



# PRODUCT / PROCESS CHANGE NOTIFICATION

PCN-000356

Date: February 16, 2016

P1/2

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- 

## Change Details

**Part Number(s) Affected:**

Product families:

GN3050

GN3250

GN3068

GN3268

Full list attached below.

**Customer Part Number(s) Affected:**  N/A

## Description, Purpose and Effect of Change:

Introducing alternate photodiode supplier.

Semtech is adding qualified alternate PD supplier for above ROSA families in order to ensure continuous and uninterrupted ROSA supply.

Supplier information:

Global Communication Semiconductors, LLC (GCS)

PD part number: DO262\_45um\_E1

<b>Change Classification</b>	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor	<b>Impact to Form, Fit, Function</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Impact to Data Sheet</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>New Revision or Date</b>	<input checked="" type="checkbox"/> N/A

## Impact to Performance, Characteristics or Reliability:

Performance, Characteristics and Reliability are not affected as per attached documentation.

<b>Implementation Date</b>	August 1, 2016	<b>Work Week</b>	
<b>Last Time Ship (LTS)</b> Of unchanged product	NA	<b>Affecting Lot No. / Serial No. (SN)</b>	NA
<b>Sample Availability</b>	April 1, 2016	<b>Qualification Report Availability</b>	Available



# PRODUCT / PROCESS CHANGE NOTIFICATION

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P2/2

## Supporting Documents for Change Validation/Attachments:

- PRODDOC001917, Reliability Qualification Report for GCS Photodiode
- PRODDOC011539, GN3050 Characterization Report (featuring GCS Photodiode)
- PRODDOC011538, GN3250 Characterization Report (featuring GCS Photodiode)
- PRODDOC011545, GN3068 Characterization Report (featuring GCS Photodiode)
- PRODDOC011551, GN3268 Characterization Report (featuring GCS Photodiode)
- GCS Material Declaration

## Issuing Authority

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## List of affected PNs:

GN3050	GN3250	GN3068	GN3268
GN3050-3EB6AL3E3	GN3250-3EB7AK8E3	GN3068-3EB6AL3E3	GN3268-3EB7AM2E3
GN3050-3EB6AL4E3	GN3250-3EB7AM2E3	GN3068-3EB6AM3E3	GN3268-3EB7AM6E3
GN3050-3EB6AM3E3	GN3250-3EB7AM6E3	GN3068-3EB6AM4E3	GN3268-3EB7AM7E3
GN3050-3EB6AM4E3	GN3250-3EB7AM7E3	GN3068-3EB6AM5E3	GN3268-3EB7AM8E3
GN3050-3EB6AM5E3	GN3250-3EB7AM8E3	GN3068-3EC6AN4E3	GN3268-3EB7AN9E3
GN3050-3EB6AN4E3	GN3250-3EB7AN4E3		GN3268-3EB7AP6E3
	GN3250-3EB7AN9E3		GN3268-3EB7AR2E3
	GN3250-3EB7AP2E3		GN3268-3EB7AS9E3
	GN3250-3EB7AP6E3		GN3268-3EB7AT2E3
	GN3250-3EB7AQ5E3		GN3268-3EB7AT8E3
	GN3250-3EB7AR2E3		GN3268-3EB7AU2E3
	GN3250-3EF7AM6E3		GN3268-3EB7AV4E3
	GN3250-3EG7AM6E3		GN3268-3EH8AN3E3
	GN3250-3EG7AR2E3		



**SEMTECH**

GENNUM PRODUCTS

**GCS Photodiode**

**Reliability Qualification Report for  
Semtech ROSAs**

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# Revision History

Version	ECO	Date	Modifications / Changes
0	ECO-010841	February 2013	New document
1	ECO-013454	June 2013	Adding DO048_36um_B1 and DO262_45um_E1

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# 1 Device Specifics

## 1.1 Manufacturing Summary

Table 1.: Manufacturing Summary

Silicon Fab Technology	Jazz SiGe120 SBC18HAZ
Package Assembly	GN3250 ROSA, Hisense
TIA	GN1554
Photodiodes	DO122_60um_LB DO048_36um_B1 DO262_45um_E1

## 1.2 Purpose

This report presents all the results of the reliability qualification that was carried out to qualify the photodiode (PD) manufactured by Global Communication Semiconductors (GCS) for use in Semtech PIN based ROSAs.

## 1.3 Product Description

The GCS photodiode is high-performance product with a front side illuminated InGaAs PIN photodiode chip that features a large detection window, and two large flexible wire-bonding pads. This product has low capacitance, high responsivity, low dark current and excellent reliability, designed for long wavelength optical receiver applications with data rate up to 10Gbps at wavelength from 1200nm to 1600nm with an either single mode or multi-mode fiber.

## 1.4 Process Qualification

The GCS PD will be qualified on the ROSA level. The qualification vehicle will be GN3250. The GN3250 uses the Semtech GN1554S TIA. The TIA is manufactured in Jazz Semiconductor 0.18um SiGe SBC18HA process. The Jazz qualification report is accepted on Agile ID#GENDOC-043127. The GN1554S reliability qualification report is in Agile ID# GENDOC-043097.

## 1.5 Product Qualification Approach

The GCS will be qualified based on its optical, electrical, and adhesive characteristics. Because the GN3250 is an already qualified Semtech product, package related stresses such as damp heat and

cyclic moisture are considered bridged to the original product. These stresses are also not expected to have an impact on the optical or electrical performance of the PD. The stresses that will be run in this qualification and their justifications are listed below in table 2.

**Table 2.: Qualification Stresses**

<b>TC + Shear test</b>	To test the GCS PD adhesion to the TIA
<b>HTS + Shear test</b>	To test the GCS PD adhesion to the TIA
<b>Wiggle Test</b>	To test the impact of wiggle on the PD performance
<b>MS/MV</b>	To test the new PD adhesion to the TIA
<b>HTOL</b>	To test the GCS PD optical and electrical stability
<b>Wire pull test</b>	To test the wire bonding to the PD
<b>Ball shear test</b>	To test the wire bonding to the PD

## 2 Reliability Qualification Plan

### 2.1 Physical Characteristics Tests

Table 3.: Physical Characteristics Tests

Stress	Conditions	Qualification Vehicle	Minimum Sample Size	Failure Criteria	Results
Die Shear test	MIL-STD-883 Method 2019	GN3250	22	<0.04kg/(0.0001 sq in)	Pass
1000 TC + Die Shear test	MIL-STD-883 Method 2019	GN3250	22	<0.04kg/(0.0001 sq in)	Pass
1000Hrs HTS + Die Shear test	MIL-STD-883 Method 2019	GN3250	22	<0.04kg/(0.0001 sq in)	Pass
Lead Pull Condition D	MIL-STD-883 METHOD 2011.8	GN3250	22	3 g for 0.9 Mil wire	Pass
Ball bond shear test	JESD22-B116A	GN3250	22	20 g for 2.5 Mil ball diameter	Pass

### 2.2 Mechanical Integrity Tests

Table 4.: Mechanical Integrity Tests

Stress	Conditions	Read Points	Qualification Vehicle	Minimum Sample Size	Failure Criteria (See Table 6)	Results
Mechanical Shock	MIL-STD-883 Method 200.5 condition B	RP0 Pre RP1 Post	GN3250	22	A, B, C Zero Failures	Pass
Vibration	MIL-STD-883 Method 2007, Cond. A, 20G, 20 - 2,000 Hz (Sinusoidal), 4 min/cyc, 4 cyc/axis	RP0 Pre RP1 Post	GN3250	22	A, B, C Zero Failures	Pass
Wiggle	Motor settings: Acceleration 0.5rev/sec; Velocity: 0.5 rev/sec. The load applied is 0.25 lbf and 0.5 lbf	n/a	GN3250	22	RSSI at 100 uW Change > 1 dB	Pass

## 2.3 Powered and Environmental Stress Tests

Table 5.: Powered Environmental Stress Tests

Stress	Conditions	Read Points	Qualification Vehicle	Minimum Sample Size	Failure Criteria ( See Table 6)	Results
High Temperature Operating Life	EIA/TIA-455-4A, Vcc=3.3 V, T=85°C for 2000 hrs, 5000 hrs for info	RP0 0 hrs	GN3250	25	A, B, C Zero Failures	Pass
		RP1 500 hrs				
		RP2 1000 hrs				
		RP3 1500 hrs				
		RP4 2000 hrs				
		RP5 5000 hrs				
Temperature Cycling	MIL-STD-883 Method 1010, '- 40C ~ 85C, > 10C/min. ramp, 15 min. dwells 500 cycles (pass/fail), 1000 cycles (info).	RP0 Pre RP1 500 cyc RP2 1000 cyc for info	GN3250	11	A, B, C Zero Failures	Pass



### 3 Failure Criteria

Table 6.: Failure criteria for selected reliability stresses

Code	Parameter	Criterion
A	Functional or parametric limits	Failure relative to start of life specification
B	Unstressed receiver sensitivity (URS)	Change > 1 dB
		Increase more than 2x
C	Dark Current	OR > 50 nA



## 4 Conclusion

The GCS photodiode has passed all reliability tests and considered qualified. This diode is fit to be used in Semtech ROSAs that use PIN photodiode.

## 5 Appendix A

### 5.1 Data and Drift Analysis

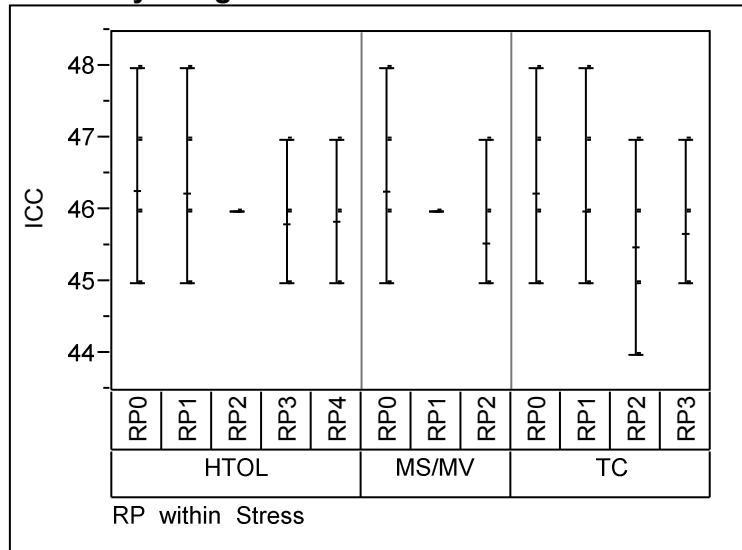
This section shows the reliability data and drift analysis performed on the following critical parameters.

- 1- URS: Unstressed Receiver Sensitivity
- 2- RSSI-dark: Receiver Signal Strength Indicator in dark conditions
- 3- RSSI-100 uW: Receiver Signal Strength Indicator under 100 uW light.
- 4- ICC: The PD power supply current

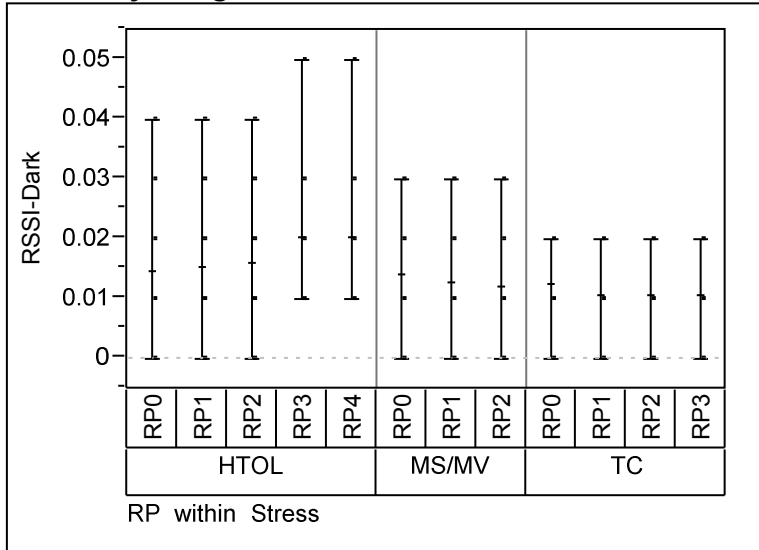
The drift analysis is done on the following stresses

- 1- Mechanical Shock and Vibration
- 2- HTOL
- 3- Temperature Cycling

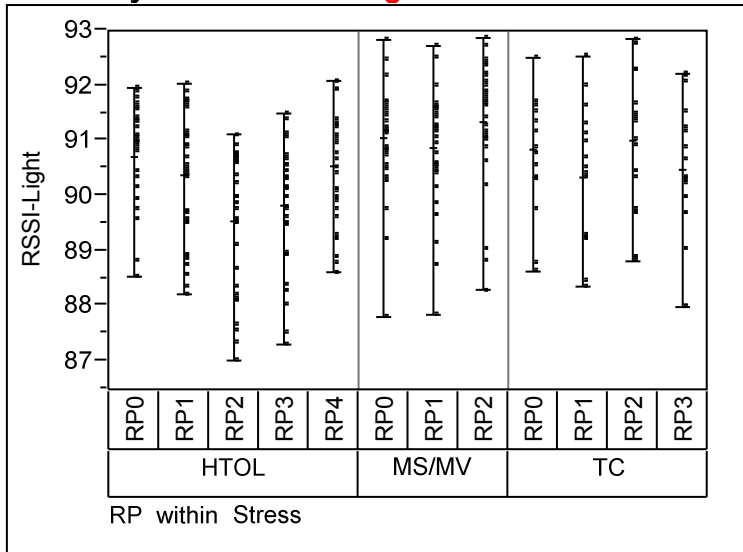
#### Variability Gauge Parameter=ICC



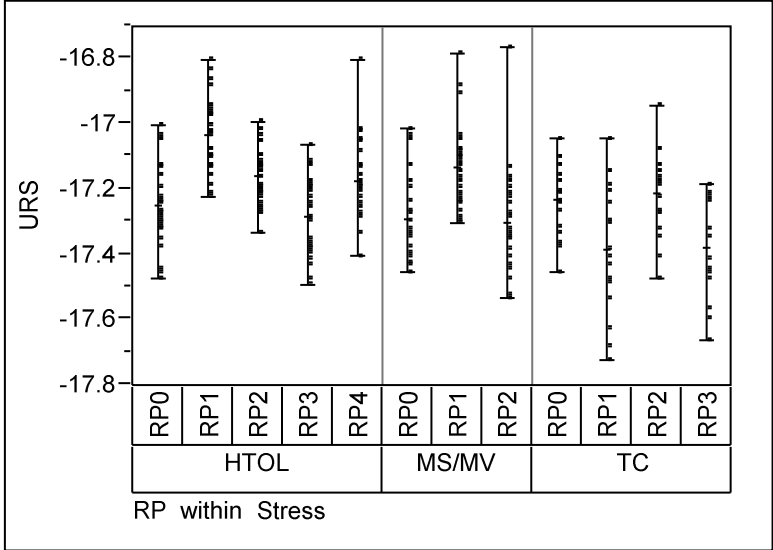
**Variability Gauge Parameter=RSSI-Dark**



**Variability Chart for Reading**



**Variability Gauge Parameter=URS**



## 5.2 Ball shear Data

Sample NO	Ball shear Test Data (Spec>20g)	
	W1	W2
	ball shear	ball shear
1	37.7	45.48
2	43.6	46.6
3	42.9	37.1
4	41.2	43.9
5	42.1	44.8
6	43.4	46.8
7	49.8	48.3
8	47.2	43.1
9	50.1	48.3
10	48.1	45.6
11	47.9	48.8
12	42.98	39.1
13	44.7	38.4
14	47.5	45.9
15	42.3	33.9
16	50.6	44.4
17	45.3	40.4
18	46.5	46.4
19	46.1	41.1
20	44.1	43.2
21	47.29	46.29
22	35.51	43.98

### 5.3 Wire Pull Data

Sample NO	Wire pull Test Data (Spec>3g)	
	W1	W2
	pull force	pull force
1	14.15	14.88
2	13.29	14.17
3	14.49	14.28
4	13.42	9.61
5	13.98	13.36
6	11.84	13.11
7	14.3	14.51
8	14.79	13.02
9	14.59	12.74
10	14.85	14.33
11	14.73	14.92
12	14.61	14.66
13	14.15	13.24
14	14.08	14.35
15	14.26	14.04
16	13.68	11.88
17	14.55	8.53
18	13.46	14.27
19	12.37	14.62
20	14.32	14.82
21	9.03	8.99
22	9.91	9.73

## 5.4 Die Shear Data

Sample NO	DIE shear Test Data (Spec>133g) (without any stress)	Result	DIE shear Test (after 1000hrs TMCL)	OK/NG	DIE shear after 1000hrs HTS)	Result
1	222	Pass	317	Pass	210	Pass
2	185	Pass	221	Pass	204	Pass
3	272	Pass	398	Pass	244	Pass
4	182	Pass	387	Pass	202	Pass
5	214	Pass	197	Pass	267	Pass
6	226	Pass	355	Pass	263	Pass
7	272	Pass	257	Pass	300	Pass
8	315	Pass	325	Pass	419	Pass
9	307	Pass	350	Pass	336	Pass
10	200	Pass	319	Pass	263	Pass
11	338	Pass	276	Pass	305	Pass
12	243	Pass	390	Pass	197	Pass
13	425	Pass	328	Pass	258	Pass
14	202	Pass	291	Pass	296	Pass
15	281	Pass	298	Pass	254	Pass
16	223	Pass	233	Pass	261	Pass
17	183	Pass	259	Pass	341	Pass
18	189	Pass	292	Pass	360	Pass
19	189	Pass	266	Pass	174	Pass
20	318	Pass	308	Pass	205	Pass
21	475	Pass	306	Pass	285	Pass
22	325	Pass	180	Pass	263	Pass





GN3050 (featuring GCS photodiode)  
Characterization Report  
(PCN-000356)

Authors: Goran Perosevic



Revision List

Revision	Author	Description of change	Revision Date (mm/dd/yyyy)	ECO#
A	Goran Perosevic	First Issue	28/01/2015	ECO-029407



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## 1. Scope

This document contains a summary of the results of the characterization testing performed on GN3050 ROSA featuring GCS (PN: DO262\_45um\_E1) photodiode.

## 2. Method

The GN3050 ROSA featuring GCS photodiode (PN: DO262\_45um\_E1) with LC optical receptacles (barrels) were tested using a Semtech designed evaluation board. These evaluation boards feature controlled impedance lines that are terminated in SMA connectors, and permit full assessment of the electrical properties of the ROSA using input from optical excitation at a wide range of frequencies.

Characterization plan is Gendoc 53406.

## 3. Results



### 3.1. Supply Current ( $I_{CC}$ )

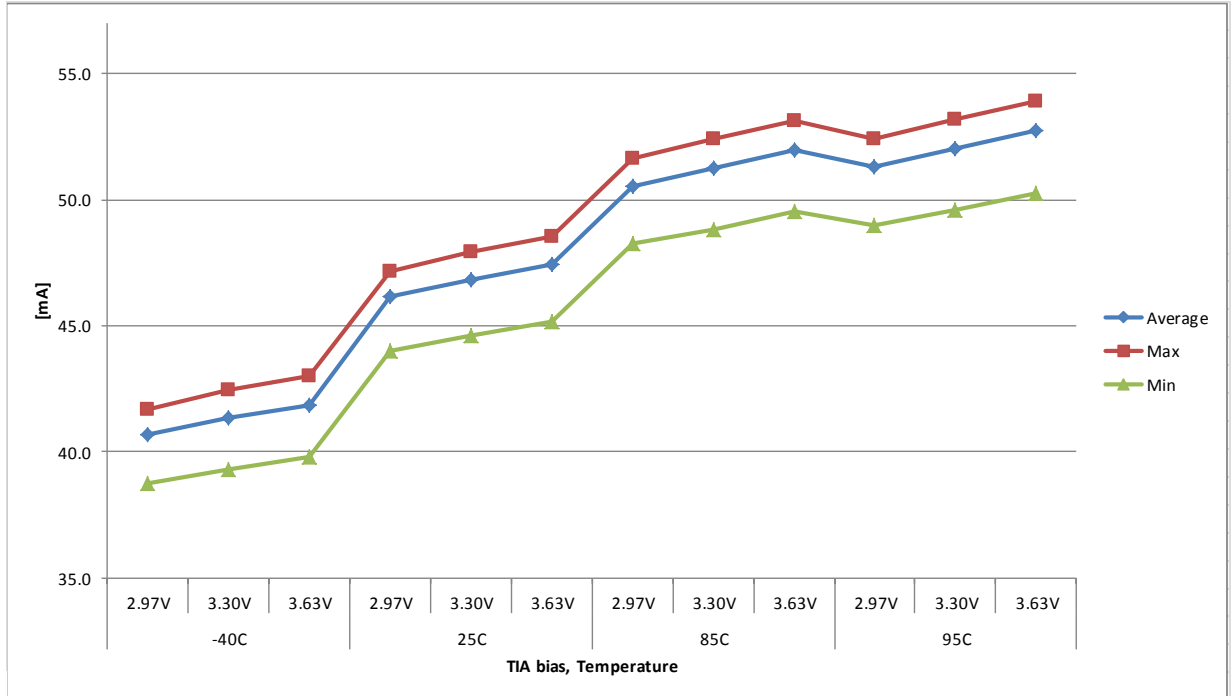
#### 3.1.1. Test Descriptions

In these tests the ROSA was powered up and the current into the  $V_{CC}$  pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

- 1) No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
- 2) 0.5dBm of avg. optical power

The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

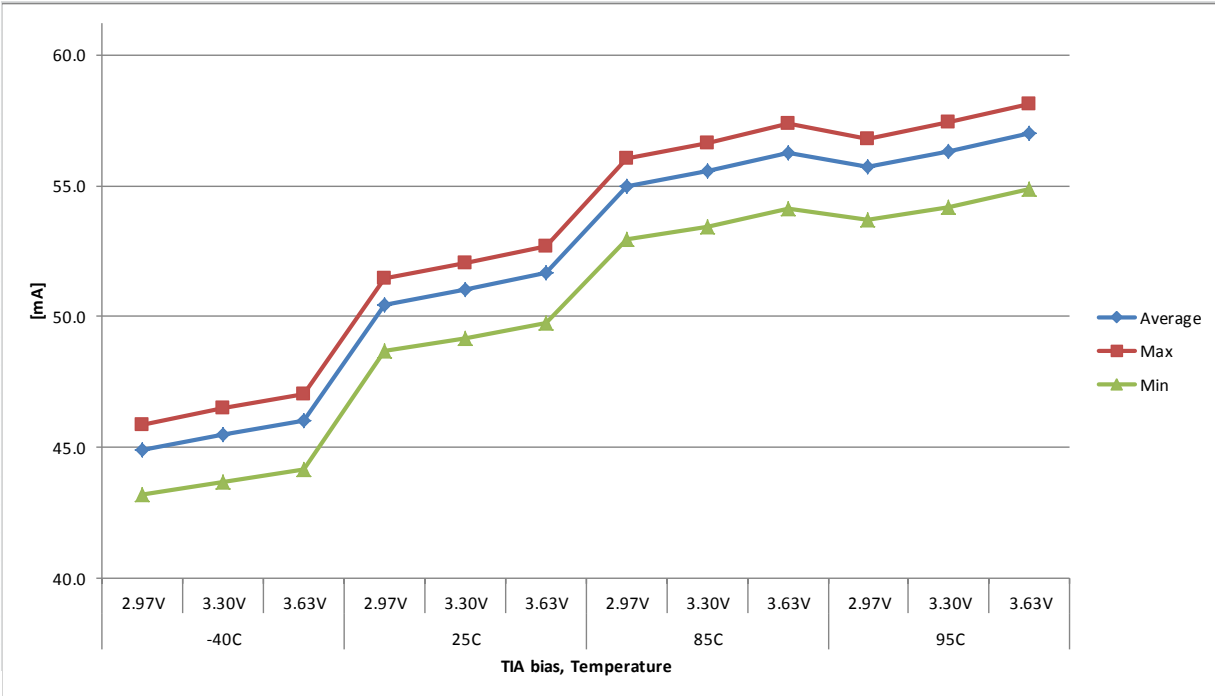
### 3.1.2. $I_{CC}$ (no optical input)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	40.7	41.4	41.9	46.1	46.8	47.5	50.5	51.3	52.0	51.3	52.0	52.8
<b>Std. Dev.</b>	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.9	0.9
<b>Max</b>	41.7	42.5	43.0	47.1	47.9	48.5	51.6	52.4	53.1	52.4	53.2	53.9
<b>Min</b>	38.7	39.3	39.8	44.0	44.6	45.2	48.3	48.9	49.5	49.0	49.6	50.3
<b>Range</b>	2.9	3.2	3.2	3.1	3.3	3.4	3.4	3.5	3.6	3.4	3.6	3.7
<b>Median</b>	40.9	41.6	42.1	46.4	47.0	47.7	50.8	51.5	52.2	51.5	52.3	53.0
1	41.1	41.9	42.4	46.6	47.3	48.0	51.0	51.8	52.5	51.8	52.5	53.3
2	41.4	42.1	42.6	46.7	47.5	48.1	51.1	51.9	52.6	51.9	52.6	53.4
3	40.1	40.8	41.3	45.5	46.2	46.8	49.9	50.6	51.3	50.7	51.4	52.1
4	40.3	41.0	41.4	45.8	46.5	47.1	50.2	50.8	51.6	50.9	51.6	52.3
5	40.2	40.8	41.3	45.6	46.3	47.0	50.0	50.6	51.4	50.7	51.4	52.1
6	41.0	41.7	42.2	46.4	47.1	47.7	50.9	51.6	52.3	51.6	52.3	53.1
7	41.3	42.1	42.6	46.9	47.7	48.3	51.3	52.0	52.8	52.1	52.8	53.6
8	41.7	42.5	43.0	47.1	47.9	48.5	51.6	52.4	53.1	52.4	53.2	53.9
9	40.3	41.0	41.5	45.7	46.4	47.0	50.2	50.8	51.5	50.9	51.6	52.3
10	41.3	42.1	42.6	47.0	47.7	48.3	51.5	52.2	53.0	52.3	53.0	53.8
11	41.4	42.2	42.8	47.0	47.8	48.4	51.5	52.2	53.0	52.3	53.0	53.8
12	40.9	41.5	42.0	46.3	47.0	47.6	50.7	51.4	52.2	51.5	52.2	52.9
13	40.0	40.7	41.2	45.4	46.1	46.7	49.7	50.4	51.1	50.5	51.1	51.8
14	41.1	41.8	42.3	46.6	47.3	48.0	51.1	51.8	52.5	51.8	52.6	53.3
15	38.7	39.3	39.8	44.0	44.6	45.2	48.3	48.9	49.5	49.0	49.6	50.3
16	40.0	40.6	41.1	45.4	46.1	46.7	49.9	50.5	51.2	50.6	51.3	52.0
17	41.3	42.0	42.5	46.7	47.5	48.1	51.2	52.0	52.7	52.0	52.7	53.5
18	40.2	40.8	41.4	45.8	46.5	47.2	50.2	50.9	51.6	51.0	51.7	52.4
19	41.4	42.1	42.5	46.9	47.5	48.2	51.3	52.0	52.8	52.1	52.8	53.6
20	39.6	40.2	40.7	44.9	45.5	46.1	49.4	50.0	50.7	50.1	50.7	51.5
21	40.5	41.2	41.7	45.9	46.6	47.2	50.2	50.9	51.6	51.0	51.7	52.4
22	41.0	41.7	42.3	46.5	47.2	47.9	51.0	51.7	52.5	51.7	52.5	53.2

