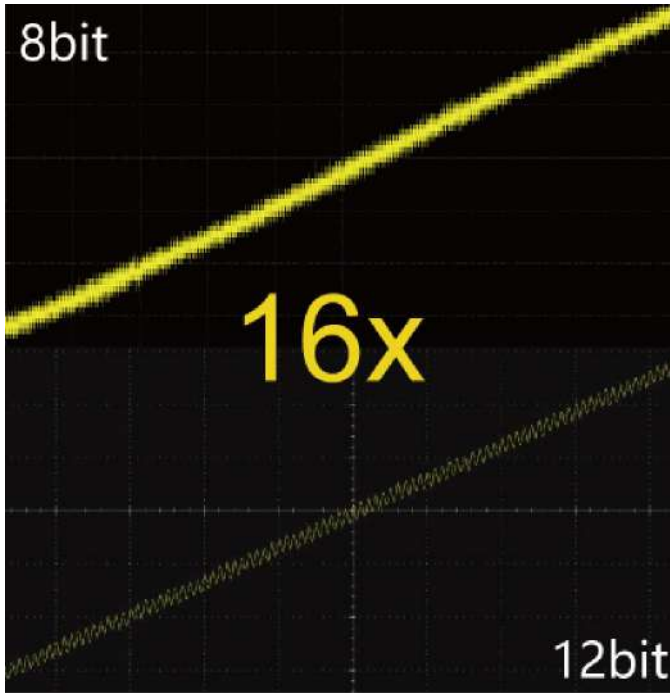


Bandwidth : 70/100/200 MHz

Highlights

- Ultra-low noise floor for cleaner signals, measuring small signals more accurately.
- 12-bit resolution ($2^{12} = 4096$) to see the most signal detail.
- Up to 2 GSa/s real-time sample rate.
- A maximum of 100 Mpts memory depth, capturing more detailed signals over longer time spans.
- Standard serial decoding: SPI, I2C, RS232/UART, CAN, and LIN.
- 10.1-inch large HD touch display (1280x800) designed for better touch interactions.
- Front panel flex knobs, bringing smoother interaction and easier measurements.



Entry Level

High Resolution

Digital Oscilloscope



Applications



An oscilloscope is an important tool for making power supply measurements. With up to 12-bit vertical resolution, the DHO 1000 series makes it easy for you to perform ripple measurement and quality test.



Education

This series redefines what you can expect in an entry level oscilloscope by providing excellent noise performance and 12 bit high resolution, providing basic functionality for higher education.



The 10.1 inch large HD touch display enables better view of signals. Large memory depth and the Autoscale function make it ready for testing of embedded system designs.



With standard CAN and LIN serial decoding functions, it provides a more affordable solution for automotive electronics testing.

Features

- Ultra low noise floor for cleaner signals, measuring small signals accurately.
- 12 bit vertical resolution.
- 70/100/200 MHz analog bandwidth (selectable), 2/4 analog channels, and 1 EXT channel.
- Up to 2 GSa/s real time sample rate.
- Max. memory depth: 100 Mpts (optional).
- Vertical sensitivity range: 500 μ V/div to 10 V/div.
- Up to 1,500,000 wfms/s waveform capture rate with the UltraAcquire mode.
- 10.1" 1280x800 HD touch display.
- User friendly flex knobs, bringing smoother interaction.
- Standard photoelectric encoder operating knobs, effectively prolonging its service.
- Standard USB Device & Host, LAN, and HDMI interfaces.

DHO1000 series digital oscilloscope is designed to meet the designing, debugging, and testing requirements of the mainstream oscilloscope market. This series achieves a fast waveform capture rate of 1,500,000 wfms/s with the UltraAcquire mode, 100 Mpts memory depth, 12-bit vertical resolution, all combined with excellent noise floor performance and vertical accuracy to meet your requirements for more accurate measurements, bringing extraordinary T&M experience for you.

Technical Specifications

All the specifications are guaranteed except the parameters marked with "Typical" and the oscilloscope needs to operate for more than 30 minutes under the specified operation temperature.

