UNI-T®

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Datasheet

UPO1000 Series Digital Phosphor Oscilloscope

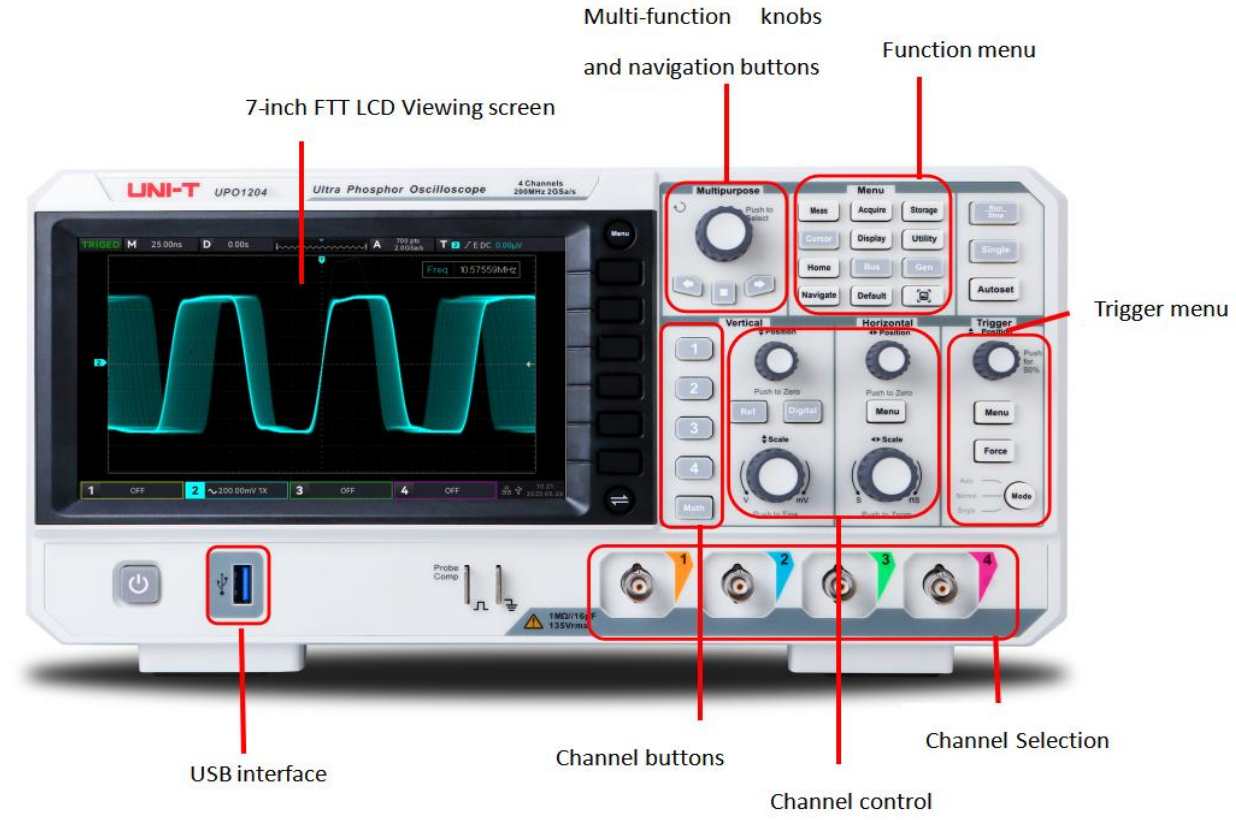
V1.1

2024.06

Features and Merits

- Analog channel bandwidth: 200 MHz, 100 MHz, 50 MHz
- Analog channel number: 4
- Maximum sampling rate: 2GSa/s
- Vertical scale: 500μV/div to 20 V/div
- Low-base noise: <100μVrms
- Maximum memory 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-digit hardware frequency counter 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 (800X480) 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
- Supports web access and control