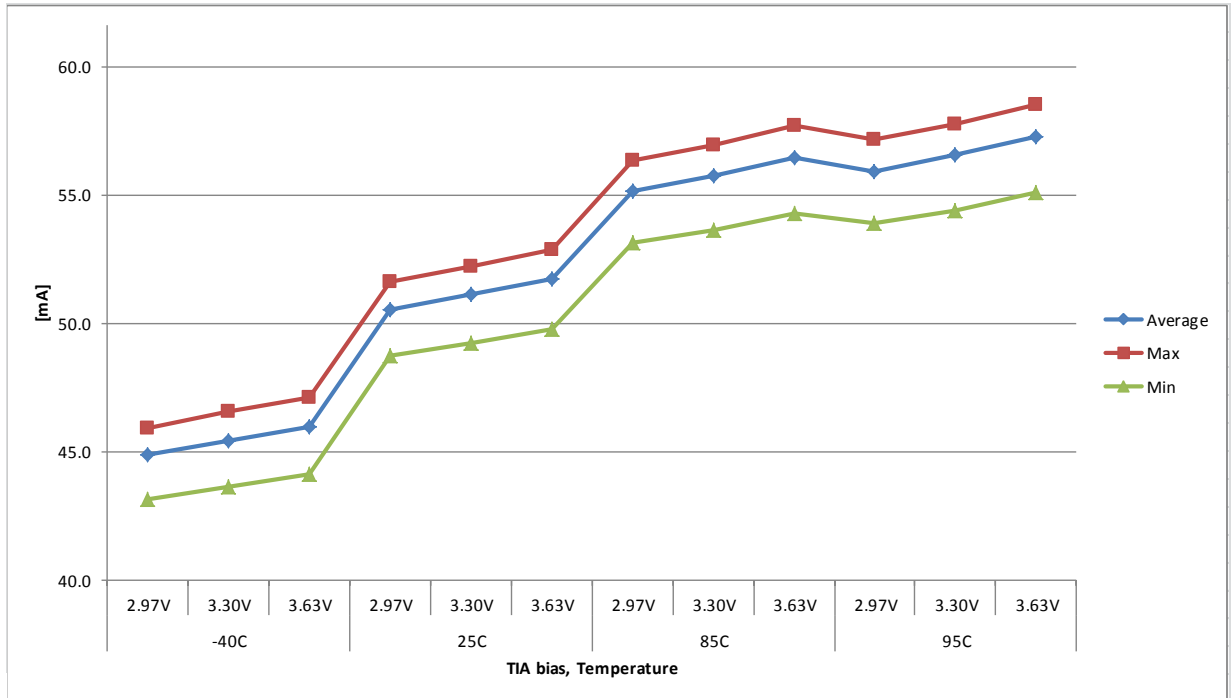


### 3.1.3. $I_{CC}$ (0.5dBm avg. optical power @ 1310nm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	44.9	45.5	46.0	50.4	51.0	51.6	55.0	55.5	56.2	55.7	56.3	57.0
<b>Std. Dev.</b>	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9
<b>Max</b>	45.9	46.5	47.0	51.4	52.1	52.7	56.0	56.6	57.4	56.8	57.4	58.1
<b>Min</b>	43.2	43.7	44.1	48.7	49.2	49.7	53.0	53.5	54.1	53.7	54.2	54.9
<b>Range</b>	2.7	2.8	2.9	2.8	2.9	3.0	3.1	3.2	3.2	3.1	3.2	3.3
<b>Median</b>	45.0	45.6	46.1	50.6	51.2	51.8	55.2	55.8	56.5	56.0	56.6	57.3
1	45.3	45.9	46.4	50.7	51.3	51.9	55.4	56.0	56.8	56.1	56.8	57.5
2	45.7	46.3	46.8	51.1	51.8	52.4	55.6	56.3	57.0	56.4	57.0	57.7
3	44.5	45.1	45.5	49.8	50.4	51.0	54.4	55.0	55.6	55.1	55.7	56.4
4	44.5	45.0	45.5	49.8	50.4	51.0	54.2	54.7	55.4	54.8	55.4	56.1
5	44.3	44.9	45.4	49.8	50.3	51.0	54.2	54.8	55.3	54.9	55.4	56.2
6	45.0	45.5	46.1	50.8	51.3	52.0	55.3	55.9	56.6	56.0	56.7	57.4
7	45.6	46.3	46.8	51.3	52.0	52.6	55.7	56.4	57.1	56.5	57.2	57.9
8	45.9	46.5	47.0	51.3	51.9	52.5	55.8	56.4	57.1	56.6	57.2	57.9
9	44.5	45.0	45.6	50.1	50.6	51.3	54.7	55.3	56.0	55.5	56.0	56.7
10	45.7	46.3	46.8	51.4	52.0	52.6	56.0	56.6	57.4	56.8	57.4	58.1
11	45.8	46.4	47.0	51.4	52.1	52.7	56.0	56.6	57.3	56.8	57.4	58.1
12	45.0	45.6	46.1	50.5	51.1	51.7	55.1	55.7	56.4	55.9	56.5	57.2
13	44.2	44.7	45.2	49.6	50.2	50.8	54.1	54.7	55.3	54.9	55.5	56.2
14	45.5	46.1	46.6	51.1	51.7	52.3	55.6	56.2	56.9	56.4	57.0	57.7
15	43.2	43.7	44.1	48.7	49.2	49.7	53.0	53.5	54.1	53.7	54.2	54.9
16	44.4	44.9	45.4	50.0	50.5	51.1	54.5	55.0	55.7	55.2	55.8	56.4
17	45.3	45.9	46.4	51.0	51.6	52.2	55.5	56.1	56.9	56.3	56.9	57.7
18	44.5	45.0	45.5	50.1	50.7	51.4	54.7	55.2	55.9	55.4	56.0	56.7
19	45.6	46.3	46.8	51.4	52.0	52.6	55.9	56.6	57.3	56.7	57.4	58.1
20	44.0	44.5	45.0	49.4	49.9	50.5	53.7	54.2	54.9	54.4	55.0	55.7
21	44.6	45.1	45.6	49.9	50.5	51.1	54.3	54.8	55.5	54.9	55.5	56.2
22	45.1	45.7	46.2	50.8	51.4	52.0	55.3	56.0	56.6	56.1	56.7	57.4

### 3.1.4. $I_{CC}$ (0.5dBm avg. optical power @ 1550nm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	44.9	45.4	46.0	50.5	51.1	51.8	55.2	55.7	56.5	55.9	56.5	57.3
<b>Std. Dev.</b>	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
<b>Max</b>	45.9	46.6	47.1	51.6	52.2	52.9	56.4	56.9	57.7	57.1	57.8	58.5
<b>Min</b>	43.2	43.6	44.1	48.7	49.2	49.8	53.1	53.6	54.3	53.9	54.4	55.1
<b>Range</b>	2.7	2.9	3.0	2.9	3.0	3.1	3.2	3.3	3.4	3.2	3.4	3.4
<b>Median</b>	44.8	45.4	45.9	50.6	51.2	51.8	55.4	56.0	56.7	56.1	56.7	57.5
1	45.1	45.7	46.2	50.5	51.2	51.8	55.5	56.1	56.8	56.2	56.9	57.6
2	45.6	46.2	46.7	51.2	51.9	52.5	55.8	56.5	57.2	56.6	57.2	58.0
3	44.5	45.1	45.5	50.0	50.6	51.2	54.7	55.3	55.9	55.4	56.0	56.7
4	44.4	45.0	45.5	49.9	50.5	51.1	54.4	54.9	55.6	55.1	55.7	56.4
5	44.2	44.7	45.2	49.7	50.4	50.9	54.3	54.8	55.5	55.1	55.7	56.4
6	44.9	45.5	46.0	50.9	51.4	52.1	55.5	56.1	56.8	56.3	56.9	57.6
7	45.6	46.2	46.8	51.5	52.2	52.8	56.0	56.7	57.4	56.8	57.5	58.2
8	45.9	46.6	47.1	51.4	52.1	52.7	56.0	56.6	57.4	56.8	57.4	58.1
9	44.3	44.9	45.4	50.1	50.7	51.3	55.0	55.5	56.2	55.8	56.3	57.0
10	45.7	46.3	46.8	51.6	52.2	52.8	56.4	56.9	57.7	57.1	57.8	58.5
11	45.8	46.5	47.1	51.6	52.2	52.9	56.3	56.9	57.6	57.1	57.7	58.4
12	44.8	45.4	45.9	50.7	51.2	51.9	55.4	55.9	56.7	56.1	56.7	57.4
13	44.2	44.7	45.2	49.7	50.2	50.8	54.3	54.8	55.5	55.1	55.6	56.3
14	45.5	46.1	46.6	51.2	51.9	52.5	55.9	56.5	57.2	56.7	57.3	58.0
15	43.2	43.6	44.1	48.7	49.2	49.8	53.1	53.6	54.3	53.9	54.4	55.1
16	44.3	44.8	45.3	50.0	50.6	51.2	54.6	55.2	55.8	55.4	55.9	56.6
17	45.3	45.9	46.4	50.9	51.6	52.2	55.7	56.3	57.0	56.5	57.1	57.8
18	44.6	45.1	45.6	50.4	50.9	51.6	55.0	55.5	56.3	55.8	56.4	57.0
19	45.7	46.3	46.8	51.6	52.2	52.8	56.3	56.9	57.7	57.1	57.7	58.5
20	44.1	44.6	45.1	49.5	50.1	50.7	53.9	54.4	55.1	54.6	55.1	55.8
21	44.4	45.0	45.5	49.8	50.5	51.1	54.2	54.9	55.6	55.1	55.7	56.4
22	45.1	45.7	46.2	50.8	51.4	52.0	55.4	56.0	56.7	56.1	56.8	57.5

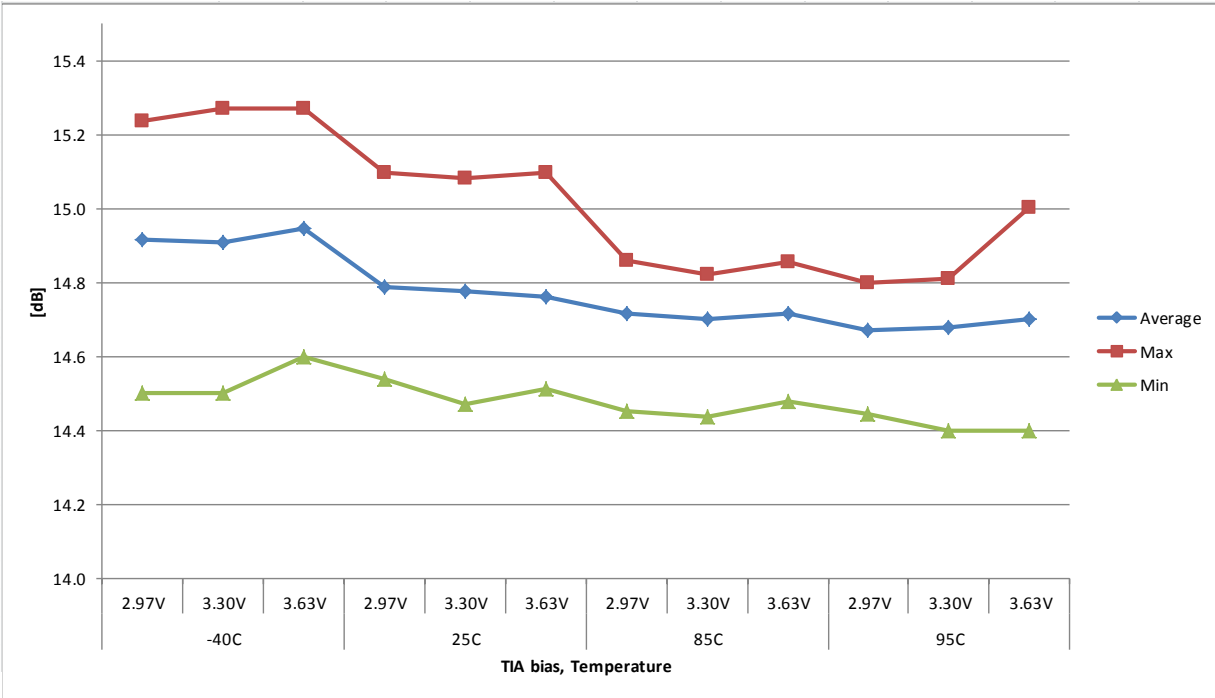


## 3.2. Optical Return Loss

### 3.2.1. Test Descriptions

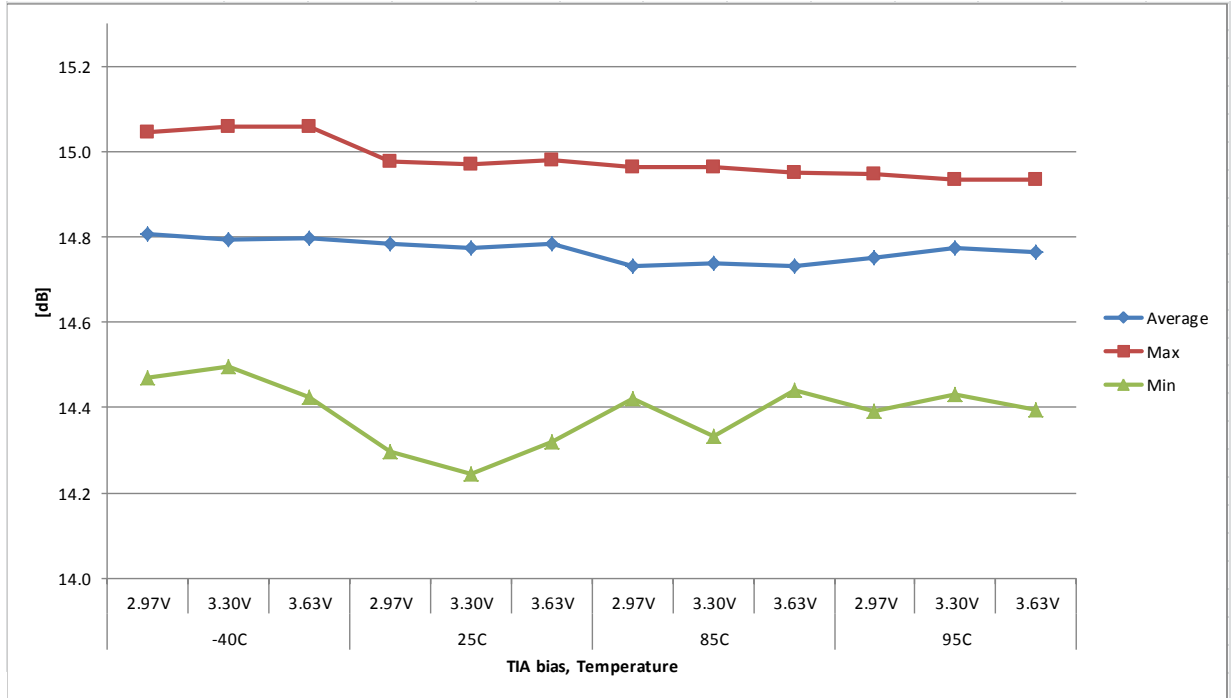
Optical return losses of the ROSAs were measured at 1550nm and 1310nm.

### 3.2.2. Optical Return Loss (dB) at 1310nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	14.9	14.9	14.9	14.8	14.8	14.8	14.7	14.7	14.7	14.7	14.7	14.7
<b>Std. Dev.</b>	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Max</b>	15.2	15.3	15.3	15.1	15.1	15.1	14.9	14.8	14.9	14.8	14.8	15.0
<b>Min</b>	14.5	14.5	14.6	14.5	14.5	14.5	14.5	14.4	14.5	14.4	14.4	14.4
<b>Range</b>	0.7	0.8	0.7	0.6	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.6
<b>Median</b>	14.9	14.9	15.0	14.8	14.8	14.7	14.7	14.7	14.7	14.7	14.7	14.7
1	15.0	15.1	15.1	14.9	14.9	14.9	14.9	14.8	14.9	14.6	14.7	14.7
2	14.8	14.8	14.8	15.1	15.1	15.1	14.8	14.7	14.8	14.7	14.8	14.8
3	15.1	15.1	15.1	14.8	14.8	14.8	14.8	14.8	14.8	14.6	14.6	14.7
4	14.8	14.7	14.8	14.7	14.7	14.7	14.7	14.6	14.7	14.6	14.7	14.6
5	14.7	14.8	15.0	14.8	14.9	14.9	14.5	14.8	14.7	14.4	14.7	14.9
6	15.0	15.0	15.0	14.7	14.7	14.7	14.8	14.8	14.8	14.7	14.7	14.7
7	15.1	15.2	15.2	14.7	14.6	14.6	14.7	14.6	14.7	14.8	14.7	14.8
8	15.1	15.1	15.1	14.8	14.8	14.8	14.7	14.6	14.6	14.8	14.8	14.8
9	14.7	14.7	14.7	14.7	14.7	14.7	14.8	14.7	14.8	14.7	14.7	14.7
10	14.7	14.8	14.8	14.8	14.8	14.8	14.7	14.8	14.7	14.8	14.7	14.8
11	14.9	14.9	15.0	14.8	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
12	15.1	14.9	14.9	14.8	14.6	14.9	14.5	14.8	14.5	14.5	14.5	14.5
13	14.8	14.8	14.8	14.7	14.7	14.7	14.6	14.6	14.6	14.8	14.8	14.8
14	15.2	15.2	15.2	14.9	14.9	14.9	14.8	14.7	14.8	14.8	14.8	14.8
15	15.1	15.1	15.1	14.8	14.8	14.8	14.7	14.7	14.7	14.7	14.7	14.7
16	15.2	15.3	15.3	14.7	14.7	14.7	14.7	14.7	14.6	14.7	14.7	14.7
17	14.5	14.5	14.6	14.5	14.5	14.5	14.8	14.4	14.8	14.6	14.4	14.5
18	14.8	14.7	14.8	14.7	14.7	14.7	14.7	14.7	14.6	14.6	14.6	14.6
19	14.6	14.6	14.6	14.9	14.9	14.8	14.8	14.8	14.8	14.7	14.7	14.7
20	14.9	14.9	14.9	14.8	14.8	14.8	14.8	14.6	14.8	14.8	14.7	14.8
21	15.0	15.0	15.2	15.0	14.8	14.5	14.9	14.8	14.7	14.7	14.5	15.0
22	14.8	14.8	14.8	14.8	14.9	14.7	14.7	14.6	14.7	14.5	14.6	14.4

### 3.2.3. Optical Return Loss (dB) at 1550nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	14.8	14.8	14.8	14.8	14.8	14.8	14.7	14.7	14.7	14.8	14.8	14.8
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1
<b>Max</b>	15.0	15.1	15.1	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.9	14.9
<b>Min</b>	14.5	14.5	14.4	14.3	14.2	14.3	14.4	14.3	14.4	14.4	14.4	14.4
<b>Range</b>	0.6	0.6	0.6	0.7	0.7	0.7	0.5	0.6	0.5	0.6	0.5	0.5
<b>Median</b>	14.8	14.8	14.8	14.8	14.8	14.8	14.7	14.8	14.8	14.8	14.8	14.8
1	14.8	14.8	14.8	15.0	14.9	14.9	14.7	14.7	14.6	14.7	14.8	14.8
2	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.8	14.9	14.9	14.8	14.8
3	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.9	14.9	14.8
4	14.9	14.9	14.9	14.8	14.8	14.8	14.9	14.9	14.9	14.8	14.8	14.7
5	14.9	14.8	14.8	14.8	14.7	14.9	14.7	14.6	14.8	14.5	14.6	14.6
6	15.0	15.1	15.1	14.8	14.8	14.8	14.9	14.8	14.8	14.9	14.9	14.9
7	14.8	14.8	14.8	14.8	14.8	14.8	14.9	14.9	14.9	14.8	14.8	14.8
8	14.7	14.8	14.8	14.7	14.8	14.7	15.0	15.0	15.0	14.9	14.9	14.9
9	14.8	14.8	14.8	14.8	14.9	14.9	14.8	14.8	14.8	14.8	14.8	14.8
10	14.8	14.8	14.8	15.0	15.0	15.0	14.6	14.6	14.6	14.8	14.8	14.8
11	15.0	15.0	15.0	14.9	14.9	14.9	14.9	14.8	14.8	14.9	14.9	14.9
12	14.5	14.5	14.4	14.3	14.2	14.3	14.4	14.3	14.4	14.4	14.4	14.4
13	14.7	14.7	14.8	14.7	14.7	14.7	14.8	14.8	14.8	14.9	14.9	14.9
14	14.8	14.7	14.7	14.6	14.7	14.6	14.7	14.6	14.6	14.7	14.7	14.7
15	14.8	14.8	14.8	14.8	14.7	14.8	14.7	14.5	14.8	14.8	14.8	14.8
16	14.9	14.9	14.9	14.8	14.8	14.9	14.7	14.8	14.7	14.8	14.8	14.8
17	14.5	14.5	14.6	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.9
18	14.8	14.6	14.7	14.8	15.0	14.8	14.7	14.8	14.6	14.5	14.7	14.6
19	14.8	14.8	14.8	14.8	14.8	14.7	14.7	14.8	14.7	14.7	14.7	14.7
20	14.9	14.9	14.9	14.7	14.7	14.7	14.7	14.6	14.7	14.6	14.6	14.6
21	14.8	14.8	14.8	14.7	14.6	14.6	14.6	14.7	14.6	14.6	14.7	14.6
22	14.7	14.7	14.6	14.8	14.7	14.7	14.6	14.7	14.6	14.9	14.9	14.8



### 3.3. Responsivity, RSSI Dark

#### 3.3.1. Test Descriptions

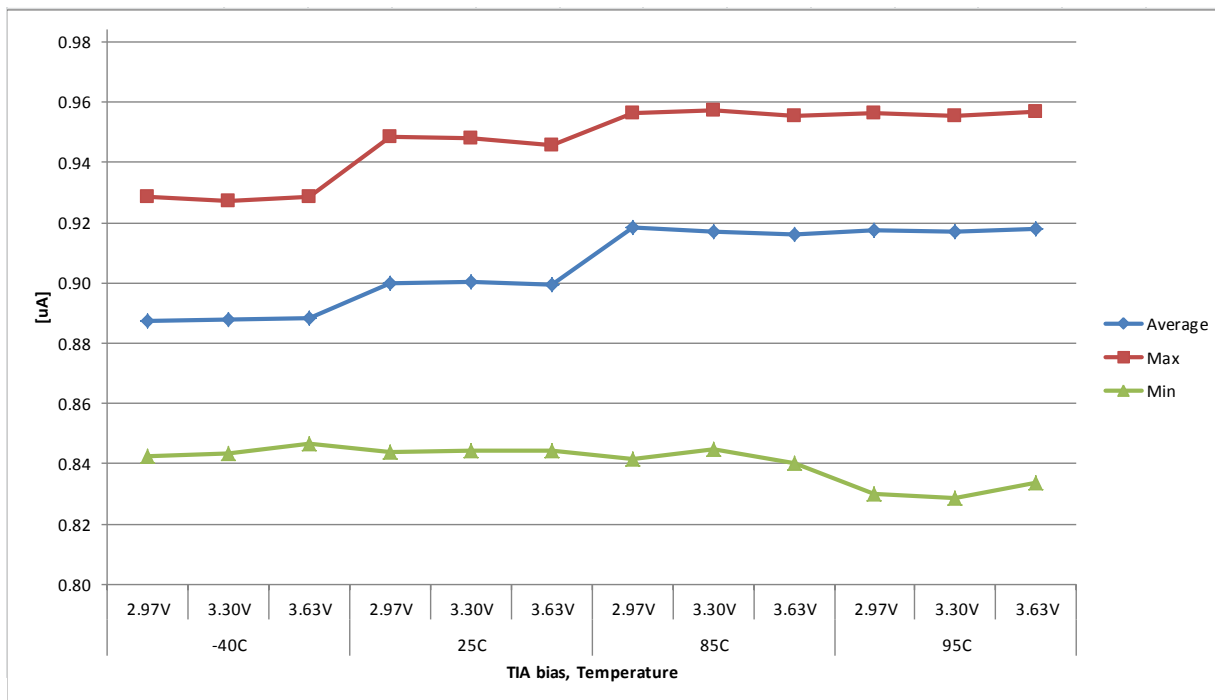
Responsivity is calculated by dividing the measured the RSSI current by the input optical power at an input optical power of -10dBm (100uW). The input optical signal is unmodulated.

In these tests the ROSA was powered up and the current sunk from the RSSI pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

- 1) No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
- 2) -30dBm of avg. optical power
- 3) -20dBm of avg. optical power
- 4) -10dBm of avg. optical power
- 5) 0dBm of avg. optical power
- 6) 0.5dBm of avg. optical power
- 7) 1.14dBm of avg. optical power
- 8) 2.04dBm of avg. optical power

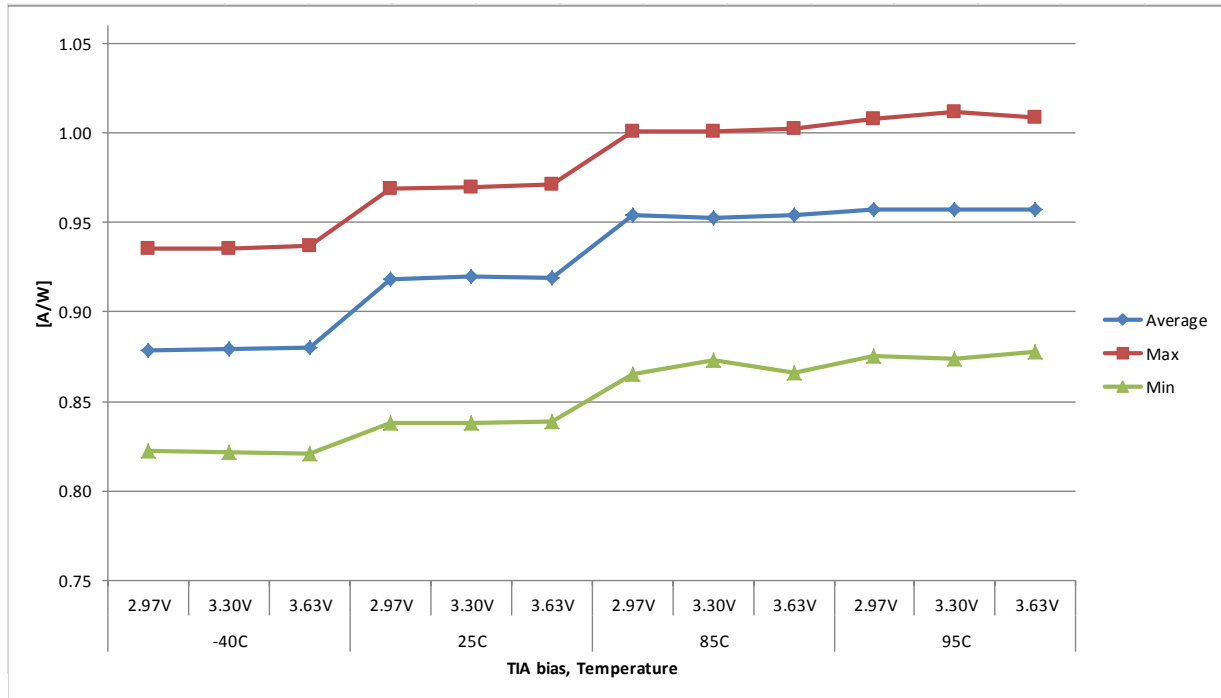
The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

### 3.3.2. Responsivity (A/W) at 1310nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	0.89	0.89	0.89	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92
<b>Std. Dev.</b>	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03
<b>Max</b>	0.93	0.93	0.93	0.95	0.95	0.95	0.96	0.96	0.96	0.96	0.96	0.96
<b>Min</b>	0.84	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.83	0.83	0.83
<b>Range</b>	0.09	0.08	0.08	0.10	0.10	0.10	0.11	0.11	0.12	0.13	0.13	0.12
<b>Median</b>	0.89	0.89	0.88	0.91	0.91	0.91	0.93	0.93	0.93	0.93	0.93	0.93
1	0.88	0.87	0.87	0.87	0.86	0.87	0.93	0.93	0.93	0.92	0.92	0.92
2	0.91	0.91	0.91	0.92	0.92	0.92	0.94	0.94	0.94	0.94	0.94	0.94
3	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93	0.94	0.94	0.94
4	0.86	0.86	0.86	0.84	0.84	0.84	0.84	0.84	0.84	0.83	0.83	0.83
5	0.89	0.89	0.88	0.88	0.87	0.88	0.90	0.90	0.88	0.89	0.87	0.89
6	0.85	0.85	0.86	0.91	0.91	0.91	0.94	0.94	0.94	0.93	0.94	0.94
7	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.92	0.93
8	0.87	0.87	0.88	0.87	0.86	0.86	0.87	0.87	0.87	0.87	0.87	0.87
9	0.89	0.88	0.88	0.91	0.92	0.91	0.94	0.94	0.94	0.94	0.94	0.94
10	0.90	0.90	0.90	0.92	0.92	0.92	0.95	0.94	0.95	0.94	0.94	0.94
11	0.91	0.91	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.94	0.94	0.93
12	0.88	0.89	0.88	0.90	0.90	0.90	0.93	0.94	0.93	0.94	0.94	0.94
13	0.85	0.85	0.86	0.86	0.86	0.86	0.90	0.90	0.90	0.91	0.91	0.91
14	0.93	0.93	0.93	0.95	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
15	0.92	0.92	0.92	0.95	0.95	0.95	0.96	0.96	0.96	0.96	0.96	0.96
16	0.92	0.92	0.92	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95
17	0.84	0.84	0.85	0.88	0.88	0.88	0.90	0.89	0.90	0.89	0.89	0.89
18	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.92	0.93	0.93	0.93
19	0.89	0.89	0.89	0.92	0.93	0.92	0.94	0.94	0.94	0.94	0.95	0.94
20	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89	0.89	0.89	0.89
21	0.86	0.85	0.86	0.84	0.85	0.84	0.88	0.85	0.86	0.85	0.85	0.85
22	0.86	0.87	0.87	0.88	0.89	0.88	0.89	0.90	0.89	0.90	0.90	0.90

