

## 8 Series Sampling Oscilloscope

### TSO820 and TSO8C17/18 Datasheet



The 8 Series Sampling Oscilloscope provides a comprehensive optical test solution for telecom and datacom applications, as well as general purpose optical component testing. The TSO8C17 and TSO8C18 optical modules provide > 30 GHz optical bandwidth, plus fully integrated Optical Reference Receivers (ORR)<sup>1</sup> enabling both single mode and multi-mode conformance testing at 850 nm, 1310 nm, and 1550 nm bands.

### Key performance specifications

- Optical bandwidth above 30 GHz
- Single mode and multi-mode support for short and long wavelength optical testing
- Optical Reference Receiver (ORR)<sup>1</sup> support for standard compliance testing

### Applications

- Design/verification of High-Speed Components and Systems
- Signal integrity analysis
- Compliance test for industry PAM4 standards: 50G, 100G, 200G, 400G IEEE 802.3™ standard such as 400GBASE-FR8, 400GBASEDR4, and similar optical direct detect standards.

### Key features

- **New system architecture**
  - Disaggregated: Separation of the acquisition hardware and software analysis allows the data to be streamed over Ethernet to a connected PC. Users have the capability to scale their analysis platforms to their needs and can connect from anywhere on the network
  - Configurable: The TSO820 mainframe supports user-swappable current and future optical modules
- **Optical modules**
  - Accurate testing and characterization of short or long wave optical signals using the high sensitivity and low noise performance of the TSO8C17 or TSO8C18 modules
  - Optical reference receivers (ORR)<sup>1</sup> supports specified requirements for standards-mandated compliance testing
  - Extinction ratio measurements with built-in variable ER correction to ensure accuracy and repeatability
- **Analysis with TSOVu®**
  - TSOVu: A new software platform that runs independent of the oscilloscope mainframe on users' computers or server for both live and post-processing of acquired data
  - TSOVu offers comprehensive analysis of PAM4 optical signals. Includes support for eye diagrams, optical measurements such as TDECQ, and other standard measurements
  - Measurement plug-in designed to interface with the base software that can be dynamically installed as needed
- **High test throughput**
  - Simultaneous capture of all channels at a high sample acquisition rate of 300 kS/s
  - Sophisticated Programmatic Interface (PI) for automation environments enables the highest test throughput. Each command supports full data synchronization, eliminating the need for wait / sleep statements

<sup>1</sup> Optical Reference Receiver (ORR) is a 4<sup>th</sup> order Bessel-Thomson filter with a frequency response and tolerances as defined by the standards. Tektronix optimizes the response for best nominal fit and highest quality mask test results

## Compliance testing

Compliance test for 50G, 100G, 200G, and 400G IEEE 802.3™ standards such as 400GBASE-FR8, 400GBASE-DR4, and similar optical direct detect standards. The TSO820 Sampling Oscilloscope is also designed to support high speed NRZ standards such as 100 Gb Ethernet (100GBASE-LR4 or similar) that operates at a rate of 25.78125 Gb/s. Stay up-to-date on the latest standards changes by updating or adding new measurement plug-ins as they are released.

## Disaggregated architecture

Traditional oscilloscopes perform measurements on-device with the specific processor that the instrument was shipped with. However, that processor becomes obsolete over time, and makes speed upgrades to the analysis platform impossible. The 8 Series Sampling Oscilloscope turns this notion upside-down and features a disaggregated architecture, which means that the acquisition hardware and analysis platform have been separated. Since TSOVu can be installed on any Windows 10 machine, users now have the freedom to choose the laptop readily available in the lab, a server connected to the network, or anything in between.

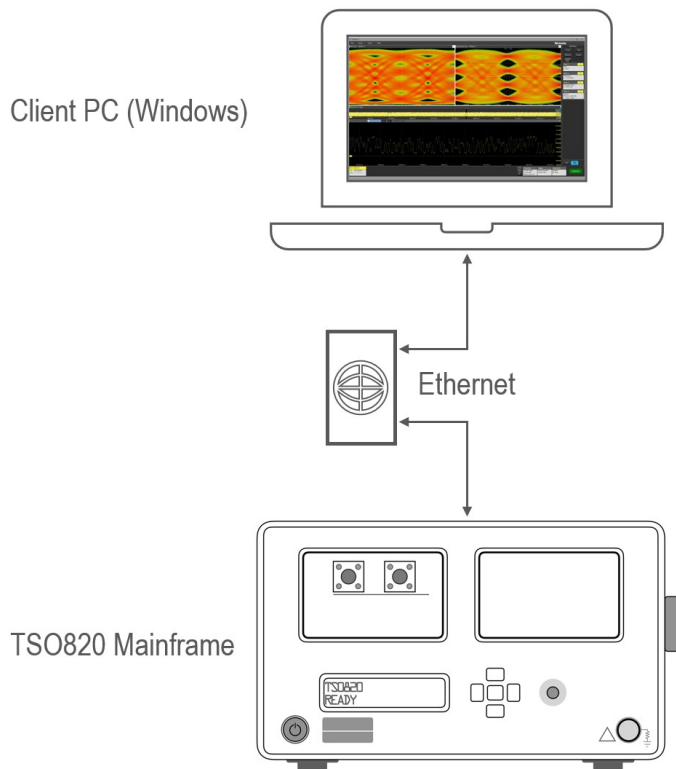


Figure 1: System diagram of client PC connected to a TSO820 mainframe via local area network (LAN)

## Flexibility by design

The 8 Series Sampling Oscilloscope has been designed with modularity in mind. The TSO820 mainframe features the two module slots that are compatible with TSO8C17 and TSO8C18 optical modules, as well as future other modules. The oscilloscope mainframe can be reconfigured on the spot by removing or inserting modules through the top of the instrument. As testing requirements evolve, scale or change capabilities to match current testing needs without sending the instrument in for factory reconfiguration.

