KEYSIGHT TECHNOLOGIES

Test Report

Overall Result: FAIL

Test Configuration Details	
Device Description	
Test Mode	Host
10G	No
5G	Yes
Reference Clock Option	SSC
TypeOFDUT	Gen 1
User defined S-parameter file	C:\Users\Public\Documents\Infiniium\Apps\USB3Test\TransferFunctions\N7015A_Deembed__13p5dbLossAt2p5GHz_Embed.tf4
User defined SSP S-parameter file	C:\Users\Public\Documents\Infiniium\Apps\USB3Test\TransferFunctions\N7015A_Deembed__TypC_TypC_14p1dbAt5GHz_Embed.tf4
Test Session Details	
Infiniium SW Version	6.20.1001.0
Infiniium Model Number	DSAV164A
Infiniium Serial Number	MY58120108
Application SW Version	3.31.0.0
Debug Mode Used	No
Compliance Limits	USB 3.1 Specification version 1.0 (official)
Last Test Date	2025-01-13 11:08:24 UTC +08:00

Summary of Results

Test Statistics	
Failed	2
Passed	20
Total	22

Margin Thresholds	
Warning	< 5 %
Critical	< 0 %

Pass	# Failed	# Trials	Test Name	Actual Value	Margin	Pass Limits
✓	0	1	5G LFPS Peak-Peak Differential Output Voltage	1.1012 V	24.7 %	800.0 mV <= VALUE <= 1.2000 V
✓	0	1	5G LFPS Period (tPeriod)	31.3848 ns	14.2 %	20.0000 ns <= VALUE <= 100.0000 ns
✓	0	1	5G LFPS Burst Width (tBurst)	1.0446 µs	44.4 %	600.0 ns <= VALUE <= 1.4000 µs
✓	0	1	5G LFPS Repeat Time Interval (tRepeat)	10.0431 µs	49.5 %	6.0000 µs <= VALUE <= 14.0000 µs
✓	0	1	5G LFPS Rise Time	177.9 ps	95.6 %	VALUE <= 4.0000 ns
✓	0	1	5G LFPS Fall Time	175.9 ps	95.6 %	VALUE <= 4.0000 ns
✓	0	1	5G LFPS Duty cycle	49.9773 %	49.9 %	40.0000 % <= VALUE <= 60.0000 %
✓	0	1	5G LFPS AC Common Mode Voltage	90.7 mV	9.3 %	VALUE <= 100.0 mV
✓	0	1	5G TSSC-Freq-Dev-Min	-5.262163 kppm	**2.4 %**	-5.300000 kppm <= VALUE <= -3.700000 kppm
✓	0	1	5G TSSC-Freq-Dev-Max	270.073 ppm	**5.0 %**	TSSCMin ppm <= VALUE <= TSSCMax ppm
✓	0	1	5G SSC Modulation Rate	31.517800 kHz	49.4 %	30.000000 kHz <= VALUE <= 33.000000 kHz
✓	0	1	5G SSC Slew Rate	5.244 ms	47.6 %	VALUE <= 10.000 ms
ⓘ		1	5G Short Channel Random Jitter	13.941 ps		Information Only
✓	0	1	5G Short Channel Maximum Deterministic Jitter	-49.246 ps	157.3 %	VALUE <= 86.000 ps
✗	1	1	5G Short Channel Total Jitter at BER-12	146.886 ps	**-11.3 %**	VALUE <= 132.000 ps
✓	0	1	5G Short Channel Template Test	0.000	100.0 %	VALUE = 0.000
✓	0	1	5G Short Channel Differential Output Voltage	319.7 mV	20.0 %	100.0 mV <= VALUE <= 1.2000 V
ⓘ		1	5G Random Jitter (CTLE ON)	21.248 ps		Information Only
✓	0	1	5G Far End Maximum Deterministic Jitter (CTLE ON)	-92.173 ps	207.2 %	VALUE <= 86.000 ps
✗	1	1	5G Far End Total Jitter at BER-12 (CTLE ON)	206.764 ps	**-56.6 %**	VALUE <= 132.000 ps
✓	0	1	5G Far End Template Test (CTLE ON)	0.000	100.0 %	VALUE = 0.000
✓	0	1	5G Far End Differential Output Voltage (CTLE ON)	135.2 mV	**3.2 %**	100.0 mV <= VALUE <= 1.2000 V

Report Detail

5G LFPS Peak-Peak Differential Output Voltage

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-28)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the peak-to-peak differential output voltage of the LFPS signal is within the conformance limits specified in Table 6-28 of the USB 3.1 Specification, version 1.0

Pass Limits: [800.0 mV to 1.2000 V] **LPFS PeakToPeakVoltage (5G) [2100]** 1.1012 V

Result Details

ConfigChannel (no value) **PDOPMute** (no value) **Num Bursts Processed** 5

5G LFPS Period (tPeriod)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-28)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the period of the LFPS signal is within the conformance limits specified in Table 6-28 of the USB 3.1 Specification, version 1.0

Pass Limits: [20.0000 ns to 100.0000 ns] **tPeriod (5G) [2105]** 31.3848 ns

Result Details

ConfigChannel (no value) **PDOPMute** (no value) **Num Bursts Processed** 5

5G LFPS Burst Width (tBurst)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-29)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the burst width (tBurst) of the Polling.LFPS signal is within the conformance limits specified in Table 6-29 of the USB 3.1 Specification, version 1.0