Panel Structure





Product Introduction

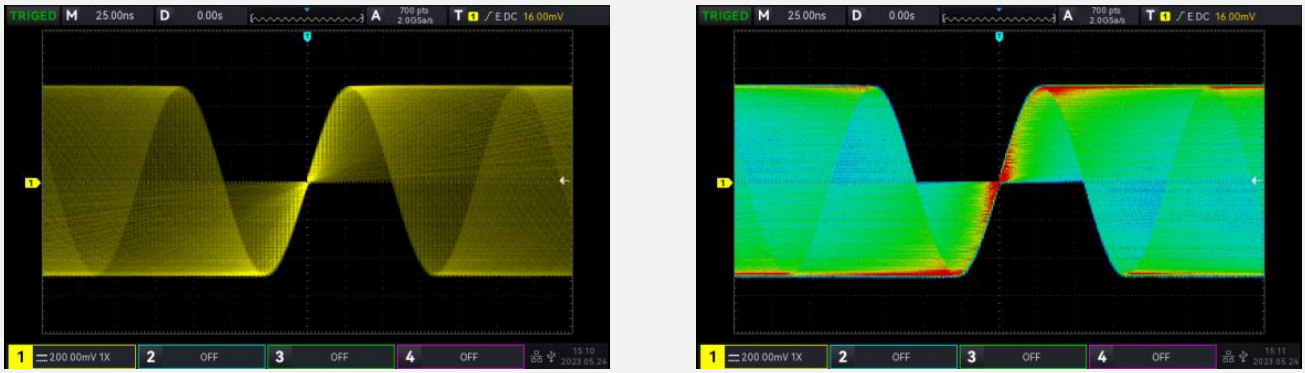
UP01000 series digital phosphor oscilloscope adopts UNI-T 3D technique Ultra Phosphor 2.0 with new appearance upgrade and the function of deep storage, high waveform capture rate, real-time waveform recording and playback and 256-level grayscale display.

The series is equipped with three levels of bandwidth of 50 MHz/100 MHz/200 MHz, real-time sampling rate up to 2 GSa/s. The whole series are equipped with 4 channels, the maximum memory depth is 56 Mpts, up to 500,000 wfms/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.

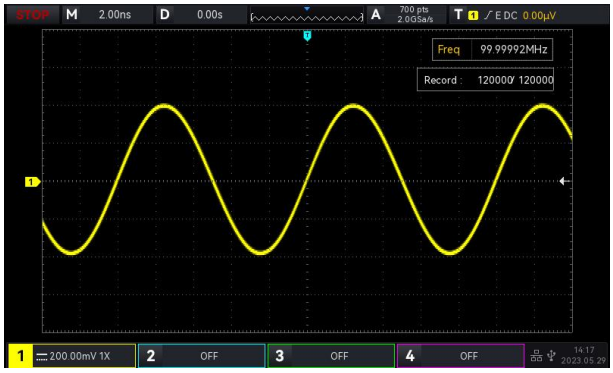
Design Highlights

256 grayscale display



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

Hardware real-time recording up to 120,000 frames



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

The maximum memory depth 56 Mpts



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.

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.)

