UPO1000CS Series Digital Oscilloscope

Data Sheet

REV 1

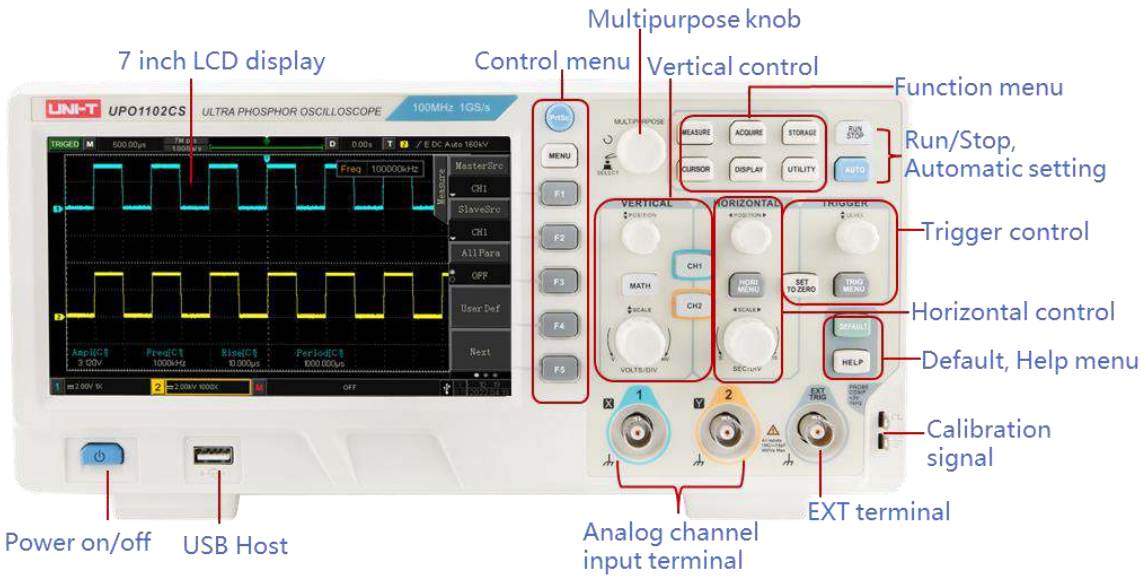
2022.01.08

UNI-T

Main Features

- Analog channel bandwidth: 200MHz, 100MHz.
- Number of analog channels: 2.
- Storage depth of each channel: 56Mpts.
- Sampling rate: 1GSa/s (non-interleaving: independent sampling per channel).
- Waveform capture rate：500,000wfms/s.
- Hardware real-time waveform uninterrupted recording of 100000 waveforms.
- Ultra Phosphor super fluorescent display effect, up to 256 levels of gray display.
- Support RS232, I2C, SPI, CAN and LIN trigger.
- Innovative RS232, I2C, SPI, CAN and LIN hardware decoding.
- Vertical scale: 1 mV/div-20 V/div.
- Low background noise：<100μVrms.
- 1M points enhanced FFT function. Support frequency setting, waterfall diagram, detection setting and marker measurement etc.
- 36 kinds of waveform parameters can be automatically measured.
- Rich trigger functions (edge, pulse width, video, slope, runt, overshoot, delay, timeout, duration, setup and hold, Nth edge and pattern trigger).
- Multi-Scopes support dual-channel independent trigger fluorescence display.
- Multi-channel independent 7-bit hardware frequency counter.
- DVM supports dual-channel independent AC and DC true RMS measurement.
- Waveform arithmetic functions (FFT, +, -, ×, ÷, digital filtering, logic operations, and advanced operations).
- Rich interfaces: USB Host、USB Device、LAN、EXT Trig、AUX Out(Trig Out、Pass/Fail).
- Support SCPI programmable instrument standard command.
- Support WEB access and control.
- 7 " WVGA (800 × 480) TFT LCD.

