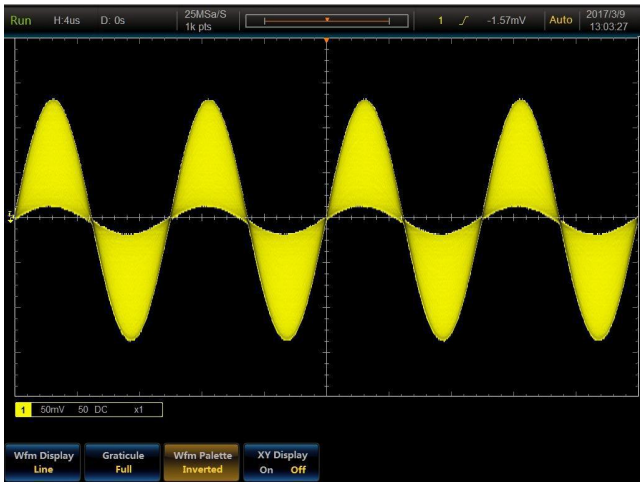
The DSO5000 series oscilloscope is equipped with segmented memory acquisitions standard, so that, even though the oscilloscope works under the deep storage mode, it can keep a high response speed and screen update rate. In addition, it supports the waveform recording and playback functions.

It supports up to 131072 storage segments.

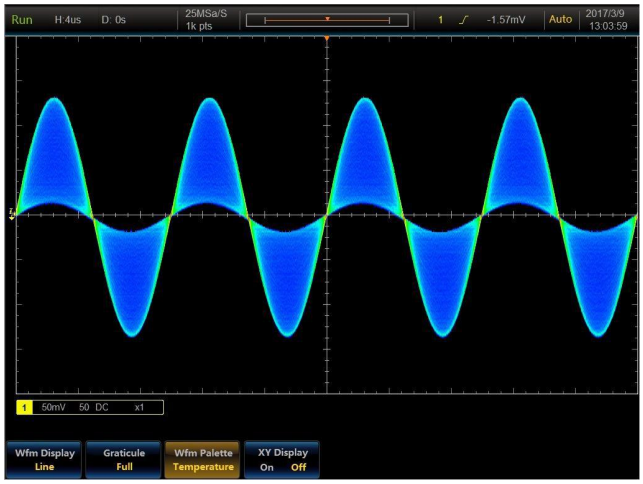
- **256-grade gray scale and four types of waveform palettes for display, gives you extraordinary visual experience.**

The DSO5000 series oscilloscope implements digital phosphor three-dimensional display technique, to tell probability of event occurrence through lightness of color (256-grade gray scale) or temperature change (color grade) , and to provide 4 types of waveform palettes including normal, inverted, temperature and spectral, which enhances the capability of contingency view for superior visual experience

Normal: indicates event probability by default channel color and gray scale. Bright color indicates events of high occurrence probability.



Inverted: indicates probability of event occurrence by default channel color and gray scale. Dark color indicates events of high occurrence probability.



Temperature: uses color grade to indicate event occurrence probability. Warm color (red or yellow) indicates events of high occurrence probability.

Spectral: uses color grade to indicate event occurrence probability. Cold color (blue or green) indicates events of high occurrence probability.

- **Multiple trigger functions, precise digital trigger locks up triggered events accurately.**

The DSO5000 series oscilloscope supplies users with rich trigger functions, including zone, edge, pulse width, video, runt pulse, logic, sequence, setup and hold time, rise and fall time, HD digital video, serial protocol trigger, which help users locate events in which they have interest out of complicated sample information.

Fundamental trigger: edge, pulse width, video.

Advanced trigger: runt pulse, logic, sequence, setup and hold time, rise and fall time.

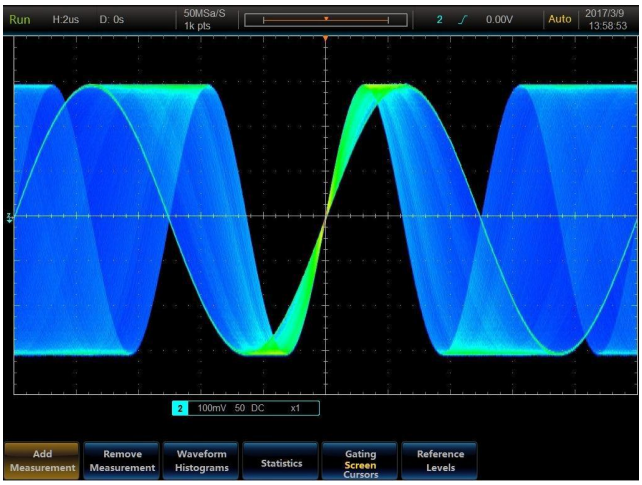
HD digital video: 480p, 576p, 720p, 1080p/i.

Serial protocol trigger: I2C, SPI, RS232, CAN, LIN, FlexRay, Audio, USB.

DSO5000 series oscilloscope implies the technique of precise digital trigger to perform trigger point determination against ADC samples collected, to restrain impact of interference signals, and to locate trigger events fast, to lay the foundation for accurate display and signal analysis of oscilloscope. Trigger jitter of the digital trigger is as low as ±1ps, highest trigger sensitivity reaches 0.1 div, narrowest pulse test width is 200ps, and channel delay calibration step is 400ps.

