TELEDYNE TEST TOOLS
Everywhereyoulook™

T3DSO3000 Data Sheet

Oscilloscopes

Debug with Confidence

200 MHz – 1 GHz



Tools for Improved Debugging

• **Long Capture** – 125 Mpts/Ch and 250 Mpts interleaved.	✓ Capture more time and show more waveform detail.
• **Math and Measure** – 9 basic math functions plus FFT, and 50+ automatic measurement parameters.	✓ Extract results from waveforms and measurements.
• **Connectivity** – USB for mass storage, printing and PC control, plus LAN for fast data transfer.	✓ Save data for external analysis and screen images for reports.
• **Includes Serial Bus Decoders for I²C, SPI, UART, CAN, LIN, CAN FD, I²S, MIL-STD-1553B, FlexRay, SENT & Manchester.**	✓ Debug serial buses directly in your Oscilloscope at no extra cost.
• **Waveform Sequence Recorder** – record and play back up to 100,000 waveforms.	✓ Replay the changing waveform history.
• **Includes Bode Plot and Power Analysis applications as standard.**	✓ Common applications coverage as standard.
• **Optional 16 Channel mixed signal capability.**	✓ Add mixed signal debugging in your Oscilloscope.

Key Specifications

Bandwidth	200 MHz, 350 MHz, 500 MHz, 1 GHz
Channels	4, 50 Ω / 1 MΩ Input Impedance
Memory	125 Mpts/Ch (250 Mpts interleaved)
Sample Rate	up to 5 GS/s (Interleaved)
Display	Large 10.1" Bright TFT LCD (1024 x 600)
Connectivity	USB Host, USB Device, LAN
Warranty	3 Years

T3DSO3204: 4 Channel 200 MHz
T3DSO3354: 4 Channel 350 MHz
T3DSO3504: 4 Channel 500 MHz
T3DSO31004: 4 Channel 1 GHz

Teledyne Test Tools new T3DSO3000 Oscilloscopes feature four channel models with analog bandwidth options from 200 MHz to 1 GHz. Each model offers a maximum sample rate of 5 GSa/s, and a maximum memory depth of 250 Mpts in half channel mode. All models incorporate two 5 GSa/s ADCs and two 250 Mpts memory modules. When all channels are enabled, each channel has sample rate of 2.5 GSa/s and a standard record length of 125 Mpts. When only a single channel per ADC is active, the maximum sample rate is 5 GSa/s and the maximum record length is 250 Mpts. For ease-of-use, the most commonly used functions can be accessed with its user-friendly front panel design.

The T3DSO3000 series employs a new generation of high speed display technology that provides excellent Signal clarity, fidelity and performance. It comes with a minimum vertical input range of 500 µV/div, an innovative digital trigger system with high sensitivity, low jitter, and a waveform capture rate of 500,000 waveforms/sec (sequence mode). The T3DSO3000 also employs a 256-level intensity grading display function and a color temperature display mode which complement the high speed update rate. Teledyne Test Tools latest oscilloscope offering supports multiple powerful triggering modes including serial bus triggering of I^2C, SPI, UART, CAN, LIN, CAN FD, I^2S, FlexRay, MIL-STD-1553B and SENT. Manchester protocol is supported as decode only and uses standard edge triggering. Serial bus support is included as standard in all the T3DSO3000 models.

Models and key Specification

Model	T3DSO3204	T3DSO3354	T3DSO3504	T3DSO31004
Bandwidth	200 MHz	350 MHz	500 MHz	1 GHz
Sampling Rate (Max.)	All models have two 5 GSa/s ADCs. When all channels are enabled, each channel has a maximum sample rate of 2.5 GSa/s. When a single channel per pair is active, that channel has sample rate of up to 5 GSa/s.			
Analog Channels	4 + EXT			
Memory Depth (Max.)	125 Mpts/Ch (non interleaved mode); 250 Mpts/Ch (interleave mode)			
Waveform Capture Rate (Max.)	110,000 wfm/s (normal mode), 500,000 wfm/s (sequence mode)			
Trigger Type	Edge, Slope, Pulse width, Window, Runt, Interval, Dropout, Pattern, Video, Qualified, Serial			
Serial Trigger and decoder [1)]	I^2C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT & Manchester			
16 Digital Channels [2)]	Maximum waveform capture rate up to 1.25 GSa/s, record length up to 62.5 Mpts/Ch			
Waveform Generator [3)]	External USB waveform generator, 25 MHz, sample rate of 125 Msa/s, 16 kpts memory			
I/O	USB Host, USB Device, LAN, Pass/Fail, Trigger In/Out, 10 MHz Reference In/Out, VGA			
Probe (Std)	1 PP020-1 for each Channel			
Display	10.1 inch Touch Screen TFT-LCD (1024 x 600)			

[1)] All serial protocols support trigger and decode capability except Manchester which offer decode only. Trigger Manchester using a standard trigger (Edge, Pulse, Window, Runt, Interval, Dropout, Pattern, Qualified).
[2)] Optional 16 channel MSO capability can be added to the T3DSO3000 range of oscilloscopes by ordering the T3DSO2000-LS.
[3)] Optional waveform generator can be added to the T3DSO3000 range of oscilloscopes by ordering the T3DSO1000-FGMOD-A.

The T3DSO3000 oscilloscope range also include History waveform recording, Sequence acquisition, Search and Navigate, Bode Plot and Power Analysis functions, as well as user upgradeable options to add a 25 MHz function/arbitrary waveform generator and 16 channel MSO capability. The new digital oscilloscope architecture also includes a hardware co-processor that delivers measurements quickly and accurately without slowing acquisition and front-panel response. The features and performance of Teledyne Test Tools new T3DSO3000 oscilloscopes offer outstanding value for money.

