

**Hantek**



**Tablet1000** series

Tablet oscilloscope

Data Manual

2022.05

## **Warranties and Declarations**

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### **Product certification**

Hantek certified Tablet1000 series oscilloscope to meet China's national industry standards and has passed the CE certification.

### **Contact us**

If you have any questions when using the products of Qingdao Hantek Electronics Co., LTD., you can obtain service and support through the following ways:

Email: [service@hantek.com](mailto:service@hantek.com), [support@hantek.com](mailto:support@hantek.com)

Website: <http://www.hantek.com>

# 1 Product features

## Product features

- 7-inch industrial specification TFT-LCD, 800\*480 multi-point full touch capacitive screen, completely get rid of mechanical keys, provide better operation experience.
- Number of channels: 4-channel tablet oscilloscope: 4 channels +1 AFG channel (1KHz channel without signal source function). 2-channel tablet oscilloscope: 2 channels +1 AFG channel (1KHz channel without signal source function).
- Analog channel bandwidth: The maximum is 250MHz.
- Maximum sampling rate: 4-channel tablet oscilloscope: 1GSa/s single channel, 500MSa/s double channel, 250MSa/s triple or quadruple channel. 2-channel tablet oscilloscope: 250MSa/s double channel, 125MSa/s single channel.
- Maximum storage depth: 4-channel tablet oscilloscope: 8Mpts (single channel), 4Mpts (double channel), 2Mpts (triple or quadruple channel). 2-channel tablet oscilloscope: 8Mpts (single channel), 4Mpts (double channel).
- Vertical sensitivity: 4-channel tablet oscilloscope: 2mV/div ~ 10 V/div.  
2-channel tablet oscilloscope: 10mV/div ~ 10 V/div.
- Product classification: 7-inch tablet oscilloscope only with oscilloscope function, 7-inch tablet oscilloscope with oscilloscope + multimeter function, 7-inch tablet oscilloscope with oscilloscope + multimeter + signal source function.
- Basic trigger functions: edge, pulse width, video, slope, timeout.
- Up to 42 waveform parameters are automatically measured.
- Various mathematical operations: addition, subtraction, multiplication, division, FFT.
- Standard interface: USB interface.
- Standard 9V2A/5V3A/12V1.5A charger, data line interface input, can share a set of charging equipment with a mobile phone.
- 4-channel tablet oscilloscope: built-in 10000mAh removable lithium batteries;  
2-channel tablet oscilloscope: built-in 5000mAh removable lithium batteries.
- With the design of a supporting stand, it can be used and put anywhere and save working space.
- Quick storage function, using one key to save waveforms to U disk or internal storage, convenient and fast.
- New man-machine interactive experience with touch, simple and clear UI, without complex operation, a professional instrument that everyone can easily use.
- 7-inch large screen display same as that of a desktop computer, which can be used on the desk or on one hand.
- Large screen, small volume, the net weight is less than 1Kg, share the charger with mobile phones, convenient to carry on business trips.

The new generation of TO1000 series handheld tablet oscilloscopes, using 7-inch industrial specification TFT-LCD 800\*480 resolution LCD, supporting multi-point capacitive touch operation; With three functions, which are oscilloscope, signal source

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and multimeter; With 2 or 4 analog channels; Built-in signal source supports 25MHz standard waveform output; A variety of built-in arbitrary waves; The multimeter has data recording function, which can monitor and record voltage, current, resistance and other data changes for a long time and generate trend charts; Standard 9V2A/5V3A/12v1.5A charger, USB interface input, can share a set of charging equipment with a mobile phone; Powered by 2 or 4 18650 lithium batteries; With a supporting stand, able to use and place anywhere.

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## 2 Technical indicators

All technical specifications are applicable to the Tablet1000 series oscilloscopes. For detail, check the end of this chapter. To verify that an oscilloscope meets the technical specifications, it must first meet the following conditions:

- The oscilloscope must have been operating continuously for at least 20 minutes at the specified operating temperature.
- If the operating temperature varies by more than 5 degrees Celsius, the "self-calibrate" operation must be performed, which can be found under the [Utility](#) menu.
- The oscilloscope must be within the ex-factory calibration period.

