ZLG

512M memory depth

4G sampling rate

1M waveform capture rate

30 kinds of protocol decoding

51 kinds of parameter measurement

FIR hardware filter

Touch operation

Problem location

Analyzing

Searching and marking

Measuring

Exception capture

Large data storage

ZDS4000 Series Data Mining Oscilloscope

Opening a new era of data mining and analysis (bandwidth: 200M, 350M, and 500M)

For more information, please visit
www.zlg.com

Product Origins

In the early days of its foundation, developing state-of-the-art instruments was the dream of ZLG Guangzhou ZHIYUAN Electronics Co., Ltd. (hereinafter referred to as "ZHIYUAN Electronics"). At that time, the domestic instrument industry was completely monopolized by foreign manufacturers. In particular, the oscilloscope contributed to the largest consumption of all electronic measuring instruments; however, all popular brands were imported from foreign countries. Although the history of the domestic digital oscilloscope spans nearly a decade, there are still many technical and quality issues centering on measurement accuracy, waveform capture rate, memory depth, analog bandwidth, sampling rate, and signal analysis. In fact, even though the oscilloscope is the only universal electronic measuring instrument, China does not have much say on the matter. ZHIYUAN Electronics is determined to change this by manufacturing oscilloscopes and making them a competitive product for establishing a benchmark for this national brand.

2004 ZHIYUAN Electronics developed a virtual oscilloscope to accumulate relevant technology.

2005 ZHIYUAN Electronics cooperated with colleges and universities to start preliminary research on the oscilloscope.

2007 ZHIYUAN Electronics participated in formulating the national standard of the digital oscilloscope.

2008 ZHIYUAN Electronics developed the first desktop oscilloscope to accumulate and sum up relevant experience for starting research on a second model.

2010 The second oscilloscope came to the market in small quantities as a trial production. Since it was not a competitive product according to the strict standards of ZHIYUAN Electronics, the market opportunity was set aside in order to begin research on a third model.

That same year, ZHIYUAN Electronics started on its proposal for preliminary research of the 1-GHz amplifier and 5-GS/s ADC.

2012 ZHIYUAN Electronics developed a third oscilloscope. However, its release was postponed to improve user experience. ZHIYUAN Electronics is a late bloomer for pursuing competitive products and good quality.

October 2014 The ZDS2000 series oscilloscope went on sale, which was the pinnacle of perfection and redefined the standard of the 200-M oscilloscope.

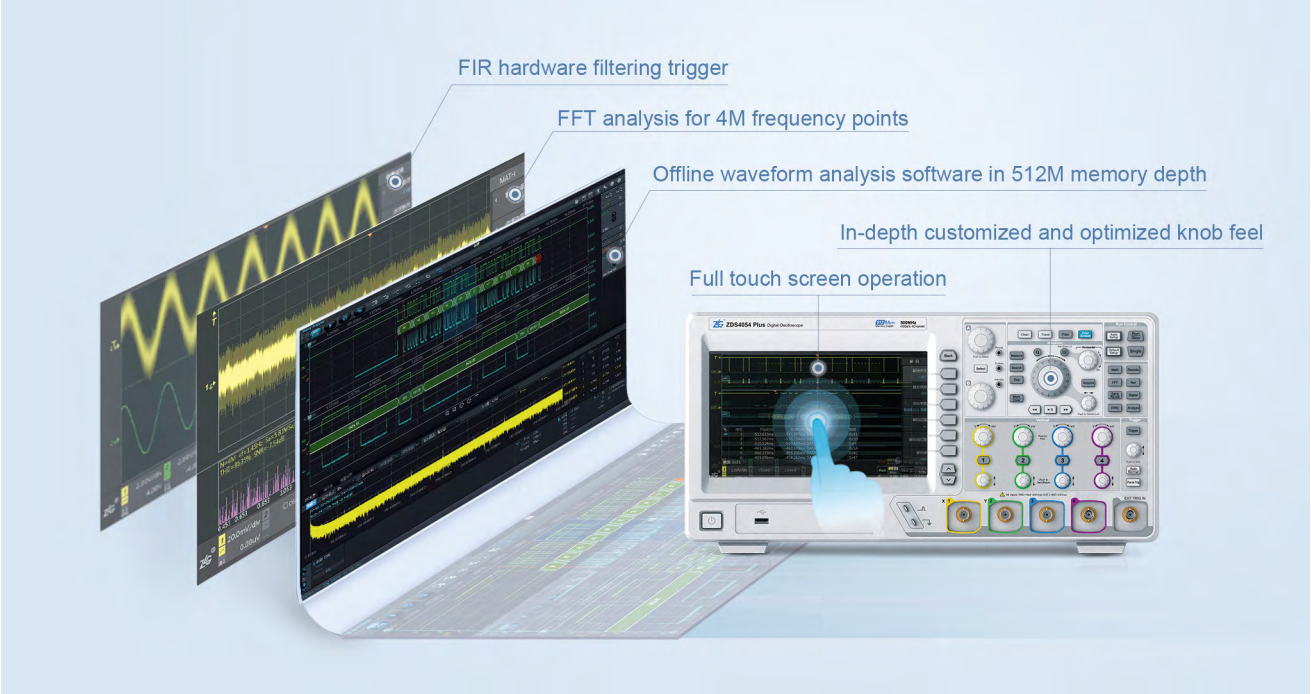
September 2016 The ZDS4000 series oscilloscope came to the market, which opened a new era of oscilloscope data mining and analysis.