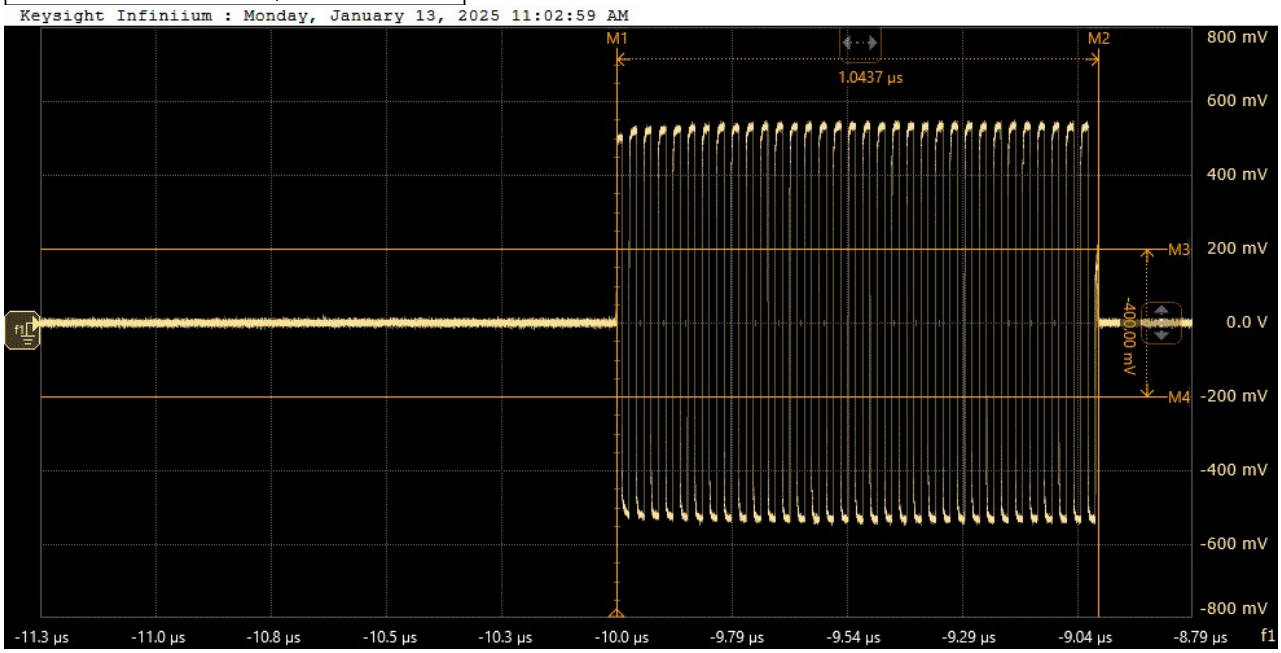
Pass Limits: [600.0 ns to 1.4000 µs] **tBurst (5G) [2110]** 1.0446 µs

Result Details

ConfigChannel (no value) **PDOPMute** (no value) **Num Bursts Processed** 5 **Burst Width Screen Capture** (See image)

Trial 1

Trial 1: Burst Width Screen Capture



5G LFPS Repeat Time Interval (tRepeat)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-29)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the time interval when the next LFPS burst is transmitted (tRepeat) is within the conformance limits specified in Table 6-29 of the USB 3.1 Specification, version 1.0

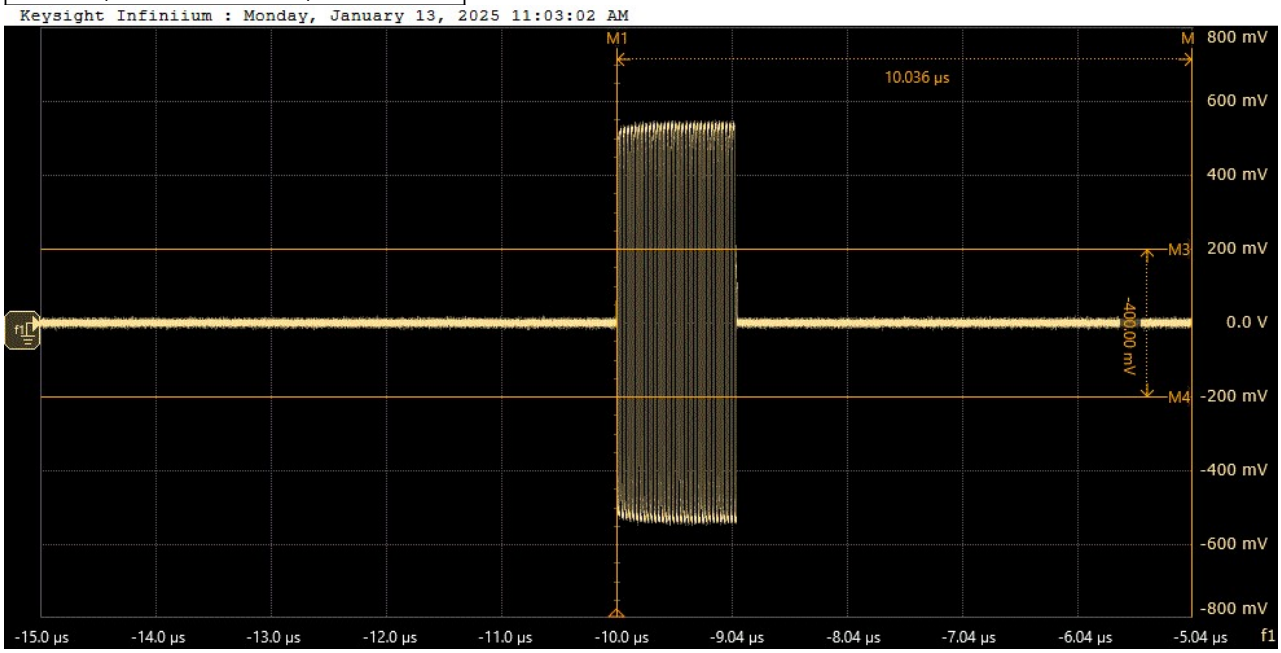
Pass Limits: [6.0000 µs to 14.0000 µs] **tRepeat (5G) [2115]** 10.0431 µs

Result Details

ConfigChannel (no value) **PDOPMute** (no value) **Num Bursts Processed** 5 **Repeat Interval Screen Capture** (See image)

Trial 1

Trial 1: Repeat Interval Screen Capture



5G LFPS Rise Time

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-28)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the rise time of the LFPS signal is within the conformance limits specified in Table 6-28 of the USB 3.1 Specification, version 1.0

Pass Limits: <= 4.0000 ns | **LFPS Rise Time (5G) [2120]** 177.9 ps

Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Num Bursts Processed** 5

5G LFPS Fall Time

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-28)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the fall time of the LFPS signal is within the conformance limits specified in Table 6-28 of the USB 3.1 Specification, version 1.0

Pass Limits: <= 4.0000 ns | **LFPS Fall Time (5G) [2125]** 175.9 ps

Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Num Bursts Processed** 5

5G LFPS Duty cycle

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-28)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the duty cycle of the LFPS signal is within the conformance limits specified in Table 6-28 of the USB 3.1 Specification, version 1.0

Pass Limits: [40.0000 % to 60.0000 %] **LFPS Duty cycle (%) (5G) [2130]** 49.9773 %

Result Details

ConfigChannel (no value) **PDOPMute** (no value) **Num Bursts Processed** 5

5G LFPS AC Common Mode Voltage

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.9, Table 6-28)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the maximum voltage from Txp + Txn for both time and amplitude is within the limits as specified in Table 6-28 of the USB 3.1 specification

Pass Limits: <= 100.0 mV | **AC Common Mode Voltage (5G) [2140]** 90.7 mV

Result Details

ConfigChannel (no value) | **PDOPMute** (no value)

5G TSSC-Freq-Dev-Min

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.5.3, Table 6-16)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the measured SSC deviation is within the conformance limits specified in Table 6-16 of the USB 3.1 Specification.

