UNI-T®

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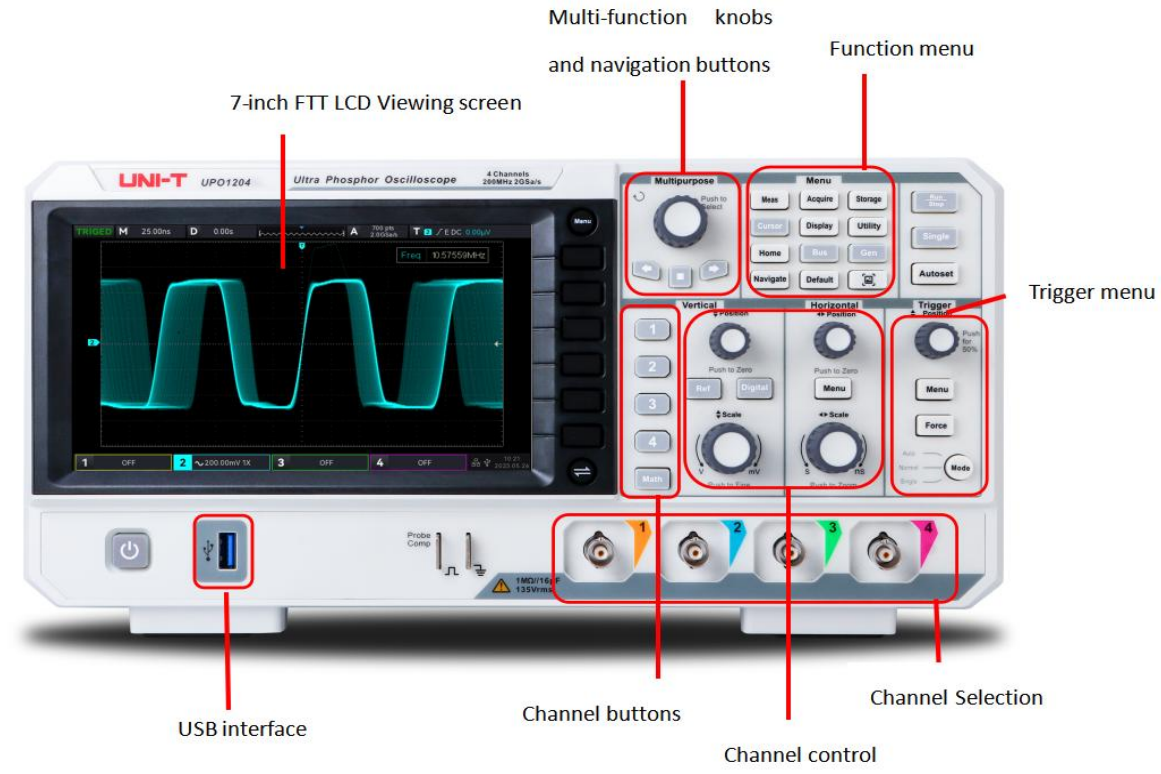
Datasheet

UPO1000 Series Digital Phosphor Oscilloscope

Features and Merits

- Analog channel bandwidth: 200MHz, 100MHz, 50MHz
- Analog channel number: 4
- Maximum sampling rate: 2GSa/s
- Vertical scale: 500μV/div-20 V/div
- Low-base noise :<100μVrms
- Maximum storage depth up to 56Mpts
- Waveform capture rate of up to 500,000 wfms/s
- The hardware can be continuous waveform recording 120,000 frame in real time
- Automatic measurement of 36 waveform parameters, the measurement range divides into screen and cursor area
- Supports 7 digits hardware frequency meter measurement
- DVM supports AC/DC TRMS (true virtual value) measurement
- Waveform calculation function (FFT, add, subtract, multiply, divide, digital filter, logical operation and advanced operation)
- 1M sampling points to enhance FFT function, it supports frequency setting, waterfall curve, demodulation mode and marker measurement
- Multiple trigger functions (edge, pulse width, video, slope, runt pulse, over-amplitude pulse, delay, timeout, duration, setup hold, Nth edge and code pattern)
- Supporting RS232, I^2C, SPI trigger
- Innovative RS232, I^2C, SPI full memory hardware for real-time decoding
- Ultra phosphor display effect, 256 grayscale display
- 7 inch WVGA（800×480）TFT LCD
- Multiple interfaces: USB Host, USB Device, LAN, EXT Trig, AUX Out (Trig Out, Pass/Fail,DVM)
- Supporting waveform navigation, marker and segment
- Supporting SCPI programmable standard command
- Support WEB access and control

Panel Structure



Product Introduction

UPO1000 series digital phosphor oscilloscope adopts UNI-T 3D technique Ultra Phosphor 2.0 with new appearance upgrade and the function of deep storage, high waveform capture rate, real-time waveform recording and playback and 256-level grayscale display.

