



# Test Report

Overall Result: PASS

Test Configuration Details	
Device Description	
ReturnLossTest	Use Vector Network Analyzer
DisturberSource	Use Keysight 33250A
Test Session Details	
Infiniium SW Version	06.20.00803
Infiniium Model Number	DSO9254A
Infiniium Serial Number	MY51260131
Application SW Version	2.50
Debug Mode Used	No
Compliance Limits (official)	IEEE Std. 802.3ae Specification
Probe (Channel 1)	Model: 1130A Serial: US49490597 Head: E2678A/B Atten: Not Calibrated, Using Default Atten (1.0000E+01) Skew: Not Calibrated, Using Default Skew
Probe (Channel 2)	Model: User Defined Probe Serial: No Serial Num  Atten: Not Calibrated, Using Default Atten (1.0000E+00) Skew: Not Calibrated, Using Default Skew
Probe (Channel 3)	Model: User Defined Probe Serial: No Serial Num  Atten: Not Calibrated, Using Default Atten (1.0000E+00) Skew: Not Calibrated, Using Default Skew
Probe (Channel 4)	Model: User Defined Probe Serial: No Serial Num  Atten: Not Calibrated, Using Default Atten (1.0000E+00) Skew: Not Calibrated, Using Default Skew
Last Test Date	2022-03-17 16:16:09 UTC -06:00

## Summary of Results

Test Statistics	
Failed	0
Passed	15
Total	15

Margin Thresholds	
Warning	< 2 %
Critical	< 0 %

Pass	# Failed	# Trials	Test Name	Actual Value	Margin	Pass Limits
✓	0	1	100 Base-TX, UTP +Vout Differential Output Voltage	1.0124 V	37.6 %	950.0 mV < VALUE < 1.0500 V
✓	0	1	100 Base-TX, UTP -Vout Differential Output Voltage	-1.0083 V	41.7 %	950.0 mV <  VALUE  < 1.0500 V
✓	0	1	100 Base-TX, UTP Signal Amplitude Symmetry	-1.004	40.0 %	980 m <  VALUE  < 1.020
✓	0	1	100 Base-TX, +Vout Overshoot	1.7 %	66.0 %	VALUE < 5.0 %
✓	0	1	100 Base-TX, -Vout Overshoot	1.6 %	68.0 %	VALUE < 5.0 %
✓	0	1	100 Base-TX, UTP AOI Template	0.000	100.0 %	No Mask Failures
✓	0	1	100 Base-TX, AOI +Vout Rise Time	4.060 ns	47.0 %	3.000 ns < VALUE < 5.000 ns
✓	0	1	100 Base-TX, AOI +Vout Fall Time	4.115 ns	44.3 %	3.000 ns < VALUE < 5.000 ns
✓	0	1	100 Base-TX, AOI +Vout Rise/Fall Symmetry	96.30 ps	80.7 %	VALUE < 500.00 ps
✓	0	1	100 Base-TX, AOI -Vout Rise Time	4.038 ns	48.1 %	3.000 ns < VALUE < 5.000 ns
✓	0	1	100 Base-TX, AOI -Vout Fall Time	3.918 ns	45.9 %	3.000 ns < VALUE < 5.000 ns
✓	0	1	100 Base-TX, AOI -Vout Rise/Fall Symmetry	150.90 ps	69.8 %	VALUE < 500.00 ps
✓	0	1	100 Base-TX, AOI Overall Rise/Fall Symmetry	197.09 ps	60.6 %	VALUE < 500.00 ps
✓	0	1	100 Base-TX, Transmit Jitter	811 ps	42.1 %	VALUE < 1.400 ns
✓	0	1	100 Base-TX, Duty Cycle Distortion	111.680 ps	77.7 %	VALUE <= 500.000 ps

## Report Detail

✓ 100 Base-TX, UTP +Vout Differential Output Voltage	
<i>Reference: IEEE Std. 802.3ae ()</i>	
Test Summary: Pass	Test Description: Vout is defined as the straight line best fit for amplitude. Here, Vout is measured over a 96ns pulse.
Pass Limits: (950.0 mV to 1.0500 V)	+Vout: 1.0124 V