Key Features

- 200 MHz, 350 MHz, 500 MHz and 1 GHz bandwidth models
- Real-time sampling rate up to 5 Gsa/s
- New generation of high speed display technology
  - Waveform capture rate up to 110,000 wfm/s (normal mode), and 500,000 wfm/s (sequence mode)
  - Supports 256-level intensity grading and multiple color display modes.
  - Record length up to 250 Mpts
- Digital intelligent trigger system: Edge, Slope, Pulse Width, Window, Runt, Interval, Dropout, Pattern, Qualified, Serial and Video
- Zone trigger: Up to 2 zones with user defined 'intersect' / 'not intersect' events.
- Video trigger, supporting HDTV
- Standard serial bus triggering and decoding, supports protocols I^2C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT.
- Decode only for Manchester (use standard oscilloscope trigger functionality).
- Low background noise with voltage sensitivity from 500 µV/div to 10 V/div.
- Abundant data analysis functions such as Search, Navigate, Digital Voltmeter, Counter, Measurement and Waveform Histograms, Bode plot and Power Analysis.
- Segmented acquisition (Sequence) mode, divides the maximum record length into multiple segments (up to 100,000), according to trigger conditions set by the user, with a very small dead time between segments to capture the qualifying event.
- History waveform record (History) function, maximum recorded waveform length is 100,000 waveforms.
- Automatic measurement function for over 50 parameters as well as Histograms, Statistics, Zoom, Gating, Math, Trend, History and Reference functions.
- 9 Math functions (FFT, addition, subtraction, multiplication, division, integration, differential, square root, and formula editor).
- 2 Math operators allowing 2 math functions to be used at the same time.
- High Speed hardware based Pass/Fail function
- Optional MSO,16 digital channels. Record Length up to 62.5 Mpts/Ch (Option T3DSO2000-LS)
- Optional 25 MHz function/arbitrary waveform generator. 6 waveform types (Sine, Square, Ramp, Pulse, DC, Noise) and 45 Arbitrary waveforms. (Option T3DSO1000-FGMOD-A)
- Bode Plot from 10 Hz to 25 MHz using the T3DSO1000-FGMOD-A function/arbitrary waveform generator, or Bode Plot measurements from 10 Hz to 120 MHz using the T3AFG120 arbitrary function generator.
- Power Analysis application included as standard, measuring power quality, current harmonics, inrush current, switching loss, slew rate, modulation, output ripple, turn on/turn off, transient response, PSRR, efficiency.
- Large 10.1 inch capacitive touch screen TFT-LCD display with 1024 x 600 resolution
- Multiple interface types: USB Host, USB Device (USB-TMC), LAN, Trigger In/Out
- Built in web server supporting remote control over LAN via a web browser. Supports SCPI remote control commands
- Supports Multi-language display and embedded online help

FUNCTION & CHARACTERISTICS



1. High Resolution 10.1-inch TFT-LCD touch screen display for clear images.
2. Horizontal controls of Timebase, Zoom, Roll and trigger position.
3. Advanced Triggering controls including Edge, Pulse, Interval, Window, Slope, DropOut, Runt and Pattern trigger types.
4. Easy to use Auto Setup, Run / Stop and Default Controls.
5. Multi-functional controls for AWG, Search, Navigate, History and Decode.
6. Individual color coded channels, Math and Digital inputs.
7. Probe compensation calibrator.
8. Color coded input channels.
9. Digital lead set socket.

10.1 inch TFT-LCD display and 15 one-button menus

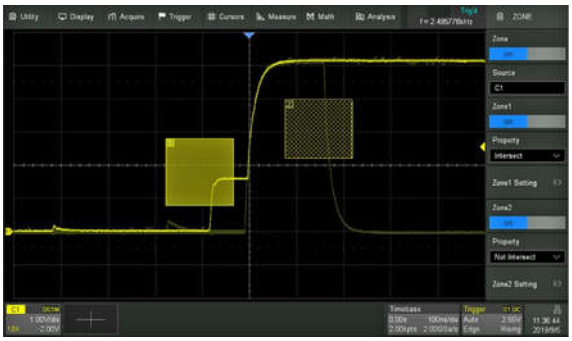
- 10.1 inch TFT-LCD capacitive touch screen display with 1024 x 600 resolution
- Most commonly used functions are accessible using 15 different one-button operation keys: Auto Setup, Default, Cursors, Measure, Roll, History, Persist, Clear Sweeps, Zoom, Print, Math, Measure, Search/Navigate, Decode and AWG.

A Wide Range Of Trigger Functions



A wide range of powerful triggering functions including Edge, Slope, Pulse, Video, Window, Runt, Interval, Dropout, Pattern, Serial, etc, allows users to debug complex hardware issues with ease.

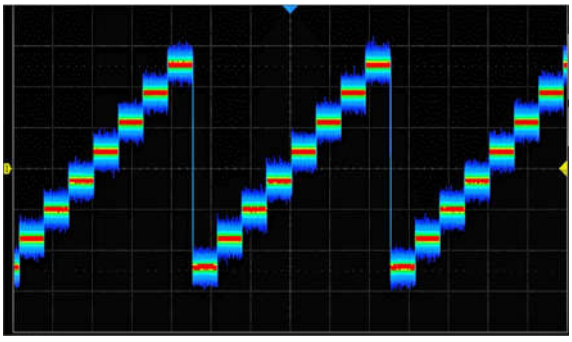
Powerful User Set Zone Trigger Extends Trigger Capability



Set up to 2 zones defining each as either an Intersect or a Non Intersect. Trigger occurs when conditions are met. Zone Trigger helps to simplify advanced triggering.

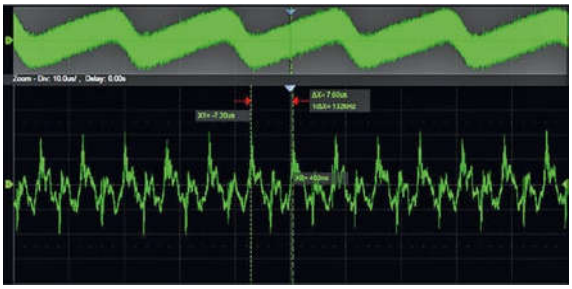
256-level Intensity Grading and Color Temperature Display

256-level intensity graded waveform display is ideal for viewing modulated and changing waveforms.



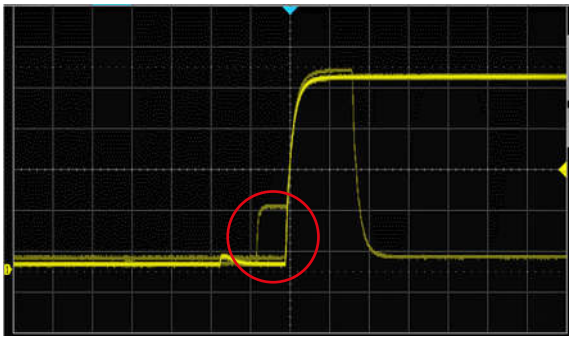
The Color temperature display clearly shows noise and jitter with infrequently occurring waveforms shown in blue through to the most frequently occurring waveforms shown in red.

Record Length of up to 250 Mpts



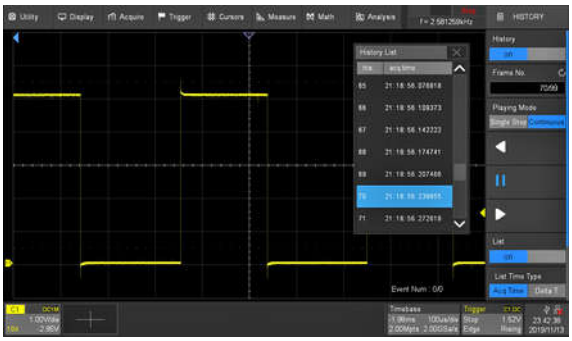
The record length of up to 250 Mpts (interleaved) or up to 125 Mpts (non-interleaved) allows use of a higher sampling rate to capture more signal detail. The hardware-based Zoom then allows quick zoom in to any area of interest.