Advantages of digital trigger:

- more precise trigger
- more flexible trigger
- higher trigger sensitivity
- lower trigger jitter
- narrower pulse test width
- more precise channel delay calibration

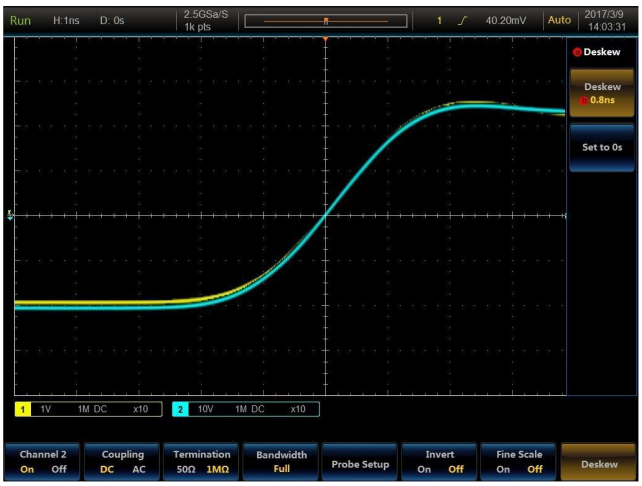


Multi-phase digit interpolation: precise location of trigger point is at 1

Trigger sensitivity can be adjusted continuously, the highest reaches 0.1 div.

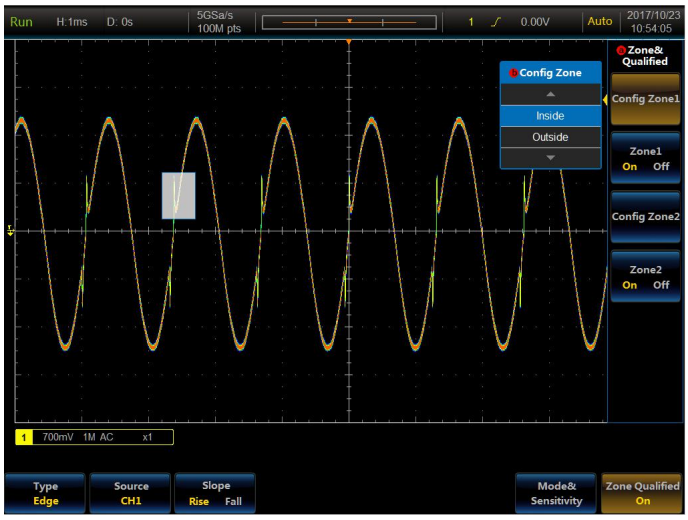
difference point. Lowest trigger jitter reaches ±1piex.

The smallest pulse capture width is 200ps.



Channel to channel deskew range is ±150ns, step is 400ps.

The DSO5000 series is adopted with the brand-new visible trigger technology, so that the oscilloscope can scan all waveform acquisitions, compare them with the waveform area on the screen, and quickly and easily identify target trigger events by simply observing interested signals on the screen and drawing an zone around it.

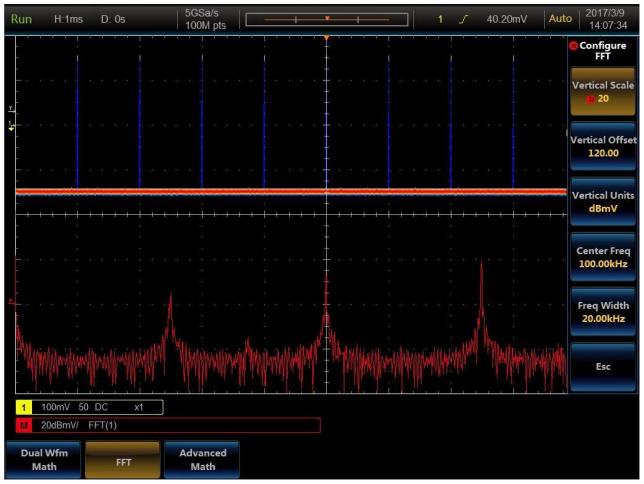


Zone trigger: Quickly isolate target events by zone definition

- **Strong calculation and analysis tools enable deep data digging and analysis.**

The DSO5000 series oscilloscope provides a complete set of analysis tools for users, including cursors based on waveform and screen, 29 kinds of parameter automatic measurements, mathematical operation, FFT analysis, advanced mathematics, waveform histogram, statistics, limit and mask measurement and analysis, serial protocol trigger and analysis, etc.

Advanced mathematics: with equation editor, users can free edit.

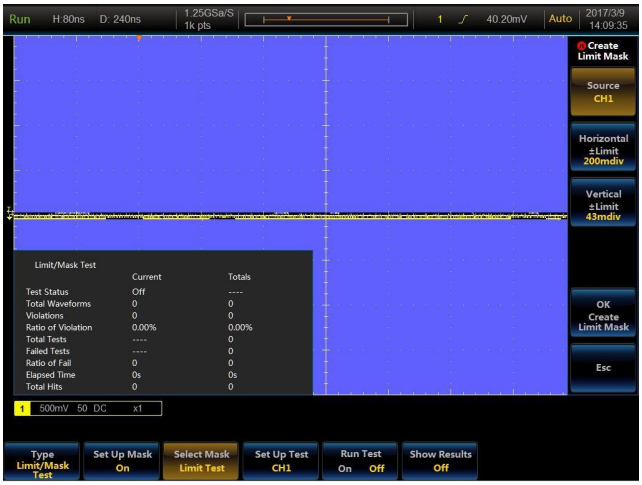


FFT analysis: observe frequency domain and characteristics of signals.

