

Datasheet

UPO1002 Series Digital Phosphor Oscilloscope

REV 0

2024.01

Features and Merits

- Analog channel bandwidth: 200 MHz, 100 MHz
- Analog channel number: 2
- Maximum sampling rate: 1 GSa/s
- Vertical scale: 500 μ V/div-20 V/div
- Low-ground noise :< 60 μ Vrms
- Maximum storage depth: 56 Mpts
- Maximum of waveform capture rate:100,000 wfms/s
- The real-time waveform of hardware can be continuously recording of 120,000 frames
- Automatic measurement of 36 waveform parameters, the measurement range divides into screen and cursor area
- Supports 6 digits hardware frequency meter measurement
- Multi-Scopes 2.0 supports independent fluorescent display for dual channel
- DVM supports AC/DC RMS (true virtual value) measurement
- Waveform calculation function (FFT, add, subtract, multiply, divide, digital filter, logical operation and advanced operation)
- 1M sampling point 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)
- Supports trigger of RS232, I²C and SPI
- RS232, I²C and SPI support full memory hardware for real-time decoding
- Ultra phosphor display effect, with 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)
- Supports waveform navigation, marker and segment
- Supports SCPI (Standard Command for Programmable Instrument)
- Supports WEB access and control

Product Introduction

UPO1002 series digital phosphor oscilloscope adopts innovative 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.

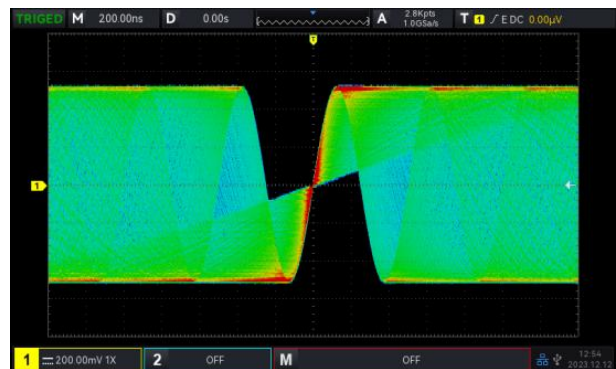
The series is equipped with the bandwidth of 100 MHz and 200 MHz, real-time sampling rate up to 1 GSa/s, 2 analog channels, maximum storage depth of 56 Mpts, maximum waveform capture rate of 100,000wfms/s, hardware real-time waveform uninterrupted recording and waveform analysis up to 120,000 waveform frames, support 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, IC design, instrumentation, industrial electronics, consumer electronics, automotive electronics, field maintenance, R&D and education.

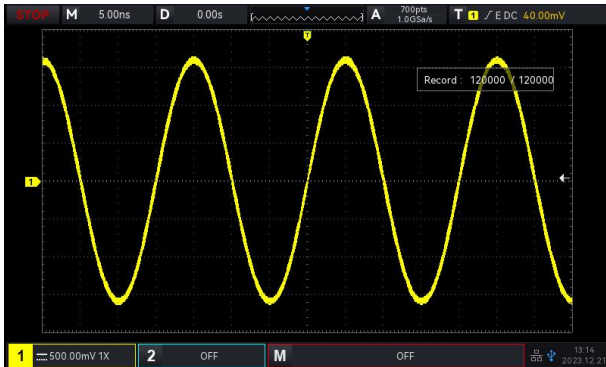
Design Highlights

256 grayscale display

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

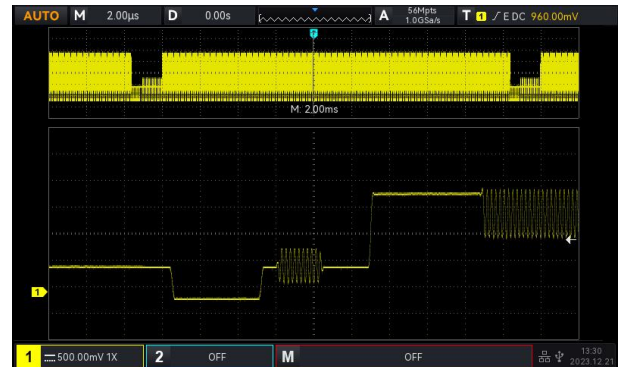


Hardware real-time maximum recording up to 120,000 frames



UPO1002 series hardware real-time maximum recording is reach to 120,000 frames.