Pass Limits: [-5.300000 kppm to -3.700000 kppm]

SSC Deviation (ppm) (5G) [2307] -5.262163 kppm

Result Details

ConfigChannel (no value)

PDOPMute (no value)

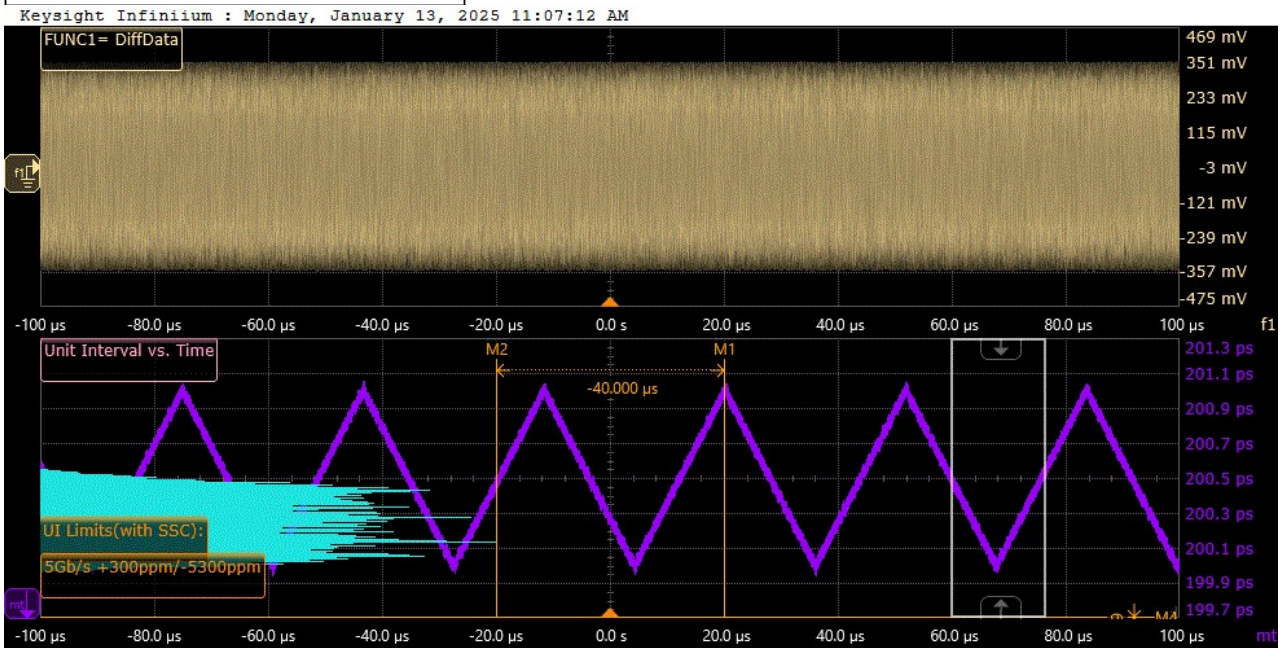
Max UI (ppm) -5.178048 kppm

Min UI (ppm) -5.262163 kppm

SSC Profile (See image)

Trial 1

Trial 1: SSC Profile



5G TSSC-Freq-Dev-Max

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.5.3, Table 6-16 Refer to ECN 018 of USB3.0 specification if Radio Friendly SSC option is turned on.)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the measured SSC deviation is within the conformance limits specified in Table 6-16 of the USB 3.1 Specification. If Radio Friendly SSC option is turned on, this test will verify SSC deviation is within the conformance limits specified in ECN 018 of USB3.0 specification.

Pass Limits: [TSSCMin ppm to TSSCMax ppm] **Worst SSC Deviation (ppm) (5G) [2311]** 270.073 ppm

Result Details

ConfigChannel (no value) **PDOPMute** (no value) **Max UI (ppm)** 270.073 ppm **Min UI (ppm)** 185.034 ppm

PassLimit Min (TSSCMin) -300.000 ppm **PassLimit Max (TSSCMax)** 300.000 ppm

5G SSC Modulation Rate

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.5.3, Table 6-16)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the measured SSC modulation rate is within the conformance limits specified in Table 6-16 of the USB 3.1 Specification.

Pass Limits: [30.000000 kHz to 33.000000 kHz] **Modulation Rate (Hz) (5G) [2308]** 31.517800 kHz

Result Details

Modulation rate measurement Success **ConfigChannel** (no value) **PDOPMute** (no value)

5G SSC Slew Rate

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.1, Table 6-17)

Test Summary: Pass

Test Description: The purpose of this test is to ensure the combination of SSC and all other jitter sources within the bandwidth of the CDR must not exceed the allowed slew rate as listed in Table 6-17.