When connecting to the TSO820 using TSOVu, any changes to the hardware configuration will be reflected by the user interface. The module type, serial number, calibration information, and so on are accessed via TSOVu or PI queries.



Figure 2: Plugging TSO8C18 module into TSO820 mainframe.

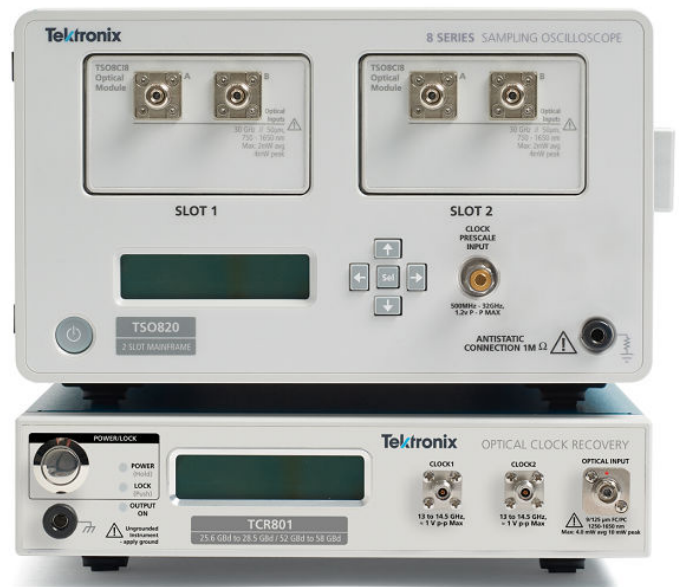


Figure 3: 8 Series instruments: TSO820 mainframe, TSO8C17 / TSO8C18 (shown) optical modules

For more information regarding the TCR801, refer TCR801 Optical Clock Recovery Datasheet on [www.tek.com/](http://www.tek.com/)

### Connection diagrams

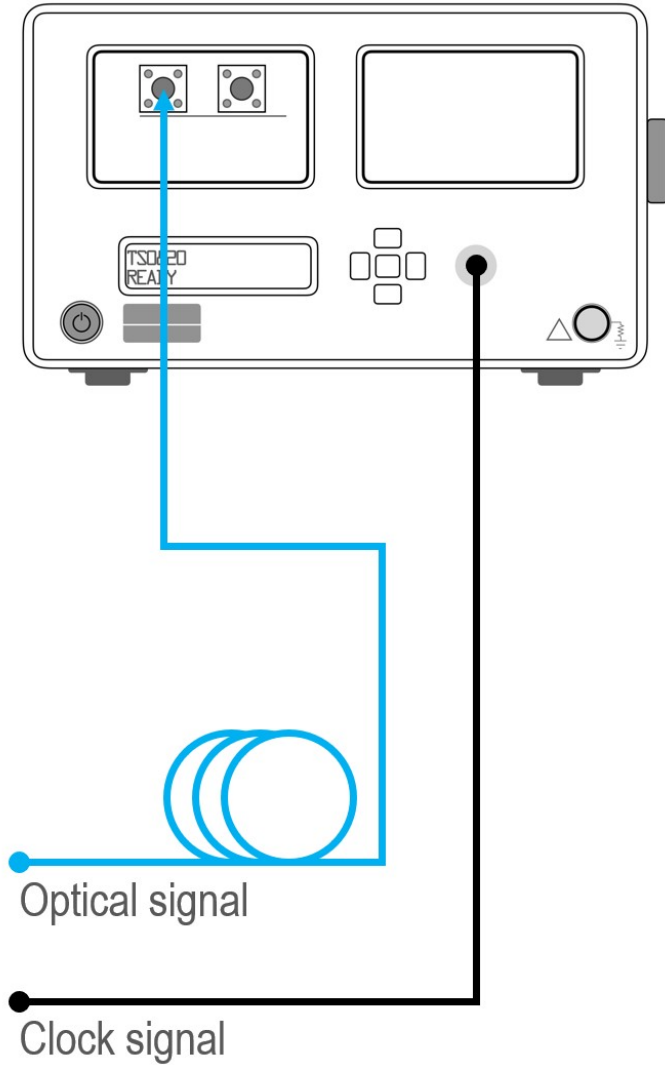


Figure 4: Connection diagram demonstrating the TSO820 mainframe with one TSO8C18 optical module, triggered directly from DUT or pattern generator