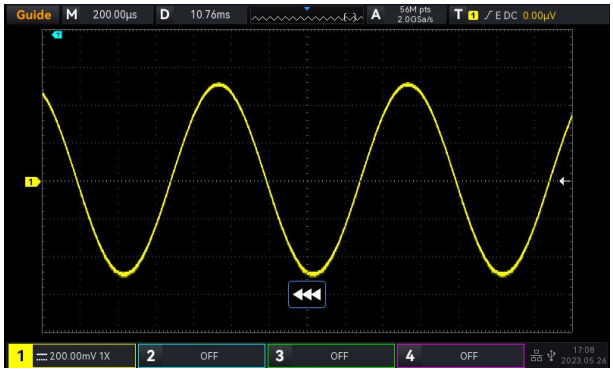
Cursor Area



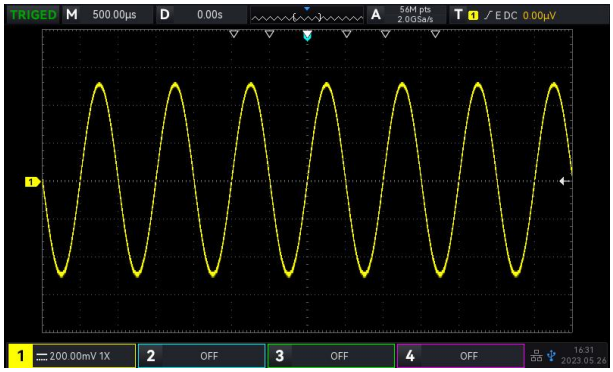
When the Cursor is opened, the waveform in cursor area can process the parameter measurement. It is convenient for user to process the waveform measurement in the specified area, it enhances the flexible and operability for the measurement area.

Waveform Navigation

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

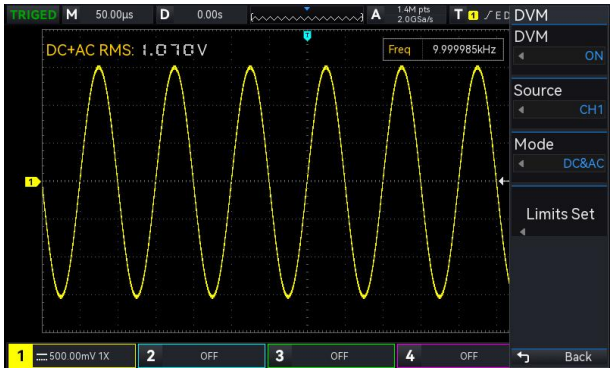


Waveform Navigation



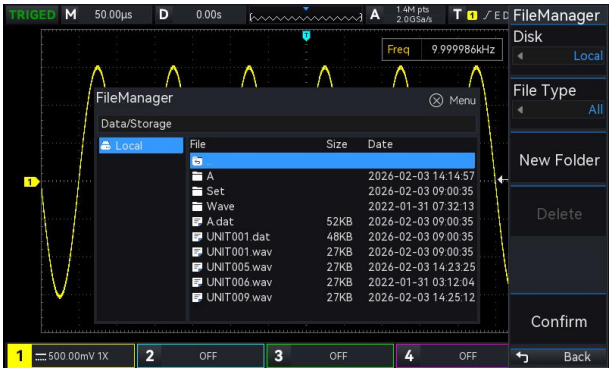
Marker Navigation

DVM (Digital Voltage Meter)



UP01000 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.

File Management



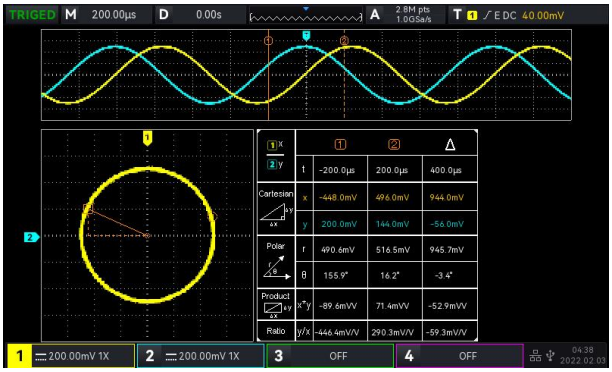
UP01000 series adds a new file management function. User can save the waveform, settings, picture to the specified Local file or the file in external USB.

Cursor Measurement



It can measure time and voltage of CH 1, CH 2, CH 3, CH 4, MATH, and REF at the same time.

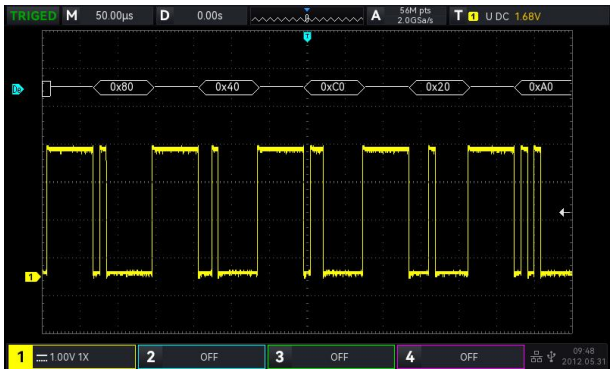
XY Mode



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.

