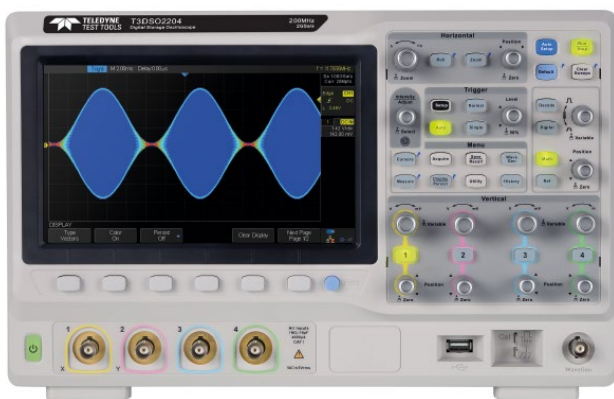


T3DSO2000 Data Sheet

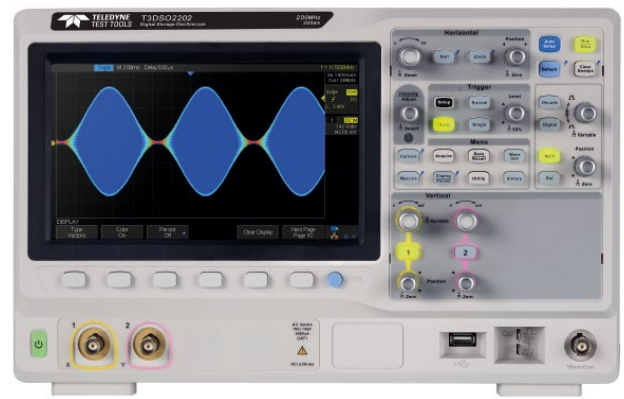
Oscilloscopes

Debug with Confidence

100 MHz – 300 MHz



Front panel of the four channel series



Front panel of the two channel series

Tools for Improved Debugging

- **Long Capture** – 70 Mpts/Ch and 140 Mpts interleaved.
 ✔ Capture more time and show more waveform detail.
- **Math and Measure** – 7 basic math functions plus FFT and 37 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.
- **Optional Serial Bus Trigger and Decode** – I²C, SPI, UART, RS232, CAN, LIN.
 ✔ Debug serial buses directly in your Oscilloscope.
- **Waveform Sequence Recorder** – record and play back up to 80,000 waveforms.
 ✔ Replay the changing waveform history.
- **Optional MSO** – 16 Digital Channels
 ✔ Add mixed signal debugging to your Oscilloscope.

Key Specifications

| | |
|---------------------|-----------------------------------|
| Bandwidth | 100 MHz, 200 MHz, 300 MHz |
| Channels | 2 or 4 |
| Memory | 70 Mpts/Ch (140 Mpts interleaved) |
| Sample Rate | up to 2 GS/s (Interleaved) |
| Display | 8" Bright TFT LCD (800 x 480) |
| Connectivity | USB Host, USB Device, LAN |

PRODUCT OVERVIEW

T3DSO2102: 2 Channel 100 MHz

T3DSO2104: 4 Channel 100 MHz

T3DSO2202: 2 Channel 200 MHz

T3DSO2204: 4 Channel 200 MHz

T3DSO2302: 2 Channel 300 MHz

T3DSO2304: 4 Channel 300 MHz

Teledyne Test Tools new T3DSO2000 Oscilloscopes feature two channel and four channel models with analog bandwidth options from 100 MHz to 300 MHz. Each model offers a maximum sample rate of 2 GSa/s, and a maximum memory depth of 140 Mpts in half channel mode. The four channel models incorporates two 2 GSa/s ADCs and two 140 Mpts memory modules. When all channels are enabled, each channel has sample rate of 1 GSa/s and a standard record length of 70 Mpts. When only a single channel per ADC is active, the maximum sample rate is 2 GSa/s and the maximum record length is 140 Mpts. For ease-of-use, the most commonly used functions can be accessed with its user-friendly front panel design.

The T3DSO2000 series employs a new generation of high speed display technology that provides excellent signal clarity, fidelity and performance. The system noise floor is also lower than similar products in the industry. It comes with a minimum vertical input range of 1 mV/div, an innovative digital trigger system with high sensitivity and low jitter, and a waveform capture rate of 500,000 waveforms/sec (sequence mode). The T3DSO2000 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. There is a low cost option for serial bus decoding of IIC, SPI, UART, CAN, LIN

bus types. The models also include History waveform recording, and sequential triggering that enable extended waveform recording and analysis. Other options available include the 25 MHz function / arbitrary waveform generator and the 16 channel MSO option. Both are field up gradable options. The new digital design 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 T3DSO2000 offers outstanding value for money.