Overview of the DHO1000 Series Technical Specifications

Overview of the DHO1000 Series Technical Specifications						
Model	DHO1072	DHO1074	DHO1102	DHO1104	DHO1202	DHO1204
Analog Bandwidth (-3 dB)	70 MHz	70 MHz	100 MHz	100 MHz	200 MHz	200 MHz
Input Channels	2+EXT	4+EXT	2+EXT	4+EXT	2+EXT	4+EXT
Rise Time (10% to 90%, Typical)	≤5 ns	≤5 ns	≤3.5 ns	≤3.5 ns	≤1.75 ns	≤1.75 ns
Sampling Mode	Real-time sampling					
Max. Sample Rate of Analog Channels	2-channel model: 2 GSa/s (single channel ^[1]), 1 GSa/s (all channels ^[3]) 4-channel model: 2 GSa/s (single channel ^[1]), 1 GSa/s (half channels ^[2]), 500 MSa/s (all channels ^[3])					
Standard Memory Depth	2-channel model: 50 Mpts (single channel ^[1]), 25 Mpts (all channels ^[3]) 4-channel model: 50 Mpts (single channel ^[1]), 25 Mpts (half channels ^[2]), 12.5 Mpts (all channels ^[3])					
Optional Memory Depth	2-channel model: 100 Mpts (single channel ^[1]), 50 Mpts (all channels ^[3]) 4-channel model: 100 Mpts (single channel ^[1]), 50 Mpts (half channels ^[2]), 25 Mpts (all channels ^[3])					
Max. Waveform Capture Rate	50,000 wfms/s (Vector Mode) 1,500,000 wfms/s (UltraAcquire Mode)					
Vertical Resolution	12 bits					
Hardware Real-time Waveform Recording and Playing	Up to 500,000 frames					
Peak Detect	Capture glitches as narrow as 2 ns					

Vertical System Analog Channels

DC Vertical Gain Accuracy ^[4]	±2% full scale
DC Vertical Offset Accuracy	≤200 mV/div (± 0.1 div ± 2 mV ± 1.5% of offset setting) >200 mV/div (± 0.1 div ± 2 mV ± 1.0% of offset setting)
Channel-to-channel Isolation	≥100:1
ESD Tolerance	±8 kV (for input BNC)

Horizontal System Analog Channels

Horizontal System Analog Channels

Time Base Range	2 ns/div to 1 ks/div
	Time base fine adjustment setting available
Time Base Resolution	400 ps
Time Base Accuracy	±5 ppm ± 1 ppm/year
Time-base Delay Time Range	Pre-trigger -5 div
	Post-trigger 1 s or 100 div, whichever is greater
Δ Time Accuracy	± (time base accuracy x reading) ± (0.001 x screen width) ± 50 ps
Channel-to-channel Deskew	Channel-to-channel deskew range: ±100 ns, accuracy: ±1 ps
Analog Channel-to-Channel Delay (Typical)	≤2 ns ^[5]
Horizontal Mode	YT Default mode
	XY On channel 1/2/3/4
	SCAN Time base ≥ 200 ms/div
	ROLL Time base ≥ 50 ms/div or ≥ 100 ms/div (selectable), available to enter or exit the ROLL mode by turning the horizontal timebase knob

Acquisition System

Acquisition System	
Max. Sample Rate of Analog Channels	2-channel model: 2 GSa/s (single channel ^[1]), 1 GSa/s (all channels ^[3]) 4-channel model: 2 GSa/s (single channel ^[1]), 1 GSa/s (half channels ^[2]), 500 MSa/s (all channels ^[3])
Max. Memory Depth of Analog Channels	2-channel model (standard): 50 Mpts (single channel ^[1]), 25 Mpts (all channels ^[3])
	2-channel model (optional): 100 Mpts (single channel ^[1]), 50 Mpts (all channels ^[3])
	4-channel model (standard): 50 Mpts (single channel ^[1]), 25 Mpts (half channels ^[2]), 12.5 Mpts (all channels ^[3])
Acquisition Mode	4-channel model (optional): 100 Mpts (single channel ^[1]), 50 Mpts (half channels ^[2]), 25 Mpts (all channels ^[3])
	Normal Default mode
	Peak Detect Capture glitches as narrow as 2 ns
	Average Selectable from 2, 4, 8, 16...to 65,536
High Resolution	14 bits, 16 bits
	UltraAcquire Up to 1,500,000 wfms/s waveform capture rate