All technical specifications are guaranteed to meet requirements except those marked "typical".

Technical indicators		
Model	Bandwidth	Sampling rate
TO1112 (C/D)	110 MHz	250MSa/S
TO1152 (C/D)	150 MHz	1GSa/S
TO1202 (C/D)	200 MHz	1GSa/S
TO1252 (C/D)	250 MHz	1GSa/S
TO1204 (C/D)	200 MHz	1GSa/S
TO1254 (C/D)	250 MHz	1GSa/S
TO1154 (C/D)	150 MHz	1GSa/S
TO1204AUTO	200 MHz	1GSa/S
TO1254AUTO	250 MHz	1GSa/S
TO1154AUTO	150 MHz	1GSa/S

### Horizontal system

Horizontal scale range	2ns/div ~ 100s/div 1, 2, and 5 steps
	Single, "sampling" mode
Incremental time accuracy (Full bandwidth)	± (1 sampling interval +100ppm× reading +0.6ns) > 16 times on average ± (1 sampling interval +100ppm× reading +0.4ns)

Sampling interval = seconds/grid ÷200

Time base accuracy	±50 ppm ± 5 ppm/year	
Time base delay range	Before trigger	≥1/2 screen width
	After trigger	1 s or 100 div(take the greater)
Time interval (ΔT)	Measurement	±(1 sampling interval)±(2 ppm x reading)
		±50ps
Range of offset correction between channels	±100 ns	
Horizontal mode	YT	Default
	XY	X1= channel 1, Y1= channel 2, X2= channel 3, Y2= channel 4.
	SCAN	Time base ≥ 100ms/div. Enter or exit SCAN mode by adjusting the horizontal time base knob.
	ROLL	Time base ≥ 100ms/div. Enter or exit ROLL mode by adjusting the horizontal time base knob.

Vertical system

Series	TO1000 Series (1G sampling rate)	TO1112 Series (250M sampling rate)
Input coupling	DC, AC or grounded	
Input impedance	1M Ω ±2%	
Input capacitance	18 pF ± 3 pF	
Vertical scale range	2mV/div~10V/div	10mV/div~10V/div
Vertical resolution	8bit	
Offset range	± 1V(2mV/div~100mV/div)	± 1V(100mV/div)
	± 10V (200mV/div~1V/div)	± 10V (1V/div)
	± 50V (2V/div~10V/div)	± 50V (10V/div)
Dynamic range	± 5 div (8 bit)	
Bandwidth limitation	20MHz, each channel is independent.	
DC gain accuracy	± 3% FullScale	

Series	TO1000 Series (1G sampling rate)	TO1112 Series (250M sampling rate)
DC offset accuracy	<100 mV/div ( $\pm 0.1$ div $\pm 2$ mV $\pm 1.5\%$ offset) <1V/div ( $\pm 0.1$ div $\pm 2$ mV $\pm 1\%$ offset) >2V/div ( $\pm 0.1$ div $\pm 2$ mV $\pm 1.0\%$ offset)	
Isolation degree between channels	40dB, DC to the maximum rated bandwidth of each model	
Supporting probe attenuation coefficient	0.01X, 0.02X, 0.05X, 0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X, 20X, 50X, 100X, 200X, 500X, 1000X, 2000X, 5000X, 10000X	

## Collect

A series of	TO1000 Series (1G sample)	TO1112 Series (250M sample)
Sampling method	Real-time sampling	
Maximum analog channel sampling rate	1 GSa/s	250MSa/s
Collection mode	Normal, average, peak, high resolution	
Waveform interpolation	(sin x)/x	
Single sequence	Collection mode	Collection stop time
	Normal and peak	All channels perform single collection at the same time.
	Average	All channels perform collections for N times at the same time. N can be 2, 4, 8, 16, 32, 64, 128, or 256.
Maximum storage depth	8Mpts (single channel), 4Mpts (double channel), 2Mpts (triple and quadruple channels)	
Peak detection	Under all time base settings, capture burrs with a minimum of 8ns.	

