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## Test & Measurement

- sales
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- calibration
- repair
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## Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

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# TDSCEM1

## Communications Eye-diagram Measurements Software



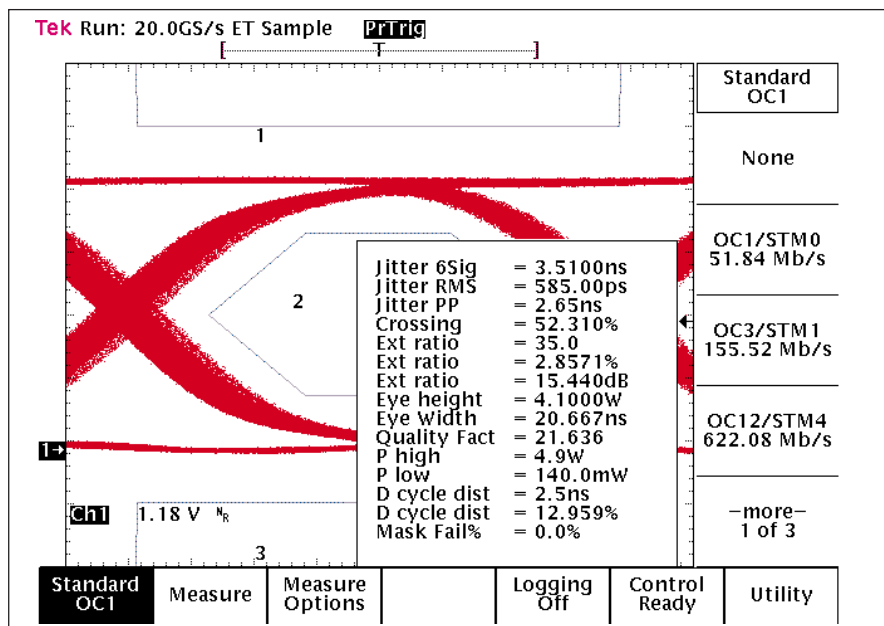
### Features and Benefits

- Perform Automatic Eye Diagram Measurements of: % Crossing, Eye Height, Eye Width, Quality Factor, Extinction Ratio and Jitter.
- Provides More In-depth Understanding of Your Communication Signal Beyond Qualitative Pass/Fail Mask Testing
- Adds Additional Capability to Your TDS Communications Analyzer Package by Enabling Your TDS 500/700 Series Oscilloscope to Perform Automated Eye Diagram Measurements
- Optical Standards Measured Include:
  - SONET/SDH: OC1/STM0, OC3/STM1, OC12/STM4
  - Fibre Channel: FC133, FC266, FC531, FC1063
  - Gigabit Ethernet: 1.25 Gb/s
- With the Unique Autoset to Standard Mask Capability, You Do Not Need to Set Up the Vertical, Horizontal, Trigger or Filter Controls
- Set the Population Size for the Statistics Measurements
- Log the Measurement Results to a File for Future Analysis
- GPIB Control of Measurements for Use in ATE Applications
- Installs Inside the TDS Oscilloscope Requiring no External GPIB, RS-232 or PC



### Applications

- Characterize the Quality of Your Optical Communications Signals with Accurate Eye Diagram Analysis



### USER-INSTALLED, OSCILLOSCOPE RESIDENT EYE DIAGRAM MEASUREMENT PACKAGE

Option 2C, the Tektronix TDS Communication Signal Analyzer package, gives you the most comprehensive oscilloscope solutions for connecting to, capturing, and characterizing optical and electrical signals in high-speed communication designs. Based on the TDS 500D/700D family of Digital Phosphor Oscilloscopes (DPOs), Option 2C and various measurement accessories tailor the oscilloscope for engineers debugging, characterizing, and verifying the compliance of communication systems to international standards.

TDSCEM1 adds additional capability to Option 2C by allowing communication customers to perform quantitative measurements on their eye diagrams in addition to qualitative mask testing. TDSCEM1 provides an exten-

sive suite of additional measurements to support analysis and trouble-shooting beyond simple pass-fail testing.

The following diagram and text describe the measurements performed:

$T_{cross1}$  = time at which the first crossing occurs.

$T_{cross2}$  = time at which the second crossing occurs.

$P_{top}$  = mean of the most predominant peak in the histogram for box 1.