Maximum storage depth of 56 Mpts



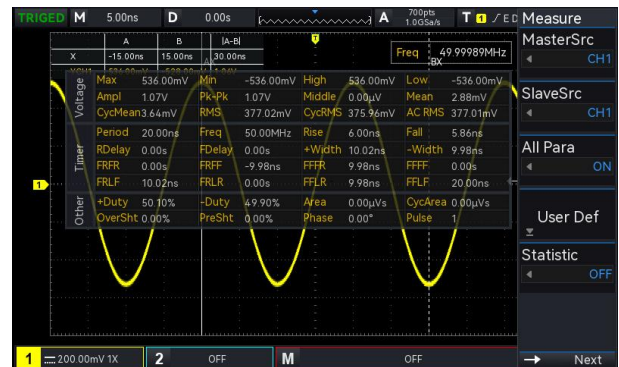
It is convenient for the oscilloscope to maintain the high sampling rate in a wider time base range, while taking into account the overall waveform and detail. It greatly improving the capture rate of abnormal waveform.

Maximum waveform capture rate of 100,000 wfms/s



Use the innovative digital signal parallel processing technique, normal sampling is reach to 100,000 wfms/s, capture the accidental signal.

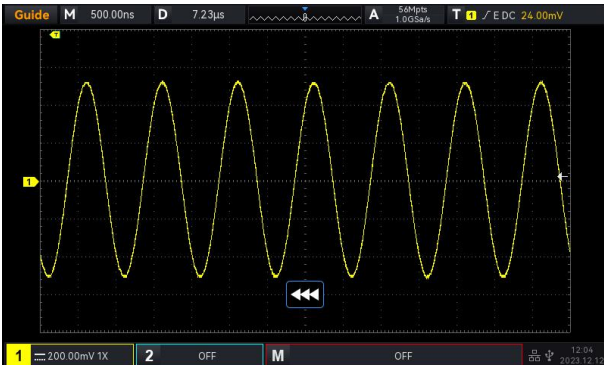
Cursor Area Measurement



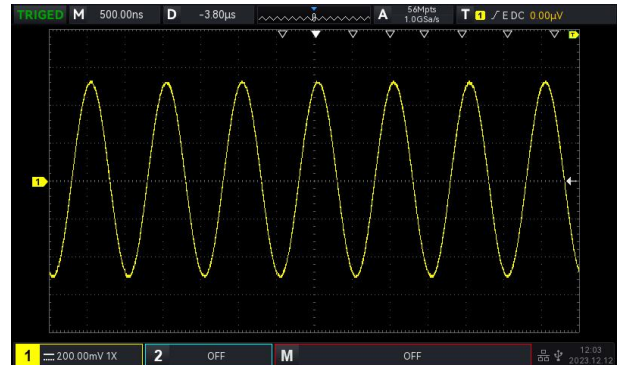
When the Cursor is opened, the waveform in cursor area can process the parameter measurement. It is convenient for user to process the waveform measurement in the specified area, it enhances the flexible and operability for the measurement area.

Waveform Navigation

Navigation includes time navigation, marker navigation and segment navigation. The user can select the different navigation mode to observe and analysis the waveform.