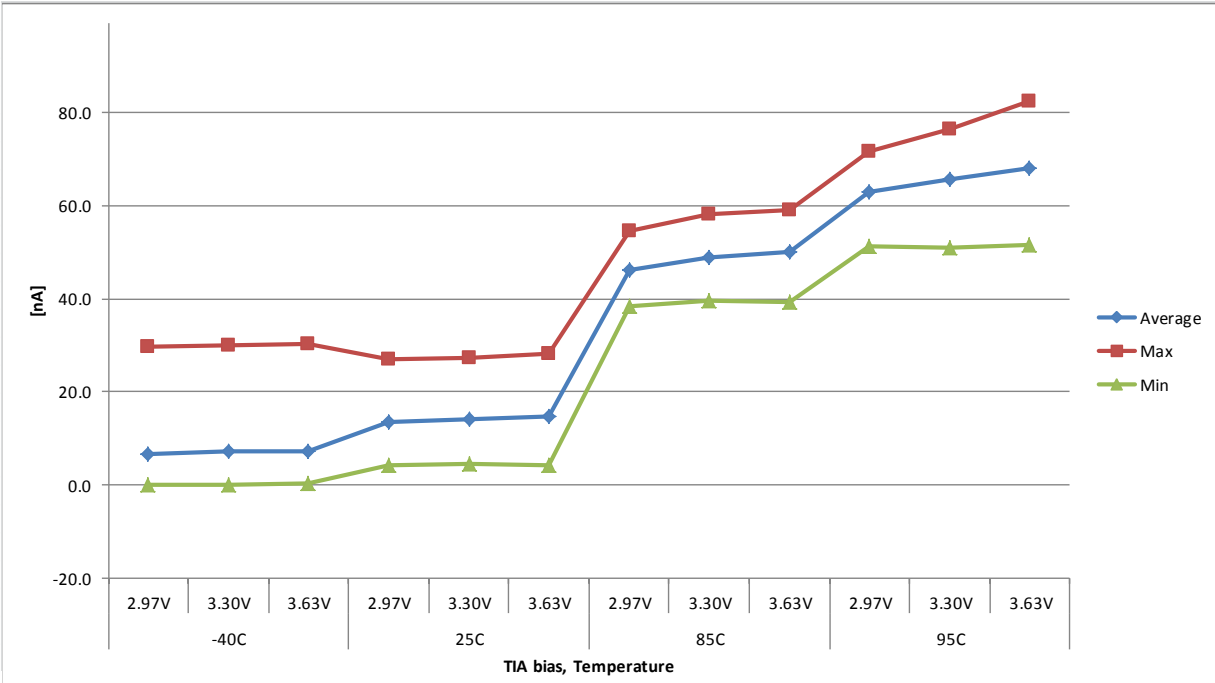
### 3.3.3. Responsivity (A/W) at 1550nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	0.88	0.88	0.88	0.92	0.92	0.92	0.95	0.95	0.95	0.96	0.96	0.96
<b>Std. Dev.</b>	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
<b>Max</b>	0.94	0.94	0.94	0.97	0.97	0.97	1.00	1.00	1.00	1.01	1.01	1.01
<b>Min</b>	0.82	0.82	0.82	0.84	0.84	0.84	0.87	0.87	0.87	0.88	0.87	0.88
<b>Range</b>	0.11	0.11	0.12	0.13	0.13	0.13	0.14	0.13	0.14	0.13	0.14	0.13
<b>Median</b>	0.88	0.88	0.88	0.94	0.94	0.94	0.97	0.97	0.97	0.98	0.97	0.98
1	0.85	0.85	0.85	0.84	0.84	0.85	0.94	0.94	0.94	0.94	0.94	0.94
2	0.89	0.89	0.89	0.94	0.94	0.94	0.97	0.97	0.97	0.98	0.98	0.98
3	0.91	0.91	0.91	0.95	0.95	0.95	0.99	0.98	0.98	0.98	0.99	0.99
4	0.86	0.86	0.86	0.87	0.87	0.87	0.88	0.88	0.88	0.88	0.89	0.88
5	0.86	0.86	0.86	0.87	0.88	0.87	0.92	0.91	0.91	0.92	0.93	0.92
6	0.84	0.84	0.84	0.94	0.94	0.94	0.97	0.97	0.97	0.97	0.97	0.97
7	0.88	0.88	0.88	0.95	0.95	0.95	0.97	0.97	0.97	0.98	0.97	0.98
8	0.88	0.89	0.89	0.89	0.90	0.90	0.90	0.91	0.91	0.90	0.90	0.90
9	0.85	0.86	0.86	0.92	0.92	0.92	0.98	0.98	0.98	0.99	0.99	0.99
10	0.90	0.90	0.90	0.96	0.96	0.96	1.00	1.00	1.00	1.01	1.01	1.01
11	0.92	0.93	0.93	0.95	0.95	0.95	0.99	0.99	0.99	0.99	0.99	0.98
12	0.84	0.84	0.84	0.92	0.92	0.92	0.97	0.96	0.98	0.98	0.98	0.98
13	0.85	0.85	0.85	0.87	0.87	0.87	0.93	0.93	0.93	0.93	0.94	0.94
14	0.92	0.92	0.93	0.97	0.97	0.97	1.00	1.00	1.00	1.01	1.01	1.00
15	0.91	0.91	0.91	0.96	0.95	0.96	0.99	0.99	0.99	0.99	0.99	0.99
16	0.90	0.90	0.90	0.95	0.95	0.95	0.98	0.98	0.98	0.98	0.98	0.98
17	0.84	0.85	0.84	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.92	0.92
18	0.92	0.92	0.92	0.94	0.95	0.95	0.99	0.98	0.99	0.99	0.99	0.99
19	0.90	0.90	0.90	0.96	0.96	0.96	1.00	1.00	1.00	1.01	1.01	1.01
20	0.94	0.94	0.94	0.95	0.95	0.94	0.92	0.92	0.92	0.92	0.92	0.92
21	0.82	0.82	0.82	0.84	0.84	0.84	0.87	0.87	0.87	0.88	0.87	0.88
22	0.85	0.85	0.86	0.88	0.89	0.88	0.91	0.91	0.91	0.91	0.91	0.91



### 3.3.4. RSSI dark (nA)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	6.7	7.3	7.3	13.6	14.1	14.8	46.1	48.8	50.0	62.9	65.7	68.2
<b>Std. Dev.</b>	8.9	9.4	9.1	6.2	6.2	6.2	4.9	5.4	5.9	5.7	6.6	7.9
<b>Max</b>	29.8	30.1	30.2	27.1	27.3	28.2	54.7	58.3	59.0	71.7	76.4	82.6
<b>Min</b>	0.0	0.1	0.3	4.3	4.6	4.1	38.5	39.7	39.4	51.4	50.9	51.6
<b>Range</b>	29.8	30.0	30.0	22.8	22.7	24.1	16.2	18.6	19.5	20.3	25.6	31.1
<b>Median</b>	3.0	3.6	3.8	11.4	11.9	13.0	46.4	49.1	50.1	63.6	66.1	68.7
1	0.0	0.4	0.7	11.2	11.6	12.9	50.4	54.7	57.1	70.6	76.4	81.7
2	11.4	17.7	11.8	18.3	18.4	14.8	42.4	44.7	45.5	59.1	62.6	62.8
3	0.0	0.1	0.5	11.9	12.4	13.4	43.9	46.4	48.6	61.8	64.7	69.3
4	0.0	0.1	0.5	9.5	9.9	11.0	41.9	44.2	45.6	59.7	63.8	64.0
5	29.8	30.1	30.2	27.1	27.3	28.2	51.4	54.0	54.2	65.8	66.8	70.4
6	6.3	6.7	7.0	14.1	14.5	15.7	48.3	51.6	52.7	65.7	68.9	71.8
7	0.0	0.1	0.3	5.5	5.9	6.7	38.7	41.2	41.6	54.4	56.3	58.4
8	5.3	5.5	7.9	10.5	10.8	11.5	38.5	40.0	40.7	54.2	54.8	57.4
9	0.6	2.3	2.6	10.7	10.7	12.2	43.5	45.5	47.0	59.5	61.1	62.6
10	0.0	0.3	0.4	11.4	12.0	13.2	50.9	54.4	58.1	71.7	76.4	82.6
11	5.6	5.9	6.6	14.0	14.0	15.1	43.2	45.1	45.5	58.4	59.6	61.5
12	8.1	8.5	8.8	19.7	20.3	21.3	47.5	52.5	52.8	64.4	67.0	68.4
13	0.0	0.1	0.4	7.3	7.3	8.8	43.0	45.6	46.8	59.3	62.0	64.8
14	0.0	0.1	0.4	9.3	9.9	11.0	48.3	51.1	53.4	66.0	69.3	73.7
15	14.9	15.5	16.0	23.2	23.9	25.1	54.7	56.8	58.6	70.3	72.7	74.6
16	0.0	0.1	0.3	4.3	4.6	4.1	45.3	47.6	49.1	64.0	69.3	69.0
17	3.1	3.6	3.6	10.7	10.9	11.8	42.1	44.6	44.5	59.2	63.7	61.9
18	15.6	19.5	18.1	24.2	24.8	25.7	54.6	58.3	59.0	71.1	72.9	77.8
19	11.0	11.2	11.5	11.4	11.7	12.6	38.7	39.7	39.4	51.4	50.9	51.6
20	3.0	3.5	4.0	14.4	15.0	16.1	48.1	50.6	51.2	63.3	65.5	67.9
21	2.4	0.1	0.4	9.5	11.5	11.1	48.3	52.0	53.6	65.8	70.2	74.0
22	29.3	29.4	29.5	21.3	22.5	22.5	49.9	52.9	54.4	67.4	70.0	74.2

### 3.4. Optical Receiver Sensitivity

#### 3.4.1. Test Descriptions

The receiver sensitivity tests were performed by performing a sweep of optical powers and recording the BER for those optical powers.

In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT. This is done because the sensitivity of the GN2013 CDR is much better than the BERT inputs and allows for a much better measurement of the true sensitivity of the ROSA.

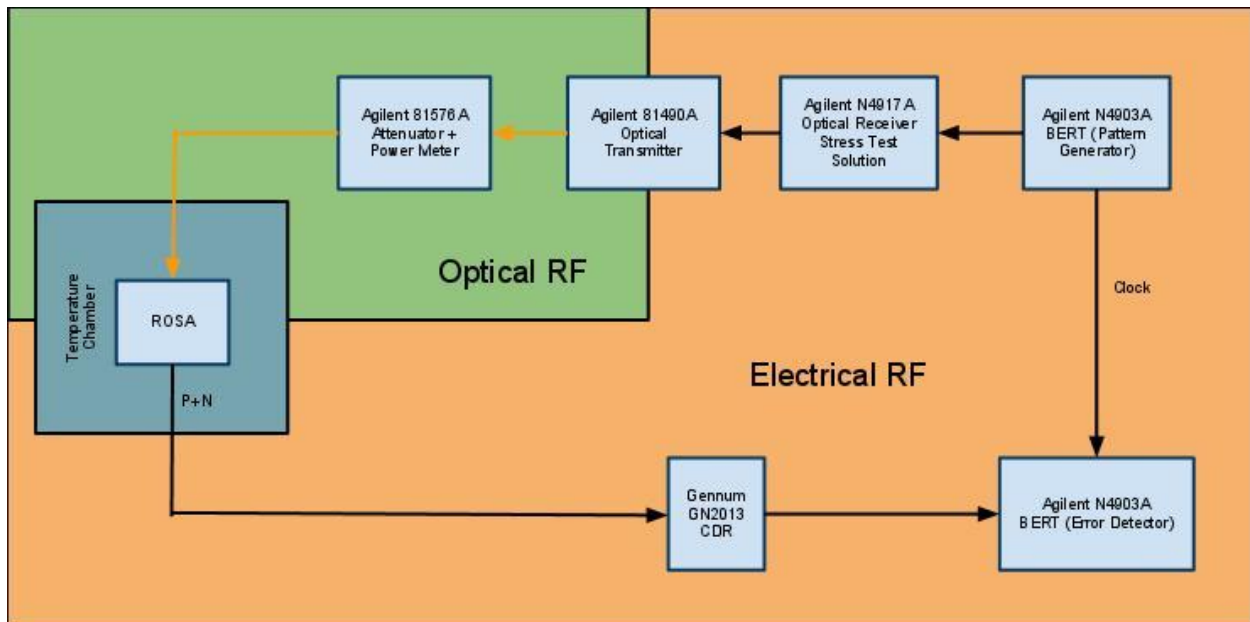


Figure 1. Sensitivity testing Block Diagram.

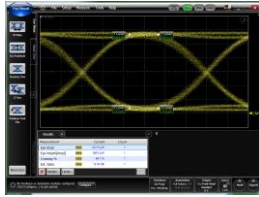


Figure 2. 1310nm 11.3Gbps Input Eye

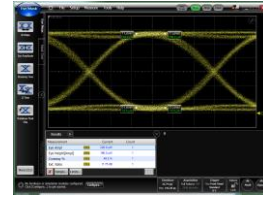


Figure 3. 1550nm 11.3Gbps Input Eye

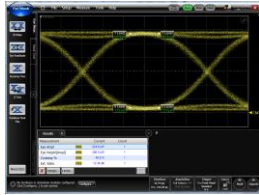


Figure 4. 1310nm 10.3125Gbps Input Eye

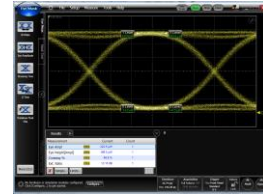


Figure 5. 1550nm 10.3125Gbps Input Eye

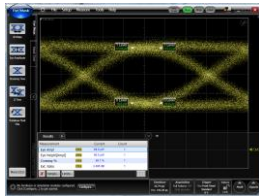


Figure 6. 1310 BaseL Input Eye

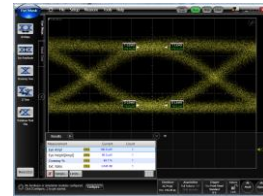


Figure 7. 1550 BaseL Input Eye

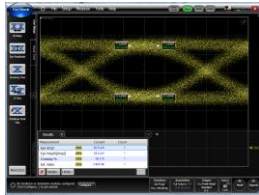


Figure 8. 1310 BaseE Input Eye

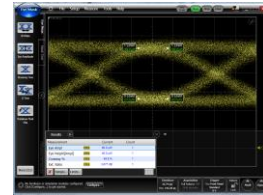
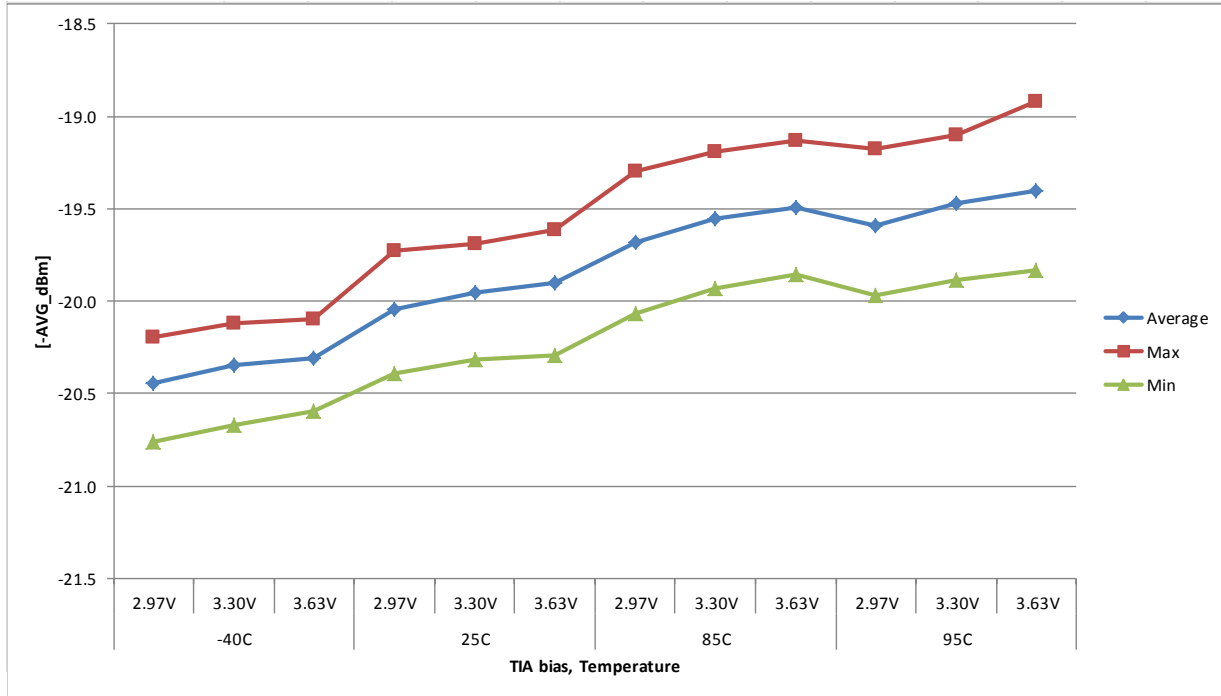


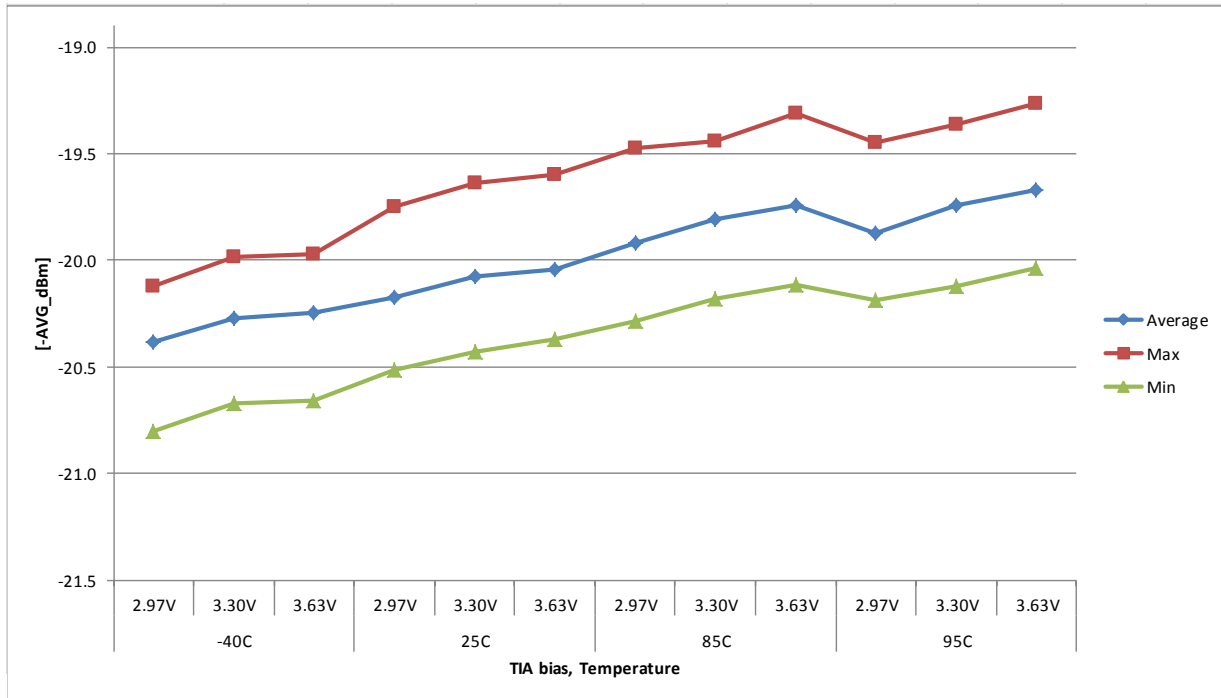
Figure 9. 1550 BaseE Input Eye

### 3.4.2. Unstressed Receiver Sensitivity at 1310nm and 11.3Gbps (Avg. power dBm)



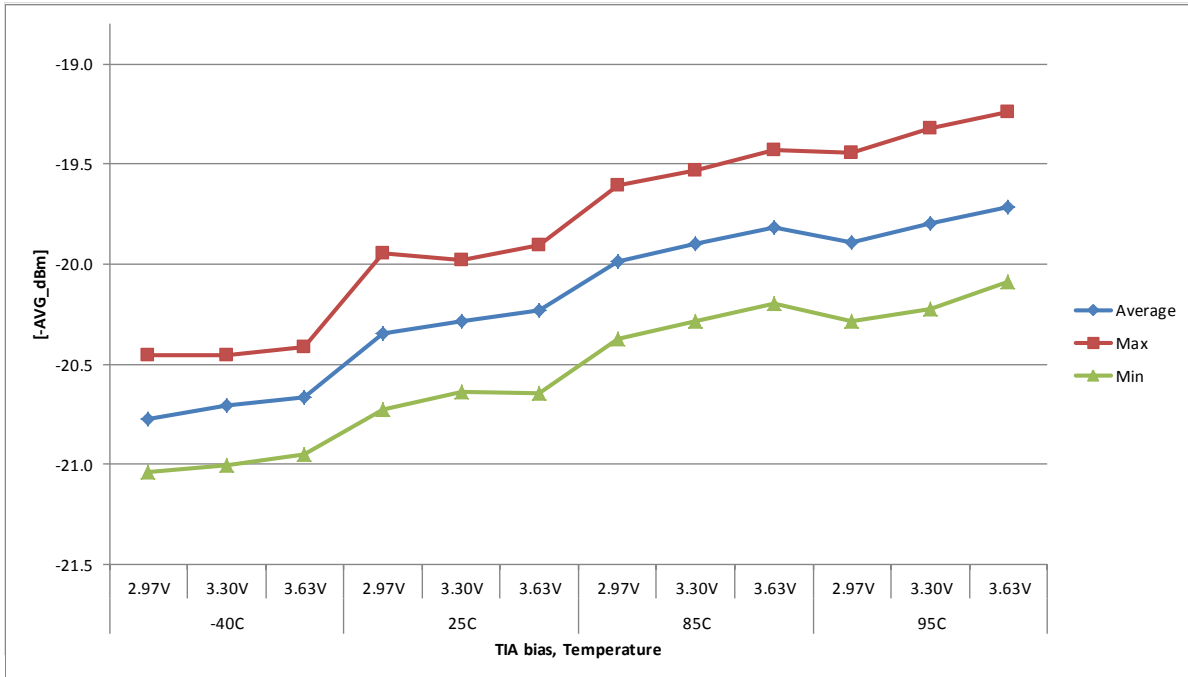
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-20.4	-20.3	-20.3	-20.0	-20.0	-19.9	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
<b>Std. Dev.</b>	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-20.2	-20.1	-20.1	-19.7	-19.7	-19.6	-19.3	-19.2	-19.1	-19.2	-19.1	-18.9
<b>Min</b>	-20.8	-20.7	-20.6	-20.4	-20.3	-20.3	-20.1	-19.9	-19.9	-20.0	-19.9	-19.8
<b>Range</b>	0.6	0.5	0.5	0.7	0.6	0.7	0.8	0.7	0.7	0.8	0.8	0.9
<b>Median</b>	-20.4	-20.3	-20.3	-20.1	-19.9	-19.9	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
1	-20.4	-20.3	-20.3	-19.9	-19.8	-19.8	-19.8	-19.6	-19.6	-19.6	-19.5	-19.5
2	-20.4	-20.3	-20.3	-20.1	-20.1	-20.0	-19.8	-19.6	-19.6	-19.7	-19.6	-19.5
3	-20.5	-20.5	-20.4	-20.1	-20.1	-20.0	-19.7	-19.6	-19.5	-19.7	-19.5	-19.5
4	-20.4	-20.3	-20.2	-19.8	-19.7	-19.7	-19.3	-19.2	-19.1	-19.2	-19.1	-18.9
5	-20.4	-20.3	-20.3	-20.0	-19.8	-19.8	-19.6	-19.4	-19.2	-19.5	-19.3	-19.3
6	-20.3	-20.2	-20.2	-20.2	-20.1	-20.0	-19.8	-19.7	-19.6	-19.7	-19.6	-19.5
7	-20.3	-20.2	-20.2	-19.9	-19.8	-19.8	-19.5	-19.5	-19.3	-19.5	-19.3	-19.3
8	-20.4	-20.3	-20.2	-19.9	-19.8	-19.7	-19.4	-19.3	-19.2	-19.3	-19.2	-19.1
9	-20.4	-20.4	-20.3	-20.1	-20.1	-20.0	-19.8	-19.8	-19.7	-19.8	-19.7	-19.6
10	-20.4	-20.4	-20.4	-20.1	-20.0	-19.9	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
11	-20.6	-20.5	-20.4	-20.1	-20.0	-20.0	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
12	-20.4	-20.3	-20.2	-20.0	-19.9	-19.8	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
13	-20.4	-20.3	-20.2	-19.9	-19.8	-19.8	-19.7	-19.6	-19.5	-19.6	-19.5	-19.5
14	-20.7	-20.5	-20.5	-20.2	-20.2	-20.2	-19.9	-19.7	-19.7	-19.8	-19.6	-19.6
15	-20.7	-20.6	-20.6	-20.4	-20.3	-20.3	-20.1	-19.9	-19.9	-20.0	-19.9	-19.8
16	-20.7	-20.5	-20.5	-20.2	-20.1	-20.1	-19.8	-19.7	-19.6	-19.7	-19.7	-19.6
17	-20.2	-20.1	-20.1	-19.9	-19.8	-19.7	-19.6	-19.3	-19.4	-19.4	-19.3	-19.2
18	-20.5	-20.4	-20.4	-20.1	-19.9	-19.9	-19.8	-19.6	-19.6	-19.7	-19.6	-19.5
19	-20.4	-20.3	-20.2	-20.1	-20.1	-20.0	-19.8	-19.7	-19.6	-19.7	-19.6	-19.5
20	-20.8	-20.7	-20.6	-20.2	-20.1	-20.1	-19.7	-19.6	-19.5	-19.5	-19.4	-19.4
21	-20.3	-20.1	-20.1	-19.7	-19.7	-19.6	-19.5	-19.3	-19.2	-19.3	-19.2	-19.1
22	-20.3	-20.2	-20.2	-19.9	-19.8	-19.8	-19.5	-19.4	-19.3	-19.4	-19.2	-19.2

### 3.4.3. Unstressed Receiver Sensitivity at 1550nm and 11.3Gbps (Avg. power dBm)



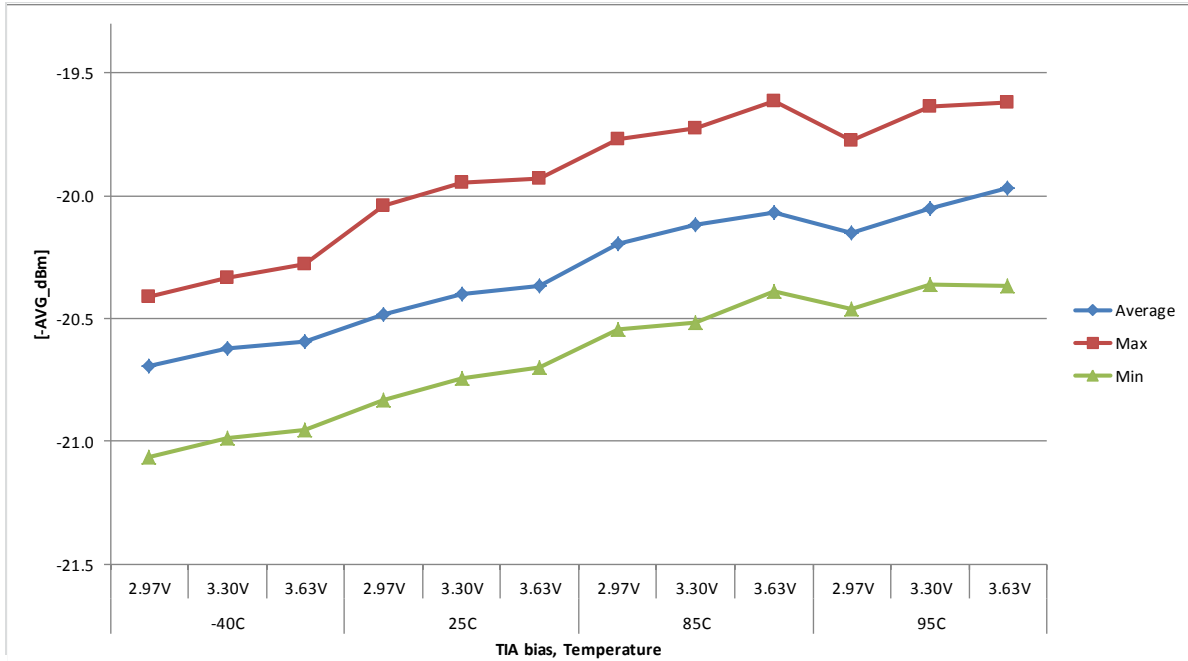
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-20.4	-20.3	-20.2	-20.2	-20.1	-20.0	-19.9	-19.8	-19.7	-19.9	-19.7	-19.7
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-20.1	-20.0	-20.0	-19.7	-19.6	-19.6	-19.5	-19.4	-19.3	-19.4	-19.4	-19.3
<b>Min</b>	-20.8	-20.7	-20.7	-20.5	-20.4	-20.4	-20.3	-20.2	-20.1	-20.2	-20.1	-20.0
<b>Range</b>	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.8
<b>Median</b>	-20.4	-20.3	-20.2	-20.2	-20.1	-20.1	-20.0	-19.8	-19.8	-19.9	-19.8	-19.7
1	-20.1	-20.0	-20.0	-19.7	-19.6	-19.6	-19.8	-19.7	-19.7	-19.8	-19.6	-19.6
2	-20.4	-20.3	-20.2	-20.2	-20.1	-20.1	-20.0	-19.8	-19.8	-19.9	-19.8	-19.7
3	-20.5	-20.3	-20.3	-20.4	-20.3	-20.2	-20.1	-20.0	-19.9	-20.1	-19.9	-19.9
4	-20.4	-20.2	-20.2	-20.0	-19.8	-19.8	-19.6	-19.5	-19.4	-19.6	-19.4	-19.3
5	-20.2	-20.1	-20.1	-20.0	-20.0	-19.9	-19.8	-19.8	-19.6	-19.8	-19.6	-19.6
6	-20.2	-20.0	-20.0	-20.3	-20.2	-20.2	-20.0	-19.9	-19.9	-19.9	-19.9	-19.8
7	-20.2	-20.2	-20.2	-20.2	-20.1	-20.1	-19.9	-19.8	-19.7	-19.8	-19.7	-19.7
8	-20.4	-20.3	-20.3	-20.1	-19.9	-19.9	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
9	-20.3	-20.2	-20.2	-20.1	-20.0	-20.0	-20.0	-20.0	-19.9	-20.0	-19.9	-19.8
10	-20.4	-20.3	-20.3	-20.3	-20.2	-20.3	-20.1	-20.0	-20.0	-20.1	-19.9	-19.8
11	-20.6	-20.5	-20.5	-20.3	-20.2	-20.1	-20.0	-19.9	-19.8	-20.0	-19.8	-19.8
12	-20.1	-20.1	-20.0	-20.2	-20.1	-20.1	-20.0	-19.8	-19.8	-19.9	-19.8	-19.7
13	-20.4	-20.3	-20.2	-20.1	-19.9	-19.9	-19.9	-19.8	-19.7	-19.9	-19.7	-19.7
14	-20.7	-20.5	-20.5	-20.4	-20.3	-20.3	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
15	-20.7	-20.6	-20.5	-20.5	-20.4	-20.4	-20.3	-20.2	-20.1	-20.2	-20.1	-20.0
16	-20.5	-20.4	-20.4	-20.3	-20.2	-20.2	-20.1	-19.9	-19.9	-20.0	-19.8	-19.8
17	-20.2	-20.1	-20.1	-19.9	-19.8	-19.8	-19.7	-19.6	-19.5	-19.7	-19.5	-19.4
18	-20.6	-20.5	-20.4	-20.3	-20.2	-20.2	-20.1	-19.9	-19.9	-20.1	-19.9	-19.8
19	-20.5	-20.4	-20.3	-20.3	-20.2	-20.2	-20.0	-19.9	-19.8	-20.0	-19.9	-19.8
20	-20.8	-20.7	-20.7	-20.4	-20.3	-20.3	-19.9	-19.8	-19.7	-19.8	-19.7	-19.6
21	-20.2	-20.0	-20.0	-19.7	-19.6	-19.6	-19.5	-19.4	-19.3	-19.4	-19.4	-19.3
22	-20.2	-20.1	-20.1	-20.0	-19.9	-19.9	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4