Waveform Capture Rate up to 500,000 wfm/s



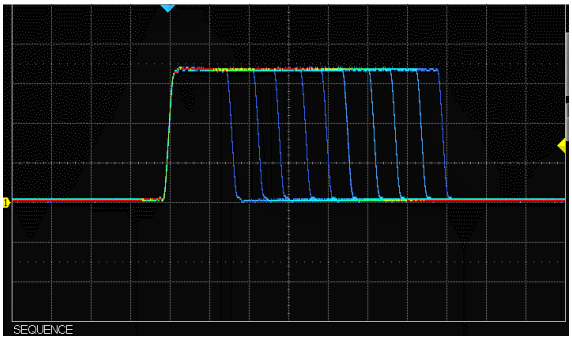
With a waveform capture rate of up to 500,000wfm/s (sequence mode) and 110,000 wfm/s (normal mode) the T3DSO3000 can easily capture glitches, infrequent anomalies and other low-probability events.

History Mode



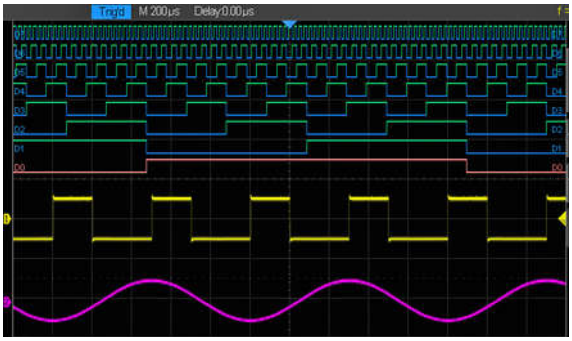
The always enabled History mode records up to 100,000 waveforms allowing users to scroll back through previous acquisitions to analyze past events and locate anomalies quickly. Serial decode, zoom and cursor measurements can be used.

Sequence Mode



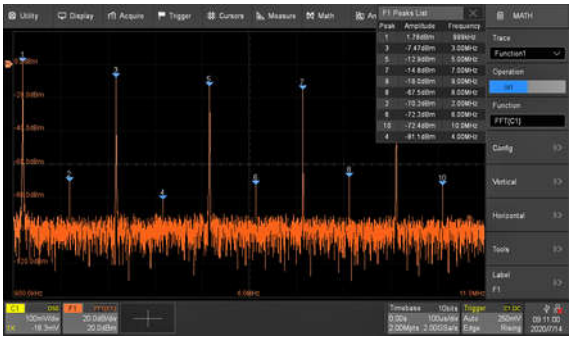
Segmented memory mode can store up to 100,000 waveforms into memory segments for capturing fast events in quick succession. Combine Sequence Mode with advanced triggers to isolate rare events. All the segments can be play back using the History function.

16 Digital Channels/MSO (Optional)



The MSO option adds 16 digital channels to the T3DSO3000 enabling users to trigger and acquire digital as well as analog waveforms in a mixed signal debug environment.

Advanced Math Function



Two Math traces support Plus, Minus, Multiply, Divide, FFT, integration, differential, square root, and formula editor, providing a quick insight into the waveform characteristics.

ERES Mode



Enhanced Resolution (ERES) function reveals hidden waveform detail by using a linear average filter to reduce waveform noise on single acquisition waveforms, where regular averaging will not work. The ERES acquisition mode is hardware based, allowing waveforms to be captured at a faster rate.

Waveform Histogram



The Waveform Histogram feature provides a statistics view of the waveform in horizontal and vertical directions.

Browser Control



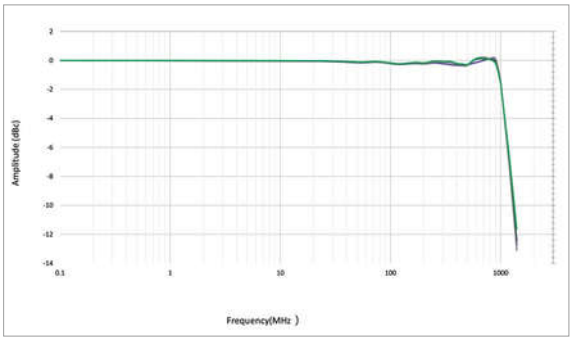
The embedded web server enables users to control the T3DSO3000 oscilloscopes from a single browser web page. This provides users with an easy to use, familiar, browser based, remote control interface for remote monitoring and troubleshooting.

High Performance Front End



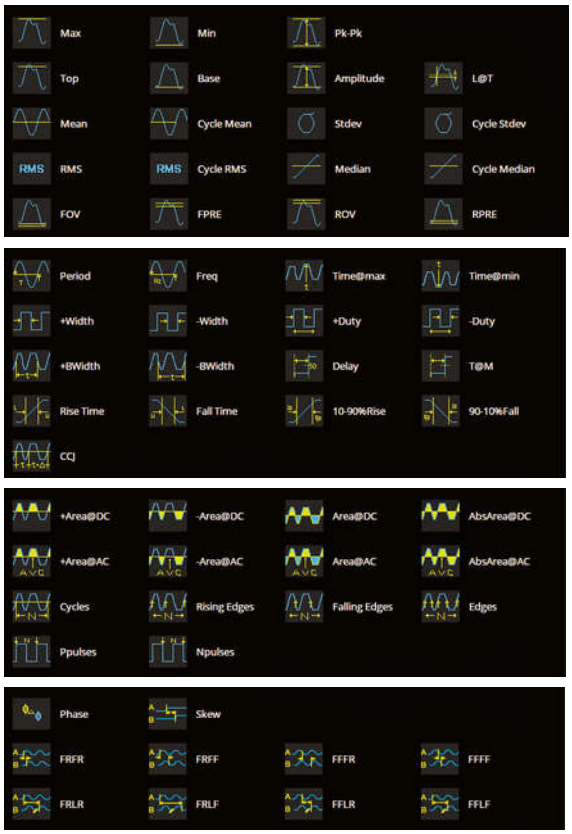
T3DSO3204: At 200 MHz bandwidth, the input noise floor is typically only 80 μVrms.

Flat Frequency Response



T3DSO31004 at 5 GSa/s shows exceptionally flat frequency response up to its maximum 1 GHz bandwidth.

