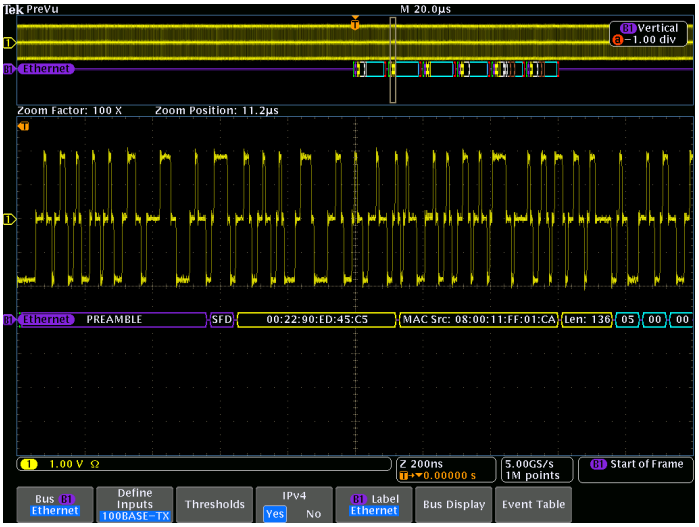
Ethernet 10/100/1000BASE-T Application Software

TDSET3 • SR-ENET • DPO4ENET Datasheet



Key features

- **TDSET3 Ethernet compliance testing**
  - Automated compliance testing for 10, 100, and 1000BASE-T PHY verification
  - Designed for use with MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series oscilloscopes
- **SR-ENET Ethernet triggering and analysis**
  - Automated trigger (MSO/DPO5000 Series only), decode, and search for 10BASE-T and 100BASE-TX Ethernet
  - Designed for use with MSO/DPO5000, DPO7000C, and DPO/DSA/MSO70000C/D/DX Series oscilloscopes
- **DPO4ENET Ethernet triggering and analysis**
  - Automated trigger, decode, and search for 10BASE-T and 100BASE-TX Ethernet
  - Designed for use with the MDO4000 Series oscilloscopes

Applications

- 10BASE-T Ethernet
- 10BASE-Te Ethernet
- 100BASE-TX Ethernet
- 1000BASE-T Ethernet

Tektronix offers comprehensive, integrated tool sets for validating the physical layer of IEEE 802.3 Ethernet devices, and for developing and debugging Ethernet-based systems.

The Tektronix TDSET3 Ethernet Compliance Test application (Opt. ET3) and selected Tektronix oscilloscopes provide one-button testing for 10/100/1000BASE-T test suites as specified by the IEEE standard for compliance testing. TDSET3 automates compliance testing and allows engineers to perform the required tests efficiently and reliably right on the bench.

The Tektronix MDO4000 Series oscilloscopes with the DPO4ENET Serial Application Module and MSO/DPO5000, DPO7000C, DPO/DSA/MSO70000C/D/DX Series oscilloscopes with the SR-ENET application simplify analysis of Ethernet waveforms when validating and debugging Ethernet-based systems. The DPO4ENET and SR-ENET applications offer automated trigger, decode, and search for 10BASE-T and 100BASE-TX Ethernet, enabling fast and efficient validation and debug.

TDSET3 – Automated Ethernet physical layer compliance testing

Ethernet compliance testing has some unique measurement challenges:

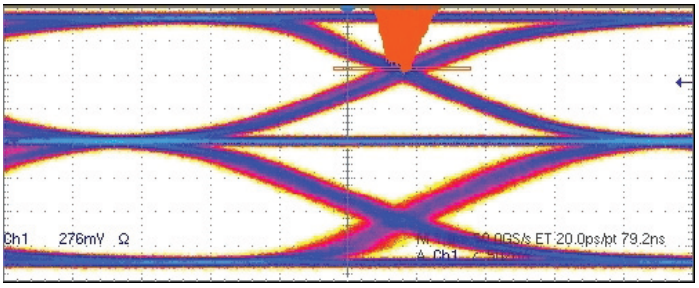
- Generating the “disturbing” signal requires tools to generate both pattern data and noise to provide real-world noise for return loss measurements
- There are many individual amplitude, timing, return loss, and template tests required for each Ethernet variant:
  - The 10BASE-T standard specifies 22 tests per port plus fault tolerance and CMRR
  - The 100BASE-TX standard outlines 12 tests per port plus CMRR and more
  - The 1000BASE-T standard calls for 80 tests per port plus BER, CMRR, and more
- Because of the large number of individual tests, compliance testing takes a lot of setup and measurement time, and makes repeatable measurement results difficult to achieve quickly
- Performing return loss measurements can be expensive if using a vector network analyzer. Tektronix provides a patented, cost-effective method using an arbitrary waveform generator (AWG) and oscilloscope

85/100/115 Ω plots for the 100BASE-TX Return Loss measurement.