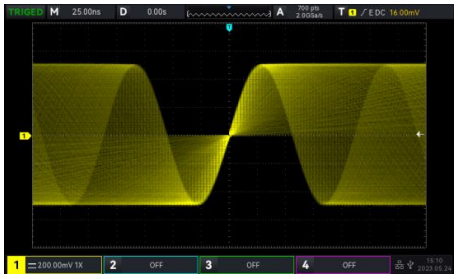
The series is equipped with three levels of bandwidth of 50MHz/100MHz/200MHz, real-time sampling rate up to 2GSa/s. The whole series are equipped with 4 channels, the maximum storage depth is 56Mpts, up to 500,000wfms/s in Fast Acquire mode. Hardware real-time waveform uninterrupted recording and waveform analysis up to 120,000 waveform frames; support independent DVM module, rich trigger and bus decoding functions, and support full memory hardware real-time decoding.

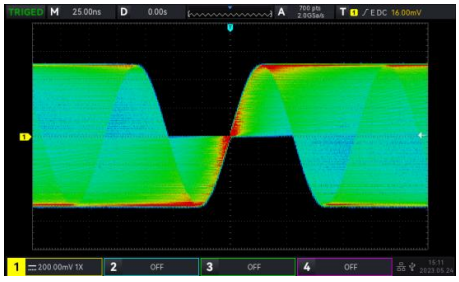
It widely used in many fields, including communication, semiconductor, computer, IC design, instrumentation, industrial electronics, consumer electronics, automotive electronics, field maintenance and R&D/education.

Design Highlights

1. 256 grayscale display

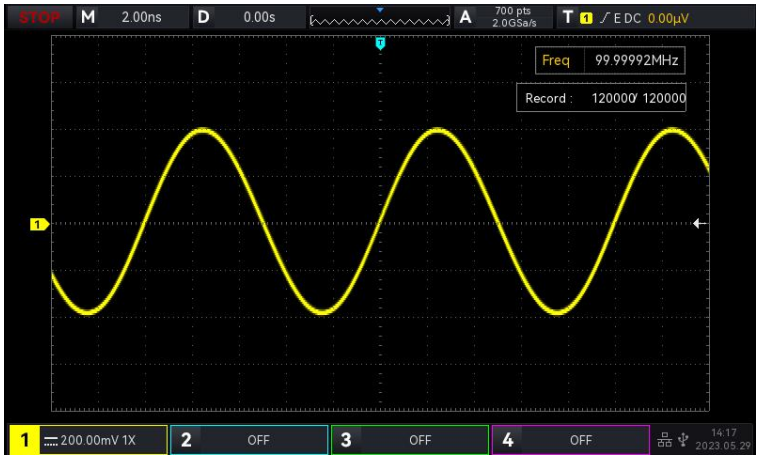
Use the original Ultra Phosphor technique to display the waveform details.





2. Hardware real-time recording up to 120,000 frames

UPO1000 can record up to 120,000 frames in real time.



3. The waveform capture rate up to 500,000 wfms/s

Use the innovative digital signal parallel processing technique, normal sampling up to 150,000wfms/s, capture the accidental signal. (In Fast Acquire mode, the capture rate up to 500,000 wfms/s.)

4. The maximum storage depth 56Mpts

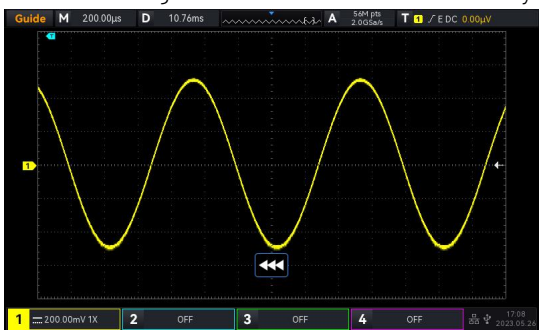
It is convenient for the oscilloscope to maintain the high sampling rate in a wider time base range, while taking into account the overall waveform and detail. It greatly improving the capture rate of abnormal waveform.