Pass Limits: <= 10.000 ms | **Max Slew Rate (5G) [2310]** 5.244 ms

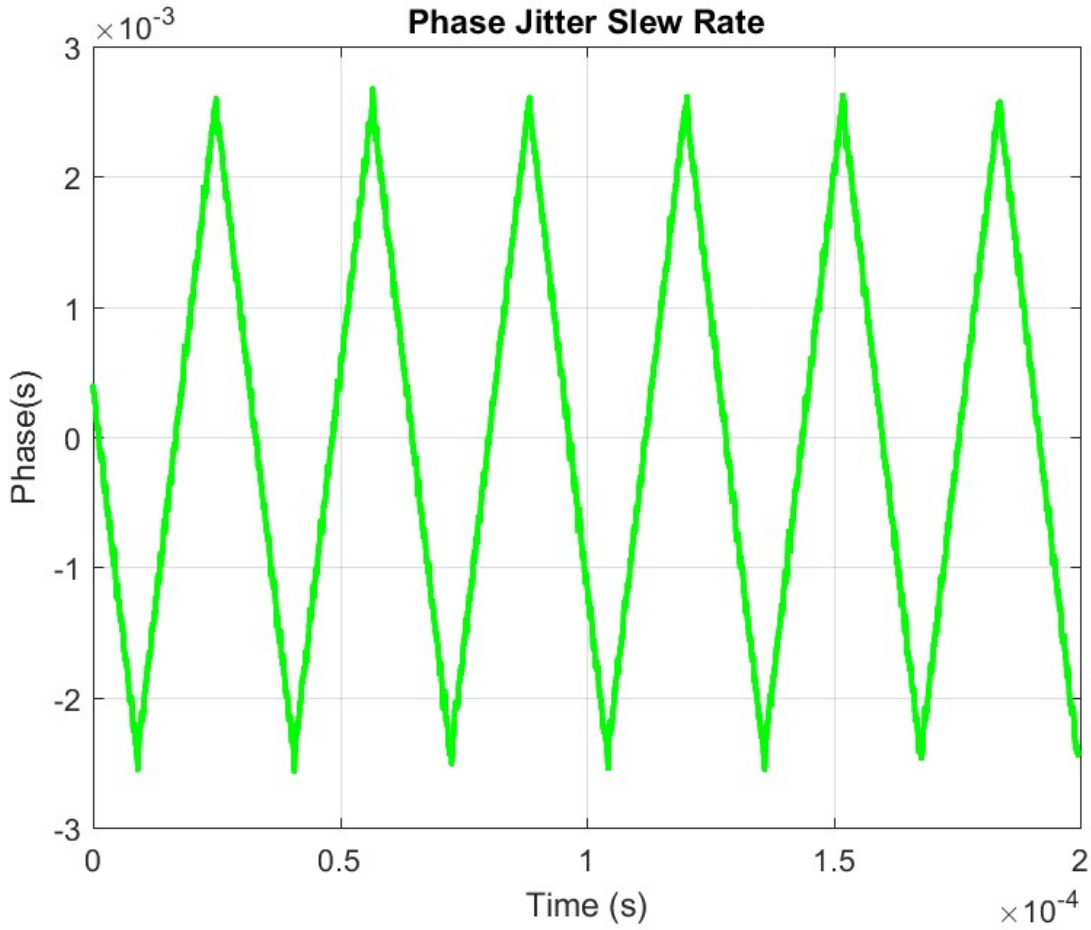
Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Slew Rate** (See image) | **Min Phase** -2.57 ms | **Max Phase** 2.67 ms

Test Pattern CP1

Trial 1

Trial 1: Slew Rate



5G Short Channel Random Jitter

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: Info

Test Description: The purpose of this test is to verify that the measured random jitter, Rj measured at TP1 is within the limits as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: Info Only | **RJ (5G) (Short Channel) [32282]** 13.941 ps

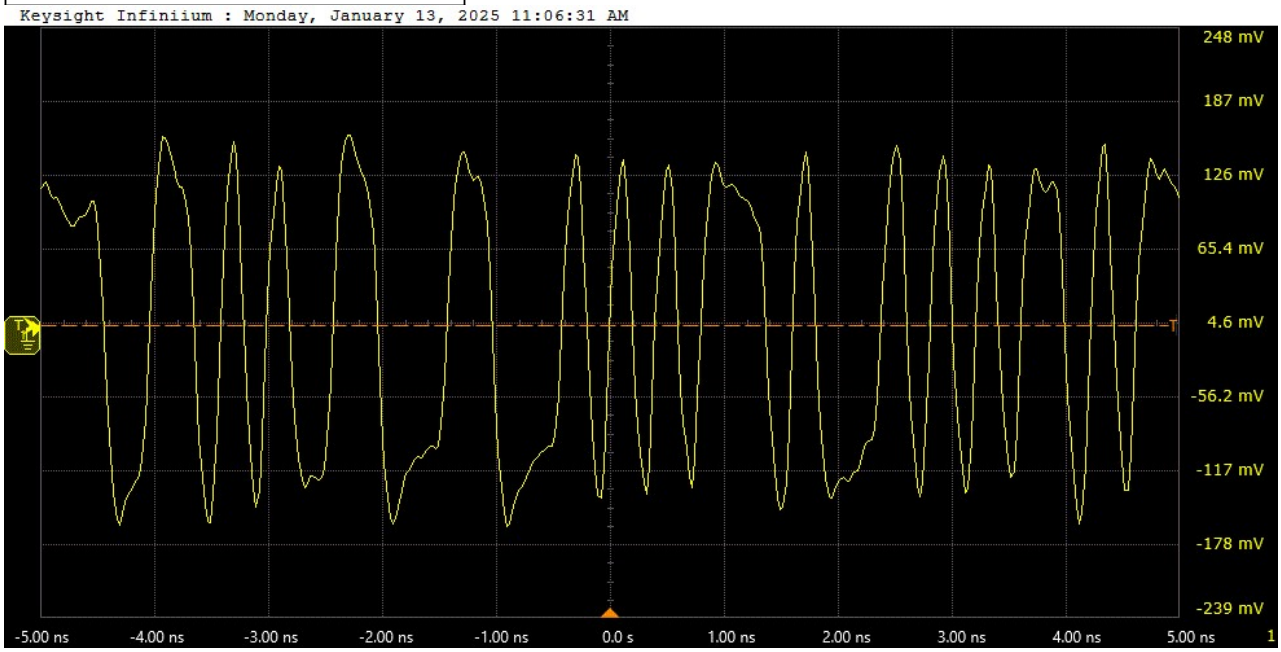
Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Number of UI for USB3 Gen1 testing** 1.000000000 M | **Rj_rms** 13.941 ps

Rj_Total 196.132 ps | **Test Pattern** CP1 | **Test Waveform** (See image)

Trial 1

Trial 1: Test Waveform



5G Short Channel Maximum Deterministic Jitter

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the measured deterministic jitter, Dj measured at TP1 is within the limits as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: <= 86.000 ps | **DJ (5G) (Short Channel) [32292]** -49.246 ps