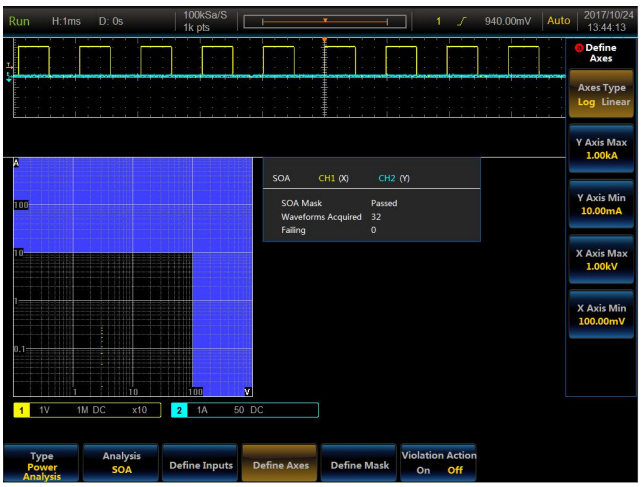
Waveform record and replay: It can be used for real-time record of waveforms, replay and viewing of waveform details.

Vertical histogram: to observe noise and noise distribution of signals.

Horizontal histogram: to observe jitter and jitter distribution of signals.



Limit and mask test: standard and custom mask, pass/fail test, result display.



Power measurement (**option S02**): It can be used for tests including power supply quality, switching loss, harmonic wave, ripple and modulation.

3.2 Logic Analyzer (Option H01)

The logic analyzer provides 16 digital channels highly integrated with the oscilloscope user interface, so as to simplify the operation, and quickly solve the design and analysis problems including analog-digital signals.

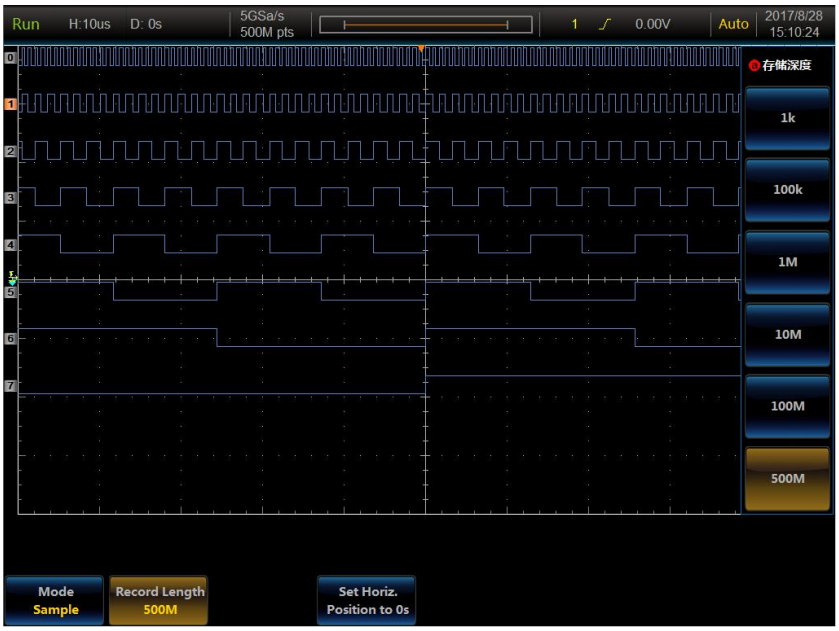
- **With 2.5GSa/s high sampling rate, it can provide more precise timing resolution**

The logical analyzer can provide 2.5GSa/s timing sampling rate, which can provide up to 400 ps time resolution for all digital channels, and can reflect the timing sequence relationship of the measured signals more truly.

Higher sampling rate and more precise timing resolution

- **With up to 500Mpts memory depth, it can provide the long time tracking and recording capability**

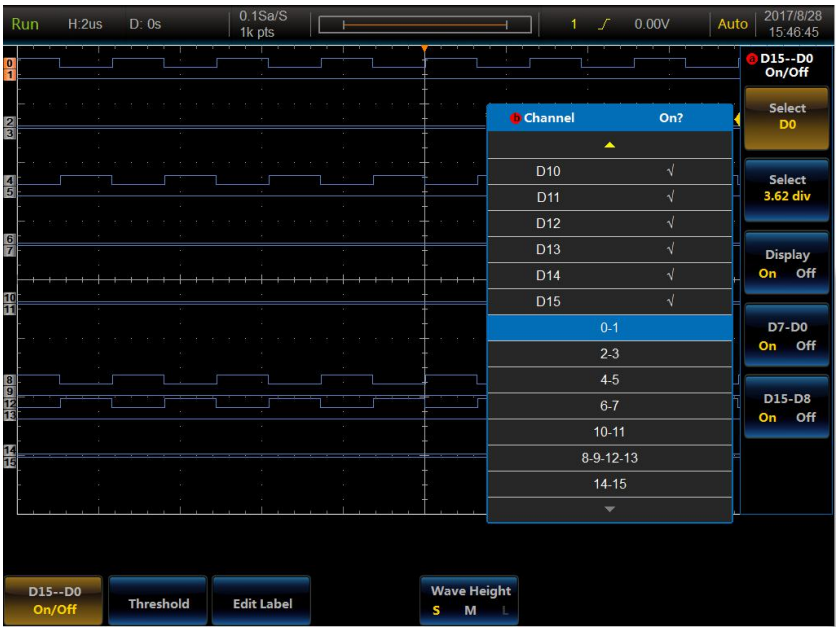
With up to 500Mpts/CH memory depth, the logical analyzer can keep a high sampling rate when capturing long time records. With hardware window extension technology, it can partially enlarge and observe the details of the waveform.