5. Cursor Area

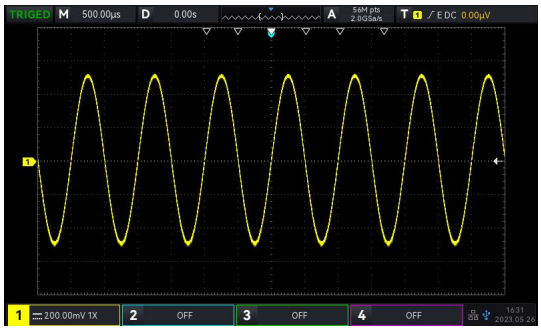
When the Cursor is opened, the waveform in cursor area can process the parameter measurement. It is convenient for user to process the waveform measurement in the specified area, it enhances the flexible and operability for the measurement area.

6. Waveform Navigation

Navigation includes time navigation, marker navigation and segment navigation. User can select the different navigation mode to observe and analysis the wave



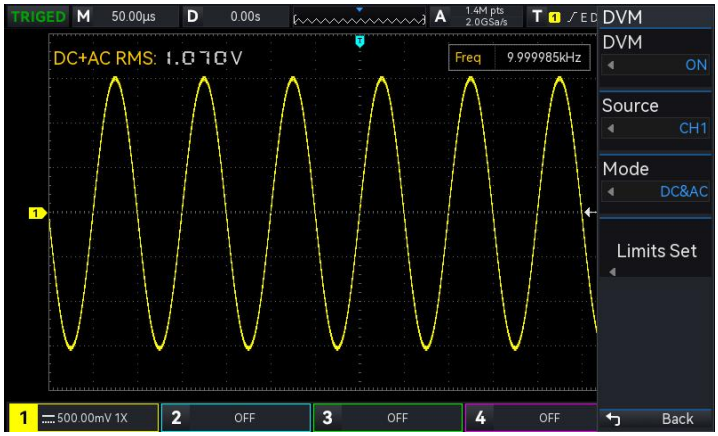
Waveform Navigation



Marker Navigation

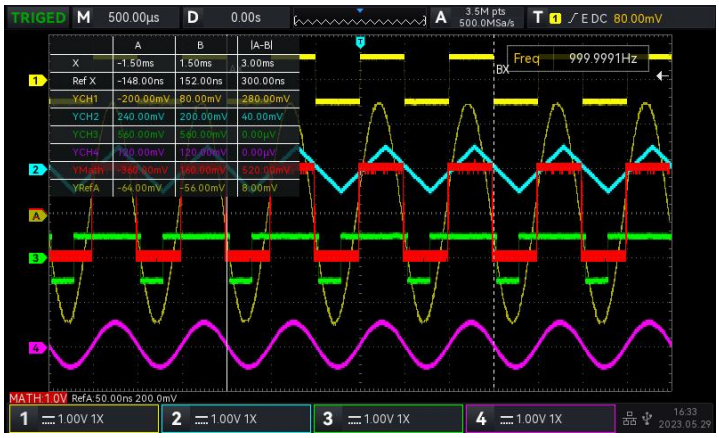
7. DVM (Digital Voltage Meter)

UPO1000 series has built-in DVM (Digital Voltage Meter), it will sound a warning when the range is accord with or over the specified range. It provides the more accurate measurement and to comprehensively improve the counting measurement experience for user.



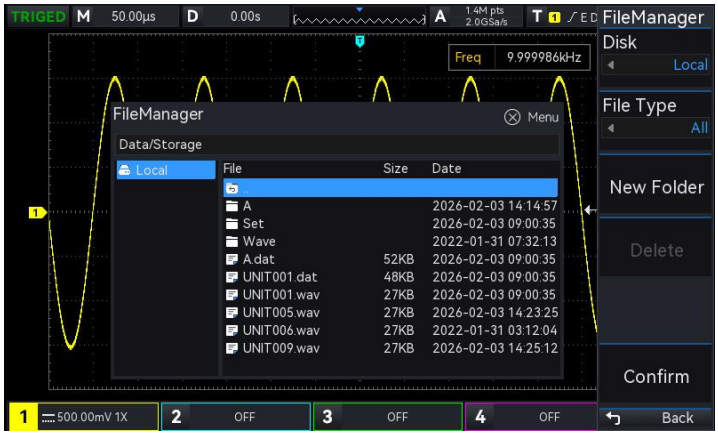
8. Cursor Measurement

It can measure time and voltage of CH1, CH2, CH3, CH4, MATH, and REF at the same time.