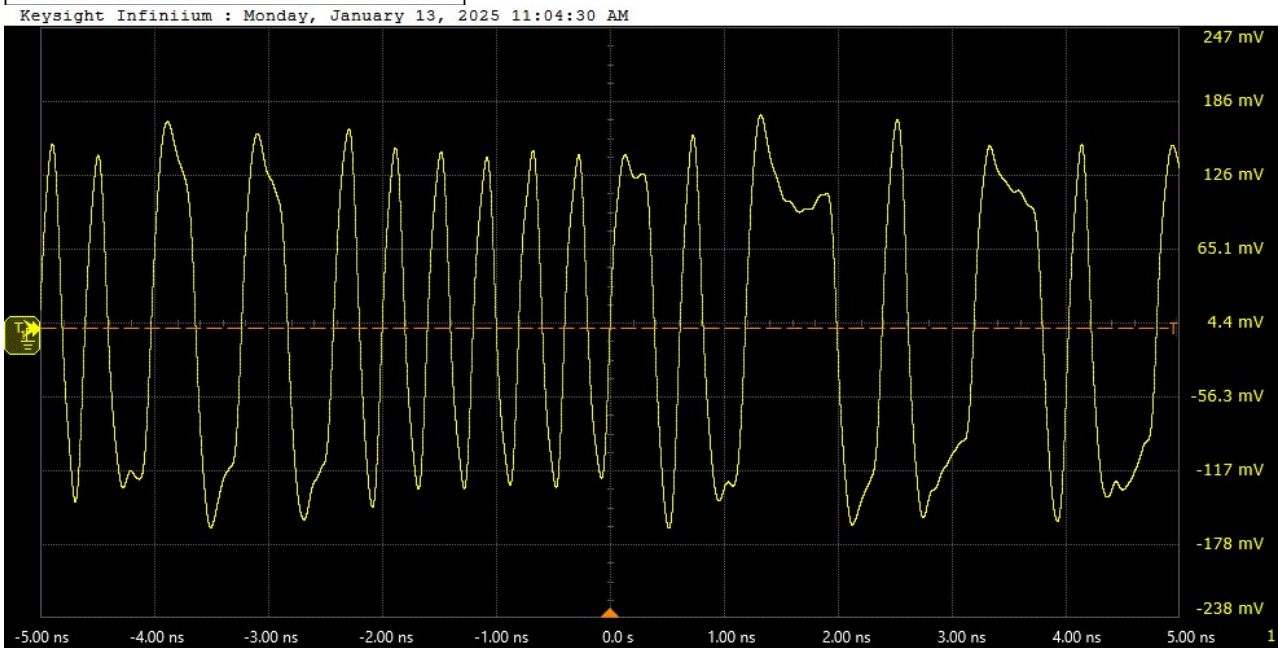
Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Number of UI for USB3 Gen1 testing** 1.000000000 M | **DJ_dd** -49.246 ps

Test Pattern CP0 | **Test Waveform** (See image)

Trial 1

Trial 1: Test Waveform



5G Short Channel Total Jitter at BER-12

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: **FAIL**

Test Description: The purpose of this test is to verify that the measured total jitter, Tj measured at TP1 is within the limits as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: <= 132.000 ps | **Tj at BER 10-12 (5G) (Short Channel) [32296]** 146.886 ps

Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Number of UI for USB3 Gen1 testing** 1.000000000 M | **Tj at BER 10-12** 146.886 ps

Rj_rms(ps) 13.941 ps | **DJ_dd(ps)** -49.246 ps | **RJ Test Pattern** CP1 | **DJ Test Pattern** CP0

TJ Equation TJ = DJ(CP0) + 14.069 * RJrms(CP1)

5G Short Channel Template Test

Reference: USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19

Test Summary: Pass

Test Description: The purpose of this test is to perform an eye mask test at TP1 using the eye mask template as specified in table 6-19 of the USB 3.1 specification.

Pass Limits: = 0.000 | **Mask Test Failures (5G) (Short Channel) [32210]** 0.000

Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Number of UI for USB3 Gen1 testing** 1.000000000 M

Non-Transition Failures 0.000 | **Transition Failures** 0.000 | **Non-Transition Eye Diagram** (See image)

Transition Eye Diagram (See image) | **Total Failures** 0.000 | **CTLE Index** 1.000 | **DFE Tap** 0.000 | **NonTrans Max Voltage** 306 m

NonTrans Min Voltage -308 m | **NonTrans Lower Margin Voltage** -110 m | **NonTrans Upper Margin Voltage** 110 m

NonTrans Eye Height 320 m | **Trans Max Voltage** 350 m | **Trans Min Voltage** -346 m | **Trans Lower Margin Voltage** -160 m

Trans Upper Margin Voltage 164 m | **Trans Eye Height** 424 m | **Maximum Peak to Peak Jitter** 60 p | **Mean Recover UI** 200.513