Key Features

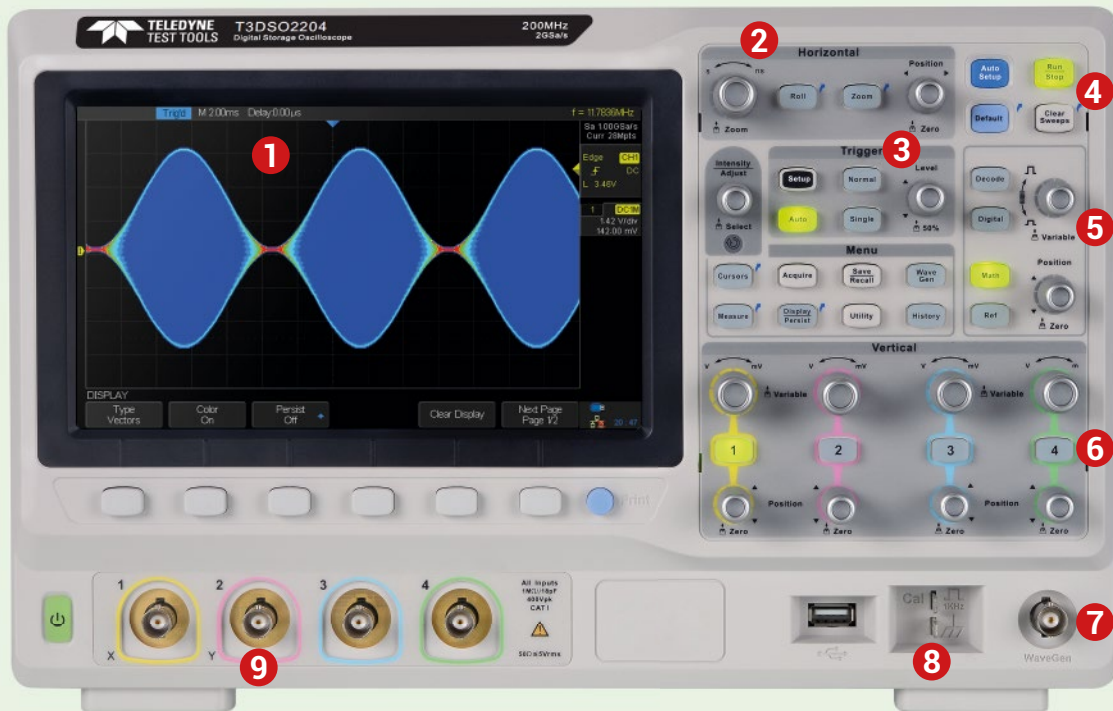
- 100 MHz, 200 MHz and 300 MHz bandwidth models
- Real-time sampling rate up to 2 Gsa/s
- New generation of high speed display technology
 - › Waveform capture rate up to 140,000 wfm/s (normal mode), and 500,000 wfm/s (sequence mode)
 - › Supports 256-level intensity grading and color display modes Record length up to 140 Mpts
 - › Digital trigger system
- Intelligent trigger: Edge, Slope, Pulse Width, Window, Runt, Interval,
- Time out (Dropout), Pattern and Video
- Serial bus triggering and decoding (Option T3DSO2000-TD), supports protocols IIC, SPI, UART, RS232, CAN, LIN
- Video trigger, supports HDTV
- Low background noise with voltage scales from 1 mV/div to 10 V/div
- 10 types of one-button shortcuts, supports Auto Setup, Default, Cursors, Measure, Roll, History, Display/Persist, Clear Sweep, Zoom and Print
- Segmented acquisition (Sequence) mode, divides the maximum record length into multiple segments (up to 80,000), according to trigger conditions set by the user, with a very small dead time segment to capture the qualifying event.

Models and key Specification

| Model | T3DSO2102 T3DSO2104 | T3DSO2202 T3DSO2204 | T3DSO2302 T3DSO2304 |
|--|--|------------------------|------------------------|
| Bandwidth | 100 MHz | 200 MHz | 300 MHz |
| SamplingRate (Max.) | Two channel series have a single 2 GSa/s ADC, four channel series have two 2 GSa/s ADCs. When all channels are enabled, each channel has a maximum sample rate of 1 GSa/s. When a single channel per pair is active, that channel has sample rate of 2 GSa/s | | |
| Channels | 4 + EXT (four channel series) 2 + EXT (two channel series) | | |
| Memory Depth (Max.) | 70 Mpts/Ch (not interleave mode); 140 Mpts/Ch (interleave mode) | | |
| Waveform Capture Rate (Max.) | 140,000 wfm/s (normal mode), 500,000 wfm/s (sequence mode) | | |
| Trigger Type | Edge, Slope, Pulse Width, Window, Runt, Interval, Dropout, Pattern, Video | | |
| Serial Trigger and decoder (Optional) | IIC, SPI, UART/RS232, CAN, LIN | | |
| 16 Digital Channels (MSO option) | Maximum waveform capture rate up to 500 MSa/s, Record length up to 140 Mpts/Ch | | |
| Waveform Generator (optional) | One channel, 25 MHz, sample rate of 125 MHz, wave length of 16 kpts | | |
| I/O | USB Host, USB Device, LAN, Pass/Fail, Trigger Out | | |
| Probe (Std) | 1 for each Channel | | |
| Display | 8 inch TFT-LCD (800 x 480) | | |

- History waveform record (History) function, maximum recorded waveform length is 80,000 frames.
- Automatic measurement function for 37 parameters as well as Measurement Statistics, Zoom, Gating, Math, History and Reference functions
- 8 Math functions (FFT, addition, subtraction, multiplication, division, integration, differential, square root)
- High Speed hardware based Pass/Fail function
- MSO, 16 digital channels. Record Length up to 140 Mpts/Ch
- 25 MHz function/arbitrary waveform generator, built-in 10 waveform types
- Large 8 inch TFT-LCD display with 800 x 480 resolution
- Multiple interface types: USB Host, USB Device (USB-TMC), LAN, Trigger Out
- Supports SCPI remote control commands
- Supports Multi-language display and embedded online help