Measurements of all relevant Parameters with Statistics





Parameter measurements include 4 categories: Vertical, Horizontal, Miscellaneous and Channel Delay providing over 50 different types of measurements.

Measurements can be performed on the whole waveform or within a specified gate period.

Simple measurement mode measures up to 12 waveform characteristics simultaneously.

Statistics show the current value, maximum value, minimum value, standard deviation, mean value of up to 12 parameters simultaneously.

Histogram is available to show the probability distribution of a parameter. Trend is available to show the parameter value vs. time. In addition, horizontal measurements can process up to 1000 signal edges within one single acquisition, thus greatly improving the test efficiency.

Serial Bus Trigger and Decode

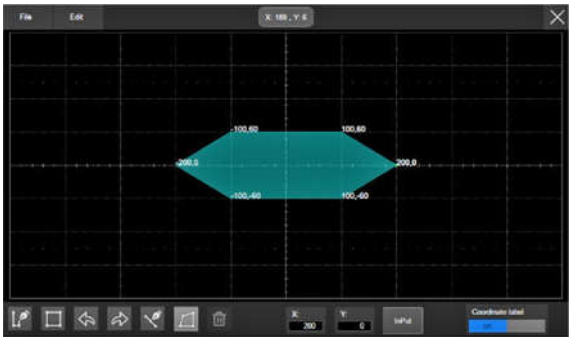


Simultaneously trigger and decode up to 2 common embedded and automotive serial buses, I²C, SPI, UART, LIN, CAN, CAN FD, FlexRay, I²S, MIL-STD-1553B, SENT and Manchester. Protocol information can be quickly and intuitively displayed, time aligned with the waveform and in table format.

Mask Test Function



The T3DSO3000 utilizes a hardware based mask test function, that can perform 18,000 pass/fail tests per second. Users can define their own masks directly from a waveform or from the mask editor capability. The masks can then be used for Go/No Go testing with any failures stored as history waveforms or screen shots. The masks can also be stored on the T3DSO3000 for future use, making it suitable for long-term signal monitoring or automated production line testing.



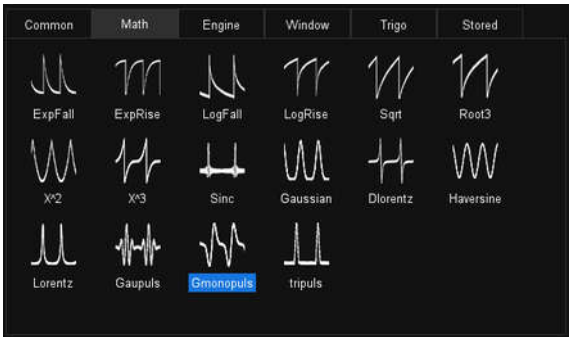
Built-in Mask Editor application helps to create custom masks.

Complete Connectivity



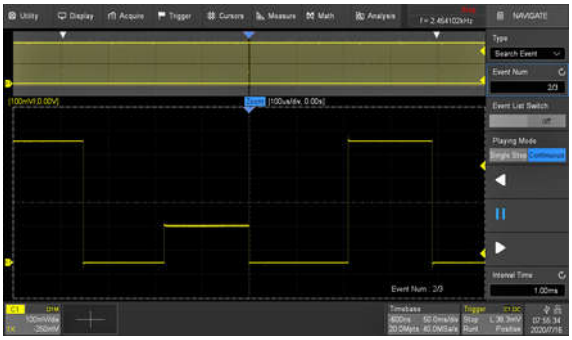
Connectivity includes External Trigger Input, Pass/Fail and Trigger Out, USB Device (USBTMC) and LAN for remote control, and a Kensington Lock security point.

25 MHz Function / Arbitrary Waveform Generator



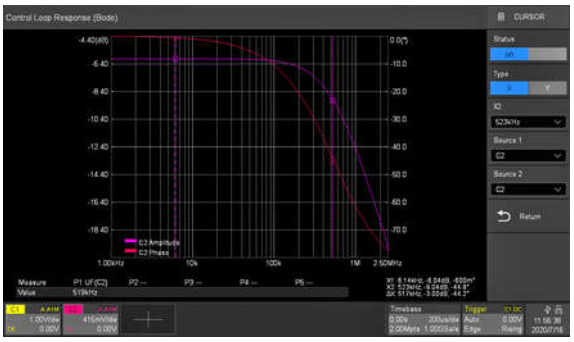
The optional 25 MHz function/arbitrary waveform generator comprises 6 standard waveforms and 45 arbitrary waveforms.

Search and Navigate

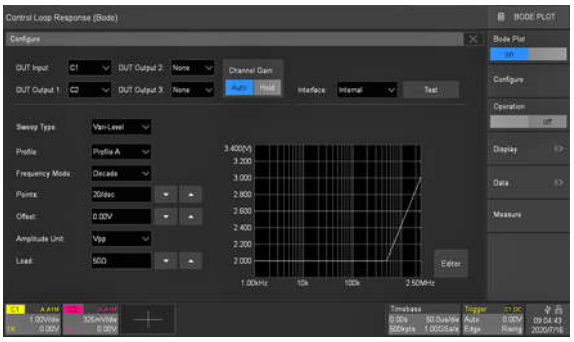


The T3DSO3000 can find events within an acquisition record or history acquisition based on user specified trigger conditions. Navigate browses through Events flagged by the Search, plays back history events or continuously moves the delay position on long records (very useful in zoom view).

Bode Plot



The T3DSO3000 Bode Plot application can control the T3DSO1000-FGMOD-A waveform generator, or any T3AFG40-80-120 function generator, to make Bode Plot measurements of passive or active components and circuits. The application scans the amplitude and phase response over frequency, making it possible to replace expensive network analyzers in less demanding applications. The T3DSO1000-FGMOD-A waveform generator allows Bode Plot measurements up to 25 MHz whereas using the T3AFG120 allows Bode Plot measurements up to 120 MHz.



The configuration screen enables setup of the reference and measurement channels, with up to three measurement channels possible. Configuration of the measurement frequency and amplitude, setting the number of measurement points, load, variable level sweeps, channel gain, decade or linear frequency mode, etc.