The TDSET3 provides automated compliance testing for 10, 100, and 1000BASE-T PHY verification, including:

- Compliance and margin testing for accurate analysis and improved interoperability
- Time- and frequency-domain measurements made with single analysis instrument
- Jitter and timing measurements with and without filters
- Amplitude, linearity, and droop testing for transmitter performance
- Frequency domain measurements including return loss and power spectral density
- User-defined mode enables flexible parameter control for characterization and margin analysis
- Detailed test reports with margin and statistical information aid analysis

Wide range of tests



Peak-to-peak jitter on 100BASE-TX with single voltage crossing.

To ensure reliable information transmission over a network, industry standards specify requirements for the network’s physical layer. The TDSET3 Ethernet Compliance Test Software automates Ethernet physical layer tests for 10BASE-T, 10BASE-Te, 100BASE-TX, and 1000BASE-T in compliance with standards such as IEEE 802.3-2000 and ANSI X3.263-1995. The portfolio of tests includes core PMA and MDI tests such as Template, Distortion, Return Loss, Jitter (including the proposed alternate jitter method), and Common Mode Voltage.

Amplitude domain tests

The industry standards require the signals to have amplitudes within specified ranges to assure interoperability between devices. The amplitude tests vary with the signal speeds, but include such parameters as peak or peak-to-peak amplitude, overshoot, common mode voltage, and positive/negative pulse symmetry.

Return loss test

The return loss of the cabling system can also affect interoperability. The standards define the minimum amount of attenuation the reflected signal should have relative to the incident signal. The Return Loss test measures the impedance, typically over the range of 100 Ω ±15%. TDSET3 ingeniously performs the Return Loss test for 85, 100, and 115 Ω(111 Ωfor 10BASE-T) impedances as prescribed by the standards, using the same tools such as oscilloscopes and AWG used for other tests, enabling efficient usage of resources.

Time domain tests

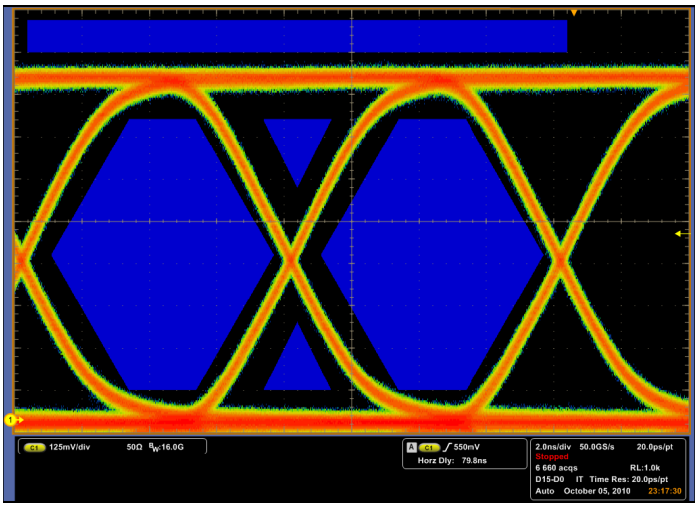
Timing parameters of the signals are also specified by the standards. These tests include timing measurements such as rise time, fall time, and difference or symmetry between rise and fall times.

Jitter tests

Jitter tests quantify the timing variations of the edges of the signal, using specified test patterns. These jitter measurements include the contributions from duty cycle distortion and the baseline wander. Jitter is determined by accumulating waveforms, measuring the width of the accumulated points at the eye crossing, and the peak-to-peak is inferred from minimum and maximum values in the tails of the histogram. For example, the preceding figure shows the jitter measurement on a 100BASE-TX signal.

Template tests

Template mask tests are often used to quickly verify that the transmitted signal meets industry-standard requirements. These template masks are defined so that signal distortions such as overshoot, jitter, incorrect rise and fall times, etc., will cause the mask test to fail. An example of a 100BASE-TX template mask test is shown above.