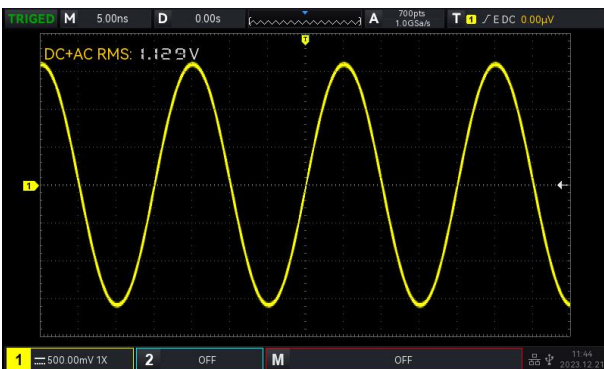


Waveform Navigation



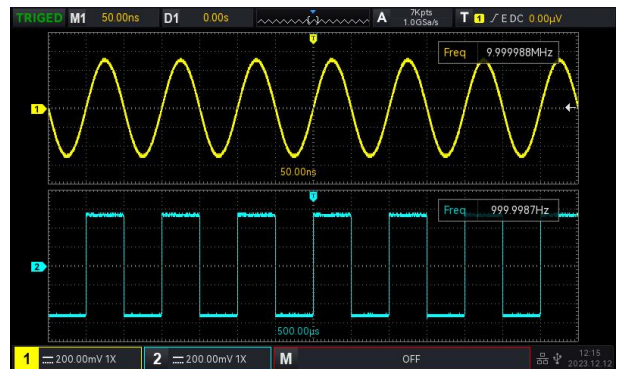
Marker Navigation

DVM (Digital Voltage Meter)



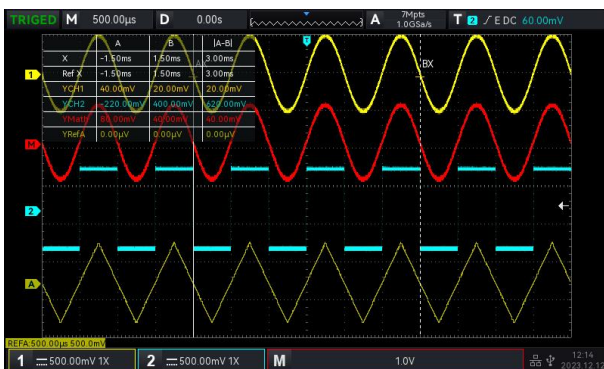
UPO1002 series has built-in DVM (Digital Voltage Meter), it will sound a warning when the range is accord with or over the specified range. It provides the more accurate measurement and to comprehensively improve the counting measurement experience for user.

Multi-Scopes 2.0



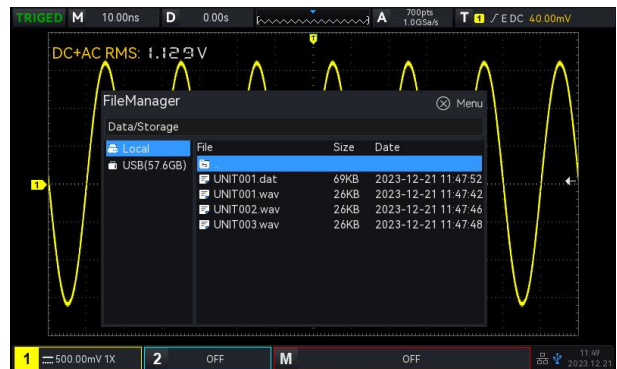
Multi-Scopes 2.0 can separate the time base and volts/div of two channels, so the user can observe two completely different signals in one window at the same time.

Cursor Measurement



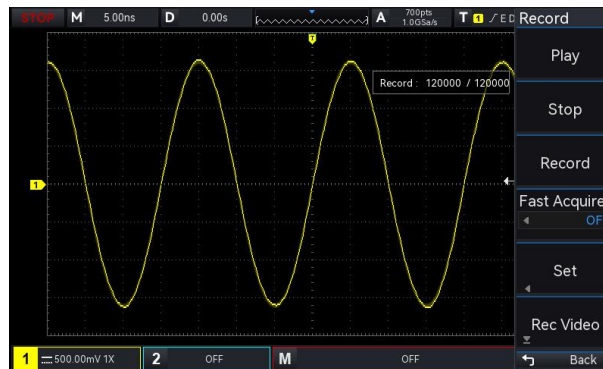
It can measure time and voltage of CH1, CH2, MATH, REFA and REFB.