Serial bus trigger and decoding

The innovative hardware decoding enables real-time decoding.

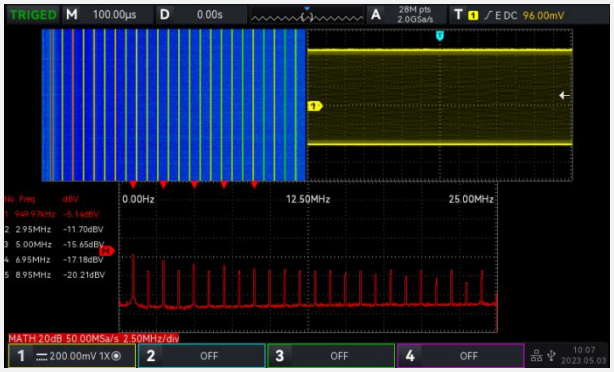


The decoding rate is greatly improved. Full-memory hardware decoding with deep storage 56Mpts improves the decoding time from tens of seconds to milliseconds, realizes real-time decoding, and greatly improves the efficiency of problem diagnosis for users.



(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.

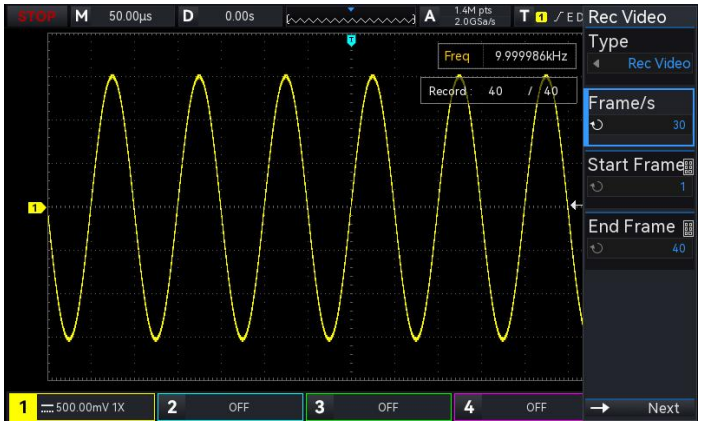
1M points FFT enhancement





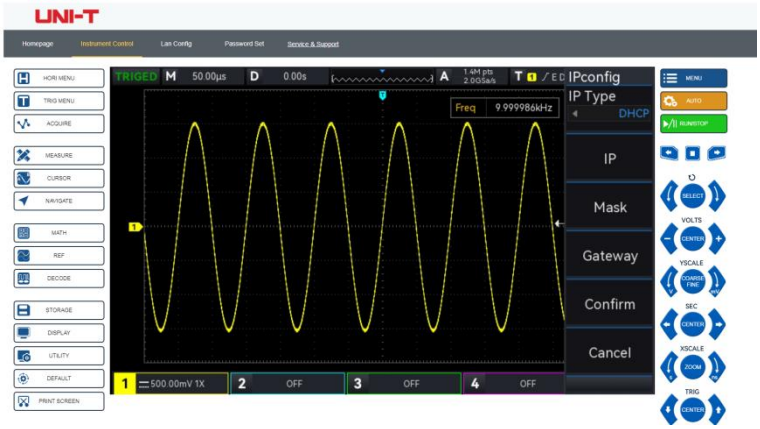
It can set the frequency range, demodulation mode and spectrum marker, waterfall curve, automatic mark peak and user-preset function It is convenient for analyzing frequency domain.

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.

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.

Performance Characteristics

All specifications are guaranteed except those marked "typical".

Unless otherwise stated, all Performance Characteristics are applicable to probes with attenuation switches set to 10X 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.

Model	UPO1054	UPO1104	UPO1204
Analog bandwidth	50 MHz	100 MHz	200 MHz
Calculated rise time (10 to 90%) (typical)	≤7 ns	≤3.5 ns	≤1.8 ns
	The typical rising time of 1mV/div and 2mV/div is 2ns		
Input/output channel number	4		
Sampling mode	Real-time sampling		
Acquisition mode	Normal, peak detect, high resolution, averaging		
Maximum sample rate	2 GSa/s (single channel), 1 GSa/s (dual channels), 500 MSa/s (four channels)		
Average	After all channels have reached N samples simultaneously, the number of N times can be selected from 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192.		