Product Type	ZDS4054 Plus	ZDS4034 Plus	ZDS4024 Plus	ZDS3054 Plus	ZDS3034 Plus	ZDS3024 Plus
Input channel	4	4	4	4	4	4
Analog bandwidth	500MHz	350MHz	200MHz	500MHz	350MHz	200MHz
Maximum real-time sampling rate	4GSa/s, use every two channels interleaved					
Memory depth	512Mpts	512Mpts	512Mpts	250Mpts	250Mpts	250Mpts
Maximum waveform capture rate	1Mwfms/s	1Mwfms/s	1Mwfms/s	330kwfms/s	330kwfms/s	330kwfms/s
Range of time base	500ps/div – 1ks/div	500ps/div – 1ks/div	500ps/div – 1ks/div	500ps/div – 1ks/div	500ps/div-1ks/div	500ps/div–1ks/div
Range of vertical sensitivity (1:1)	2mv/div~10V/div	2mv/div~10V/div	2mv/div~10 V/div	2mv/div~10V/div	2mv/div ~ 10V/div	2mv/div~10V/div
Input impedance	1MΩ/50Ω	1MΩ/50Ω	1MΩ/50Ω	1MΩ/50Ω	1MΩ/50Ω	1MΩ/50Ω
Protocol decoding (standard configuration)	Over 30 kinds, including UART, SPI, I2C, USB, PS/2, DALI, Wiegand, 1-Wire, DS18B20, HDQ, SD-SPI, SD-SD, IrDA, Manchester, DiffManche, Miller, DHT11, SHT11, NEC, RC5, RC6, CAN, LIN, FlexRay, CAN FD, MVB, ISO7816, Modbus, WTB, MIL-STD-1553B, and MIPI_DSI					
FIR hardware filter	Supported	Not supported	Supported	Not supported		Supported
Trigger function	12 basic triggers, 28 protocol triggers, and an innovative mask trigger	12 basic triggers, 28 protocol triggers, and an innovative mask trigger	12 basic triggers, 28 protocol triggers, and an innovative mask trigger	12 basic triggers, 28 protocol triggers, and an innovative mask trigger	2 basic triggers, 28 protocol triggers, and an innovative mask trigger	12 basic triggers, 28 protocol triggers, and an innovative mask trigger
Automatic measurement	51 automatic measurement and statistic functions					
Mathematic function	Addition, subtraction, multiplication, division, differentiation, integration, FFT, custom formula operation (logarithm, exponential, trigonometric function, and square root), trend, and filter					
Advanced functions	Double zoom mode, segmented storage, waveform play, intelligent marking, power analysis software, and upper computer control analysis software					
FFT	4 Mpts, supporting window functions including rectangular window, Hamming window, Hann window, and Blackman window					
Display screen	Touch screen and 9-inch WVGA color display screen with resolution of 800*480					
Touch operation	Dual touch and supporting zoom gestures					
Waveform display	256 gray level display and color temperature display; and supporting variable persistence					
Interface	USBHost, USBDevice, LAN, VGA, Trig Out, and Trig In					
Waveform search	Search conditions: rising edge, falling edge, rising time, falling time, positive pulse width, negative pulse width, positive duty cycle, negative duty cycle, cycle, frequency, positive runt pulse, and negative runt pulse					

Note: Except for FFT, all arithmetical operations are full hardware operations.

What is a data mining oscilloscope?

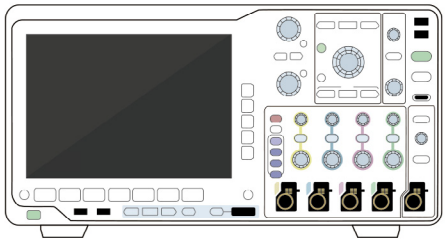
By capturing 512M massive waveforms and having an in-depth data mining capability, and a smooth operation experience based on a full touch screen, ZDS4000 series data mining oscilloscopes offer a brand new model of analysis to locate problems.



Data mining oscilloscope

- 512M massive memory depth, achieving better waveform fidelity;
- True measurement, quickly locating abnormal signals;
- Full hardware acceleration search, ensuring a quick response;
- Combining intelligent markings with a high capture rate, locating exceptions efficiently;
- Standard configuration of multiple analytical plug-ins are provided for free;
- Completing debugging easily and locating the problem quickly.