With deeper memory depth, it can provide longer time recording capability

- **Intuitive digital waveform and grouping display**

The logical analyzer option supports waveform color display of 16 digital channels, and you can change the height of each channel waveform and its display position on the screen. You can also flexibly group digital channels and display them with labels. After the grouping, all channels in the group can be positioned, so as to shorten the setting time required for traditional channel positioning one by one.



Flexible grouping settings and random label settings

- **Wide measurement and analysis functions**

The logical analyzer option supports automatic measurement and statistical analysis of the time-related parameters, supports to view values of all the digital channels with markers, and supports trigger and decoding analysis of all kinds of serial buses.

Marker measurement function

- **Logic probe**

The logic probe provides two 8-channel separation seats and simplifies the connection to the tested device, therefore, you can use the provided lead set or claw to attach to the chip equipment or test point. The input impedance of the logic probe is 100kΩ.

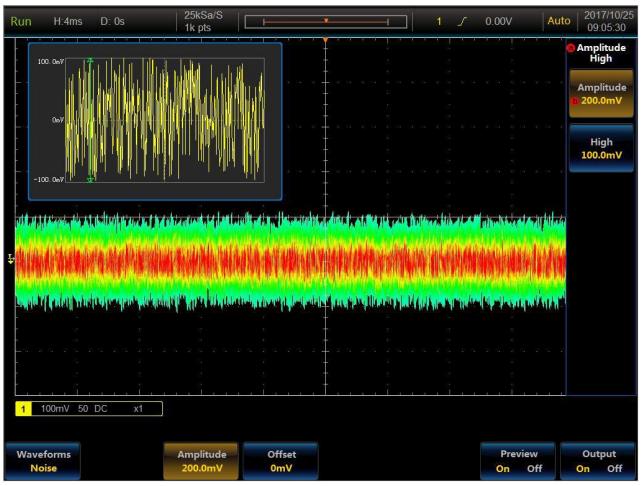
Logic probe (Option H16)

3.3 Function Generator (Option H02)

The function generator can help you simulate the sensor signal or add noise to the signal in the design, so as to carry out allowance test. In addition, the analog or digital signal captured by the oscilloscope can be transmitted to arbitrary waveform memory, and the signal captured by the oscilloscope can also be reproduced by the function generator.

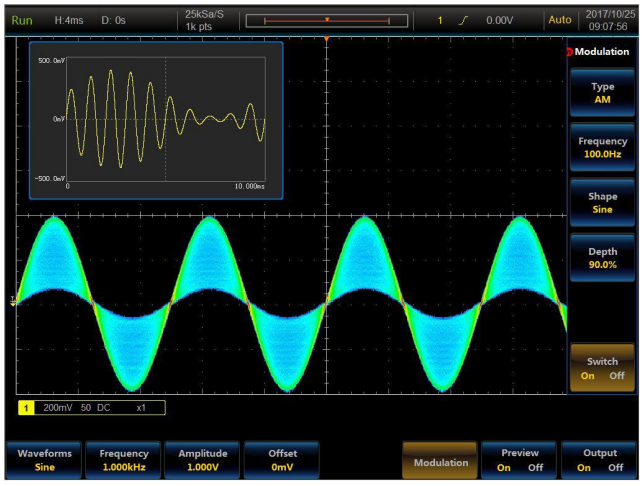
- **A number of predefined waveform outputs up to 25MHz**

The function generator option provides a number of predefined waveform outputs up to 25 MHz, including sine wave, square wave, Ramp wave, pulse, DC, noise, arbitrary wave, SinC, Exponential Rise/Decay, Gaussian, Lorentz curve and haversine curve, and it also supports output of modulation waveforms including FM, AM and FSK.



Standard waveform output: Sine wave, square wave, ramp wave, pulse, DC, noise and arbitrary wave.

Built-in waveform output: SinC, Exponential Rise/Decay, Gaussian, Lorentz curve and haversine curve.



Modulation waveform: FM, AM and FSK.

- **It has arbitrary waveform output up to 16k points, and supports the waveform capacitive screen touch input**

The function generator option provides arbitrary waveform output function of 16k-point record length, which is used to reproduce the waveform of the analog input end, internal document save position and U disk or external PC from the waveform generator. You can also freely edit and modify the output waveform through the capacitive touch screen, so as to quickly generate the waveform you need.

The saved waveform will be copied and generated from the function generator.

The capacitive screen can draw arbitrary waveform output quickly.

3.4 Protocol Analyzer (Option S04 – S12)

The protocol analyzer can be used to trigger and decode the content of the packet level of the commonly used serial bus (I2C, SPI, CAN, LIN, FlexRay, RS232, USB, Audio, MIL-STD-1553) standards, and export the decoding table and save the test results.

- **It supports full hardware triggering and decoding of a number of buses**

The DSO5000 series oscilloscope supplies a powerful set of serial protocol analysis tools, which support auto trigger and analysis of many buses like I2C, SPI, CAN, LIN, FlexRay, RS232, USB, Audio and MIL-STD-1553, provide serial bus test solutions of embedded, auto, computer, audio and other serial protocols. Based on FPGA hardware decoding technique, DSO5000 series oscilloscope improves the acquisition probability of random serial communication error codes.

Embedded bus: I2C, SPI

Auto bus: CAN, LIN, FlexRay

Computer bus: RS232, USB

Audio bus: I2S, LJ, RJ, TDM

Aviation bus: MIL-STD-1553

- **It supports the display of a number of views**

The bus analyzer option provides traditional digital view as well as a higher level of bus view display, so as to facilitate identifying a number of bus package types, such as package start, address, data and package end. You can also view the captured bus package with an event list with a time stamp.