Maximum memory depth	56Mpts
Maximum waveform capture rate	150,000 wfms/s
	500,000 wfms/s (Fast Acquire)
Hardware real-time waveform recording and playing	120,000 frames
Screen	7-inch 800X480 TFT LCD
Vertical System	
Input coupling	DC, AC, GND
Input impedance	(1 MΩ ± 2%) ‖ (16 pF ± 2 pF)
Probe attenuation factor	Voltage probe ratio: 0.001X, 0.01X, 0.1X, 1X, 10X, 100X, 1000X, 2000X , Custom Current probe ratio, 5 mV/A, 10 mV/A, 50 mV/A, 100 mV/A, Custom
Maximum input voltage	135VRMS
Vertical resolution	8-bit
Vertical scale	500 μV/div to 20 V/div
Offset range	500 μV/div to 50m V/div: ±2 V 100 mV/div to 500m V/div: ±20 V 1 V/div to 5 V/div: ±200 V 10 V/div to 20 V/div: ±400 V
Band limit(typical)	20 MHz
Low frequency response	(AC coupling, -3 dB), ≤5 Hz (on BNC)
DC gain accuracy	<10 mV: ±4.0% full scale ≥10 mV: ±3.0% full scale
DC offset accuracy	≤± (2%+0.1 div+2 mV)
Channel-to-channel isolation(typical)	DC to maximum bandwidth: >40 dB
Horizontal System	
Time base range	1 ns/div to 1000 s/div (Display current sampling rate, memory depth)
Time base accuracy	±5 ppm initial accuracy; ±1 ppm annual aging rate
Timebase delay time range	Pre-trigger (negative delay) : ≥1 screen width Post-trigger (positive delay) : 1 s to 50 s
Time base mode	Y-T, X-Y (CH1-CH2, CH1-CH3, CH1-CH4, CH2-CH3, CH2-CH4, CH3-CH4), Roll
Number of X - Y	1
Trigger	
Trigger level range	Inside: ± 5 Spaces from the center of the screen External: EXT ± 9 V
Trigger modes	Auto, Normal, Single

Trigger holdoff	80 ns to 10 s
Trigger coupling (typical)	DC: Passes all components of the signal
	AC: The direct current component that blocks the input signal
	HF reject: Attenuates the high-frequency components above 40 kHz
	LF reject: Blocks the DC component and attenuates the low-frequency components below 40 kHz
	Noise reject: The high frequency noise in the signal is suppressed to reduce the probability of oscilloscope being triggered by mistake
Edge	
Slope	Rising, Falling, Either
Runt	
When	>, <, ⩽ ⩾, None
Polarity	Positive, Negative
Pulse width	8 ns to 10 s
Window	
Polarity	Rising, Falling, Either
When	Enter, Exit, Time
Set	8 ns to 10 s
Nth Edge	
Slope	Rising,Falling
Idle time	8 ns to 10 s
Edge number	1 to 65535
Delay	
Edge type	Rising,Falling
When	>, <, ⩽ ⩾, None
Delay time	8 ns to 10 s
Timeout	
Slope	Rising, Falling, Either
Timeout	8 ns to 10 s
Pattern	
Code pattern	H, L, X, Rising, Falling
Duration	
Code pattern	H, L, X