Traditional oscilloscope

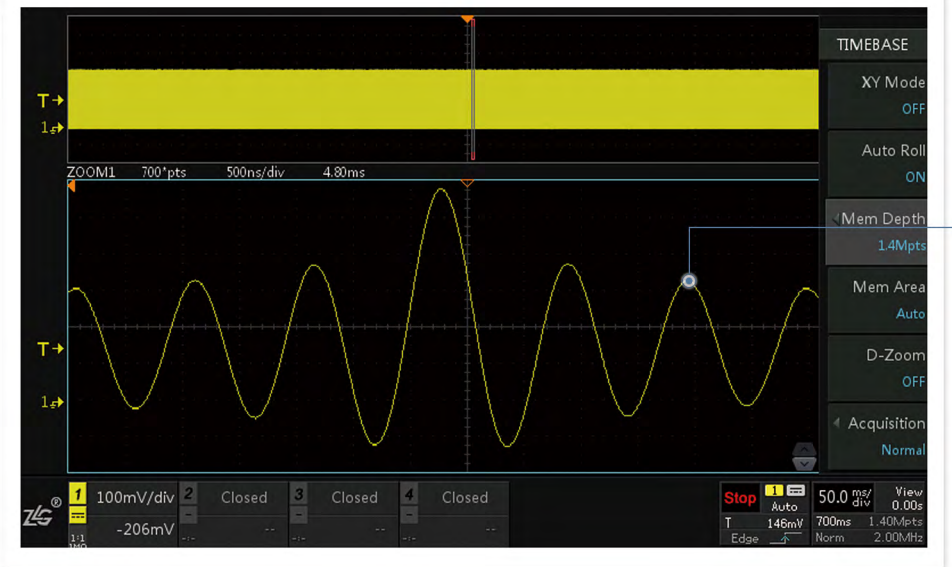


- Insufficient memory depth, making the waveform distorted easily;
- Sampling point measurement, making it hard to locate abnormal signals;
- Slow search response in the case of large amount of data;
- Low capture rate, making it difficult to locate the abnormal waveform;
- Every analytical plug-in is charged separately;
- Repeated debugging, making it difficult to locate problem.

Step 1 of data mining: 512M large data storage

The memory depth is just like a container, whose capacity determines the quantity of objects, i.e., it determines how many data waveforms can be stored. If the memory depth is sufficient, it can capture long-time waveform at a high sampling rate. Similarly, if the memory depth is insufficient, the long-time waveform can be captured only by reducing the sampling rate. Therefore, if the memory depth of an oscilloscope is not large enough, the high sampling rate cannot give full play to its value. The ZDS4000 series oscilloscope has a standard configuration of 512Mpts memory depth, so there will be a waveform as long as 128ms can be stored even at a sampling rate of 4GSa/s.

The sampling rate stays as high as **500MHz** in **512M** memory depth. The waveform of **1,024ms** is captured without any distortion.



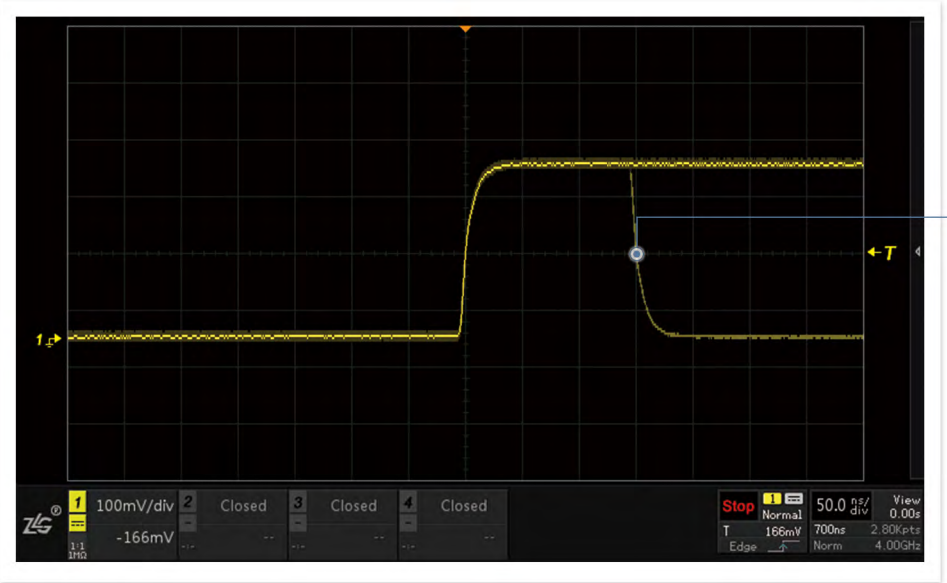
The sampling rate drops to **2M** in a memory depth of **1.4M**. The waveform of **700ms** is captured in total distortion.