Trigger System

Trigger System	
Trigger Sources	Analog channel (1~4), EXT TRIG, AC Line
Trigger Mode	Auto, Normal, and Single
Trigger Coupling	DC DC coupled trigger
	AC AC coupled trigger
	HF Reject High frequency reject, cutoff frequency ~75 kHz (internal trigger only)
	LF Reject Low frequency reject, cutoff frequency ~75 kHz (internal trigger only)

Trigger System

Noise Rejection		Increase delay for the trigger circuit (internal trigger only), on/off
Trigger Holdoff Range		8 ns to 10 s
Trigger Bandwidth	Internal	Analog bandwidth
	External	200 MHz
Trigger Sensitivity	Internal	0.50 div, ≥ 50 mV/div 0.7 div (with noise rejection enabled)
	External	200 mVpp, from DC to 100 MHz 500 mVpp, from 100 MHz to 200 MHz
EXT TRIG	Input Impedance	1 M Ω \pm 1%, BNC connector
	Trigger Jitter (Typical)	< 1 ns _{rms} Normal acquisition, Edge trigger, trigger level located near 50% of EXT input signal
Trigger Level Range	Internal	± 5 div from center screen
	External	± 5 V
	AC Line	fixed 40%-60%

Trigger Type

Trigger Type

Trigger Type	Edge trigger, Pulse trigger, Slope trigger, Video trigger, Pattern trigger, Duration trigger, Timeout trigger, Runt trigger, Window trigger, Delay trigger, Setup/Hold trigger, Nth Edge trigger, I2C, SPI, RS232/UART, CAN, LIN
Edge	Triggers on the threshold of the specified edge of the input signal. The edge types can be Rising, Falling, or Either. Source channel: CH1~CH4, EXT, or AC Line
Pulse Width	Triggers on the positive or negative pulse, whose time duration is less than a value, greater than a value, or inside a time range. Source channel: CH1~CH4

Trigger Type	
Slope	<p>Triggers on the positive or negative slope of the specified time, whose time is less than a value, greater than a value, or inside a time range.</p> <p>Source channel: CH1~CH4</p>
Video	<p>Trigger on all lines, specified line, odd/even fields that conform to the video standards. The supported video standards include NTSC, PAL/SECAM, 480p/60Hz, 576p/50Hz, 720p/60Hz, 720p/50Hz, 720p/30Hz, 720p/25Hz, 720p/24Hz, 1080p/60Hz, 1080p/50Hz, 1080p/25Hz, 1080p/24Hz, 1080i/60Hz, and 1080i/50Hz.</p> <p>Source channel: CH1~CH4</p>
Pattern	<p>Identifies a trigger condition by searching for a specified pattern. The pattern is a combination of multiple selected channel sources. The logic pattern of each channel is H, L, X, Rising, or Falling.</p> <p>Source channel: CH1~CH4</p>
Duration	<p>Triggers when the specified pattern meets the specified duration condition. The pattern is a combination of multiple selected channel sources. The logic pattern of each channel is H, L, and X. The duration is less than a value, greater than a value, inside a time range, or outside a time range.</p> <p>Source channel: CH1~CH4</p>
Timeout	<p>Triggers when duration of a certain event exceeds the specified time. The event can be specified as Rising, Falling, or Either.</p> <p>Source channel: CH1~CH4</p>
Runt	<p>Triggers when the pulses pass through one threshold but fail to pass through another threshold.</p> <p>Source channel: CH1~CH4</p>
Window	<p>Triggers in a specified window state when the rising edge of the signal crosses the upper threshold or the falling edge crosses the lower threshold. The window state can be Enter, Exit, or Time.</p> <p>Source channel: CH1~CH4</p>
Delay	<p>Triggers when the time difference between the specified edges of Source A and Source B meets the preset time. The delay time is less than a value, greater than a value, inside a time range, or outside a time range.</p> <p>Source channel: CH1~CH4</p>
Setup/Hold	<p>When the setup time or hold time between the input clock signal and the data signal is smaller than the specified time.</p> <p>Source channel: CH1~CH4</p>
Nth Edge	<p>Triggers on the Nth edge after the specified idle time. The edge can be specified as Rising or Falling.</p> <p>Source channel: CH1~CH4</p>