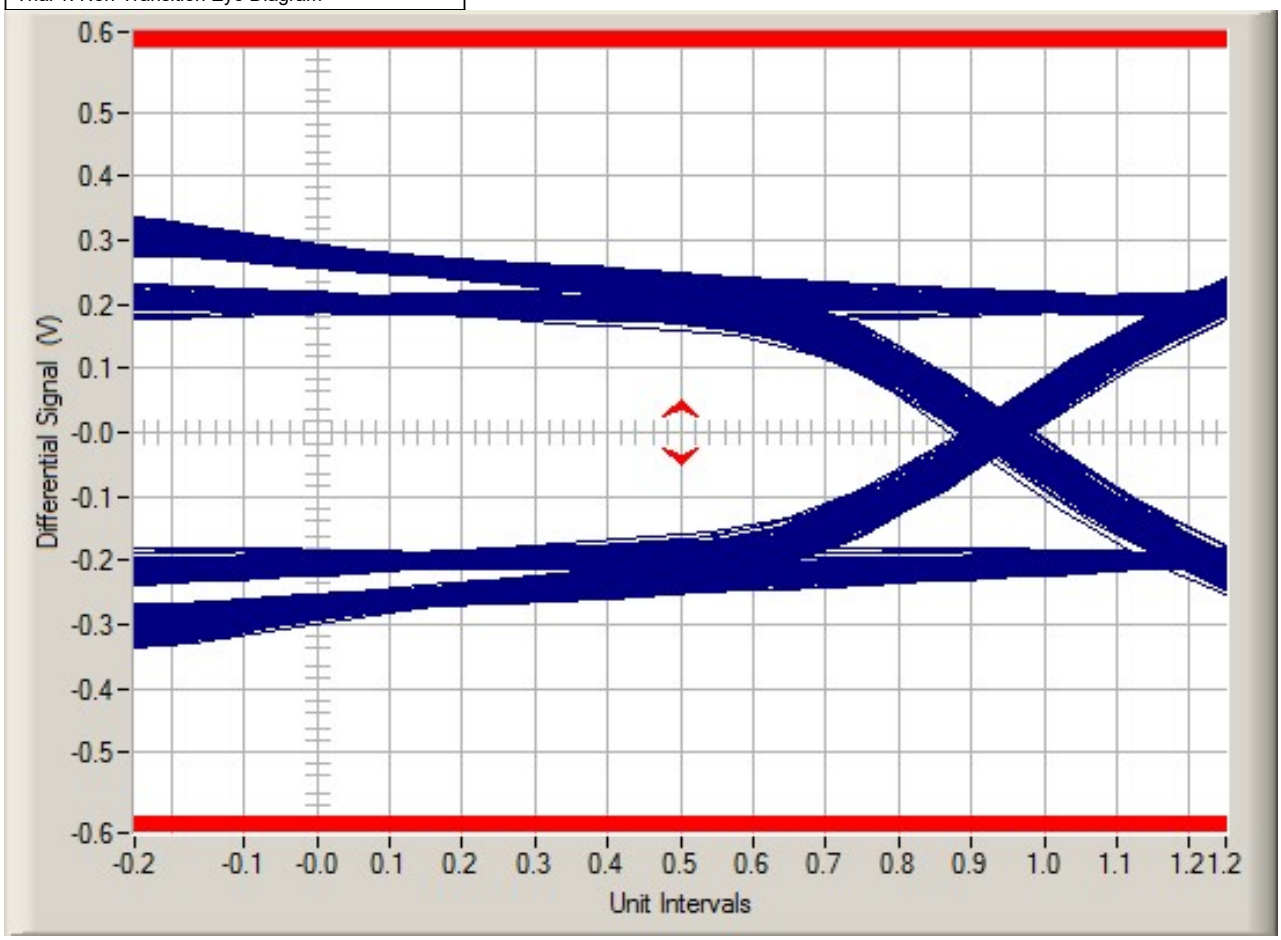
Min Eye Width 53.240 | **Composit Eye Height** 320 m | **Composit Eye Location** 500 m | **Min Time Between CrossOver** 200 p

Test Pattern CP0

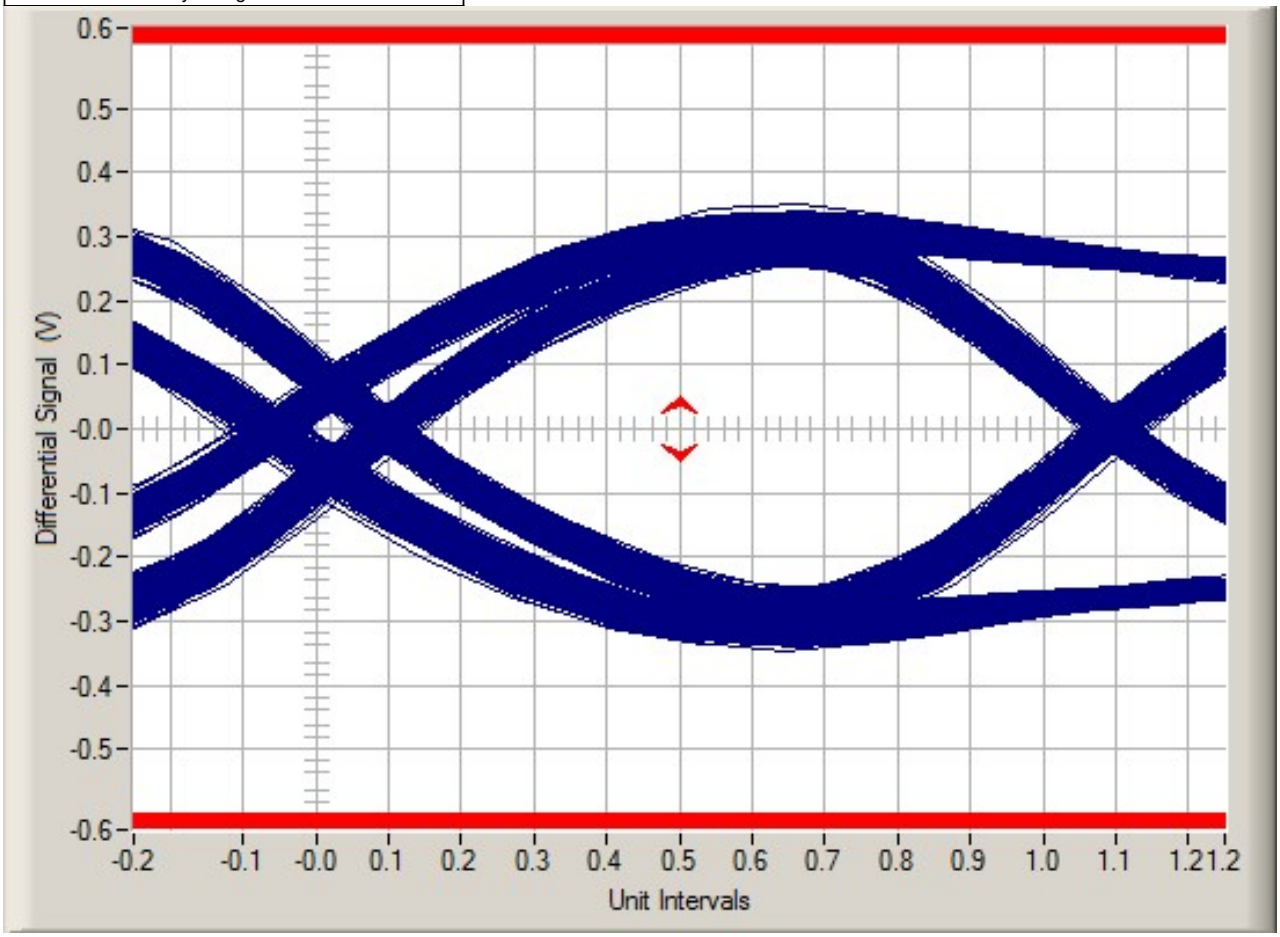
Template File C:\ProgramData\Keysight\Infiniium\Apps\USB3Test\SigTest5G\templates\usb_3_5gb\USB_3_5Gb_CP0_RjIN_SHORT.dat

