

TBS2000B Model Overview

Models	TBS2072B	TBS2074B	TBS2102B	TBS2104B	TBS2202B	TBS2204B
Analog Channels	2	4	2	4	2	4
Bandwidth	70 MHz	70 MHz	100 MHz	100 MHz	200 MHz	200 MHz
Max Sample Rate	2 GS/s - Half Channel					
	1 GS/s - All Channels					
Record length	5 M points					

Vertical system analog channels

Hardware bandwidth limits

20 MHz

Input coupling

DC or AC

Input impedance

1 M Ω \pm 1 %, 13 pF \pm 1.5 pF

Input sensitivity range

1mV/div to 10 V/div

Vertical resolution

8 bits

Maximum input voltage, 1 M Ω

300 VRMS, Installation Category II; with peaks \leq \pm 450 V

Acquisition modes

Sample

Acquire sampled values.

Peak Detect

Captures glitches as narrow as 3.5 ns at all sweep speeds.

Average

From 2 to 512 waveforms included in average.

Hi-Res

Averages multiple sample of one acquisition interval into one waveform point.

Roll

Scrolls waveforms right to left across the screen at sweep speeds slower than or equal to 40 ms/div.

Math modes**All units:**

Ch 1 - Ch 2

Ch 2 - Ch 1

Ch 1 + Ch 2

Ch 1 X Ch 2

FFT

4 channel units:

Ch 3 - Ch 4

Ch 3 + Ch 4

Ch 4 - Ch 3

Ch 3 X Ch 4

DC balance

$\pm (1 \text{ mV} + 0.1 \text{ div})$

DC gain accuracy

$\pm 2\%$ 10 V/div through 5 mV/div

$\pm 3\%$ typical 1 mV/div

DC voltage measurement accuracy average mode**Average of > 16 waveforms**

$\pm((\text{DC Gain Accuracy}) \times |\text{reading} - (\text{offset} - \text{position})| + \text{Offset Accuracy} + 0.11 \text{ div} + 1 \text{ mV})$

Delta Volts between any two averages of ≥ 16 waveforms acquired with the same oscilloscope setup and ambient conditions

$\pm(\text{DC Gain Accuracy} \times |\text{reading}| + 0.08 \text{ div} + 1.4 \text{ mV})$

Vertical position range

± 5 divisions

Vertical offset ranges

Volts/Div setting	1 M Ω , Input
1 mV/Div to 50 mV/Div	$\pm 1 \text{ V}$
51 mV/div to 505 mV/div	$\pm 10 \text{ V}$

510 mV/div to 10 V/div

 ± 100 V**Analog bandwidth, DC coupled****200 MHz models:**

DC to >200 MHz

100 MHz models:DC to ≥ 100 MHz**70 MHz models:**DC to ≥ 70 MHz**Common mode rejection ratio (CMRR), typical**

100:1 at 60 Hz, reducing to 10:1 with 50 MHz sine wave with equal Volts/div and coupling settings on each channel.

Channel-to-channel isolation

TBS2072B, TBS2074B	TBS2102B, TBS2104B	TBS2202B, TBS2204B
$\geq 100:1$ at ≤ 70 MHz	$\geq 100:1$ at ≤ 100 MHz	$\geq 100:1$ at ≤ 200 MHz

Horizontal system analog channels

Maximum duration of time captured at highest sample rate (all channels)

5 ms

Time base range

TBS220xB, TBS207xB, TBS210xB: 1 ns/div to 100 sec/div

Seconds division range

TBS207xB, TBS210xB, TBS220xB: 1 ns/div to 100 sec/div in a 1-2-4 sequence

Time-base delay time range

-15 divisions to 5000 s

Deskew range ± 100 ns**Time base accuracy** ± 25 ppm over any ≥ 1 ms interval

Trigger system

Trigger modes

Auto, Normal, and Single

Trigger holdoff range

20 ns to 8 s

Trigger types

Edge

Positive or negative slope on any channel. Coupling includes DC, HF reject, LF reject, and noise reject.

Pulse width

Trigger on width of positive or negative pulses that are $>$, $<$, $=$, or \neq a specified period of time.

Runt

Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again.

Trigger coupling analog channels

DC, Noise Reject, High Freq Reject, Low Freq Reject.

Sensitivity, edge-type trigger, DC coupled

Trigger Source	Sensitivity
Analog inputs	0.4 division from DC to 50 MHz
0.6 divisions >50 MHz to 100 MHz	
0.8 divisions >100 MHz to 200 MHz	

Trigger level ranges

Input channels: \pm 4.90 divisions from center screen

Data storage

Nonvolatile memory retention time, typical

No time limit for Front Panel Settings, saved waveforms, setups, and calibration constants.