Trigger Type

RS232/UART	Triggers on the Start, Error, Check Error, or Data frame of the RS232/UART bus (up to 20 Mb/s). Source channel: CH1~CH4
I2C	Triggers on the Start, Stop, Restart, MissedACK, Address (7 bits, 8 bits, or 10 bits), Data, or Address Data of the I2C bus. Source channel: CH1~CH4
SPI	Triggers on the specified pattern of the specified data width (4 to 32) of SPI bus. CS and Timeout are supported. Source channel: CH1~CH4
CAN	Triggers on the start of a frame, end of a frame, Remote ID, Overload, Frame ID, Frame Data, Data&ID, Frame Error, Bit Fill, Answer Error, Check Error, Format Error, and Random of the CAN signal (up to 5 Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF. Source channel: CH1~CH4
LIN	Triggers on the Sync, ID, Data (length settable), Data&ID, Wakeup, Sleep, and Error of the LIN bus signal (up to 20 Mb/s). Source channel: CH1~CH4

Search & Navigate

Search & Navigate

Type	Edge, pulse width
Source	Analog channels
Copy	Copy to/from trigger; independent settings including threshold and trigger condition setup
Result Display	Event list or be exported to external/internal memory
Navigate	Time: view acquired waveforms in time order
	Event: use the navigation controls to go to found search events
	Segments: use the navigation controls to play through the acquired segments in UltraAcquire mode

Waveform Measurement

Waveform Measurement

	Number of Cursors	2 pairs of XY cursors
	Manual Mode	Voltage deviation between cursors (ΔY) Time deviation between cursors (ΔX) Reciprocal of ΔX (Hz) ($1/\Delta X$)
Cursor	Track Mode	Fix Y-axis to track X-axis waveform point's voltage and time values Fix X-axis to track Y-axis waveform point's voltage and time values
	Auto Measurement	Allow to display cursors during auto measurement
	XY Mode	Measures the voltage parameters of the corresponding channel waveforms in XY time base mode X = Channel 1, Y = Channel 2

Waveform Measurement

	Number of Measurements	41 auto measurements; and up to 14 measurements can be displayed at a time.
	Measurement Source	CH1 to CH4, Math1 to Math4
	Measurement Range	Main, Zoom
	All Measurements	Displays 33 measurement items (vertical and horizontal) for the current measurement channel; the measurement results are updated continuously.
Auto Measurement	Vertical	Vmax, Vmin, Vpp, Vtop, Vbase, Vamp, Vupper, Vmid, Vlower, Vavg, VRMS, Per. VRMS, Overshoot, Preshoot, Area, Period Area, and AC RMS.
	Horizontal	Period, Frequency, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Positive Pulse Count, Negative Pulse Count, Rising Edge Count, Falling Edge Count, Tvmax, Tvmin, +Slew Rate, and -Slew Rate
	Others	Delay (A↑-B↑), Delay (A↑-B↓), Delay (A↓-B↑), Delay (A↓-B↓), Phase (A↑-B↑), Phase (A↑-B↓), Phase (A↓-B↑), and Phase (A↓-B↓)
	Statistics	Items: Current, Average, Max, Min, Standard Deviation, Count Statistical times settable

Waveform Math

Waveform Math

	Number of Math Functions	4, displays 4 math functions simultaneously
	Arithmetic	A+B, A-B, A×B, A/B, FFT, A&&B, A B, A^B, !A, Intg, Diff, Lg, Ln, Exp, Sqrt, Abs, AX+B, LowPass, HighPass, BandPass, and BandStop
	Color Grade	FFT supported

Waveform Math

	Record Size	Up to 1 Mpts
FFT	Window Type	Rectangular, Blackman-Harris, Hanning (default), Hamming, Flattop, and Triangle
	Peak Search	A maximum of 15 peaks, confirmed by the settable threshold and offset threshold set by users