Correspondence table of sampling rate and time gear in different memory depths

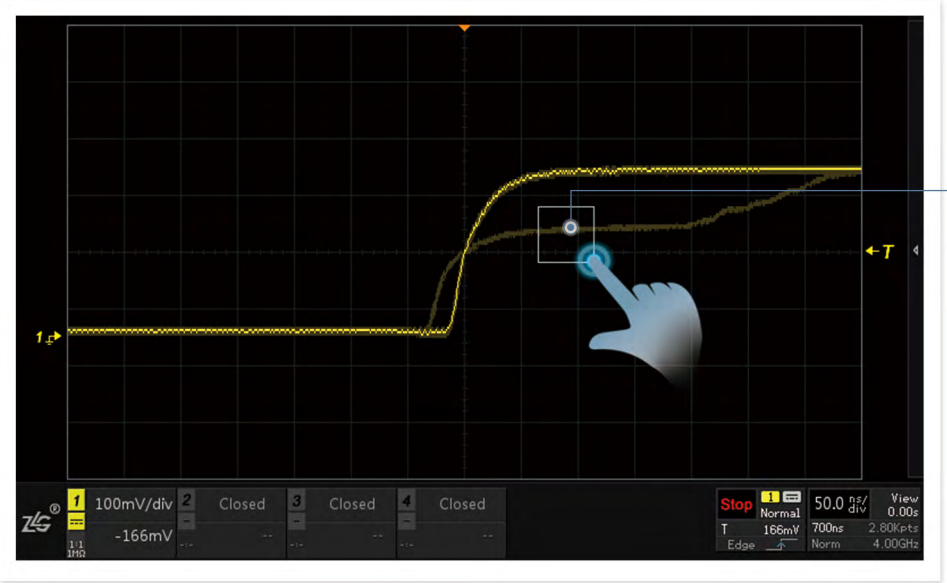
Waveform time gear	Sampling rate in 512M memory depth	Sampling rate in 10M memory depth	Sampling rate in 2M memory depth
5ms/div	4G Sa/s	200M Sa/s	40M Sa/s
50ms/div	500M Sa/s	20M Sa/s	4M Sa/s
500ms/div	50M Sa/s	2M Sa/s	400K Sa/s

Step 2 of data mining: Exception capture at 1M capture rate

A data oscilloscope inevitably has a "dead time"; however, the faster the waveform capture rate is, the shorter the dead time and the greater the probability of capturing exceptions and occasional events will be. The ZDS4000 series oscilloscope has the highest capture rate of 1 million waveforms/second in the industry, which minimizes the dead time of the oscilloscope. A higher waveform capture rate can locate abnormal signals more quickly. When combined with the mask trigger function, any regular abnormal signals can be isolated easily.



Only oscilloscopes with a **high capture rate** can capture abnormal signals with **low probability of occurrence**.



Full support for dual touch Simple **area trigger**

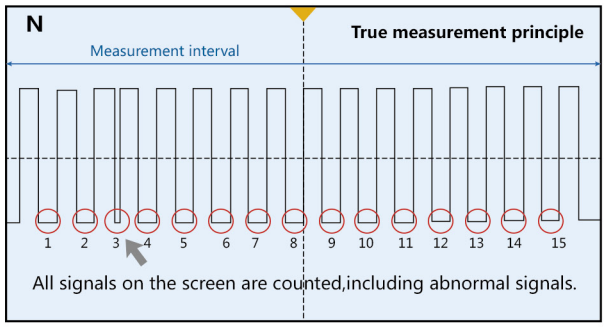
Exception capture time corresponding to different capture rates

Exception occurrence frequency [times/sec]	Waveform capture rate [frame/sec]			
	0.1K	10K	100K	1M
100	1h:22m:14s	49s	4.9s	0.49s
10	13h:42m:21s	8m:13s	49s	4.9s
1	5d:17h:3m:31s	1h:22m:14s	8m:13s	49s
0.1	57d:2h:35m:11s	13h:42m:21s	1h:22m:14s	8m:13s

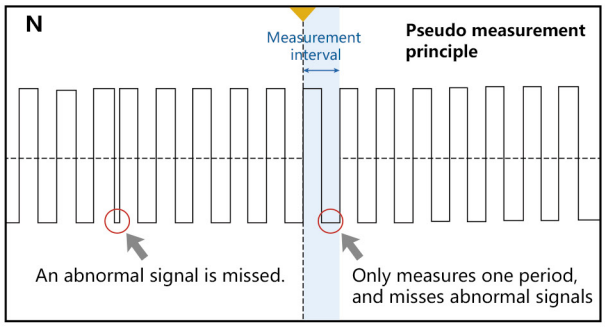
Note: The error detection probability is 99.9% under the conditions of 4GSa/s sampling rate and 10ns/div.

Step 3 of data mining: True parameter measurement

Different from traditional oscilloscopes which only measure one period or use re-measurement mode by reducing samples, the ZDS4000 series oscilloscope measures every period of each frame of the waveform through FPGA full hardware parallel processing and based on original sampling rate and 512Mpts full memory depth. It only takes about 1 second to realize true parameter measurement of 512Mpts data, with the measurement items as many as 51 kinds and support for simultaneous display of 24 parameters. This measurement has essential difference with the traditional oscilloscope measurement, which is also a major breakthrough in oscilloscope test methods.

