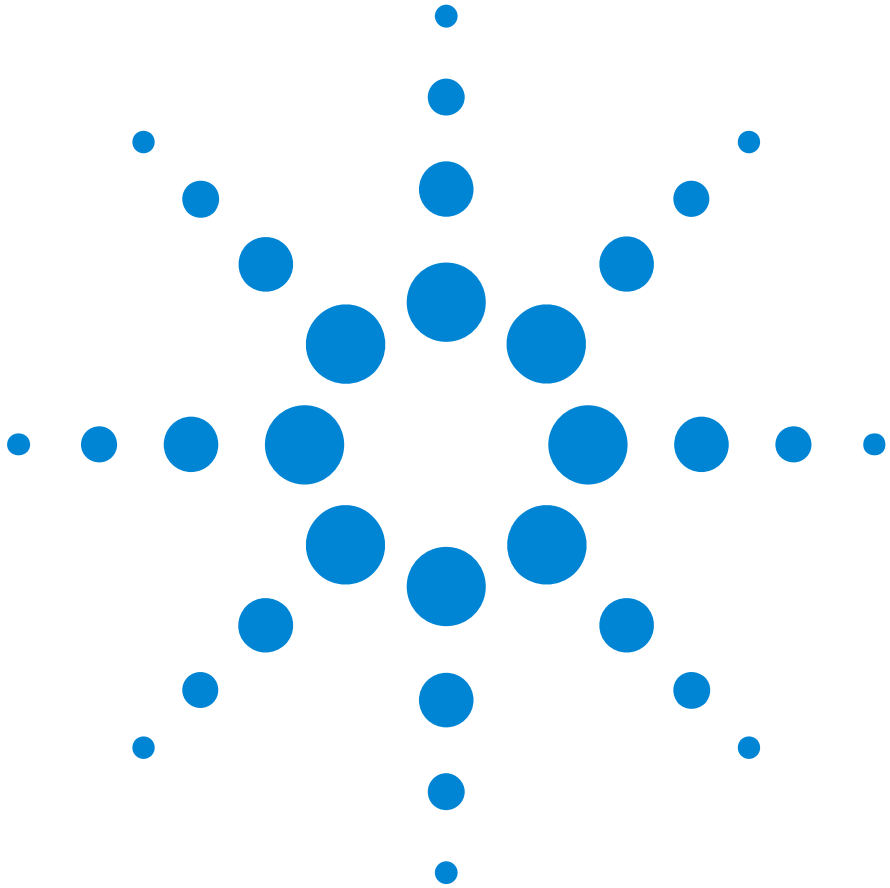

Agilent ParBERT 81250 Measurement Software

Fast Eye Mask Measurement User Guide

Agilent Technologies

Important Notice

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Introduction

Electrical/Optical Measurement Capabilities

The Agilent 81250 ParBERT Measurement Software provides the capability of not only measuring electrical inputs and outputs, it can also be used to test optical and optoelectrical devices.

For electrical measurements, the threshold is given in Volts.
For optical measurements, the threshold is given in optical power (W or dBm).

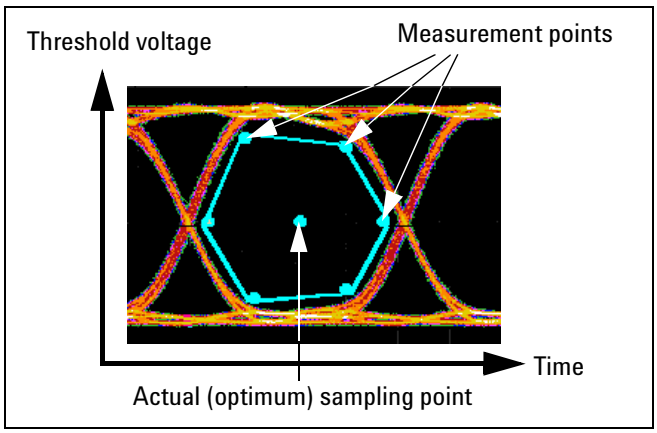
Because the Fast Eye Mask Measurement is related to the threshold, this measurement can use either optical or electrical ports, but not both simultaneously.

Measurement Characteristics

The fast eye mask measurement is first of all meant for production and screening tests. It allows to determine very quickly whether the eye openings seen at the output terminals of a device are within specifications, that means, within certain timing and voltage limits.

Measuring the eye openings of several terminals with an oscilloscope used to be a time-consuming procedure. With the fast eye mask measurement of the Agilent 81250 ParBERT, pass/fail information can be obtained within seconds.

This is achieved by measuring the bit error rate at a limited number of test points.



Up to 32 measurement points can be specified, each defined by a sampling time relative to the actual sampling point (which can be the optimum sampling point) and a threshold voltage (which can be fixed or adaptive). In practice, six measurement points will often suffice. Six measurement points are preset by default.

As the measurement occurs in parallel on all output terminals of the device, its duration is independent of the number of terminals.

This document provides the following information:

- For a quick start, read the example session given in *"Example of a Fast Eye Mask Measurement" on page 7*.
- *"Basics of the Fast Eye Mask Measurement" on page 17* provides detailed information on the prerequisites and the parameters shown in the result window.
- *"Setting the Properties of a Fast Eye Mask Measurement" on page 25* shows how to specify the measurement parameters.

NOTE It is assumed that you are familiar with the general characteristics of the ParBERT Measurement Software. The general capabilities and operating procedures are documented in the *ParBERT Measurement Software Framework User Guide*.

Example of a Fast Eye Mask Measurement

This chapter shows how to set up and perform a fast eye mask measurement:

1. Use the *Agilent 81250 User Software* for connecting the device under test with the system.

   See *"Setting Up and Connecting the DUT" on page 8*.

2. Prepare a bit error measurement with the *Agilent 81250 User Software*.

   See *"Preparing the Measurement" on page 9*.

3. Use the *Agilent 81250 Measurement Software* for creating a workspace and measurement and run the measurement.

   See *"Executing a Fast Eye Mask Measurement" on page 11*.

4. Change the measurement properties and see the results.

   See *"Changing the Fast Eye Mask Properties" on page 14*.

For this example, we use the following hardware components:

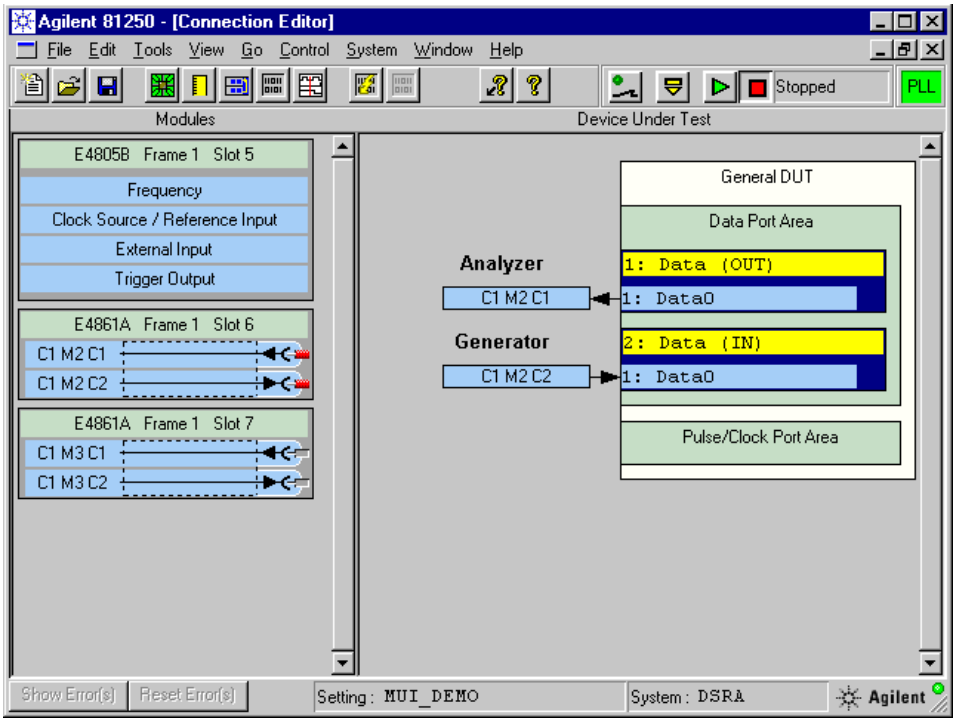
- E4832A generator/analyzer 667 Mbit/s module
- E4843A generator frontend
- E4835A analyzer frontend

Setting Up and Connecting the DUT

Use the *Agilent 81250 User Software* to create a model of the hardware. For a detailed description of the *Agilent 81250 User Software*, refer to the *Agilent 81250 ParBERT System User Guide*.

1 Create a DUT output port and a DUT input port.

2 Connect the analyzer to the DUT electrical output port and the generator to the DUT electrical input port.



3 Using a shielded cable, connect the analyzer frontend physically with the generator. The cable connection will be our device under test.