FUNCTION & CHARACTERISTICS

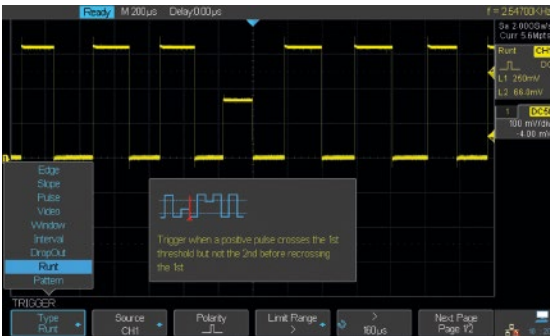


- 1 High Resolution 8-inch TFT-LCD display for clear images.
- 2 Horizontal controls of Timebase, Zoom, Roll and trigger position.
- 3 Advanced Triggering controls including Edge, Pulse, Interval, Window, Slope, DropOut, Runt and Pattern trigger types.
- 4 Easy to use Auto Setup, Run / Stop and Default Controls.
- 5 Multi-functional controls for Serial Decode, Math and Digital inputs.
- 6 Individual color coded channels and display for ease of use.
- 7 Optional 25 MHz built in arbitrary waveform generator.
- 8 Probe compensation calibrator.
- 9 Color coded input channels.

8 inch TFT-LCD display and 10 one-button menus

- 8-inch TFT-LCD display with 800 x 480 resolution
- Most commonly used functions are accessible using 10 different one-button operation keys: Auto Setup, Default, Cursor, Measure, Roll, History, Persist, Clear
- Sweep, Zoom, Print

A Wide Range Of Trigger Functions

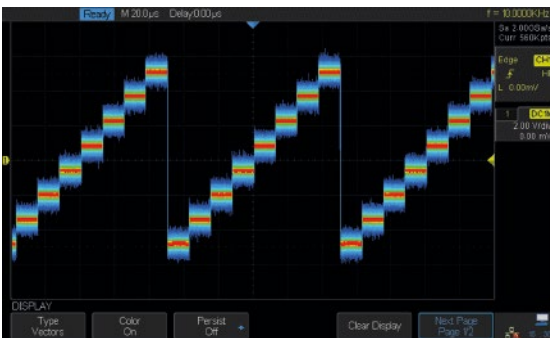


A wide range of powerful triggering functions including Edge, Slope, Pulse, Video, Window, Runt, Interval, Dropout, Pattern, etc, allows users to debug complex hardware issues with ease.

256-level Intensity Grading and Color Temperature Display



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



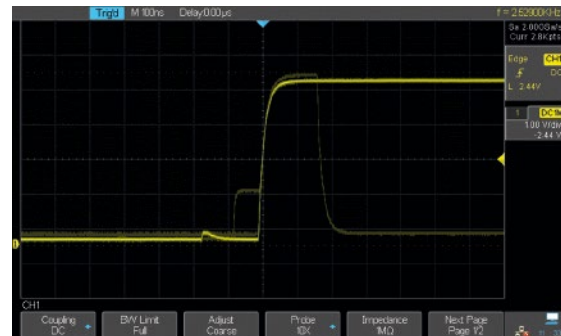
The Color temperature display clearly shows noise and jitter with infrequently occurring waveforms shown in blue through to the most frequently occurring waveforms shown in red.

Record Length of up to 140 Mpts



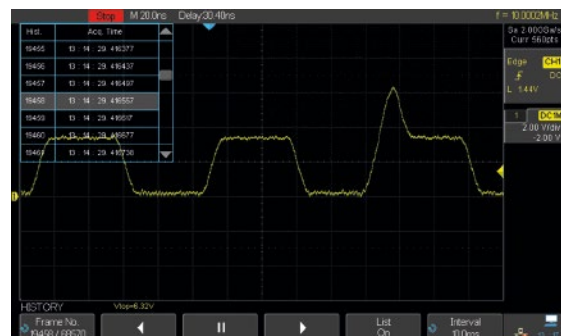
The record length of up to 140 Mpts allows use of a higher sampling rate to capture more signal detail. The hardware-based Zoom then allows quick zoom in to any area of interest.

Waveform Capture Rate up to 500,000 wfm/s



With a waveform capture rate of up to 500,000 wfm/s (sequence mode) and 140,000 wfm/s (standard mode) the T3DSO2000 can easily capture glitches, infrequent anomalies and other low-probability events.

History Mode



The always enabled History mode records up to 80,000 waveforms allowing users to scroll back through previous acquisitions to observe past events and locate anomalies quickly.

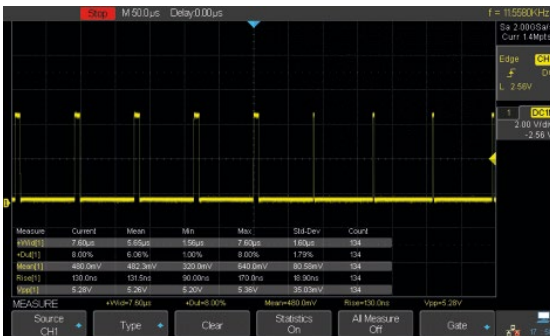
FUNCTION & CHARACTERISTICS

Sequence Mode



Segmented memory mode can store up to 80,000 waveforms into memory segments for capturing fast pulses in quick succession. Combine Sequence Mode with advanced triggers to isolate rare events. All the segments can be play back using the History function.