### 3.4.4. Unstressed Receiver Sensitivity at 1310nm and 10.3125Gbps (Avg. power dBm)



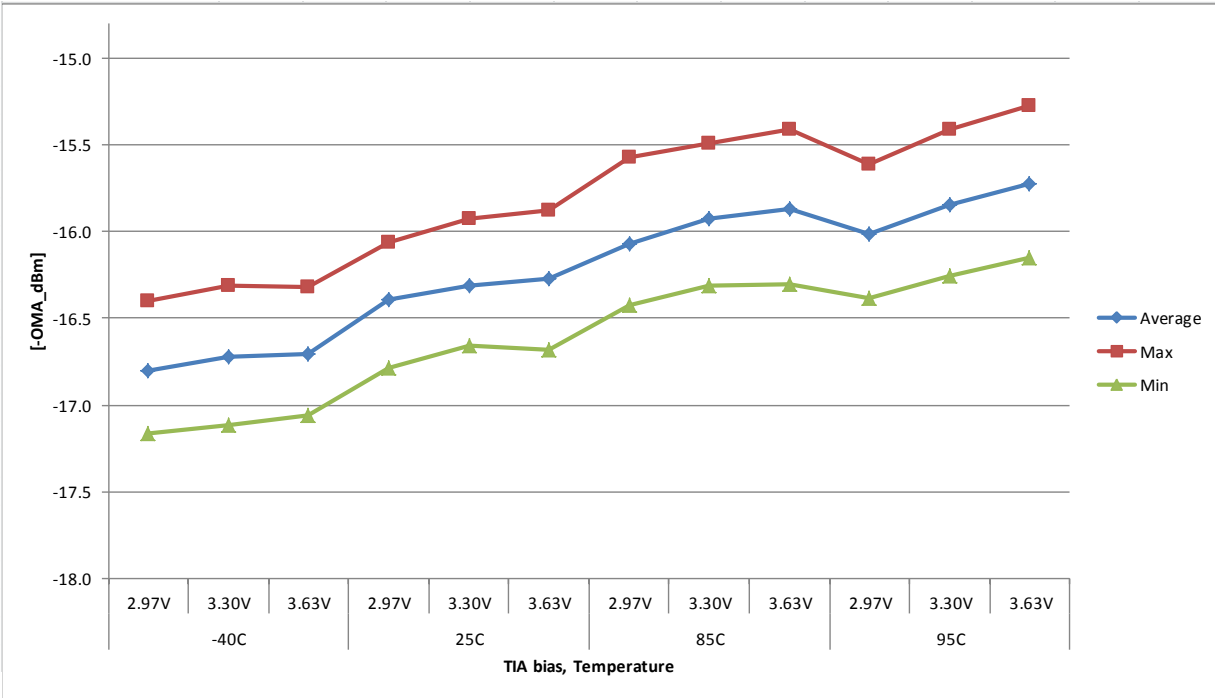
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-20.8	-20.7	-20.7	-20.3	-20.3	-20.2	-20.0	-19.9	-19.8	-19.9	-19.8	-19.7
<b>Std. Dev.</b>	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-20.5	-20.5	-20.4	-19.9	-20.0	-19.9	-19.6	-19.5	-19.4	-19.4	-19.3	-19.2
<b>Min</b>	-21.0	-21.0	-21.0	-20.7	-20.6	-20.6	-20.4	-20.3	-20.2	-20.3	-20.2	-20.1
<b>Range</b>	0.6	0.5	0.5	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.8
<b>Median</b>	-20.7	-20.7	-20.6	-20.4	-20.3	-20.2	-20.0	-19.9	-19.9	-19.9	-19.8	-19.8
1	-20.7	-20.7	-20.6	-20.2	-20.2	-20.1	-20.1	-19.9	-19.9	-19.9	-19.8	-19.8
2	-20.8	-20.7	-20.6	-20.5	-20.4	-20.3	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
3	-20.9	-20.9	-20.8	-20.5	-20.4	-20.3	-20.0	-20.0	-19.9	-20.0	-19.9	-19.8
4	-20.7	-20.6	-20.6	-20.1	-20.1	-20.0	-19.6	-19.5	-19.4	-19.4	-19.3	-19.2
5	-20.8	-20.8	-20.7	-20.2	-20.1	-20.2	-19.8	-19.7	-19.6	-19.8	-19.6	-19.6
6	-20.6	-20.6	-20.6	-20.4	-20.4	-20.3	-20.1	-20.0	-20.0	-20.0	-20.0	-19.9
7	-20.7	-20.6	-20.6	-20.2	-20.2	-20.2	-19.8	-19.8	-19.7	-19.8	-19.7	-19.5
8	-20.7	-20.7	-20.6	-19.9	-20.0	-20.0	-19.7	-19.7	-19.6	-19.6	-19.5	-19.5
9	-20.7	-20.7	-20.7	-20.4	-20.4	-20.4	-20.1	-20.1	-20.0	-20.0	-20.0	-19.9
10	-20.9	-20.8	-20.7	-20.4	-20.3	-20.2	-20.1	-19.9	-19.9	-19.9	-19.8	-19.8
11	-20.9	-20.9	-20.8	-20.5	-20.4	-20.3	-20.0	-20.0	-19.9	-19.9	-19.9	-19.8
12	-20.7	-20.6	-20.6	-20.3	-20.2	-20.1	-19.9	-19.9	-19.8	-19.9	-19.8	-19.7
13	-20.7	-20.7	-20.6	-20.3	-20.2	-20.1	-20.0	-19.9	-19.8	-19.9	-19.9	-19.8
14	-21.0	-20.9	-20.8	-20.6	-20.5	-20.4	-20.2	-20.1	-20.0	-20.1	-20.0	-19.9
15	-21.0	-21.0	-21.0	-20.7	-20.6	-20.6	-20.4	-20.3	-20.2	-20.3	-20.2	-20.1
16	-20.9	-20.9	-20.9	-20.5	-20.4	-20.4	-20.1	-20.0	-20.0	-20.1	-20.0	-19.9
17	-20.5	-20.5	-20.4	-20.2	-20.2	-20.1	-19.9	-19.8	-19.8	-19.7	-19.7	-19.5
18	-20.8	-20.7	-20.7	-20.3	-20.3	-20.2	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
19	-20.7	-20.6	-20.6	-20.4	-20.4	-20.4	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
20	-21.0	-20.9	-20.9	-20.5	-20.5	-20.4	-20.0	-19.9	-19.8	-19.8	-19.7	-19.7
21	-20.6	-20.5	-20.5	-20.1	-20.0	-19.9	-19.8	-19.7	-19.5	-19.7	-19.5	-19.4
22	-20.6	-20.5	-20.5	-20.3	-20.2	-20.1	-19.8	-19.7	-19.6	-19.7	-19.6	-19.5

### 3.4.5. Unstressed Receiver Sensitivity at 1550nm and 10.3125Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-20.7	-20.6	-20.6	-20.5	-20.4	-20.4	-20.2	-20.1	-20.1	-20.1	-20.1	-20.0
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-20.4	-20.3	-20.3	-20.0	-19.9	-19.9	-19.8	-19.7	-19.6	-19.6	-19.6	-19.6
<b>Min</b>	-21.1	-21.0	-21.0	-20.8	-20.7	-20.7	-20.5	-20.5	-20.4	-20.5	-20.4	-20.4
<b>Range</b>	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7
<b>Median</b>	-20.7	-20.6	-20.6	-20.5	-20.5	-20.4	-20.2	-20.2	-20.1	-20.2	-20.1	-20.0
1	-20.4	-20.3	-20.3	-20.0	-20.0	-19.9	-20.1	-20.0	-20.0	-20.1	-20.0	-19.9
2	-20.7	-20.7	-20.6	-20.5	-20.5	-20.4	-20.2	-20.1	-20.1	-20.2	-20.1	-20.0
3	-20.8	-20.7	-20.7	-20.7	-20.6	-20.6	-20.4	-20.3	-20.3	-20.3	-20.1	-20.1
4	-20.7	-20.6	-20.5	-20.3	-20.2	-20.2	-19.9	-19.9	-19.8	-19.8	-19.8	-19.6
5	-20.5	-20.4	-20.4	-20.3	-20.3	-20.2	-20.0	-20.1	-19.9	-20.0	-20.0	-19.8
6	-20.5	-20.4	-20.3	-20.7	-20.6	-20.5	-20.3	-20.2	-20.2	-20.3	-20.2	-20.1
7	-20.6	-20.6	-20.5	-20.5	-20.4	-20.4	-20.1	-20.0	-20.0	-20.2	-20.0	-19.9
8	-20.7	-20.6	-20.6	-20.4	-20.3	-20.3	-20.0	-19.9	-19.8	-19.9	-19.8	-19.7
9	-20.7	-20.5	-20.6	-20.4	-20.4	-20.3	-20.3	-20.2	-20.1	-20.3	-20.2	-20.2
10	-20.8	-20.7	-20.6	-20.7	-20.6	-20.6	-20.4	-20.3	-20.3	-20.3	-20.2	-20.2
11	-21.0	-20.9	-20.9	-20.7	-20.5	-20.5	-20.3	-20.2	-20.2	-20.3	-20.2	-20.1
12	-20.5	-20.3	-20.4	-20.5	-20.4	-20.3	-20.3	-20.2	-20.1	-20.2	-20.2	-20.0
13	-20.6	-20.6	-20.6	-20.3	-20.2	-20.2	-20.2	-20.1	-20.1	-20.1	-20.0	-20.0
14	-20.9	-20.9	-20.8	-20.7	-20.6	-20.6	-20.3	-20.3	-20.2	-20.3	-20.2	-20.1
15	-21.0	-21.0	-20.9	-20.8	-20.7	-20.7	-20.5	-20.5	-20.4	-20.5	-20.4	-20.4
16	-20.9	-20.8	-20.8	-20.7	-20.6	-20.5	-20.3	-20.2	-20.2	-20.3	-20.2	-19.9
17	-20.5	-20.4	-20.4	-20.3	-20.2	-20.1	-20.0	-19.9	-19.9	-20.0	-19.8	-19.7
18	-20.9	-20.8	-20.8	-20.6	-20.5	-20.4	-20.4	-20.2	-20.2	-20.4	-20.2	-20.1
19	-20.8	-20.7	-20.7	-20.5	-20.5	-20.5	-20.2	-20.2	-20.2	-20.3	-20.2	-20.1
20	-21.1	-21.0	-21.0	-20.7	-20.7	-20.6	-20.2	-20.1	-20.0	-20.1	-20.0	-19.9
21	-20.4	-20.3	-20.3	-20.1	-19.9	-19.9	-19.8	-19.7	-19.6	-19.8	-19.6	-19.6
22	-20.5	-20.4	-20.4	-20.3	-20.2	-20.2	-20.0	-19.9	-19.9	-19.9	-19.8	-19.7

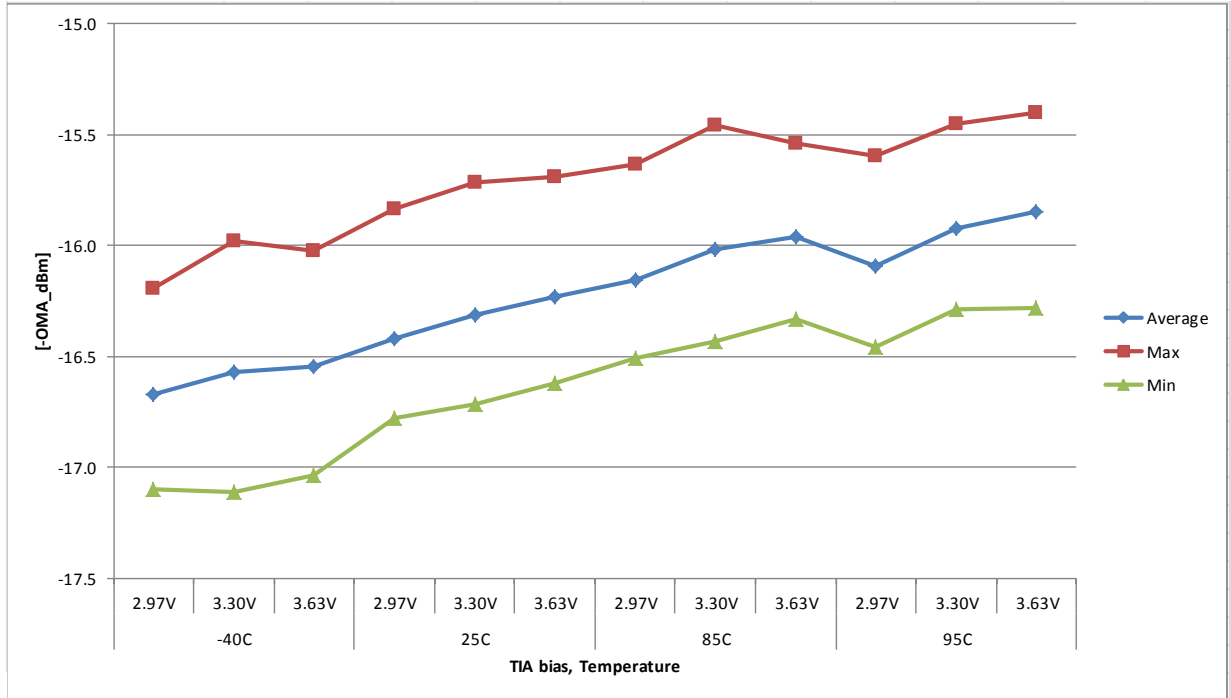
### 3.4.6. Stressed Receiver Sensitivity at 1310nm and BaseL (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	-16.8	-16.7	-16.7	-16.4	-16.3	-16.3	-16.1	-15.9	-15.9	-16.0	-15.8	-15.7
Std. Dev.	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Max	-16.4	-16.3	-16.3	-16.1	-15.9	-15.9	-15.6	-15.5	-15.4	-15.6	-15.4	-15.3
Min	-17.2	-17.1	-17.1	-16.8	-16.7	-16.7	-16.4	-16.3	-16.3	-16.4	-16.3	-16.1
Range	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.8	0.8	0.9
Median	-16.8	-16.8	-16.7	-16.4	-16.3	-16.2	-16.1	-15.9	-15.8	-16.0	-15.8	-15.7
1	-16.8	-16.7	-16.7	-16.2	-16.1	-16.2	-16.2	-16.0	-16.0	-16.0	-15.8	-15.7
2	-16.7	-16.5	-16.6	-16.3	-16.3	-16.2	-16.1	-15.8	-15.8	-15.9	-15.8	-15.7
3	-16.8	-16.8	-16.7	-16.4	-16.3	-16.3	-16.1	-15.9	-15.8	-16.1	-16.0	-15.7
4	-16.7	-16.6	-16.5	-16.1	-16.0	-15.9	-15.6	-15.5	-15.4	-15.6	-15.4	-15.3
5	-16.9	-16.8	-16.7	-16.4	-16.3	-16.2	-16.0	-15.8	-15.8	-16.0	-15.7	-15.4
6	-16.8	-16.6	-16.6	-16.5	-16.5	-16.4	-16.2	-16.1	-16.1	-16.2	-15.9	-15.9
7	-16.4	-16.5	-16.5	-16.3	-16.2	-16.1	-15.9	-15.7	-15.7	-15.9	-15.7	-15.4
8	-16.8	-16.5	-16.8	-16.4	-16.1	-16.1	-15.8	-15.7	-15.6	-15.8	-15.6	-15.5
9	-16.8	-16.8	-16.7	-16.5	-16.4	-16.4	-16.3	-16.1	-16.1	-16.3	-16.0	-16.0
10	-17.1	-17.0	-17.0	-16.7	-16.6	-16.6	-16.3	-16.2	-16.2	-16.2	-16.1	-16.0
11	-16.9	-16.8	-16.8	-16.3	-16.3	-16.2	-16.0	-15.8	-15.8	-16.0	-15.8	-15.6
12	-16.7	-16.7	-16.7	-16.3	-16.3	-16.2	-16.0	-15.9	-15.8	-16.1	-15.9	-15.8
13	-16.8	-16.8	-16.7	-16.4	-16.3	-16.2	-16.2	-16.0	-15.9	-16.1	-16.0	-15.9
14	-17.1	-17.0	-17.0	-16.2	-16.6	-16.6	-16.3	-16.2	-16.1	-16.3	-16.1	-16.1
15	-17.1	-17.1	-16.9	-16.8	-16.7	-16.7	-16.4	-16.3	-16.3	-16.4	-16.3	-16.1
16	-17.0	-16.8	-16.8	-16.5	-16.4	-16.3	-16.2	-16.1	-16.0	-16.1	-15.9	-15.8
17	-16.4	-16.4	-16.4	-16.2	-16.1	-16.1	-15.9	-15.8	-15.7	-15.8	-15.7	-15.6
18	-16.8	-16.8	-16.6	-16.4	-16.2	-16.3	-16.1	-15.9	-15.8	-16.0	-15.8	-15.7
19	-16.9	-16.8	-16.7	-16.6	-16.5	-16.5	-16.2	-16.0	-16.0	-16.1	-16.0	-15.9
20	-17.2	-17.1	-17.1	-16.7	-16.6	-16.6	-16.2	-16.0	-16.0	-16.1	-15.9	-15.8
21	-16.4	-16.3	-16.3	-16.1	-15.9	-15.9	-15.7	-15.6	-15.5	-15.7	-15.4	-15.4
22	-16.7	-16.7	-16.7	-16.3	-16.2	-16.1	-15.9	-15.8	-15.7	-15.9	-15.7	-15.6

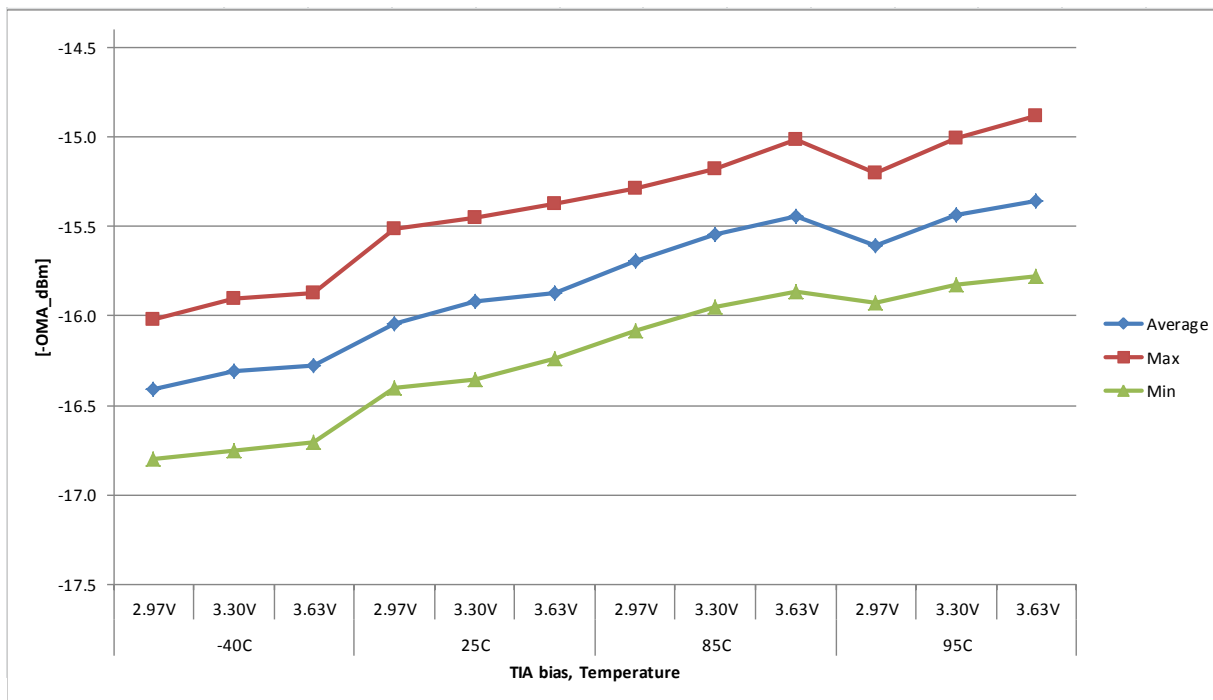


### 3.4.7. Stressed Receiver Sensitivity at 1550nm and BaseL (OMA power dBm)



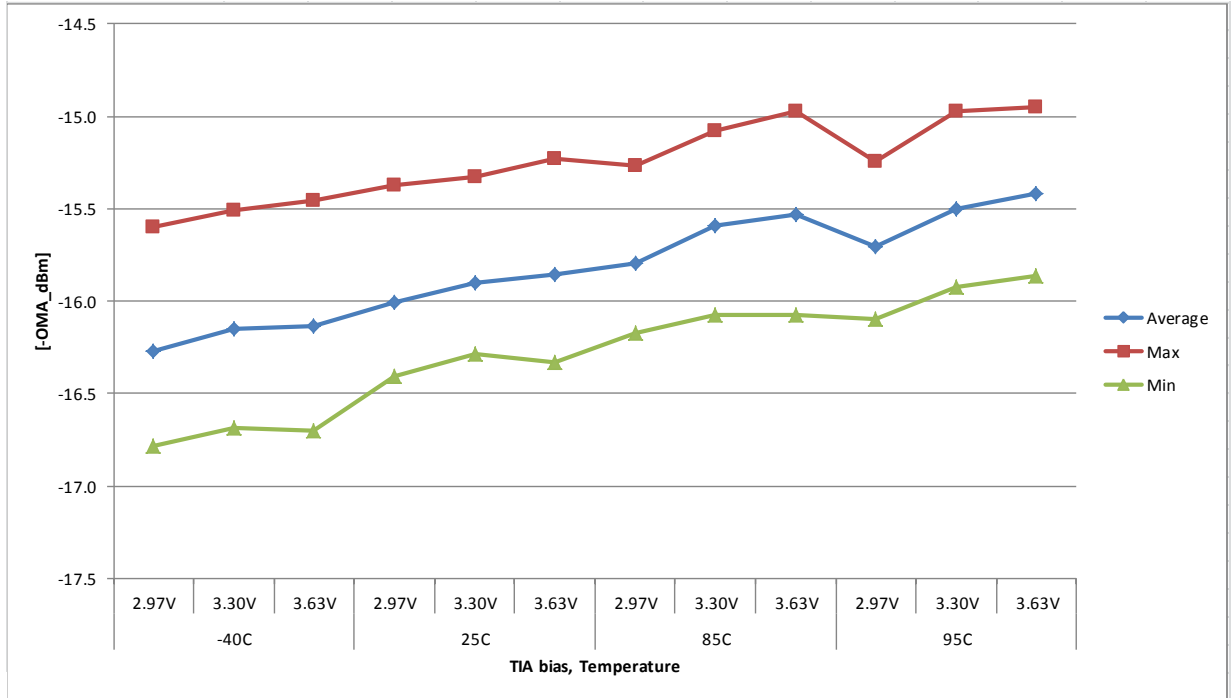
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-16.7	-16.6	-16.5	-16.4	-16.3	-16.2	-16.2	-16.0	-16.0	-16.1	-15.9	-15.8
<b>Std. Dev.</b>	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-16.2	-16.0	-16.0	-15.8	-15.7	-15.7	-15.6	-15.5	-15.5	-15.6	-15.5	-15.4
<b>Min</b>	-17.1	-17.1	-17.0	-16.8	-16.7	-16.6	-16.5	-16.4	-16.3	-16.5	-16.3	-16.3
<b>Range</b>	0.9	1.1	1.0	0.9	1.0	0.9	0.9	1.0	0.8	0.9	0.8	0.9
<b>Median</b>	-16.7	-16.6	-16.6	-16.4	-16.3	-16.2	-16.2	-16.0	-16.0	-16.1	-15.9	-15.9
1	-16.5	-16.4	-16.4	-16.0	-15.9	-15.9	-16.1	-15.9	-15.9	-16.0	-15.8	-15.8
2	-16.4	-16.4	-16.2	-16.4	-16.2	-16.2	-16.1	-16.0	-15.8	-16.0	-15.9	-15.7
3	-16.7	-16.7	-16.6	-16.6	-16.5	-16.4	-16.3	-16.1	-16.0	-16.2	-16.0	-16.0
4	-16.5	-16.4	-16.4	-16.2	-16.0	-16.0	-15.8	-15.7	-15.6	-15.7	-15.5	-15.5
5	-16.7	-16.6	-16.6	-16.3	-16.2	-16.1	-16.0	-16.0	-15.9	-15.9	-15.9	-15.7
6	-16.6	-16.5	-16.4	-16.6	-16.5	-16.4	-16.3	-16.2	-16.1	-16.2	-16.1	-16.0
7	-16.5	-16.3	-16.4	-16.4	-16.3	-16.2	-16.0	-15.9	-15.8	-16.0	-15.8	-15.7
8	-16.8	-16.7	-16.7	-16.4	-16.2	-16.1	-15.9	-15.8	-15.7	-15.9	-15.6	-15.5
9	-16.6	-16.5	-16.5	-16.5	-16.4	-16.3	-16.4	-16.2	-16.2	-16.4	-16.1	-16.1
10	-17.0	-17.0	-16.9	-16.8	-16.7	-16.4	-16.5	-16.4	-16.3	-16.4	-16.3	-16.3
11	-16.9	-16.8	-16.7	-16.6	-16.3	-16.3	-16.2	-16.1	-16.0	-16.2	-15.9	-15.9
12	-16.3	-16.4	-16.3	-16.4	-16.3	-16.2	-16.2	-16.0	-16.0	-16.1	-15.9	-15.9
13	-16.8	-16.6	-16.6	-16.3	-16.2	-16.2	-16.2	-16.1	-16.0	-16.2	-16.1	-15.9
14	-16.9	-16.8	-16.8	-16.7	-16.6	-16.6	-16.5	-16.2	-16.3	-16.4	-16.2	-16.2
15	-17.0	-16.8	-16.8	-16.8	-16.6	-16.6	-16.5	-16.4	-16.3	-16.5	-16.3	-16.2
16	-16.7	-16.6	-16.6	-16.5	-16.4	-16.3	-16.2	-16.1	-16.0	-16.2	-16.0	-15.9
17	-16.4	-16.3	-16.3	-16.1	-15.9	-15.9	-15.9	-15.7	-15.6	-15.8	-15.6	-15.5
18	-16.7	-16.6	-16.6	-16.4	-16.3	-16.3	-16.2	-16.1	-16.0	-16.2	-16.0	-15.9
19	-16.8	-16.7	-16.7	-16.6	-16.5	-16.4	-16.4	-16.3	-16.2	-16.3	-16.2	-16.1
20	-17.1	-17.1	-17.0	-16.7	-16.7	-16.6	-16.2	-16.0	-16.0	-16.1	-15.9	-15.9
21	-16.2	-16.0	-16.0	-15.8	-15.7	-15.7	-15.6	-15.5	-15.5	-15.6	-15.5	-15.4
22	-16.6	-16.5	-16.4	-16.3	-16.1	-16.1	-16.0	-15.8	-15.8	-15.9	-15.7	-15.6

### 3.4.8. Stressed Receiver Sensitivity at 1310nm and BaseE (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	-16.4	-16.3	-16.3	-16.0	-15.9	-15.9	-15.7	-15.5	-15.4	-15.6	-15.4	-15.4
Std. Dev.	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Max	-16.0	-15.9	-15.9	-15.5	-15.5	-15.4	-15.3	-15.2	-15.0	-15.2	-15.0	-14.9
Min	-16.8	-16.7	-16.7	-16.4	-16.4	-16.2	-16.1	-15.9	-15.9	-15.9	-15.8	-15.8
Range	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.8	0.9
Median	-16.4	-16.3	-16.3	-16.1	-15.9	-15.8	-15.7	-15.5	-15.5	-15.7	-15.5	-15.4
1	-16.4	-16.2	-16.3	-15.8	-15.7	-15.7	-15.7	-15.6	-15.5	-15.6	-15.4	-15.3
2	-16.2	-16.1	-16.1	-16.0	-15.9	-15.7	-15.7	-15.4	-15.3	-15.5	-15.3	-15.2
3	-16.4	-16.3	-16.3	-16.1	-16.0	-15.9	-15.7	-15.6	-15.5	-15.7	-15.5	-15.4
4	-16.3	-16.1	-16.1	-15.8	-15.6	-15.6	-15.4	-15.2	-15.1	-15.3	-15.0	-14.9
5	-16.5	-16.4	-16.4	-16.1	-15.9	-15.9	-15.6	-15.5	-15.4	-15.6	-15.4	-15.3
6	-16.2	-16.1	-16.1	-16.2	-16.1	-16.0	-15.8	-15.7	-15.6	-15.8	-15.6	-15.5
7	-16.2	-16.1	-16.1	-15.9	-15.8	-15.8	-15.6	-15.4	-15.3	-15.5	-15.3	-15.2
8	-16.5	-16.3	-16.4	-15.9	-15.8	-15.7	-15.4	-15.4	-15.2	-15.3	-15.2	-15.1
9	-16.5	-16.4	-16.3	-16.1	-16.1	-16.0	-15.9	-15.7	-15.6	-15.9	-15.6	-15.5
10	-16.7	-16.7	-16.7	-16.4	-16.3	-16.2	-16.0	-15.9	-15.7	-15.8	-15.7	-15.6
11	-16.4	-16.3	-16.3	-16.1	-15.8	-15.8	-15.7	-15.4	-15.4	-15.6	-15.4	-15.3
12	-16.3	-16.3	-16.2	-16.1	-15.8	-15.8	-15.7	-15.6	-15.4	-15.7	-15.5	-15.5
13	-16.5	-16.4	-16.4	-16.0	-15.9	-15.8	-15.8	-15.7	-15.6	-15.7	-15.6	-15.4
14	-16.7	-16.6	-16.6	-16.3	-16.2	-16.2	-15.9	-15.8	-15.7	-15.8	-15.7	-15.7
15	-16.7	-16.6	-16.6	-16.4	-16.3	-16.2	-16.1	-15.9	-15.9	-15.9	-15.8	-15.8
16	-16.6	-16.4	-16.3	-16.1	-16.0	-16.0	-15.8	-15.5	-15.5	-15.7	-15.5	-15.5
17	-16.1	-16.0	-15.9	-15.7	-15.6	-15.7	-15.5	-15.3	-15.3	-15.3	-15.1	-15.1
18	-16.2	-16.2	-16.1	-15.8	-15.8	-15.7	-15.7	-15.5	-15.4	-15.7	-15.5	-15.3
19	-16.4	-16.3	-16.3	-16.2	-16.1	-16.1	-15.8	-15.6	-15.6	-15.7	-15.6	-15.5
20	-16.8	-16.7	-16.7	-16.3	-16.4	-16.2	-15.7	-15.5	-15.6	-15.7	-15.5	-15.4
21	-16.0	-15.9	-15.9	-15.5	-15.5	-15.4	-15.3	-15.2	-15.0	-15.2	-15.1	-14.9
22	-16.4	-16.3	-16.2	-16.0	-15.8	-15.8	-15.5	-15.4	-15.3	-15.4	-15.4	-15.3

