

# UNI-T®

## **UPO2000E** **Series Ultra Phosphor Oscilloscope** **User Manual**



[www.uni-trend.com](http://www.uni-trend.com)

## UPO2000E Series Ultra Phosphor Oscilloscope Introduction

UPO2000E series digital oscilloscopes contains the following 4 models

Model	Analog Channels	Bandwidth
UPO2072E	2	70MHz
UPO2102E	2	100MHz
UPO2074E	4	70MHz
UPO2104E	4	100MHz

UPO2000E series digital oscilloscope is based on UNI-T's unique Ultra Phosphor technology. A multi-functional, high performance oscilloscope that is easy to use, with excellent technical specifications, a perfect combination of multi functionalities that can help users to quickly complete testings. UPO2000E series is aimed at satisfying the most extensive oscilloscope markets, including communications, semiconductors, computers, aerospace defense, instrumentation, industrial electronics, consumer electronics, automotive electronics, field maintenance, R&D, education, etc.

The main features of the UPO2000E series are:

- 70MHz/100MHz bandwidth, providing 2-channel and 4-channel models
- Real-time sampling rate of up to 1GS/s, can observe faster signals
- Maximum storage depth of 56Mpts, which allows the oscilloscopes to maintain a high sampling rate in a wider time base, taking into account the structure and details of the waveform
- Waveform capture rate of up to 80,000wfms/s
- Real-time continuous hardware waveform recording and waveform analysis support waveform recording up to 65,000 waveforms.
- Common protocols decoding : RS232, I2C, SPI
- 256-level grayscale display
- Independent adjustable time base of each channel
- 8-inch WVGA (800 \* 480) TFT LCD, ultra widescreen, vivid color, clear display
- Abundant trigger features, including a variety of advanced trigger options
- Standard configuration interface: USB-Host, USB-Device, LAN, and AUX
- Automatic measurement of 34 waveform parameters
- Supports USB storage and software upgrades, one click screen copy function
- Supports plug and play USB device, can be used to communicate with computer

**(4) There is a waveform displays but not stable:**

- ① Check the trigger source in the trigger menu and confirm that it matches the input channel of the actual signal.
- ② Check the trigger type: Normal signals should use edge trigger mode. Stable waveform will be displayed only by setting to the correct trigger mode.
- ③ Try changing the trigger coupling to high frequency suppression or low frequency suppression in order to filter out the high or low frequency noise which might interfere the trigger.

**(5) Pressing the **RUN/STOP** key and no waveform is displayed:**

- ① Check whether the trigger mode is normal or single, and whether the trigger level has exceeded the waveform range. If so, center the trigger level or set the trigger mode to **AUTO**.
- ② Press the **AUTO** key to complete the above settings automatically.

**(6) Waveform refresh rate is too slow:**

- ① Check whether the acquisition mode is average, and the average times is large.
- ② You can speed up the refresh rate by reducing the average times or select other acquisition mode such as normal sampling.

## Chapter 15 Technical Index

Aside from specification labeled "typical", all specifications are guaranteed.

Unless otherwise stated, all technical specifications are applicable to probes with attenuation 10X and UPO2000E series oscilloscope. Oscilloscope must first meet the following two conditions in order to achieve these standards:

- The instrument must be operated at the specified operating temperature for more than 30 minutes.
- If the operating temperature range reaches or exceeds 5 degree Celsius, user must open the system function menu to perform self-correcting.

Input	
Input Coupling	DC, AC, GND
Input Impedance	1MΩ ± 2% // 21pF ± 3pF
Probe Attenuation Coefficient	0.001×, 0.01×, 0.1×, 1×, 10×, 100×, 1000×
Maximum Input Voltage	CATI 300 Vrms, CATII 100 Vrms, Transient Overvoltage 1000 Vpk

Vertical				
Model	UPO2104E	UPO2074E	UPO2102E	UPO2072E
Analog Bandwidth	100MHz	70MHz	100 MHz	70MHz
Rise Time (Typical)	≤3.5ns	≤5ns	≤3.5ns	≤5ns
Channels	4		2	
Vertical Resolution	8bit			
Vertical Scale	1mV/div ~ 20 V/div (1-2-5 base)			
Vertical Displacement Range	1mV/div ~ 200 mV/div: ± 2V 500 mV/div ~ 2 V/div: ± 40V 5V/div ~ 20 V/div: ± 400V			

## Chapter 16 Accessories

### Appendix A Accessories

Model Number	UPO2072E / UPO2074E (70 MHz)
	UPO2102E / UPO2104E (100 MHz)
Standard Accessories	Power cord that complies with the country's standard
	USB data cable (UT-D06)
	2/4 passive probes (100MHz)
	CD-ROM (including user manual and application software)

Please order all accessories from local UNI-T dealers.

### Appendix B Maintenance and Cleaning

#### (1) General Maintenance

Do not store or place the instrument in places where the LCD monitor will be exposed to direct sunlight for a long time.

Caution: Do not allow sprays, liquids and solvents to be stained on the instrument or probe to prevent damage.

#### (2) Clean

Refer to the operating conditions of the instrument and probe and perform frequent checks. Clean the outer surface of the instrument according to the following steps:

- Please use a soft cloth to wipe the dust off the instrument and the probes. When cleaning the LCD screen, please pay attention and protect the transparent LCD screen.
- Please disconnect the power supply, then wipe the instrument with a damp but not dripping soft cloth. Do not use any abrasive chemical cleaning agent on the instrument or probes.

#### Warning:

Please confirm that the instrument is completely dry before use, to avoid electrical shorts or even personal injury caused by moisture.