$P_{base}$  = mean of the most predominant peak in the histogram for box 2.

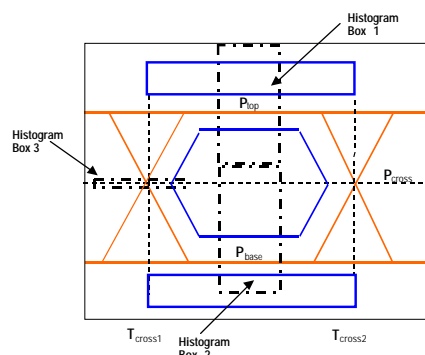
$P_{cross}$  = level at which the first crossing occurs.

- Crossing % is the location of the zero crossing as a % of the eye opening  
 – Crossing % =  $100 [(P_{cross} - P_{base}) / (P_{top} - P_{base})]$

- Eye Height is the vertical opening of the eye  
 – Eye height =  $(P_{top} - 3\sigma_{top}) - (P_{base} + 3\sigma_{base})$

- Eye Width is the the horizontal opening of the eye  
 – Eye width =  $(T_{cross2} - 3\sigma_{cross2}) - (T_{cross1} + 3\sigma_{cross1})$

- Quality Factor is the vertical opening of the eye relative to the noise present  
 – Quality factor =  $(P_{top} - P_{base}) / (\sigma_{top} + \sigma_{base})$



# TDSCM1

## Communications Eye-diagram Measurements Software

### CHARACTERISTICS

• Extinction Ratio is the ratio of the average high logic level to the average low logic level. In the Option 2C extinction ratio measurement, the  $P_{top}$  and  $P_{base}$  levels are determined by using all high logic levels and all low logic low levels. In the TDSCM1 application, the  $P_{top}$  and  $P_{base}$  levels are determined by using the middle 20% of the eye opening. In addition, the TDSCM1 extinction ratio measurement allows the user to determine the statistical population size before the measurement is performed.

$$- \text{Ext ratio} = P_{top}/P_{base}$$

$$- \text{Ext Ratio \%} = 100[(P_{base} - P_{dark}) / (P_{top} - P_{dark})]$$

$$- \text{Ext Ratio dB} = 10 \text{ Log } [(P_{top} - P_{dark}) / (P_{base} - P_{dark})]$$

• Jitter is the time variation of the signal zero crossing

$$- \text{Jitter RMS} = \sigma$$

$$- \text{Jitter } 6\sigma = 6\sigma$$

$$- \text{Jitter PP} = \text{max} - \text{min}$$

Customers who will benefit from TDSCM1 are electronic design engineers working for communication equipment manufacturers in the communications industry who develop products with standard communication interfaces. These engineers need tools to properly characterize their designs and verify compliance to industry standards. These standards include SONET/SDH, Fibre Channel and Gigabit Ethernet. Characterization of these optical and electrical signals include mask testing as well as eye diagram measurements.

TDSCM1 comes on a single floppy disk, is easily installed in a TDS oscilloscope, and doesn't require any external processing or connections. After installation, the application is accessible from the oscilloscope front panel.

### TEKTRONIX DIGITAL OSCILLOSCOPES SUPPORTED

TDS 500D, TDS 700D series oscilloscopes with Communication Signal Analyzer Option 2C and a hard disk drive (Option HD or Option 2M).

### ORDERING INFORMATION

#### TDSCM1

Communications Eye Diagram Measurement Software for TDS 500/700 Oscilloscopes.

**Includes:** Software on a 3.5-in. Disk, Manual.

#### TDSCM1 RECOMMENDED OPTIONS AND ACCESSORIES

**AMT75** – 75  $\Omega$  Adapter.

**TDS Option 3C** – (includes P6701B) Short-wavelength Fibre Channel Optical Reference Receiver.

**TDS Option 4C** – (includes P6703B) Long-wavelength SONET/SDH Optical Reference Receiver.

**P6701B/P6703B** – Optical-to-Electrical Converters.

**P6723** – Optical Logic Probe.

**OA5002/OA5012/OA5022/OA5032** – Optical Attenuators.

#### For further information, contact Tektronix:

Worldwide Web: for the most up-to-date product information visit our web site at: [www.tektronix.com](http://www.tektronix.com)

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