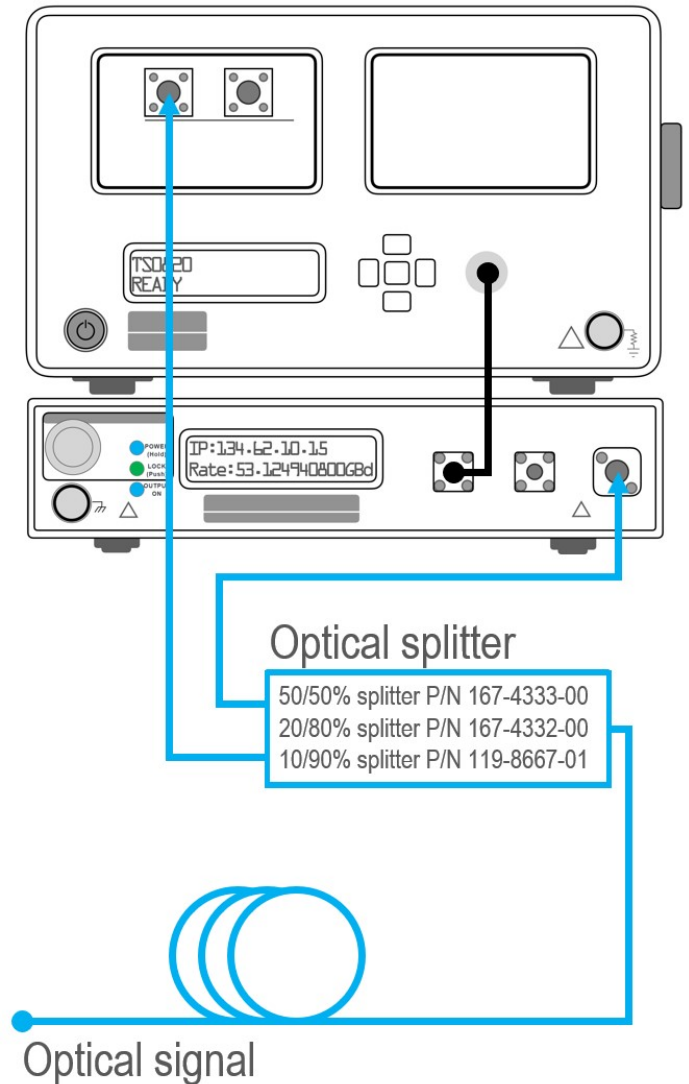



Figure 5: Connection diagram demonstrating the TSO820 mainframe with one TSO8C18 optical module, triggered by the TCR801 Optical Clock Recovery.

### User interface

The 8 Series Sampling Oscilloscope features a brand-new sampling oscilloscope software architecture called TSOVu. This new software runs on a user's external Windows 10 PC and features an intuitive user interface and analysis engine for increased measurement throughput and limits oscilloscope downtime.

The communication between the PC running TSOVu and the TSO820 mainframe is based on an IEEE 802.3™ Ethernet network, such as 100BASE-T or 1000BASE-T. TSOVu's Programmatic Interface (PI) commands can be used in the automation environments to control instrument functionality and analysis reporting. Use TSOVu with the TSO820 Sampling Oscilloscope Mainframe to acquire multiple channels simultaneously and analyze remotely over Ethernet or Wi-fi.

 **Note:** Wi-fi requires consistent and stable network connection for proper use.

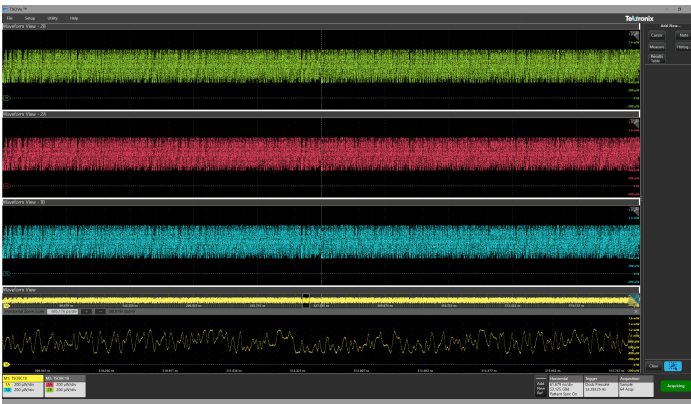
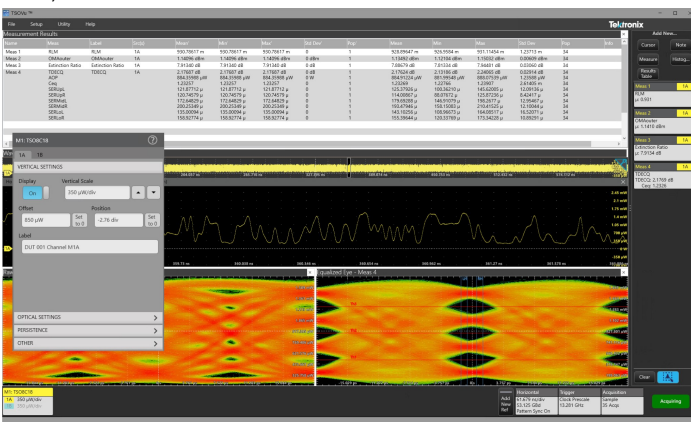
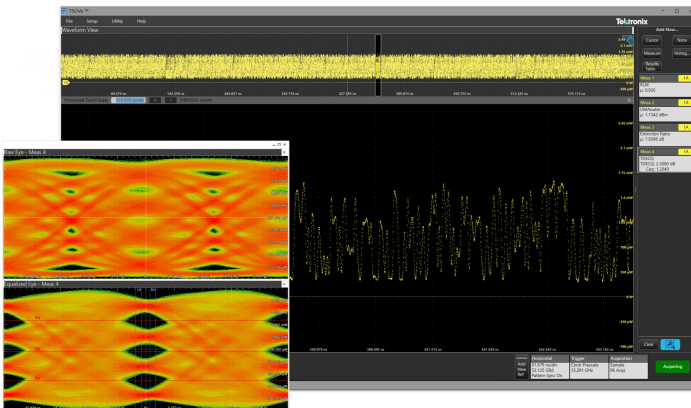