### 3.4.9. Stressed Receiver Sensitivity at 1550nm and BaseE (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-16.3	-16.2	-16.1	-16.0	-15.9	-15.9	-15.8	-15.6	-15.5	-15.7	-15.5	-15.4
<b>Std. Dev.</b>	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2
<b>Max</b>	-15.6	-15.5	-15.5	-15.4	-15.3	-15.2	-15.3	-15.1	-15.0	-15.2	-15.0	-14.9
<b>Min</b>	-16.8	-16.7	-16.7	-16.4	-16.3	-16.3	-16.2	-16.1	-16.1	-16.1	-15.9	-15.9
<b>Range</b>	1.2	1.2	1.2	1.0	1.0	1.1	0.9	1.0	1.1	0.8	1.0	0.9
<b>Median</b>	-16.3	-16.2	-16.2	-16.0	-15.9	-15.9	-15.8	-15.6	-15.6	-15.7	-15.5	-15.4
1	-16.1	-16.0	-16.0	-15.6	-15.5	-15.5	-15.7	-15.5	-15.5	-15.6	-15.4	-15.3
2	-16.0	-15.9	-15.8	-15.9	-15.9	-15.7	-15.7	-15.5	-15.3	-15.6	-15.4	-15.2
3	-16.4	-16.3	-16.2	-16.1	-16.0	-15.9	-15.8	-15.6	-15.6	-15.7	-15.6	-15.4
4	-16.3	-15.9	-16.0	-15.7	-15.6	-15.6	-15.4	-15.2	-15.2	-15.4	-15.1	-15.1
5	-16.3	-16.1	-16.2	-15.9	-15.8	-15.6	-15.7	-15.5	-15.5	-15.6	-15.5	-15.4
6	-16.1	-16.2	-16.1	-16.2	-16.0	-16.0	-15.9	-15.7	-15.6	-15.8	-15.7	-15.6
7	-16.1	-16.0	-15.9	-16.0	-15.8	-15.8	-15.6	-15.5	-15.4	-15.6	-15.3	-15.3
8	-16.4	-16.3	-16.3	-16.0	-15.9	-15.8	-15.6	-15.4	-15.2	-15.5	-15.3	-15.1
9	-16.1	-16.0	-16.0	-16.1	-16.1	-16.0	-16.1	-15.8	-15.7	-15.9	-15.7	-15.7
10	-16.7	-16.6	-16.6	-16.4	-16.3	-16.3	-16.2	-16.1	-16.0	-16.0	-15.9	-15.8
11	-16.4	-16.2	-16.3	-16.1	-15.9	-15.9	-15.9	-15.6	-15.5	-15.7	-15.4	-15.3
12	-16.0	-15.6	-15.8	-16.0	-15.9	-16.0	-15.9	-15.6	-15.5	-15.8	-15.5	-15.5
13	-16.4	-16.3	-16.3	-16.0	-15.8	-15.8	-15.8	-15.6	-15.6	-15.8	-15.7	-15.5
14	-16.5	-16.6	-16.4	-16.3	-16.3	-16.2	-16.2	-15.9	-15.9	-16.0	-15.9	-15.8
15	-16.6	-16.4	-16.4	-16.3	-16.2	-16.2	-16.1	-16.0	-16.1	-16.1	-15.8	-15.9
16	-16.3	-16.2	-16.1	-16.1	-15.9	-16.0	-16.0	-15.7	-15.6	-15.8	-15.5	-15.4
17	-16.1	-15.9	-15.8	-15.7	-15.5	-15.6	-15.5	-15.3	-15.2	-15.4	-15.2	-15.1
18	-16.3	-16.2	-16.2	-16.0	-15.9	-15.8	-15.9	-15.6	-15.6	-15.8	-15.5	-15.4
19	-16.4	-16.3	-16.3	-16.2	-16.2	-16.1	-16.1	-15.8	-15.8	-15.9	-15.8	-15.7
20	-16.8	-16.7	-16.7	-16.3	-16.3	-16.2	-15.8	-15.7	-15.6	-15.7	-15.5	-15.5
21	-15.6	-15.5	-15.5	-15.4	-15.3	-15.2	-15.3	-15.1	-15.0	-15.2	-15.0	-14.9
22	-16.1	-16.1	-16.1	-15.9	-15.7	-15.7	-15.5	-15.4	-15.3	-15.5	-15.3	-15.2



## 3.5. Optical Overload

### 3.5.1. Test Descriptions

The optical overload is measured by decreasing the average optical power to the ROSA in steps from a suitable power level.

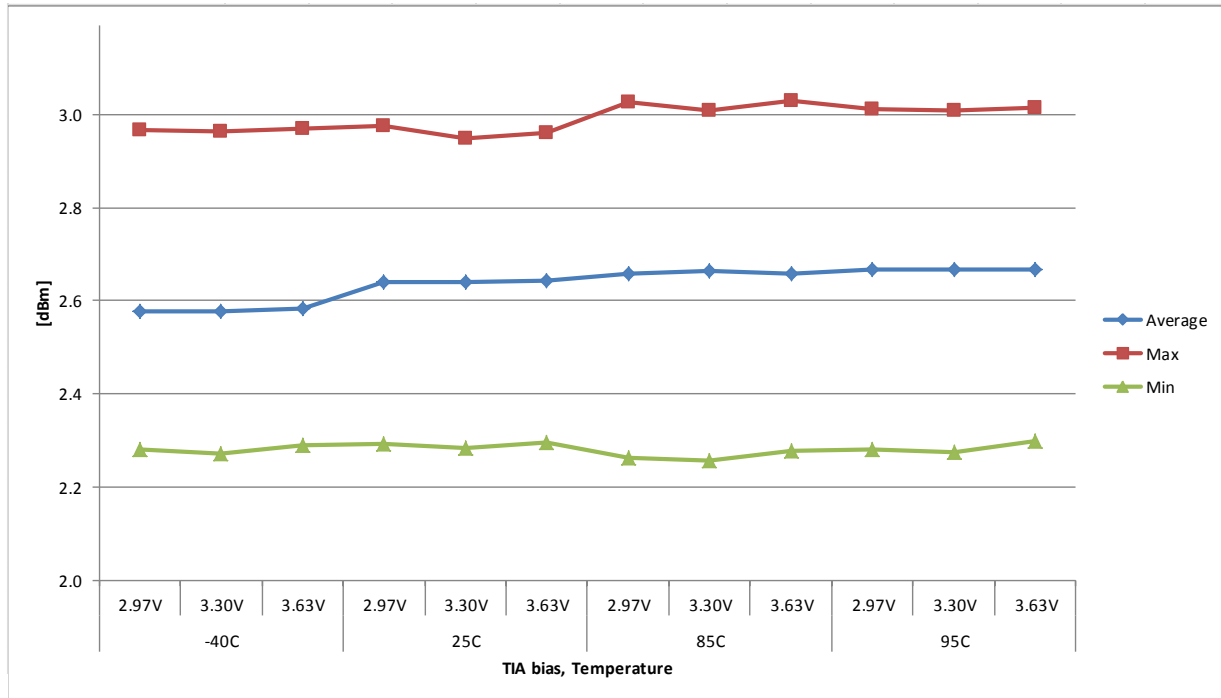
In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT.

**In all cases the overload test was limited by the maximum optical power of the optical transmitter. As a result the results in the report only represent a lower bound to the performance of the ROSAs. The ROSA performance is better than results presented.**

The input eyes used are the same as for the sensitivity tests.

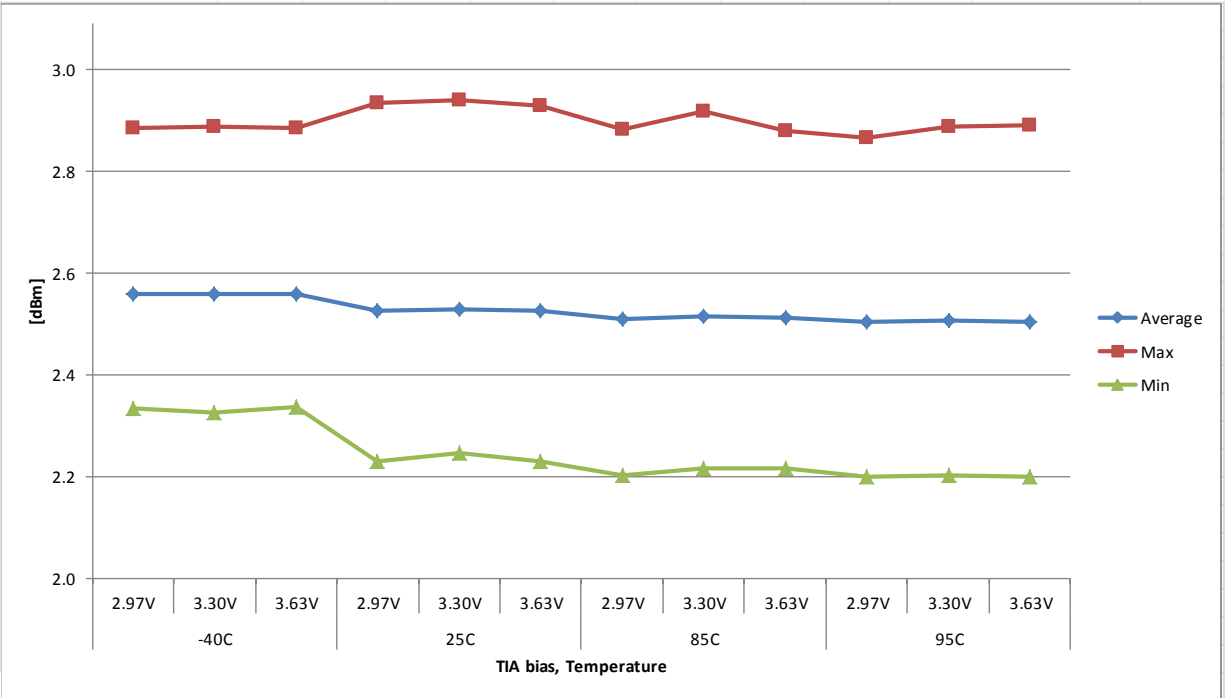
The equipment setup is the same as for the sensitivity tests.

### 3.5.2. Overload at 1310nm and 11.3Gbps (Avg. power dBm)



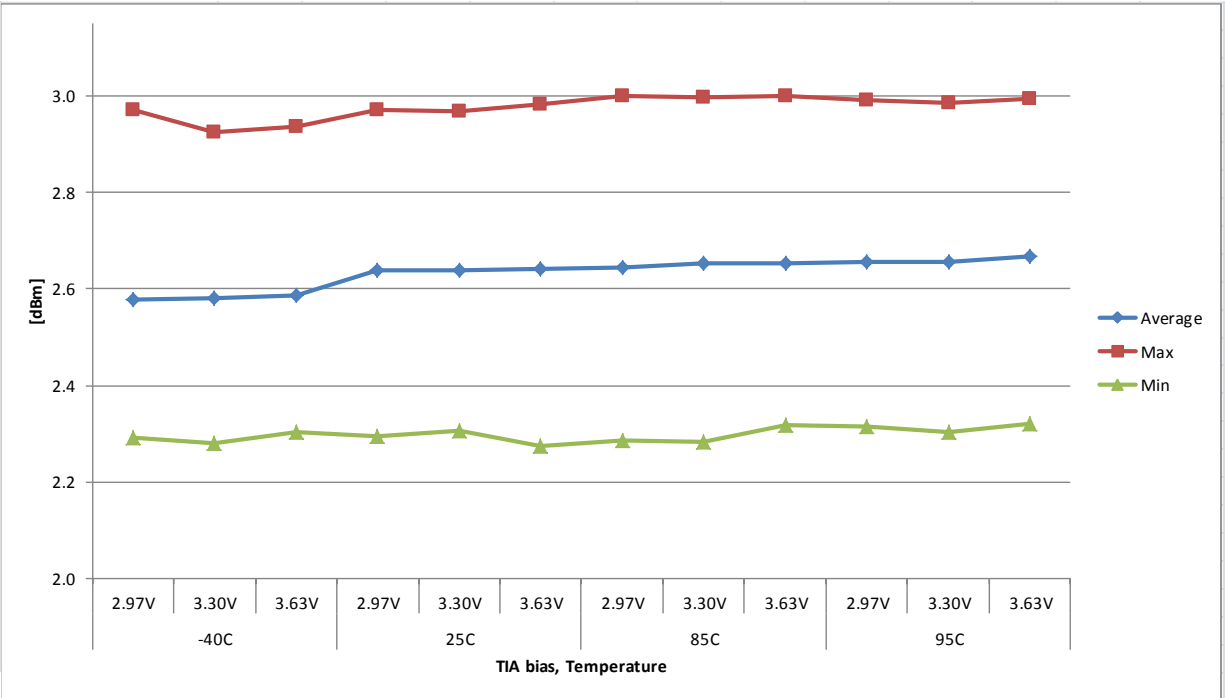
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	3.0	3.0	3.0	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0
<b>Min</b>	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Range</b>	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7
<b>Median</b>	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1	2.7	2.7	2.7	2.8	2.8	2.9	2.8	2.8	2.8	2.9	2.9	2.9
2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
3	2.7	2.8	2.7	3.0	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
5	2.3	2.3	2.3	2.7	2.7	2.7	2.7	2.8	2.7	2.8	2.8	2.8
6	2.3	2.3	2.3	3.0	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0
7	2.8	2.7	2.8	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4
8	2.7	2.7	2.7	3.0	2.9	3.0	3.0	2.9	3.0	3.0	3.0	3.0
9	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.5	2.5	2.5
10	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
11	2.3	2.3	2.3	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6
12	2.6	2.6	2.6	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9
13	2.7	2.6	2.7	2.5	2.5	2.5	2.6	2.6	2.6	2.5	2.5	2.6
14	2.8	2.7	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
15	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
16	3.0	3.0	3.0	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
17	2.6	2.6	2.6	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4
18	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
19	2.6	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
20	2.3	2.3	2.3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
21	2.4	2.3	2.4	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
22	2.7	2.7	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7

### 3.5.3. Overload at 1550nm and 11.3Gbps (Avg. power dBm)



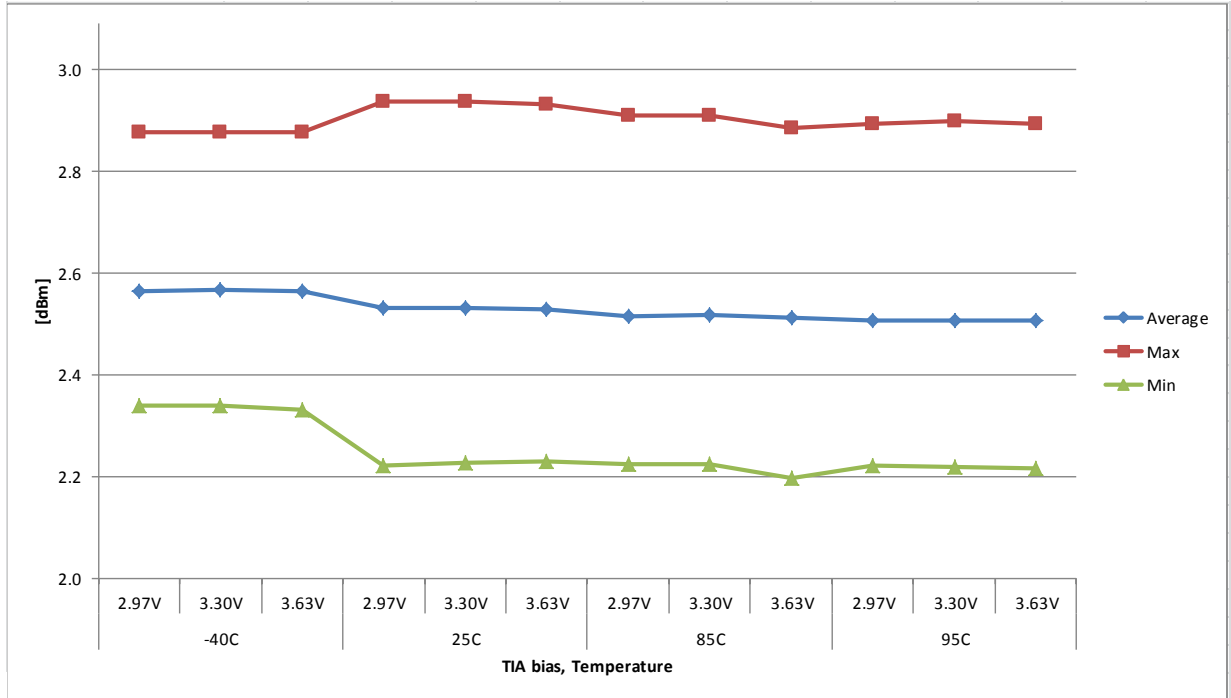
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
<b>Min</b>	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
<b>Range</b>	0.5	0.6	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
<b>Median</b>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
1	2.7	2.7	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
2	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4
3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
4	2.5	2.5	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
6	2.4	2.4	2.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
8	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
9	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
10	2.6	2.6	2.6	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
11	2.4	2.4	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4
12	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5
13	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
15	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
16	2.9	2.9	2.9	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3
17	2.5	2.5	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
18	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
19	2.5	2.5	2.5	2.6	2.6	2.5	2.6	2.6	2.6	2.5	2.5	2.5
20	2.3	2.4	2.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
21	2.3	2.3	2.3	2.4	2.5	2.4	2.4	2.5	2.4	2.4	2.4	2.4
22	2.7	2.7	2.7	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4

### 3.5.4. Overload at 1310nm and 10.3125Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	3.0	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
<b>Min</b>	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Range</b>	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
<b>Median</b>	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1	2.7	2.7	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
3	2.7	2.7	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4	2.5	2.5	2.5	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4
5	2.3	2.3	2.3	2.7	2.7	2.7	2.7	2.8	2.7	2.7	2.7	2.7
6	2.3	2.3	2.3	3.0	3.0	3.0	3.0	3.0	2.9	3.0	3.0	3.0
7	2.7	2.7	2.7	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
8	2.7	2.7	2.8	3.0	2.9	2.9	3.0	2.9	2.9	2.9	3.0	2.9
9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
10	2.5	2.5	2.5	2.6	2.6	2.6	2.5	2.6	2.6	2.6	2.6	2.6
11	2.3	2.3	2.3	2.6	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6
12	2.6	2.6	2.6	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9
13	2.6	2.6	2.7	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.7	2.8	2.8	2.7	2.7	2.8	2.7	2.7	2.7	2.7	2.7	2.8
15	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
16	3.0	2.9	2.9	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
17	2.7	2.6	2.7	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4
18	2.7	2.7	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
19	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
20	2.4	2.4	2.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
21	2.3	2.3	2.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
22	2.7	2.8	2.8	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7

### 3.5.5. Overload at 1550nm and 10.3125Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
<b>Std. Dev.</b>	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
<b>Min</b>	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
<b>Range</b>	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
<b>Median</b>	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
1	2.7	2.7	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
4	2.6	2.6	2.6	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2
5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
6	2.4	2.4	2.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
8	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
9	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
10	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
11	2.4	2.4	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4
12	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5
13	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
15	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
16	2.9	2.9	2.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
17	2.5	2.5	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
18	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
19	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.6
20	2.4	2.4	2.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
21	2.3	2.3	2.3	2.5	2.5	2.4	2.4	2.5	2.4	2.4	2.4	2.4
22	2.7	2.7	2.7	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4



### 3.6. Electrical Output Eyes

#### 3.6.1. Test Descriptions

Electrical output eyes of the P and N channel for the following conditions were measured at 11.3G data rate, unstressed eye at 1310nm wavelength.

- 1) Average power of -18dBm
- 2) Average power of -10dBm
- 3) Average power of 1.6dBm

Single-ended measurements were made of the P and N channel eyes for the following parameters after displaying 512 waveforms with 1350 points per waveform. The following was measured.

- 1) Crossing Percentage
- 2) Rise Time
- 3) Fall Time
- 4) Eye Height
- 5) Eye Amplitude
- 6) Peak to Peak Jitter
- 7) RMS Jitter

The following tables contain P channel measurements obtained.

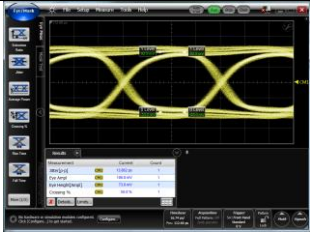
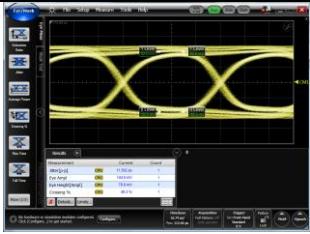
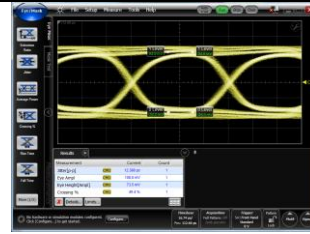
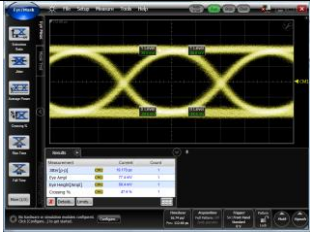
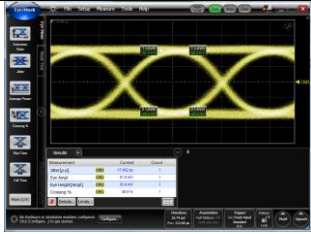
The input eyes used are the same as for the sensitivity tests.

The Jitter measurements are uncorrected for jitter of the source.

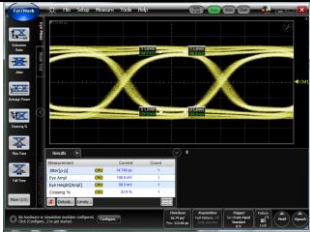
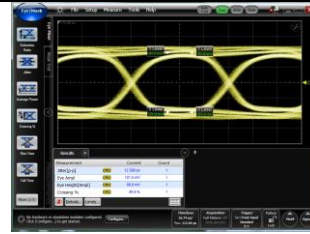
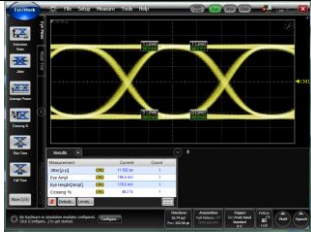
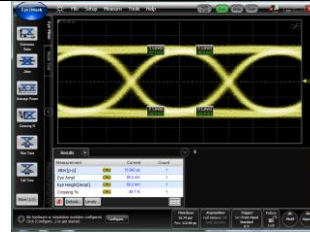
Long RF cables had to be used to test the ROSAs in a temperature chamber. Due to the attenuation in the RF cables from the ROSA to the scope, the measured parameters of the output eyes are negatively affected. The measured heights and amplitudes are lower than if the signal was directly measured at the output of the ROSA.

For information on the definitions of the eye diagram measurements see Appendix 1

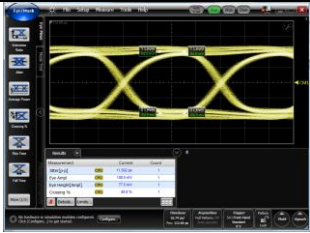
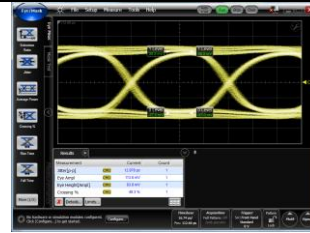
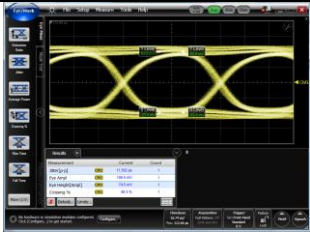
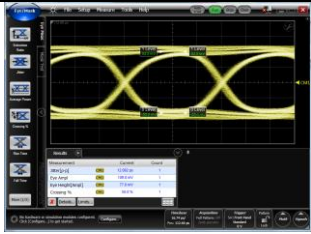
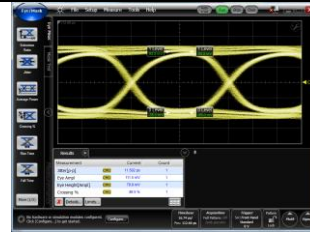
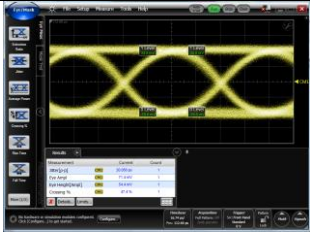
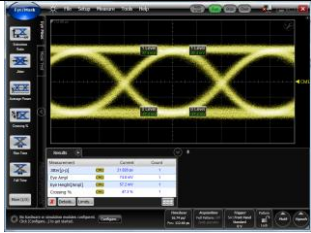
### 3.6.2. Typical Eye Diagrams at 25C

Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

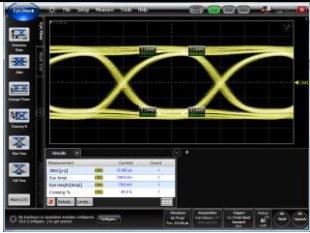
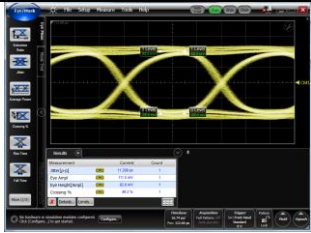
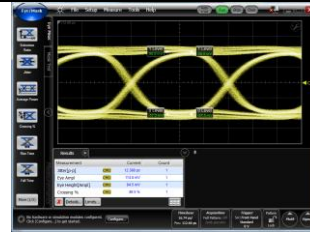
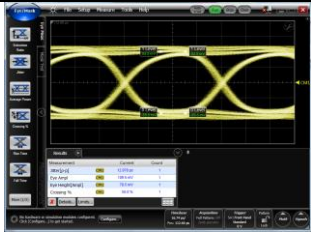
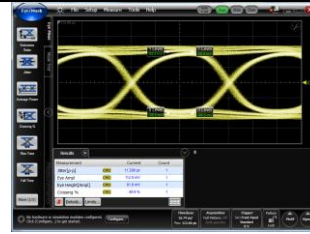
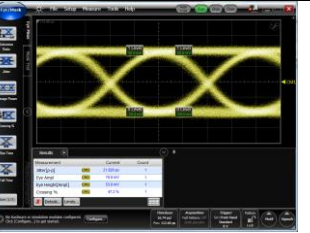
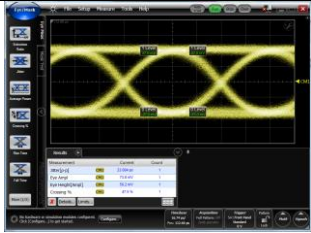
### 3.6.3. Typical Eye Diagrams at -40C

Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

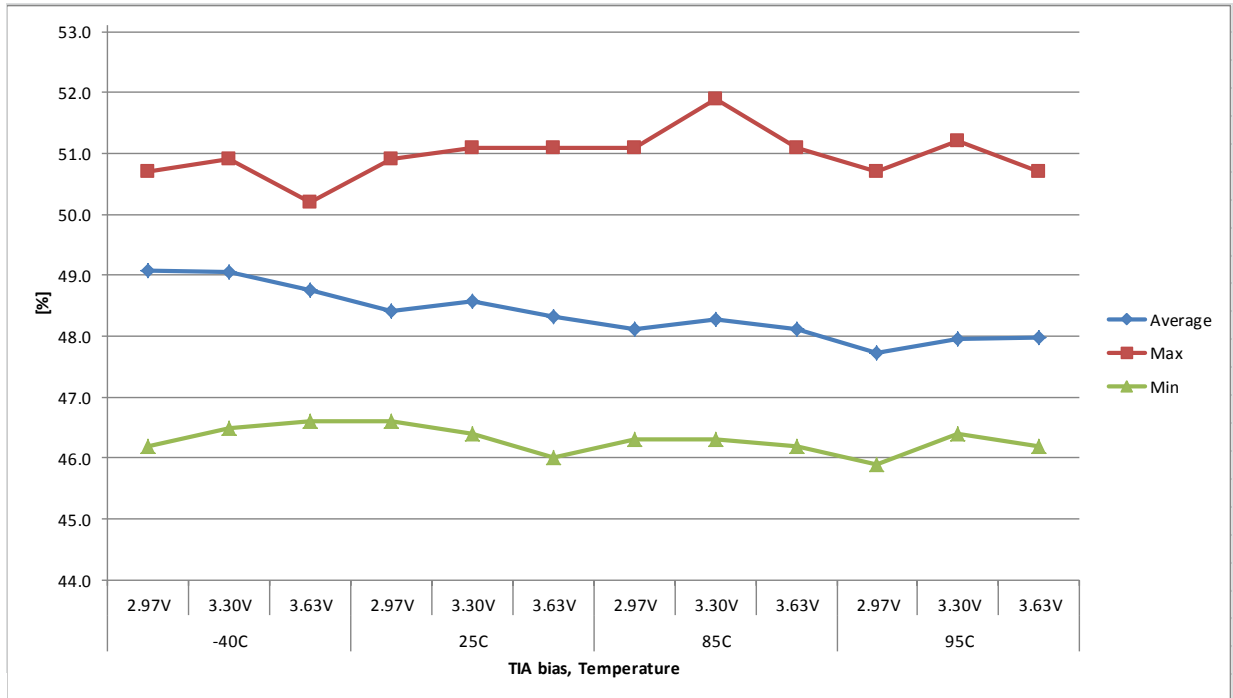
### 3.6.4. Typical Eye Diagrams at 85C

Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.5. Typical Eye Diagrams at 95C