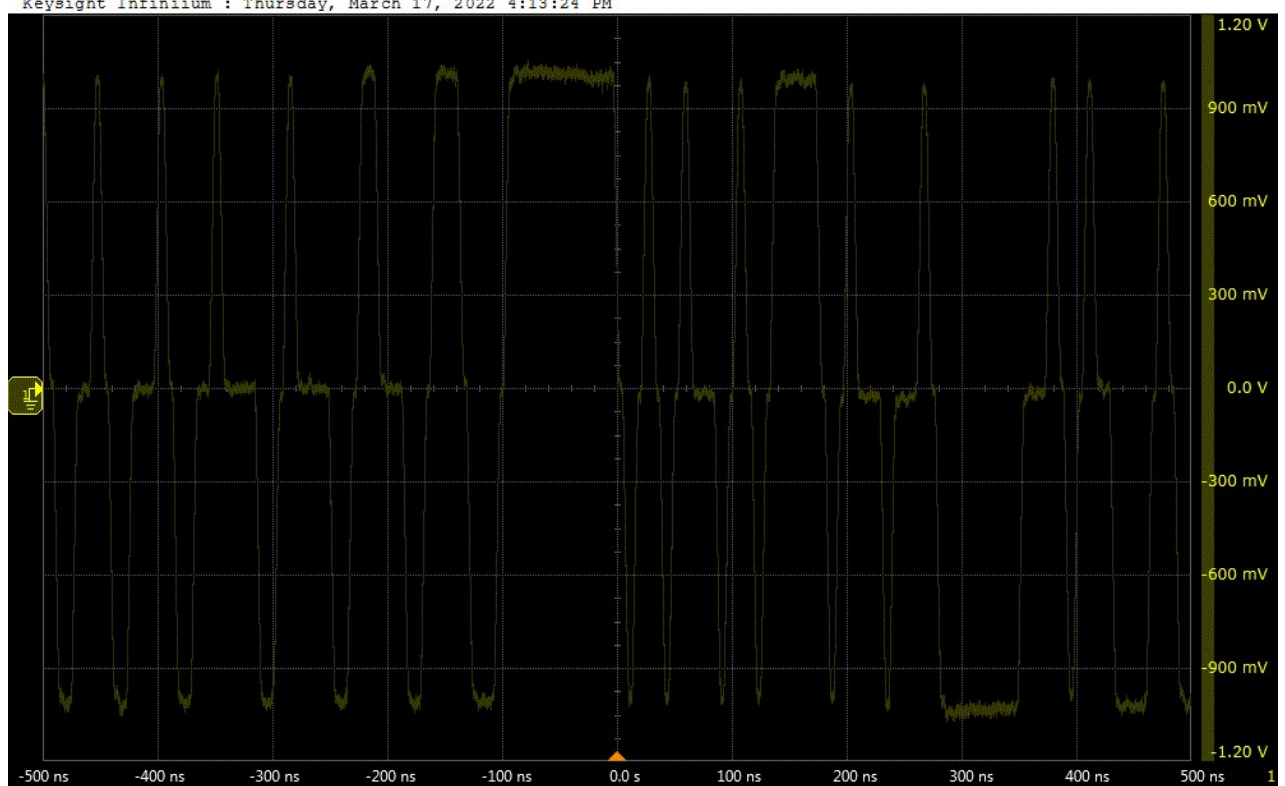
### Result Details

Mid Voltage	0.000 V	#Avgs	128
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Trial 1

Trial 1: +Vout

Keysight Infiniium : Thursday, March 17, 2022 4:13:24 PM



✓ 100 Base-TX, UTP -Vout Differential Output Voltage  
Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.2.2)

Test Summary: Pass Test Description: Vout is defined as the straight line best fit for amplitude. Here, Vout is measured over a 96ns pulse.

Pass Limits: (950.0 mV to 1.0500 V) -Vout -1.0083 V

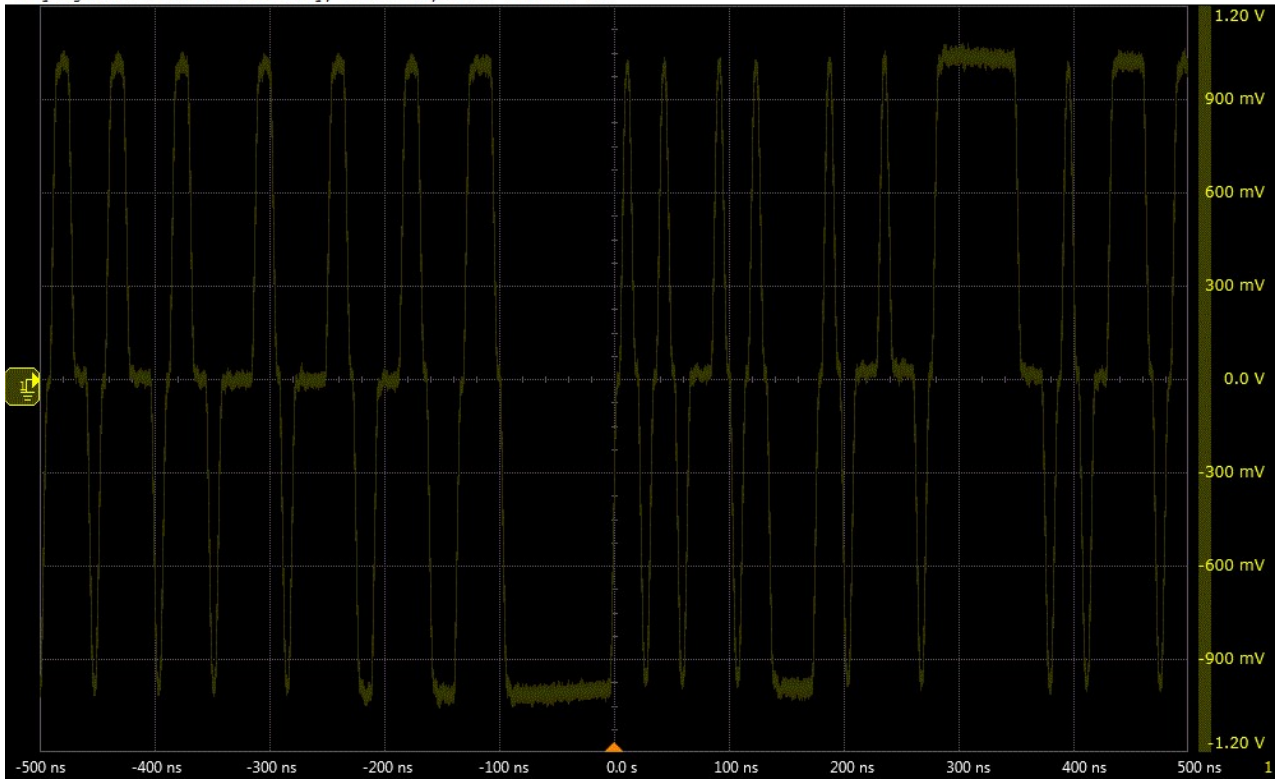
Result Details

Mid Voltage 0.000 V #Avgs 128

Trial 1

Trial 1: -Vout

Keysight Infiniium : Thursday, March 17, 2022 4:13:37 PM



### ✓ 100 Base-TX, UTP Signal Amplitude Symmetry

Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.4)

Test Summary: Pass

Test Description: The ratio of the +Vout magnitude to -Vout magnitude shall be between the limits of 0.98 and 1.02

Pass Limits: (980 m to 1.020)

Amplitude Symmetry: -1.004

#### Result Details

+Vout 1.0124 V

-Vout -1.0083 V

#Avgs 128

### ✓ 100 Base-TX, +Vout Overshoot

Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.3)

Test Summary: Pass

Test Description: We define overshoot as the percentage difference between the peak voltage of the waveform and the final adjusted value (VOut). The peak voltage is measured between the 50% transition crossing time from 0 to VOut and a point in time 8ns afterward.