Figure 6: Example of the TSOVu session connected to a TSO820 mainframe with two TSO8C18 optical modules

Adjust vertical channel parameters individually based on the modulation type, channel bandwidth, and inherent signal characteristics like offset, skew, or external attenuation as shown:



Add reference waveforms for offline processing of previously captured data, view eye diagrams before and after TDECQ FFE equalization, and detach windows from the base software to be rearranged or resized



## Measurement plug-in interface

Using the flexible plug-in architecture in TSOVu, measurement plug-ins that can interface with TSOVu will display directly in the Add Measurement window. This includes Tektronix' standard Pulse Measurement and PAM4 Optical Measurement plug-ins, and enables quick development of custom measurement libraries that are fully integrated in TSOVu to be called from the user interface or through PI commands.

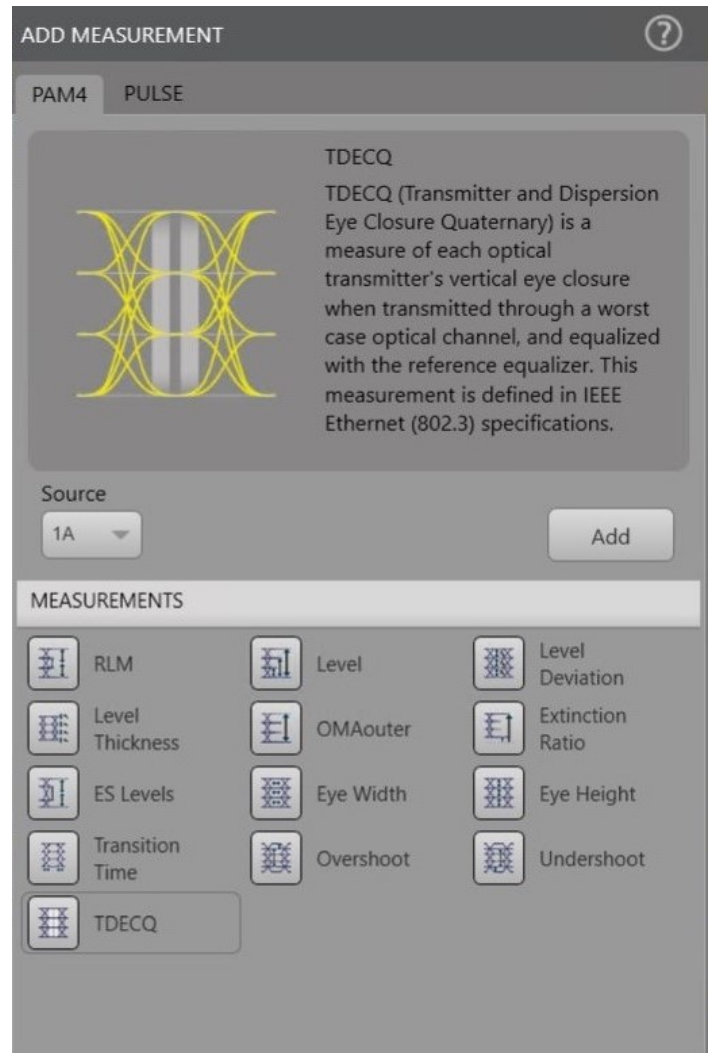


Figure 7: Example of the Add Measurement window displaying available optical PAM4 measurements. All measurements have short descriptions and can be added to live channels or reference waveforms



## Supported measurements

|                                  |                         |
|----------------------------------|-------------------------|
| Pulse measurements:<br>Amplitude | High                    |
|                                  | Low                     |
|                                  | Amplitude               |
|                                  | Max                     |
|                                  | Min                     |
|                                  | Mid                     |
|                                  | Mean                    |
|                                  | Pk-Pk                   |
|                                  | AC RMS                  |
|                                  |                         |
| Pulse measurements: Timing       | Period                  |
|                                  | Frequency               |
|                                  | Rise                    |
|                                  | Fall                    |
|                                  | Positive Cross          |
|                                  | Negative Cross          |
|                                  | Positive Width          |
|                                  | Neagive Width           |
|                                  | RMS Jitter              |
|                                  | Pk-Pk Jitter            |
|                                  | Delay                   |
|                                  |                         |
|                                  |                         |
| PAM4 Optical measurements        | RLM                     |
|                                  | Level                   |
|                                  | Level Deviation         |
|                                  | Level Thickness         |
|                                  | OMAouter                |
|                                  | Extinction Ratio        |
|                                  | Effective Symbol Levels |
|                                  | Eye Width               |
|                                  | Eye Height              |
|                                  | Transition Time         |
|                                  | Overshoot               |
|                                  | Undershoot              |
|                                  | TDECQ                   |

## High-sensitivity operation accommodates lowamplitude signals

The TSO8C17 and TSO8C18 optical modules feature high input sensitivity for measurement of low power signals. This enables the user to recover full pattern acquisitions with little noise contribution from the oscilloscope, making it possible to take true and accurate measurements in conditions where signal power is low.