Display of a number of views: Digital view, bus view, event list

Digital voltmeter

The DSO5000 series oscilloscope provides you with a 4-bit digital voltmeter and a 6-bit frequency counter. The voltage and frequency measurement functions can be by multiplexing the oscilloscope channel, and its probe is the same as that of the general oscilloscope.

4-bit voltage measurement and 6-bit frequency measurement

3.5 Oacilloscope Probes (Option)

DSO5000 series support passive high resistance probe, high voltage single end probe, high voltage differential probe, current probe and logic probe to satisfy the test requirements of probe in different cases.

- **Passive voltage probe**

The DSO5000 series oscilloscope supports 4 types of passive voltage probes, including P9350A, P9550A, P9551 and P9600A. The passive voltage probe is a standard probe of the oscilloscope, which can be purchased by users additionally, and it is a kind of most commonly used probe type of the oscilloscope.

The P9350A passive voltage probe has a bandwidth of 350 MHz, fixed attenuation of 10:1 and input impedance of 10 MΩ, which supports automatic identification functions. It is a standard probe of DSO5034/5034S, which can be purchased by users additionally. The option number is H14.

P9350A passive voltage probe (H14)

The P9550A passive voltage probe has a bandwidth of 500 MHz, fixed attenuation of 10:1 and input impedance of 10 MΩ, which supports automatic identification functions. It is a standard probe of DSO5054/5104/5054S/5104S, which can be purchased by users additionally. The option number is H12.

P9550A passive voltage probe (H12)

The P9551 passive voltage probe has a bandwidth of 500 MHz, fixed attenuation of 10:1 or 1:1 and input impedance of 10 MΩ, which doesn't support automatic identification functions. It can be purchased by users additionally. The option number is H13.

P9551 passive voltage probe (H13)

The P9600A passive voltage probe has a bandwidth of 600 MHz, fixed attenuation of 10:1 and input impedance of 10 MΩ, which supports automatic identification functions. It can be purchased by users additionally. The option number is H15.

P9600Apassive voltage probe (H15)

- **High voltage single-ended probe (Option)**

The DSO5000 series oscilloscope supports 3 types of high voltage single-ended probes, including P9558, P3258 and P4220. The high voltage single end probe is an option of the oscilloscope, which shall be purchased by users additionally.

The P9558 high voltage single-ended probe has a bandwidth of 250 MHz, fixed attenuation of 100:1, input impedance of 100 MΩ and maximum input voltage of 3,000 V (DC+ACpk), which doesn't support automatic identification functions.

P9558 high voltage single-ended probe (H03)

The P3258 high voltage single-ended probe has a bandwidth of 100 MHz, fixed attenuation of 100:1, input impedance of 100 MΩ and maximum input voltage OF 1500V (DC+ACpk), which doesn't support automatic identification functions.

P3258 high voltage single-ended probe (H04)

The P4220 high voltage single-ended probe has a bandwidth of 220 MHz, fixed attenuation of 1,000:1, input impedance of 900 MΩ and maximum input voltage of 39 kV (DC+ACpk), which doesn't support automatic identification functions.

P4220 high voltage single-ended probe (H20)

- **High voltage differential probe (Option)**

The DSO5000 series oscilloscope supports 5 kinds of high voltage differential probes, including P8050, P8100, P7100, P6100 and P5020. The high voltage differential probe is an option of the oscilloscope, which shall be purchased by users additionally. It is mainly used for floating ground isolation measurement, which has high safety.

The P8050 high voltage differential probe has a bandwidth of 50 MHz, fixed attenuation of 50:1 and 500:1, measurement precision of ±2% and maximum input voltage of 1,300 V (DC+ACpk), which is equipped with 9 VDC external adapter for power supply.

The P8050 high voltage differential probe has a bandwidth of 50 MHz, fixed attenuation of 50:1 and 500:1, measurement precision of ±2% and maximum input voltage of 1,300 V (DC+ACpk), which is equipped with 9 VDC external adapter for power supply.

P8050 high voltage differential probe (H05)

The P8100 high voltage differential probe has a bandwidth of 100 MHz, fixed attenuation of 50:1 and 500:1, measurement precision of ±2% and maximum input voltage of 1,300 V (DC+ACpk), which is equipped with 9 VDC external adapter for power supply.

P8100 high voltage differential probe (H06)

The P7100 high voltage differential probe has a bandwidth of 100 MHz, fixed attenuation of 100:1 and 1000:1, measurement precision of ±1% and maximum input voltage of 7,000 Vpp, which is equipped with 6 VDC external adapter or built-in 4×AA alkaline batteries for power supply.

P7100 high voltage differential probe (H19)

The P6100 high voltage differential probe has a bandwidth of 100 MHz, fixed attenuation of 100:1 and 1,000:1, measurement precision of ±1% and maximum input voltage of 14 kVpp, which is equipped with 6 VDC external adapter or built-in 4×AA alkaline batteries for power supply.

P6100 high voltage differential probe (H18)

The P5020 high voltage differential probe has a bandwidth of 20 MHz, fixed attenuation of 500:1 and 5,000:1, measurement precision of ±2% and maximum input voltage of 40 kV (DC+ACpk-pk), which is equipped with 9 VDC external adapter for power supply.