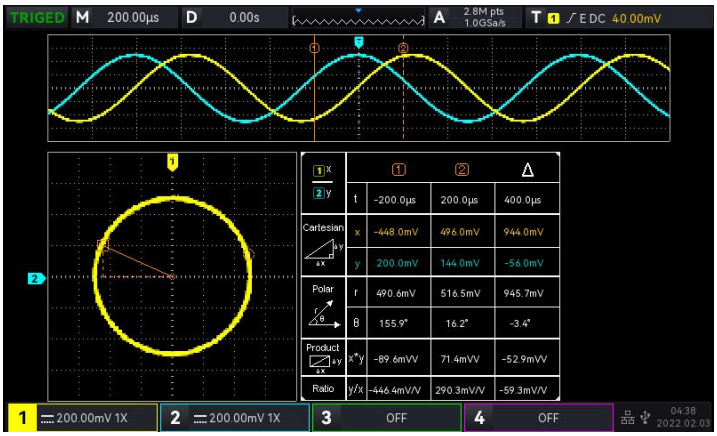
9. File Management

UPO1000 series adds a new file management function. User can save the waveform, settings, picture to the specified Local file or the file in external USB.



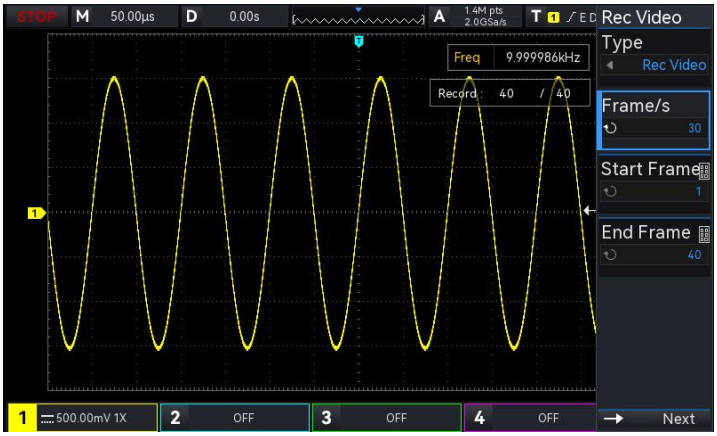
10. XY Mode

In XY mode, X axis and Y axis represents the voltage value. The oscilloscope converts the two input channels from voltage-time display to voltage-voltage display. Use Lissajous method can be easily measure the difference value between two signals with the same frequency. XY mode supports the automatic measurement of the polar coordinates and time coordinates.



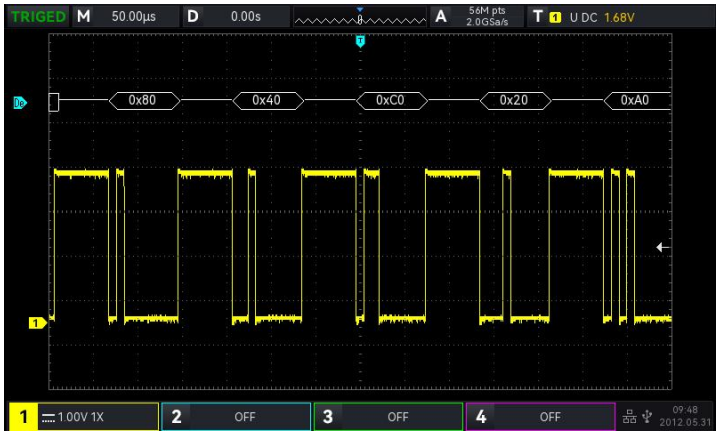
11. Recording converts to video

When the recording waveform is completed, the recorded waveform can save to USB. The waveform can be played back and observed on the PC, which is convenient for users to import the waveform into the PC and improve the user experience.



12. Lin bus trigger and decoding

The innovative hardware decoding enables real-time decoding.



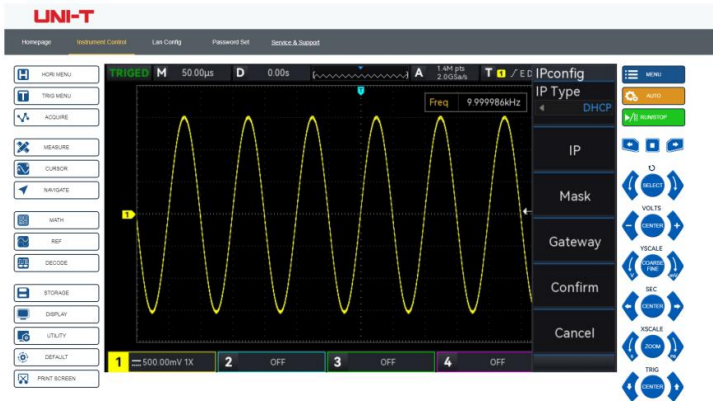
The decoding rate is greatly improved. Full-memory hardware decoding with deep storage 56Mpts improves the decoding time from tens of seconds to milliseconds, realizes real-time decoding, and greatly improves the efficiency of problem diagnosis for users.