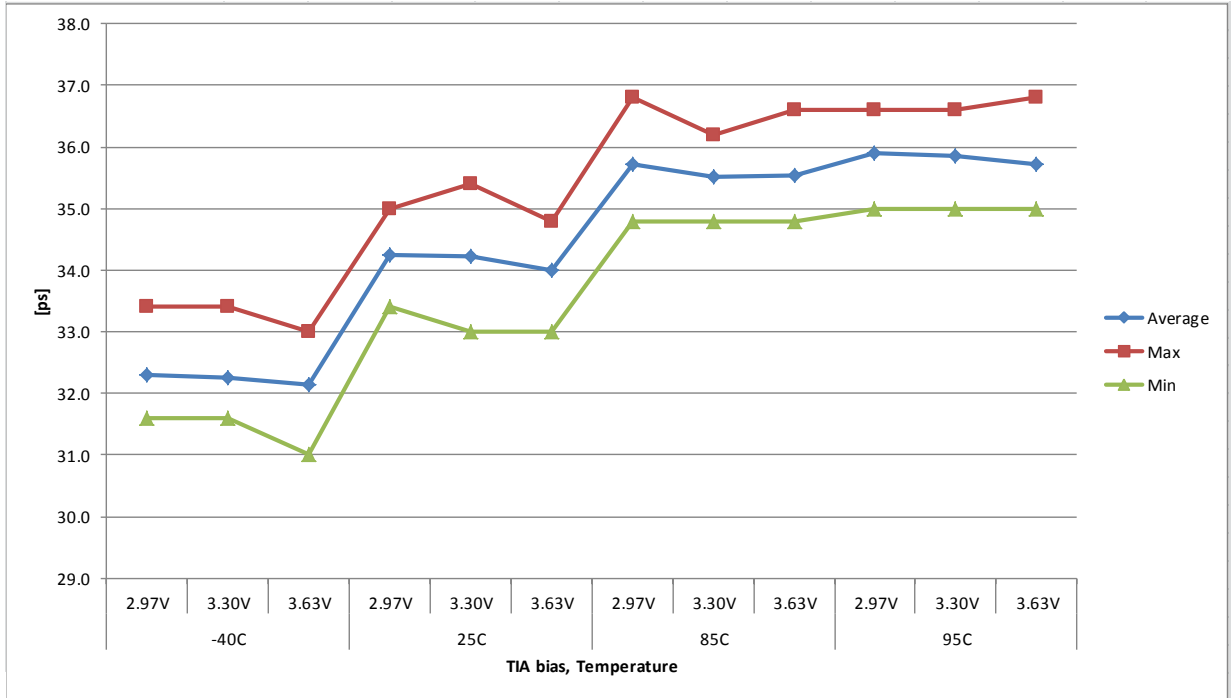
Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.6. Crossing Percentage at -18 dBm avg. Power at 1310nm and 11.3Gbps



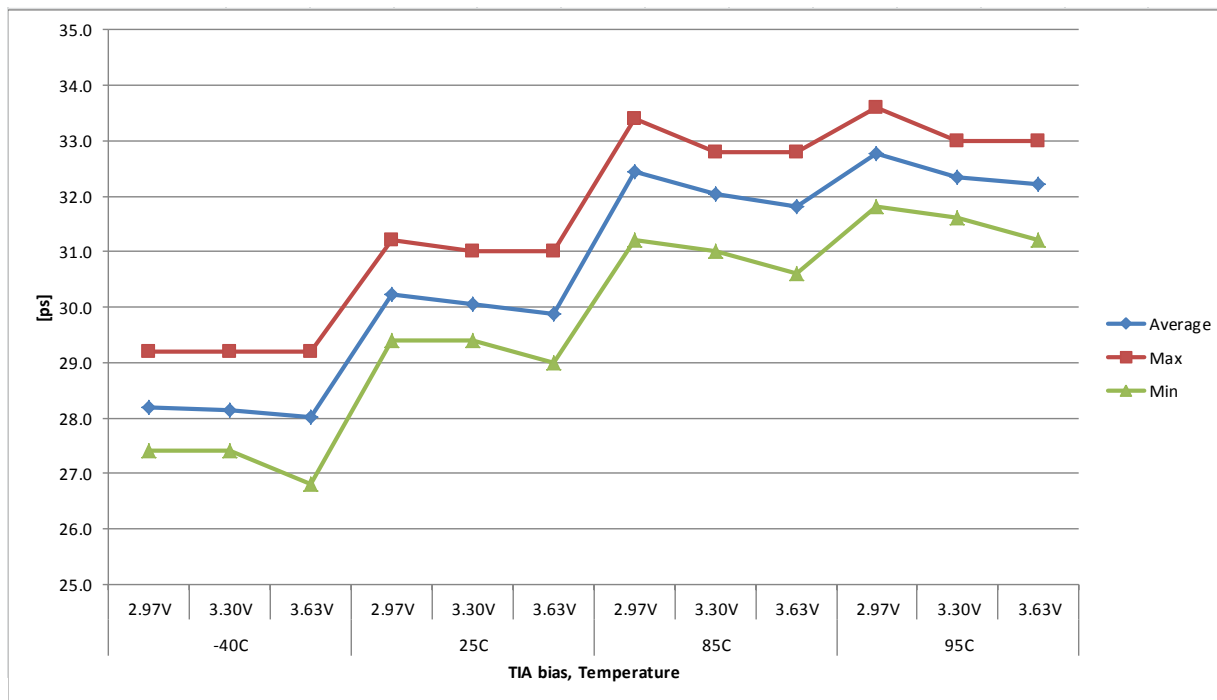
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	49.1	49.1	48.8	48.4	48.6	48.3	48.1	48.3	48.1	47.7	48.0	48.0
Std. Dev.	1.3	1.2	1.1	1.2	1.3	1.2	1.3	1.4	1.5	1.1	1.2	1.2
Max	50.7	50.9	50.2	50.9	51.1	51.1	51.1	51.9	51.1	50.7	51.2	50.7
Min	46.2	46.5	46.6	46.6	46.4	46.0	46.3	46.3	46.2	45.9	46.4	46.2
Range	4.5	4.4	3.6	4.3	4.7	5.1	4.8	5.6	4.9	4.8	4.8	4.5
Median	49.4	49.3	49.0	48.3	48.5	48.4	47.8	48.0	47.8	47.5	48.0	47.8
1	50.6	50.2	50.1	50.9	51.0	50.3	50.3	50.6	50.9	49.4	49.7	49.7
2	50.5	50.4	50.1	50.9	51.1	51.1	51.1	51.9	51.1	50.7	51.2	50.7
3	50.0	49.6	50.0	48.6	48.7	48.4	46.9	47.5	47.0	47.1	47.3	47.4
4	49.5	50.0	49.3	48.8	48.6	48.9	47.2	47.3	47.0	47.5	47.5	46.6
5	49.5	49.4	49.2	48.1	48.3	46.4	47.0	46.9	46.5	46.5	46.4	46.5
6	50.1	50.2	49.7	47.6	48.9	47.7	47.4	47.3	47.3	47.2	47.5	47.4
7	49.0	49.2	48.5	47.2	46.5	47.0	46.9	47.2	46.8	46.9	46.8	46.9
8	48.3	48.1	47.6	47.5	48.1	47.5	47.9	48.2	47.8	47.4	48.0	47.3
9	47.8	47.8	47.9	49.1	50.2	49.1	49.9	50.2	50.1	48.9	48.9	49.4
10	46.2	46.5	47.5	46.6	46.4	46.0	46.3	46.3	46.2	45.9	46.5	46.2
11	50.6	50.4	49.7	49.5	49.1	48.9	47.5	47.8	47.4	47.3	47.4	47.5
12	50.0	50.4	49.3	47.2	47.0	47.1	46.8	47.2	46.8	46.4	46.6	46.6
13	46.9	47.7	46.6	47.7	48.0	47.4	47.6	47.8	47.6	47.3	47.9	48.0
14	48.0	48.4	47.8	47.9	49.0	49.0	48.7	48.9	50.1	48.6	48.3	49.9
15	47.9	48.0	47.8	47.5	48.2	48.4	48.2	48.3	47.9	47.8	48.4	48.0
16	48.5	48.3	48.4	48.7	48.4	48.2	48.8	48.2	48.8	48.1	48.4	48.3
17	50.7	50.9	50.2	49.1	49.2	49.2	48.5	48.5	48.3	48.2	48.2	48.4
18	50.7	49.5	49.5	49.4	48.0	48.3	48.3	48.6	48.3	48.4	48.2	48.4
19	49.3	47.8	48.7	49.6	50.2	49.5	50.2	49.4	49.9	47.7	49.3	48.7
20	47.6	48.2	48.0	47.8	47.3	47.3	47.4	47.3	47.7	47.1	47.0	47.2
21	49.8	49.8	49.6	48.5	49.7	49.3	49.1	49.3	48.5	48.1	49.0	48.8
22	48.4	48.4	47.1	47.1	46.6	48.1	46.6	47.2	46.7	47.5	46.4	47.4

### 3.6.7. Rise Time at -18 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	32.3	32.2	32.1	34.2	34.2	34.0	35.7	35.5	35.5	35.9	35.9	35.7
<b>Std. Dev.</b>	0.4	0.5	0.5	0.4	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.5
<b>Max</b>	33.4	33.4	33.0	35.0	35.4	34.8	36.8	36.2	36.6	36.6	36.6	36.8
<b>Min</b>	31.6	31.6	31.0	33.4	33.0	33.0	34.8	34.8	34.8	35.0	35.0	35.0
<b>Range</b>	1.8	1.8	2.0	1.6	2.4	1.8	2.0	1.4	1.8	1.6	1.6	1.8
<b>Median</b>	32.2	32.2	32.2	34.2	34.2	34.0	35.6	35.6	35.6	36.0	36.0	35.6
1	32.2	31.8	31.8	34.0	34.0	33.0	35.4	35.0	35.0	35.4	35.6	35.0
2	32.2	31.8	32.2	34.6	34.8	34.6	36.0	35.6	36.2	36.2	36.2	36.2
3	33.0	33.0	32.8	35.0	35.0	34.8	36.0	36.2	36.0	36.6	36.2	36.2
4	32.4	32.8	33.0	34.6	34.8	34.6	36.6	36.0	35.6	36.6	36.2	35.6
5	32.4	32.8	32.4	34.8	34.8	34.2	36.0	35.6	35.6	36.2	36.0	36.0
6	32.2	31.8	31.6	34.0	33.4	33.0	35.4	34.8	34.8	35.4	35.6	35.0
7	32.2	32.2	31.8	34.0	34.0	34.0	35.4	35.0	35.4	36.0	35.4	35.6
8	31.8	32.2	31.8	33.4	33.4	33.4	35.0	34.8	35.0	35.4	35.4	35.4
9	32.2	32.2	32.2	34.6	34.2	34.0	35.6	35.6	35.6	36.2	36.2	36.0
10	31.6	31.6	31.0	33.4	33.0	33.0	34.8	34.8	35.0	35.0	35.0	35.0
11	31.8	32.2	31.8	34.0	34.2	33.4	35.4	35.0	35.0	35.4	35.4	35.4
12	32.2	32.8	32.2	34.2	34.0	34.0	35.6	35.6	35.4	35.6	35.6	35.6
13	32.2	32.2	32.4	34.0	34.0	34.6	35.6	35.4	35.6	36.0	36.0	36.0
14	32.2	31.6	31.6	34.0	33.6	33.6	35.0	35.0	35.4	35.4	36.0	35.6
15	33.4	33.4	33.0	34.8	35.4	34.8	36.8	36.2	36.6	36.6	36.6	36.8
16	32.2	32.2	32.4	34.6	34.2	34.0	36.0	36.0	35.6	36.0	36.2	36.2
17	32.2	31.8	31.8	34.2	34.2	34.0	35.4	35.0	34.8	35.4	35.6	35.0
18	32.8	32.2	32.4	34.2	34.6	34.2	36.2	36.2	36.0	36.2	36.2	36.0
19	31.8	31.8	31.8	34.0	34.0	34.0	35.6	35.4	35.4	36.0	35.6	35.4
20	32.8	32.2	32.2	34.2	34.2	34.2	36.0	36.0	35.6	36.0	35.6	36.0
21	32.2	32.4	32.4	34.2	34.8	34.6	36.0	36.2	36.6	36.2	36.2	36.0
22	32.4	32.4	32.4	34.6	34.6	34.2	36.0	36.0	35.6	36.2	36.0	35.6

### 3.6.8. Fall Time at -18 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	28.2	28.1	28.0	30.2	30.0	29.9	32.4	32.0	31.8	32.8	32.3	32.2
<b>Std. Dev.</b>	0.5	0.5	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5
<b>Max</b>	29.2	29.2	29.2	31.2	31.0	31.0	33.4	32.8	32.8	33.6	33.0	33.0
<b>Min</b>	27.4	27.4	26.8	29.4	29.4	29.0	31.2	31.0	30.6	31.8	31.6	31.2
<b>Range</b>	1.8	1.8	2.4	1.8	1.6	2.0	2.2	1.8	2.2	1.8	1.4	1.8
<b>Median</b>	28.2	28.0	28.0	30.0	30.0	29.8	32.4	32.0	31.8	32.8	32.4	32.2
1	27.4	27.4	26.8	29.8	29.4	29.2	31.2	31.0	30.6	31.8	31.6	31.2
2	27.8	27.4	27.8	29.8	30.0	29.4	31.6	31.8	31.6	32.2	31.6	32.2
3	28.4	28.6	28.4	30.4	30.4	30.4	33.0	32.4	32.2	33.0	33.0	32.8
4	28.4	28.4	29.0	30.4	30.6	30.4	33.4	32.8	32.4	33.6	33.0	32.8
5	28.4	28.4	28.4	31.0	30.4	30.6	33.4	32.4	32.4	33.4	33.0	32.8
6	28.0	27.8	27.8	29.8	29.4	29.4	31.8	31.8	31.2	32.4	32.4	31.8
7	28.0	27.8	27.4	30.0	29.8	30.0	32.4	32.2	31.6	32.8	32.2	32.2
8	27.8	28.0	28.0	29.8	29.8	29.4	31.8	31.6	31.6	32.8	31.8	31.8
9	28.4	28.0	28.0	30.4	29.8	29.8	32.2	31.6	31.8	33.0	32.2	32.2
10	27.8	27.8	27.2	30.0	29.4	29.4	31.8	31.8	31.6	33.0	31.8	31.8
11	27.4	27.4	27.4	29.4	29.4	29.0	32.2	31.2	31.2	32.2	31.8	31.2
12	28.6	29.0	28.6	30.6	30.0	30.0	33.0	32.8	31.8	32.8	32.4	32.8
13	28.6	28.6	28.6	30.6	30.4	30.6	33.0	31.8	31.6	33.0	32.4	32.2
14	27.8	27.8	27.4	29.8	29.4	29.4	31.8	31.6	31.2	32.4	32.4	32.2
15	29.2	29.2	29.2	31.0	31.0	31.0	33.0	32.2	32.8	33.4	33.0	33.0
16	28.4	27.8	28.0	30.0	30.0	29.4	32.4	32.2	31.8	32.4	32.4	32.2
17	27.8	27.8	28.0	30.0	30.0	29.8	32.4	31.8	31.8	32.4	32.4	31.8
18	28.4	28.4	28.4	30.4	30.0	29.4	32.8	32.2	32.2	32.8	32.8	32.4
19	28.0	28.4	28.0	30.0	30.0	29.8	32.2	31.8	31.8	32.4	31.8	31.6
20	29.0	28.4	28.0	30.6	31.0	30.6	33.0	32.4	32.4	33.6	33.0	32.8
21	27.8	27.8	27.4	30.0	30.4	29.8	32.4	32.4	31.8	32.8	31.8	32.2
22	28.6	28.6	28.4	31.2	30.4	30.4	33.0	32.8	32.4	32.8	32.8	32.8

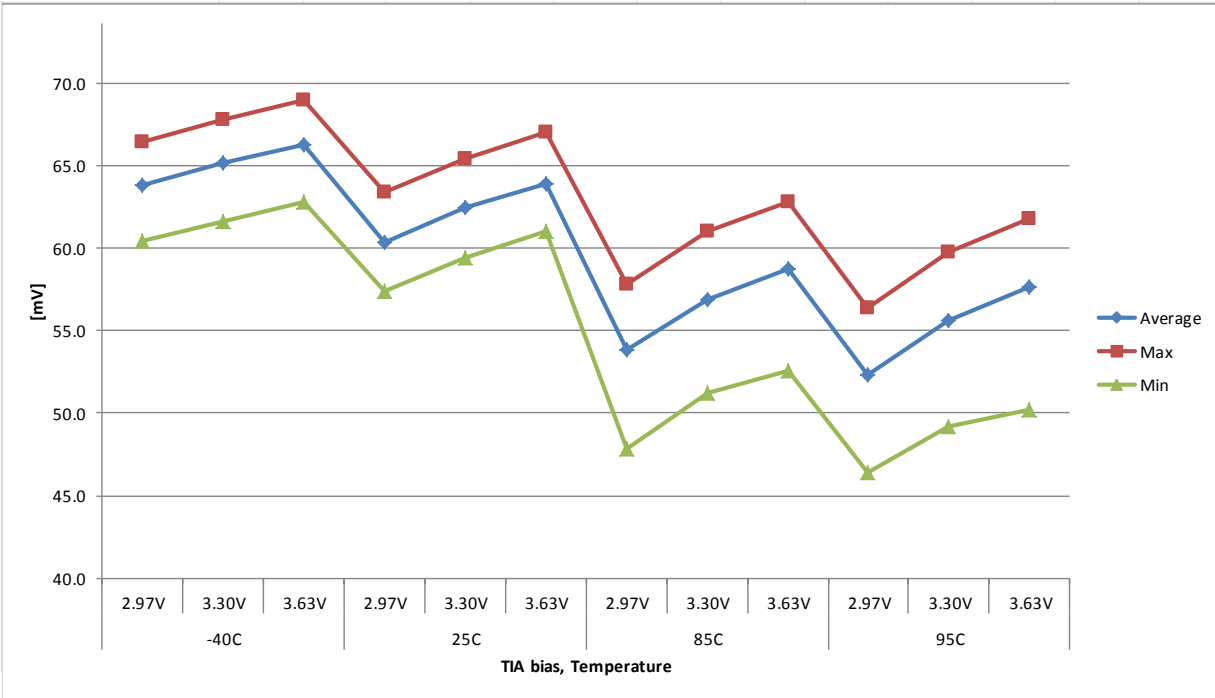


### 3.6.9. Height at -18 dBm avg. Power at 1310nm and 11.3Gbps



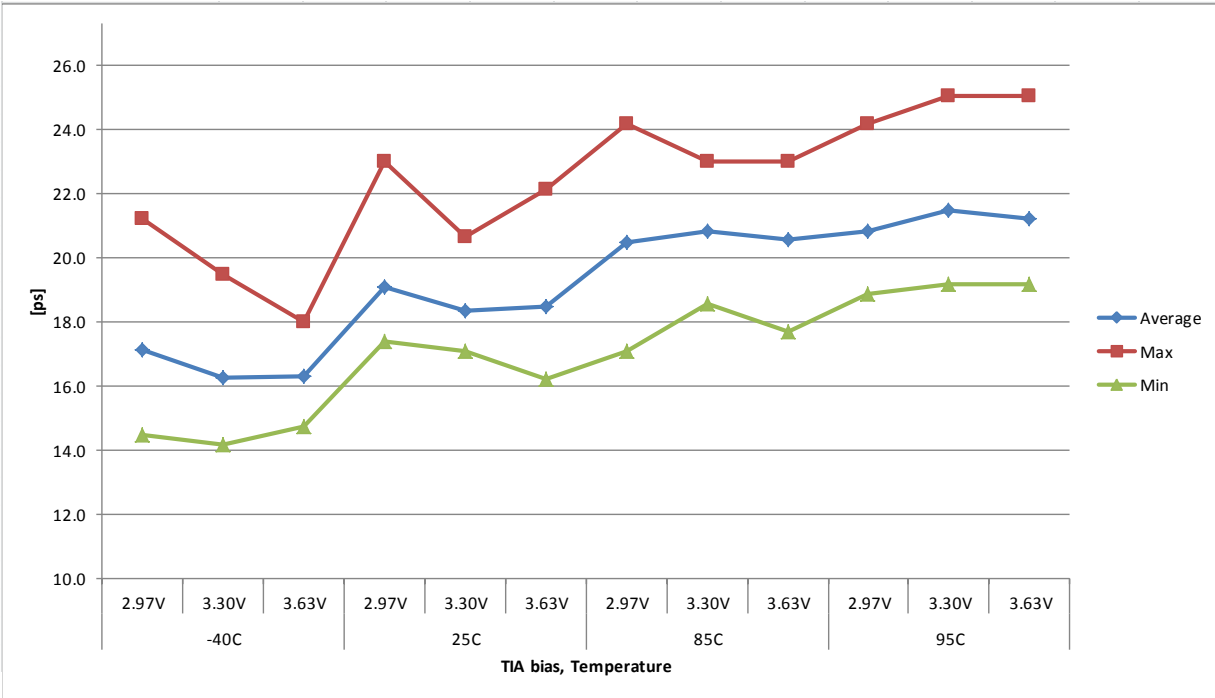
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	63.8	65.2	66.3	60.3	62.4	63.9	53.9	56.9	58.7	52.3	55.6	57.6
Std. Dev.	1.3	1.3	1.3	1.6	1.6	1.7	2.3	2.4	2.7	2.4	2.6	2.7
Max	66.4	67.8	69.0	63.4	65.4	67.0	57.8	61.0	62.8	56.4	59.8	61.8
Min	60.4	61.6	62.8	57.4	59.4	61.0	47.8	51.2	52.6	46.4	49.2	50.2
Range	6.0	6.2	6.2	6.0	6.0	6.0	10.0	9.8	10.2	10.0	10.6	11.6
Median	63.7	65.0	66.2	60.4	62.5	64.0	54.0	57.0	58.7	52.7	55.9	57.8
1	64.0	65.6	66.6	60.4	62.4	63.6	56.4	59.4	61.8	54.4	57.6	59.8
2	65.4	66.6	67.8	63.4	65.4	67.0	57.8	61.0	62.8	56.4	59.8	61.4
3	63.4	64.6	65.8	60.6	62.4	64.0	52.8	56.4	57.6	51.8	55.2	56.8
4	63.2	64.6	65.6	57.4	59.4	61.0	47.8	51.2	52.6	46.4	49.2	50.2
5	63.4	64.8	65.8	58.8	60.6	61.2	51.0	53.4	54.6	49.2	51.8	54.4
6	63.6	65.0	66.2	60.4	63.4	64.6	54.4	57.2	59.4	53.0	56.2	58.6
7	63.8	65.2	66.2	59.0	60.6	62.4	52.2	55.2	56.8	50.8	54.0	56.0
8	66.4	67.8	69.0	60.4	63.0	64.4	52.6	56.6	58.0	51.0	54.8	56.2
9	64.0	65.4	66.6	61.8	64.6	65.6	56.8	60.6	62.2	55.2	59.2	61.2
10	63.0	64.6	66.0	61.0	62.8	64.4	55.0	57.8	60.2	53.6	57.2	59.0
11	65.4	66.8	67.8	62.8	64.6	66.4	55.4	58.8	60.4	54.0	57.6	59.4
12	65.4	66.8	67.8	60.4	62.8	64.0	53.8	57.4	58.8	52.4	55.6	57.6
13	62.4	64.0	64.8	58.6	60.6	62.0	52.6	55.8	57.6	51.8	55.2	57.2
14	64.2	65.6	66.8	62.0	65.0	66.4	56.6	59.8	62.4	55.6	58.8	61.8
15	60.4	61.6	62.8	59.0	61.2	62.8	54.2	56.8	58.6	53.0	56.2	58.0
16	63.6	65.0	66.0	61.0	62.8	64.2	55.0	57.6	60.0	53.2	56.6	58.6
17	63.6	65.0	66.0	59.4	61.6	63.0	52.8	55.4	57.8	51.0	54.4	56.6
18	65.0	66.2	67.4	61.6	62.6	64.6	54.6	57.6	59.2	53.2	56.6	58.8
19	64.0	65.0	66.6	62.4	64.2	65.8	57.0	59.4	62.0	54.4	58.6	60.4
20	62.0	63.4	64.4	59.8	61.4	63.0	52.2	54.8	57.0	50.4	53.2	55.4
21	63.6	64.8	66.0	57.6	60.8	61.6	52.2	54.0	55.6	49.2	52.8	54.4
22	64.6	65.8	66.8	59.4	61.4	63.6	52.0	55.6	56.8	51.6	53.4	56.0

### 3.6.10. Amplitude at -18 dBm avg. Power at 1310nm and 11.3Gbps



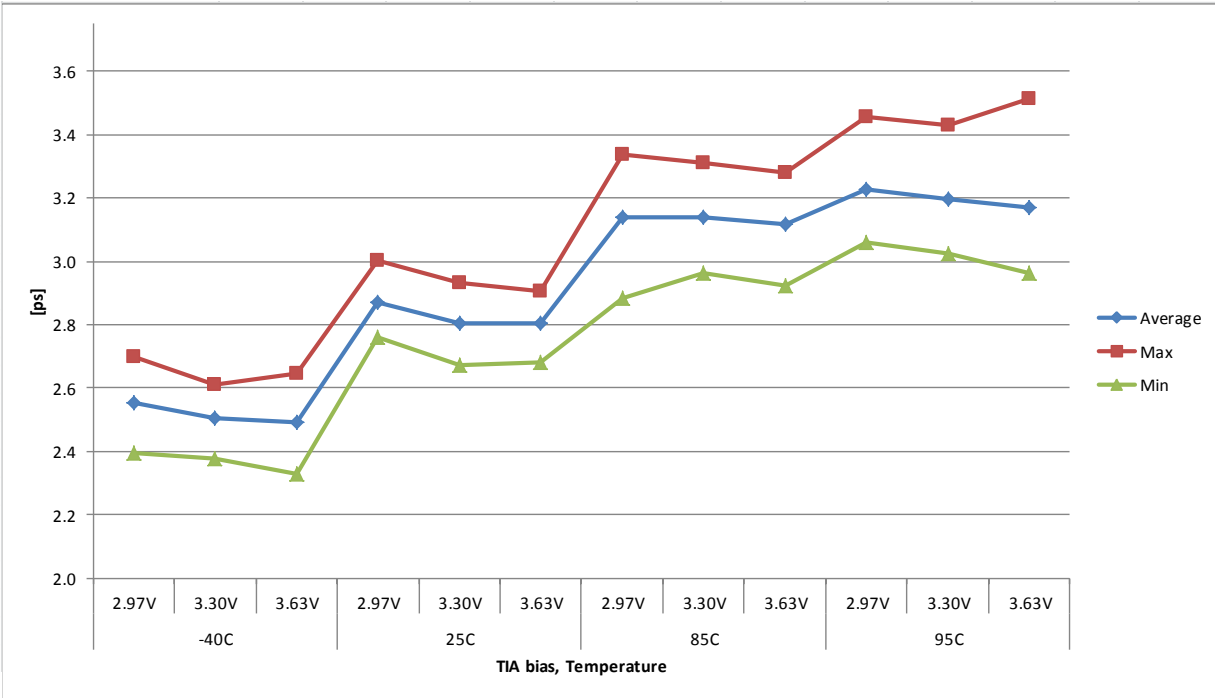
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	83.4	85.1	86.4	77.4	80.1	81.8	71.0	74.8	77.0	69.6	73.6	76.0
<b>Std. Dev.</b>	1.7	1.7	1.7	1.7	1.8	1.8	2.2	2.3	2.4	2.2	2.4	2.5
<b>Max</b>	86.8	88.6	90.0	80.8	83.6	85.2	74.8	78.8	81.0	73.4	77.6	79.8
<b>Min</b>	79.4	81.0	82.4	74.0	76.6	78.6	65.4	69.6	71.4	64.0	67.8	69.2
<b>Range</b>	7.4	7.6	7.6	6.8	7.0	6.6	9.4	9.2	9.6	9.4	9.8	10.6
<b>Median</b>	83.4	85.2	86.4	77.3	80.4	81.9	71.3	74.8	77.0	70.0	73.9	76.1
1	83.6	85.2	86.4	77.2	79.6	81.2	73.2	76.8	79.6	71.4	75.4	77.8
2	86.0	87.6	89.0	80.8	83.6	85.2	74.8	78.8	81.0	73.4	77.6	79.8
3	84.4	85.8	87.4	78.2	80.8	82.4	70.4	74.6	76.2	69.4	73.4	75.4
4	82.2	84.2	85.2	74.0	76.6	78.6	65.4	69.6	71.4	64.0	67.8	69.2
5	83.4	85.2	86.4	76.2	78.4	79.4	68.6	71.6	73.2	66.8	70.2	73.2
6	82.2	84.0	85.2	77.4	81.0	82.2	71.4	74.8	77.2	70.0	73.8	76.4
7	83.0	84.8	86.0	76.2	78.2	80.4	69.4	73.2	75.2	68.4	72.2	74.6
8	85.6	87.6	88.8	77.2	80.4	82.2	70.0	74.8	76.8	68.8	73.4	75.4
9	83.6	85.4	86.8	79.0	82.4	83.6	73.8	78.4	80.4	72.2	77.0	79.6
10	83.2	85.2	87.2	78.6	81.0	82.8	72.4	75.8	78.6	71.0	75.2	77.4
11	86.8	88.6	90.0	80.0	82.8	84.6	72.6	76.8	78.8	71.2	75.6	78.0
12	84.6	86.6	87.8	77.4	80.4	81.8	71.4	75.6	77.4	70.0	74.0	76.4
13	81.0	83.0	83.8	75.2	77.6	79.4	69.4	73.2	75.4	68.6	72.8	75.0
14	84.2	85.8	87.2	79.0	82.2	84.0	73.2	77.2	80.0	72.4	76.2	79.4
15	79.4	81.0	82.4	76.4	79.0	81.0	71.2	74.6	76.6	70.0	74.0	75.8
16	83.4	85.2	86.6	77.8	80.4	82.0	71.6	75.2	77.8	70.0	74.4	76.6
17	81.6	83.4	84.8	76.0	78.4	80.2	69.6	73.0	75.8	68.0	72.2	74.8
18	84.8	85.8	87.4	78.8	80.4	82.6	72.0	75.6	77.6	70.4	74.6	77.0
19	82.6	83.8	85.6	79.0	81.6	83.2	73.6	76.8	79.6	71.2	76.2	78.2
20	82.0	83.8	85.2	77.0	79.2	81.0	69.4	72.6	75.0	67.6	71.2	73.4
21	83.2	85.0	86.2	74.8	78.8	79.6	69.4	72.2	74.2	66.6	71.0	73.2
22	83.6	85.2	86.4	76.6	79.0	81.4	69.6	74.0	75.8	69.4	72.0	75.2