P5020 high voltage differential probe (H17)

- **Current probe (Option)**

The DSO5000 series oscilloscope supports 5 kinds of current probes, including AP622, AP202, AP621, AP622D and AP204A. The current probe is an option of the oscilloscope, which shall be purchased by users additionally. It is mainly used for current test.

The AP622 is a kind of AC/DC current probe, which has a bandwidth of the DC - 100 kHz. For the current probe with a range of 10 mV/A, the peak current measurement range is 1A - 100A; for the current probe with a range of 100 mV/A, the peak current measurement range is 50mA - 10A. Its measurement precision is ±4%, which is equipped with built-in 4×AA alkaline batteries for power supply.

AP622 current probe (H07)

The AP202 is a kind of AC/DC current probe, which has a bandwidth of the DC~25 MHz. For the current probe with a range of 100 mV/A, the peak current measurement range is 20 A (DC+ACpk). Its measurement precision is ±3%, which is equipped with 9 VDC external adapter for power supply.

AP202 current probe (H08)

The AP621 is a kind of AC/DC current probe. Its bandwidth is 10 Hz - 100 kHz. For the current probe with a range of 100 mV/A, the peak current measurement range is 0.1A - 20A; for the current probe with a range of 10 mV/A, the peak current measurement range is 1A - 200A; for the current probe with a range of 1 mV/A, the peak current measurement range is 10A - 2,000A, with the output errors of ±(3%+10 mV).

AP621 current probe (H21)

The AP622D is a kind of AC/DC current probe, which has a bandwidth of the DC - 1.5 MHz. For the current probe with a range of 100 mV/A, the peak current measurement range is 80 App; for the current probe with a range of 1 V/A, the peak current measurement range is 8 App. Its measurement precision is ±4%, which is equipped with 9 VDC external adapter or built-in 4×AA alkaline batteries for power supply.

AP622D current probe (H22)

The AP6204A is a kind of AC/DC current probe, which has a bandwidth of the DC - 50MHz. For the current probe with a range of 50mV/A, the peak current measurement range is 40 A (DC+ACpk). Its measurement precision is ± 3%, which is equipped with 9 VDC external adapter for power supply.

AP204A current probe (H23)

4 Typical Applications

The DSO5000 Series Digital Phosphor Oscilloscope is a multi-functional test instrument integrating oscilloscope, logic analyzer, function generator, protocol analyzer and digital voltmeter. As a most extensively used debugging and verification instrument, it can help you fast discover, locate, analyze and solve problems. It is widely applied in such fields, for instance design and debugging of analog and digital circuits, circuits diagnosis and transient signals capture, design of power components and power electronics, embedded design and debugging, test of automotive electronics, design, test and quality control of visual systems, education and training and repair service.