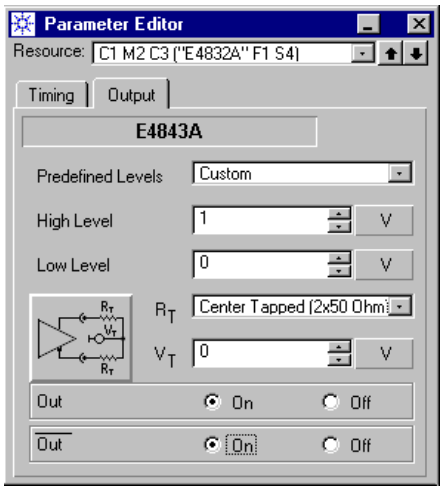
Preparing the Measurement

Use the *Agilent 81250 User Software* to prepare a bit error rate test:

1 Adjust the clock frequency, if desired.

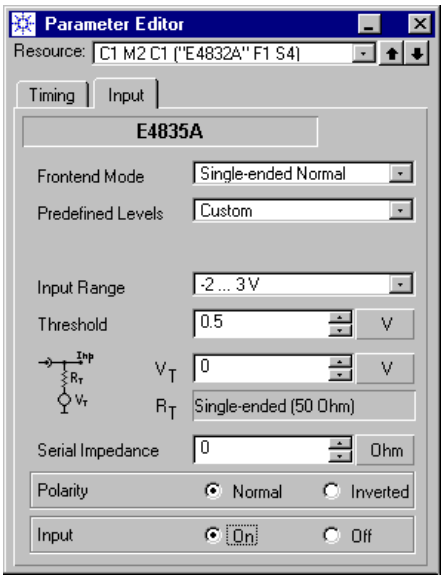
We use a clock rate of 125 MHz in this example. This corresponds to a clock period of 8 ns.

2 Set the high and low voltage levels of the generator frontend and switch the frontend on.



We use a voltage swing of 0 V (*Low Level*) to 1 V (*High Level*) in this example.

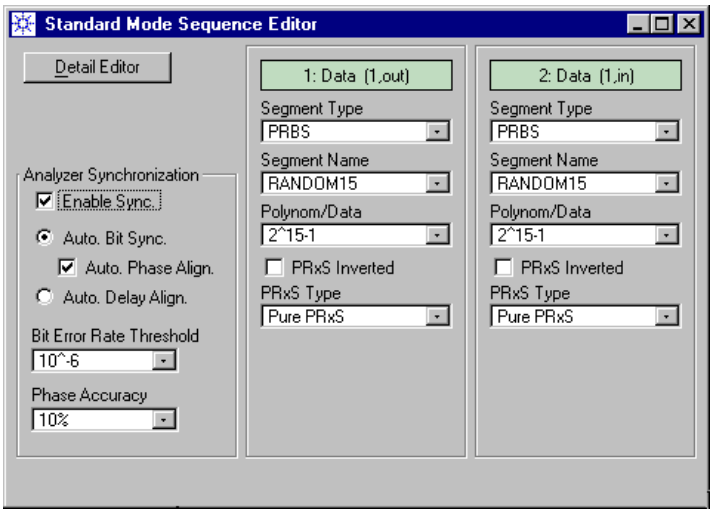
3 Set the *Frontend Mode* of the analyzer frontend to *Single-ended Normal*. Set the *Threshold* to 0.5 V and switch the analyzer on.



Measuring eye openings requires an analyzer threshold voltage. The fast eye mask measurement can therefore not be performed in differential mode.

4 Create the test sequence with the *Standard Mode Sequence Editor*. We use the same PRBS segment for the generator and the analyzer.

5 Activate *Automatic Bit Synchronization* with *Automatic Phase Alignment*. Set the *Phase Accuracy* to 10 %.



Automatic Bit Synchronization with *Automatic Phase Alignment* ensures that the analyzer will position its sampling point automatically at the optimum, no matter what the total signal delay is.

You could also use *Automatic Delay Alignment*, but this requires that you specify a suitable analyzer start delay with the Parameter Editor.

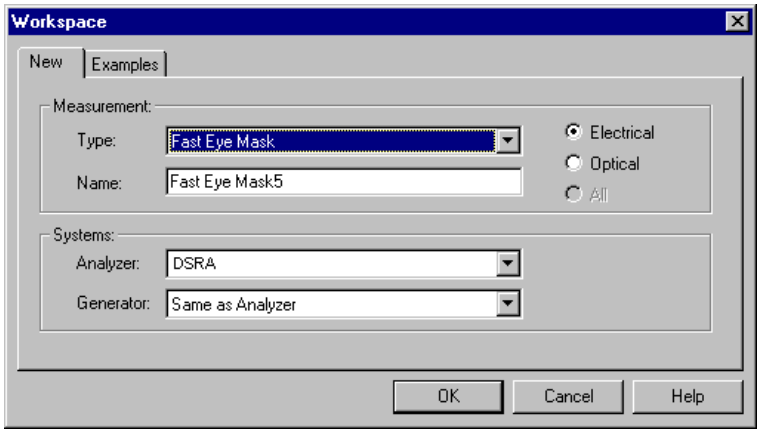
6 Save the setting as *MUI_DEMO*.

Once you have saved the setting, you may terminate the *Agilent 81250 User Software* if you wish to do so.

Executing a Fast Eye Mask Measurement

Use the *Agilent 81250 Measurement Software* to set up and perform the fast eye mask measurement:

1 Start the *Agilent 81250 Measurement Software* and select the measurement type *Fast Eye Mask*.



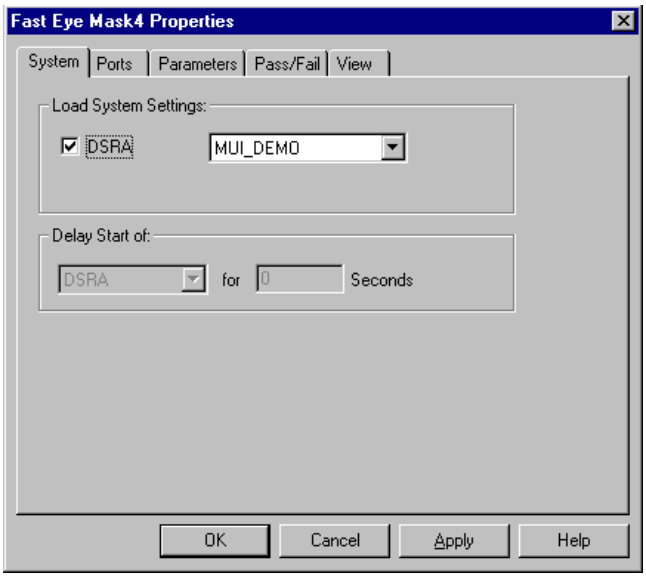
NOTE Each time you open the Measurement dialog box, your last settings are displayed.

Only one system (DSRA) is used in this example. In case of two systems you would now select the analyzing and generating systems.

2 Click *OK*. This creates a new measurement and opens the measurement*'s Properties* dialog.

The *System* page shows the chosen system(s) and the presently loaded setting of each system.

3 If no setting is loaded or a different setting than *MUI_DEMO*, click the system's check box and choose the setting *MUI_DEMO* from the drop-down list.



4 Click *OK*. This terminates the *Properties* dialog. To load a new setting without terminating the *Properties* dialog, you would click *Apply*.

5 In the tool bar, click the *Run* button to execute the measurement.

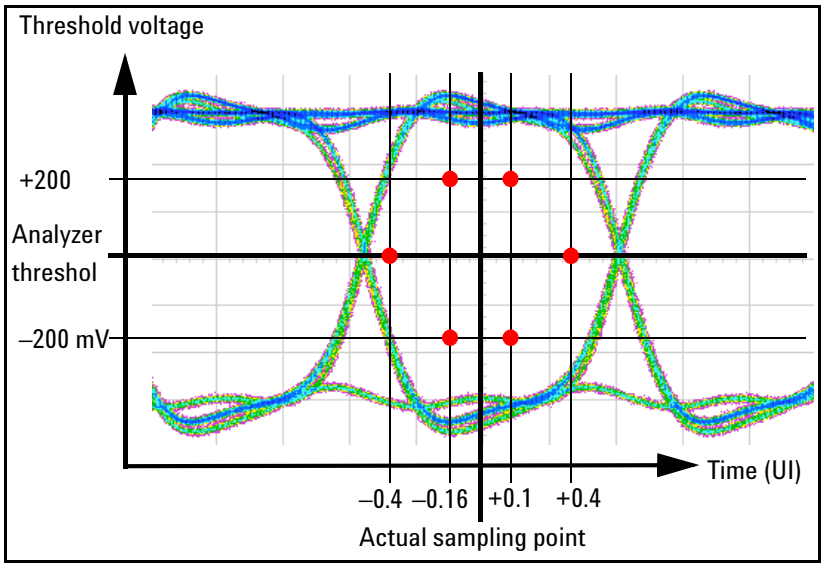
The measurement is run and the result window shows the bit error rates measured at six measurement points. The bit error rates are zero.

Fast Eye Mask4

Port/Terminal	Copied	1	2	3	4	5	6	7
Measurement								
Relative Time		-0.400 UI	0.400 UI	-0.160 UI	0.160 UI	-0.160 UI	0.160 UI	
Voltage(abs)		500.000 mV	500.000 mV	700.000 mV	700.000 mV	300.000 mV	300.000 mV	
[1] Data								
[1:1] Data0		0	0	0	0	0	0	

The result window shows also the positions of the measurement points.

By default, the six measurement points are symmetrically placed, as illustrated in the figure below:



The relative time refers to the actual sampling point. In this example, where *Automatic Bit Synchronization* with *Automatic Phase Alignment* was set, this is the optimum sampling point.

The time unit is UI (Unit Interval). One UI is the period of the current clock frequency. If the system clock frequency is 125 MHz, one UI is 8 ns.