Overshoot 0s computed as  $(V_{peak} - V_{Out})/V_{Out} * 100$  percent.

Pass Limits: &lt; 5.0 %

+Overshoot (%) 1.7 %

#### Result Details

VPeak 1.0294 V

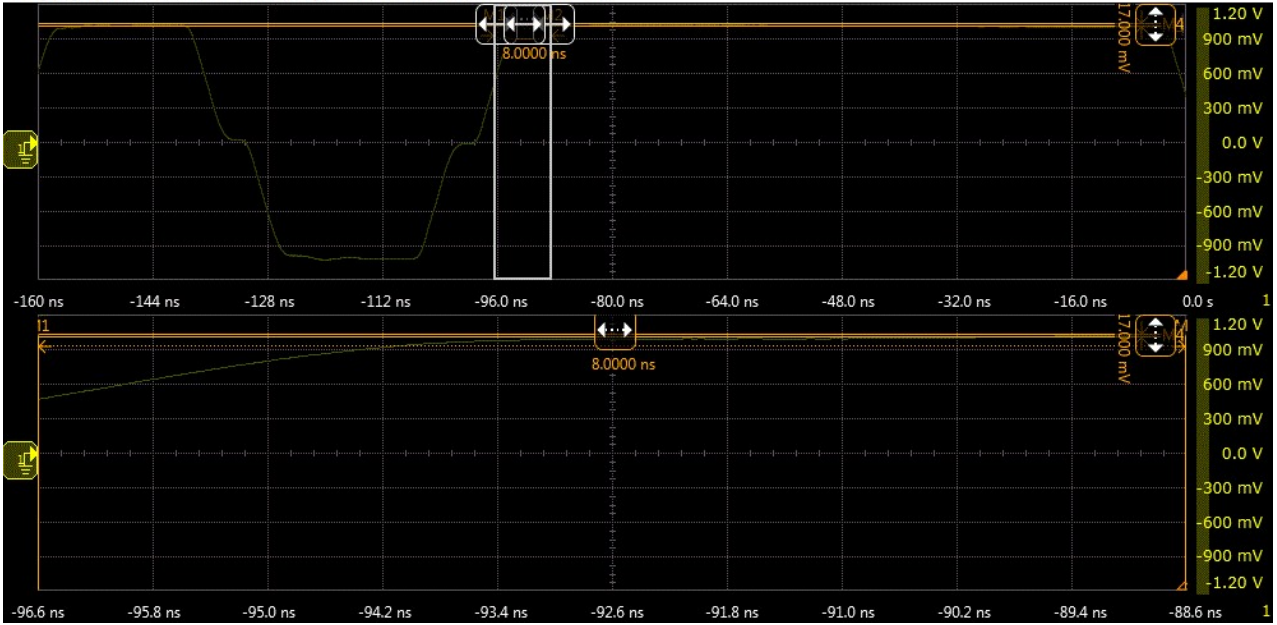
VOut 1.0124 V

#Avgs 128

Trial 1

Trial 1: +Overshoot (%)

Keysight Infiniium : Thursday, March 17, 2022 4:13:42 PM



✓ 100 Base-TX, -Vout Overshoot Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.3)

**Test Summary:** Pass    **Test Description:** We define overshoot as the percentage difference between the peak voltage of the waveform and the final adjusted value (VOut). The peak voltage is measured between the 50% transition crossing time from 0 to VOut and a point in time 8ns afterward. Overshoot 0s computed as (Vpeak - VOut)/VOut \* 100 percent.

**Pass Limits:** < 5.0.%    **-Overshoot (%)** 1.6.%

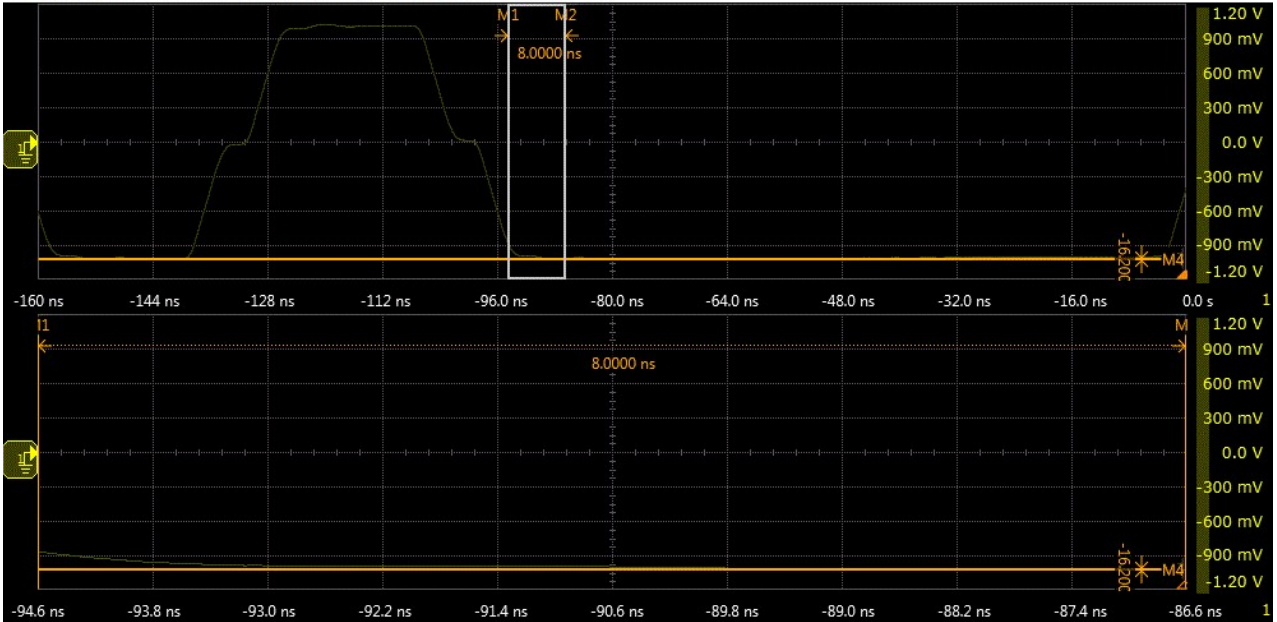
**Result Details**

**VPeak** 1.0245 V    **VOut** 1.0083 V    **#Avgs** 128

**Trial 1**

Trial 1: -Overshoot (%)

Keysight Infiniium : Thursday, March 17, 2022 4:13:48 PM



✓ 100 Base-TX, UTP AOI Template Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Annex J)

**Test Summary:** Pass    **Test Description:** The template is first centered vertically on the eye pattern baseline. It should be translated horizontally and scaled in amplitude for the best fit to the eye pattern. For UTP, the scaling factor must be between 0.95 and 1.05.