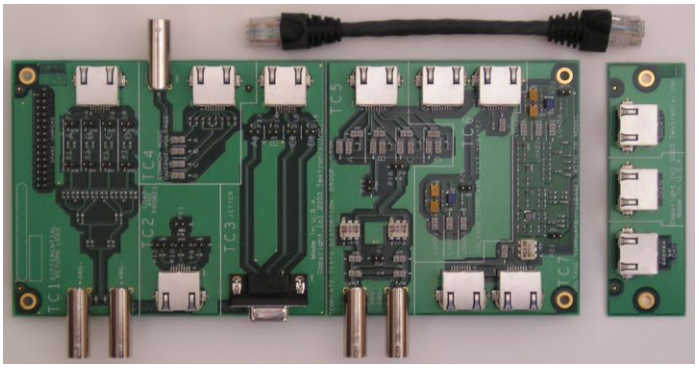
Positive side AOI Template test of 100BASE-TX signal.

Test report generation

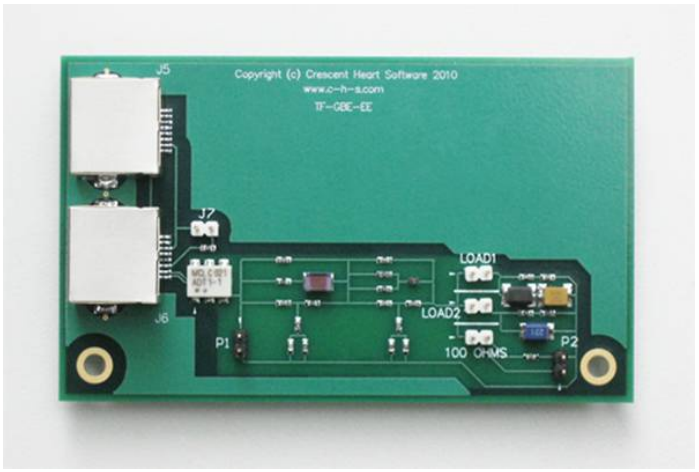
The unparalleled automation built into TDSET3 also enables faster validation including the tedious task of generating reports. The user can generate summary or detailed reports at a press of a button.

Test fixtures

The TF-GBE Series of test fixtures supports many of the Ethernet compliance tests, providing convenient signal access, test points for accurate removal of disturbing signals, return loss calibration, and cross-connect circuits to connect to traffic generators and link partners. The TF-GBE-BTP is the basic test package for 10/100/1000BASE-T tests. The TF-GBE-ATP is the advanced test package which also includes a 1000BASE-T jitter test channel cable.



TF-GBE-BTP Basic Ethernet Test Fixture.



The TF-GBE-EE is an additional test fixture which is required to perform the Energy Efficient Ethernet measurements.

Complete solution for receiver test

Tektronix offers a complete solution for creating and managing “disturbing” signals for accurate receiver stress testing. The Tektronix arbitrary waveform generators provide support for adding and removing the noise-related elements of the disturbing signal. Tektronix offers a complete set of instruments for Ethernet compliance tests and debug work; from oscilloscopes and probes, to compliance test software, test fixtures, and signal sources.

SR-ENET– 10BASE-T and 100BASE-TX triggering and analysis

Debugging Ethernet-based embedded systems designs provides some complex measurement and analysis challenges:

- Capturing specific Ethernet addresses and data
- Displaying the elements of the Ethernet message in an understandable format, in a variety of formats, for a wide variety of engineers and technicians
- Time-correlating Ethernet messages with analog and digital signals in the embedded system
- Capturing long time windows of Ethernet traffic and then finding specific events within the acquired data

The optional SR-ENET application software, installed in an MSO/DPO5000, DPO7000C, or DPO/DSA/MSO70000C/D/DX Series oscilloscope, provides a robust set of tools for debugging embedded systems with 10BASE-T and 100BASE-TX Ethernet, including:

- Automated serial decode and search for Ethernet 10BASE-T and 100BASE-TX
- Serial triggering (MSO/DPO5000 Series only) on all the critical elements of an Ethernet 10BASE-T and 100BASE-TX such as address, data, etc.
- Decoding IPv4 internet protocol and TCP transport protocol
- Decoding all the critical elements of each message. No more counting 1s and 0s!
- Searching through long acquisitions using user-defined criteria to find specific messages
- Event Table showing decoded serial bus activity in a tabular, time-stamped format for quick summary of system activity

10BASE-T and 100BASE-TX triggering

Trigger on packet content such as start frame delimiter (SFD), MAC addresses, MAC length/type, MAC client data, Q-tag control information, IPv4 and TCP header, TCP and IPv4 client data, end-of-packet, and FCS errors.