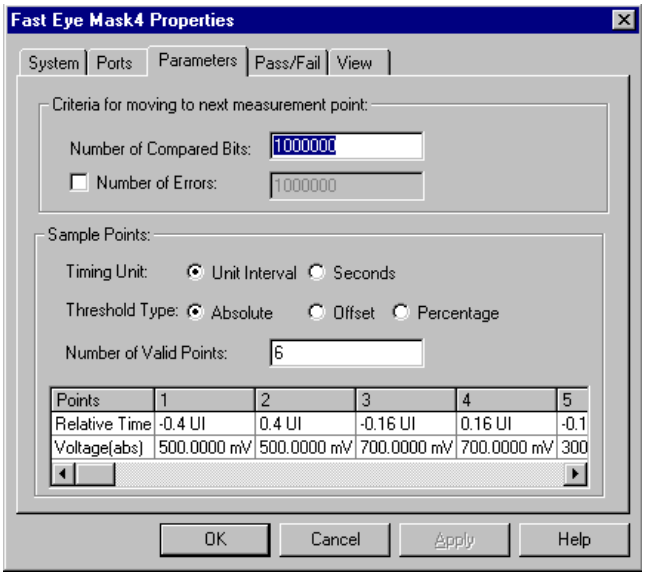
The voltages are derived from the threshold of the first connected analyzer frontend. As we have set an analyzer threshold of 500 mV, the voltages of the measurement points are 500 mV, 300 mV, and 700 mV. By default, these voltages are used for all terminals.

Changing the Fast Eye Mask Properties

The default positions of the six measurement points allow to test many devices under fairly relaxed conditions. However, you may wish to measure more measurement points, to use different voltage levels, or a tighter timing.

1 Open the context menu of the result window (right mouse button) and choose *Properties*.

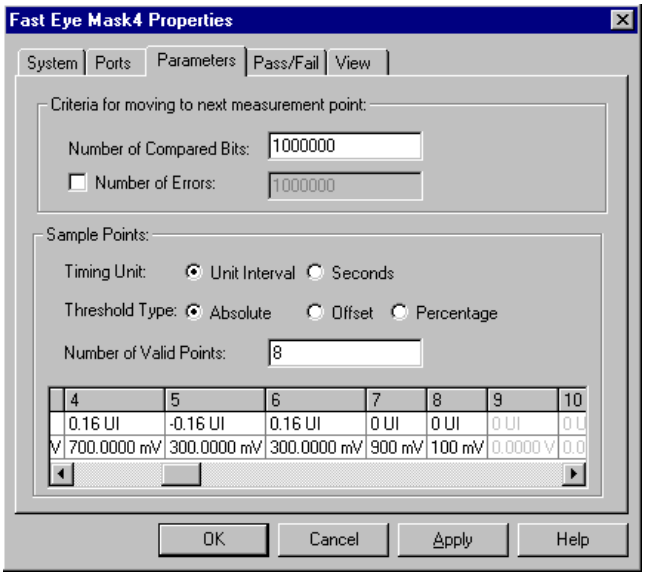
2 Click the *Parameters* tab.



By default, the *Timing Unit* is *Unit Interval* (UI), the *Threshold Type* is *Absolute*. Six measurement points are preset.

One UI is equal to one clock period—in this example 8 ns.

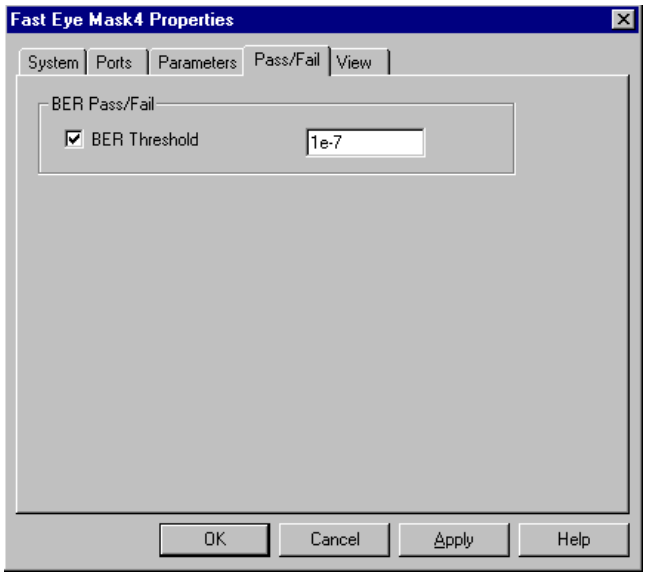
3 Set the Number of Valid Points to 8. Enter the relative time and voltage for these points.



In this example, we will measure the bit error rate at the actual analyzer sampling point, using threshold voltages of 0.1 and 0.9 V.

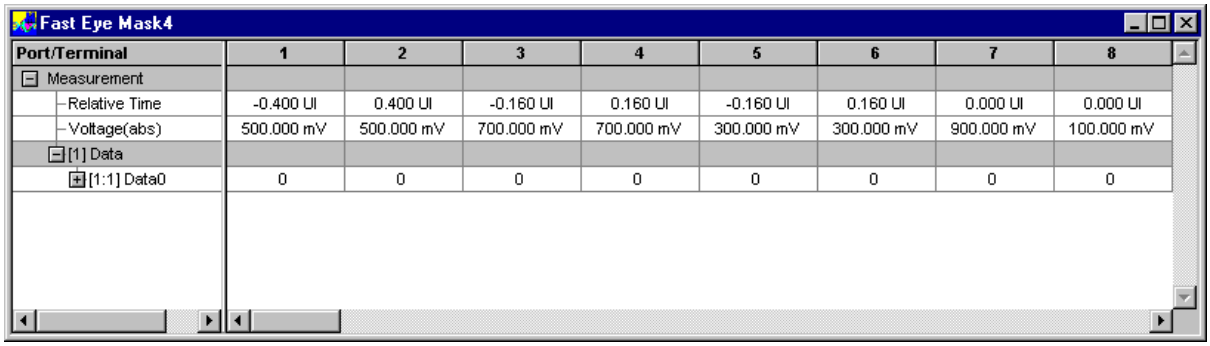
4 Click *Apply*.

5 Click the *Pass/Fail* tab and set a suitable pass/fail limit.



6 Click OK to accept your changes and to close the *Properties* dialog.

7 In the tool bar, click the *Run* button to execute the measurement.



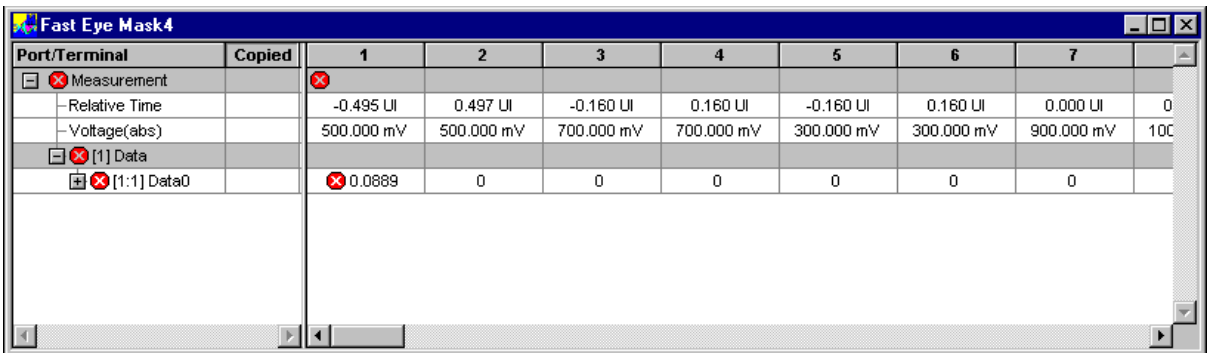
All measurement points have passed.

Critical areas at the analyzer threshold voltage are generally close to ±0.5 UI.

8 Open the *Properties* dialog, click the *Parameters* tab, and set the relative time for the first measurement point to –0.495.

9 Close the *Properties* dialog by clicking *OK*.

10 Run the measurement.



The measurement, the port, the terminal, and the measurement point are marked with “failed” symbols. The measured bit error rate is much higher than 10^{-7}.

Basics of the Fast Eye Mask Measurement

In this chapter you find the following information:

- For the preconditions to be met to run the measurement, refer to *"Prerequisites for Fast Eye Mask Measurements" on page 17*.
- For the definitions of the measurement results, refer to *"Fast Eye Mask Measurement Results" on page 18*.

Prerequisites for Fast Eye Mask Measurements

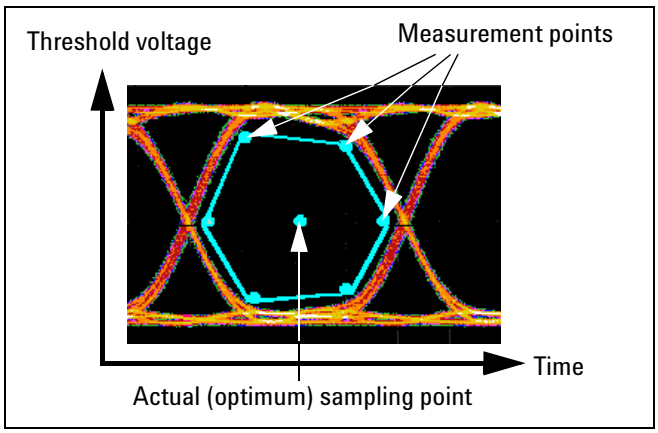
In order to perform fast eye mask measurements, the following prerequisites have to be met in addition to the global ones (see *Prerequisites* in the *Framework User Guide*):

- The analyzers should be synchronized to the incoming data stream
  - either manually (specify a valid start delay)

    or
  - by automatic analyzer sampling point adjustment (Automatic Bit Synchronization or Automatic Delay Alignment).
- If automatic analyzer sampling point adjustment is used, the phase verniers of the analyzers should be in zero position.