5 Technical Specification

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
Channels		4					
Bandwidth		350MHz	500MHz	1GHz	350MHz	500MHz	1GHz
Sample rate		5GSa/s (1CH), 2.5GSa/s (4CH)			5GSa/s (1CH), 1.25GSa/s (4CH)		
Memory depth		500Mpts/CH			200Mpts/CH		
Vertical System	Rise time	<1ns	<700ps	<450ps	<1ns	<700ps	<450ps
	Bandwidth limits	20MHz, 250MHz					
	Input impedance	1MΩ±1%, 50Ω±1%					
	Input coupling	DC, AC					
	Input sensitivity range	1MΩ: 1mV/div - 10V/div, 50Ω: 1mV/div - 1V/div					
	Amplitude accuracy	±3% （Note: >5mV/div）					
	Max. Input voltage	1MΩ: 300Vrms, 50Ω: 5Vrms					
	Vertical resolution	8bit					
	Offset range	±1V (1mV/div - 100mV/div)					
		±10V (200mV/div - 1V/div)					
		±100V (2V/div - 10V/div)					
	Channel isolation	≥40dB					
Horizontal System	Sample rate	5GSa/s (1ch,2ch), 2.5GSa/s (3ch,4ch)			5GSa/s (1ch), 2.5GSa/s (2ch), 1.25GSa/s (3ch, 4ch)		
	Record length	500Mpts/CH					
	Acquisition modes	Normal: acquire sampled values and sample value					
		Peak Detect: capture glitches as narrow as 200ps			Peak Detect: capture glitches as narrow as 800ps		
		Hi Res: 11digits resolution, can reduce random noise					
		Envelope: min-max envelope reflecting peak detect data over multiple acquisitions					
		Average: from 2 to 512 waveforms included in average					
		Roll: scroll waveforms right to left across the screen, time-base: 100ms/div~1000s/div					
		Segmentation: The economical acquisition memory can be divided into 131,072 segments maximally					
	Maximum waveform	Fast sample model: 1,000,000 wfms/s,					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
	capture rate	Segment model: 700,000 wfms/s					
	Time base range	200ps/div - 1000s/div			400ps/div - 1000s/div		
	Time base accuracy	±5ppm					
	Time base delay time range	-10 divisions to 5000s					
	Ch to ch deskew range	±150ns, resolution: 400ps			±150.4ns, resolution: 800ps		
Trigger System	Trigger types	Zone trigger: trigger on a user-defined zone drawn on the display.					
		Edge: trigger at positive or negative edge in any channel or auxiliary input .					
		Sequence: prepare at a chosen edge, trigger at a chosen time or other chosen edge of the event.					
		Runt: trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again.					
		Pulse width: trigger on width of positive or negative pulses that are >, <, =, ≠, or inside/outside a specified period of time. Pulse width range: 0.8ns-10s，resolution: 0.8ns.					
		Logic: trigger when any logical pattern of channels goes false or stays true for specified period of time. Any input can be used as a clock to look for the pattern on a clock edge. Pattern (AND, OR, NAND, NOR) specified for all input channels defined as High, Low, or Don't Care.					
		Setup and hold: trigger on violations of both setup time and hold time between clock and data present on any of the input channel.					
		Rise/Fall time: trigger on pulse edge rates that are faster or slower than specified.					
		Video: trigger on all lines, odd, even, or all fields on NTSC, PAL, and SECAM video signals.					
		HD video (Option S03): trigger on 480p/60、576p/50、720p/50、720p/60、1080i/50、1080i/60、1080p/24、1080p/25、1080p/30.					
Measurement and analysis system	Auto measurement	**30, of which up to eight can be displayed on-screen at any one time.** Measurements include: period, frequency, delay, top drop, rise Time, fall Time, positive duty cycle, negative duty cycle, positive pulse width, negative pulse width, burst width, phase, positive overshoot, negative overshoot , peak to peak, amplitude, high, low, max, min, mean, cycle mean, RMS, cycle RMS, positive pulse count, negative pulse count, rising edge count, falling edge count, area and cycle area.					
	Cursors	Waveform and screen					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
	Measurement statistics	Mean, min, max, standard deviation					
	Reference levels	User-definable reference levels for automatic measurements can be specified in either percent or units.					
	Gating	Isolate the specific occurrence within an acquisition to take measurements on, using either the screen or waveform cursors.					
	Waveform histogram measurement	A waveform histogram provides an array of data values representing the total number of hits inside of a user-defined region of the display.					
		Source: CH1-CH4, REF1-REF4, math.					
		Type: vertical, horizontal.					
		Measurement types: 12, of which up to eight can be displayed on-screen at any one time. waveform count, hits in box, peak hits, median, max, min, peak-to-peak, mean, standard deviation, sigma 1, sigma 2, sigma 3.					
	Waveform mathematics	Arithmetic: add, subtract, multiply and divide waveforms.					
		Math functions: integrate, differentiate, FFT					
		FFT: set FFT vertical scale to Linear RMS or dBV RMS, and FFT window to rectangular, hamming, hanning or blackman-harris.					
		Advanced math: define extensive algebraic expressions including waveforms, reference waveforms, math functions, scalars, up to two user-adjustable variables and results of parametric measurements.					
	Limit and mask test (Option S01)	Incluided standard masks: ITU-T, ANSI T1.102, USB					
		Mask test source: CH1-CH4					
		Limit test source: CH1-CH4, REF1-REF4					
		Mask creation: Limit test vertical tolerance from 0 to 1 division; limit test horizontal tolerance from 0 to 500 m division. Load standard mask and custom mask from text file.					
		Mask scaling: lock to source on, lock to source off.					
		Test criteria run unti: Minimum number of waveforms (from 1 to 1,000,000 and Infinity). The shortest time (1s-48h; infinity)					
		Violatetion threshold: 1-1000000.					
		Actions on test failure: stop acquisition, save screen image to file, save waveform to file, trigger out pulse.					
		Actions on test complete: trigger out pulse.					
		Result display: test status, total waveforms, number of violations, violation rate,					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
		total tests, failed tests, test failure rate, elapsed time, total hits for each mask segment.					
	Power measurement and analysis (Option S02)	Power quality test: V_{RMS}, $V_{crest\ factor}$, frequency, I_{RMS}, $I_{crest\ factor}$, active power, apparent power, reactive power, power factor, phase angle					
		Switching loss measurement: Power loss and energy loss, including T_{on}, T_{off}, conduction, total loss					
		Harmonics THD-F, THD-R, RMS measurement, harmonic graphic display and table display					
		Ripple measurement: V_{ripple} and I_{ripple}					