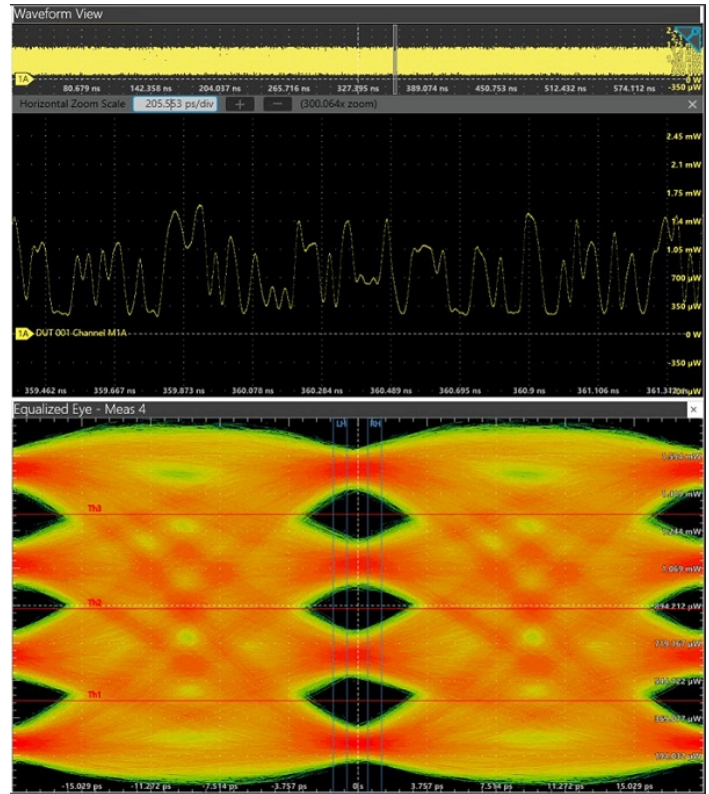


Figure 8: Example of a 53 GBd PRBS15Q signal acquired on the Tektronix TSO820 Sampling Oscilloscope with TSO8C18 optical module, triggered by the TCR801 Optical Clock Recovery

## PC requirements

- Processor: AMD or Intel:
  - Minimum: AMD Ryzen 5 or Intel i5 with hyperthreading
  - Recommended: AMD Ryzen 7 or Intel i7 class processor or better.



**Note:** The time to calculate measurements, including TDECQ is inversely proportional to the processor clock speed.

- Memory:
  - Minimum: 8 GB
  - Recommended: 16 GB or more
- Disk: 256 GB SSD
- OS: Windows 10, 64 bit
- Networking: 1 Gigabit Ethernet recommended

## Specifications

### TSO820 Mainframe Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

#### Vertical system

|                               |  |
|-------------------------------|--|
| Rise time / bandwidth         | Determined by the sampling modules used            |
| Vertical resolution (nominal) | 15.6 bits over the sampling modules' dynamic range |

#### Horizontal system

|                                   |                      |
|-----------------------------------|----------------------|
| Main time base / horizontal scale | 1 ps/div to 1 ms/div |
| Record length                     | > 800 Msamples       |

#### Trigger system

|                |                                    |
|----------------|------------------------------------|
| Trigger source | Clock Prescale Input (front panel) |
|----------------|------------------------------------|

#### Clock Prescale Input

|   |  |
|---|--|
| Clock input sensitivity   | 200 mVp-p at 0.5 GHz to 32 GHz   |
| Clock input range   | 200 mVp-p to 1.0 Vp-p (max); AC coupled  |
| Pattern lengths supported (Pattern Sync)                              | Up to PRBS23 (8,388,607 symbols) inclusive   |
| Clock input jitter in clock-eye and clock-pattern trigger modes (max) | 500 MHz to 2 GHz: < 1530 fs RMS (sinusoidal trigger waveform; typical square-wave performance similar to below values)<br>2 to 3 GHz: < 600 fsRMS<br>3 to 9 GHz: < 580 fsRMS<br>9 to 32 GHz: < 500 fsRMS |

#### Acquisition system

|  |  |
|--|--|
| Acquisition modes                        | Pattern Sync (sample and average), Sequential [Pattern Sync disabled] (sample and average) |
| Number of sampling modules accommodated  | Two (2) modules  |
| Number of simultaneously acquired inputs | Four (4) inputs  |
| Maximum acquisition rate                 | 300 kSa/s  |