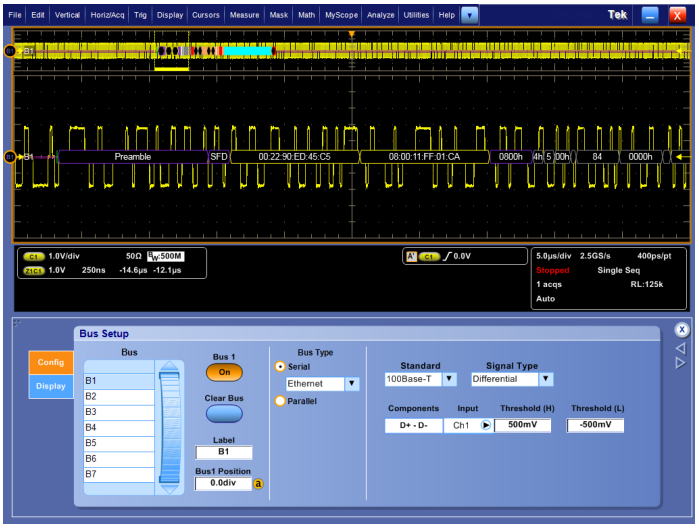
10BASE-T and 100BASE-TX decode

The SR-ENET Ethernet Serial Application provides a higher-level, combined view of the individual signals that make up the 10BASE-T or 100BASE-TX bus, making it easy to identify where packets begin and end and identifying subpacket components such as preamble, SFD, MAC addresses, data, FSC, errors, etc.

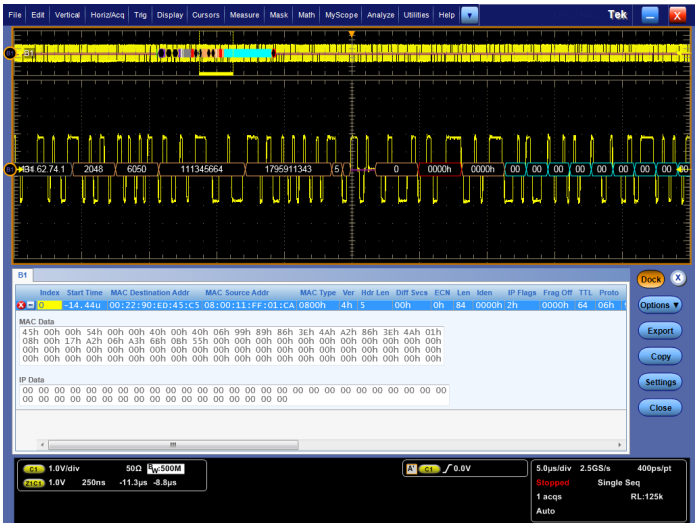
Are you wasting time manually decoding the waveform? Tired of having to visually inspect the waveform to count clocks, determine if each bit is a 1 or a 0, combine bits into bytes, and determine the hex value? Let the oscilloscope with the SR-ENET application do it for you! Once you've set up a 10BASE-T or 100BASE-TX bus, the MSO/DPO5000, or DPO7000C, or DPO/DSA/MSO70000C/D/DX Series will decode each packet on the bus, and display the value in hex, binary, or decimal in the bus waveform.

10BASE-T and 100BASE-TX event table

In addition to seeing 10BASE-T and 100BASE-TX decoded data on the bus waveform itself, you can view all captured packets in a tabular view much like you would see in a software listing. Packets are time stamped and listed consecutively with columns for each component (Time, Destination Address, Source Address, Length, Data, FCS/CRC, and Errors).



Color-coded display of 100BASE-TX, showing preamble, MAC addresses, IP header, TCP header components of the serial signal.



100BASE-TX decoded Event Table showing all packet information with time stamp information