When	>, <, ⩽ ⩾
Duration	8 ns to 10 s
Setup and Hold	
Clock edge	Rising, Falling
Data type	H, L
Setup	2 ns to 4s
Hold	8 ns to 10 s
Pulse width	
Polarity	Positive, Negative
When	>, <, ⩽ ⩾
Pulse width	2 ns to 4 s
Slope	
Polarity	Positive, Negative
When	>, <, <>
Time	8 ns to 1s
Video	
Standard	Supports standard NTSC, PAL, and SECAM broadcast systems with line counts ranging from 1 to 525 (NTSC) and 1 to 625 (PAL/SECAM)
Decoding	
Decoding type	RS232/UART, I^2C, SPI
Number of decodes	1
RS232 / UART	
When	Start, Frame Err, Check Err, Data
Baud rate	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, 230400 bps, 460800 bps, 921600 bps, 1382400 bps, 1843200 bps, 2764800 bps, Custom
Data bit	5 bits, 6 bits, 7 bits, 8 bits
I2C	
When	Start, Restart, Stop, Loss, Add, Data, A & D
Addr mode	7 bits, 10 bits
Addr range	0 to 127, 0 to 1023
Byte length	1 to 5
SPI	
When	Idle, Idle& Data, SS, SS& Data

Timeout	80 ns to 10s
Data bit	4 bits to 32 bits
Data set	H, L, X
Edge of the clock	Rising, Falling
Measure	
Cursor	Voltage difference between cursors（△V） Time difference between cursors（△T） Reciprocal of △T（Hz）（1/△T）
	Voltage and time of waveform point
	Display the cursor in the automatic measurement
Automatic measurements	Maximum, Minimum, Top, Base, Amplitude,Peak-Peak, Middle, Average, Average-Cycle, RMS, RMS-Cycle, AC RMS, Period, Frequency, Rise time, Fall time, RiseDelay, FallDelay, +Width, -Width, FRFR, FRFF, FFFR, FFFF, FRLF, FRLR, FFLR, FFLF, +Duty, -Duty, Area, Area-Cycle, Overshoot, Preshoot, Phase, Pulse count a total of 36 measurement parameters
Measurement type	Simultaneously display 5 kinds of parameter measurement
Measurement range	Main time base, Zoom time base, Cursor area
Measurement statistics	Mean, Maximum, Minimum, Std Dev, Count
Frequency Counter	7 digits hardware frequency counter
XY measurement	Time, Cartesian, Polar, Product, Ratio
Mathematical	
Waveform math	A+B, A-B, A×B, A/B, FFT, Editable advanced operations (Log, Exp, Sin, Cos, Tan, Sqrt), Logic
Maximum FFT count	1M points
FFT window types	Hanning, Hamming, Rectangle, Blackman , FlatTop
FFT display	Split screen, Fullscreen, Independent, WaterFall-1, WaterFall-2
FFT vertical scale	Vrms, dBV
FFT	Spectrum range: Start frequency, Stop frequency, Center frequency, Span
	Detection mode: Normol, Average, Max Hold, Min Hold
	Marker: Marker type, Marker Points, Marker list
Filter	Low pass, High pass, Band pass, Band stop
Logical operations	AND, OR, NOT,XOR
Function	Sin, Cos, Sinc, Tan, Sqrt, Exp, Lg, In, Floor, ABS, Acos, Asin, Atan, Sinh, Tanh, Ceil, Cosh, Fabs, intg, diff
Storage	
Set	Inside and Outside

Waveform	Inside and Outside
Image	External USB memory, and can store related parameter information.
Display	
Screen	7-inch 800X480 TFT LCD
color	24 - bit true colors
Persistence	Minimum , 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	10 Hz,100 Hz,1 kHz,10 kHz
Power Source	
Power source voltage	100 to 240 VAC (Fluctuations: ±10%), 50 Hz/60 Hz
	100 to 120 VAC (Fluctuations: ±10%), 400 Hz
Power consumption	75 W Max
Fuse	2.5 A, F class, 250 V
Environmental	
Temperature	Operation: 0 ℃ to +40 ℃ Non-operating: -20 ℃ to +70 ℃
Cooling	Forced cooling by fan
Humidity	Operation: +35 ℃ ≤ 90% relative humidity Non-operating: +35 ℃ to +40 ℃ ≤ 60% relative humidity
Altitude	Operation: below 3,000 meters Non-operating: up to 15,000 meters
Pollution degree	2
Operating environment	In-door
Specifications	
Dimension (W×H×D)	336 mm X 170 mm X 110 mm
weight	2.45 kg
Adjust the interval	
Calibration interval is recommended	One year
Safety Regulations	