Panel Structure

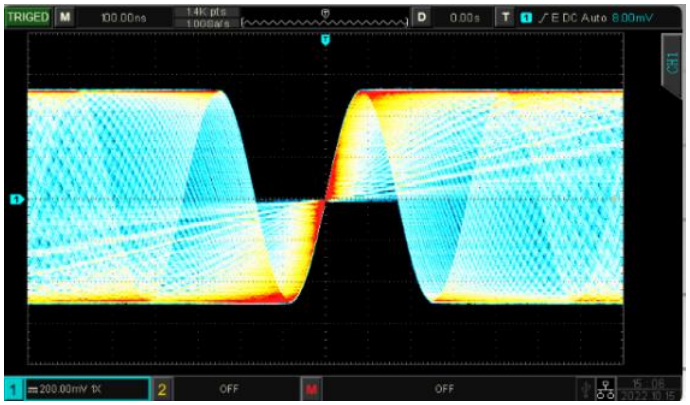


Product Introduction

UPO1000CS series is a multi-function, cost-effective digital phosphor oscilloscope. It can be widely used in the fields of electronic and electrical design, debugging, education and industrial design. UPO1000CS series adopts parallel digital signal processing technology, which greatly improves the data processing speed and waveform capture rate. The original Ultra Phosphor technology can present the cumulative effect of the tested signal as a multi-layered afterglow. Compared with traditional digital storage oscilloscopes, the persistence of digital phosphor oscilloscopes can present three-dimensional waveform data of amplitude, time and signal intensity. Fast Acquire technology can accurately capture abnormal events such as video, jitter, noise and runt signals.

256 gray level display

The original Ultra Phosphor display technology is easy to obtain more waveform information and detailed observation.

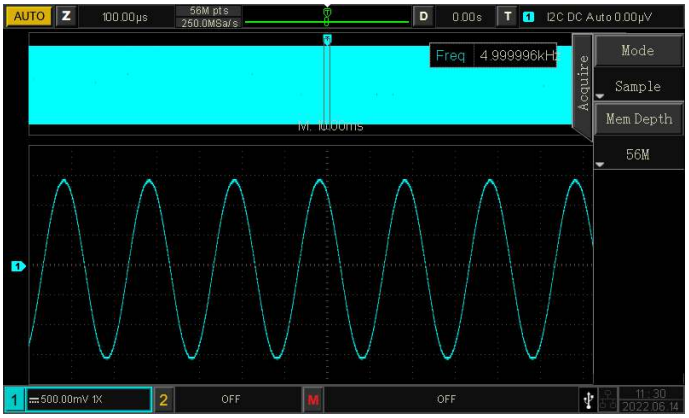


Ultra high capture rate

UPO1000CS series adopts innovative digital signal parallel processing technology. It has a very high capture rate in its peer products. Effectively reduce signal loss and help you better capture abnormal signals.

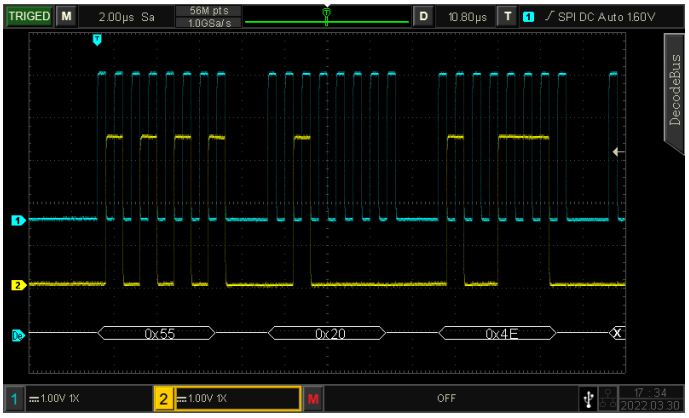
Deep storage depth

UPO1000CS series 56M sampling points per channel. This enables the oscilloscope to maintain high sampling rate in a wider time base range, At the same time considering the whole and details of the waveform, which greatly improves the ability to capture abnormal waveforms.