### 3.6.11. Jitter pk-pk at -18 dBm avg. Power at 1310nm and 11.3Gbps



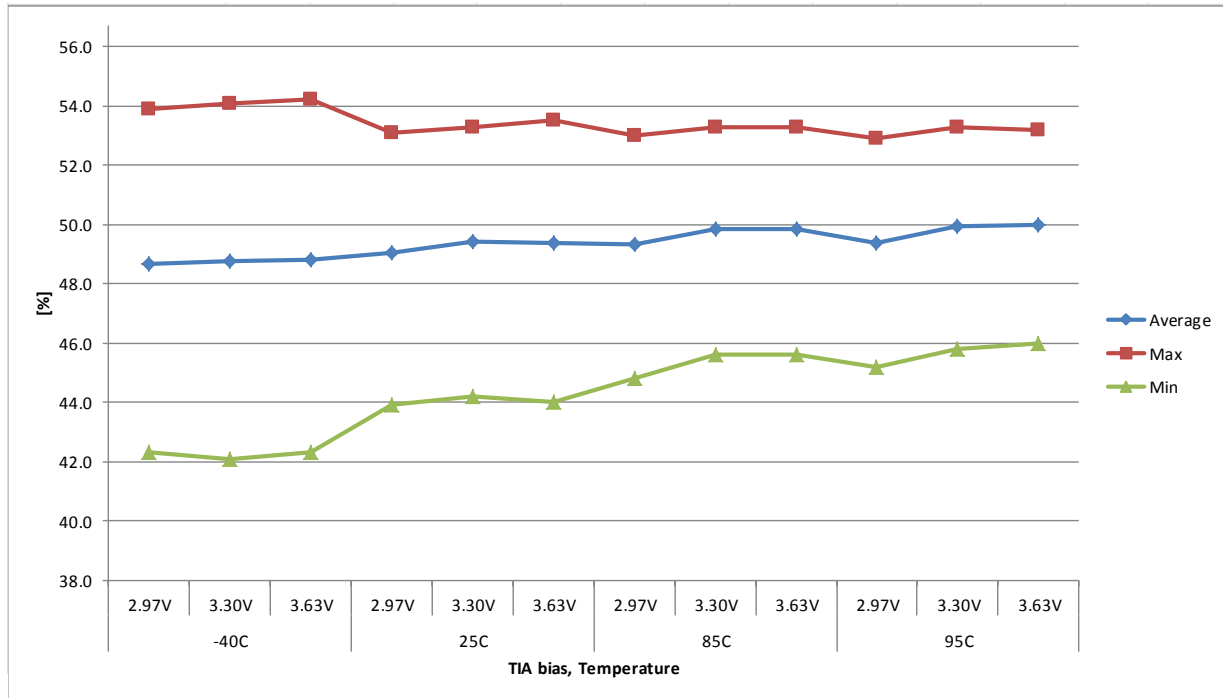
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	17.1	16.3	16.3	19.1	18.3	18.5	20.5	20.8	20.6	20.8	21.5	21.2
<b>Std. Dev.</b>	1.4	1.4	0.9	1.4	1.1	1.4	1.5	1.1	1.7	1.3	1.8	1.3
<b>Max</b>	21.2	19.5	18.0	23.0	20.6	22.1	24.2	23.0	23.0	24.2	25.1	25.1
<b>Min</b>	14.5	14.2	14.7	17.4	17.1	16.2	17.1	18.6	17.7	18.9	19.2	19.2
<b>Range</b>	6.8	5.3	3.2	5.6	3.5	5.9	7.1	4.4	5.3	5.3	5.9	5.9
<b>Median</b>	17.0	15.9	16.2	19.0	18.0	18.3	20.4	20.6	20.6	20.5	21.1	20.9
1	16.8	18.9	15.6	18.6	19.5	18.6	20.4	20.4	18.0	19.5	21.2	20.6
2	17.7	18.0	16.5	20.6	17.7	19.2	20.1	18.9	17.7	19.5	23.9	20.1
3	18.3	15.0	15.6	20.4	17.4	20.6	20.4	21.5	20.9	21.5	19.2	23.0
4	16.2	15.3	15.3	23.0	20.6	19.2	21.2	20.1	21.5	24.2	24.2	25.1
5	21.2	16.8	18.0	17.4	18.9	17.7	23.3	20.4	21.2	21.2	23.0	20.4
6	18.9	19.5	15.0	19.2	17.4	16.8	20.1	21.8	20.1	19.8	20.9	20.4
7	17.4	15.9	17.1	17.7	17.1	22.1	24.2	18.6	21.8	23.0	20.6	21.2
8	17.1	15.0	16.2	18.9	17.1	18.3	21.2	20.4	18.9	20.4	24.5	22.1
9	16.5	15.6	15.9	18.0	17.7	18.9	22.1	20.9	18.0	20.4	21.2	19.2
10	15.9	15.6	18.0	17.7	20.1	17.1	17.1	20.6	19.2	20.1	20.4	20.6
11	16.5	14.7	15.3	18.3	19.2	16.2	20.4	20.6	21.5	21.2	20.9	22.1
12	17.1	15.9	16.2	17.4	17.4	19.8	20.9	20.9	23.0	19.2	20.1	20.4
13	16.8	15.3	17.7	19.2	18.3	19.2	18.3	22.4	22.1	20.9	25.1	20.1
14	15.6	16.8	16.5	19.8	18.3	17.4	18.3	21.5	19.5	18.9	19.5	20.1
15	18.0	16.2	14.7	20.4	17.4	17.7	20.1	21.8	20.1	20.6	20.4	20.9
16	16.5	16.2	15.6	20.1	17.7	18.3	20.1	20.6	21.2	22.4	23.3	21.2
17	16.2	15.3	16.2	17.7	17.4	20.9	19.5	22.4	23.0	20.4	19.2	20.9
18	16.2	17.4	16.5	19.8	18.3	17.7	20.9	20.1	20.1	21.5	21.5	22.1
19	17.1	14.2	17.7	19.2	18.6	16.8	19.8	20.6	20.4	19.5	22.1	22.4
20	14.5	18.3	16.5	20.4	17.1	17.7	20.4	19.5	23.0	22.4	19.5	21.2
21	18.9	15.6	15.6	18.9	19.5	18.6	20.6	23.0	22.4	20.4	21.5	22.4
22	17.7	16.2	16.8	18.0	20.6	17.7	21.5	21.5	18.9	21.2	20.1	20.4

### 3.6.12. Jitter RMS at -18 dBm avg. Power at 1310nm and 11.3Gbps



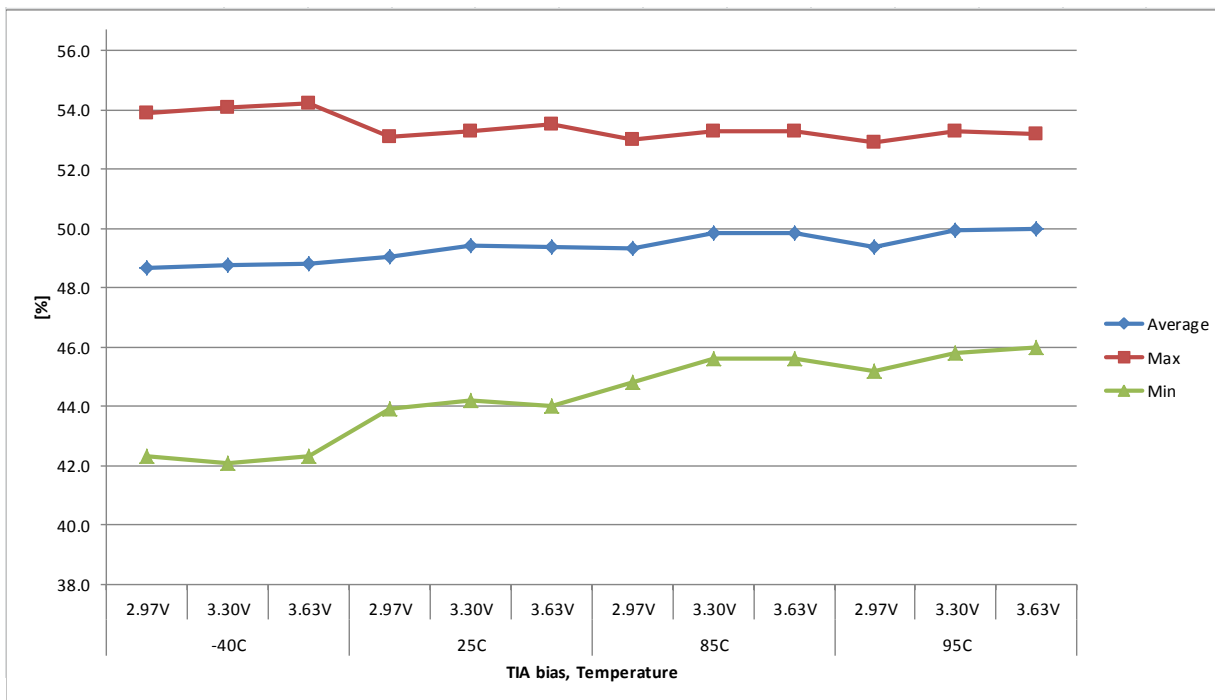
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.5	2.5	2.9	2.8	2.8	3.1	3.1	3.1	3.2	3.2	3.2
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Max</b>	2.7	2.6	2.6	3.0	2.9	2.9	3.3	3.3	3.3	3.5	3.4	3.5
<b>Min</b>	2.4	2.4	2.3	2.8	2.7	2.7	2.9	3.0	2.9	3.1	3.0	3.0
<b>Range</b>	0.3	0.2	0.3	0.2	0.3	0.2	0.5	0.4	0.4	0.4	0.4	0.5
<b>Median</b>	2.6	2.5	2.5	2.9	2.8	2.8	3.1	3.1	3.1	3.2	3.2	3.2
1	2.6	2.5	2.5	2.8	2.8	2.8	2.9	3.0	2.9	3.1	3.1	3.0
2	2.6	2.5	2.5	2.8	2.8	2.8	3.2	3.2	3.0	3.2	3.2	3.1
3	2.5	2.5	2.4	2.8	2.8	2.7	3.2	3.2	3.2	3.3	3.1	3.2
4	2.7	2.5	2.5	2.9	2.9	2.9	3.3	3.3	3.3	3.5	3.4	3.5
5	2.6	2.5	2.5	2.9	2.9	2.9	3.3	3.3	3.3	3.3	3.2	3.3
6	2.6	2.5	2.5	2.8	2.7	2.8	3.1	3.1	3.0	3.1	3.1	3.0
7	2.6	2.6	2.6	2.9	2.9	2.9	3.2	3.3	3.2	3.3	3.3	3.2
8	2.5	2.5	2.4	2.9	2.8	2.9	3.1	3.1	3.2	3.2	3.3	3.3
9	2.7	2.6	2.6	2.9	2.9	2.9	3.2	3.3	3.1	3.2	3.2	3.2
10	2.5	2.5	2.4	2.8	2.7	2.8	3.0	3.0	3.0	3.2	3.0	3.1
11	2.4	2.4	2.3	2.9	2.7	2.8	3.1	3.1	3.1	3.1	3.2	3.1
12	2.6	2.5	2.6	2.9	2.8	2.9	3.2	3.1	3.1	3.2	3.2	3.3
13	2.7	2.5	2.6	2.9	2.9	2.8	3.1	3.1	3.2	3.3	3.2	3.2
14	2.4	2.5	2.4	2.9	2.8	2.7	3.0	3.0	3.1	3.1	3.2	3.0
15	2.6	2.5	2.5	2.8	2.8	2.7	3.1	3.1	3.0	3.2	3.1	3.0
16	2.4	2.4	2.4	2.9	2.7	2.7	3.1	3.1	3.1	3.3	3.1	3.1
17	2.6	2.5	2.5	2.8	2.8	2.9	3.1	3.1	3.1	3.2	3.2	3.2
18	2.5	2.6	2.5	2.9	2.8	2.8	3.2	3.1	3.0	3.3	3.2	3.2
19	2.5	2.5	2.5	2.9	2.7	2.7	3.1	3.0	3.1	3.1	3.1	3.0
20	2.5	2.5	2.4	2.9	2.8	2.8	3.1	3.2	3.2	3.2	3.2	3.2
21	2.6	2.6	2.6	3.0	2.9	2.9	3.2	3.3	3.3	3.3	3.4	3.4
22	2.6	2.5	2.4	2.9	2.8	2.9	3.2	3.3	3.2	3.3	3.3	3.2

### 3.6.13. Crossing Percentage at -10 dBm avg. Power at 1310nm and 11.3Gbps



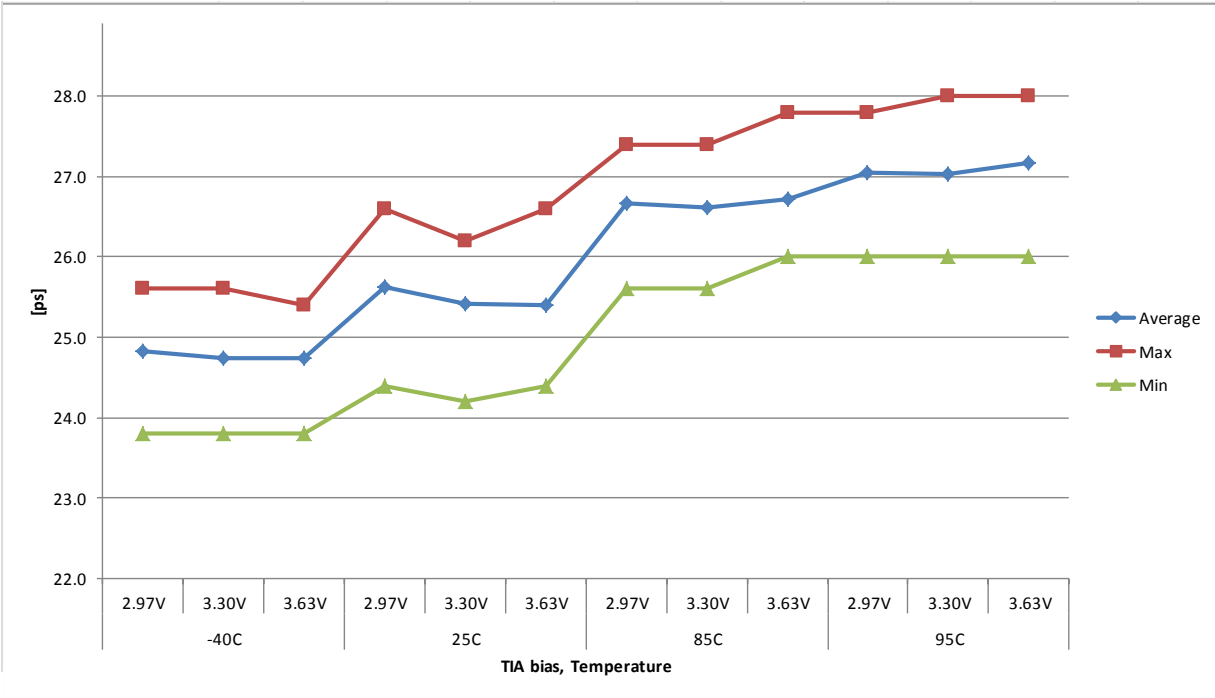
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	48.7	48.8	48.8	49.0	49.4	49.4	49.3	49.8	49.8	49.4	49.9	50.0
<b>Std. Dev.</b>	2.9	2.9	2.9	2.2	2.3	2.3	1.9	1.9	1.9	1.8	1.8	1.7
<b>Max</b>	53.9	54.1	54.2	53.1	53.3	53.5	53.0	53.3	53.3	52.9	53.3	53.2
<b>Min</b>	42.3	42.1	42.3	43.9	44.2	44.0	44.8	45.6	45.6	45.2	45.8	46.0
<b>Range</b>	11.6	12.0	11.9	9.2	9.1	9.5	8.2	7.7	7.7	7.7	7.5	7.2
<b>Median</b>	49.0	49.1	49.1	49.0	49.5	49.3	49.0	49.7	49.5	49.2	49.8	49.8
1	49.4	49.4	49.2	49.7	50.2	50.0	50.2	50.6	50.7	50.4	50.8	50.8
2	53.9	54.1	54.2	53.1	53.3	53.5	53.0	53.3	53.3	52.9	53.3	53.2
3	50.1	50.2	50.6	50.6	50.8	50.9	50.7	51.2	51.3	50.5	51.2	51.1
4	49.8	50.1	49.7	49.3	49.6	49.5	48.9	49.7	49.9	49.2	50.1	50.0
5	46.8	47.1	47.0	47.9	48.1	48.1	48.2	48.9	48.7	48.5	48.9	49.3
6	49.3	49.6	49.4	49.2	49.6	49.4	49.3	50.0	49.5	49.4	50.0	49.9
7	50.1	50.3	50.4	50.1	50.6	50.5	50.7	51.3	51.1	50.5	51.0	51.2
8	45.9	45.8	45.9	47.7	48.1	48.0	48.5	49.2	49.0	48.7	49.6	49.6
9	47.0	47.3	47.3	48.1	48.6	48.4	48.7	49.0	48.9	48.4	49.2	49.2
10	42.3	42.1	42.3	43.9	44.2	44.0	44.8	45.6	45.6	45.2	45.8	46.0
11	51.3	51.4	51.4	51.6	52.3	52.0	51.6	52.3	52.3	51.8	52.5	52.4
12	48.7	48.8	49.0	48.7	48.8	49.1	48.8	49.6	49.4	48.9	49.3	49.6
13	45.5	45.5	45.6	47.1	47.0	47.1	47.4	48.1	48.2	47.6	48.3	48.3
14	46.3	46.3	46.4	46.8	47.5	47.4	47.4	47.7	47.9	47.4	47.9	48.1
15	48.7	48.5	48.5	48.8	49.4	49.2	49.0	49.5	49.3	49.2	49.5	49.5
16	51.1	51.5	51.5	51.3	51.9	51.9	51.3	51.7	52.0	51.4	51.9	51.9
17	51.3	51.2	51.2	50.8	51.5	51.4	50.8	51.1	51.2	50.6	51.1	51.0
18	51.1	51.1	51.0	51.2	51.0	51.3	50.7	51.2	51.2	50.9	51.2	51.4
19	47.2	47.2	47.5	47.7	47.9	47.9	48.2	48.5	48.6	48.0	48.6	48.6
20	45.7	45.9	46.0	46.4	47.0	46.9	47.2	47.5	47.6	47.3	47.8	47.9
21	53.3	53.8	53.7	52.4	53.0	52.7	51.8	52.3	52.6	51.8	52.3	52.3
22	45.5	45.9	45.9	46.6	47.2	47.2	47.6	48.1	48.1	47.9	48.2	48.4

### 3.6.14. Rise Time at -10 dBm avg. Power at 1310nm and 11.3Gbps



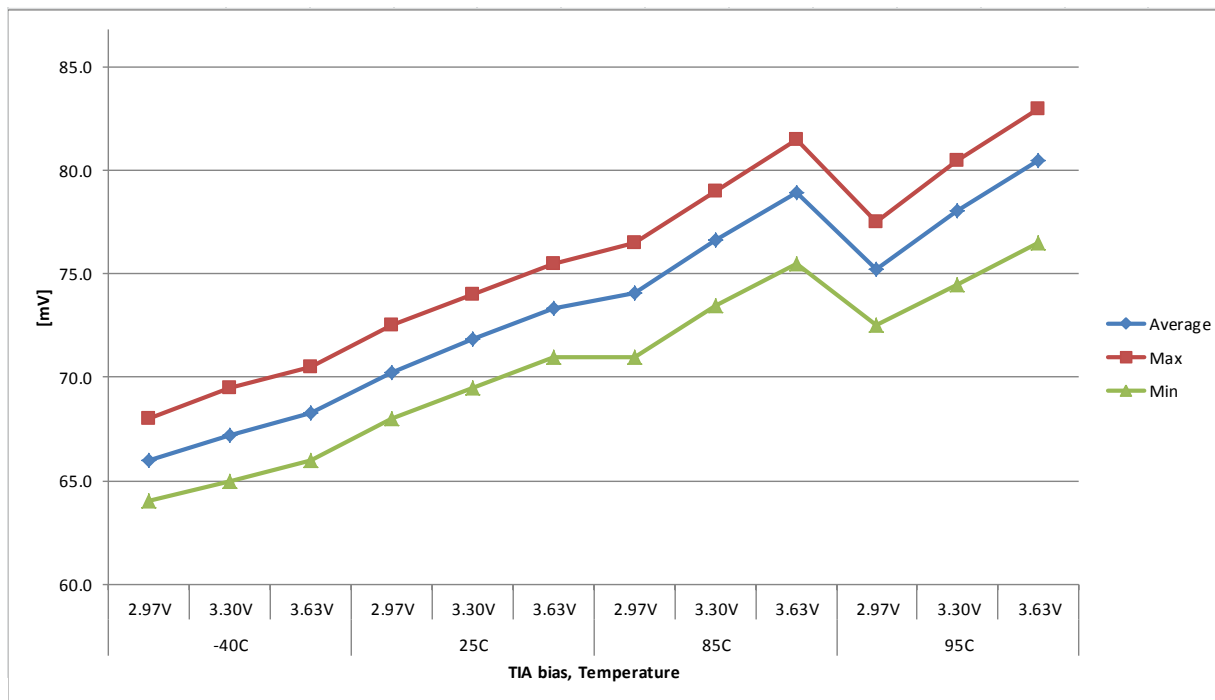
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	29.7	29.6	29.4	31.8	31.6	31.5	33.8	33.6	33.6	34.3	34.0	34.0
<b>Std. Dev.</b>	0.6	0.5	0.4	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.5
<b>Max</b>	31.0	30.6	30.0	33.0	32.8	32.4	34.8	34.8	34.6	35.4	35.0	35.0
<b>Min</b>	28.4	28.6	28.6	30.6	30.4	30.4	32.8	32.8	32.2	33.0	32.8	32.8
<b>Range</b>	2.6	2.0	1.4	2.4	2.4	2.0	2.0	2.0	2.4	2.4	2.2	2.2
<b>Median</b>	29.8	29.4	29.4	31.8	31.6	31.4	33.8	33.5	33.4	34.2	34.0	34.0
1	29.0	28.6	28.6	30.6	30.4	30.6	32.8	32.8	32.8	33.4	33.0	33.4
2	29.2	29.2	29.0	31.8	31.8	31.6	33.4	33.4	33.4	34.2	33.6	34.0
3	30.6	30.4	30.0	32.4	32.4	32.2	34.6	34.6	34.6	34.8	35.0	34.8
4	30.4	30.0	30.0	32.8	32.4	32.4	34.8	34.6	34.6	35.0	34.8	34.8
5	30.0	29.8	29.8	32.2	32.2	31.8	34.6	34.2	34.6	34.6	34.8	34.6
6	28.4	28.6	28.6	30.6	30.6	30.4	33.0	32.8	32.2	33.0	32.8	32.8
7	29.8	29.4	29.4	31.8	31.8	31.8	34.0	33.6	34.0	34.2	34.0	34.2
8	29.8	29.4	29.4	31.2	31.2	31.2	33.6	33.0	33.4	34.0	33.4	33.6
9	29.2	29.4	29.4	31.2	31.2	31.0	33.4	33.0	33.4	34.0	33.4	33.6
10	29.4	29.2	29.0	31.2	31.2	31.2	33.6	33.0	33.4	34.0	34.0	33.4
11	29.4	29.4	29.2	31.2	31.2	31.0	34.0	33.6	33.6	34.2	33.6	34.0
12	30.4	30.0	30.0	32.2	31.8	32.2	34.2	34.0	34.6	34.6	34.6	34.2
13	29.4	29.8	29.4	31.8	31.2	31.2	33.4	33.4	33.0	34.0	34.0	33.6
14	29.2	29.2	29.0	31.6	31.0	31.0	33.0	33.0	33.0	33.4	33.6	33.4
15	30.6	30.6	30.0	32.4	32.4	32.2	34.6	34.0	34.0	34.8	34.6	34.2
16	29.2	29.4	29.4	31.8	31.6	31.2	33.6	33.4	33.4	34.6	34.0	33.4
17	29.8	29.2	29.2	31.6	31.2	31.6	34.0	33.6	33.0	34.2	34.0	33.6
18	29.4	29.8	29.4	31.6	31.6	31.2	33.6	33.4	33.4	34.2	33.6	34.0
19	29.8	29.4	29.4	31.8	31.2	31.2	33.4	33.0	33.4	34.6	34.0	34.0
20	30.0	30.0	29.4	32.2	32.2	32.2	34.2	33.6	34.0	34.6	34.2	34.2
21	29.8	29.2	29.4	31.6	31.8	31.8	34.0	34.0	33.6	34.2	34.2	34.2
22	31.0	30.4	30.0	33.0	32.8	32.4	34.8	34.8	34.6	35.4	35.0	35.0

### 3.6.15. Fall Time at -10 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	24.8	24.7	24.7	25.6	25.4	25.4	26.7	26.6	26.7	27.0	27.0	27.2
<b>Std. Dev.</b>	0.6	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.5
<b>Max</b>	25.6	25.6	25.4	26.6	26.2	26.6	27.4	27.4	27.8	27.8	28.0	28.0
<b>Min</b>	23.8	23.8	23.8	24.4	24.2	24.4	25.6	25.6	26.0	26.0	26.0	26.0
<b>Range</b>	1.8	1.8	1.6	2.2	2.0	2.2	1.8	1.8	1.8	1.8	2.0	2.0
<b>Median</b>	25.0	24.8	24.8	25.6	25.5	25.4	26.8	26.7	26.6	27.2	27.0	27.2
1	23.8	23.8	23.8	24.8	24.4	24.8	26.2	26.0	26.0	26.2	26.6	26.6
2	25.0	25.0	24.8	26.0	25.6	25.6	26.8	26.8	27.2	27.8	27.4	27.8
3	25.4	25.4	25.0	26.0	26.0	26.0	27.2	27.4	27.2	27.8	27.8	27.8
4	25.0	25.0	25.0	26.0	26.0	25.6	26.8	26.8	27.2	27.8	27.4	28.0
5	24.4	24.8	24.8	26.0	25.4	25.4	26.8	26.8	27.2	27.2	27.2	27.4
6	23.8	24.2	23.8	24.8	24.8	24.4	26.0	26.0	26.0	26.2	26.2	26.2
7	24.8	24.8	24.8	25.4	25.4	25.0	26.8	26.8	26.6	26.8	26.8	27.2
8	24.8	24.4	24.4	25.4	25.0	24.8	26.2	26.2	26.2	26.8	26.6	26.8
9	25.0	24.8	25.0	25.4	25.6	25.4	26.2	26.8	26.6	26.6	26.8	27.2
10	23.8	23.8	23.8	24.4	24.2	24.4	25.6	25.6	26.0	26.2	26.0	26.0
11	24.4	24.4	24.4	25.4	25.0	25.0	26.6	26.6	26.2	26.8	26.8	27.2
12	25.4	25.6	25.4	26.2	26.0	26.2	27.4	27.2	27.8	27.8	27.8	27.8
13	25.4	25.0	25.4	26.2	25.6	25.4	26.8	26.6	26.6	27.2	27.2	27.2
14	24.2	24.4	24.2	25.0	24.8	25.0	26.0	26.0	26.0	26.0	26.2	26.6
15	25.6	25.6	25.4	26.6	26.2	26.6	27.2	27.2	27.2	27.4	28.0	27.4
16	25.0	24.8	25.0	26.0	25.6	25.4	26.8	26.6	26.6	27.2	27.2	26.8
17	25.0	24.8	24.8	25.6	25.0	25.4	26.8	26.6	26.8	27.4	27.4	27.2
18	25.0	25.0	25.4	26.0	25.6	25.4	26.8	26.8	26.8	27.2	26.8	27.4
19	25.0	24.8	25.0	25.6	25.4	25.4	26.6	26.6	26.6	27.2	26.8	27.2
20	25.4	25.0	24.8	25.6	26.0	26.0	27.2	26.8	27.2	27.4	27.2	27.2
21	24.4	23.8	24.4	25.0	25.4	25.4	26.6	26.2	26.6	26.6	26.8	26.8
22	25.4	25.0	25.0	26.2	26.0	26.0	27.2	27.2	27.2	27.4	27.8	27.8