Real-Time clock

A programmable clock providing time in years, months, days, hours, minutes, and seconds.

Waveform measurements

Cursors

Time, amplitude, and screen.

Automated measurements

32, of which up to six can be displayed on-screen at any one time. Measurements include: Period, Frequency, Rise Time, Fall Time, Positive Duty Cycle, Negative Duty Cycle, Positive Pulse Width, Negative Pulse Width, Burst Width, Phase, Positive Overshoot, Negative Overshoot, Peak to Peak, Amplitude, High, Low, Max, Min, Mean, Cycle Mean, RMS, Cycle RMS, Positive Pulse Count, Negative Pulse Count, Rising Edge Count, Falling Edge Count, Area, Cycle Area, Delay FR, Delay FF, Delay FR, and Delay RR.

Gating

Isolate the specific occurrence within an acquisition to take measurements on, using either the screen, between waveform cursors or full record length.

Waveform math

Arithmetic

Add, subtract, and multiply waveforms.

FFT

Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning, or Blackman-Harris.

Remote control software

Web page

Built-in web page enables remote control of horizontal and vertical scale, trigger settings, and measurements. Allows waveform and image save to USB flash drive.

Display system

Display type

9 inch (228 mm) wide format liquid crystal TFT color display.

Display resolution

800 horizontal by 480 vertical displayed pixels (WVGA).

Waveform styles

Vectors, Variable Persistence, and Infinite Persistence.

Graticules

Grid, None.

Format

YT and XY.

Input output ports

USB 2.0 high-speed host port

Supports USB mass storage devices, Wi-Fi dongle, One port available on rear panel and one on front panel.

USB 2.0 device port

USB 2.0 high-speed device port

Device port

Rear-panel connector allows for communication/control of oscilloscope through USBTMC or GPIB with a TEK-USB-488.

Compatible USB-WIFI dongles

NETGEAR WNA1000M, WNA3100M, D-LINK DWA-131, TP-LINK TL-WN823N

LAN port (Ethernet)

RJ-45 connector, supports 10/100BASE-T

Probe compensator**Amplitude**

5 V

Frequency

1 kHz

Kensington-style lock

Rear-panel security slot connects to standard Kensington-style lock.

Power source

Power source voltage

100 to 240 V_{AC} RMS \pm 10%

Power source frequency

47 Hz to 63 Hz (100 to 240 V)

360 Hz to 440 Hz (100 to 132 V)

Power consumption

80 W maximum

Physical characteristics

Dimensions**TBS2xx2B:**

Height: 174.9 mm (6.89 in)

Width: 372.4 mm (14.66 in)

Depth: 103.3 mm (4.07 in)

TBS2xx4B:

Height: 201.5mm (7.93 in)

Width: 412.8 mm (16.25 in)

Depth: 128.1 mm (5.04 in)

Weight**TBS2xx2B:**

2.62 kg (5.8 lbs.), standalone instrument.

5.1 kg (11.2 lbs.), when packaged for domestic shipment.

TBS2xx4B:

4.17 kg (9.2 lbs.), stand-alone instrument.

7 kg (15.4 lbs.), when packaged for domestic shipment.

Cooling clearance

50 mm (2 in) required on left side and rear of instrument.

EMC, environment, and safety

Temperature

Operating:

0 °C to +50 °C (+32 °F to 122 °F)

Nonoperating:

-40 °C to +71 °C, (-40 °F to 160 °F)

Humidity

Operating:

5% to 95% relative humidity (% RH) at up to +30° C
5% to 60% RH above +30° C up to +50° C non-condensing

Nonoperating:

5% to 95% RH (Relative Humidity) at up to +30° C
5% to 60% RH above +30° C up to +60° C non-condensing

Humidity

Operating:

5% to 95% relative humidity (% RH) at up to +30 °C
5% to 60% RH above +30 °C up to +50 °C, noncondensing.

Nonoperating:

5% to 95% RH (Relative Humidity) at up to +30 °C
5% to 60% RH above +30 °C up to +60 °C, noncondensing.

Altitude

Operating:

Up to 3,000 meters (9,842 feet).

Non-Operating:

Up to 12,000 meters (39,370 feet).

Altitude is limited by possible damage to LCD at higher altitudes. This damage is independent of operation.

Regulatory

Electromagnetic compatibility

EC Council Directive 2014/30/EU

Safety

UL61010-1, UL61010-2-030, CAN/CSA-C22.2 No. 61010.1, CAN/CSA-C22.2 No. 61010-2:030;
complies with the Low Voltage Directive 2014/35/EU for Product Safety