(1) The waveform refresh rate will not be effect while decoding and the waveform display with digital phosphor;
(2) The event list can display the decoding data under the deep storage and time of data packet;
(3) The recorded waveform is also support full memory hardware real-time decoding.

13. 1M sampling rate to enhance FFT

It can set the frequency range, demodulation mode and spectrum marker, waterfall curve, automatic mark peak and user-preset function It is convenient for analyzing frequency domain.

14. Remote control via Web



Built-in Web Server can remote control, observe waveform, acquire the measured results of the oscilloscope through the browser. It can be applied to the scenario of remote monitoring, telecommuting and data sharing. It can realize cross-platform control without installing driver software and host computer software.
The built-in virtual control panel and oscilloscope panel is exactly the same, support PC web layout, and it is more simple and convenient to use.

Technical Index

All specifications are guaranteed except those marked "TYPICAL".
Unless otherwise stated, all technical index are applicable to probes with attenuation switches set to 10× and UPO1000 series digital phosphor oscilloscope. In order to achieve these specifications, the oscilloscope must satisfy the following two conditions at first.

- The instrument must operate continuously for more than 30 minutes at the specified operating temperature.
- If the operating temperature range reaches or exceeds 5 degrees Celsius, the system function menu must be opened to perform the self-calibration function.

Brand Series	UNI-T UPO1000
Sample	
Sampling methods	Real-time sampling
Acquisition mode	Sampling, peak detection, high resolution, averaging
Real time sampling rate	2GSa/s(single channel), 1GSa/s(dual channels), 500MSa/s(four channels)
Average	Average: 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192
Maximum Memory Depth	56Mpts
Input	
Channels	4
Coupling	DC, AC, GND
Impedance	(1MΩ± 2%）‖（16 pF± 2 pF）
Probe attenuation	0.001×, 0.01×, 0.1×, 1×, 10×, 100×, 1000×,2000× ,Custom
Max. Input voltage	400V(DC+ACVpk) Max
Vertical System	
Bandwidth (-3 dB)	UPO1054: DC to 50MHz UPO1104: DC to 100MHz UPO1204: DC to 200MHz
Single bandwidth	UPO1054: DC to 50MHz UPO1104: DC to 100MHz UPO1204: DC to 200MHz
Vertical Resolution	8-bit
Vertical Scale	500μV/div to 20 V/div
Offset range	500μV/div～50mV/div: ±2V 100mV/div～500mV/div: ±20V 1V/div～5V/div: ±200V 10V/div～20V/div: ±400V
Bandwidth Limit	20 MHz
Low frequency	≤5 Hz（On the BNC）

response (AC coupling, -3dB)	
Rise time	UPO1054: ≤7ns UPO1104: ≤3.5ns UPO1204: ≤1.8ns (The typical rising time of 1mV/div and 2mV/div is 2ns)
DC Gain Accuracy	<10mV: ±4.0% full scale ≥10mV: ±3.0% full scale
DC offset accuracy	≤± (2%+0.1div+2mV)
SFDR including harmonics	DC to maximum bandwidth: >40 dB
Horizontal System	
Time base Scale	1ns/div to 1000s/div (Display current sampling rate, storage depth)
Time base accuracy	±5 ppm initial accuracy; ±1ppm annual aging rate
Scope of delay	Pre-trigger (negative delay) : ≥1 screen width Post-trigger (positive delay) : 1 s to 50s
Display Format	Y-T, X-Y (CH1-CH2, CH1-CH3, CH1-CH4, CH2-CH3, CH2-CH4, CH3-CH4), Roll
number of X - Y	1
Hardware real-time waveform recording and playback	120,000 frames
Waveform Capture Rate	150,000 wfms/s
	500,000 wfms/s（Fast Acquire mode）
Trigger	
Trigger level range	Inside: ± 5 Spaces from center of screen External: EXT ± 9 V
Trigger Mode	Auto, Normal, Single
Hold off Range	80 ns to 10 s
Trigger coupling	DC: Passes all components of the signal
	AC: The direct current component that blocks the input signal
	HFRJ: Attenuates the high-frequency components above 40kHz
	LFRJ: Blocks the DC component and attenuates the low-frequency components below 40kHz
	Noise suppression: The high frequency noise in the signal is suppressed to reduce the probability of oscilloscope being triggered by mistake
Edge Trigger	
Slope	Rise, Fall, Any
Runt Set	
Pulse width conditions	>, <, <>, none
Polarity	+wid , -wid
Pulse width range	8 ns to 10 s