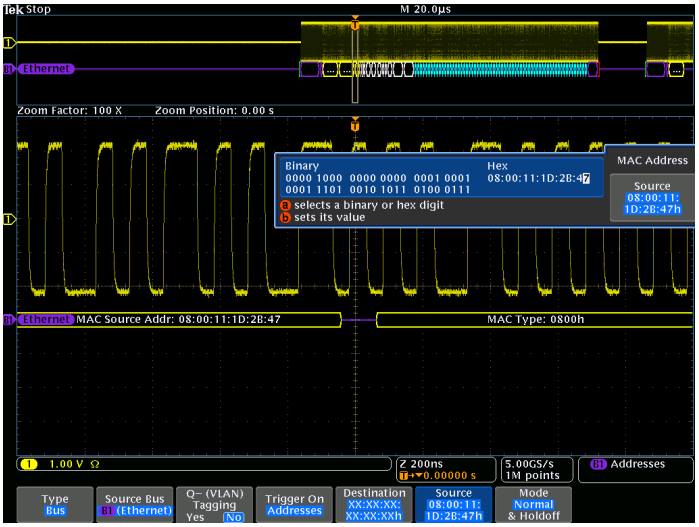
10BASE-T and 100BASE-TX search

Triggering is very useful for isolating the event of interest, but once you've captured it and need to analyze the surrounding data, what do you do? In the past, users had to manually scroll through the waveform counting and converting bits and looking for what caused the event. With the SR-ENET application installed, you can enable the oscilloscope to automatically search through the acquired data for user-defined criteria including packet content. Each occurrence is highlighted by a search mark. Rapid navigation between marks is as simple as pressing the Previous (←) and Next (→) buttons on the oscilloscope front panel.

DPO4ENET – 10BASE-T and 100BASE-TX triggering and analysis

Debugging Ethernet-based embedded systems designs provides some complex measurement and analysis challenges:

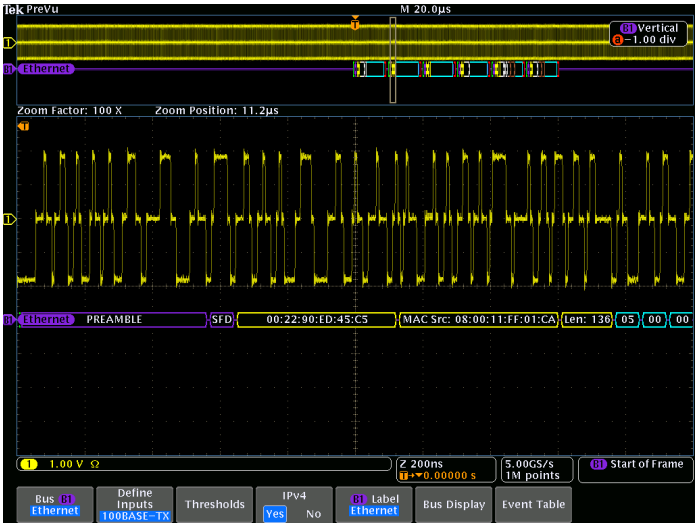
- Capturing specific Ethernet addresses and data
- Displaying the elements of the Ethernet message in an understandable format, in a variety of formats, for a wide variety of engineers and technicians
- Time-correlating Ethernet messages with analog and digital signals in the embedded system
- Capturing long time windows of Ethernet traffic and then finding specific events within the acquired data



DPO4ENET triggering on a specific 10BASE-T MAC source address. A complete set of triggers, including triggers for specific MAC address, MAC length/type, MAC client data, IPv4 and TCP header content, TCP and IPv4 client data, and FCS errors, ensures you quickly capture your event of interest.

The DPO4ENET application module, installed in an MDO4000 Series oscilloscope, provides a robust set of tools for debugging embedded systems with 10BASE-T and 100BASE-TX Ethernet, including:

- Automated serial triggering, decode, and search for Ethernet 10BASE-T and 100BASE-TX
- Triggering on all the critical elements of an Ethernet 10BASE-T and 100BASE-TX such as address, data, etc.
- Triggering on and decoding IPv4 internet protocol and TCP transport protocol
- Decoding all the critical elements of each message. No more counting 1s and 0s!
- Searching through long acquisitions using user-defined criteria to find specific messages
- Event Table showing decoded serial bus activity in a tabular, time-stamped format for quick summary of system activity



Color-coded DPO4ENET display of 100BASE-TX, showing preamble, MAC addresses, IP header, TCP header components of the serial signal.

10BASE-T and 100BASE-TX triggering

Trigger on packet content such as start frame delimiter (SFD), MAC addresses, MAC length/type, MAC client data, Q-tag control information, IPv4 and TCP header, TCP and IPv4 client data, end-of-packet, and FCS errors.