Fast Eye Mask Measurement Results

The fast eye mask measurement measures the bit error rate at certain measurement points. These points have to be positioned inside the expected eye opening.



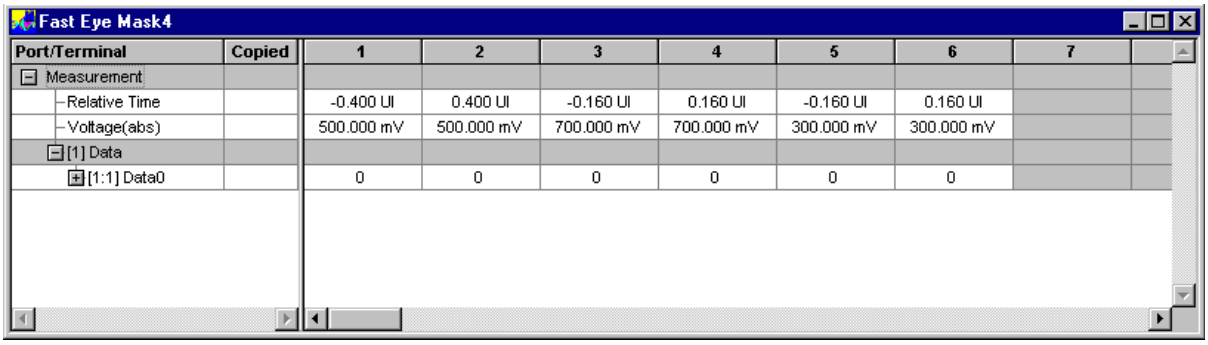
The results of a fast eye mask measurement are displayed in tabular form.

For details see:

- *"The Fast Eye Mask Result Display" on page 19*
- *"Explanation of the Fast Eye Mask Results" on page 22*

The Fast Eye Mask Result Display

The result display of the fast eye mask measurement shows a table:



Port/Terminal	Copied	1	2	3	4	5	6	7
Measurement								
Relative Time		-0.400 UI	0.400 UI	-0.160 UI	0.160 UI	-0.160 UI	0.160 UI	
Voltage(abs)		500.000 mV	500.000 mV	700.000 mV	700.000 mV	300.000 mV	300.000 mV	
[1] Data								
[1:1] Data0		0	0	0	0	0	0	

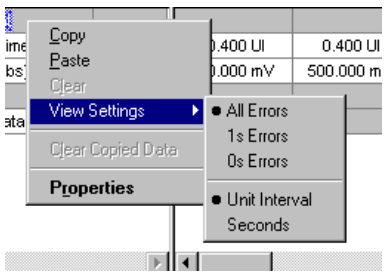
The left-hand section identifies the rows of the table. The rows *Relative Time* and *Voltage* define the positions of the measurement points.

Ports and associated terminals are identified by numbers and names. The terminal number [1:1] means “port one, terminal one”.

The right-hand section shows for each measurement point its position and the bit error rates measured at the terminals. By default, six measurement points are preset, and up to 32 can be specified (for details see *“Explanation of the Fast Eye Mask Results” on page 22*).

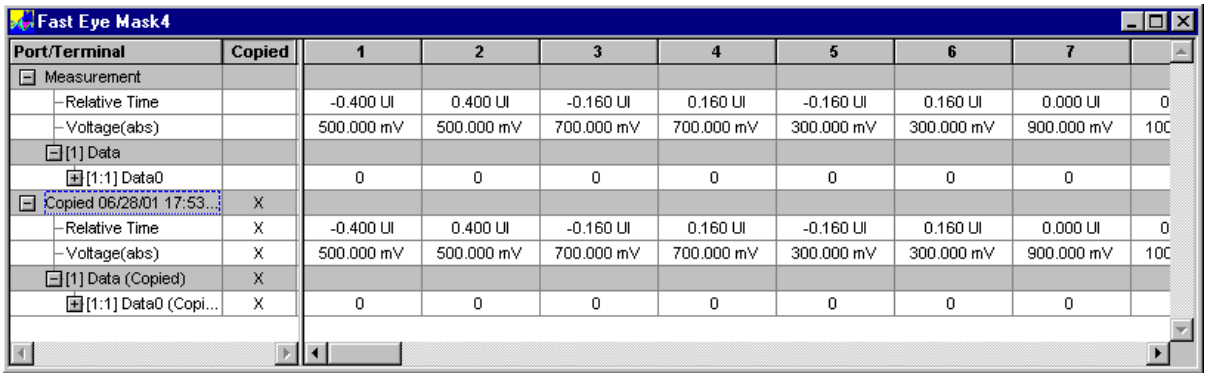
Changing the Display

Context menus are opened by clicking the right mouse button. They provide a convenient means to change the display or to access the *Properties* dialog (see also *“Setting the Properties of a Fast Eye Mask Measurement” on page 25*). The available options depend on the current cursor position.



Copy and paste

You can copy all measurement results or just a few rows to the clipboard and paste them below the present results. This looks as shown below:



Fast Eye Mask4

Port/Terminal	Copied	1	2	3	4	5	6	7	
Measurement									
Relative Time		-0.400 UI	0.400 UI	-0.160 UI	0.160 UI	-0.160 UI	0.160 UI	0.000 UI	0
Voltage(abs)		500.000 mV	500.000 mV	700.000 mV	700.000 mV	300.000 mV	300.000 mV	900.000 mV	100
[1] Data									
[1:1] Data0		0	0	0	0	0	0	0	
Copied 06/28/01 17:53...	X								
Relative Time	X	-0.400 UI	0.400 UI	-0.160 UI	0.160 UI	-0.160 UI	0.160 UI	0.000 UI	0
Voltage(abs)	X	500.000 mV	500.000 mV	700.000 mV	700.000 mV	300.000 mV	300.000 mV	900.000 mV	100
[1] Data (Copied)	X								
[1:1] Data0 (Copi...	X	0	0	0	0	0	0	0	

The copy and paste functions are described in the *ParBERT Measurement Software Framework User Guide*. If copied data is present, the *Clear Copied Data* menu option becomes enabled.

View Settings

You can display the bit error rate calculated from *All Errors* (default), *1s Errors* (errors where logical 1 was expected, but logical 0 received), or *0s Errors* (errors where logical 0 was expected, but logical 1 received).

You can display the *Relative Time* in *UI* (one *Unit Interval* is equal to one system clock period) or in *Seconds*.

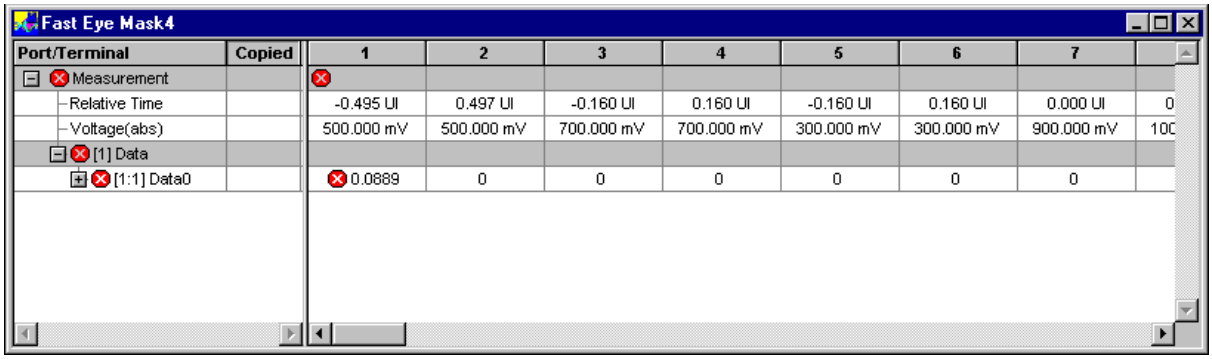
These settings can also be set on the *View* page of the *Properties* dialog.

Show/Hide Part of Calculation

You can show or hide the results of selected ports or terminals.

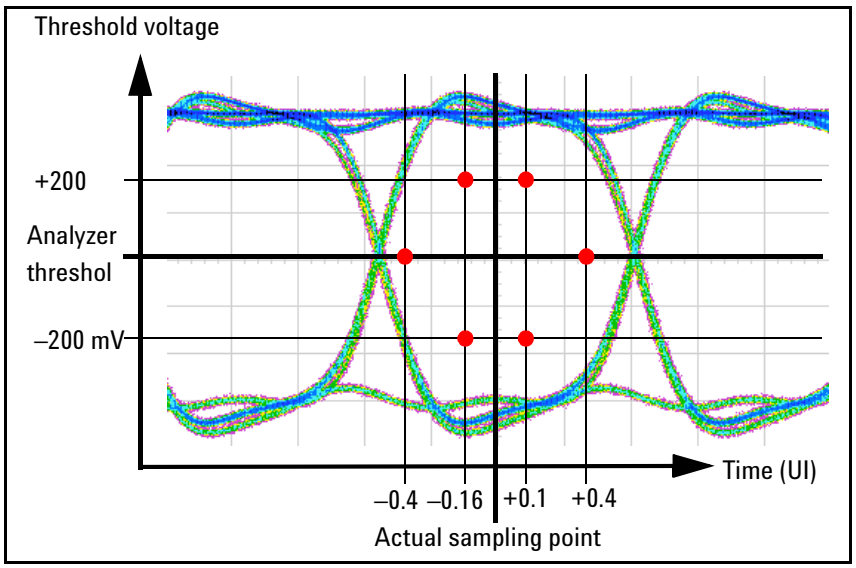
Pass/Fail Indicators

If a bit error rate limit has been set on the *Pass/Fail* page of the *Properties* dialog, failing measurement points, terminals and ports are highlighted as shown below:



Explanation of the Fast Eye Mask Results

By default, the fast eye mask measurement measures the bit error rate at six measurement points. These points are symmetrically placed as illustrated below:



These settings can be changed, and up to 32 measurement points can be defined.