Comprehensive Statistical Functions



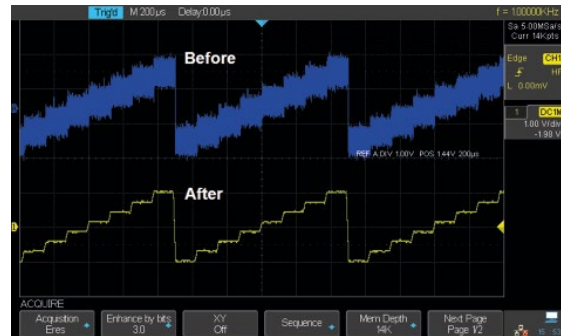
Parametric statistical data for 5 parameters can be displayed simultaneously. The statistical measurements include: Current Value, Mean Value, Minimum Value, Maximum Value, Standard Deviation, and the measurement count.

Advanced Math Function



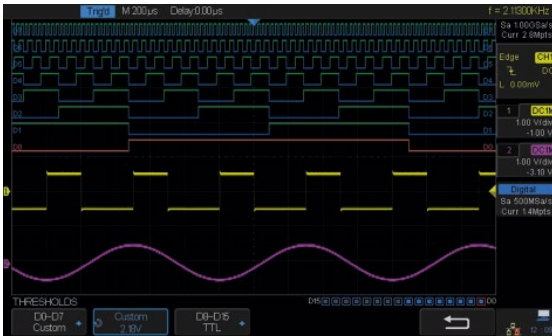
The standard Math operations include Plus, Minus, Multiply, Divide, FFT, integration, differential, and square root for quick insight into waveform characteristics.

Eres Mode



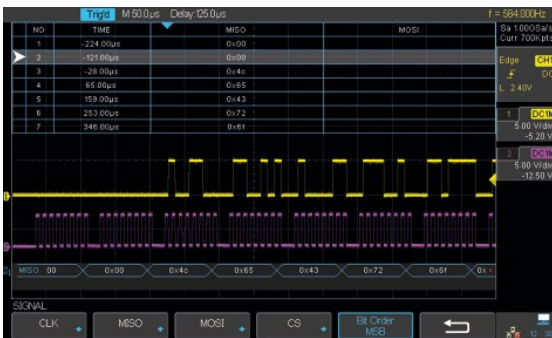
Enhanced Resolution (Eres) mode reveals hidden waveform detail by using a linear average filter to reduce waveform noise, even on single acquisition waveforms.

16 Digital Channels/MSO (Optional)



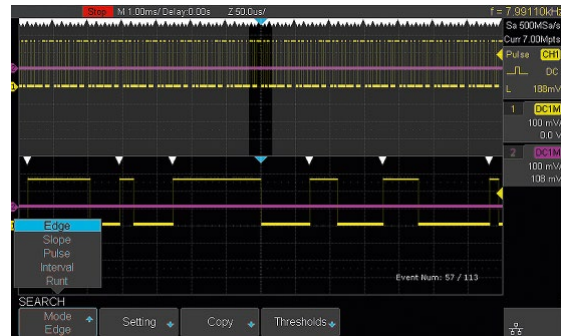
The MSO option adds 16 digital channels to the T3DSO2000 analog channels enabling users to trigger and acquire digital as well as analog waveforms in a mixed signal debug environment.

Serial Bus Decoding Function (Optional)



Trigger and decode up to 2 common embedded and automotive serial buses (I²C, SPI, UART/RS232, LIN and CAN) simultaneously with the T3DSO2000-TD option. Bus protocol information can be quickly and intuitively displayed time aligned with the waveform and in table format.

Complete Connectivity



Connectivity includes External Trigger Input, Pass/Fail and Trigger Out, USB Device (USBTMC) and LAN(VXI-11) for remote control, and a Kensington Lock security point.

Built-in 25 MHz Function/Arbitrary Waveform Generator (Optional)



The optional built-in 25 MHz function generator (T3DSO2000-FG) comprises 10 built-in waveforms. 4 of your own arbitrary waveforms can be created and downloaded via PC waveform editing software.

SPECIFICATIONS

All specifications are not guaranteed unless 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 (18~28)

Acquire System

| | |
|---------------|---|
| Sampling Rate | 2 GSa/s (single-channel ¹⁾), 1 GSa/s (dual-channel) |
| Memory Depth | 140 Mpts (single-channel), 70 Mpts (dual-channel) |
| Peak Detect | 1 ns |
| Average | Averages: 4, 16, 32, 64, 128, 256, 512, 1024 |
| Eres | Enhance bits: 0.5, 1, 1.5, 2., 2.5, 3 selectable |
| Interpolation | Sinx/x, Linear |