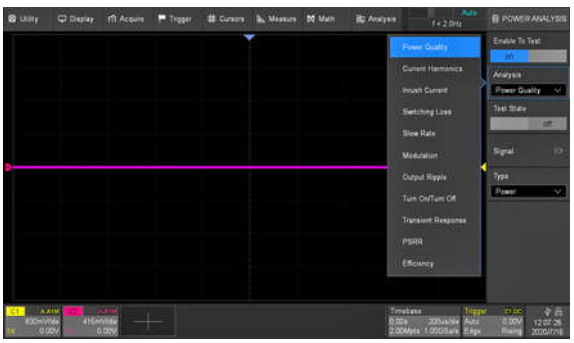


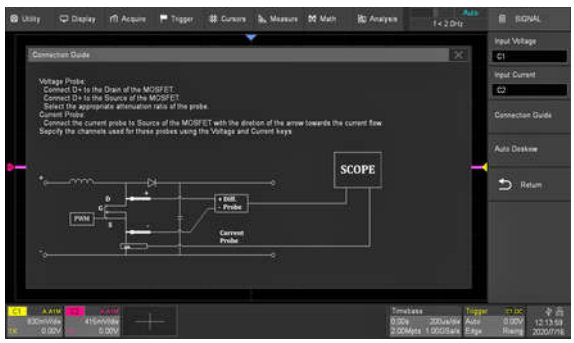
The measurement screen enables the setting of five common measurements: Upper cutoff frequency, lower cutoff frequency, bandwidth, gain margin and phase margin, in addition there are user settable measurement cursors and a table of measurement results which can be exported in CSV format.

Power Analysis



The T3DSO3000 Power Analysis application provides a full suite of power measurement and analysis tools. These tools enable an improvement in the efficiency of measurements made on switching power supplies and power devices. The Power Analysis application can measure Power Quality, Current Harmonics, Inrush Current, Switching Loss, Slew Rate, Modulation, Output Ripple, Turn On/Turn Off, Transient Response, PSRR and Efficiency. Each measurement has a help screen showing a connection diagram with notes.





SPECIFICATIONS

All specifications are only guaranteed if the following conditions are met:

- The oscilloscope calibration period is valid
- The oscilloscope has been working continuously for at least 30 minutes at the specified temperature (18 °C to 28 °C)

Acquire System

Sampling Rate	5 GSa/s (interleaving mode), 2.5 GSa/s (non-interleaving mode)
Memory Depth	250 Mpts (single-channel),125 Mpts (dual-channel)
Peak Detect	400 ps
Average	Averages: 4, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536
Eres	Enhance bits: 0.5, 1, 1.5, 2, 2.5, 3 selectable
Interpolation	Sinx/x, Linear

Input

Channels	4 + EXT
Coupling	DC, AC, GND
Impedance	DC: (1 MΩ ± 2 %) || (16 pF ± 2 pF) 50 Ω: 50 Ω ± 1 %
Max.Input voltage	1 MΩ ≤ 400 Vpk (DC + Peak AC), DC – 10 kHz 50 Ω ≤ 5 Vrms, ± 10 V Peak
CH to CH Isolation	DC – 100 MHz > 40 dB, 100 MHz – BW ≥ 34 dB
Probe Attenuation	1X, 10X, 100X, Custom

Horizontal System

Time Scale	**T3DSO3204 / T3DSO3354:** 1.0 ns/div – 1000 s/div **T3DSO3504:** 500 ps/div – 1000 s/div **T3DSO31004:** 200 ps/div – 1000 s/div
Channel Skew	< 150 ps
Waveform Capture Rate	Up to 110,000 wfm/s (normal mode), 500,000 wfm/s (sequence mode)
Intensity grading	256-level
Display Format	Y-T, X-Y, Roll (≥ 50 ms/div)
Time base Accuracy	±1 ppm initial; ±1 ppm 1st year ageing; ± 3.5 ppm 10-year ageing
Roll Mode	50 ms/div – 1000 s/div (1-2-5 Step)

Vertical System

Bandwidth (-3dB) [1]	**T3DSO31004:** 1 GHz **T3DSO3504:** 500 MHz **T3DSO3354:** 350 MHz **T3DSO3204:** 200 MHz	
Vertical Resolution	8 bit	
Vertical Range	8 divisions	
Vertical scale (Probe 1X)	1 MΩ: 500 µV/div – 10 V/div (setting range), 1 mV/div – 10 V/div (specified range) 50 Ω: 500 µV/div – 1 V/div (setting range), 1 mV/div – 1 V/div (specified range)	
Offset Range (Probe 1X)	**T3DSO3204 / T3DSO3354:** 500 µV/div – 100 mV/div: ± 2V 102 mV/div – 1 V/div: ± 20V 1.02 V/div – 10 V/div: ± 200V	**T3DSO3504 / T3DSO31004:** 500 µV/div – 20 mV/div: ± 2V 20.5 mV/div – 100 mV/div: ± 5V 102 mV/div – 200 mV/div: ± 20V 205 mV/div – 1 V/div: ± 50V 1.02 V/div – 2 V/div: ± 200V 2.05 V/div – 10 V/div: ± 400V
Bandwidth Limit	20 MHz (± 40 %), 200 MHz (± 40 %)	
Bandwidth Flatness (50 Ω, >2mV/div)	50 kHz – BW/10: ± 0.5 dB BW/10 – BW/3: ± 0.8 dB BW/3 – BW2/3: +1.0 dB, -1.2 dB BW2/3 – BW: +2.0 dB, -2.5 dB	
Low Frequency Response (AC Coupling -3 dB)	5 Hz (typical)	
SFDR	≥ 32 dBc	
DC Gain Accuracy	< 5 mV/div < 3.0 %, ≥ 5 mV/div <1.5 %	
Offset Accuracy	± (1.5 % x offset + 1.5 % x full scale + 1 mV)	

[1] All ranges below 5 mV/Div are limited to 200 MHz maximum bandwidth.

Vertical System (continue)

Rise Time (typical) 50 Ω	**T3DSO31004:** 0.4 ns **T3DSO3504:** 0.7 ns **T3DSO3354:** 1.0 ns **T3DSO3204:** 1.7 ns
Overshoot (150 ps Fast Edge, 50 Ω)	**T3DSO3204, T3DSO3354, T3DSO3504:** <10 % (typical) **T3DSO31004:** <15 % (typical)