Relative Time

The six default measurement points are preset to ±0.4 UI and ±0.16 UI from the actual sampling point.

If *Automatic Bit Synchronization* with *Automatic Phase Alignment* is enabled (highly recommended) or *Automatic Delay Alignment*, and the phase vernier is in zero position, the actual sampling point is the optimum sampling point.

If the automatic analyzer delay adjustment is disabled, the actual sampling point is set by the analyzer start delay and the phase vernier.

The absolute positions of the actual sampling point may differ from analyzer to analyzer. The *Relative Time* position, however, is the same for all analyzers. Instead of UI (one *Unit Interval* is equal to one system clock period) the relative time can also be specified in seconds.

Measurement Point Voltage

This is the analyzer threshold voltage for measuring the bit error rate at this measurement point. The voltages of the measurement points can be set as absolute voltages, as offset voltages, or as percentages. This is done on the *Parameters* page of the *Properties* dialog (see also *"How to Specify the Measurement Points" on page 32*).

The voltages are distinguished as follows:

- *Absolute*: The thresholds for the measurement points are absolute voltages and set to fixed values for all analyzers.

  In this mode, the voltages of the six default measurement points are derived from the threshold voltage of the first connected analyzer frontend, as defined in the loaded system setting: Threshold, threshold plus 200 mV, and threshold minus 200 mV.

- *Offset*: The thresholds for the measurement points are specified as voltages to be added to or subtracted from the individual threshold voltages of the analyzers defined in the loaded setting.

  In this mode, the offset voltages of the six default measurement points are 0, +300 mV, and –300 mV. If the threshold of an analyzer is set to 500 mV, this would generate measurement point thresholds at 500 mV, 800 mV, and 200 mV.

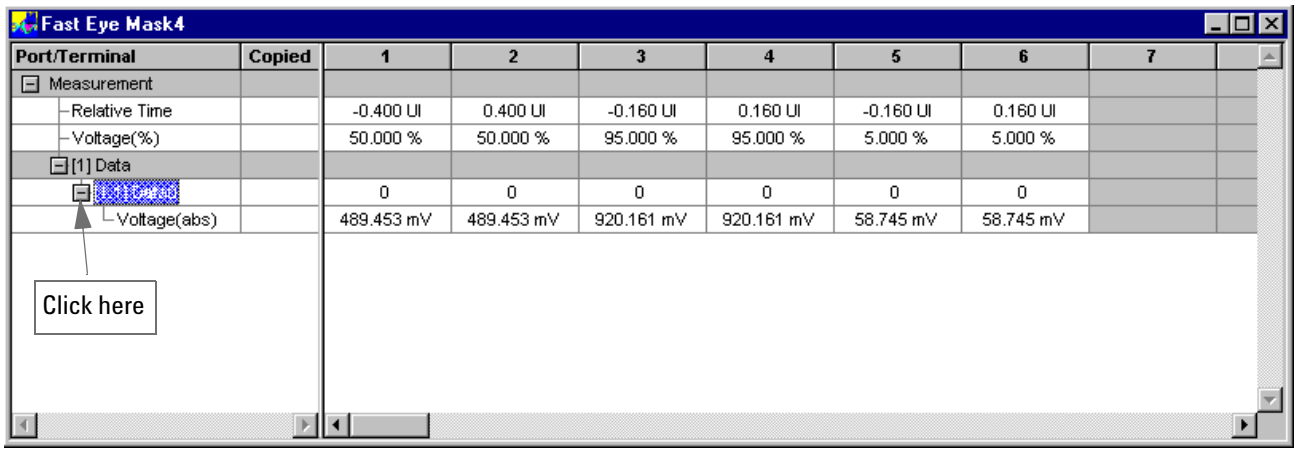
- *Percentage*: The thresholds for the measurement points are specified as a percentile of the current eye opening voltages of the analyzers.

  In this mode, the analyzer frontends automatically determine the height of the eye opening before starting the measurement. Starting from the analyzer threshold defined in the loaded setting, they increment that voltage step by step to find the upper limit, and decrement that voltage step by step to find the lower limit. The limits are reached as soon as a bit error occurs. The error-free voltage range is taken as 100 %.

  In this mode, the percentile voltages of the six default measurement points are 10 %, 50 %, and 90 %.

In offset or percentage mode, every analyzer and hence every terminal can have its own voltages for the measurement points.

The result window therefore provides an extra button for every terminal which can be clicked to view the absolute voltages that have been used for the measurement.



Bit Error Rate

You can display the bit error rate calculated from *All Errors* (default), *1s Errors*, or *0s Errors*.

Option	Definition
All Errors	BER (All Errors) is defined as the total number of errors, divided by the total number of compared bits: $$BER_{AllErrors} = \frac{(\sum Error1s + \sum Error0s)}{(\text{total \# of Bits})}$$
1s Errors	The BER is the number of errors where a 1 is expected, divided by the total number of compared bits: $$BER_{1sErrors} = \frac{\sum Error1s}{(\text{total \# of Bits})}$$
0s Errors	The BER is the number of errors where a 0 is expected, divided by the total number of compared bits: $$BER_{0sErrors} = \frac{\sum Error0s}{(\text{total \# of Bits})}$$

Setting the Properties of a Fast Eye Mask Measurement

Before you can run a new fast eye mask measurement you have to set the required parameters on the measurement's *Properties* pages:

- *"How to Set Up the System to be Used" on page 26*
- *"How to Select the Ports to be Measured" on page 28*
- *"How to Specify the Measurement Parameters" on page 29*
- *"How to Set Pass/Fail Criteria" on page 38*
- *"How to Specify the View" on page 40*

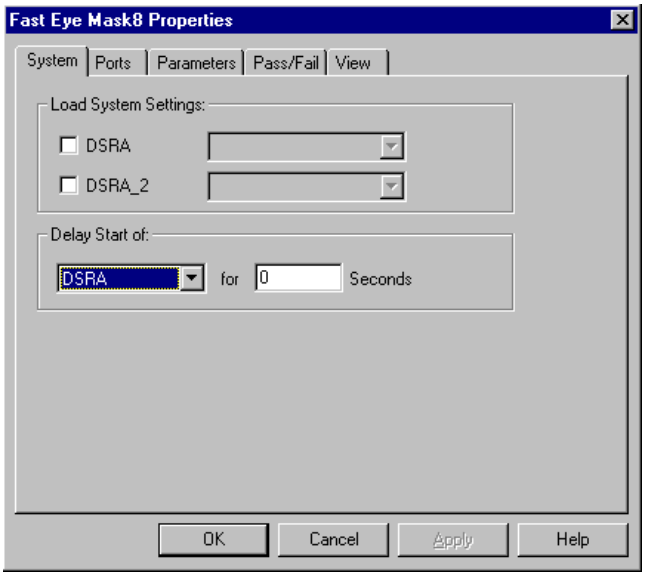
When you create a new measurement the *Properties* dialog will be automatically displayed. To change the parameters of an existing measurement, choose *Measurement – Properties* from the menu bar. Or click the right mouse button and choose *Properties* from the context menu.

If you change the measurement settings after the measurement has been run, please note:

- Changes on the *View* and *Pass/Fail* pages have only an impact on the display of the results. There is no need to repeat the measurement.
- Changes on the *System*, *Ports,* and *Parameters* pages take only effect if you rerun the measurement. To remind you that the present results have not been obtained with the modified settings and that you should repeat the measurement, the result display shows a yellow bar.

How to Set Up the System to be Used

The *System* page of the *Properties* dialog appears automatically if you have set up a new measurement. The *System* page shows one or two systems, depending on your selection when creating the measurement.



If you have already loaded a setting with the *Agilent 81250 User Software*, the name of this setting will be displayed, and it will be used by default.

If no setting is indicated, as in the figure above, or if the name of a different setting than required is displayed, you have to load one or two settings.

To load a setting:

1 Click the check box belonging to the system.

  This activates the setting name field.

2 Choose a suitable setting from the drop-down list.

  When you choose a new system setting, it will be downloaded to the firmware. You have to confirm this action before it will actually be performed.

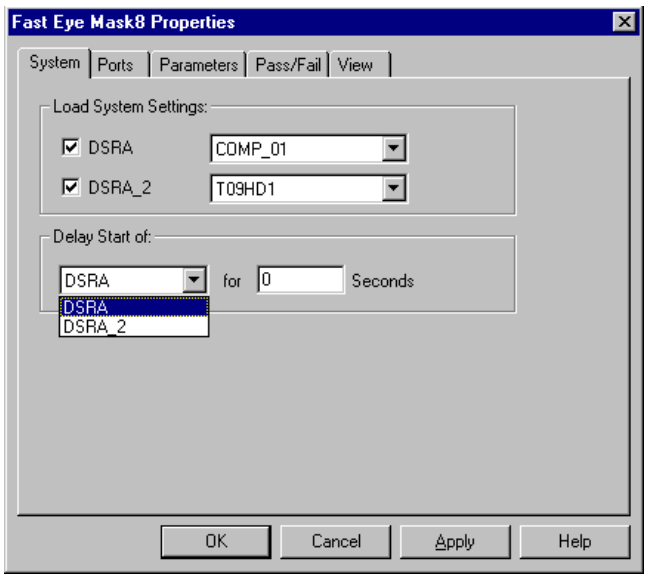
NOTE On one system only one setting can be loaded at one time. The *Agilent 81250 User Software* and the *Agilent 81250 Measurement Software* therefore always refer to the same setting. If the *Agilent 81250 User Software* is active and you load a different setting from the *Agilent 81250 Measurement Software*, the *Agilent 81250 User Software* will be updated, and vice versa.