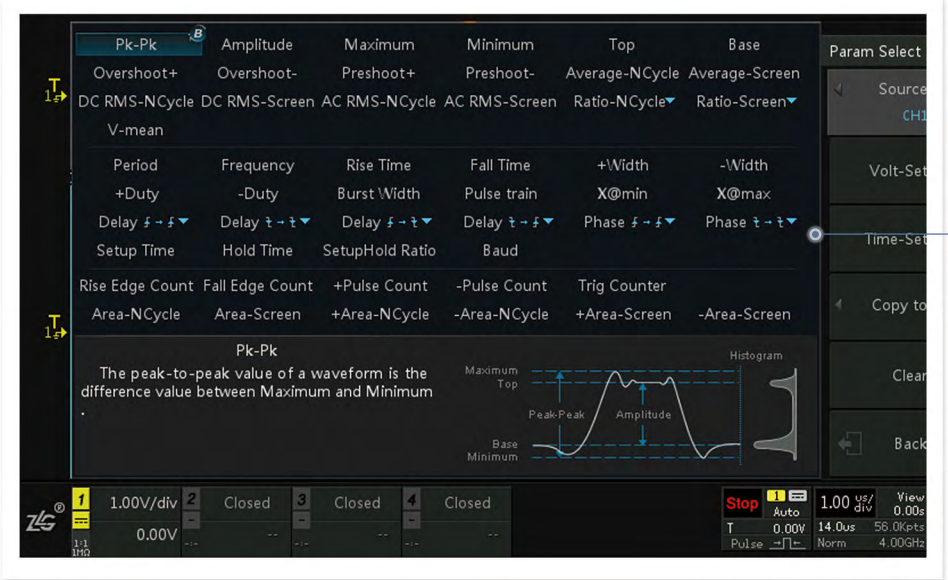


For data mining oscilloscopes, all periodic signals can be measured, realizing true measurement.



For traditional oscilloscopes, only one periodic waveform is measured near the triggering position, which is a pseudo measurement.

If not each waveform in all memory depths can be measured, the only value of the memory depth is the basic requirement of "no distortion of waveforms", but the exceptions in the waveforms cannot be further mined automatically. Only with the true parameter measurement and statistic function, the value of 512Mpts mass data can be mined; otherwise, what is the meaning of mass data if only one period is measured?

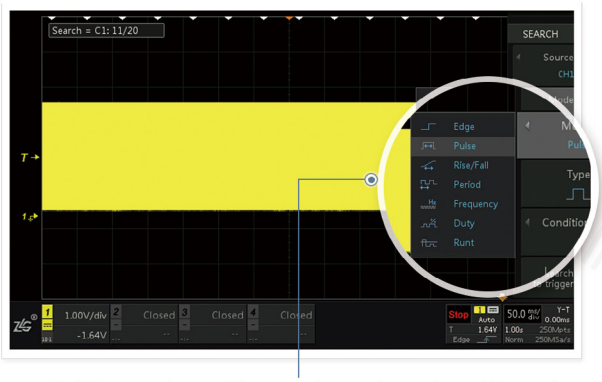


Supports measurement of **51** parameters

Displays **24 kinds** of parameters simultaneously

Step 4 of data mining: Waveform search and intelligent marking

The ZDS4000 series oscilloscope not only provides 512M waveform data, but also is equipped with a powerful waveform search and intelligent marking function. You can locate the abnormal position in 512Mpts waveform data through such search conditions as edge, pulse width, runt, rising/falling time, cycle/frequency, etc; and mark abnormal signals with an intelligent marking function. In this process, all measurement is performed by FPGA full hardware acceleration, and the whole process can be completed at around 1 second.



Set the search conditions, such as edge, pulse width, runt, rising/falling time, cycle/frequency, etc.

zExplore panel

Efficient waveform zoom and jumping

All signals conforming to the conditions will have a white inverted triangle.