**Pass Limits:** No.Mask.Failures.    **Total # Failures** 0.000.

**Result Details**

**Eye TopAutofit Mask Scale** 983 m **Eye Top -- #Waveforms Tested** 100.0

**Eye Top -- Failure Details** No Failure **Eye Top** (no value) **Eye BottomAutofit Mask Scale** 977 m

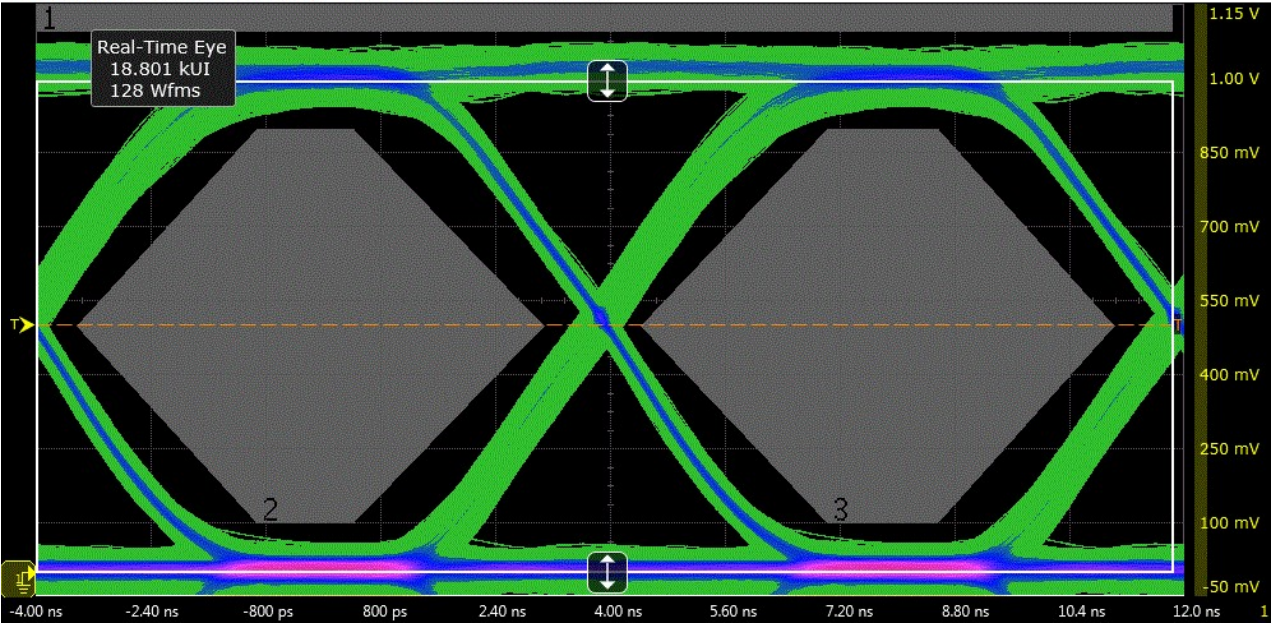
**Eye Bottom -- #Waveforms Tested** 100.0 **Eye Bottom -- Failure Details** No Failure **Eye Bottom** (no value)