If you add or delete ports or terminals or change their connections with the *Agilent 81250 User Software*, then the *Agilent 81250 Measurement Software* will detect such changes when you attempt to run the measurement.

TIP If you have changed the current setting with the *Agilent 81250 User Software* and wish to keep your modifications, save the setting with the *Agilent 81250 User Software* before loading a different one. The *Agilent 81250 Measurement Software* does not save settings.

3 In case of two systems, you can specify a start delay for one of the systems.

This may be useful, for instance, to allow a PLL or clock recovery circuit in the DUT to lock onto the incoming data stream.

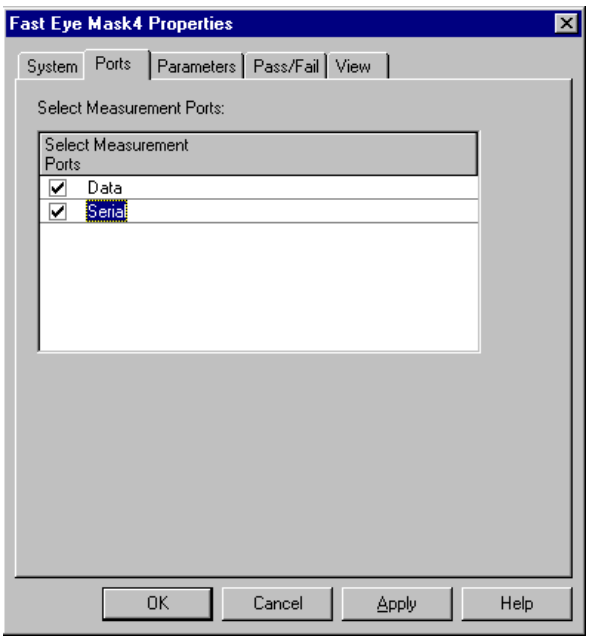


4 Click *Apply* to accept the modifications without leaving the *Properties* dialog. Or click *OK* to accept the modifications and close the *Properties* dialog.

How to Select the Ports to be Measured

After you have specified the measurement system and the related system setting, you may wish to exclude one or several DUT output ports from the measurement.

1 In the *Properties* dialog, select the *Ports* tab.



The *Ports* page lists all the output ports of the device under test, as defined in the loaded setting. In case of two systems, this is the setting loaded on the analyzing system. By default, all these ports are enabled and will be measured.

The display is not automatically updated if you change the loaded setting by means of the *Agilent 81250 User Software*.

2 Disable the ports that shall not be measured.

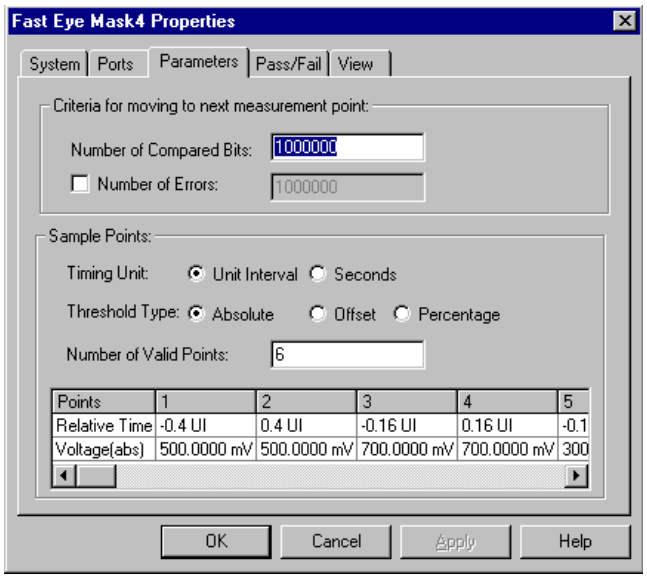
3 Click *Apply* to accept the modifications without leaving the *Properties* dialog. Or click *OK* to accept the modifications and close the *Properties* dialog.

How to Specify the Measurement Parameters

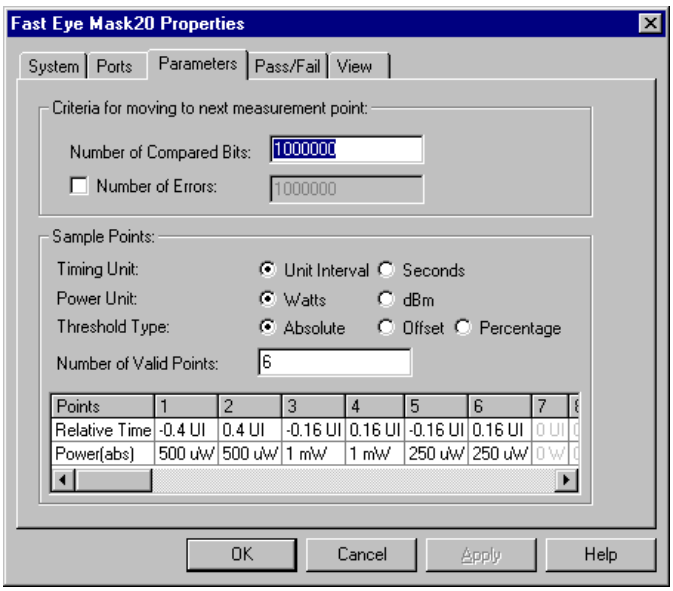
The *Parameters* page of the *Properties* dialog allows you to specify the parameters of the fast eye mask measurement.

NOTE If you modify the settings of this page, you have to rerun the measurement to update the results.

♦ In the *Properties* dialog, click the *Parameters* tab.



If you created a measurement for optical ports, the *Parameters* tab looks as follows:



The figures above show the defaults:

- At each measurement point, one million bits will be compared for measuring the bit error rate at this point.
- The *Number of Errors* is not checked.
- The *Timing Unit* is set to *Unit Interval (UI)*, the *Threshold Type* is set to *Absolute*.
- **For optical ports only**: The *Power Unit* is set to Watts.
- Six measurement points are enabled and preset. The figure above shows the defaults for an analyzer threshold voltage of 500 mV.

For details, see *"How to Set the Criteria for Moving to the Next Point" on page 31* and *"How to Specify the Measurement Points" on page 32*.

How to Set the Criteria for Moving to the Next Point

In the upper section of the *Parameters* page, you can control the speed and precision of the fast eye mask measurement.

1 Change the *Number of Compared Bits*, if desired.

The default number is one million bits.

A smaller number reduces the duration of the whole fast eye mask measurement. A larger number increases the precision of the measured bit error rates.

NOTE If you keep the default setting, the minimum bit error rate you can measure is 10^{-6} (one error per 1,000,000 bits). The pass/fail threshold should be higher. For safety reasons, you would set the pass/fail limit to at least 2e–6 (two errors per million) or higher.

2 If desired, activate the *Number of Errors* and enter a suitable number.

If this check box is active, the software compares the total number of errors from all terminals with this number. If the total is higher, the measurement proceeds to the next measurement point.

This option can be used to reduce the measurement time for points that display many errors.

When you specify a number, you should take the number of terminals and the pass/fail limit into account. You may wish to be informed, if one of the measurement points is critical.

3 Click *Apply* to accept the modifications without leaving the *Properties* dialog. Or click *OK* to accept the modifications and close the *Properties* dialog.

How to Specify the Measurement Points

In the lower section of the *Parameters* page, you can change the defaults and define up to 32 measurement points.

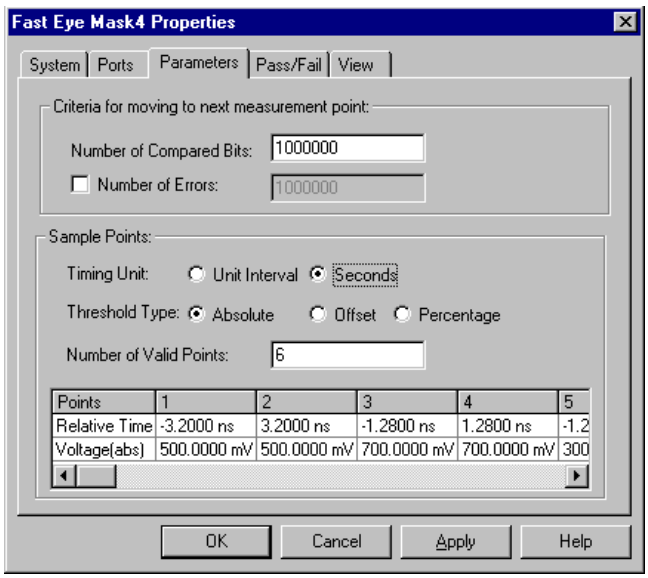
1 Change the *Timing Unit*, if desired. Choices are *Unit Interval* or *Seconds*.

– The *Unit Interval (UI)* is equal to one system clock period. If the system clock period is 10 ns (100 MHz), one UI is also 10 ns. If the system clock period is set to 2.5 ns (400 MHz), one UI is 2.5 ns.

Using the *Unit Interval* is hence a convenient way to set and check timing values independently from the actual test frequency.

The six default measurement points are preset to ±0.4 and ±0.16 UI.