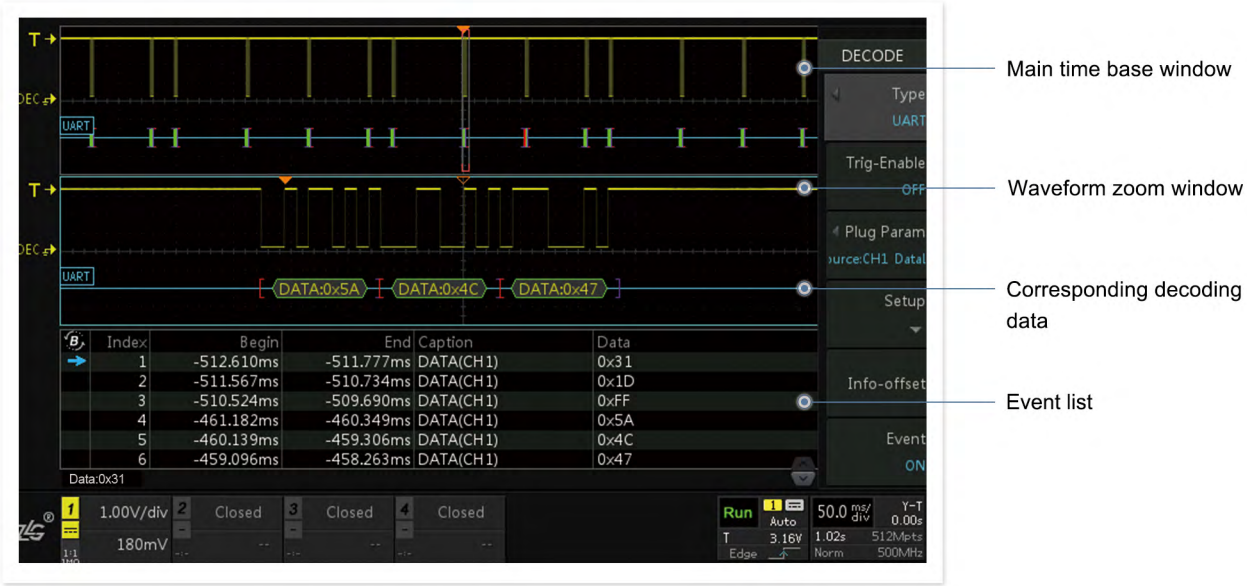
Each interested signal can be marked.

The process of “large data storage –exception capture - parameter measurement - searching and marking” is the core of data mining. The introduction of data mining technology gives the oscilloscope the ability of in-depth positioning for interested waveforms based on the waveform data, which then enables the waveform to be directly analyzed by the built-in analytical plug-ins for targeted analysis. Both original waveforms and analysis results can be exported for storage by the comprehensive waveform analysis software, which is convenient for your secondary measurement at anytime and anywhere.

Step 5 of data mining: Joint analysis of various plug-ins

Standard configuration of over 30 kinds of protocol decoding

Different from the individual charging for every analytical plug-in, all plug-ins of the ZDS4000 series oscilloscope are standard configuration, which can provide a further analysis for interested waveforms, greatly improving the fault debugging efficiency of overall system signals and assisting engineers to quickly locate the problem.



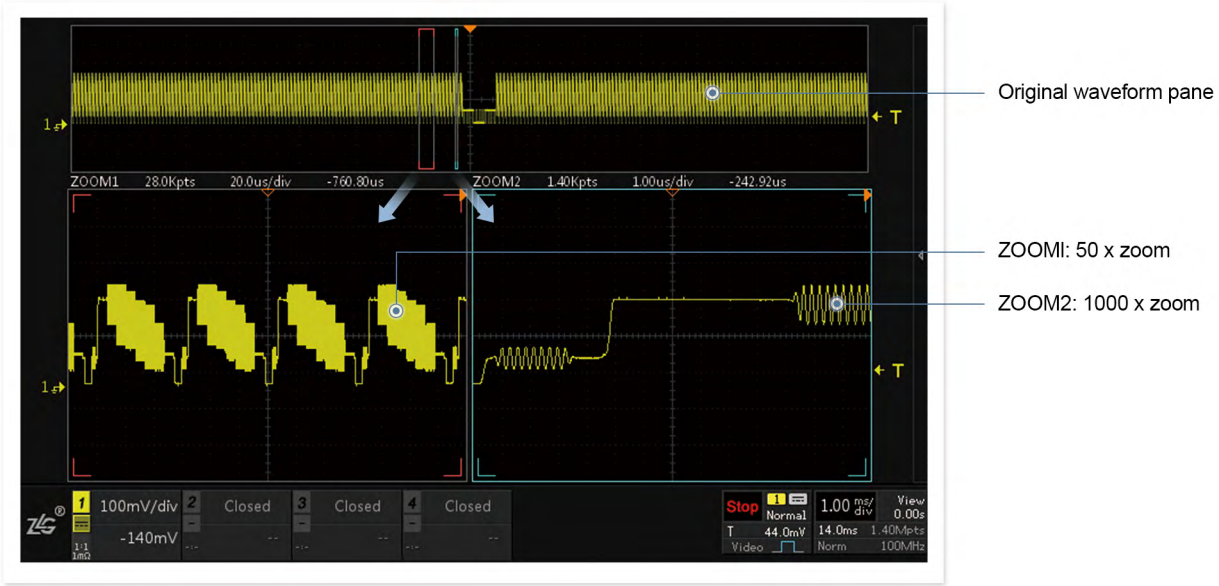
Supported protocol decoding types: UART, SPI, I2C, USB, PS/2, DALI, Wiegand, 1-Wire, DS18B20, HDQ, SD-SPI, SD-SD, IrDA, Manchester, DiffManche, Miller, DHT11, SHT11, NEC, RC5, RC6, CAN, LIN, FlexRay, CAN FD, MVB, ISO7816, Modbus, WTB, MIL-STD-1553B, and MIPI-DSI.