**# Waveforms** 100

**Trial 1**

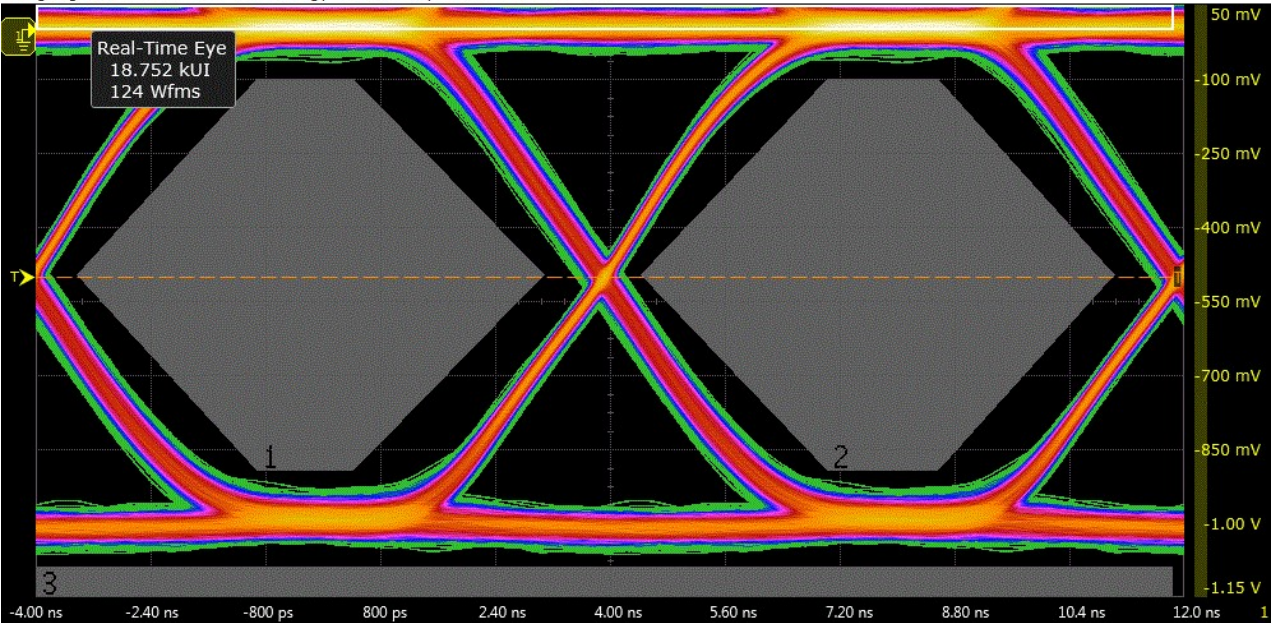
Trial 1: Eye Top -- No Failures

Keysight Infiniium : Thursday, March 17, 2022 4:14:10 PM



Trial 1: Eye Bottom -- No Failures

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**✓100 Base-TX, AOI +Vout Rise Time** *Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)*

**Test Summary:** Pass **Test Description:** The AOI signal rise is defined as the transition from the baseline voltage (nominally 0V) to either +Vout or -Vout. The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. A number of rise/falltime measurements are made. The worst case is reported here.

**Pass Limits:** (3.000 ns to 5.000 ns) **Worst Case Risetime** 4.060 ns

**Result Details**

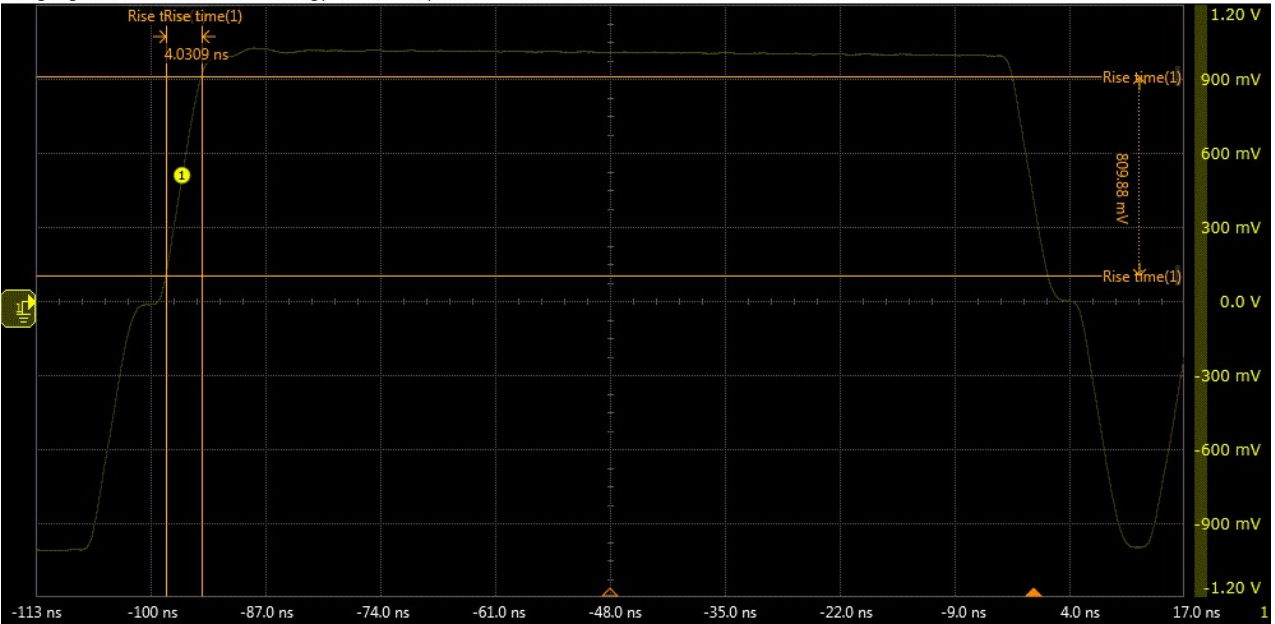
**Maximum Risetime** 4.060 ns **Minimum Risetime** 4.019 ns **Average Risetime** 4.027 ns **+Vout** 1.0124 V

# Rise/Fall Avgs 128 # Rise/Fall Meas 100

**Trial 1**

Trial 1: One +Vout Signal Rise (of 100.0 total)

Keysight Infiniium : Thursday, March 17, 2022 4:14:50 PM



✓100 Base-TX, AOI +Vout Fall Time Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)

Test Summary: Pass Test Description: The AOI signal fall is defined as the transition from the +Vout or -Vout to the baseline voltage (nominally 0V). The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. Note that this test uses 100 measurements. The reported "Actual Value" is the current/last measurement. The statistics (min/max) over 100 measurements are used to determine compliance.