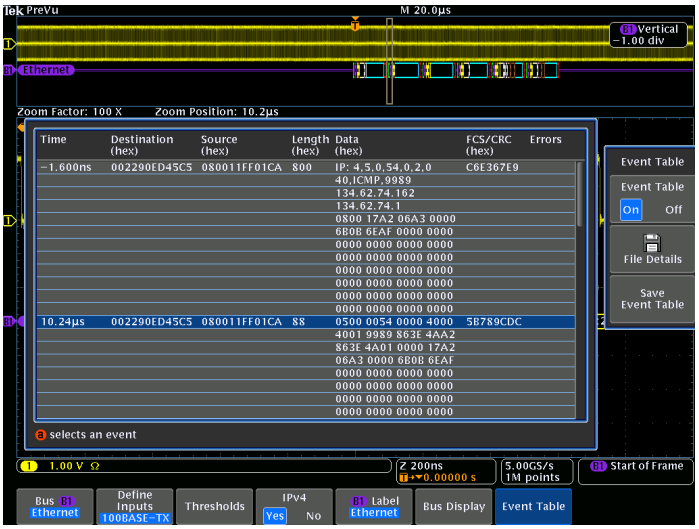
10BASE-T and 100BASE-TX decode

The DPO4ENET Ethernet Serial Application Module provides a higher-level, combined view of the individual signals that make up the 10BASE-T or 100BASE-TX bus, making it easy to identify where packets begin and end and identifying subpacket components such as preamble, SFD, MAC addresses, data, FSC, errors, etc.

Are you wasting time manually decoding the waveform? Tired of having to visually inspect the waveform to count clocks, determine if each bit is a 1 or a 0, combine bits into bytes, and determine the hex value? Let the MDO4000 Series with a DPO4ENET Ethernet Serial Application Module do it for you! Once you've set up a 10BASE-T or 100BASE-TX bus, the MDO4000 Series will decode each packet on the bus, and display the value in hex, binary, or ASCII in the bus waveform.

10BASE-T and 100BASE-TX event table

In addition to seeing 10BASE-T and 100BASE-TX decoded data on the bus waveform itself, you can view all captured packets in a tabular view much like you would see in a software listing. Packets are time stamped and listed consecutively with columns for each component (Time, Destination Address, Source Address, Length, Data, FCS/CRC, and Errors).



DPO4ENET 100BASE-TX decoded Event Table showing all packet information with time stamp information.

10BASE-T and 100BASE-TX search

10BASE-T and 100BASE-TX packet content triggering is very useful for isolating the event of interest, but once you've captured it and need to analyze the surrounding data, what do you do? In the past, users had to manually scroll through the waveform counting and converting bits and looking for what caused the event. With a DPO4ENET Ethernet Serial Application Module, you can enable the MDO4000 Series oscilloscope to automatically search through the acquired data for user-defined criteria including packet content. Each occurrence is highlighted by a search mark. Rapid navigation between marks is as simple as pressing the Previous (←) and Next (→) buttons on the oscilloscope front panel.

Specifications

TDSET3 compliance test characteristics

General mask Autofit, Waveform/Sample Count.

Instrument compatibility

Ethernet standards	Recommended oscilloscopes for compliance testing (Windows 7 versions only)
10BASE-T, 10BASE-Te, 100BASE-TX, and 1000BASE-T	≥1 GHz models of MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series
10BASE-T, 10BASE-Te, and 100BASE-TX	≥500 MHz models of MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series
10BASE-T and 10BASE-Te	All models of MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series

10BASE-T/10BASE-Te

Test	Description
Template	MAU Ext (and inverted), MAU Int (and inverted), Link Pulse, and TP_IDL
MAU Template Scale	0.9 and 1.1
Amplitude	Differential voltage, common mode output voltage
Harmonic	Content of ones
Jitter	With and without cable
Return Loss	85, 100, 115 Ω [1]

100BASE-TX

Test	Description
Template	Positive and negative polarity
Amplitude	Signal amplitude, amplitude symmetry, differential output voltage, waveform overshoot
Time Domain Tests	Rise Time, Fall Time, Rise/Fall Time Symmetry
Jitter	Jitter and duty cycle distortion
Return Loss	85, 100, 115 Ω [1]

1000BASE-T

Test	Description
Template	Points A, B, C, D, F, H
Amplitude	Peak voltage (points A, B) Level Accuracy (points B, C, D) Droop (points G, J) Distortion (with and without TX_TCLK [2]) Common Mode Output Voltage
Disturber Options	With and without disturber signal

1 85 Ω and 115 Ω plots require four-channel oscilloscopes.

2 If clock inaccuracy is high, results may vary on some oscilloscopes due to limitations on the segmented memory acquisitions.