#### Waveform measurements

|                                      |  |
|--------------------------------------|--|
| System measurement rate              | Supports up to 32 simultaneous measurement <sup>2</sup> with optional display of per-measurement statistics (min, max, mean and standard deviation)                                  |
| Cursor modes                         | Vertical bar, horizontal bar, vertical and horizontal bar, and waveform cursors  |
| Waveform processing                  | Bandwidth Enhancement/Impulse Response Correction (BWE), TDECQ equalized waveform  |
| Histograms                           | Supports up to 30 histograms on multiple windows   |
| Pulse measurements (standard)        | High, Low, Amplitude, Max, Min, Mid, Mean, Peak-Peak, Period, Frequency, Rise, Fall, Positive Cross, Negative Cross, Positive Width, Negative Width, RMS Jitter, Pk-Pk Jitter, Delay |
| PAM4 measurements (license required) | RLM, Level, Level Deviation, Level Thickness, OMAouter, Extinction Ratio, Effective Symbol Levels, Eye Width, Eye Height, Transition Time, Overshoot, Undershoot, TDECQ              |

<sup>2</sup> Lower limit which is applicable for complex measurements such as TDECQ

**Input / output ports****Front Panel**

|   |   |
|---|---|
| <b>Anti-static protection connector</b> | Banana-jack connector, 1 M $\Omega$   |
| <b>Clock Prescale Input</b>             | 200 mVp-p to 1 Vp-p operational, AC coupled with maximum DC offset (-2.2 V to +2.2 V);<br>2 Vp-p absolute maximum |

**Rear Panel**

|                      |   |
|----------------------|---|
| <b>Ethernet port</b> | RJ45 connector; supports IEEE 802.3 <sup>TM</sup> Ethernet 100/1000BASE-T |
|----------------------|---|

**Control**

|                           |   |
|---------------------------|---|
| <b>Control interface</b>  | <a href="#">Ethernet port</a> on page 7                                 |
| <b>Device information</b> | Instrument serial number, software version, other available using TSOVu |

**Physical**

|                                   |                    |
|-----------------------------------|--------------------|
| <b>Height</b>                     | 132 mm (5.18 in.)  |
| <b>Width</b>                      | 217 mm (8.55 in.)  |
| <b>Depth</b>                      | 590 mm (23.22 in.) |
| <b>Weight (with blank module)</b> | 5.4 kg (12.0 lbs.) |

**Environmental****Temperature**

|                     |  |
|---------------------|--|
| <b>Operating</b>    | 5 to 45 °C, above 1500 m de-rate 1 °C per 300 m; automatic shutdown for temperature > 55 °C $\pm$ 5 °C ambient |
| <b>Nonoperating</b> | -20 to 60 °C   |

**Altitude**

|                     |   |
|---------------------|---|
| <b>Operating</b>    | 3,000 m (9642 ft.); derate maximum operating temperature by 1 °C per 300 m above 1,500 m (4821 ft.) |
| <b>Nonoperating</b> | 12,000 m (39,370 ft.)   |

**Relative humidity**

|                     |   |
|---------------------|---|
| <b>Operating</b>    | 5 to 95% relative humidity at or below 30 °C; 5 to 45% above 30 °C to below 45 °C, non-condensing |
| <b>Nonoperating</b> | 5 to 95% relative humidity at or below 30 °C; 5 to 45% above 30 °C to below 60 °C, non-condensing |

## TSO8C17 and TSO8C18 Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

### Optical inputs

#### Optical channel count

TSO8C17 One (1) optical channel

TSO8C18 Two (2) optical channels

Wavelength range 750 to 1650 nm

Calibrated wavelength ( $\pm 20$  nm) 850 nm, 1310 nm, and 1550 nm

#### Unfiltered optical bandwidth

Multi-mode 30 GHz

Single mode > 30 GHz

Fiber input<sup>3</sup> 50  $\mu$ m FC/PC

#### Optical return loss

Multi-mode > 16 dB

Single mode > 16 dB

### Optical inputs

Acquisition delay adjustment range  $\pm 65$  ps per channel

Power meter range -38 to +6 dBm at 1310 nm

Power meter accuracy (typical) +/- [100 nW + (External Power Meter Reading) \* [5% + 6% Uncertainty]]

RMS optical noise (hardware; typical)

| Bandwidth <sup>4</sup> | 850 nm      | 1310 nm     | 1550 nm     |
|------------------------|-------------|-------------|-------------|
| 12.6 GHz               | 4.2 $\mu$ W | 2.8 $\mu$ W | 3.0 $\mu$ W |
| 13.28125 GHz           | 4.3 $\mu$ W | 2.9 $\mu$ W | 3.0 $\mu$ W |
| 19.335 GHz             | 5.3 $\mu$ W | 3.7 $\mu$ W | 3.9 $\mu$ W |
| 21 GHz                 | 6.2 $\mu$ W | 4.2 $\mu$ W | 4.4 $\mu$ W |
| 22.5 GHz               | 8.1 $\mu$ W | 5.0 $\mu$ W | 5.4 $\mu$ W |

RMS optical noise (hardware; maximum)

| Bandwidth <sup>4</sup> | 850 nm       | 1310 nm     | 1550 nm     |
|------------------------|--------------|-------------|-------------|
| 12.6 GHz               | 6.0 $\mu$ W  | 3.6 $\mu$ W | 3.9 $\mu$ W |
| 13.28125 GHz           | 6.0 $\mu$ W  | 3.6 $\mu$ W | 3.9 $\mu$ W |
| 19.335 GHz             | 7.5 $\mu$ W  | 4.5 $\mu$ W | 4.8 $\mu$ W |
| 21 GHz                 | 8.3 $\mu$ W  | 5.0 $\mu$ W | 5.4 $\mu$ W |
| 22.5 GHz               | 11.1 $\mu$ W | 6.7 $\mu$ W | 6.9 $\mu$ W |