File Management



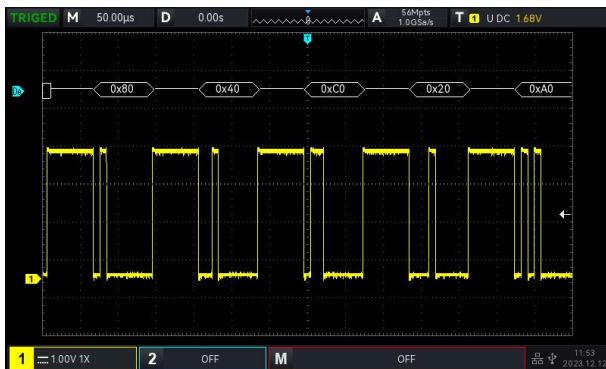
UPO1002 series adds file management function. The user can save the waveform, settings, picture to the specified Local file or the file folder USB.

Recording converts to video

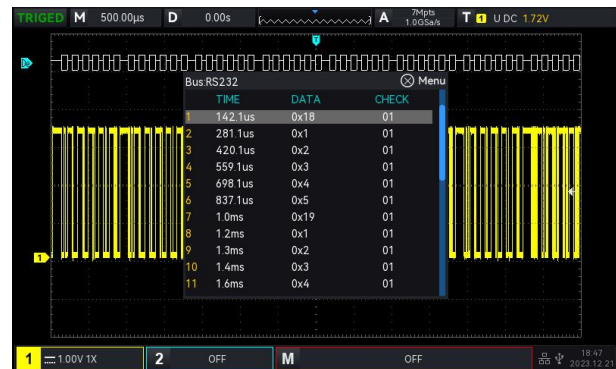


When the recording waveform is completed, the recorded waveform can save to USB. The waveform can be played back and observed on the PC, which is convenient for users to import the waveform to the PC and improve the user experience.

Serial bus trigger and decoding



The innovative hardware decoding enables real-time decoding.

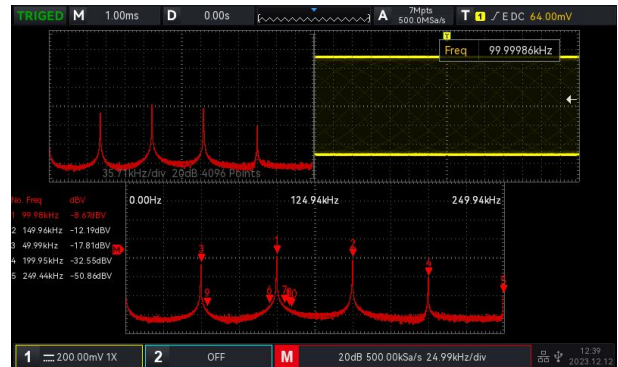
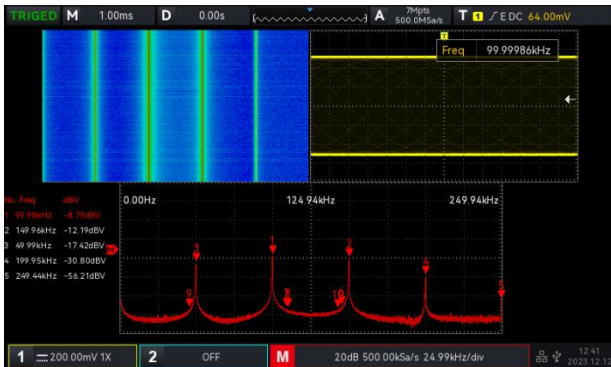


The decoding rate is greatly improved. Full-memory hardware decoding with deep storage of 56 Mpts improves the decoding time from tens of seconds to milliseconds, realizes real-time decoding, and greatly improves the efficiency of problem diagnosis for users.