Pass Limits: (3.000 ns to 5.000 ns) Worst Case Faltime 4.115 ns

**Result Details**

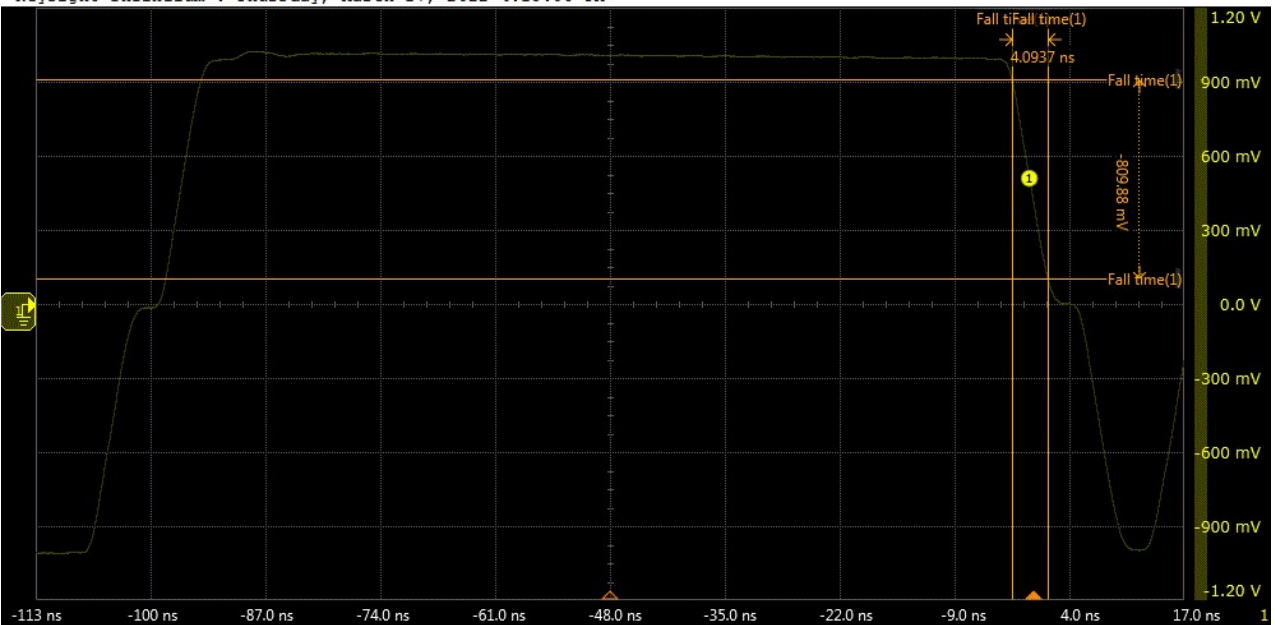
Maximum Faltime 4.115 ns Minimum Faltime 4.041 ns Average Faltime 4.087 ns +Vout 1.0124 V

# Rise/Fall Avgs 128 # Rise/Fall Meas 100

**Trial 1**

Trial 1: One +Vout Signal Fall (of 100.0 total)

Keysight Infiniium : Thursday, March 17, 2022 4:15:06 PM



✓100 Base-TX, AOI +Vout Rise/Fall Symmetry Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)

Test Summary: Pass Test Description: The difference between the maximum and minimum of all rise and fall times shall be less than or equal to 0.5ns. The statistics (min/max Rise/Falltime) over 100 measurements are used to determine compliance.

Pass Limits: < 500.00 ps +Vout, Worst Case Delta 96.30 ps

### Result Details

Min Risetime 4.019 ns Max Risetime 4.060 ns Min Falltime 4.041 ns Max Falltime 4.115 ns  
+Vout 1.0124 V # Rise/Fall Avgs 128 # Rise/Fall Meas 100

## ✓100 Base-TX, AOI -Vout Rise Time

Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)

Test Summary: Pass Test Description: The AOI signal rise is defined as the transition from the baseline voltage (nominally 0V) to either +Vout or -Vout. The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. Note that this test uses 100 measurements. The reported "Actual Value" is the current/last measurement. The statistics (min/max) over 100 measurements are used to determine compliance.

Pass Limits: (3.000 ns to 5.000 ns) Worst Case Risetime 4.038 ns

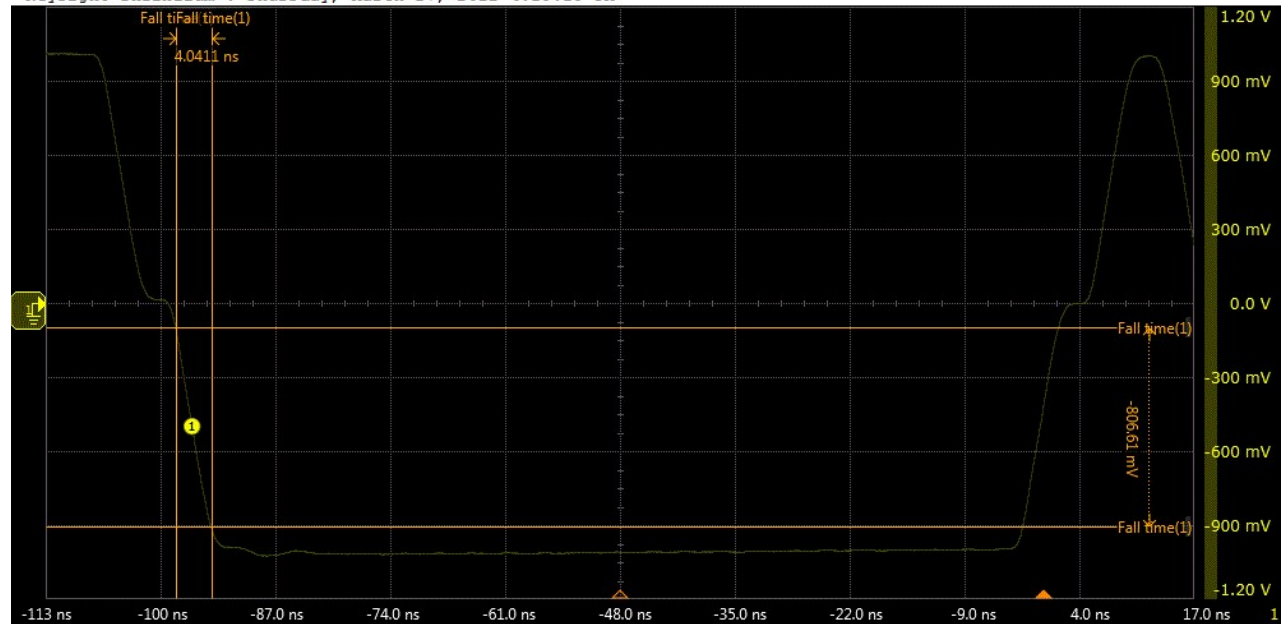
### Result Details

Maximum Risetime 4.038 ns Minimum Risetime 4.029 ns Average Risetime 4.033 ns -Vout -1.0083 V  
# Rise/Fall Avgs 128 # Rise/Fall Meas 100

#### Trial 1

Trial 1: One -Vout Signal Rise (of 100.0 total)

Keysight Infiniium : Thursday, March 17, 2022 4:15:15 PM



## ✓100 Base-TX, AOI -Vout Fall Time

Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)

Test Summary: Pass Test Description: The AOI signal fall is defined as the transition from the +Vout or -Vout to the baseline voltage (nominally 0V). The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. Note that this test uses 100 measurements. The reported "Actual Value" is the current/last measurement. The statistics (min/max) over 100 measurements are used to determine compliance.