Trial 1

Trial 1: Non-Transition Eye Diagram



Trial 1: Transition Eye Diagram



5G Short Channel Differential Output Voltage

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the differential output voltage measured at TP1 meets the minimum eye height as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: [100.0 mV to 1.2000 V] **PeakToPeakVoltage (5G) (Short Channel) [32241]** 319.7 mV

Result Details

ConfigChannel (no value) **PDOPMute** (no value)

5G Random Jitter (CTLE ON)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: Info

Test Description: The purpose of this test is to verify that the measured random jitter, Rj measured at TP1 is within the limits as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: Info Only | **RJ (5G) (Far End) (CTLE ON) [22820]** 21.248 ps

Result Details

ConfigChannel (no value) | **PDOPMute** (no value) | **Number of UI for USB3 Gen1 testing** 1.000000000 M | **Rj_rms** 21.248 ps

Rj_Total 298.937 ps | **Test Pattern** CP1

5G Far End Maximum Deterministic Jitter (CTLE ON)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the measured deterministic jitter, Dj measured at TP1 is within the limits as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: <= 86.000 ps | **DJ (5G) (Far End) (CTLE ON) [22920]** -92.173 ps

Result Details

ConfigChannel (no value)	**PDOPMute** (no value)	**Number of UI for USB3 Gen1 testing** 1.000000000 M	**DJ_dd** -92.173 ps
Test Pattern CP0	**OptDeembedMode5G** C to C	**Embedded channel file** N7015A_Deembed__13p5dbLossAt2p5GHz_Embed.tf4	

5G Far End Total Jitter at BER-12 (CTLE ON)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: **FAIL**

Test Description: The purpose of this test is to verify that the measured total jitter, Tj measured at TP1 is within the limits as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: <= 132.000 ps

Tj at BER 10-12 (5G) (Far End) (CTLE ON) [22960] 206.764 ps

Result Details

ConfigChannel (no value)

PDOPMute (no value)

Number of UI for USB3 Gen1 testing 1.000000000 M

Tj at BER 10-12 206.764 ps

Rj_rms(ps) 21.248 ps

DJ_dd(ps) -92.173 ps

RJ Test Pattern CP1

DJ Test Pattern CP0

TJ Equation TJ = DJ(CP0) + 14.069 * RJrms(CP1)

5G Far End Template Test (CTLE ON)

Reference: USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19

Test Summary: Pass

Test Description: The purpose of this test is to perform an eye mask test at TP1 using the eye mask template as specified in table 6-19 of the USB 3.1 specification.

Pass Limits: = 0.000 | **Mask Test Failures (5G) (Far End) (CTLE ON) [22100]** 0.000

Result Details

Number of UI for USB3 Gen1 testing 1.000000000 M | **Non-Transition Failures** 0.000 | **Transition Failures** 0.000

Non-Transition Eye Diagram (See image) | **Transition Eye Diagram** (See image) | **Total Failures** 0.000 | **CTLE Index** 1.000

DFE Tap 0.000 | **NonTrans Max Voltage** 157 m | **NonTrans Min Voltage** -158 m | **NonTrans Lower Margin Voltage** -18 m

NonTrans Upper Margin Voltage 17 m | **NonTrans Eye Height** 135 m | **Trans Max Voltage** 162 m | **Trans Min Voltage** -161 m

Trans Lower Margin Voltage -25 m | **Trans Upper Margin Voltage** 28 m | **Trans Eye Height** 153 m

Maximum Peak to Peak Jitter 70 p | **Mean Recover UI** 200.510 | **Min Eye Width** -6.573 | **Composit Eye Height** 135 m

Composit Eye Location 500 m | **Min Time Between CrossOver** 200 p | **Test Pattern** CP0

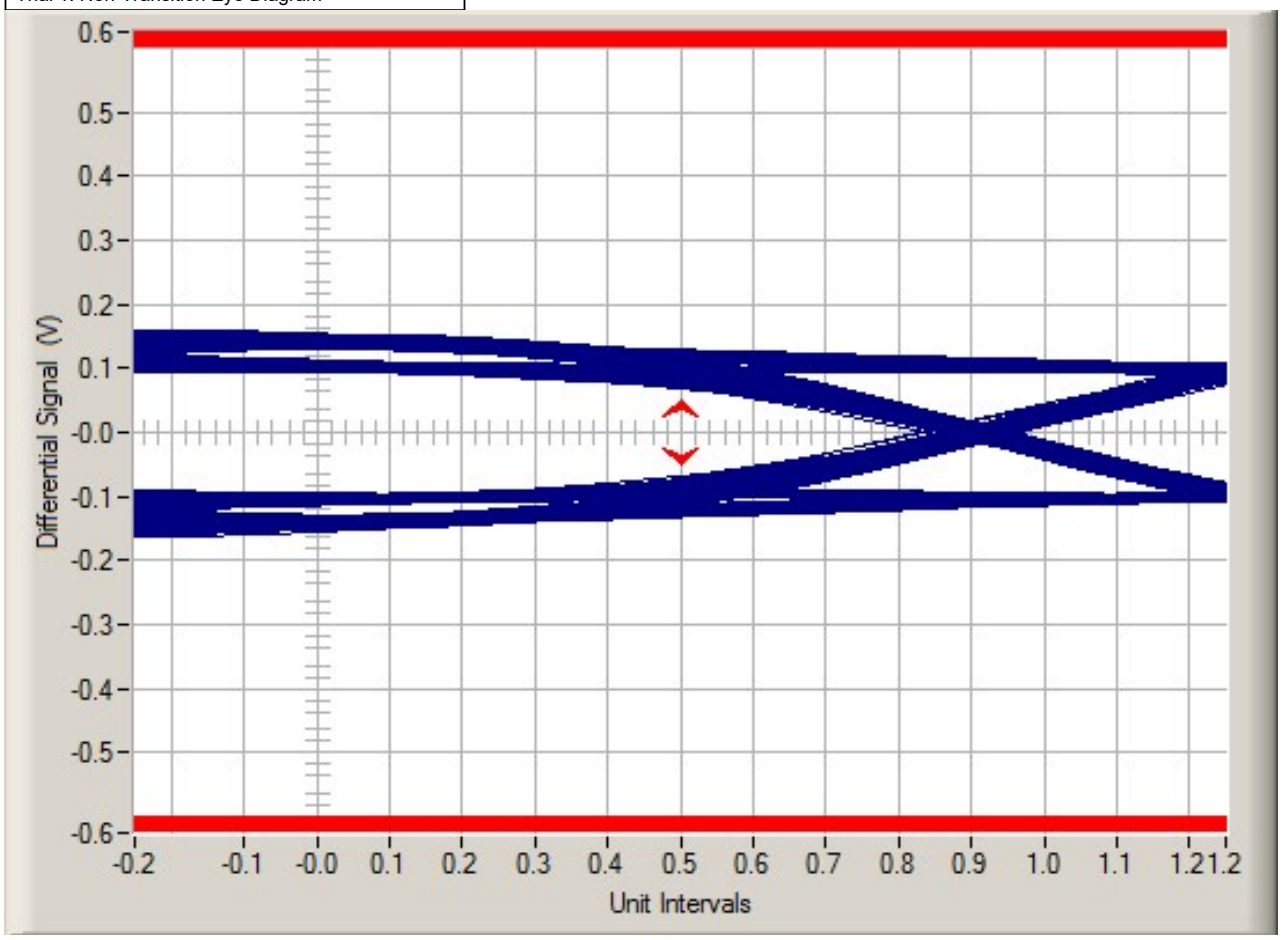
Template File C:\ProgramData\Keysight\Infiniium\Apps\USB3Test\SigTest5G\templates\usb_3_5gb\USB_3_5Gb_CP0_RjIN.dat