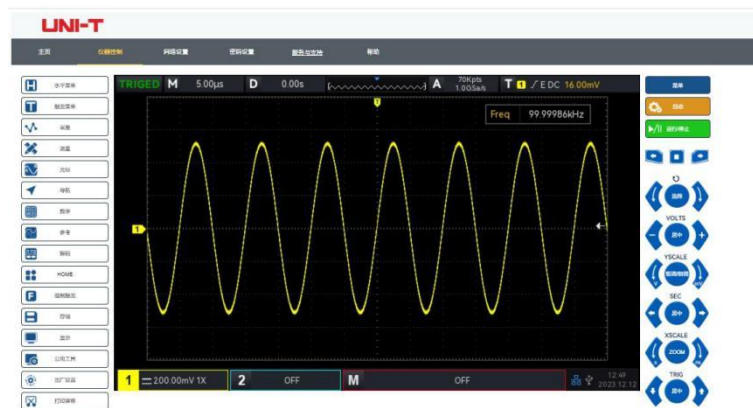
- (1) The waveform refresh rate will not be effect while decoding and the waveform display with digital phosphor;
- (2) The event list can display the decoding data under the deep storage and time of data packet;
- (3) The recorded waveform is also support full memory hardware real-time decoding

1M sampling point 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 frequency domain analysis of signal.



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. UPO1002 series embedded 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	UNIT UPO1002 Series
Model	UPO1102 UPO1202
Sampling methods	Real-time sampling
Acquisition mode	Sampling, Peak detection, High resolution, Averaging
Real time sampling rate	1GSa/s
Average	Average: 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096 ,8192
Maximum Memory Depth	56 Mpts
Coupling	DC, AC, GND
Impedance	(1 MΩ± 2%) (16 pF± 3 pF)
Probe attenuation	0.001×, 0.01×, 0.1×, 1×, 10×, 100×, 1000×, 2000×,Custom
Max Input voltage	135V _{RMS}
Vertical system	
Bandwidth (-3 dB)	UPO1102: DC to 100 MHz UPO1202: DC to 200 MHz
Single bandwidth	UPO1102: DC to 100 MHz UPO1202: DC to 200 MHz
Vertical Resolution	8-bit
Vertical Scale	500 μV/div to 20 V/div
Offset range	±8 div
Bandwidth Limit	20 MHz

Low frequency response (AC coupling, -3dB)	≤5 Hz (On the BNC)
Rise time	UPO1102: ≤3.5ns UPO1202: ≤1.8ns (The typical rising time of 1 mV/div and 2 mV/div is 2 .0ns)
DC Gain Accuracy	±3% Full scale
Channel-to-channel isolation	DC to maximum bandwidth: >40 dB
Horizontal system	
Time base Scale	1 ns/div to 1000 s/div (Display current sampling rate, storage depth)
Time base accuracy	≤ ± (50 + 2 × Service life) ppm
Scope of delay	Pre-trigger (negative delay) : ≥1 screen width Post-trigger (positive delay) : 1 s to 10s
Display Format	Y-T,X-Y, Roll
Number of X - Y	1
Hardware real-time waveform recording and playback	120,000 frames
Waveform Capture Rate	100,000 wfms/s
Time base mode	Y-T, default
	X-Y, CH1-CH2 Roll, time base ≥ 50 ms/div, automatically enter or exit Roll mode by adjusting the horizontal time base knob
Multi-Scopes 2.0	Number of independent time base channels: 2 Each channel can be displayed independently and the time base can be adjusted independently
Trigger	
Trigger level range	Inside: ± 5 Spaces from center of screen External: EXT ± 7 V
Trigger Mode	Auto, Normal, Single
Hold off Range	100 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 40 kHz
	LFRJ: Blocks the DC component and attenuates the low-frequency components below 40 kHz
	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
Source	CH1, CH2, AC Line, EXT

Runt trigger

Pulse width conditions	>, <, <>, none
Polarity	+wid , -wid
Pulse width range	8 ns to 10 s
Source	CH1, CH2

Window trigger

Type	Rise, Fall, Any
Trigger position	Enter, Exit, Time
Time	8 ns to 10 s
Source	CH1, CH2

Nth edge trigger

Edge type	Rise, Fall
Free time	8 ns to 10 s
Edge number	1 to 65535
Source	CH1, CH2