Serial bus trigger and hardware decoding

Innovative hardware decoding realizes real-time decoding. The decoding speed with deep storage 56Mpts realizes the millisecond level, which solves the problem of long-time waiting for viewing decoded data. The decoding will not affect the refresh speed of the waveform, and the waveform has the effect of digital fluorescence display. The event list can display the decoded data with deep storage and the time of the packet. These improved technologies will help you better test the serial bus.

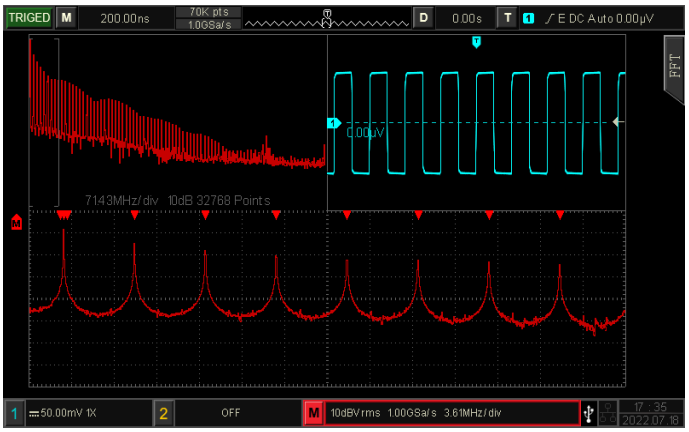


Multi-Scopes

Signals with different clock sources and large frequency difference can also display the waveform stably on the screen, which is convenient for customers to analyze the waveform parameters.

1M FFT sampling point

UPO1000CS series has 1M FFT sampling points. It can also set the practical functions of spectrum analyzer such as frequency range, detection mode and spectrum marking. It is convenient for you to analyze the signal in frequency domain on oscilloscope.



Remote control via web page

The oscilloscope can be connected and remotely controlled via the web page. This eliminates the need to install local programs, saving space and time.

Quick Selection

Parameter \ Model	UPO1202CS	UPO1102CS
Bandwidth	200MHz	100MHz
Analog channel	2	2
Sampling rate	1GS/s	1GS/s
Storage depth	56Mpts per channel	56Mpts per channel
Rise time	≤1.8ns	≤3.5ns
Capture rate	500,000wfms/s	500,000wfms/s
Waveform record	100,000 frames	100,000 frames

Technical Parameter

All specifications are warranted except those marked "Typical".
Unless otherwise stated, all specifications are for probes with the attenuation switch set to 10× and the UPO1000CS series digital phosphor oscilloscope. To meet these specifications, an oscilloscope must first meet the following two conditions:

- The instrument must run continuously for more than 30 minutes at the specified operating temperature.
- If the operating temperature variation range reaches or exceeds 5 degrees Celsius, you must open the system function menu and execute the self-calibration function.

Sample	
Sampling methods	Real-time sampling
Acquisition mode	Sampling, peak detection, averaging, high resolution
Real time sampling rate	1GS/s (Each channel)
Average	Average:2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192
Memory Depth	56Mpts (Each channel)
Input	
Channels	2
Coupling	DC, AC, GND
Impedance	（1MΩ± 2%）||（16 pF± 3 pF）
Probe attenuation	0.001×, 0.01×, 0.1×, 1×, 10×, 100×, 1000×, Custom
Max. Input voltage（1MΩ）	400V Max（DC+Vpeak）
Vertical System	
Bandwidth	UPO1102CS: DC to 100MHz