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 (50 MHz, 4 analog channels)	UPO1054
	UPO1104 (100 MHz, 4 analog channels)	UPO1104
	UPO1204 (200M Hz, 4 analog channels)	UPO1204
Standard accessories	Power cord that conforms to the standard of the destination country (1)	
	USB data cable (1)	UT-D14
	Passive probe (200 MHz/100 MHz/50 MHz)(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 200MHz	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 to 8 MHz 10X: DC to 25 MHz Oscilloscope compatibility: UNI-T all series
UT-P03		
	High impedance probe	1X: DC to 8 MHz 10X: DC to 60 MHz Oscilloscope compatibility: UNI-T all series
UT-P04		
	High impedance probe	1X: DC to 8 MHz 10X: DC to 100 MHz Oscilloscope compatibility: UNI-T all series
UT-P05		
	High impedance probe	1X: DC to 8 MHz 10X: DC to 200 MHz series Oscilloscope compatibility: UNI-T all
UT-P06		
	High impedance probe	1X: DC to 8 MHz 10X: DC to 300 MHz Oscilloscope compatibility: UNI-T all series
UT-P07A		
	High impedance probe	10X:DC to 500 MHz Input resistance: 10 MΩ Maximum safe operating voltage： <600Vpk Oscilloscope compatibility: UNI-T all series
UT-P08A		
	High impedance probe	10X:DC to 350 MHz Input resistance： 10 MΩ Maximum safe operating voltage： <600 Vpk Oscilloscope compatibility: UNI-T all series

UT-P20		
	High impedance probe	DC to 100 MHz Probe coefficient 100:1 Maximum operating voltage 1500 Vrms Oscilloscope compatibility: UNI-T all series
UT-V23		
	High voltage probe	DC to 100 MHz 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 to 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 to 100 kHz Range 50 mV/A, 5 mV/A Current range 0.4 A to 60 A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series
UT-P41		
	Current probe	DC to 100 kHz Range 100 mV/A, 10 mV/A Current range 0.4A ~ 100 A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series
UT-P42		
	Current probe	DC ~ 150 kHz Range 100 mV/A, 10 mV/A Current range 0.4A to 200A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series
UT-P43		
	Current probe	DC to 25 MHz Range 100 mV/A Maximum measurement current 20 A Rise time 14 ns Oscilloscope compatibility: UNI-T all series

UT-P44 	Current probe	DC to 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 to 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 to 100 MHz Attenuation ratio 1000:1,100:1 Input differential voltage ±1.5 kVpp Oscilloscope compatibility: UNI-T all series
UT-P32 	High-Voltage Differential Probes	DC to 50 MHz Attenuation ratio 1000:1,100:1 Input differential voltage ±3 kVpp Oscilloscope compatibility: UNI-T all series
UT-P33 	High-Voltage Differential Probes	DC to 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 to 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		DC to 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
	High-Voltage Differential Probes	

Options ordering and installation

1. **Purchase options:** Based on your requirements, please purchase the specified function options from Uni-t Sales Personnel and provide the serial number of the instrument that needs the option installed.
2. **Receive certificate:** You will receive the license certificate based on the address provided in the order.
3. **Register and obtain license:** Visit the Uni-t official website license activation session for registration. Use the license key and instrument serial number provided in the certificate to obtain the option license code and license file.
4. **Install the option:** Download the option license file to the root directory of a USB storage device, and connect the USB storage device to the instrument. Once the USB storage device is recognized, the Option Install menu will be activated. Press this menu key to begin installing the option.

Limited Warranty and Liability

Uni-T guarantees that the Instrument product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination or improper handling. If you need warranty service within the warranty period, please contact your seller directly. Uni-T will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by using this device. For the probes and accessories, the warranty period is one year. Visit instrument.uni-trend.com for full warranty information.

Learn more at: www.uni-trend.com

Register your product to confirm your ownership. You will also get product notifications, update alerts, exclusive offers and all the latest information you need to know.

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https://instruments.uni-trend.com/ContactForm/

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