## Trigger

Model	Automatic, normal, single
Level	CH1 ~ CH4 or CH1 ~ CH2 $\pm 4$ degrees from the center of the display
Release inhibition range	8ns~10s

Trigger level accuracy	CH1 ~ CH4 or CH1 ~ CH2 0.2 grid x volt/grid in $\pm 4$ degrees from the center display
Trigger sensitivity	$\pm 0.2\text{div}$

**Edge-triggered**

Slope	Rising edge, falling edge, double edge
Data source	CH1 ~ CH4 or CH1 ~ CH2

**Pulse width trigger**

Polarity	Positive polarity, negative polarity
Condition	<, >, !=, =
Data source	CH1 ~ CH4 or CH1~ CH2
Pulse width range	8ns~10s

**Video trigger**

Signal standard	NTSC, PAL, HDTV720p, HDTV1080p, HDTV1080i
Data source	CH1 ~ CH4 or CH1 ~ CH2
Synchronous	Scan lines, number of lines, odd field, even field, all fields

**Slope trigger**

Slope	Up, down
Condition	Scan lines, number of lines, odd field, even field, all fields
Data source	CH1 ~ CH4 or CH1 ~ CH2
Time range	8ns~10s

**Timeout trigger**

Data source	CH1 ~ CH4 or CH1 ~ CH2
Polarity	Positive polarity, negative polarity
Time range	8ns~10s

**Measurement**

Cursor	The voltage difference between the cursors $\Delta Y$
	The time difference between the cursors $\Delta X$
Automatic measurement	Reciprocal of $\Delta X$ in Hertz ( $1/\Delta X$ )
	Frequency, double peak, on average, maximum, minimum, period, top, median, bottom, amplitude, RMS, rising edge overshoot, rising edge preshoot, period RMS, cycle average, rise time, fall time, positive pulse width, negative pulse width, positive duty ratio,



negative duty ratio, FRR, FFF, falling edge overshoot, falling edge preshoot, pulse width, FRF, FFR, LRR, LRF, LFR, LFF, maximum time, minimum time, positive phase difference, negative phase difference, variance, positive pulse number, negative pulse number, rising edge number, falling edge number, trigger count

#### Mathematical operation

Data source	CH1 ~ CH4 or CH1 ~ CH2		
Operator	+, -, ×, /, FFT		
FFT	Point	1024	
	Window	Rectangle, Hanning, Hemming, Blackman, Bartlett, flat top	
	Display	Display single or display all	
	Vertical scale	dB, VRms	

#### Storage

Save/call out (non-volatile)	Save and call out, including images, references, CSV, binary, settings
Save to external storage	Images, references, CSV, binary, settings

#### Arbitrary waveform generator

Channel number	1 channel arbitrary wave generator output (with signal generator function)	
	1 channel 1KHz output (without signal generator function)	
Sampling rate	200MSa/s	
Vertical resolution	12bit	
The highest frequency	25MHz	
Standard waveform	Sine wave, square wave, triangle wave, noise, DC	
Arbitrary waveform	Arb1, Arb2, Arb3, Arb4	
Sine wave	Frequency range	0.1 Hz ~ 25 MHz
	Frequency range	0.1 Hz ~ 10 MHz
Square wave/pulse	Duty ratio	0% ~ 100%