Window Set	
Type	Rise, Fall, Any
Trigger position	Enter, Exit, Time
Time	8 ns to 10 s
Nth Edge	
Edge type	Rise, Fall
Free time	8 ns to 10 s
Edge number	1 to 65535
Delay triggers	
Edge type	Rise, Fall
Delayed type	>, <, <>, none
Delay time	8 ns to 10 s
Timeout triggers	
Edge type	Rising, Falling, Any
Timeout	8 ns to 10 s
Pattern triggers	
Pattern Setting	H, L, X, Rise, Fall
Duration trigger	
Type set	H, L, X
Trigger condition	>, <, <>
Duration	8 ns to 10 s
Setup Hold trigger	
Edge type	Rise, Fall
Data type	H, L
Setup time	2 ns to 4s
Hold time	8 ns to 10 s
Pulse trigger	
Polarity	+Wid , -Wid
Limiting conditions	>, <, <>
Pulse width	2 ns to 4 s
Slope trigger	

Conditions of the slope	Positive slope, Negative slope
Limiting conditions	>, <, <>
Time set	8 ns to 1s
Video Trigger	
Signal system line frequency range	Supports standard NTSC, PAL, and SECAM broadcast systems with line counts ranging from 1 to 525 (NTSC) and 1 to 625 (PAL/SECAM)
Decoding	
Types of decoding	RS232/UART, I2C, SPI
Decoding the number	1
RS232 / UART trigger	
Trigger condition	Start Frame ,Frame Error , Check Error, Data
Baud rate	2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, 230400bps, 460800bps, 921600bps, 1382400bps, 1843200bps, 2764800bps, Custom
Data bits wide	5 bits, 6 bits, 7 bits, 8 bits
I2C trigger	
Trigger condition	Start, Restart, Stop, Loss confirmation, Address, Data, Address& Data
Address bits wide	7 bits, 10 bits
Address range	0 ~ 127, 0 ~ 1023
Bytes	1 to 5
SPI trigger	
Trigger condition	Idle, Idle& Data, SS, SS& Data
Free time	80 ns to 10s
Data bits	4 bits to 32 bits
Data set	H, L, X
Edge of the clock	Rise, Fall
Measure	

Cursor	Cursor Manual mode: Voltage difference between cursors (△V) Time difference between cursors (△T) Inverse of △T (Hz)(1/△T)
	Trace mode: waveform point voltage value and time value
Allows the cursor to be displayed during automatic measurements	allow
Automatic measurement	Max, Min, High, Low, ampl, Pk- Pk, Middle, Mean, Cycmean, RMS, CycRMS, AC RMS, Period, Freq, Rise, Fall, RiseDelay, FallDelay, +Width, -Width, FRFR, FRFF, FFFR, FFFF, FRLF, FRLR, FFLR, FFLF, +Duty, -Duty, Area, CycArea, Oversht, Presht, Phase, Pulse, a total of 36 measurement parameters;
Number of measurements	5 measurements are displayed simultaneously
Measuring range	Screen or cursor
Measurement statistics	Mean, maximum, minimum, standard deviation and number of measurements
Frequency meter	7 digits hardware frequency meter
XY measurement	Support time, cartesian coordinates, polar coordinates, product and scale display
Mathematical operations	
Waveform calculation	A+B, A-B, A×B, A/B, FFT, Editable advanced operations (Log, Exp, Sin, Cos, Tan, Sqrt), Logical operations
Maximum FFT points	1M points
FFT window type	Rectangle, Hanning, Blackman, Hamming, FlatTop
FFT display	Split screen, Fullscreen, Independent, WaterFall-1, WaterFall-2
FFT vertical scale	Vrms, dBVrms
FFT	Spectrum Range Settings: Start Frequency, End Frequency, Center Frequency, Sweep Width
	Detection mode: Normal, Average, Maximum Hold, Minimum Hold
	Tags: Tag type, Tag Trace, Tag Maximum number of points, Event List
Digital filtering	Low pass, High pass, Band pass, Band stop
Logical operations	And, OR, NOT,XOR