<sup>3</sup> Modules with fiber inputs of 50  $\mu$ m can accommodate 9  $\mu$ m (single mode) fibers

<sup>4</sup> Electrical bandwidth is a 4<sup>th</sup> order Bessel-Thomson filter



**Supported Optical Reference Receivers<sup>4</sup>**

| TSO8C17 and TSO8C18 | PAM2 NRZ               | PAM4   |
|---------------------|------------------------|--|
|                     | 25.78125 GBd (TDEC-MM) | 26.5625 GBd Single-mode and multi-mode standards of the IEEE 802.3™ (E.g. BW <sub>el</sub> 13.28125 GHz) |
|                     | 25.78125 GBd           |  |
|                     | 27.95 GBd              | 53.125 GBd standards of the IEEE 802.3™ (E.g. BW <sub>el</sub> 26.5625 GHz)                              |
|                     | 28.05 GBd              |  |

**Physical**

|                |                      |
|----------------|----------------------|
| <b>Height</b>  | 53 mm (2.1 in.)      |
| <b>Width</b>   | 96 mm (3.76 in.)     |
| <b>Depth</b>   | 236 mm (10.35 in.)   |
| <b>Weight</b>  |                      |
| <b>TSO8C17</b> | 0.549 kg (1.21 lbs.) |
| <b>TSO8C18</b> | 0.660 kg (1.46 lbs.) |

**Environmental****Temperature**

|                     |  |
|---------------------|--|
| <b>Operating</b>    | 5 to 45 °C, above 1,500 m derate 1°C per 300 m |
| <b>Nonoperating</b> | -20 to 60 °C                                   |

**Altitude**

|                     |   |
|---------------------|---|
| <b>Operating</b>    | 3000 m (9642 ft.); derate maximum operating temperature by 1 °C per 300 m above 1,500 m (4821 ft.). |
| <b>Nonoperating</b> | 12,000 m (39,370 ft.)   |

**Relative humidity**

|                     |  |
|---------------------|--|
| <b>Operating</b>    | 5% to 95% relative humidity at or below 30 °C,   |
| <b>Nonoperating</b> | 5% to 45% above 30 °C to below 45 °C, non-condensing<br>5% to 95% relative humidity at or below 30 °C; 5% to 45% above 30°C to below 60 °C, non-condensing |

## Ordering information

### TSO820 Mainframe

#### Models

TSO820 8 Series Tektronix Sampling Oscilloscope 2 Slot Mainframe

#### Standard accessories

Cable, Ethernet 2 m ethernet cable (CAT6/RJ45). Tektronix P/N 174-7292-00

50  $\Omega$  termination 50  $\Omega$  termination. Tektronix P/N 015-1022-01

Screw driver T-10 screw driver. Tektronix P/N 003-1962-00

ESD Strap 6 ft coiled ESD strap. Tektronix P/N 006-3415-05

#### Power plug options

Opt. A0 North America Power Cord

Opt. A1 Universal EURO

Opt. A2 United Kingdom Power Cord

Opt. A3 Australia Power Cord

Opt. A4 240V North America

Opt. A5 Switzerland Power Cord

Opt. A6 Japan Power Cord

Opt. A10 China Power Cord

Opt. A11 India Power Cord

Opt. A12 Brazil Power Cord

Opt. A99 No Power Cord or AC Adapter

#### Language options

Opt. L0 English manual

Opt. L5 Japanese manual

Opt. L7 Simplified Chinese manual

Opt. L9 Korean manual

#### Service options

Opt. G3 Three Year Gold Care Plan. Includes expedited repair of all product failures including ESD and EOS, access to a loaner product during repair or advanced exchange to reduce downtime, priority access to Customer Support among others

Opt. G5 Five Year Gold Care Plan. Includes expedited repair of all product failures including ESD and EOS, access to a loaner product during repair or advanced exchange to reduce downtime, priority access to Customer Support among others

Opt. R3 Standard Warranty Extended to 3 Years. Covers parts, labor and 2-day shipping within country. Guarantees faster repair time than without coverage. All repairs include calibration and updates. Hassle free - a single call starts the process

Opt. R5 Standard Warranty Extended to 5 Years. Covers parts, labor and 2-day shipping within country. Guarantees faster repair time than without coverage. All repairs include calibration and updates. Hassle free - a single call starts the process

|                |   |
|----------------|---|
| <b>Opt. C3</b> | Calibration service 3 years. Includes traceable calibration or functional verification where applicable, for recommended calibrations. Coverage includes the initial calibration plus 2 years calibration coverage  |
| <b>Opt. C5</b> | Calibration service 5 years. Includes traceable calibration or functional verification where applicable, for recommended calibrations. Coverage includes the initial calibration plus 4 years calibration coverage. |
| <b>Opt. D1</b> | Calibration Data Report   |
| <b>Opt. D3</b> | Calibration Data Report 3 Years (with Option C3)  |
| <b>Opt. D5</b> | Calibration Data Report 5 Years (with Option C5)  |

**Recommended accessories**

|                                   |  |
|-----------------------------------|--|
| <b>Clock recovery instruments</b> | TCR801: 26 and 53 GBaud Optical Clock Recovery Unit. |
|-----------------------------------|--|

**Optical Modules**

Optical modules plug directly into one of the two slots provided by the TSO820 sampling oscilloscope mainframe.