（-3 dB）	UPO1202CS: DC to 200MHz
Single bandwidth	UPO1102CS: DC to 100MHz UPO1202CS: DC to 200MHz
Vertical Resolution	8-bit
Vertical Scale	1mV/div to 20 V/div
Bandwidth Limit	20 MHz
Low frequency response (AC coupling, -3dB)	≤5 Hz（On the BNC）
Risetime	UPO1102CS：≤3.5ns UPO1202CS：≤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;
SFDR including harmonics	Dc to maximum bandwidth: >40 dB
Horizontal System	
Timebase Scale	UPO1102CS ： 2 ns/div to 1000 s/div UPO1202CS ： 1 ns/div to 1000 s/div
Accuracy of time base	≤± （50 + 2 ×Use fixed number of year）ppm
Scope of delay	Pre-trigger (negative delay) : ≥1 screen width Post-trigger (positive delay) : 1 s to 50s
Display Format	Y-T, X-Y, Roll
number of X - Y	1
Hardware real-time waveform recording and playback	100,000 frames
Waveform Capture Rate	150,000 wfms/s
	500,000 wfms/s（Fast Acquire mode）
Multi-Scopes	Quantity: 2 Support each channel independent display, and independently adjustable time base
Trigger	
Trigger level range	Inside: ± 5 Spaces from center of screen External: EXT ± 3 V
Trigger Mode	Auto, Normal, Single
Holdoff 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	8 ns to 10 s
Hold time	8 ns to 10 s
Pulse trigger	
Polarity	+wid , -wid
Limiting conditions	>, <, <>
Pulse width	2 ns to 10 s
Slope trigger	
Conditions of the slope	Positive slope, negative slope
Limiting conditions	>, <, <>
Time set	8 ns to 10 s
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, CAN（optional, LIN（optional）
Decoding the number	1
RS232 / UART trigger	
Trigger condition	Frame start, error frame, check error, data
Baud rate	2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, 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	0~7F, 0~3FF
Bytes	1 to 5
SPI trigger	
Trigger condition	Idle, Idle& Data
Free time	80 ns to 10 s
Data bits	4 bits to 32 bits

Data set	H, L, X
Edge of the clock	Rise, Fall
CAN trigger (optional)	
Signal types	Rx/Tx, CAN_H, CAN_L, difference
Trigger condition	Frame start, FRAME type, ID, DATA, ACK loss, BIT padding error, ID and data, End of frame
Signal rate	10kbps, 20kbps, 33.3kbps, 50kbps, 62.5kbps, 83.3kbps, 100kbps, 125kbps, 1Mbps, custom
Sampling point	1% to 99%
Frame type	Data frame, remote frame, error frame, overload frame
LIN trigger (optional)	
Trigger condition	Synchronization, Identifier, Data, ID and Data, Wake up frame, Sleep frame, Synchronization error, ID verification error, checksum error
Speed signal	V1, V2, Both
Bit rate	2.4kbps, 4.8kbps, 9.6kbps,19.2kbps, Specified
Sampling point	1%~99%
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-bit 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,Intg,Diff), Logical operations
FFT points	1M points
FFT window type	Rectangle, Hanning, Blackman, Hamming
FFT display	Split screen, Full screen;The time base is independently adjustable
FFT vertical scale	Vrms, dBVrms
FFT	Display mode: Full screen, split screen and waterfall
	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	Intg, Diff, 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.
Displayz	
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
Display type	Point, vector

Interface			
Standard	USB Host, USB Device~LAN, EXT Trig, AUX Out(Trig Out/, Pass/Fail)		
General technical specifications			
Probe compensator output			
Output voltage	About 3Vp-p		
Frequency	10Hz,100Hz,1kHz,10kHz		
Power supply			
power supply voltage	100V~240VACrms (Fluctuations±10%), 50Hz/60Hz		
power	100VA		
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	3.0 Kg		
Adjust the interval			
Calibration interval is recommended	1 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	CISPR 11/EN	CLASS B group 1，

	disturbance	55011	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		

*The UPO1000CS series have been certified by CE, UKCA, cETLus.