Real-time FIR hardware filter

Each channel of the ZDS4000 series oscilloscope is equipped with a filter ranging from 50Hz to 200MHz, which is particularly suitable for filtering out unwanted signals, observing occasions where there are particular bandwidth signals, and supporting trigger and measurement analysis of waveform after filtering.

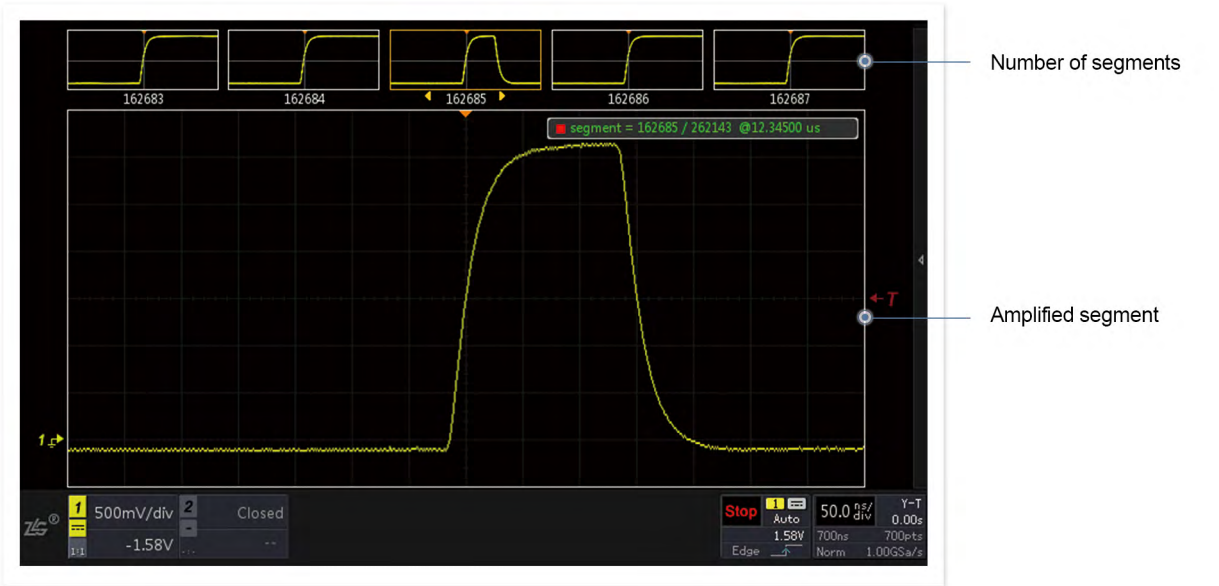
Dual-ZOOM mode

The ZDS4000 series oscilloscope supports the dual-ZOOM mode, which can set the zoom coefficient for two windows separately to display the waveform of two different timeline ranges simultaneously. Combined with convenient touch and large knob operations, the waveform of each window can be easily controlled.



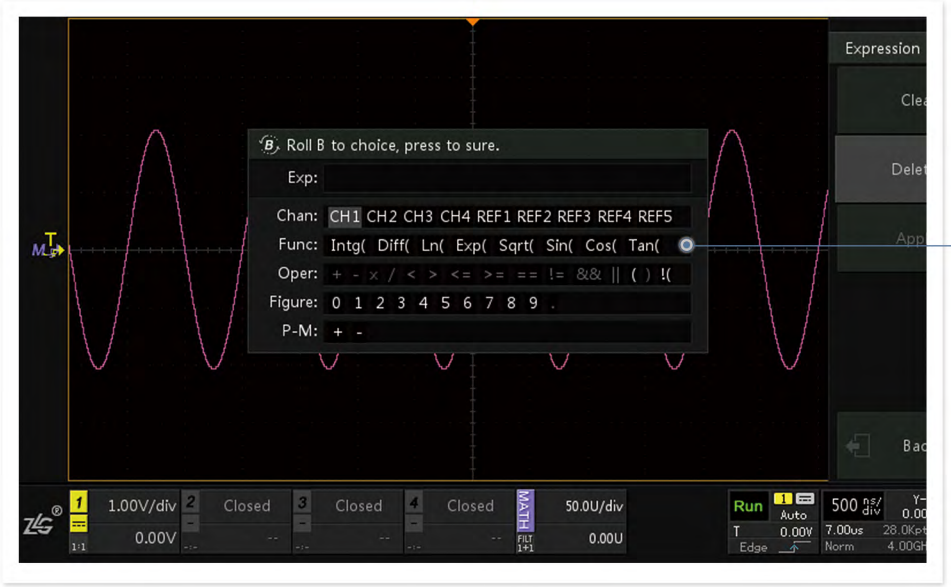
Segmented storage function

If the signal to be captured is a low duty cycle pulse or a burst signal and there is a long idle time between signals, the segmented storage function of the ZDS4000 series oscilloscope can effectively extend the waveform sampling time.