Pass Limits: (3.000 ns to 5.000 ns) Worst Case Falltime 3.918 ns

### Result Details

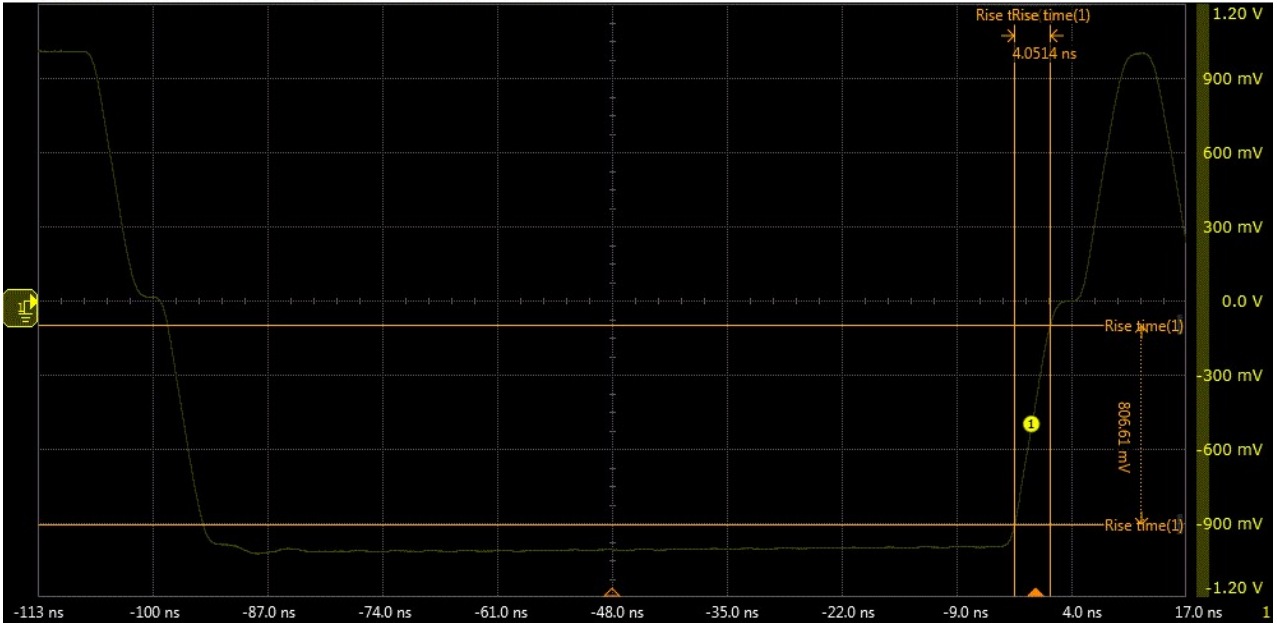
Maximum Falltime 4.069 ns Minimum Falltime 3.918 ns Average Falltime 4.053 ns -Vout -1.0083 V  
# Rise/Fall Avgs 128 # Rise/Fall Meas 100

#### Trial 1



**Trial 1: One -Vout Signal Fall (of 100.0 total)**

Keysight Infiniium : Thursday, March 17, 2022 4:15:30 PM



**✓100 Base-TX, AOI -Vout Rise/Fall Symmetry**  
*Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)*

**Test Summary:** Pass    **Test Description:** The difference between the maximum and minimum of all rise and fall times shall be less than or equal to 0.5ns. The statistics (min/max Rise/Falltime) over 100 measurements are used to determine compliance.

**Pass Limits:** < 500.00 ps    **-Vout Worst Case Delta** 150.90 ps

**Result Details**

<b>-Vout</b> -1.0083 V	<b>Minimum Risetime</b> 4.029 ns	<b>Maximum Risetime</b> 4.038 ns	<b>Minimum Falltime</b> 3.918 ns
<b>Maximum Falltime</b> 4.069 ns	<b># Rise/Fall Avgs</b> 128	<b># Rise/Fall Meas</b> 100	

**✓100 Base-TX, AOI Overall Rise/Fall Symmetry**  
*Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.6)*

**Test Summary:** Pass    **Test Description:** The difference between the maximum and minimum of all rise and fall times shall be less than or equal to 0.5ns. The statistics (min/max Rise/Falltime) over 100 measurements are used to determine compliance.

**Pass Limits:** < 500.00 ps    **+Vout, Worst Case Delta** 197.09 ps

**Result Details**

<b>Min Rise/Falltime</b> 3.918 ns	<b>Max Rise/Falltime</b> 4.115 ns	<b># Rise/Fall Avgs</b> 128	<b># Rise/Fall Meas</b> 100
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**✓100 Base-TX, Transmit Jitter**  
*Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.9)*

**Test Summary:** Pass    **Test Description:** Total Transmit jitter, including contributions from duty cycle distortion and Baseline Wander shall not exceed 1.4 ns peak-to-peak.