Order information

	Description	Standard Quantity per Carton	Order No.
Model	UPO1102CS（100MHz, 1GSa/s, 2CH）	1	UPO1102CS
	UPO1202CS（200MHz, 1GSa/s, 2CH）	1	UPO1202CS
Standard accessories	Power cord that conforms to the standard of the destination country	1	—
	USB data cable	1	—
	Passive probe (200MHz/100MHz)	2	UT-P05/UT-P04
Optional accessories	CAN Decoding options	—	UPO1000CS-AUTO
	LIN Decoding options	—	
	High voltage probe	—	UT-V23, 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

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

UNI-T oscilloscope probes and accessories supported by UPO1000CS series

Passive probe

Model	Type	Description
UT-P01 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 25MHz Oscilloscope compatibility: UNI-T all series
UT-P03 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 60MHz Oscilloscope compatibility: UNI-T all series
UT-P04 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 100MHz series Oscilloscope compatibility: UNI-T all
UT-P05 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 200MHz Oscilloscope compatibility: UNI-T all series
UT-P06 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 300MHz Oscilloscope compatibility: UNI-T all series

UT-P07 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 500MHz Oscilloscope compatibility: UNI-T all sereis
UT-P08 	High impedance probe	1X:DC ~ 8MHz 10X:DC ~ 350MHz Oscilloscope compatibility: UNI-T all serie
UT-P20 	High impedance probe	DC ~ 100MHz Probe coefficient 100:1 Maximum operating voltage 1500Vrms Oscilloscope compatibility: UNI-T all series
UT-V23 	High voltage probe	DC ~ 100MHz Probe coefficient 100:1 Input resistance 100MΩ±2% Maximum operating voltage 2000Vpp Oscilloscope compatibility: UNI-T all series
UT-P21 	High voltage probe	DC~50MHz Probe coefficient 1000:1 Maximum operating voltage DC 15kVrms，AC 10kV(sine wave) Oscilloscope compatibility: UNI-T all series

UT-P40 	Current probe	DC ~ 100kHz Range 50mV/A, 5mV/A Current range 0.4A ~ 60A Maximum operating voltage 600Vrms Oscilloscope compatibility: UNI-T all series
UT-P41 	Current probe	DC ~ 100kHz Range 100mV/A, 10mV/A Current range 0.4A ~ 100A Maximum operating voltage 600Vrms Oscilloscope compatibility: UNI-T all series
UT-P42 	Current probe	DC ~ 150kHz Range 100mV/A, 10mV/A Current range 0.4A ~ 200A Maximum operating voltage 600Vrms Oscilloscope compatibility: UNI-T all series
UT-P43 	Current probe	DC ~ 25MHz Range 100mV/A Maximum measurement current 20A Rise time 14ns Oscilloscope compatibility: UNI-T all series
UT-P44 	Current probe	DC ~ 50MHz Range 50mV/A Maximum measurement current 40A Rise time 7ns Oscilloscope compatibility: UNI-T all series

Active probe

Model	Type	Description
UT-P30 	High-Voltage Differential Probes	DC ~ 100MHz Attenuation ratio 100:1,10:1 Input differential voltage ±800Vpp Oscilloscope compatibility: UNI-T all series
UT-P31 	High-Voltage Differential Probes	DC ~ 100MHz Attenuation ratio 1000:1,100:1 Input differential voltage ±1.5kVpp Oscilloscope compatibility: UNI-T all series
UT-P32 	High-Voltage Differential Probes	DC ~ 50MHz Attenuation ratio 1000:1,100:1 Input differential voltage ±3kVpp Oscilloscope compatibility: UNI-T all series
UT-P33 	High-Voltage Differential Probes	DC ~ 120MHz Attenuation ratio 100:1,10:1 Input differential voltage ±14kVpp Oscilloscope compatibility: UNI-T all series

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

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 distriburots

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UNI-T group maintains a wide products category includes Digital Test & Measurement instruments, Field Testing Meter, Infrared thermal imaging products. As early as 2008, we continue to introduce self-developed Digital Test and Measurement instruments to the market and have made remarkable achievements. At present, we have formed a variety of product lines of Oscilloscope, AWG, Spectrum Analyzer, Bench Multi-meter, Power Supply, DC Load, Power Meter, LCR Meter, Micro Ohm Meter and Data logger. We have separated instruments sub-sites, instruments.uni-trend.com, on the basis of the original website www.uni-trend.com, in order to be more targeted to provide customers with better service and value.