OptDeembedMode5G C to C | **Embedded channel file (5G)** N7015A_Deembed__13p5dbLossAt2p5GHz_Embed.tf4

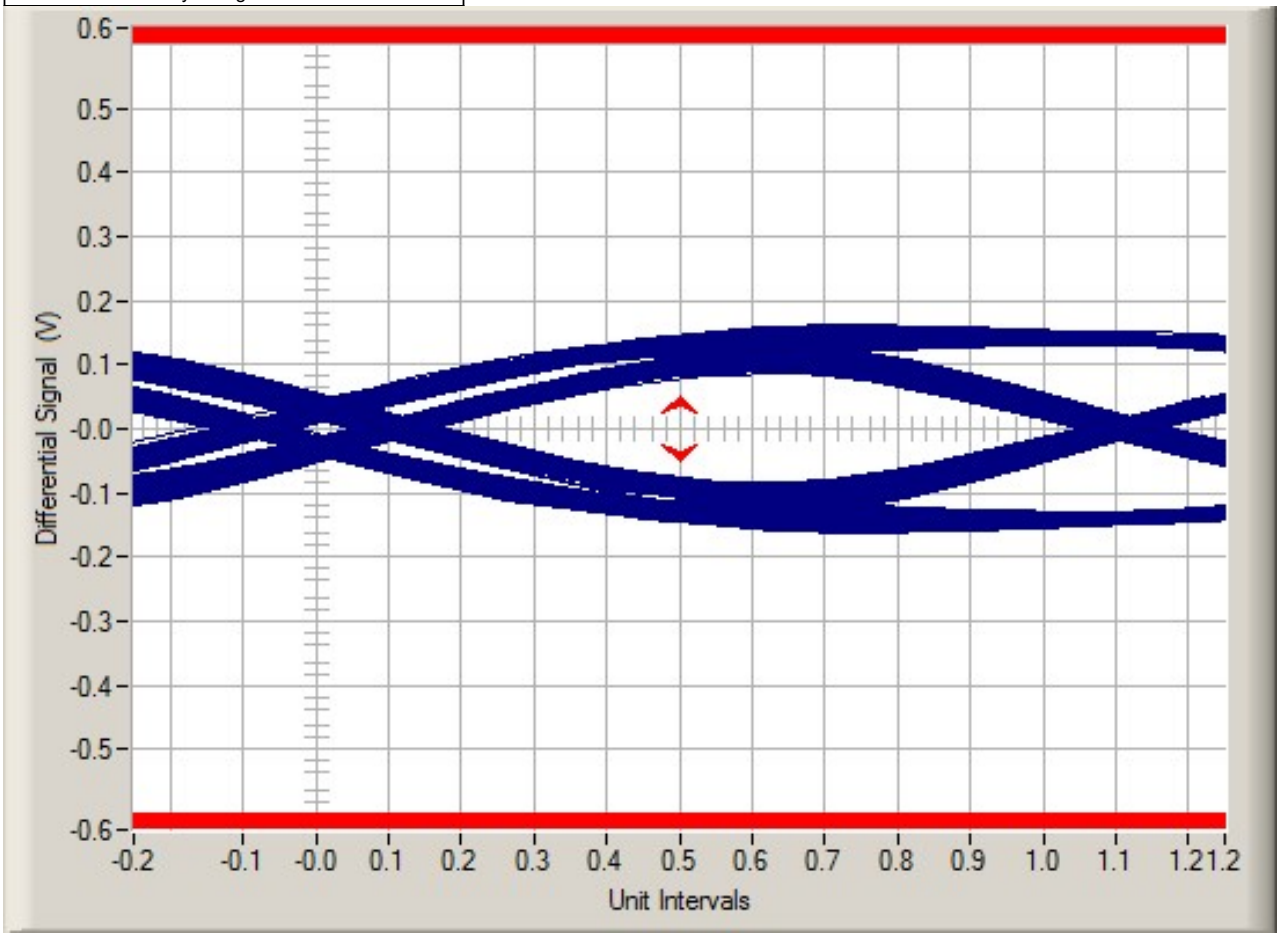
ConfigChannel (no value) | **PDOPMute** (no value)

Trial 1

Trial 1: Non-Transition Eye Diagram



Trial 1: Transition Eye Diagram



5G Far End Differential Output Voltage (CTLE ON)

Reference: USB 3.1 Specification, Rev 1.0 (USB 3.1 Specification, Rev 1.0, Section 6.7.3, Table 6-19)

Test Summary: Pass

Test Description: The purpose of this test is to verify that the differential output voltage measured at TP1 meets the minimum eye height as specified in Table 6-19 of the USB 3.1 specification.

Pass Limits: [100.0 mV to 1.2000 V] **PeakToPeakVoltage (5G) (Far End) (CTLE ON) [22410]** 135.2 mV

Result Details

ConfigChannel (no value) **PDOPMute** (no value)