Input

| | |
|--------------------|--|
| Channels | 2/4 + EXT |
| Coupling | DC, AC, GND |
| Impedance | DC: (1 MΩ ± 2 %) (22 pF ± 3 pF) 50 Ω: 50 Ω ± 2 % |
| Max. Input voltage | 1 MΩ ≤ 400 Vpk (DC + Peak AC ≤ 10 kHz) 50 Ω ≤ 5 Vrms |
| CH to CH Isolation | DC ~ Max BW > 35 dB |
| Probe Attenuation | 0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X, 20X, 50X, 100X, 200X, 500X, 1000X, 2000X, 5000X, 10000X |

Horizontal System

| | |
|-----------------------|--|
| Time Scale | 1.0 ns/div ~ 50 s/div |
| Channel Skew | < 100 ps |
| Waveform Capture Rate | Up to 140,000 wfm/s (normal mode), 500,000 wfm/s (sequence mode) |
| Intensity grading | 256-level |
| Display Format | Y-T, X-Y, Roll |
| Time base Accuracy | ± 25 ppm |
| Roll Mode | 50 ms/div ~ 50 s/div (1-2-5 Step) |

Vertical System

| | |
|--|---|
| Bandwidth (-3dB) | 300 MHz (T3DSO2304 / T3DSO2302) 200 MHz (T3DSO2204 / T3DSO2202) 100 MHz (T3DSO2104 / T3DSO2102) |
| Vertical Resolution | 8 bit |
| Vertical Range | 8 divisions |
| Vertical Scale (Probe 1X) | 1 mV/div – 10 V/div (1-2-5 step) |
| Offset Range (Probe 1X) | 1 mV/div ~ 100 mV/div: ±1 V 102 mV/div ~ 1 V/div: ±10 V 1.02 V/div ~ 10 V/div: ±100 V |
| Bandwidth Limit | 20 MHz ± 40 % |
| Bandwidth Flatness | DC ~ 10 % (BW): ± 1 dB 10 % ~ 50 % (BW): ± 2 dB 50 % ~ 100 % (BW): + 2 dB/-3 dB |
| Low Frequency Response (AC Coupling -3 dB) | ≤ 10 Hz (at input BNC) |
| Noise | stdev ≤ 0.2 div (< 2 mV/div) stdev ≤ 0.5 div (≥ 2 mV/div) |
| DC Gain Accuracy | 5 mV/div ~ 10 V/div: ≤ 3.0 % ≤ 2 mV/div: ≤ 4.0 % |
| Offset Accuracy | ≥ 2 mV/div: ± (1 % * offset + 1.5 % * 8 * div + 2 mV) < 2 mV/div: ± (1 % * offset + 1.5 % * 8 * div + 1 mV) |
| Rise Time ¹⁾ | (Typ.) < 1.2 ns (T3DSO2304 / T3DSO2302) (Typ.) < 1.7 ns (T3DSO2204 / T3DSO2202) (Typ.) < 3.5 ns (T3DSO2104 / T3DSO2102) |
| Overshoot (500 ps Rise Edge) | < 10 % |

Trigger System

| | |
|---|---|
| Mode | Auto, Normal, Single |
| Level | Internal: ± 4.5 div from the center of the screen EXT: ± 0.6 V EXT/5: ± 3 V |
| Holdoff Range | 100 ns ~ 1.5 s |
| Coupling | AC, DC, LFRJ, HFRJ, Noise RJ (CH1 ~ CH4) |
| Coupling Frequency Response (CH1 ~ CH4) ²⁾ | DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 8 Hz LFRJ: Attenuates the frequency components below 900 kHz HFRJ: Attenuates the frequency components above 500 kHz |
| Coupling Frequency Response (EXT) ²⁾ | DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 8 Hz LFRJ: Attenuates the frequency components below 400 kHz HFRJ: Attenuates the frequency components above 1 MHz |
| Accuracy ²⁾ | CH1 ~ CH4: ± 0.2 div EXT: ± 0.3 div |
| Sensitivity | CH1 ~ CH4: 0.6 div EXT: 200 mVpp (DC ~ 10 MHz) 300 mVpp (10 MHz ~ BW) EXT/5: 1 Vpp (DC ~ 10 MHz) 1.5 Vpp (10 MHz ~ BW) |
| Jitter | < 100 ps (CH1 ~ CH4) |
| Displacement | Pre-Trigger: 0 ~ 100 % memory Delay-Trigger: 0 ~ 2,000 div |

Edge Trigger

| | |
|--------|-----------------------------------|
| Slope | Rising, Falling, Rising & Falling |
| Source | CH1 ~ CH4/EXT/(EXT/5)/AC Line |

Slope Trigger

| | |
|-------------|-----------------|
| Slope | Rising, Falling |
| Limit Range | <, >, < >, > < |
| Source | CH1 ~ CH4 |
| Time Range | 2 ns ~ 4.2 s |
| Resolution | 1 ns |

Pulse Width Trigger

| | |
|-------------------|----------------|
| Polarity | +wid, -wid |
| Limit Range | <, >, < >, > < |
| Source | CH1 ~ CH4 |
| Pulse Width Range | 2 ns ~ 4.2 s |
| Resolution | 1 ns |

Video Trigger

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

Window Trigger

| | |
|-------------|--------------------|
| Window Type | Absolute, Relative |
| Source | CH1 ~ CH4 |