Custom waveform operations

The ZDS4000 series oscilloscope supports custom operations among waveform channels. Instead of simple operations such as addition, subtraction, multiplication, and division, its operations are conducted according to customized waveform formulas. Suppose the voltage waveform inputs to channel l and the current waveform inputs to channel 2 inputs, an energy curve can be obtained directly by setting the formula of Intg (CH1*CH2). As all operations are based on FPGA hardware acceleration, all operation waveforms can be presented within a few hundred milliseconds.

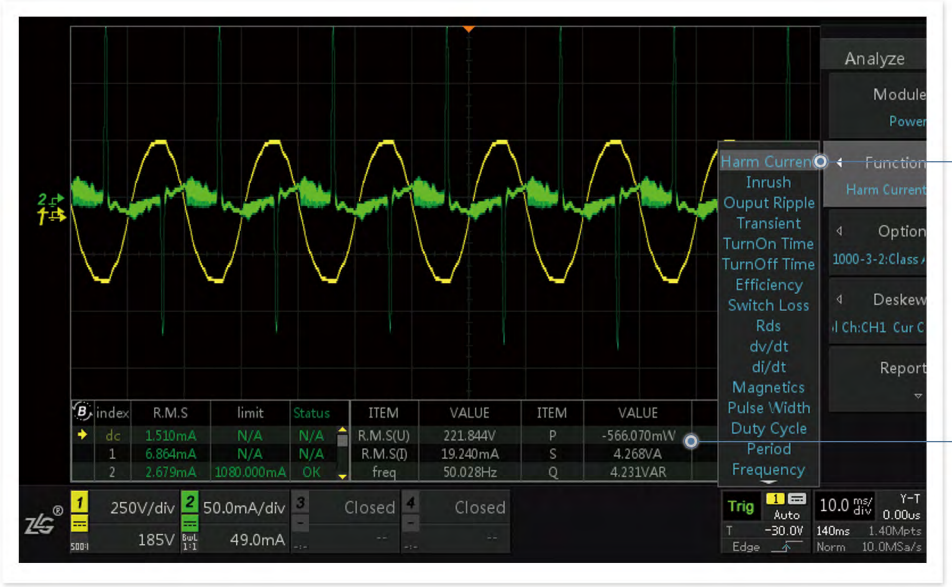


4Mpts FFT function

The majority of oscilloscopes on the market can only support the FFT analysis of 8K sample points at most. If the sampling rate is 1G, the frequency resolution is only 125 kHz; therefore, in most cases, it is impossible to accurately judge the spectral distribution of signals. The ZDS4000 series oscilloscope eliminates the simple function parcel. It applies a professional processing chip internally, breaks through technical barriers, and upgrades the number of FFT analysis points to 4M sample points. Its frequency resolution can be accurate to

Power supply analysis software for switching power supply testing

Facing various power supply tests, ZHIYUAN Electronics has provided the ZDS4000 series oscilloscope with customized power supply analysis software. The software is able to measure and analyze the operating characteristics of power conversion devices and circuits, including input analysis, switching device analysis, modulation analysis, and output analysis. In addition, the probe settings and measurement settings are completed in a simple user interface. The report for analysis results will be generated automatically, which is very convenient and quickly.



Comprehensive waveform analysis software

The data mining oscilloscope can not only use its powerful analysis function to perform various analyses, but also export a large waveform data of 512M via Ethernet for further offline analysis through the Wave Analyze software equipped with the oscilloscope.

Step 6 of data mining: Locate the problem

The waveform is not information but raw materials to be dug out. Engineers are required not only to capture the waveform, but also explore the in-depth data meaning behind the waveform. The ZDS4000 series data mining oscilloscope is no longer a simple tool of "trigger - analysis" based on a small band of waveforms. It is an efficient analytical tool that features "large data storage - exception capture - measurement - search - mark - analysis". By capturing massive waveforms and having an in-depth data mining capability, powerful analytical plug-ins, and a smooth operation experience, ZDS4000 series data mining oscilloscopes offer a brand new model of analysis to locate problems.

Standard accessories

Accessory Name	Description
Probe	Standard configuration of 10:1 500MHz passive probe for each channel
USB communication cable	Communication between PC and oscilloscope
Power cable	For the power supply of an oscilloscope
Information disk	Product e-information
Warranty card	To apply for product warranty

Optional accessories

Accessory Name	Description
ZP1050D	High voltage differential probe, bandwidth:50 MHz, accuracy: ±2%; maximum differential voltage: 1,300 Vp
Panel cover	To protect the front machine panel
Portable package	To carry an oscilloscope on a business trip

Warranty service

Three-year warranty for the host machine, which excludes probes and accessories.

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