Triangle wave	Frequency range	0.1 Hz ~ 1 MHz	
	Symmetry	0% ~ 100%	
Noise	Bandwidth	> 25 MHz	
DC	Offset	$\pm 1.5V$ (50 $\Omega$ )、 $\pm 3V$ (high resistance)	
	Resolution	100 $\mu V$	
	Precision	2% (1 KHz)	
Arbitrary wave	Frequency range	0.1 Hz ~ 10 MHz	
		Support upper computer download, and external memory calling out	
Amplitude		0mV~3Vpp (50 $\Omega$ )	
		0mV~6Vpp (high resistance)	
Wavelength		4Ksa	
Frequency resolution		0.1 Hz or 4 bits, take the greater one of the two	
		Frequency accuracy 100 ppm (< 10 kHz) 50 ppm (> 10 kHz)	
Output impedance		50 $\Omega$ $\pm$ 2%	
Modulation	FM	Modulation waveform	Sine wave, square wave, triangle wave
		Modulation frequency	1Hz~50KHz
		Modulation deviation	0.1Hz~1KHz
	AM	Modulation waveform	Sine wave, square wave, triangle wave
		Modulation frequency	1Hz~50KHz
		Modulation depth	0% - 120%.
Burst	Type	Multi-period, infinite	
	Cycle number	1-2000000000	
	Trigger source	Manual	

Multimeter

Maximum resolution 4000 points

Measuring method Voltage, current, resistance, capacitance, diode, on-off measurement

Maximum input voltage AC:600V, DC: 600V

Maximum input current AC: 10A, DC:10A

Input impedance 10M $\Omega$

### Multimeter gear

Measurement item	Range	Precision	Resolution
Direct current voltage	400mV	$\pm (1\% + 2)$	100uV
	4.000V		1mV
	40.00V		10mV
	400.0V		100mV
	600.0V		1V
	Overload protection: 250V for the 400mv range, 600Vrms for the rest ranges.		
Alternating current voltage	4.000 V	$\pm (1.2\% + 5)$	1mV
	40.00V		10mV
	400.0V		100mV
	600.0V		1V
Frequency range: 40Hz ~ 400Hz			
Frequency range of 400V and 600V range: 40Hz ~ 100Hz			
Direct current	40.00 mA	$\pm (1\% + 2)$	10uA

Measurement item	Range	Precision	Resolution
	200.0 mA	$\pm (1.5\% + 2)$	100uA
	4.000 A	$\pm (1.8\% + 2)$	1mA
	10.00 A	$\pm (3\% + 2)$	10mA
	Overload protection: self-recovery fuse 200mA/250V, no fuse for 4A and10A range		
Alternating current	40.00 mA	$\pm (1.3\% + 2)$	10uA
	400.0 mA	$\pm (1.8\% + 2)$	100uA
	4.000 A	$\pm (2\% + 3)$	1mA
	10.00 A	$\pm (3\% + 5)$	10mA
	Frequency range: 40Hz~400Hz;		
	Self-recovery fuse: 200mA/250V, no fuse for 4A and10A range		
Resistance	400.0 $\Omega$	$\pm (1\% + 3)$	0.1 $\Omega$
	4.000K $\Omega$	$\pm (1.2\% + 5)$	1 $\Omega$
	60.00K $\Omega$		10 $\Omega$
	400.0K $\Omega$		100 $\Omega$
	4.000M $\Omega$		1K $\Omega$
	40.00M $\Omega$	$\pm (1.5\% \pm 3)$	10K $\Omega$
	Overload protection: 220V effective value		
Capacitance	40.00nF	$\pm (3\% + 5)$	10pF
	400.0nF		100pF

Measurement item	Range	Precision	Resolution
	4.000uF		1nF
	40.00uF		10nF
	100.0uF		100nF
Overload protection: 220V effective value			
Diode	0V ~ 1.0V		
On and off measurement	< 50 Ω		
<b>Display</b>			
Screen type	7 "TFT LCD		
Display resolution	800 (horizontal) *480 (vertical) pixels		
Display type	Point, vector		
Waveform Brightness	Adjustable		
Grid type	Solid line, dotted line, none		
Grid brightness	Adjustable		
Screen brightness	Adjustable		
Afterglow	1S, 5s, 10S, 30s, Infinite, off		
<b>Interface</b>			
Standard interface	USB Host and USB Device		
<b>Power supply</b>			
Power supply	AC 100 ~ 240V, 50 ~ 60Hz; DC input 5V3A/9V2A/12v1.5A		
Power	< 8 w		

Quick charge	Support quick charge
Battery	3.7V 2600mAh *4 in parallel 3.7V 2600mAh *2 in parallel