Trigger System

Mode	Auto, Normal, Single
Level	Internal: ± 4.1 div from the center of the screen EXT: ± 0.61 V EXT/5: ± 3.05 V
Holdoff Range	By Time: 8 ns – 30 s (8 ns Step) By Event: 1 – 10^8
Coupling: CH1 – CH4	DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 8 Hz LFRJ: Attenuates the frequency components below 1.2 MHz HFRJ: Attenuates the frequency components above 740 kHz Noise RJ: Increases the trigger hystersis
Coupling: EXT	DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 10 Hz LFRJ: Attenuates the frequency components below 400 kHz HFRJ: Attenuates the frequency components above 1.6 MHz
Accuracy (typical)	CH1 – CH4: ± 0.2div EXT: ± 0.3div
Sensitivity	Noise RJ = OFF: CH1 – CH4: >10 mV/div 0.3 div, 5 mV/div-10 mV/div: 0.5 div, ≤ 2 mV/div: 1 div Noise RJ = ON: CH1 – CH4: >10 mV/div 0.7 div, 5 mV/div-10 mV/div: 0.7 div, ≤ 2 mV/div: 1.5 div EXT: 200 mVpp, DC – 10 MHz, 300 mVpp, 10 MHz – bandwidth EXT/5: 1 Vpp, DC – 10 MHz, 1.5 V pp, 10 MHz – bandwidth
Jitter	< 9 ps RMS (typical) for ≥ 300 MHz sine and ≥ 6 divisions pk-pk from 2.5 mV/div to 10 V/div < 5 ps RMS (typical) for ≥ 500 MHz sine and ≥ 6 divisions pk-pk from 2.5 mV/div to 10 V/div
Trigger Position	Pre-Trigger: 0 – 100 % memory Delay-Trigger: 0 – 5,000 div
Zone	Up to 2 zones, Source: CH1 - CH4, Property: Intersect / Not Intersect

Edge Trigger

Source	CH1 – CH4/EXT/(EXT/5)/ACLine/D0 – D15
Slope	Rising, Falling, Rising & Falling

Slope Trigger

Source	CH1 – CH4
Slope	Rising, Falling
Limit	<, >, in range, out of range
Time Range	2 ns – 20 s; Resolution 1 ns

Pulse Width Trigger

Source	CH1 – CH4, D0 – D15
Polarity	+wid, -wid
Limit range	<, >, in range, out of range
Pulse Width Range	2 ns – 20 s; Resolution 1 ns

Video Trigger

Source	CH1 – CH4
Standard	NTSC, PAL, 720p/50, 720p/60, 1080p/50, 1080p/60, 1080i/50, 1080i/60, Custom
Sync	Any, Select
Trigger condition	Line, Field

Window Trigger

Source	CH1 – CH4
Window type	Absolute, Relative

Interval Trigger

Source	CH1 – CH4, D0 – D15
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time Range	2 ns – 20 s; Resolution 1 ns

Dropout Trigger

Source	CH1 – CH4, D0 – D15
Timeout type	Edge, State
Slope	Rising, Falling
Time Range	2 ns – 20 s; Resolution 1 ns

Runt Trigger

Source	CH1 – CH4
Polarity	Positive, Negative
Limit range	<, >, in range, out of range
Time Range	2 ns – 20 s; Resolution 1 ns

Pattern Trigger

Source	CH1 – CH4, D0 – D15
Pattern setting	Don't Care, Low, High
Logic	AND, OR, NAND, NOR
Limit Range	<, >, in range, out of range
Time Range	2 ns – 20 s; Resolution 1 ns

Qualified Trigger

Type	State, State with Delay, Edge, Edge with Delay
Qualified Source	CH1 – CH4, D0 – D15
Edge Trigger Source	CH1 – CH4, D0 – D15

Nth Edge Trigger

Source	CH1 – CH4, D0 – D15
Slope	Rising, Falling
Idle Time	8 ns – 20 s; Resolution 1 ns
Edge Number	1 – 65535

Delay Trigger

Source A	CH1 – CH4, D0 – D15
Source B	CH1 – CH4, D0 – D15
Limit range	<, >, in range, out of range
Time Range	2 ns – 20 s; Resolution 1 ns
Slope	Rising, falling

Serial Trigger

I²C Trigger	
Condition	Start, Stop, Restart, No Ack, EEPROM, Address & Data, Data Length
Source (SDA/SCL)	CH1 – CH4, D0 – D15
Data format	Hex
Limit Range	EEPROM: =, >, <
Data Length	EEPROM: 1 byte Address & Data: 1 – 2 byte Data Length: 1 – 12 byte
R/W bit	Address & Data: Read, Write, Don't Care
SPI Trigger	
Condition	Data
Source (CS/CL/Data)	CH1 – CH4 / D0 – D15
Data format	Binary
Data Length	4 – 96 bit
Bit Value	0, 1, X
Bit Order	LSB, MSB
UART Trigger	
Condition	Start, Stop, Data, Parity Error
Source (RX/TX)	CH1 – CH4 / D0 – D15
Data format	Hex
Limit Range	=, <, >,
Data Length	1 byte
Data Width	5 bit, 6 bit, 7 bit, 8 bit
Parity Check	None, Odd, Even
Stop Bit	1 bit, 1.5 bit, 2 bit
Idle Level	High, Low
Baud Rate (Selectable)	600/1200/2400/4800/9600/19200/38400/57600/115200 bit/s
Baud Rate (Custom)	300 bit/s – 334000bit/s
CAN Trigger	
Type	All, Remote, ID, ID + Data, Error
Source	CH1 – CH4 / D0 – D15
ID	STD (11 bit), EXT(29 bit)
Data format	Hex
Data Length	1 – 2 byte
Baud Rate (Selectable)	5 k, 10 k, 20 k, 50 k, 100 k, 125 k, 250 k, 500 k, 800 k, 1 M bit/s
Baud Rate (Custom)	5 kbit/s – 1 Mbit/s
LIN Trigger	
Type	Break, Frame ID, ID+Data, Error
Source	CH1 – CH4 / D0 – D15
ID	1 byte
Data format	Hex
Data Length	1 – 2 byte
Baud Rate (Selectable)	600/1200/2400/4800/9600/19200 bit/s
Baud Rate (Custom)	300 bit/s – 20 kbit/s
CAN FD Trigger	
Type:	Start, Remote, ID, ID+Data, Error
FlexRay Trigger	
Type:	TSS, Frame, Symbol, Errors
I²S Trigger	
Type:	Data, Mute, Clip, Glitch, Rising Edge, Falling Edge
MIL-STD-1553B Trigger	
Type:	Transfer, Word, Timing, Error
SENT Trigger	
Type:	Start, Slow Channel, Fast Channel, Error
Manchester Trigger	
Type:	No Manchester specific triggering, use standard scope triggers (edge, +ve width, -ve width, etc)