**Models**

|                |  |
|----------------|--|
| <b>TSO8C17</b> | 8 Series Optical Module: Single Channel, Single / Multi Mode, 30GHz optical bandwidth for 50G/100G/200G/400G |
| <b>TSO8C18</b> | 8 Series Optical Module: Dual Channel, Single / Multi Mode, 30GHz optical bandwidth for 50G/100G/200G/400G   |

**Standard accessories**

|                              |  |
|------------------------------|--|
| <b>Optical Fiber Cleaner</b> | Optical connector cleaner; 2.5 m. Tektronix P/N 068-327-00 |
|------------------------------|--|

**Language options**

|                |                           |
|----------------|---------------------------|
| <b>Opt. L0</b> | English manual            |
| <b>Opt. L5</b> | Japanese manual           |
| <b>Opt. L7</b> | Simplified Chinese manual |
| <b>Opt. L9</b> | Korean manual             |

**Service options**

|                |  |
|----------------|--|
| <b>Opt. G3</b> | Three Year Gold Care Plan. Includes expedited repair of all product failures including ESD and EOS, access to a loaner product during repair or advanced exchange to reduce downtime, priority access to Customer Support among others         |
| <b>Opt. G5</b> | Five Year Gold Care Plan. Includes expedited repair of all product failures including ESD and EOS, access to a loaner product during repair or advanced exchange to reduce downtime, priority access to Customer Support among others          |
| <b>Opt. R3</b> | Standard Warranty Extended to 3 Years. Covers parts, labor and 2-day shipping within country. Guarantees faster repair time than without coverage. All repairs include calibration and updates. Hassle free - a single call starts the process |
| <b>Opt. R5</b> | Standard Warranty Extended to 5 Years. Covers parts, labor and 2-day shipping within country. Guarantees faster repair time than without coverage. All repairs include calibration and updates. Hassle free - a single call starts the process |
| <b>Opt. C3</b> | Calibration service 3 years. Includes traceable calibration or functional verification where applicable, for recommended calibrations. Coverage includes the initial calibration plus 2 years calibration coverage                             |
| <b>Opt. C5</b> | Calibration service 5 years. Includes traceable calibration or functional verification where applicable, for recommended calibrations. Coverage includes the initial calibration plus 4 years calibration coverage.                            |
| <b>Opt. D1</b> | Calibration Data Report  |
| <b>Opt. D3</b> | Calibration Data Report 3 Years (with Option C3)   |

Opt. D5 Calibration Data Report 5 Years (with Option C5)

## Recommended accessories

### Accessories

|             |                                     |
|-------------|-------------------------------------|
| 167-4333-00 | 50%/50% Single Mode FP/PC Splitter. |
| 167-4332-00 | 20%/80% Single Mode FP/PC Splitter. |
| 119-8667-01 | 10%/90% Single Mode FP/PC Splitter. |

## Software

TSOVu is available for download at [www.tek.com/downloads](http://www.tek.com/downloads)

Software licenses for TSOVu are available for purchase to extend the analysis capabilities of the base oscilloscope software. The Pulse Measurement Plug-in is available free with every TSOVu; other measurement plug-ins can be enabled for operation with purchase of a valid license.

### Software licensing and activation information

Optional plug-ins for TSOVu require installation of a valid license before initial use. Each software enabled feature requires its own license, and licenses can be managed within the Tektronix Asset Management System (Tek AMS). Product license management requires a login account and can be accessed via the Tek AMS web site address ([www.tek.com/products/product-license](http://www.tek.com/products/product-license)).

There are four types of licenses available for plug-in applications which are explained below:

- **NLP:** Node-locked perpetual licenses enable oscilloscope features permanently, are assigned to the Host ID of an instrument or TSOVu software, and guarantee software updates for the first 12 months. Software updates after the first 12 months are available with 1-year renewal.
- **FLP:** Floating perpetual licenses enable oscilloscope features permanently, can be transferred between Host IDs (mainframe or software), and guarantee software updates for the first 12 months. Software updates after the first 12 months are available with 1-year renewal.
- **NL:** Node-locked subscription licenses enable oscilloscope features for a predefined time period, are assigned to the Host ID of an instrument or TSOVu software, and guarantee software updates for the duration of the license.
- **FL:** Floating subscription licenses enable oscilloscope features for a predefined time period, can be transferred between Host IDs (mainframe or software), and guarantee software updates for the duration of the license.



**Note:** Use the Tektronix Asset Management system to check in and check out floating licenses.

### License

PAM4-O PAM4 Optical Measurement Plug-in

### License options (required)

|            |   |
|------------|---|
| TSO8SW-NLP | Node-Locked Perpetual License           |
| TSO8SW-FLP | Floating Perpetual License              |
| TSO8SW-NL1 | Node-Locked 1-Year Subscription License |
| TSO8SW-NL3 | Node-Locked 3-Year Subscription License |
| TSO8SW-FL1 | Floating 1-Year Subscription License    |
| TSO8SW-FL3 | Floating 3-Year Subscription License    |



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.





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