**Environment**

Operating temperature	0 °C ~ 50 °C
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Storage temperature- 20 °C ~ 70 °C

Humidity	≤+104°F (≤+40° C): relative humidity≤90% 106°F~122°F (+41° C ~50° C): relative humidity≤60%
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Cooling	Convection
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Altitude	Operating and not operating	3,000m (10,000 ft)
	Random vibration	0.31g RMS at 50Hz to 500Hz, 10 minutes in each axial direction
	Not operating	2.46g RMS at 5Hz to 500Hz, 10 minutes in each axial direction

**Mechanical parts**

Oscilloscope size	248mm*176mm*54mm (length * width * height)
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Weight	1.2kg (including batteries)
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### 3 Order information and warranty period

#### Order information

Order information	Order no.
<b>Host model</b>	
250MSa/S, 110MHz, 2-channel oscilloscope	TO1112
250MSa/S, 110MHz, 2-channel oscilloscope + multimeter	TO1112C
250MSa/S, 110MHz, 2-channel oscilloscope + multimeter + signal source	TO1112D
1GSa/S, 150MHz, 2-channel oscilloscope	TO1152
1G Sa/S, 200MHz, 2-channel oscilloscope	TO1202
1G Sa/S, 250MHz, 2-channel oscilloscope	TO1252
1G Sa/S, 150MHz, 2-channel oscilloscope + multimeter	TO1152C
1G Sa/S, 200MHz, 2-channel oscilloscope + multimeter	TO1202C
1G Sa/S, 250MHz, 2-channel oscilloscope + multimeter	TO1252C
1G Sa/S, 150MHz, 2-channel oscilloscope + multimeter + signal source	TO1152D

Order information	Order no.
1G Sa/S, 200MHz, 2-channel oscilloscope + multimeter + signal source	TO1202D
1G Sa/S, 250MHz, 2-channel oscilloscope + multimeter + signal source	TO1252D
1G Sa/S, 150MHz, 4-channel oscilloscope	TO1154
1G Sa/S, 200MHz, 4-channel oscilloscope	TO1204
1G Sa/S, 250MHz, 4-channel oscilloscope	TO1254
1G Sa/S, 150MHz, 4-channel oscilloscope + multimeter	TO1154C
1G Sa/S, 200MHz, 4-channel oscilloscope + multimeter	TO1204C
1G Sa/S, 250MHz, 4-channel oscilloscope + multimeter	TO1254C
1G Sa/S, 150MHz, 4-channel oscilloscope + multimeter + signal source	TO1154D
1G Sa/S, 200MHz, 4-channel oscilloscope + multimeter + signal source	TO1204D
1G Sa/S, 250MHz, 4-channel oscilloscope + multimeter + signal source	TO1254D
1G Sa/S, 150MHz, 4-channel oscilloscope + multimeter + signal source	TO1154AUTO



Order information	Order no.
1G Sa/S, 200MHz, 4-channel oscilloscope + multimeter + signal source	TO1204AUTO
1G Sa/S, 250MHz, 4-channel oscilloscope + multimeter + signal source	TO1254AUTO
<b>Standard accessories</b>	
9V2A/5V3A/12V1.5A adapter	--
USB cable	--
Multimeter Pen *1 (only for TO1000C/D series)	--
	PP150B (110 MHZ)
Oscilloscope probe (one for 2-channel series, two for 4-channel series)	PP150B (150 MHZ)
	PP200 (200 MHZ)
	PP250 (250 MHZ)
Crocodile clip (one for 2-channel series, two for 4-channel series)	HT324

### Warranty period

The host machine is guaranteed for 3 years, not including probe and accessories.



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Addr: #35 Building, No. 780 Baoyuan Road, High-tech Zone, Qingdao, Shandong, China 266114

Switchboard: 400-036-7077

Email: [service@hantek.com](mailto:service@hantek.com)

Tel: (0086)532-55678770 & 55678772 & 55678773

Zip code: 266114

Website: [www.hantek.com](http://www.hantek.com)

Qingdao Hantek Electronics Co., LTD