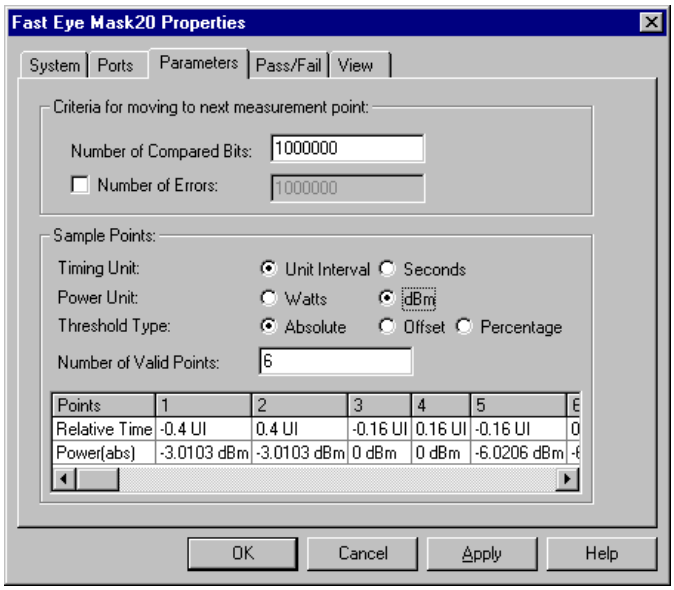
– The timing values can be converted to *Seconds* at any time.



For the example above, a system clock period of 8 ns (125 MHz) was set.

2 For optical ports, change the *Power Unit*, if desired. Choices are *Watts* or *dBm*.

NOTE The Power Unit is only available when optical ports are used for the measurement.



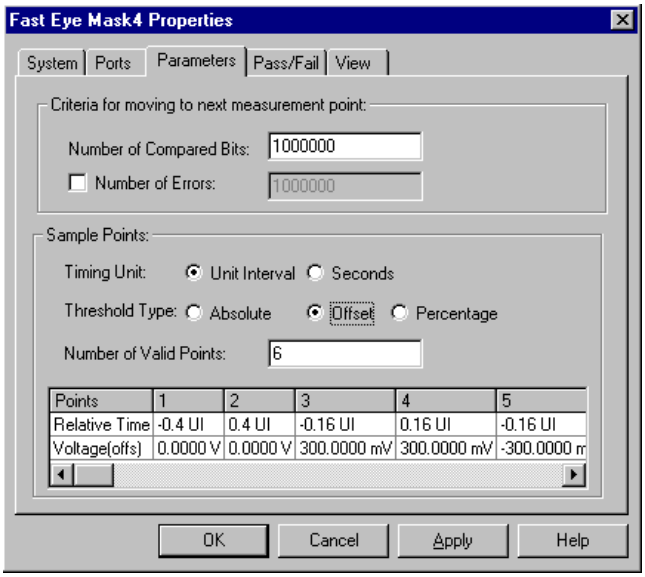
3 Change the *Threshold Type*, if desired. Choices are *Absolute, Offset,* or *Percentage*.

– *Absolute*: You specify the thresholds for the measurement points as absolute voltages.

Defaults: The three voltages of the six default measurement points are derived from the threshold voltage of the first connected analyzer frontend after the clock module, as defined in the loaded system setting: Threshold, threshold plus 200 mV, and threshold minus 200 mV.

– *Offset*: You specify the thresholds for the measurement points as values to be added to or subtracted from the individual analyzer threshold voltages defined in the loaded setting.

Defaults: The three offset voltages of the six default measurement points are: 0, +300 mV, –300 mV.

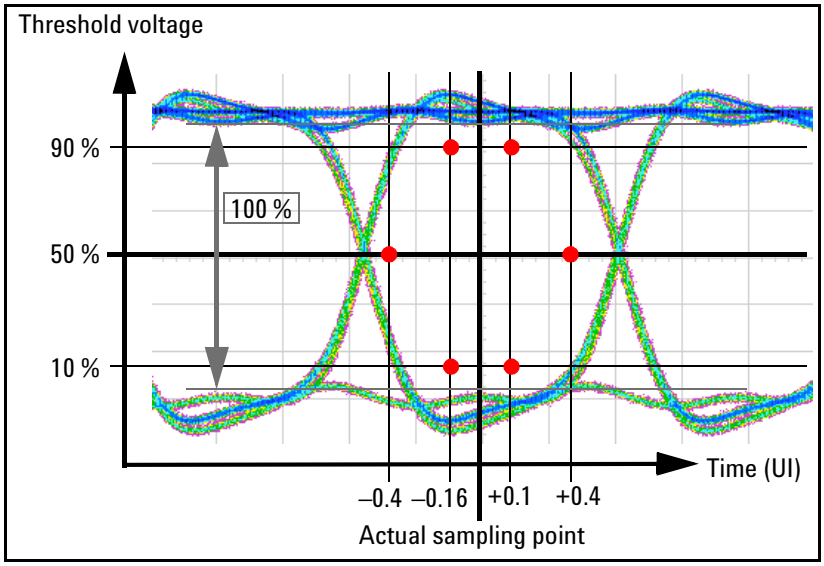


– *Percentage*: You specify the thresholds for the measurement points as a percentile of the current eye opening voltages of the analyzers.

In this mode, every analyzer frontend automatically determines the height of the eye opening before starting the measurement. Thresholds given as percentiles adapt themselves to the received signals.

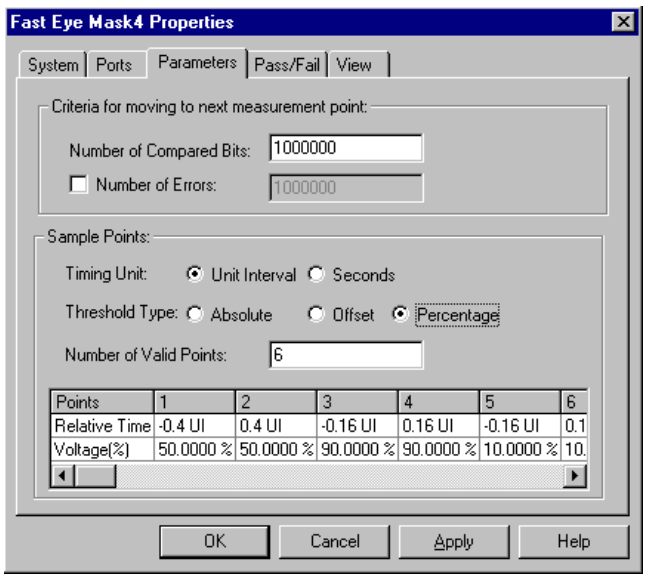
Starting from the analyzer threshold defined in the loaded setting, the analyzers increment that voltage step by step to find the upper limit, and decrement that voltage step by step to find the lower limit. The limits are reached as soon as a bit error occurs. The error-free voltage range is taken as 100 %.

Defaults: The percent voltages of the six default measurement points are: 10 %, 50 %, and 90 %, as illustrated in the figure below.



Depending on the quality and characteristics of the eye opening, the resulting 50 % threshold may deviate from the analyzer threshold defined in the loaded setting.

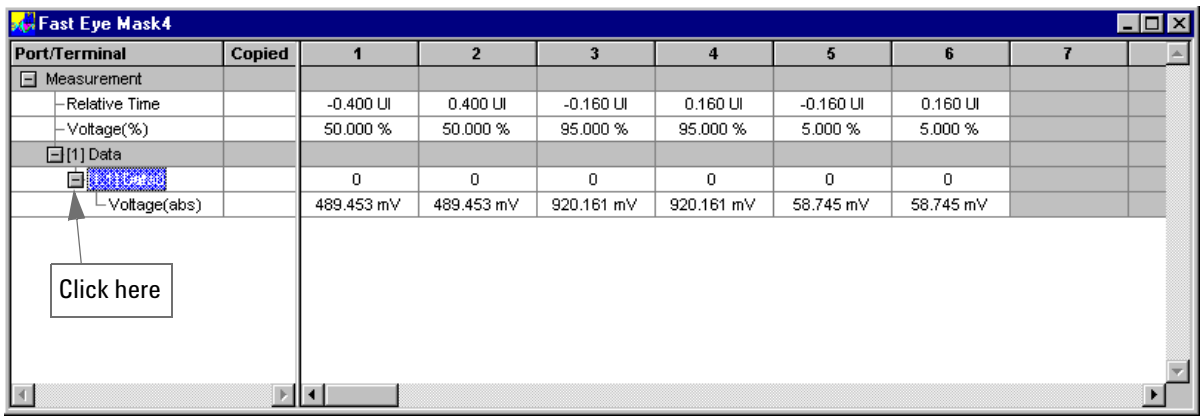
The defaults in percentage mode are shown below.



TIP If your analyzers have been configured to use different threshold levels, you should use the options *Offset* or *Percentage*. These options consider the settings of the individual analyzers.

In offset or percentage mode, every analyzer and hence every terminal can have its own threshold voltages for the measurement points.

The result window therefore provides an extra button for every terminal which can be clicked to view the absolute voltages that have been used for the measurement.



Particularly in percentage mode, this makes it easy to check whether the height and absolute voltage position of the eye opening received by a terminal are within specifications.