### Appendix C Warranty Overview

UNI-T (UNI-TREND TECHNOLOGY (CHINA) CO., LTD.) ensures the production and sale of products, from authorized dealer's delivery date of three years, without any defects in materials and workmanship. If the product is proven to be defective within this period, UNI-T will repair or replace the product in accordance with the detailed provisions of the warranty. To arrange for repair or acquire warranty form, please contact the nearest UNI-T sales and repair department.

In addition to permit provided by this summary or other applicable insurance guarantee, UNI-T does not provide any other explicit or implied guarantee, including but not limited to the product trading and special purpose for any implied warranties. In any case, UNI-T does not bear any responsibility for indirect, special, or consequential loss.

### Appendix D Contact Us

If the use of this product has caused any inconvenience, please contact your local UNI-T dealer or sales center.

Service support: Many UNI-T products have the option of extending the warranty and calibration period, please contact your local UNI-T dealer or sales center.

To obtain the address list of our service centers, please visit our website at URL: <http://www.uni-trend.com>

<b>Measure</b>		
Cursor	Manual	Voltage difference between cursors ( $\Delta V$ ) Time difference between cursors ( $\Delta T$ ) The reciprocal of $\Delta T$ (Hz) ( $1/\Delta T$ )
	Tracking Mode	Voltage and time at waveform point
	Indicator	Allows cursor display during automatic measurement
Automatic Measurement	Maximum, minimum, peak-to-peak, median, top, bottom, amplitude, period average, average, periodic RMS, RMS, overshoot, preshoot, frequency, period, rise time, fall time, positive pulse width, negative pulse width, rise delay, fall delay, FRR, FRF, FFR, FFF, LRF, LRR, LFR, LFF, positive duty ratio, negative duty ratio, phase, area, cycle area.	
Number of Measurement	Displays 5 measurements at the same time	
Measurement Range	Screen or cursor	
Measurement Statistics	Average, maximum, minimum, standard deviation and the number of measurements	
Frequency Meter	6-bit hardware frequency meter	
<b>Mathematical Operations</b>		
Waveform Calculation	A+B, A-B, A×B, A/B, FFT, logic operation, digital filtering, advanced operation	
FFT Window Type	Rectangle, Hanning, Blackman, Hamming	
FFT Display	Split screen; time base can be adjusted independently	
FFT Vertical Scale	Vrms, dBVrms	
Digital Filter	Low-pass, high-pass, band-pass and band-stop	
Logic Operation	AND, OR, NOT, XOR	
Advanced Operation	Log, Exp, Sin, Cos, Tan, Sqrt, Inth, Diff	

<b>Storage</b>	
Setting	Internal (256), external USB storage device
Waveform	Internal (256), external USB storage device
Bitmap	External USB storage device, it can also store the relevant parameter information.

<b>Setup/Hold Trigger</b>	
Edge Type	Rising edge, falling edge
Data Type	H, L
Setup Time	8ns ~ 10s
Hold Time	8ns ~ 10s
<b>Slope Trigger</b>	
Slope Condition	Positive slope (greater than, less than, specified range) Negative slope (greater than, less than, specified range)
Time Setting	8ns ~ 10s
<b>Video Trigger</b>	
Signal System Horizontal Scanning Frequency Range	Supports standard NTSC, PAL and SECAM broadcast system with line numbers ranging from 1 ~ 525 (NTSC) and 1 ~ 625 (PAL/SECAM).
Code Trigger	
Code Setting	H, L, X, rising edge, falling edge
<b>Rs232 Decode</b>	
Trigger Condition	Start of frame, error frame, parity error, data
Baud Rate	2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, user-defined
Data Bit Width	5 bits, 6 bits, 7 bits, 8 bits
<b>I2C Decode</b>	
Trigger Condition	Start, restart, stop, lost acknowledgment, address, data, address/data
Address Bit Width	7 bits, 10 bits
Address Range	0 to 119, 0 to 1023
Byte Size	1bit to 5bits
Data Qualifier	Equal to, greater than, less than
<b>SPI Decode</b>	
Trigger Condition	Chip select, timeout
Idle Time	80 ns ~ 1s
Data Bits	4 bits to 32 bits
Data Setting	H, L, X
Clock Edge	Rising edge, falling edge

<b>Edge Trigger</b>	
Edge Type	Rising, falling, any
<b>Pulse Width Trigger</b>	
Pulse Width Condition	>, <, =
Polarity	Positive, negative pulse width
Pulse Width Range	4ns ~ 10s
<b>Runt Trigger</b>	
Pulse Width Condition	>, <, =
Polarity	Positive/negative
Pulse Width Range	8ns ~ 10s
<b>Window Trigger</b>	
Window Type	Rising edge, falling edge, any edge
Trigger Position	Window enter, exit, time
Window time	8ns ~ 10s
<b>N-Edge Trigger</b>	
Edge Type	Rising edge, falling edge
Idle Time	8ns ~ 10s
Number of Edges	1 ~ 65535
<b>Delay Trigger</b>	
Edge Type	Rising edge, falling edge
Delay Type	Greater than, less than, within range, out of range
Delay time	Normal: 8ns ~ 10s Lower time limit: 8ns ~ 10s Upper time limit: 32ns ~ 10s
<b>Timeout Trigger</b>	
Edge Type	Rising edge, falling edge, any edge
Timeout	8ns ~ 10s
<b>Duration Trigger</b>	
Code	H, L, X
Trigger Condition	Greater than, less than, within range
Duration Time	Normal: 8ns ~ 10s Lower time limit: 8ns ~ 10s Upper time limit: 32ns ~ 10s