Serial Decoder

No. of Decoder	2
Decode Type	Full Duplex
Threshold	-4.1 – +4.1 Div
List	1 – 7 lines
I²C Decoder	
Source	CH1 – CH4, D0 – D15
Signal	SCL, SDA
Address	7 bit, 10 bit
SPI Decoder	
Source	CH1 – CH4, D0 – D15
Signal	CLK, MISO, MOSI, CS
Edge Select	Rising, Falling
Chip Select	Active Low, Active High, Clock Timeout
Bit Order	MSB, LSB
UART Decoder	
Source	CH1 – CH4, D0 – D15
Signal	RX, TX
Data Width	5 bit, 6 bit, 7 bit, 8 bit
Parity Check	None, Odd, Even, Mark, Space
Stop Bit	1 bit, 1.5 bit, 2 bit
Idle Level	Low, High
Bit Order	LSB, MSB
CAN Decoder	
Signal	CAN_H, CAN_L
Source	CH1 – CH4, D0 – D15
LIN Decoder	
LIN Specification Package Revision	Ver1.3, Ver2.0
Baud Rate (Selectable)	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, custom
CAN FD	
Source	CH1 – CH4, D0 – D15
Nominal Baud Rate	10 kbps, 25 kbps, 50 kbps, 100 kbps, 250 kbps, 1 Mbps, custom
Data Baud Rate	500 kbps, 1 Mbps, 2 Mbps, 5 Mbps, 8 Mbps, 10 Mbps, custom
FlexRay	
Source	CH1 – CH4, D0 – D15
Data Baud Rate	2.5 Mbps, 5 Mbps, 10 Mbps, custom
I²S	
Source	CH1 – CH4, D0 – D15
Signal	BCLK, WS, DATA
Audio Variant	Audio-I²S, Audio-LJ, Audio-RJ
Start Bits	0 – 31
Baud Rate	1 – 32
MIL-STD-1553B	
Source	CH1 – CH4
SENT	
Source	CH1 – CH4, D0 – D15
Manchester	
Source	CH1 – CH4
Baud rate	500 bps – 5 Mbps

Measurement

Source	CH1 – CH4, D0 – D15, Math, Ref, History, Zoom
Mode	Simple, Advanced
Range	Screen, Gate
Custom Threshold	Upper, Middle, Lower
Number Of Measurements	Display 12 measurements at the same time (Display mode = M2)
Measurement Parameters	
Vertical	Max, Min, Pk-Pk, Top, Base, Amplitude, Mean, Cycle Mean, Stdev, Cycle Stdev, RMS, Cycle RMS, Median, Cycle Median, FOV, FPRE, ROV, RPRE, Level@Trigger
Horizontal	Period, Frequency, Time@max, Time@min, +Width, -Width, 10–90 % Risetime, 90–10 % Falltime, Risetime, Falltime, +Burst Width, -Burst Width, +Duty Cycle, -Duty Cycle, Delay, Time@Middle, Cycle-Cycle jitter
Miscellaneous	+Area@DC, -Area@DC, Area@DC, Absolute Area@DC, +Area@AC, -Area@AC, Area@AC, Absolute Area@AC, Cycles, Rising Edges, Falling Edges, Edges, Positive pulses, Negative pulses
Delay	Phase, FRFR, FRFF, FFFR, FFFF, FRLR, FRLF, FFLR, FFLF, Skew
Cursors	Source: CH1 – CH4, D0 – D15, Math, Ref, Histogram Manual: Time X1, X2, (X1–X2), (1/ΔT) Vertical Y1, Y2, (Y1–Y2) Track: Time X1, X2, (X1–X2)
Statistics	Current, Mean, Min, Max, Sdev, Count, Histogram, Trend
Counter	Source: CH1 – CH4 Frequency resolution: 7 digits Totalizer: Counter on edges, supports Gate and Trigger

Math

Number of Math Operators	2 (F1, F2)
Source	CH1 – CH4, F1 – F2, Z1 – Z4
Operation	FFT, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, |x|, Sign, e^x, 10^x, ln, lg, Interpolation, Formula Editor
FFT	Length: 2Mpts,1Mpts, 512kpts, 256kpts, 128kpts, 64kpts, 32kpts, 16kpts, 8kpts, 4kpts, 2kpts Window: Rectangular, Blackman, Hanning, Hamming, Flattop Display: FullScreen, Split, Exclusive Mode: Normal, Max hold, Average Tools: Peaks, Markers

Analysis

Search	
Source	CH1– CH4, History
Mode	Edge, Slope, Pulse, Interval, Runt
Copy setting	Copy from trigger, Copy to trigger
Navigate	
Type	Search event, Time, History frame
Mask Test	
Source	CH1 – CH4, Z1 – Z4
Mask creating	Auto (Create mask), Custom (Mask Editor)
Mask test speed	Up to 18,000 frames/s
DVM	
Source	CH1 – CH4
Mode	DC Mean, DC RMS, AC RMS, Peak-peak, Amplitude
Plot	Bar, Histogram, Trend
Bode Plot	
Source	CH1 – CH4
Supported signal sources	T3DSO1000-FGMOD-A T3AFG30, T3AFG40, T3AFG60, T3AFG80, T3AFG120, T3AFG200, T3AFG350, T3AFG500
Sweep type	Simple, Vari-level
Frequency [1)]	Mode: Linear, Logarithmic Range:10 Hz – 120 MHz (T3AFG120)
Measure	Upper cutoff frequency, Lower cutoff frequency, Bandwidth, Gain margin, Phase margin
Power Analysis	
Measure	Power quality, Current Harmonics, Inrush current, Switching loss, Slew rate, Modulation, Output ripple, Turn on/turn off, Transient response, PSRR, Efficiency

[1)] The maximum frequency is the maximum signal source frequency or 120 MHz, whichever is lower.

Arbitrary Waveform Generator (T3DSO1000-FGMOD-A)

Channel	1
Max. Output Frequency	25 MHz
Sampling Rate	125 MSa/s
Frequency Resolution	1 μHz
Frequency Accuracy	± 50 ppm
Vertical Resolution	14 bits
Amplitude Range	-1.5 V – +1.5 V (into 50 Ω) -3 V – +3 V (into High-Z)
Waveforms	Sine, Square, Ramp, Pulse, DC, Noise, 45 Arbitrary
Output Impedance	50 Ω ±2 %
Protection	Over voltage protection, Current limit
Isolation Voltage	± 42 Vpk

Sine

Frequency	1 μHz – 25 MHz
Offset Accuracy (10 kHz)	± (1 % x offset setting value + 3 mVpp)
Amplitude Flatness	± 0.3 dB, compare to 10 kHz, 5 Vpp
SFDR	DC – 1 MHz -60 dBc 1 MHz – 5 MHz -55 dBc 5 MHz – 25 MHz -50 dBc
Harmonic Distorsion	DC – 5 MHz -50 dBc 5 MHz – 25 MHz -45 dBc

Square/Pulse

Frequency	1 μHz – 10 MHz
Duty Cycle	1 % – 99 %
Rise/Fall time	< 24 ns (10 % – 90 %)
Overshoot	< 3 % (typical, 1 kHz, 1 Vpp)
Pulse Width	> 50 ns
Jitter	< 500 ps + 10 ppm