4 Change the *Number of Valid Points*, if you wish to use less or more measurement points for the measurement.

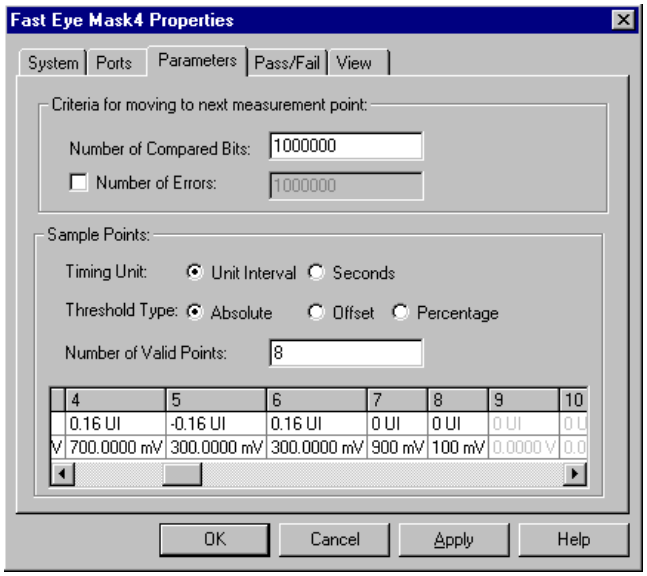
5 Change or add measurement points. Enter the *Relative Time* and *Voltage*.

– *Relative Time*: This positive or negative time value refers to the actual sampling point of the individual analyzer frontend. It has to be entered according to the chosen *Timing Unit*.

If *Automatic Bit Synchronization* with *Automatic Phase Alignment* is enabled (highly recommended) or *Automatic Delay Alignment*, and the phase vernier is in zero position, the actual sampling point is the optimum sampling point.

If the automatic analyzer delay adjustment is disabled, the actual sampling point is set by the analyzer start delay and the phase vernier.

– *Voltage*: This is the analyzer threshold voltage for measuring the bit error rate at this measurement point. It has to be entered according to the chosen *Threshold Type*.



In the figure above, two measurement points have been added at 0 UI as absolute voltages.

6 Click *Apply* to accept the modifications without leaving the *Properties* dialog. Or click *OK* to accept the modifications and close the *Properties* dialog.

How to Set Pass/Fail Criteria

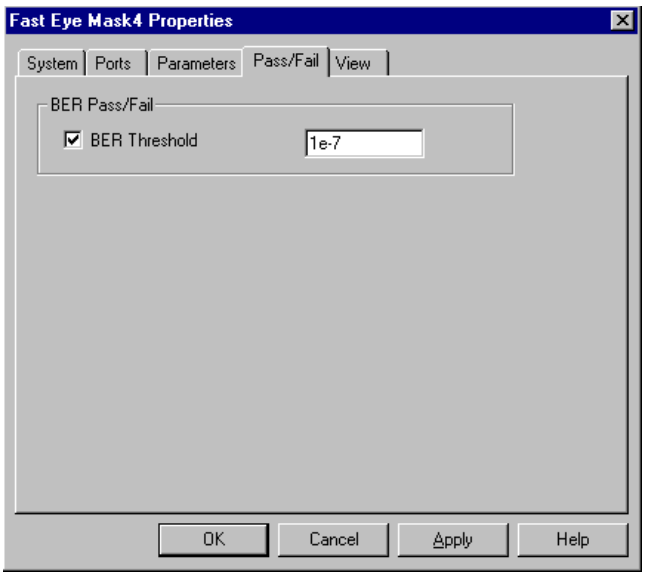
The *Pass/Fail* page of the *Properties* dialog allows you to specify the criteria which determine whether the DUT has passed or failed the test.

You can change the pass/fail criteria without rerunning the measurement. The software compares the results with the limit after the measurement has finished.

1 In the *Properties* dialog, click the *Pass/Fail* tab.

The fast eye mask measurement has only one pass/fail condition: The bit error rate.

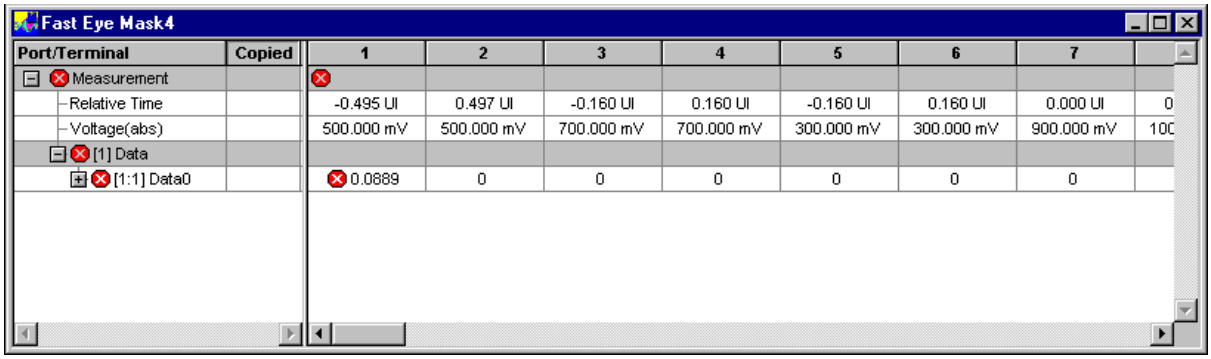
2 If desired, enable the *BER Threshold* and set a suitable threshold.



The minimum useful threshold is determined by the *Number of Compared Bits* (see *"How to Set the Criteria for Moving to the Next Point" on page 31*).

3 Click *Apply* to accept the modifications without leaving the *Properties* dialog. Or click *OK* to accept the modifications and close the *Properties* dialog.

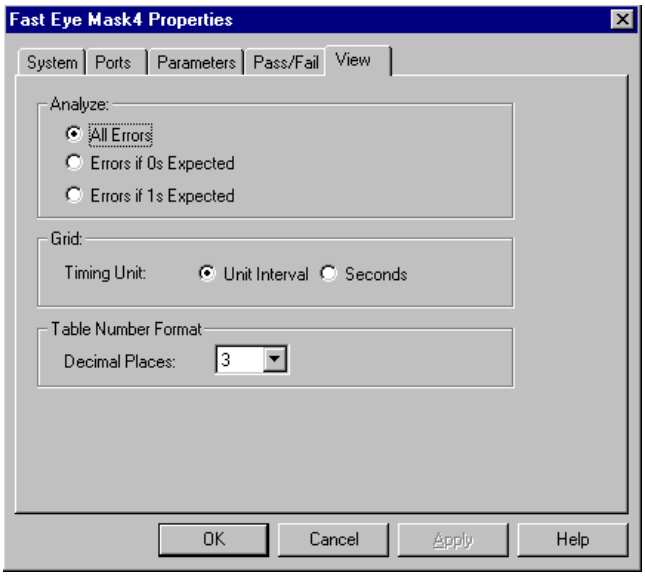
The pass/fail threshold applies to all measurement points, ports and terminals. All measurements where the bit error rate is higher than this threshold will be marked as “failed”, as shown in the figure below:



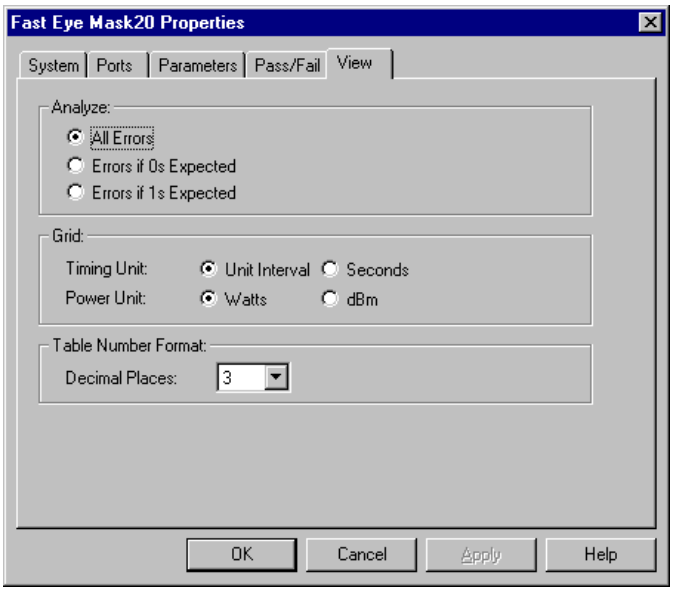
How to Specify the View

The *View* tab of the *Properties* dialog allows you to modify the display of the measurement results.

1 In the *Properties* dialog, click the *View* tab.



If you created a measurement for optical ports, the *View* tab looks as follows:



These figures show the default settings.

2 Set the kind of bit error rate you wish to be displayed. Choices are: *All Errors*, *Errors if 0 expected*, *Errors if 1 expected*.

- *All Errors*: Shows the bit error rate as calculated by dividing the number of errored bits by the total number of received bits.
- *Errors if 0 expected*: Shows the bit error rate as calculated by dividing the number of bits where 0 was expected, but 1 received, by the total number of received bits.
- *Errors if 1 expected*: Shows the bit error rate as calculated by dividing the number of bits where 1 was expected, but 0 received, by the total number of received bits.

3 Set the *Timing Unit* for the display. Choices are: *Unit Interval* or *Seconds*.

- *Unit Interval*: Shows the relative time of the measurement points in Timing Units (UI), independent of the current clock frequency.
- *Seconds*: Shows the relative time of the measurement points in seconds, calculated from the current clock frequency.

4 For optical ports, choose the *Power Unit* for the display of the threshold. Choices are *Watts* or *dBm*.

NOTE The Power Unit is only available when optical ports are used for the measurement.

5 Choose the number of *Decimal Places*.

By default, numbers are displayed with three digits. You can increase or decrease that number.

6 Click *Apply* to accept the modifications without leaving the *Properties* dialog. Or click *OK* to accept the modifications and close the *Properties* dialog.

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