**Pass Limits:** < 1.400 ns    **PkPk Transmit Jitter (ns)** 811 ps

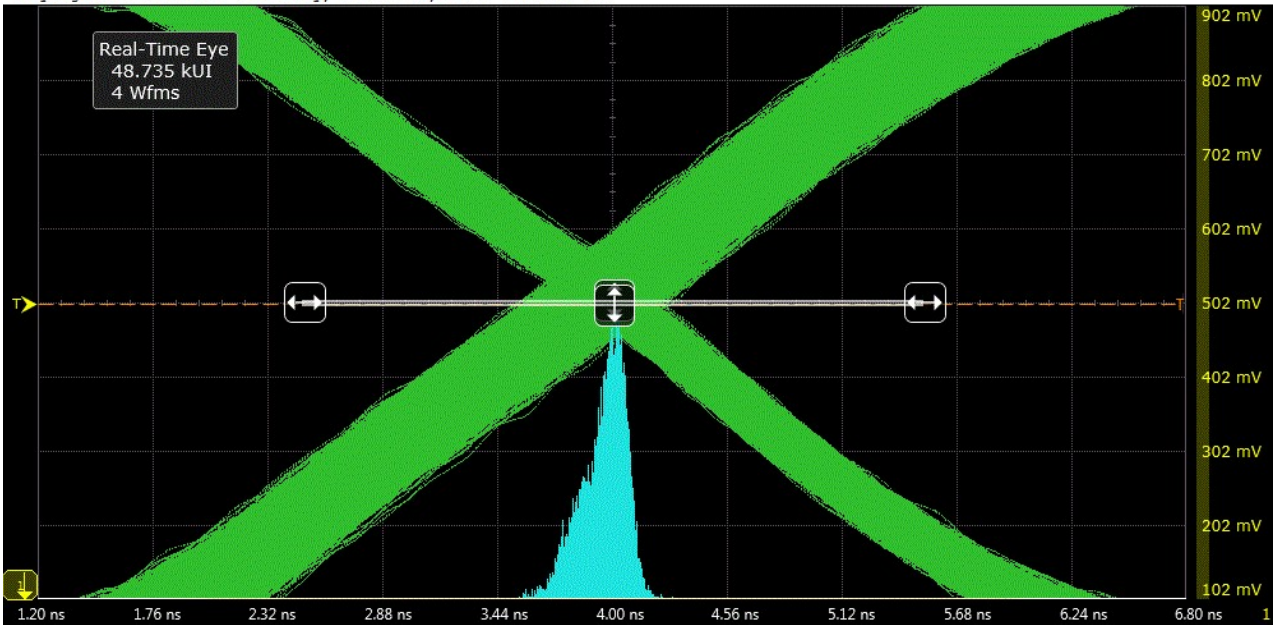
**Result Details**

<b>Top Crossing Min</b> -468.1 ps	<b>Top Crossing Max</b> 302.2 ps	<b>Top Crossing Width</b> 770 ps
<b>Bottom Crossing Min</b> -377.9 ps	<b>Bottom Crossing Max</b> 343.3 ps	<b>Bottom Crossing Width</b> 721 ps
<b>Total UI Measured</b> 1.024960e+005 (2.435300e+004 actual crossings)	<b>Minimum #Jitter UI requested</b> 100,000	

Trial 1

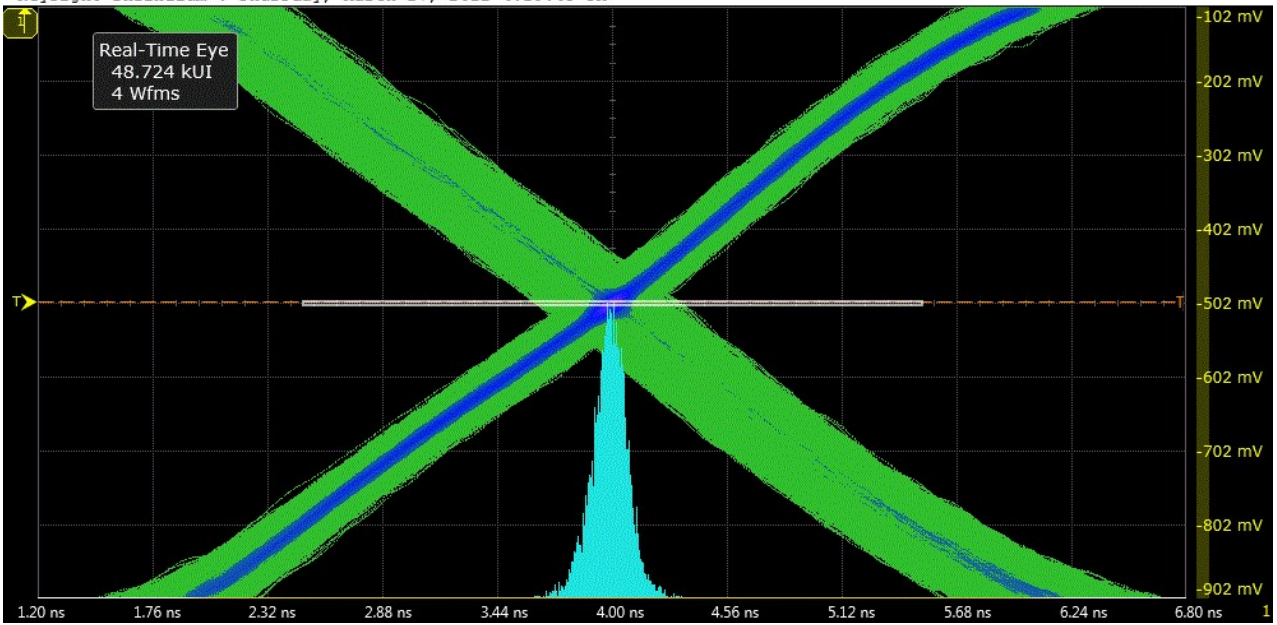
**Trial 1: Top Crossing Width**

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**Trial 1: Bottom Crossing Width**

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**✓100 Base-TX, Duty Cycle Distortion** *Reference: IEEE Std. 802.3ae (ANSI X3.263-1995, Section 9.1.8)*

Test Summary: **Pass**    Test Description: The deviations of the 50 crossing times from a best fit to a time grid of 16 ns spacing shall not exceed +/- 0.25 ns. The peak-to-peak Duty Cycle Distortion shall not exceed 0.5ns

Pass Limits:  $\leq 500.000$  ps.    PkPk.Duty.Cycle.Distortion...1.11.680 ps.

**Result Details**

**t1-t0** 16.108420 ns    **t2-t1** 15.977970 ns    **t3-t2** 15.910350 ns

Trial 1

Trial 1: DCD Waveform (PkPk)  
DCD=1.116800e+002ps)

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