Ramp

Frequency	1 μHz – 300 kHz
Linearity (Typical)	< 0.1 % of Pk-Pk (typical, 1 kHz, 1 Vpp, 50 % symmetry)
Symmetry	0 % – 100 %

DC

Offset range	± 1.5 V (into 50 Ω) ± 3 V (into Hi-Z)
Accuracy	± (|setting value| x 1 % + 3 mV)

Noise

Bandwidth (-3 dB)	> 25 MHz

Arb

Frequency	1 μHz – 5 MHz
Wave Length	16 Kpts
Sampling Rate	125 MSa/s
Waveform Import	EasyWaveX, U-Disk, directly from waveform data of analog channels

Digital Channels (T3DSO2000-LS)

No. of Channels	16
Max. Sampling Rate	1.25 GSa/s
Memory Depth	62.5 Mpts/Ch
Min. Detectable Pulse Width	3.3 ns
Level Group	D0-D7, D8-D15
Level Range	-10V – 10V
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom
Skew	D0 – D15: ±1 sampling interval Digital to Analog: ± (1 sampling interval +1 ns)

I/O

Standard	3 USB Hosts, 1 USB Device, LAN, AUX (Pass/Fail+Trigger Out), 10 MHz In/Out
Pass / Fail	3.3 V TTL Output
Ext Trigger Channel	Ext ≤1.5 Vrms, Ext/5 ≤7.5 Vrms

Display

Display Type	10.1 inch TFT LCD Capacitive Touch Screen
Resolution	1024 x 600
Contrast	500:1
Backlight	500 nit typical
Range	8 x 10 grid

Waveform Display

Type	Dot, Vector
Persistence Time	OFF, 1s, 5s, 10s, 30s, infinite
Color Display	Normal, Color; Supports user defined trace color
Screen Saver	1 min, 5 min, 10 min, 30 min, 1 hour, OFF

Language

Language	Simplified Chinese, Traditional Chinese, English, French, Japanese, German, Spanish, Russian, Italian, Portuguese
Built-in Help System	Simplified Chinese, English

Environmental

Temperature	Operating: 0 °C – 40 °C Non-operating: -20 °C – 60 °C	
Humidity	Operating: 85 % RH, 40 °C, 24 hours Non-operating: 85 % RH, 65 °C, 24 hours	
Altitude	Operating: ≤3,000 m Non-operating: ≤15,000 m	
Electromagnetic Compatibility	Meets EMC directive (2014/30/EU), meets or exceeds IEC 61326-1:2012/EN61326-1:2013 (Basic)	
Conducted disturbance	CISPR 11/EN 55011	CLASS A group 1, 150 kHz – 30 MHz
Radiated disturbance	CISPR 11/EN 55011	CLASS A group 1, 30 MHz – 1 GHz
Electrostatic discharge (ESD)	IEC 61000-4-2/EN 61000-4-2	4.0kV (Contact), 8.0 kV (Air)
Radio-frequency electromagnetic field Immunity	IEC 61000-4-3/EN 61000-4-3	10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 2 GHz); 1 V/m (2.0 GHz to 2.7 GHz)
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	3 V, 0.15 – 80 MHz
Voltage dips and interruptions	IEC 61000-4-11/EN 61000-4-11	Voltage Dips: 0 % UT during half cycle; 0 % UT during 1 cycle; 70 % UT during 25/30 cycles Voltage interruptions: 0 % UT during 250/300 cycles
Safety	UL 61010-1:2012/R: 2018-11; CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11. UL 61010-2-030:2018; CAN/CSA-C22.2 No. 61010-2-030:2018.	

All T3DSO3000 Series Oscilloscopes come with a 3 year Teledyne LeCroy warranty.

Power Supply

Input Voltage & Frequency	100 – 240 Vrms 50/60Hz
Power	100 W Max, 70 W typical, 4 W typical in standby mode

Mechanical

Dimensions	Length x Width x Height = 370 mm x 144 mm x 231 mm
Weight	N.W 4.0 Kg G.W 5.6 Kg

ORDERING INFORMATION

T3DSO3000 Probes

Probe type	Model	Picture	Description
Passive	**PP020-1**		500 MHz bandwidth, 10 MΩ, 10X Probe, 1 supplied per channel. Replacement probe for the T3DSO3204, T3DSO3354, T3DSO3504 and T3DSO31004 Oscilloscope.
Logic Probe	**T3DSO2000-LS**		Optional 16 Channel Logic Probe.

Ordering information

Description	1 GHz, 4 Ch, 5 GSa/s (Max.), 125 Mpts/Ch, 250 Mpts Interleaved	T3DSO31004
	500 MHz, 4 Ch, 5GSa/s (Max.),125 Mpts/Ch, 250 Mpts Interleaved	T3DSO3504
	350 MHz, 4 Ch, 5GSa/s (Max.),125 Mpts/Ch, 250 Mpts Interleaved	T3DSO3354
	200 MHz, 4 Ch, 5GSa/s (Max.),125 Mpts/Ch, 250 Mpts Interleaved	T3DSO3204
Standard Accessories	Passive Probe x4	
	USB Cable	
	Power Cord	
	Quick Start Guide	
	Certificate of Calibration	
Optional Accessories	16 Channel MSO Probe	T3DSO2000-LS
	25 MHz Function/Arbitrary Waveform Module	T3DSO1000-FGMOD-A
	500 MHz Passive Probe, 10:1, 10 MΩ	PP020-1

ABOUT TELEDYNE TEST TOOLS

TELEDYNE TEST TOOLS
Everywhereyoulook™

Company Profile

Teledyne LeCroy is a leading provider of oscilloscopes, protocol analyzers and related test and measurement solutions that enable companies across a wide range of industries to design and test electronic devices of all types. Since our founding in 1964, we have focused on creating products that improve productivity by helping engineers resolve design issues faster and more effectively. Oscilloscopes are tools used by designers and engineers to measure and analyze complex electronic signals in order to develop high-performance systems and to validate electronic designs in order to improve time to market.

The Teledyne Test Tools brand extends the Teledyne LeCroy product portfolio with a comprehensive range of test equipment solutions. This new range of products delivers a broad range of quality test solutions that enable engineers to rapidly validate product and design and reduce time-to-market. Designers, engineers and educators rely on Teledyne Test Tools solutions to meet their most challenging needs for testing, education and electronics validation.

Location and Facilities

Headquartered in Chestnut Ridge, New York, Teledyne Test Tools and Teledyne LeCroy has sales, service and development subsidiaries in the US and throughout Europe and Asia. Teledyne Test Tools and Teledyne LeCroy products are employed across a wide variety of industries, including semiconductor, computer, consumer electronics, education, military/aerospace, automotive/industrial, and telecommunications.

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