¹⁾ Single-channel: one channel in CH1/CH2 (or CH3/CH4) is ON and another is OFF
Dual-channel: both channels in CH1/CH2 (or CH3/CH4) are ON

²⁾ Typical Value refers to the tested value under specific conditions. It might vary with the ambient temperature or other conditions

SPECIFICATIONS

Interval Trigger

| | |
|-------------|-----------------|
| Slope | Rising, Falling |
| Limit Range | <, >, <>, >< |
| Source | CH1 ~ CH4 |
| Time Range | 2 ns ~ 4.2 s |
| Resolution | 1 ns |

Dropout Trigger

| | |
|--------------|-----------------|
| Timeout Type | Edge, State |
| Source | CH1 ~ CH4 |
| Slope | Rising, Falling |
| Time Range | 2 ns ~ 4.2 s |
| Resolution | 1 ns |

Runt Trigger

| | |
|-------------|--------------|
| Polarity | +wid, -wid |
| Limit Range | <, >, <>, >< |
| Source | CH1 ~ CH4 |
| Time Range | 2 ns ~ 4.2 s |
| Resolution | 1 ns |

Pattern Trigger

| | |
|-----------------|--------------------|
| Pattern Setting | Invalid, Low, High |
| Logic | AND, OR, NAND, NOR |
| Source | CH1 ~ CH4 |
| Limit Range | <, >, <>, >< |
| Time Range | 2 ns ~ 4.2 s |
| Resolution | 1 ns |

Serial Trigger

IIC Trigger

| | |
|------------------|--|
| Condition | Start, Stop, Restart, No Ack, EEPROM, Address&Data, Data Length |
| Source (SDA/SCL) | CH1 ~ CH4 |
| 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, Do not care |

SPI Trigger

| | |
|---------------------|------------|
| Condition | Data |
| Source (CS/CL/Data) | CH1 ~ CH4 |
| Data format | Binary |
| Data Length | 4 ~ 96 bit |
| Bit Value | 0, 1, X |
| Bit Order | LSB, MSB |

| UART / RS232 Trigger | |
|-----------------------------|--|
| Condition | Start, Stop, Data, Parity Error |
| Source (RX/TX) | CH1 ~ CH4 |
| 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 ~ 334000 bit/s |

| CAN Trigger | |
|------------------------|--|
| Type | All, Remote, ID, ID + Data, Error |
| Source | CH1 ~ CH4 |
| 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 |
| 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 |

Serial Decoder (Optional)

| | |
|----------------|---|
| No. of Decoder | 2 |
|----------------|---|

| IIC Decoder | |
|--------------------|----------------|
| Signal | SCL, SDA |
| Address | 7 bit, 10 bit |
| Threshold | -4.5 ~ 4.5 div |
| List | 1 ~ 7 lines |

| SPI Decoder | |
|--------------------|---------------------|
| Signal | CLK, MISO, MOSI, CS |
| Edge Select | Rising, Falling |
| Idle Level | Low, High |
| Bit Order | MSB, LSB |
| Threshold | -4.5 ~ 4.5 div |
| List | 1 ~ 7 lines |

| UART / RS232 Decoder | |
|-----------------------------|----------------------------|
| Signal | RX, TX |
| 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 | Low, High |
| Threshold | -4.5 ~ 4.5 div |
| List | 1 ~ 7 lines |

| CAN Decoder | |
|--------------------|---------------------------|
| Signal | CAN_H, CAN_L |
| Source | CAN_H, CAN_L, CAN_H-CAN_L |
| Threshold | -4.5 ~ 4.5 div |
| List | 1 ~ 7 lines |

| LIN Decoder | |
|------------------------------------|----------------|
| LIN Specification Package Revision | Ver1.3, Ver2.0 |
| Threshold | -4.5 ~ 4.5 div |
| List | 1 ~ 7 lines |