Delay trigger

Edge type	Rise, Fall
Delayed type	>, <, <>, none
Delay time	8 ns to 10 s
Source	CH1, CH2

Timeout trigger

Edge type	Rising, Falling, Any
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Timeout	8 ns to 10 s
Source	CH1, CH2
Pattern trigger	
Pattern Setting	H, L, X, Rise, Fall
source	CH1, CH2
Duration trigger	
Type set	H, L, X
Trigger condition	>, <, <>
Duration	8 ns to 10 s
Source	CH1, CH2
Setup hold trigger	
Edge type	Rise, Fall
Data type	H, L
Setup time	8 ns to 1s
Hold time	8 ns to 1 s
Source	CH1, CH2
Pulse trigger	
Polarity	+Wid , -Wid
Limiting conditions	>, <, <>
Pulse width	2 ns to 4 s
Source	CH1, CH2, AC Line, EXT
Slope trigger	
Conditions of the slope	Positive slope, Negative slope
Limiting conditions	>, <, <>
Time set	8 ns to 1s
Source	CH1, CH2
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)
Source	CH1, CH2
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	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, Custom
Data bits wide	5 bits, 6 bits, 7 bits, 8 bits
Source	CH1, CH2
I²C trigger	
Trigger condition	Start, Restart, Stop, Loss confirmation, Address, Data, Address& Data
Address bits wide	7 bits, 10 bits
Address range	0 ~ 7F, 0 ~ 3FF
Bytes	1 to 5
Trigger condition	Start, Restart, Stop, Loss confirmation, Address, Data, Address& Data
Source	CH1, CH2
SPI trigger	
Trigger condition	Idle, Idle& Data, SS, SS& Data
Free time	100 ns to 10 s
Data bits	4 bits to 32 bits
Data set	H, L, X
Edge of the clock	Rise, Fall
Source	CH1, CH2
Measure	
Cursor	<p>Cursor Manual mode:</p> <p>Voltage difference between cursors (ΔV)</p> <p>Time difference between cursors (ΔT)</p> <p>Inverse of ΔT (Hz) ($1/\Delta T$)</p> <hr/> <p>Trace mode: waveform point voltage value and time value</p>
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	6 digits hardware frequency meter
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, dBV
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	Sin, Cos, Sinc, Tan, Sqrt, Exp, Log, ln, Floor, ABS, Acos, Asin, Atan, Sinh, Tanh, Ceil, Cosh, Fabs
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	10 Hz,100 Hz,1 kHz,10 kHz
Supply voltage	
Power supply voltage	100 ~ 240 VAC (Fluctuations: ±10%), 50 Hz/60 Hz
	100 ~ 120 VAC (Fluctuations: ±10%), 400 Hz
power	75 W Max
Fuse	3A, T class, 250 V
Environment	
Temperature range	Operation: 0°C~+40°C
	No operation: -20°C~+70°C
Cooling method	Forced fan cooling
Humidity range	Operation: +35°C ≤ 90% relative humidity
	No operation: +35 °C to +40 °C ≤ 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)	336mm×164mm×105mm
Weight	<2.5 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, 150 kHz-30 MHz
Radiated disturbance	CISPR 11/EN 55011	CLASS B group 1, 30 MHz-1 GHz
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	0 V/m (80 MHz to 1 GHz) 3 V/m (1.4 GHz to 2 GHz) 1 V/m (2.0 GHz to 2.7GHz)
Electrical fast transients (EFT)	IEC 61000-4-4/EN 61000-4-4	2 kV (Input AC Power Ports)
Surges	IEC 61000-4-5/EN 61000-4-5	1 kV(Line to line) 2 kV(Line to ground)
Radio-frequency continuous conducted Immunity	IEC 61000-4-6/EN 61000-4-6	3V,0.15-80MHz
Voltage dips and interruptions	IEC61000-4-11/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 Option







Order information



	Description	Order No.
Model	UPO1102 (100 MHz, 2 analog channels)	UPO1102
	UPO1202 (200 MHz, 2 analog channels)	UPO1202
Standard accessories	Power cord that conforms to the standard of the destination country x1	
	USB data cable x1	UT-D14
	Passive probe (200 MHz/100 MHz) x2	UT-P05, UT-P04
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	UPO1002X-1MT2M

Note: For all hosts, accessories and options, please order from your local UNI-T distributor.