Waveform Analysis

Waveform Analysis

		Store the signal under test in segments according to the trigger events, i.e. save all the sampled waveform data as a segment to the RAM for each trigger event. The maximum number of the sampled segments reaches 500,000.
Waveform Recording	Source	All enabled analog channels
	Analysis	Support playing frame by frame or continuous playing; capable of calculating, measuring, and decoding the played waveforms
Pass/Fail Test		Compare the signal under test with the user-defined mask to provide the test results: the number of successful tests, failed tests, and the total number of tests. The pass/fail event can enable immediate stop, beeper, and the screenshot.
	Source	Any analog channel
Color Grade		A dimensional view for color grade waveforms, color grade > 16, 256-level color scale display
	Source	Any analog channel
	Color Theme	Temperature and intensity
	Mode	All modes available

Serial Decoding

Serial Decoding

No. of Decodings	4, decodes and enables/disables four protocol types simultaneously
Decoding Type	Standard: Parallel, RS232/UART, I2C, SPI, LIN, CAN

Serial Decoding

Parallel	<p>Up to 4 bits of Parallel decoding, available for any analog channel. User-defined clock and auto clock settings are supported.</p> <p>Source channel: CH1~CH4</p>
RS232/UART	<p>Decodes the RS232/UART (up to 20 Mb/s) bus's TX/RX data (5 to 9 bits), parity (Odd, Even, or None), and stop bits (1 to 2 bits)</p> <p>Source channel: CH1~CH4</p>
I2C	<p>Decodes the address (with or without the R/W bit) of the I2C bus, data, and ACK.</p> <p>Source channel: CH1~CH4</p>
SPI	<p>Decodes the MISO/MOSI data (4 to 32 bits) of the SPI bus. Timeout and CS are supported.</p> <p>Source channel: CH1~CH4</p>
CAN	<p>Decodes the remote frame (ID, byte number, CRC), overload frame, and data frame (standard/extended ID, control domain, data domain, CRC, and ACK) of the CAN bus (up to 5 Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF.</p> <p>Source channel: CH1~CH4</p>
LIN	<p>Decodes the protocol version (1.X or 2.X) of the LIN bus (up to 20 Mb/s). The decoding displays sync, ID, data, and check sum.</p> <p>Source channel: CH1~CH4</p>

Auto

Auto

AutoScale	Minimum voltage greater than 10 mVpp, duty cycle greater than 1%, and frequency over 35 Hz
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Digital Voltmeter

Digital Voltmeter

Source	Any analog channel
Function	DC, AC+DC _{rms} , AC _{rms}
Resolution	ACV/DCV: 4 bits
Limits Beeper	Support upper/lower limit settings; sounds an alarm when the voltage value is inside or outside of the limit range

Precision Counter

Precision Counter		
Source	Any analog channel and EXT	
Measurement	Frequency, period, totalize	
Totalizer	Resolution	3 to 6 digits, user-defined
	Max. Frequency	Maximum analog bandwidth
Totalizer	48-bit totalizer	
	Counts the number of the rising edges	
Time Reference	Internal Reference	

Command Set

Command Set	
Common Commands Support	Standard SCPI commands
Error Message Definition	Error Message
Support Status Report Mechanism	Status Reporting
Support Sync Mechanism	Synchronization

Display

Display	
LCD	10.1-inch capacitive multi-touch gesture-enabled display
Resolution	1280 x 800 (Screen Region) 16:9
Graticule	10 horizontal divisions x 8 vertical divisions
Persistence	Off, Infinite, variable persistence (100 ms to 10 s)
Brightness	256 intensity levels (LCD, HDMI)

Processor System

Processor System	
Processor	Cortex-A72, 1.8 GHz, hexa-core
System Memory	4 GB RAM

Processor System

Operating System Android

Internal Non-volatile Memory 8 GB

I/O

I/O

USB3.0 Host 2 on the front panel

USB3.0 Device 1 on the rear panel

LAN Port 1 on the rear panel, 10/100/1000 Base-T, supporting LXI-C

Web Control Support Web Control interface (input the IP address of the oscilloscope into the Web browser to display the operation interface of the oscilloscope)

BNC output on the rear panel

$V_o(H) \geq 2.5\text{ V}$ open circuit, $\geq 1.0\text{ V } 50\ \Omega$ to GND

$V_o(L) \leq 0.7\text{ V}$ to load $\leq 4\text{ mA}$; $\leq 0.25\text{ V } 50\ \Omega$ to GND