SPECIFICATIONS

Measurement

| | | | |
|--|--|--|---|
| Source | CH1 ~ CH4, Math, Ref, History | | |
| No. of Measurements | Display 5 measurements at the same time | | |
| Range | Screen, Gating | | |
| Measurement Parameters (37 Types) | | | |
| Vertical (Voltage) | Vmax | Highest value in input waveform | |
| | Vmin | Lowest value in input waveform | |
| | Vpp | Difference between maximum and minimum data values | |
| | Vamp | Difference between top and base in a bimodal signal, or between max and min in an unimodal signal | |
| | Vtop | Value of most probable higher state in a bimodal waveform | |
| | Vbase | Value of most probable lower state in a bimodal waveform | |
| | Mean | Average of all data values | |
| | Vmean | Average of data values in the first cycle | |
| | stdev | Standard deviation of all data values | |
| | Vstd | Standard deviation of all data values in the first cycle | |
| | Vrms | Root mean square of all data values | |
| | Crms | Root mean square of all data values in the first cycle | |
| | FOV | Overshoot after a falling edge; (base-min)/Amplitude | |
| | FPRE | Overshoot before a falling edge; (max-top)/Amplitude | |
| | ROV | Overshoot after a rising edge; (max-top)/Amplitude | |
| | RPRE | Overshoot before a rising edge; (base-min)/Amplitude | |
| | Level@X | The voltage value of the trigger point | |
| Horizontal (Time) | Period | Period for every cycle in waveform at the 50 % level, and positive slope | |
| | Freq | Frequency for every cycle in waveform at the 50 % level, and positive slope | |
| | +Wid | Width measured at 50 % level and positive slope | |
| | -Wid | Width measured at 50 % level and negative slope | |
| | Rise | Time Duration of rising edge from 10 – 90 % | |
| | Fall | Time Duration of falling edge from 90 – 10 % | |
| | Bwid | Time from the first rising edge to the last falling edge, or the first falling edge to the last rising edge at the 50 % crossing | |
| | +Dut | Ratio of positive width to period | |
| | -Dut | Ratio of negative width to period | |
| | Delay | Time from the trigger to the first transition at the 50 % crossing | |
| | Time@Level | Time from trigger of each transition at a specific level and slope | |
| | Delay | Phase | Calculate the phase difference between two edges |
| | | FRR | Time between the first rising edges of the two channels |
| FRF | | Time from the first rising edge of channel A, to the first falling edge of channel B | |
| FFR | | Time from the first falling edge of channel A, to the first rising edge of channel B | |
| FFF | | Time from the first falling edge of channel A, to the first falling edge of channel B | |
| LRR | | Time from the first rising edge of channel A, to the last rising edge of channel B | |
| LRF | | Time from the first rising edge of channel A, to the last falling edge of channel B | |
| LFR | | Time from the first falling edge of channel A, to the last rising edge of channel B | |
| LFF | | Time from the first falling edge of channel A, to the last falling edge of channel B | |
| Cursors | Manual: Time X1, X2, (X1-X2), (1/ΔT) Voltage Y1, Y2, (Y1-Y2) Track: Time X1, X2, (X1-X2) | | |
| Statistics | Current, Mean, Min, | | |
| Counter | ± 1 Hz counter error | | |

Math

| | |
|-------------|--|
| Operation | +, -, *, /, FFT, d/dt, f/dt, square root |
| FFT window | Rectangular, Blackman, Hanning, Hamming |
| FFT display | Full Screen, Split |

Built-in Function/Arbitrary Waveform Generator (Optional)

| | |
|-----------------------|--|
| Channel | 1 |
| Max. Output Frequency | 25 MHz |
| Sampling Rate | 125 MSa/s |
| Frequency Resolution | 1 μ Hz |
| Frequency Accuracy | ± 50 ppm |
| Vertical Resolution | 14 bits |
| Amplitude Range | 2 mVpp ~ 3 Vpp (into 50 Ω) 4 mVpp ~ 6 Vpp (into HiZ) |
| Waveforms | Sine, Square, Ramp, Pulse, DC, Noise, Cardiac, Gaus Pulse, Exp Rise, Exp Fall, Arb |
| Output Impedance | 50 $\Omega \pm 2\%$ |
| Protection | Short-Circuit Protection |

Sine

| | |
|---|---|
| Frequency | 1 μ Hz ~ 25 MHz |
| Offset Accuracy (100 kHz) | $\pm (0.3 \text{ dB} * \text{offset setting value} + 1 \text{ mVpp})$ |
| Amplitude Flatness (Compare to 100 kHz, 5 Vpp) | $\pm 0.3 \text{ dB}$ |
| SFDR | DC ~ 1 MHz -60 dBc 1 MHz ~ 5 MHz -55 dBc 5 MHz ~ 25 MHz -50 dBc |
| HD | DC ~ 5 MHz -50 dBc 5 MHz ~ 25 MHz -45 dBc |

Square/Pulse

| | |
|----------------|------------------------------|
| Frequency | 1 μ Hz ~ 10 MHz |
| Duty Cycle | 20% ~ 80% |
| 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 μ Hz ~ 300 kHz |
| Linearity (Typical) | < 0.1% of Pk-Pk (Typical, 1 kHz, 1 Vpp, 100% Symmetry) |
| Symmetry | 0% ~ 100% |

DC

| | |
|--------------|---|
| Offset range | $\pm 1.5 \text{ V}$ (into 50 Ω) $\pm 3 \text{ V}$ (into HiZ) |
| Accuracy | $\pm (\text{offset} * 1\% + 3 \text{ mV})$ |

Noise

| | |
|-----------|------------------|
| Bandwidth | > 25 MHz (-3 dB) |
|-----------|------------------|

Arb

| | |
|-----------------|--------------------|
| Frequency | 1 μ Hz ~ 5 MHz |
| Wave Length | 16 Kpts |
| Sampling Rate | 125 MSa/s |
| Waveform Import | EasyWave, U-Disk |

SPECIFICATIONS

Digital Channels

| | |
|-----------------------------|---|
| No. of Channels | 16 |
| Max. Sampling Rate | 500 MSa/s |
| Memory Depth | 14 Mpts/Ch |
| Min. Detectable Pulse Width | 4 ns |
| Level Group | D0 ~ D7, D8 ~ D15 |
| Level Range | -3 V ~ 3 V |
| Logic Type | TTL, CMOS, LVCMOS3.3, LVCMOS2.5, custom |
| Skew ²⁾ | D0 ~ D15: ± 1 sampling interval Digital to Analog: ± (1 sampling interval +1 ns) |

I/O

| | |
|-----------|---|
| Standard | USB Host, USB Device, LAN, Pass/Fail, Trigger Out |
| Pass/Fail | 3.3 V TTL Output |