Mathematical function	Log, Exp, Sqrt, Sine, Cosine, Tangent
Storage	
Set	Inside and Outside
Waveform	Inside and Outside
Bitmap	External USB memory, and can store related parameter information.
Display	
Display type	7-inch TFT
Resolution of display	800×480
Display color	24 - bit true colors
Afterglow setting	Minimum value, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 20s, infinite,DSO
Display type	Point, vector
Interface	
Standard	USB Host, USB Device, LAN, EXT Trig, AUX Out(Trig Out/,Pass/Fail、 DVM)
General technical specifications	
Probe compensator output	
Output voltage	About 3Vp-p
Frequency	10Hz,100Hz,1kHz,10kHz
Power supply	
Power supply voltage	100～240VACrms (Fluctuations：±10%), 50Hz/60Hz
	100～120VACrms (Fluctuations：±10%), 400 Hz
Power	75VA Max
Fuse	2.5A, F class, 250V
Environment	
Temperature range	Operation: 0℃~+40℃ No operation: -20℃~+70℃
Cooling method	Forced fan cooling
Humidity range	Operation: +35℃ ≤ 90% relative humidity No operation: +35 ℃ to +40 ℃ ≤ 60% relative humidity
Altitude	Operation: below 3000 meters Non-operational: up to 15,000 m

Pollution degree	2		
Operating environment	Indoor use		
Specifications			
Size (Width x height x depth)	306mm×138mm×107mm		
weight	2.45 kg		
Adjust the interval			
Calibration interval is recommended	One year		
Standard			
Electromagnetic compatibility	Comply with EMC Directive (2014/30/EU), in line with or better than IEC61326-1:2021/EN61326-1:2021, IEC61326-2-1:2021/EN61326-2-1:2021		
	Conduction disturbance	CISPR 11/EN 55011	CLASS B group 1, 150kHz-30MHz
	Radiated disturbance	CISPR 11/EN 55011	CLASS B group 1, 30MHz-1GHz
	Electrostatic discharge (ESD)	IEC 61000-4-2/EN 61000-4-2	4.0 kV (contact), 8.0 kV (air)
	Radio-frequency electromagnetic field Immunity	IEC 61000-4-3/EN 61000-4-3	0V/m（80 MHz to 1 GHz） 3V/m（1.4 GHz to 2 GHz） 1V/m（2.0 GHz to 2.7GHz）
	Electrical fast transients (EFT)	IEC 61000-4-4/EN 61000-4-4	2kV (Input AC Power Ports)
	Surges	IEC 61000-4-5/EN 61000-4-5	1kV(Line to line) 2kV(Line to ground)
	Radio-frequency continuous conducted Immunity	IEC 61000-4-6/EN 61000-4-6	3V,0.15-80MHz
	Voltage dips and interruptions	IEC 61000-4-11/EN 61000-4-11	Voltage Dips: 0% UT during 1 cycle 40% UT during 10/12 cycles 70% UT during 25/30 cycles Short interruption：0% UT during 250/300 cycles
Safety	EN61010-1:2010+A1:2019 EN IEC61010-2-030:2021+A11:2021 BS EN61010-1:2010+A1:2019 BS EN IEC61010-2-030:2021+A11:2021 UL61010-1:2012 Ed.3+ R:19 Jul2019 UL61010-2-030:2018 Ed.2 CSA C22.2#61010-1:2012 Ed.3+U1;U2;A1 CSA C22.2#61010-2-030:2018 Ed.2		

Accessories and Optional

Order Information

	Description	Order No.
Model	UPO1054 (50MHz，4 analog channels)	UPO1054
	UPO1104 (100MHz，4 analog channels)	UPO1104
	UPO1204 (200MHz，4 analog channels)	UPO1204
Standard accessories	Power cord that conforms to the standard of the destination country (1)	
	USB data cable (1)	UT-D04
	Passive probe (200MHz/100MHz/50MHz)(4)	UT-P05/UT-P04/UT-P03
Optional accessories	High voltage probe	UT-V23, UT-P20, UT-P21
	High-Voltage Differential Probes	UT-P30, UT-P31,UT-P32, UT-P33, UT-P35, UT-P36
	Current Probe	UT-P40, UT-P41, UT-P42, UT-P43, UT-P44
	bandwidth upgrade to 200M	MSO/UPO1000X-1MT2M

Note: All mainframes, accessories and options can be ordered from your local UNI-T dealer.