		Modulation analysis: Graphic display of modulation types including +pulse width, -pulse width, period, frequency, +duty ratio and -duty ratio					
		Safety operation area: Graphic display of measurement of safety operation areas of switching equipment and template test					
		Measurement of dV/dt and dI/dt: Conversion rate marker measurement					
Protocol analysis Option	Decode channel	1					
	Display format	Binary, hexadecimal					
	Display types	Bus, digital, event list with time scale information					
	I2C (Option S04)	Trigger on start, repeated start, stop, missing ACK, address, data, or address and data on I2C buses up to 10 Mb/s.					
		Signal rate: ≤10Mbps; Protocol type: 7 digits /10 digits address					
	RS232 (Option S05)	Trigger on Tx start bit, Rx start bit, Tx end of packet, Rx end of packet, Tx data, Rx data, Tx parity error, and Rx parity error up to 2Mbps.					
		Signal rate: 50bps - 2Mbps					
	SPI (Option S06)	Trigger on start of frame, MOSI, MISO, or MOSI and MISO on SPI buses up to 10 Mb/s.					
		Signal rate: ≤10Mbps					
	CAN (Option S07)	Trigger on start of frame, frame type, identifier, data, identifier and data,end of frame, missing ACK, or bit stuffing error on CAN signals up to 1 Mb/s.					
		Signal rate: 10kbps - 1Mbps					
	LIN (Option S08)	Trigger on sync, identifier, data, identifier and data, wakeup frame, sleep frame, errors, up to 100 kb/s.					
		Signal rate: 800bps - 100kbps; Protocol standard: 1.x, 2.x					
	FlexRay (Option S09)	Trigger on start of frame, type of frame, identifier, cycle count, complete header field,data, identifier and data, end of frame or errors, up to 10 Mb/s.					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
		Signal rate: 2.5Mbps, 5Mbps, 10Mbps					
	Audio (Option S10)	Trigger on word select, frame sync, or data. Maximum data rate for I2S/LJ/RJ/TDM is 10 Mb/s.					
		Signal rate: ≤10Mbps; Protocol type: I2S, LJ, RJ, TDM					
	USB (Option S11)	Trigger on sync active, start of frame, reset, suspend, resume, end of packet, token packet, data packet, handshake packet, special packet, error. Low speed is 1.5Mbps and full speed is 12Mbps.					
		Signal rate: low speed 1.5Mbps, full speed 12Mbps					
	MIL-STD-1553 (Option S12)	Trigger on synchronization, word type, command word, data word, error and idle time, with a rate of 1 Mbps.					
		Signal rate: 1Mbps					
Logical analyzer (Option H01)	Number of digital channels	16					
	Threshold grouping	Pod 1: D7-D0; Pod2: D15-D8					
	Threshold selection	TTL (1.4V), 5VCMOS (2.5V), 3.3VCMOS (1.65V), 2.5VCMOS (1.25V), ECL (-1.3V), PECL (3.7V), user-defined					
	User-defined threshold range	±20V, with an increment of 10 mV					
	Threshold precision	± (150mV+3% of threshold setting)					
	Max. Input voltage	±40V peak-peak value					
	Input dynamic range	±10V relative to the threshold					
	Min. Voltage amplitude	400mVpp					
	Max. input switching rate	400MHz					
	Input impedance	100kΩ ± 1%					
	Vertical resolution	1 bit					
	Timing sample rate	2.5GSa/s					
	Memory depth	500Mpts/CH			200Mpts/CH (-S)		
	Min. Detection pulse width	2ns					
	Inter channel delay error	3.2ns					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
Function Generator (Option H02)	Number of channels	1					
	Max. Output frequency	25MHz					
	Max. Sample rate	200MSa/s					
	Vertical resolution	14 bit					
	Output impedance	50Ω (typical value)					
	Output waveform	Standard waveform: Sine wave, square wave, oblique wave, pulse, DC, noise and arbitrary wave					
		Built-in waveform: SinC, Exponential Rise/Decay, Gaussian, Lorentz curve and haversine curve					
	Modulation	FM, AM, FSK					
	Sine wave	Frequency range: 0.1 Hz - 25 MHz					
		Harmonic distortion: -40dBc					
		Stray: -40dBc					
		Total harmonic distortion: 1%					
		Signal-to-noise ratio: 40dB					
	Square wave/pulse	Frequency range: 0.1 Hz - 10MHz					
		Duty ratio: 1% - 99%					
		Duty ratio resolution: 0.1% or 5ns (the larger one prevails)					
		Minimum pulse width: 40ns					
		Pulse width resolution: 5ns or 4 digits (the larger one prevails)					
	Ramp/triangular wave	Frequency range: 0.1 Hz - 1MHz					
		Linearity: 1%					
		Variable symmetry: 0 - 100%					
	Noise	Bandwidth: 25MHz					
	Built-in waveform frequency	0.1 Hz - 1 MHz					
	Arbitrary waveform	Waveform length: 1 - 16,384					
		Frequency range: 0.1Hz - 10MHz					
	Frequency	Precision: 100 ppm					
		Resolution: 0.1Hz or 4 digits (the larger one prevails)					
	Amplitude	Output range: 50 mVpp - 2.5 Vpp (50Ω)					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
		Precision: ±[1.5% peak to peak amplitude setting +1.5% DC offset setting)+1mV					
	DC offset	Offset range: ±1.25V (50Ω)					
		Offset resolution: 1mV (50Ω)					
		Offset precision: ±2% of the offset setting value					
Digital Voltmeter	Measurement source	CH1, CH2, CH3, CH4					
	Measurement types	AC RMS, DC, DC+AC RMS, frequency					
	Resolution	Digital voltmeter: 4 digits, Frequency counter: 6 digits					
Display System	Display type	10.4 inch color LCD					
	Display resolution	1024 horizontal × 768 vertical pixels					
	Graticules	full, grid, crosshair, frame					
	Touch screen	Capacitive, supports waveform and menu operation.					
	Waveform styles	Dots, vectors, persistence.					
	Display format	YT、XY					
	Grey grade	256					
	Waveform color	Normal, inverted, temperature and spectral					
	Language	English					
	Brightness	The waveform, scale and screen brightness can be freely adjusted					
Input and output ports	USB host port	Two ports on front and two ports on rear of instrument.					
	USB device port	One port on rear of instrument.					
	LAN port	RJ-45 connector, supports 10/100/1000Mb/s					
	Video output port	DB-15 female connector, connect to show the oscilloscope display on an external monitor or projector.					
	Auxiliary input	Rear panel BNC, 1MΩ impedance, max.input: 300Vrms.					
	Auxiliary output	Rear panel BNC, used for trigger pulse signal output, event output of limit mask test, or built-in training signal output					
	Reference input/output	Rear panel BNC，time base systems is used for input or output of reference clock, frequency is 10MHz.					
	Probe compensator	Front panel pins, frequency is 1kHz, amplitude is approx. 3V.					
Physical Characters	Structural style	Portable					
	Power source	100V-240VAC, 50Hz-60Hz					
		Max.power consumption: 150 W					

Models		DSO5034	DSO5054	DSO5104	DSO5034S	DSO5054S	DSO5104S
	Operating temperature	0℃ to +50℃					
	Dimensions	426mm×221.5mm×160mm (W×H×D)					
	Max. weight	6kg					

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