AUX Out Trig Out Output a pulse signal when the oscilloscope is triggered

Pass/Fail Output a pulse signal when a pass/fail event occurs.
Support user-defined pulse polarity and pulse time (100 ns to 10 ms)

Rise Time $\leq 1.5\text{ ns}$

10 MHz Reference Clock Input Interface 1, BNC connector on the rear panel

Output Interface 1, BNC connector on the rear panel

In/Out Input Mode $50\ \Omega$, with the amplitude 130 mVpp to 4.1 Vpp (-10 dBm, 20 dBm), frequency $10\text{ MHz} \pm 10\text{ ppm}$

Output Mode $50\ \Omega$, 1.5 Vpp sine waveform

HDMI Video Output 1 on the rear panel, HDMI 1.4, A plug; used to connect an external monitor or projector

Probe Compensation Output 1 kHz frequency, 0 to 3 V amplitude, Square

Power

Power

Power Voltage	AC 100 to 240 V, 50 to 60 Hz
Power	400 VA maximum (connect various interfaces, USB storage device, and active probes)
Fuse	3.15 A, T degree, 250 V

Environment

Environment

Temperature Range	Operating	0°C to +50°C
	Non-operating	-30°C to +60°C

Mechanical Characteristics

Mechanical Characteristics	
Dimensions	358.14 mm (W) x 214.72 mm (H) x 120.62 mm (D)
Rack Mount Kit	4U
Weight ^[6]	Net: 3.8 kg
	Shipping: 5.37 kg

Non-volatile Memory

Non-volatile Memory	
	Setup/Image setup (*.stp), image (*.png, *.bmp, *.jpg)
Data/File Storage	Waveform Data CSV waveform data (*.csv), binary waveform data (*.bin,), list data (*.csv), and reference waveform data (*.ref, *.csv, *.bin)
Internal Capacity	8 GB
Reference Waveform	Displays 10 internal waveforms
Setting	Limited by size of USB drive
USB Capacity	Industry standard flash drives

NOTE:

[1]: If any one of the channels is enabled, it is called single channel mode.

[2]: For 4-channel models, if two of the channels are enabled, it is called half channels mode.

[3]: For 2-channel models, if two channels are enabled, it is called all channels mode. For 4-channel models, if any three channels or all four channels are enabled, it is called all channels mode.

[4]: 500 μ V/div is a magnification of 1 mV/div setting. For vertical accuracy calculations, use full scale of 8 mV for sensitivity setting.

[5]: For any channel, under the same input impedance with DC-coupled, the Volts/div setting is the same for 100 mV/div and 200 mV/div setting.

Order Information

Order Information	Order No.
Model	
70 MHz, 2 GSa/s, 50 Mpts, 2CH DHO	DHO1072
70 MHz, 2 GSa/s, 50 Mpts, 4CH DHO	DHO1074
100 MHz, 2 GSa/s, 50 Mpts, 2CH DHO	DHO1102
100 MHz, 2 GSa/s, 50 Mpts, 4CH DHO	DHO1104
200 MHz, 2 GSa/s, 50 Mpts, 2CH DHO	DHO1202
200 MHz, 2 GSa/s, 50 Mpts, 4CH DHO	DHO1204
Standard Accessories	
Power cord (based on destination country)	— —
USB Cable	— —
4 Passive HighZ Probes (350 MHz) Standard for DHO1204, 2 Passive HighZ Probes (350 MHz) Standard for DHO1202	PVP2350
4 Passive HighZ Probes (150 MHz), Standard for DHO1104/ DHO1074	PVP3150
2 Passive HighZ Probes (150 MHz), Standard for DHO1102/ DHO1072	PVP3150
Bandwidth Upgrade Option	
70 MHz to 100 MHz Upgrade Option	DHO1000-BWU7T10
70 MHz to 200 MHz Upgrade Option	DHO1000-BWU7T20
100 MHz to 200 MHz Upgrade Option	DHO1000-BWU10T20
Memory Depth Upgrade Option	
100 Mpts Memory Depth Upgrade Option	DHO1000-RLU-01