UNI-T oscilloscope probes and accessories supported by UPO1000 series

Passive probe

Model	Type	
UT-P01 	High impedance probe	1X: DC ~ 8 MHz 10X: DC ~ 25 MHz Oscilloscope compatibility: UNI-T all series
UT-P03 	High impedance probe	1X: DC～8 MHz 10X: DC～60 MHz Oscilloscope compatibility: UNI-T all series
UT-P04 	High impedance probe	1X: DC ~ 8 MHz 10X: DC ~ 100 MHz Oscilloscope compatibility: UNI-T all series
UT-P05 	High impedance probe	1X: DC ~ 8 MHz 10X: DC ~ 200 MHz series Oscilloscope compatibility: UNI-T all
UT-P06 	High impedance probe	1X: DC ~ 8 MHz 10X: DC ~ 300 MHz Oscilloscope compatibility: UNI-T all series
UT-P07A 	High impedance probe	10X:DC～500MHz Input resistance： 10MΩ Maximum safe operating voltage： <600V pk Oscilloscope compatibility: UNI-T all series
UT-P08A	High	10X:DC ~ 350MHz

	impedance probe	Input resistance： 10MΩ Maximum safe operating voltage： <600V pk Oscilloscope compatibility: UNI-T all series
UT-P20 	High impedance probe	DC ~ 100MHz Probe coefficient 100:1 Maximum operating voltage 1500 Vrms Oscilloscope compatibility: UNI-T all series
UT-V23 	High voltage probe	DC ~ 100MHz Probe coefficient 100:1 Input resistance 100 MΩ±2% Maximum operating voltage 2000 Vpp Oscilloscope compatibility: UNI-T all series
UT-P21 	High voltage probe	DC~50 MHz Probe coefficient 1000:1 Maximum operating voltage DC 15 kVrms，AC 10 kV(sine wave) Oscilloscope compatibility: UNI-T all series
UT-P40 	Current probe	DC ~ 100kHz Range 50 mV/A, 5 mV/A Current range 0.4A ~ 60A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series
UT-P41 	Current probe	DC ~ 100 kHz Range 100 mV/A, 10 mV/A Current range 0.4A ~ 100A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series
UT-P42	Current	DC ~ 150 kHz

	probe	Range 100 mV/A, 10 mV/A Current range 0.4A ~ 200A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series
UT-P43 	Current probe	DC ~ 25 MHz Range 100 mV/A Maximum measurement current 20A Rise time 14ns Oscilloscope compatibility: UNI-T all series
UT-P44 	Current probe	DC ~ 50 MHz Range 50 mV/A Maximum measurement current 40A Rise time 7ns Oscilloscope compatibility: UNI-T all series

Active probe

Mode	Type	
UT-P30 	High-Voltage Differential Probes	DC～100 MHz Attenuation ratio 100:1,10:1 Input differential voltage ±800 Vpp Oscilloscope compatibility: UNI-T all series
UT-P31 	High-Voltage Differential Probes	DC～100 MHz Attenuation ratio 1000:1,100:1 Input differential voltage ±1.5k Vpp Oscilloscope compatibility: UNI-T all series
UT-P32	High-Voltage	DC～50 MHz

	Differential Probes	Attenuation ratio 1000:1,100:1 Input differential voltage ±3 kVpp Oscilloscope compatibility: UNI-T all series
UT-P33 	High-Voltage Differential Probes	DC～120 MHz Attenuation ratio 100:1,10:1 Input differential voltage ±14 kVpp Oscilloscope compatibility: UNI-T all series
UT-P35 	High-Voltage Differential Probes	DC～50 MHz Attenuation ratio 500:1,50:1 Rise time 7ns Accuracy 2% Input differential mode voltage 1/50:130 (DC+peak AC) 1/500:1300 (DC+peak AC) Input common mode voltage 100Vrms, CATI 600Vrms, CATII Oscilloscope compatibility: UNI-T all series
UT-P36 	High-Voltage Differential Probes	DC～50 MHz Attenuation ratio 2000:1,200:1 Rise time 3.5ns Accuracy 2% Input differential mode voltage 1/200:560 (DC+peak AC) 1/2000:5600 (DC+peak AC) Input common mode voltage 2800 Vrms, CATI 1400 Vrms, CATII Oscilloscope compatibility: UNI-T all series