TDSET3 compliance test characteristics

Test	Description
Jitter	Master (filtered and unfiltered), Slave [3] (filtered and unfiltered)
Return Loss	85, 100, 115 Ω [1]

SR-ENET Ethernet triggering and analysis test characteristics

Instrument compatibility

Ethernet standards	Recommended oscilloscopes
10BASE-T and 100BASE-TX	All models of MSO/DPO5000, DPO7000C, and DPO/DSA/MSO70000C/D/DX Series

Bus setup options

Option	Description
Ethernet compatibility	10BASE-T, 100BASE-TX
Sources	Analog channels 1-4 Math channels 1-4
Recommended probing	Differential
Address/data formats available	Hex Binary Hex or ASCII: Data Mixed: Hex or ACSII data, other fields in decimal and hex.

Bus decode

Option	Description
Ethernet data rates	10BASE-T: 10 Mb/s 100BASE-TX: 100 Mb/s
Decode display	Start of Packet (green bar) Preamble (blue packet) Start of Frame Delimiter (blue packet) MAC Destination and Source Addresses (yellow packets) MAC Length/Type (blue packet) Data (cyan packet) IPv4 Header (white packet) TCP Header (brown packet) Frame Check Sequence/CRC (purple packet) End of Packet (red bar) Error (red packet)
Internet protocol support	IPv4
Transport layer protocol support	TCP

Display modes

Option	Description
Bus	Bus display on/off
Event Table	Decoded packet data in a tabular view

3 Slave-filtered tests require four-channel oscilloscopes.

SR-ENET Ethernet triggering and analysis test characteristics

Bus trigger options

Option	Description
Trigger [4] and/or Search On	**10BASE-T:** Start Frame Delimiter MAC Addresses: Trigger on Source and Destination 48-bit address values MAC Q-tag Control Information: Trigger on Q-tag 32-bit value MAC Length/Type: Trigger on ≤, <, =, >, ≥, ≠ a particular 16-bit value, or inside or outside of a range MAC Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular 16-bit value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 IPV4 Header: Trigger on IP header 8-bit value, Source Address, Destination Address TCP Header: Trigger on Destination Port, Source Port, Sequence Number, and Ack Number TCP/IPv4 Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular data value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 End of Packet FCS (CRC) Error **100BASE-TX:** Start Frame Delimiter MAC Addresses: Trigger on Source and Destination 48-bit address values MAC Q-tag Control Information: Trigger on Q-tag 32-bit value MAC Length/Type: Trigger on ≤, <, =, >, ≥, ≠ a particular 16-bit value, or inside or outside of a range IPV4 Header: Trigger on IP header 8-bit value, Source Address, Destination Address TCP Header: Trigger on Destination Port, Source Port, Sequence Number, and Ack Number MAC Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular data value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 TCP/IPv4 Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular data value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 End of Packet FCS (CRC) Error Idle

DPO4ENET Ethernet triggering and analysis test characteristics

Instrument compatibility

Ethernet standards	Recommended oscilloscopes
10BASE-T and 100BASE-TX	≥350 MHz models of MSO/DPO4000B and MDO4000 Series
10BASE-T	All models of MSO/DPO4000B and MDO4000 Series

Bus setup options

Option	Description
Ethernet compatibility	10BASE-T, 100BASE-TX
Sources	Single-ended: Analog channels 1-4 Differential: Analog channels 1-4 Math channel Reference channels 1-4 Recommended Probing 10BASE-T: Single-ended or
Recommended probing	10BASE-T: Single-ended or differential 100BASE-TX: Differential

4 Ethernet triggering available on MSO/DPO5000 Series only

DPO4ENET Ethernet triggering and analysis test characteristics

Option	Description
Thresholds presets	10BASE-T: Single-ended (D+ 1.25 V; D– 1.25 V); Differential (High 1.25 V; Low –1.25 V) 100BASE-TX: Single-ended (D+ 500 mV; D– 500 mV); Differential (High 500 mV; Low –500 mV)
Address/data formats available	Hex Binary Hex or ASCII: Data Decimal and Hex: Other Fields

Bus decode

Option	Description
Ethernet data rates	10BASE-T: 10 Mb/s 100BASE-TX: 100 Mb/s
Decode display	Start (green bar) MAC Address (yellow packet) Data (cyan packet) IPv4 Header (white packet) TCP Header (brown packet) CRC (purple packet) Stop (red bar) Error (red packet)
Internet protocol support	IPv4
Transport layer protocol support	TCP

Display modes

Mode	Description
Bus	Bus only
Bus and Waveforms	Simultaneous display of bus and digital waveforms
Event Table	Decoded packet data in a tabular view