Display

| | |
|--------------|------------------|
| Display Type | 8-inch TFT LCD |
| Resolution | 800 × 480 |
| Color | 24 bit |
| Contrast | 500:1 |
| Backlight | 300 nit |
| Range | 8 x 14 divisions |

Waveform Display

| | |
|------------------|---|
| Type | Dot, Vector |
| Persistence Time | OFF, 1 s, 5 s, 10 s, 30 s, infinite |
| Color Display | Normal, Color |
| Screen Saver | 1 min, 5 min, 10 min, 30 min, 1 hour, OFF |

Language

| | |
|----------|--|
| Language | Simplified Chinese, Traditional Chinese, English, French, Japanese, Korean, German, Russian, Italian, Portuguese |
|----------|--|

Environments

| | |
|-------------------------------|---|
| Temperature | Operating: 10 ~ 40 Non-operating: -20 ~ 60 |
| Humidity | Operating: 85 % RH, 40 Deg C, 24 hours Non-operating: 85 % RH, 65 Deg C, 24 hours |
| Altitude | Operating: ≤ 3000 m Non-operating: ≤ 15,266 m |
| Electromagnetic Compatibility | 2004/108/EC Execution Standard EN 61326-1:2006 EN 61000-3-2:2006 + A2:2009, EN 61000-3-3:2008 |
| Safety | 2006/95/EC Execution Standard EN 61010-1:2010 / EN 61010-2-030:2010 |

Power Supply

| | |
|---------------------------|--|
| Input Voltage & Frequency | 100 ~ 240 Vrms 50/60 Hz 100 ~ 120 Vrms 400 Hz |
| Power | 25 W Max |

Mechanical

| | |
|------------|--|
| Dimensions | Length * Width * Height = 352 mm * 128 mm * 224 mm |
| Weight | N.W 3.4 Kg (2-ch); 3.6 Kg (4-ch) G.W 4.9 Kg (2-ch); 5.2 Kg (4-ch) |

²⁾ Typical Value refers to the tested value under specific conditions. It might vary with the ambient temperature or other conditions

T3DSO2000 Probes

| Probe type | Model | Picture | Description |
|---------------------------|-----------------------------|---|--|
| Passive | T3PP300 |  | 300 MHz bandwidth, 1 Mohm 10X Probe 1 supplied per channel. |
| Logic Probe | T3DSO2000-LS |  | 16 Channel Logic Probe. This probe REQUIRES that the Oscilloscope has option T3DSO2000-MSO |
| MSO Software | T3DSO2000-MSO ¹⁾ |  | Software License for the MSO capability. Enables one T3DSO2000-LS 16 channel logic probe lead set to be shared amongst several licensed T3DSO2000 oscilloscopes. This software option does not come with a logic probe lead set. |
| Current | T3CP50 |  | Bandwidth: 50 MHz, Max. continuous current: 30 Arms, Peak current: 50A Switch Ratio: 100 mV/A, 1 V/A, Accuracy: 1 V/A ($\pm 1\% \pm 1\text{ mA}$), 100 mV/A ($\pm 1\% \pm 10\text{ mA}$), DC 12 V / 1.2 A power adapter |
| High Voltage Differential | T3DP7000 |  | Bandwidth: 100 MHz Differential Range: 7000 V (DC + Peak AC), 100X/1000X Accuracy: $\pm 2\%$ DC 5 V/1 A USB adapter |
| High Voltage | T3VP100 |  | Bandwidth: 40 MHz Differential Range: DC 10 KV, AC (rms): 7 KV (sine), AC (Vpp): 20KV (Pulse) 1000X Accuracy: $\leq 3\%$ |

¹⁾ This probe REQUIRES that the scope has option T3DSO2000-MSO.

Ordering information

| | | |
|--|---|---|
| Description | 300 MHz, 4 Ch, 2 GSa/s (Max.), 140 Mpts | T3DSO2304 |
| | 300 MHz, 2 Ch, 2 GSa/s (Max.), 140 Mpts | T3DSO2302 |
| | 200 MHz, 4 Ch, 2 GSa/s (Max.), 140 Mpts | T3DSO2204 |
| | 200 MHz, 2 Ch, 2 GSa/s (Max.), 140 Mpts | T3DSO2202 |
| | 100 MHz, 4 Ch, 2 GSa/s (Max.), 140 Mpts | T3DSO2104 |
| | 100 MHz, 2 Ch, 2 GSa/s (Max.), 140 Mpts | T3DSO2102 |
| | Standard Accessories | USB Cable -1 |
| Passive Probe -2 (2-ch model); -4 (4-ch model) | | |
| Power Cord -1 | | |
| Quick Start -1 | | |
| Certificate of Calibration -1 | | |
| Optional Accessories | T3DSO2000-TD | IIC, SPI, UART/RS232, CAN, LIN Decoder |
| | T3DSO2000-FG | 25 MHz Function/Arbitrary Waveform Generator |
| | T3DSO2000-MSO | 16 Digital Channels Software, requires T3DSO2000-LS |
| | T3DSO2000-LS | 16 Channel Logic Probe, requires T3DSO2000-MSO |
| | T3VP100 | High Voltage Probe |
| | T3CP50 | Current Probe |
| | T3DP7000 | High Voltage Differential Probe |

ABOUT TELEDYNE TEST TOOLS



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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