UNI-T oscilloscope probes and accessories supported by UPO1002 series




Passive probe

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




<p>UT-P08A</p> 	<p>High impedance probe</p>	<p>10X:DC ~ 350MHz Input resistance : 10MΩ Maximum safe operating voltage : <600V pk Oscilloscope compatibility : UNI-T all series</p>
<p>UT-P20</p> 	<p>High impedance probe</p>	<p>DC ~ 100MHz Probe coefficient 100:1 Maximum operating voltage 1500 Vrms Oscilloscope compatibility : UNI-T all series</p>
<p>UT-V23</p> 	<p>High voltage probe</p>	<p>DC ~ 100MHz Probe coefficient 100:1 Input resistance 100 MΩ±2% Maximum operating voltage 2000 Vpp Oscilloscope compatibility: UNI-T all series</p>
<p>UT-P21</p> 	<p>High voltage probe</p>	<p>DC~50 MHz Probe coefficient 1000:1 Maximum operating voltage DC 15 kVrms, AC 10 kV(sine wave) Oscilloscope compatibility: UNI-T all series</p>




Current Probe

<p>UT-P40</p> 	<p>Current probe</p>	<p>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</p>
<p>UT-P41</p> 	<p>Current probe</p>	<p>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</p>

<p>UT-P42</p> 	<p>Current probe</p>	<p>DC ~ 150 kHz Range 100 mV/A, 10 mV/A Current range 0.4A ~ 200A Maximum operating voltage 600 Vrms Oscilloscope compatibility: UNI-T all series</p>
<p>UT-P43</p> 	<p>Current probe</p>	<p>DC ~ 25 MHz Range 100 mV/A Maximum measurement current 20A Rise time 14ns Oscilloscope compatibility: UNI-T all series</p>
<p>UT-P44</p> 	<p>Current probe</p>	<p>DC ~ 50 MHz Range 50 mV/A Maximum measurement current 40A Rise time 7ns Oscilloscope compatibility: UNI-T all series</p>

Active Probe

Model	Type	
<p>UT-P30</p> 	<p>High-Voltage Differential Probes</p>	<p>DC ~ 100 MHz Attenuation ratio 100:1,10:1 Input differential voltage ± 800 Vpp Oscilloscope compatibility: UNI-T all series</p>
<p>UT-P31</p> 	<p>High-Voltage Differential Probes</p>	<p>DC ~ 100 MHz Attenuation ratio 1000:1,100:1 Input differential voltage $\pm 1.5k$ Vpp Oscilloscope compatibility: UNI-T all series</p>
<p>UT-P32</p> 	<p>High-Voltage Differential Probes</p>	<p>DC ~ 50 MHz Attenuation ratio 1000:1,100:1 Input differential voltage ± 3 kVpp Oscilloscope compatibility: UNI-T all series</p>

<p>UT-P33</p> 	<p>High-Voltage Differential Probes</p>	<p>DC ~ 120 MHz Attenuation ratio 100:1,10:1 Input differential voltage ± 14 kVpp Oscilloscope compatibility: UNI-T all series</p>
<p>UT-P35</p> 	<p>High-Voltage Differential Probes</p>	<p>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</p>
<p>UT-P36</p> 	<p>High-Voltage Differential Probes</p>	<p>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</p>

Warranty

Three-years warranty, excluding probes and accessories. Please visit https://instruments.uni-trend.com/list_190/65.html to learn more information. To protect your investment, please purchase from UNI-T official authorized global distributors.

Find a Distributor

Find an authorized distributor here: <https://instruments.uni-trend.com/Network>

Contact Us

UNI-T Technical Support Hotline: 400-876-7822

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