DPO4ENET Ethernet triggering and analysis test characteristics

Bus trigger options

Option	Description
Trigger and/or Search On	**10BASE-T:** Start Frame Delimiter MAC Addresses: Trigger on Source and Destination 48-bit address values MAC Q-tag Control Information: Trigger on Q-tag 32-bit value MAC Length/Type: Trigger on ≤, <, =, >, ≥, ≠ a particular 16-bit value, or inside or outside of a range MAC Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular 16-bit value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 IP Header: Trigger on IP header 8-bit value, Source Address, Destination Address TCP Header: Trigger on Destination Port, Source Port, Sequence Number, and Ack Number TCP/IPv4 Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular data value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 End of Packet FCS (CRC) Error **100BASE-TX:** Start Frame Delimiter MAC Addresses: Trigger on Source and Destination 48-bit address values MAC Q-tag Control Information: Trigger on Q-tag 32-bit value MAC Length/Type: Trigger on ≤, <, =, >, ≥, ≠ a particular 16-bit value, or inside or outside of a range MAC Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular data value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 IP Header: Trigger on IP header 8-bit value, Source Address, Destination Address TCP Header: Trigger on Destination Port, Source Port, Sequence Number, and Ack Number TCP/IPv4 Client Data: Trigger on ≤, <, =, >, ≥, ≠ a particular data value, or inside or outside of a range. Selectable number of bytes to trigger on from 1-16. Byte offset options of Don't Care, 0-1499 End of Packet FCS (CRC) Error Idle

Ordering information

TDSET3 10, 100, 1000BASE-T Ethernet physical-layer compliance test application

Model	New instrument orders	Product upgrades	Floating licenses
MSO/DPO5000 Series	Opt. ET3	DPO-UP Opt. ET3	DPOFL-ET3
DPO7000C Series	Opt. ET3	DPO-UP Opt. ET3	DPOFL-ET3
DPO/DSA/MSO70000 Series	Opt. ET3	DPO-UP Opt. ET3	DPOFL-ET3

TDSET3 recommended accessories

For most Ethernet signal probing, use a 1-1.5 GHz differential probe.

For 1000BASE-T jitter testing, use two 1-1.5 GHz active probes for slave jitter test, and one 1-1.5 GHz active probe for master jitter test.

Please refer to www.tek.com/probes for further information on the recommended models of probes and any necessary probe adapters.

Ethernet test fixtures

Fixture	Description
TF-GBE-BTP	Basic Ethernet Test Package
TF-GBE-ATP	Advanced Ethernet Test Package, includes Jitter Channel
TF-GBE-EE	Energy Efficient Ethernet Test Package [5]
TF-GBE-JTC	103-meter 1000BASE-T Jitter Test Channel Cable
TF-GBE-SIC	Short (4 inch or 0.1 meter) RJ-45 Interconnect Cable

Signal source (for return loss and disturbing signal tests)

AFG3102 [6], AFG3252 [6], AWG5000C, or AWG7000C [7] Series Arbitrary Waveform Generator.

5 Order directly from Crescent Heart Software http://www.c-h-s.com

6 Setup files and waveforms to be copied onto the instrument using a memory stick. Not suitable for 1000Base-T Return Loss testing.

7 Two amplifiers, one for each channel, are required. Tektronix has qualified Picosecond Pulse Labs Amplifier Model #5866.

SR-ENET 10BASE-T and 100BASE-TX triggering and analysis application

SR-ENET 10BASE-T and 100BASE-TX triggering and analysis application

Model	New instrument orders	Product upgrades	Floating licenses
MSO/DPO5000 Series	Opt. SR-ENET	DPO-UP Opt. SR-ENET	DPOFL-SR-ENET
DPO7000C Series	Opt. SR-ENET	DPO-UP Opt. SR-ENET	DPOFL-SR-ENET
DPO/DSA/MSO70000 C/D/DX Series	Opt. SR-ENET	DPO-UP Opt. SR-ENET	DPOFL-SR-ENET

DPO4ENET 10BASE-T and 100BASE-TX triggering and analysis application

Model	New instrument orders	Product upgrades	Floating licenses
MDO4000 Series	DPO4ENET	DPO4ENET	-

Recommended probes

Please refer to www.tek.com/probes for further information on the recommended models of probes and any necessary probe adapters.

Additional information

Tektronix offers a range of solutions for Ethernet testing, including 10GBASE-T and 40/100G Ethernet. To see a comprehensive listing, and download the latest resources, visit: www.tek.com/ethernet.

TDSET3 solution updates and up-to-date instrument software upgrades are available at: www.tek.com/downloads.

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