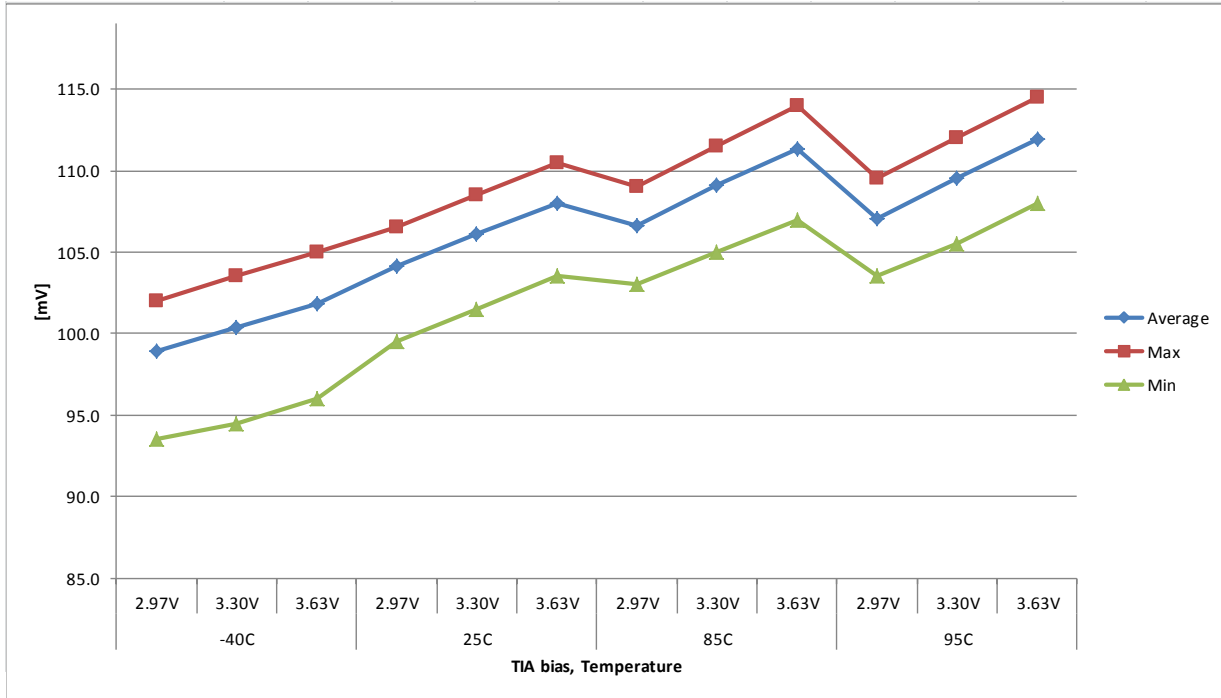
### 3.6.16. Height at -10 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	66.0	67.2	68.3	70.2	71.8	73.3	74.1	76.7	78.9	75.3	78.0	80.5
Std. Dev.	1.2	1.1	1.2	1.1	1.2	1.1	1.3	1.4	1.4	1.3	1.4	1.6
Max	68.0	69.5	70.5	72.5	74.0	75.5	76.5	79.0	81.5	77.5	80.5	83.0
Min	64.0	65.0	66.0	68.0	69.5	71.0	71.0	73.5	75.5	72.5	74.5	76.5
Range	4.0	4.5	4.5	4.5	4.5	4.5	5.5	5.5	6.0	5.0	6.0	6.5
Median	66.0	67.0	68.3	70.5	72.0	73.5	74.5	77.0	79.0	75.5	78.5	81.0
1	66.0	67.0	68.0	70.5	72.0	73.5	74.5	77.0	79.5	76.0	78.5	81.0
2	67.0	68.5	69.5	71.5	73.5	75.0	76.0	78.5	80.5	77.0	80.0	82.5
3	65.5	66.5	67.5	69.5	71.0	72.0	73.0	75.5	78.0	74.5	77.0	79.5
4	65.5	67.0	68.0	70.0	71.5	73.0	73.5	76.0	78.0	74.0	77.0	79.0
5	65.0	66.5	67.5	68.5	70.0	72.0	72.0	74.5	76.5	73.0	76.0	78.0
6	65.5	67.0	68.0	70.0	71.5	73.5	74.5	77.0	79.0	76.0	78.5	81.0
7	65.5	67.0	68.0	69.5	71.0	72.5	74.0	76.5	79.0	75.0	78.0	80.5
8	68.0	69.5	70.5	72.5	74.0	75.5	76.5	79.0	81.5	77.5	80.5	83.0
9	67.0	68.0	69.0	70.5	72.0	73.5	74.5	77.0	79.5	75.5	78.5	81.0
10	64.0	65.5	66.5	69.0	70.5	72.0	73.0	75.5	77.5	74.0	77.0	79.5
11	66.5	67.5	68.5	71.0	72.5	74.0	75.0	78.0	80.0	76.5	79.5	82.0
12	68.0	69.0	70.0	71.5	73.5	75.0	75.0	78.0	80.0	76.0	79.0	81.5
13	65.0	66.5	67.5	69.5	71.5	73.0	73.0	75.5	78.0	74.0	77.0	79.0
14	65.5	67.0	68.0	70.5	72.0	73.5	74.5	77.5	80.0	76.0	78.5	81.5
15	64.0	65.0	66.0	68.0	69.5	71.0	71.0	73.5	75.5	72.5	74.5	76.5
16	66.0	67.0	68.5	70.5	72.0	73.5	74.5	77.0	79.0	75.5	78.5	80.5
17	66.0	67.0	68.5	70.5	72.5	73.5	75.0	77.5	80.0	76.5	79.0	81.5
18	67.5	69.0	70.0	72.0	73.5	75.0	75.5	78.0	80.5	76.5	79.5	82.0
19	66.0	67.5	68.5	70.5	72.0	73.5	74.5	77.5	80.0	76.0	79.0	81.5
20	64.0	65.5	66.5	68.5	70.0	72.0	72.0	74.5	77.0	73.5	76.0	78.5
21	66.5	67.5	68.5	70.0	71.5	73.0	73.5	76.0	78.5	74.5	77.5	80.0
22	67.0	68.0	69.5	70.5	72.5	74.0	74.5	77.0	79.0	75.5	78.0	81.0

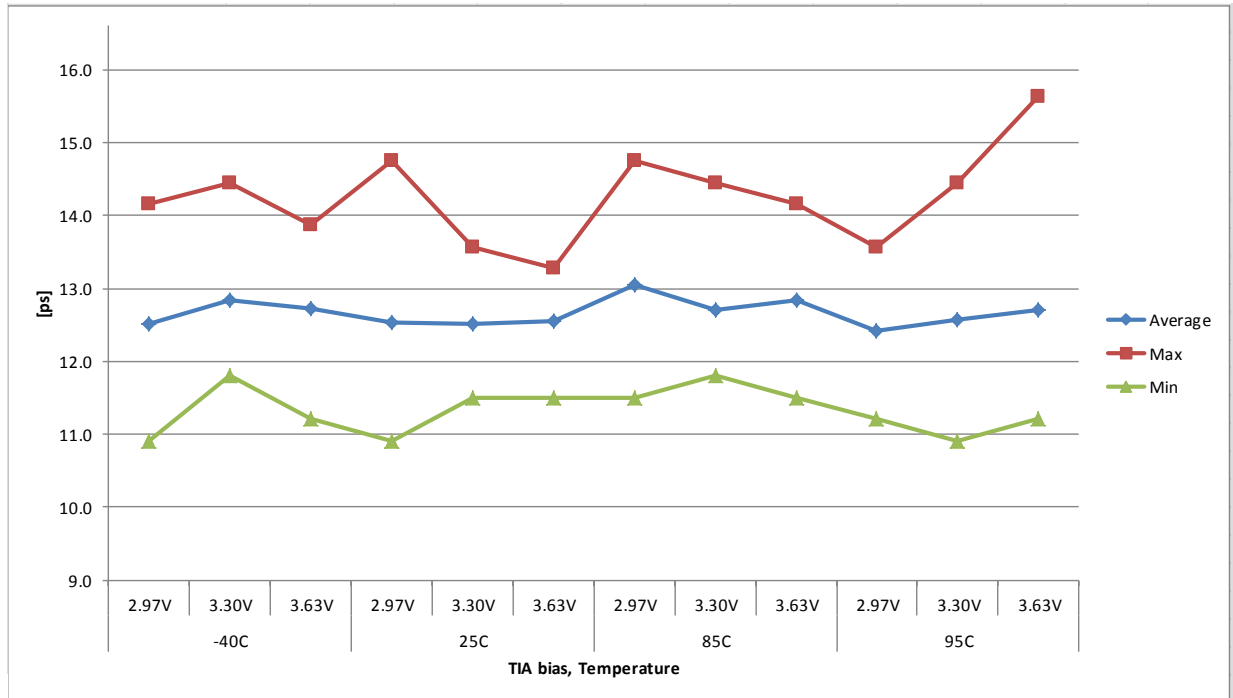


### 3.6.17. Amplitude at -10 dBm avg. Power at 1310nm and 11.3Gbps



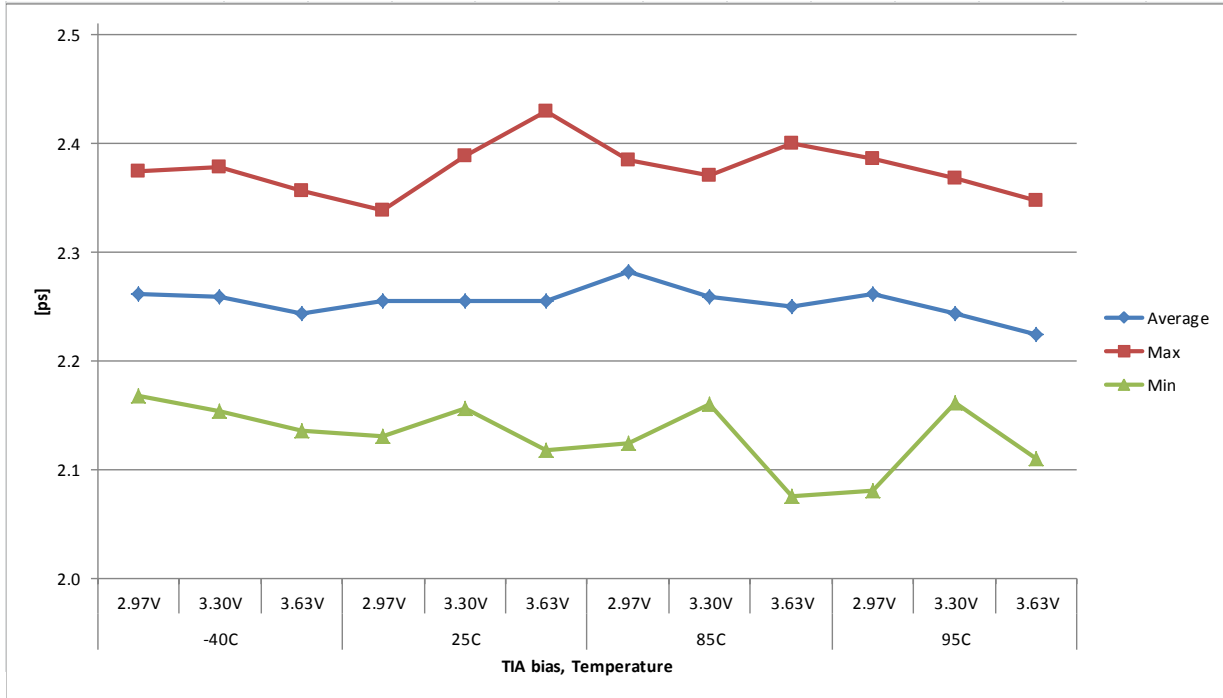
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	98.9	100.4	101.8	104.1	106.1	108.0	106.6	109.1	111.3	107.0	109.5	111.9
<b>Std. Dev.</b>	1.8	1.9	1.9	1.5	1.5	1.5	1.3	1.5	1.6	1.3	1.5	1.5
<b>Max</b>	102.0	103.5	105.0	106.5	108.5	110.5	109.0	111.5	114.0	109.5	112.0	114.5
<b>Min</b>	93.5	94.5	96.0	99.5	101.5	103.5	103.0	105.0	107.0	103.5	105.5	108.0
<b>Range</b>	8.5	9.0	9.0	7.0	7.0	7.0	6.0	6.5	7.0	6.0	6.5	6.5
<b>Median</b>	99.0	100.5	102.0	104.5	106.5	108.3	106.8	109.3	111.8	107.3	109.8	112.3
1	99.5	101.0	102.5	105.0	107.0	108.5	107.5	110.0	112.5	108.0	110.5	113.0
2	100.5	102.0	103.5	105.5	107.5	109.0	108.0	110.5	112.5	108.0	110.5	113.0
3	98.0	100.0	101.0	103.0	105.0	107.0	105.5	108.0	110.0	106.0	108.5	111.0
4	98.5	100.0	101.5	103.5	105.5	107.5	106.0	108.5	110.5	106.0	108.5	111.0
5	98.0	99.5	101.0	103.0	105.0	107.0	105.5	107.5	110.0	106.0	108.5	110.5
6	98.5	100.5	101.5	104.0	106.0	108.0	106.5	109.0	111.5	107.0	109.5	112.0
7	100.0	101.5	103.0	104.5	106.5	108.5	107.0	109.5	112.0	107.5	110.0	112.5
8	102.0	103.5	105.0	106.5	108.5	110.5	109.0	111.5	114.0	109.5	112.0	114.5
9	99.0	100.5	101.5	104.0	105.5	107.5	106.5	109.0	111.0	107.0	109.5	111.5
10	99.0	100.5	102.0	105.0	107.0	109.0	107.5	110.0	112.0	108.0	110.5	113.0
11	101.0	102.5	104.0	106.0	108.0	110.0	108.5	111.0	113.5	109.0	111.5	114.0
12	100.5	102.0	103.5	105.5	107.5	109.5	107.5	110.0	112.5	108.0	110.5	113.0
13	97.5	99.0	100.5	103.0	105.0	107.0	105.5	108.0	110.0	106.0	108.0	110.5
14	99.0	100.5	102.0	104.5	106.5	108.5	107.5	110.0	112.0	107.5	110.5	112.5
15	93.5	94.5	96.0	99.5	101.5	103.5	103.0	105.0	107.0	103.5	105.5	108.0
16	98.0	99.5	101.0	103.5	105.5	107.0	105.5	108.0	110.0	106.0	108.5	111.0
17	99.5	101.0	102.5	104.5	106.5	108.5	107.0	109.5	112.0	107.5	110.0	112.5
18	99.0	100.5	102.0	104.5	106.5	108.0	106.5	109.0	111.0	106.5	109.0	111.5
19	99.5	101.0	102.5	104.5	107.0	108.5	107.5	110.0	112.5	108.0	111.0	113.0
20	95.5	97.0	98.5	102.0	104.0	105.5	105.0	107.0	109.5	105.5	107.5	110.0
21	99.0	100.5	102.0	104.0	106.0	107.5	106.0	108.5	110.5	106.5	109.0	111.5
22	100.5	101.5	103.5	105.0	107.0	109.0	107.5	110.0	112.5	108.0	110.5	113.0

### 3.6.18. Jitter pk-pk at -10 dBm avg. Power at 1310nm and 11.3Gbps



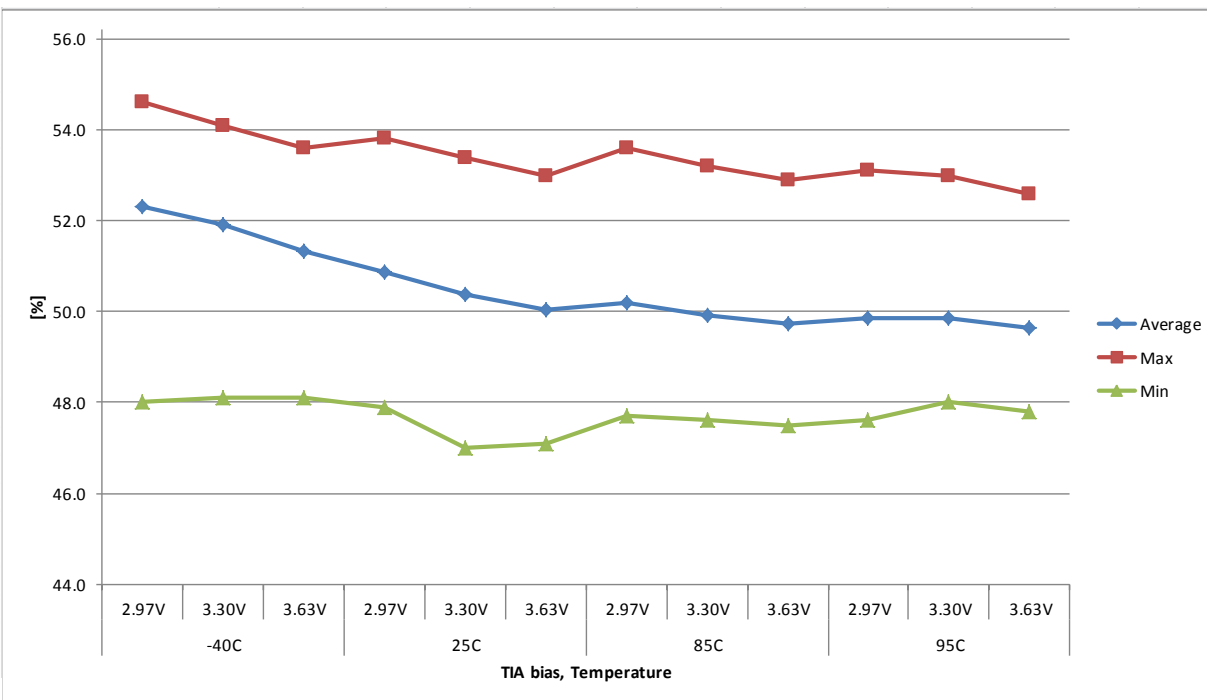
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	12.5	12.8	12.7	12.5	12.5	12.5	13.0	12.7	12.8	12.4	12.6	12.7
<b>Std. Dev.</b>	0.7	0.7	0.7	0.9	0.6	0.6	0.8	0.7	0.7	0.6	0.9	1.0
<b>Max</b>	14.2	14.5	13.9	14.7	13.6	13.3	14.7	14.5	14.2	13.6	14.5	15.6
<b>Min</b>	10.9	11.8	11.2	10.9	11.5	11.5	11.5	11.8	11.5	11.2	10.9	11.2
<b>Range</b>	3.2	2.7	2.7	3.8	2.1	1.8	3.2	2.7	2.7	2.4	3.5	4.4
<b>Median</b>	12.7	12.7	12.8	12.4	12.5	12.8	12.8	12.7	12.8	12.4	12.7	12.4
1	12.1	13.0	12.1	13.0	12.1	11.5	13.6	12.7	13.9	11.2	13.6	13.3
2	13.3	12.1	12.4	13.0	12.4	12.7	13.9	13.0	12.4	12.7	12.7	14.5
3	13.0	14.2	13.0	12.4	12.4	13.0	13.6	11.8	12.4	12.4	13.0	12.4
4	12.1	13.3	13.9	13.3	12.1	13.0	13.6	14.2	13.0	13.3	10.9	12.4
5	13.0	13.0	13.3	12.1	13.0	11.8	12.7	12.7	13.3	11.5	11.5	12.4
6	12.7	11.8	12.4	11.5	11.8	12.4	11.5	12.1	11.5	13.3	13.0	11.2
7	13.0	13.0	12.7	14.7	11.8	12.1	11.8	13.0	13.3	12.4	12.7	13.3
8	11.5	12.4	11.2	11.2	12.7	11.5	12.7	12.1	13.3	12.1	12.1	12.7
9	13.0	12.4	12.4	11.8	13.0	13.3	13.3	14.5	13.3	13.6	14.5	15.6
10	11.5	12.7	12.1	11.5	13.0	13.0	12.4	13.3	12.7	12.4	12.1	11.8
11	12.4	12.7	13.0	10.9	12.1	12.1	13.0	13.6	13.6	13.0	10.9	11.8
12	12.1	13.3	13.0	12.1	12.7	12.4	14.7	13.3	13.0	13.0	13.3	12.7
13	12.7	12.4	12.4	12.4	13.6	13.0	12.7	11.8	12.1	13.0	12.4	13.0
14	14.2	12.7	13.3	13.3	13.6	13.0	13.0	11.8	12.4	13.0	12.7	13.6
15	12.7	12.7	13.0	13.3	13.3	13.3	13.6	13.0	12.7	12.1	13.0	13.9
16	12.1	12.7	12.4	12.4	12.7	13.0	12.7	13.0	12.7	12.1	12.1	12.1
17	12.4	14.2	11.8	13.0	12.7	13.3	12.7	12.4	13.3	11.8	11.2	12.7
18	13.0	12.1	13.6	12.1	12.1	13.0	14.7	12.1	11.5	12.1	13.3	11.2
19	10.9	14.5	12.1	12.4	11.5	13.0	12.4	12.1	12.4	12.1	12.7	12.4
20	13.0	12.4	13.9	14.2	12.1	11.5	12.7	12.4	14.2	11.8	13.0	12.1
21	12.7	13.3	13.3	12.7	12.7	12.4	12.4	12.7	12.7	12.7	13.3	12.4
22	12.1	11.8	13.0	12.7	12.4	12.1	13.6	12.4	13.0	12.1	12.7	12.1

### 3.6.19. Jitter RMS at -10 dBm avg. Power at 1310nm and 11.3Gbps



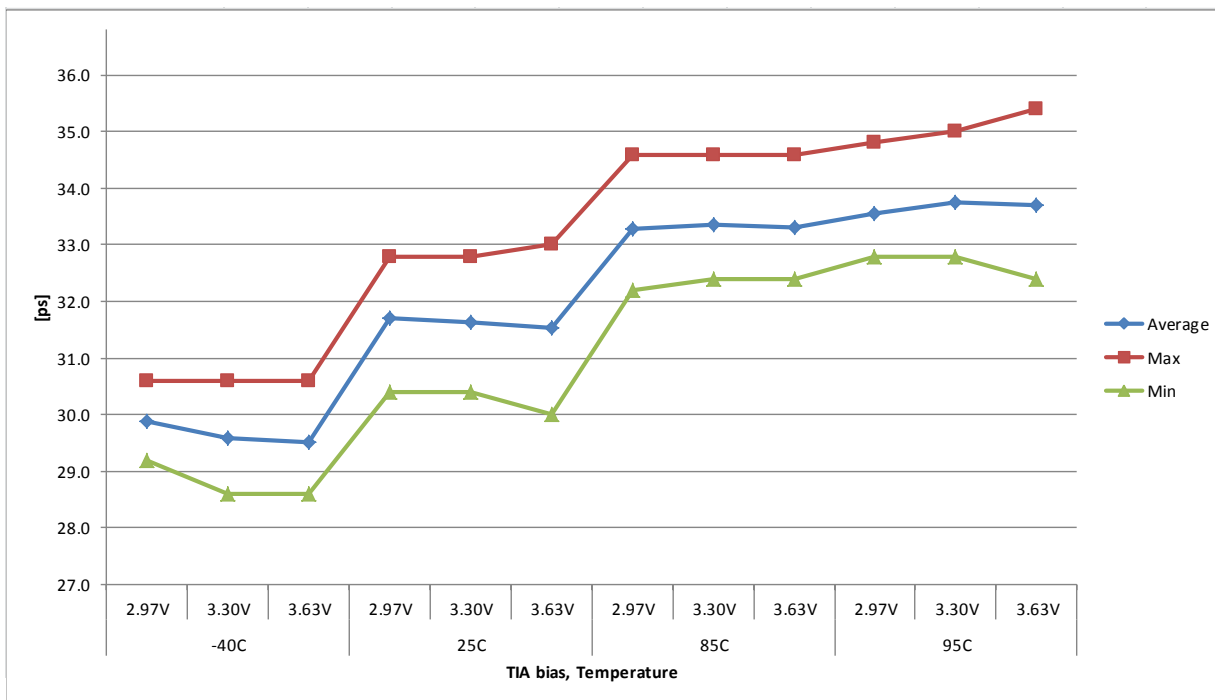
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2
Std. Dev.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Max	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3
Min	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.1
Range	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.3	0.2	0.2
Median	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2
2	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3
3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.3	2.2
4	2.3	2.4	2.3	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.2
5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3
6	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.2
7	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3
8	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
9	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3
10	2.3	2.2	2.1	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
11	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2
12	2.3	2.4	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.4	2.3	2.2
13	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3
14	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3
15	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3
16	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.3	2.2
17	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2
18	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2
19	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.3	2.2
20	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.2
21	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.2
22	2.3	2.2	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.1

### 3.6.20. Crossing Percentage at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



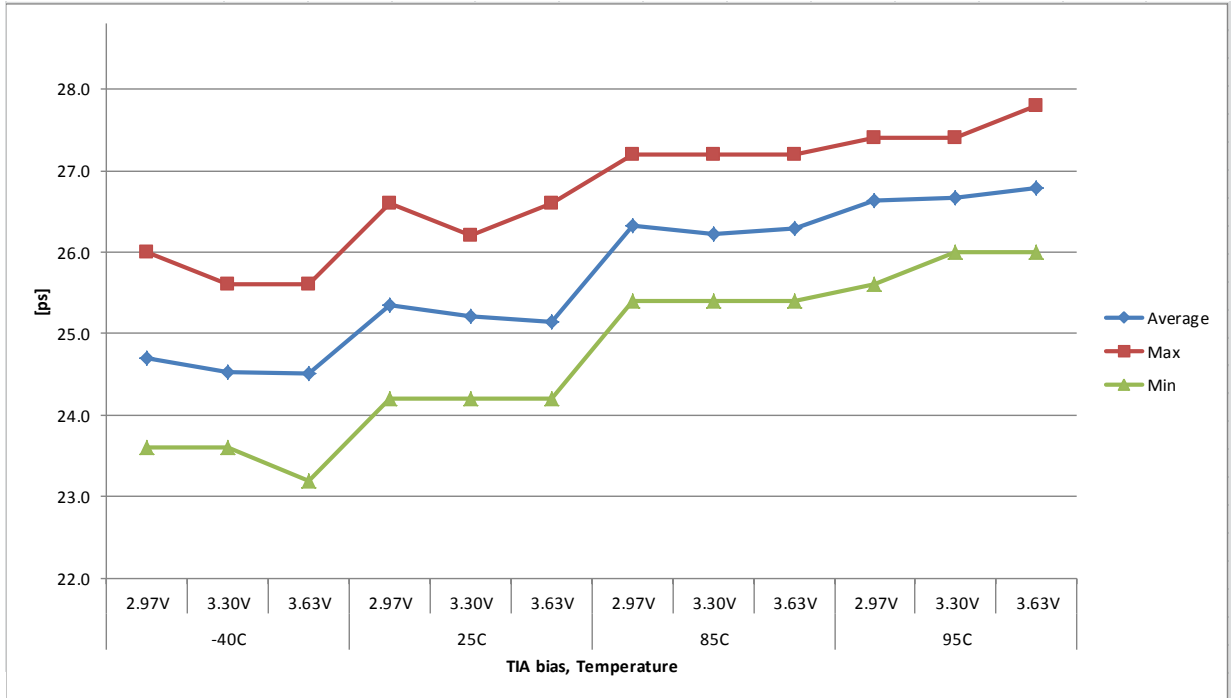
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	52.3	51.9	51.3	50.9	50.4	50.0	50.2	49.9	49.7	49.9	49.8	49.6
<b>Std. Dev.</b>	1.6	1.5	1.5	1.4	1.5	1.3	1.4	1.3	1.3	1.2	1.2	1.2
<b>Max</b>	54.6	54.1	53.6	53.8	53.4	53.0	53.6	53.2	52.9	53.1	53.0	52.6
<b>Min</b>	48.0	48.1	48.1	47.9	47.0	47.1	47.7	47.6	47.5	47.6	48.0	47.8
<b>Range</b>	6.6	6.0	5.5	5.9	6.4	5.9	5.9	5.6	5.4	5.5	5.0	4.8
<b>Median</b>	52.6	52.2	51.6	50.9	50.8	50.3	50.1	50.0	49.7	49.8	49.8	49.7
1	53.4	53.3	52.4	52.6	51.9	51.4	52.2	51.7	52.0	51.1	51.3	51.2
2	54.4	54.1	53.6	53.8	53.4	53.0	53.6	53.2	52.9	53.1	53.0	52.6
3	53.9	53.3	53.1	51.9	51.1	50.7	50.0	50.0	49.4	49.9	49.7	49.3
4	52.8	52.5	51.6	50.6	50.0	50.0	49.0	49.2	48.9	49.2	49.1	48.4
5	51.9	51.8	51.4	50.3	49.4	48.4	49.1	48.7	48.4	48.7	48.6	48.4
6	52.9	52.6	51.8	50.0	50.6	50.1	49.8	49.4	49.3	49.4	49.2	49.5
7	52.5	51.9	51.2	50.0	49.5	49.2	49.5	49.4	49.1	49.4	49.3	49.0
8	50.8	50.3	49.3	49.6	48.9	48.9	49.2	49.7	49.0	49.2	49.5	49.1
9	51.2	50.8	50.2	51.2	51.5	50.6	51.4	51.1	50.6	50.8	50.7	50.7
10	48.0	48.1	48.1	47.9	47.0	47.1	47.7	47.6	47.5	47.6	48.0	47.8
11	54.4	53.5	53.0	52.7	51.8	51.1	50.5	50.2	49.9	50.5	50.1	49.8
12	52.5	52.9	51.5	49.5	49.0	48.8	49.0	48.8	48.5	48.8	48.9	48.5
13	50.0	49.8	48.7	49.7	48.9	48.7	49.0	48.9	49.0	49.5	49.2	49.1
14	51.5	51.2	50.8	50.1	50.3	50.0	50.1	50.0	50.5	49.9	49.9	50.7
15	52.6	52.4	51.8	51.1	50.9	50.8	50.7	50.6	50.1	50.4	50.5	50.0
16	52.7	52.0	51.8	52.2	51.2	51.2	51.5	50.5	50.9	50.8	50.7	50.3
17	53.4	52.8	52.2	51.7	51.2	50.6	50.5	50.4	50.1	50.1	50.3	50.1
18	54.6	53.0	52.7	52.3	51.0	50.9	51.0	50.4	50.2	50.9	50.6	50.3
19	52.2	50.7	51.0	51.4	51.4	50.4	51.4	50.5	50.7	49.7	50.7	50.1
20	51.2	51.5	50.9	49.5	49.1	48.9	49.1	48.6	48.6	48.4	48.6	48.3
21	53.6	53.2	53.0	51.8	51.8	51.1	51.4	51.0	50.2	50.6	50.5	50.5
22	50.5	50.2	49.1	48.9	48.1	48.7	48.8	48.3	48.1	48.8	48.1	48.4

### 3.6.21. Rise Time at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



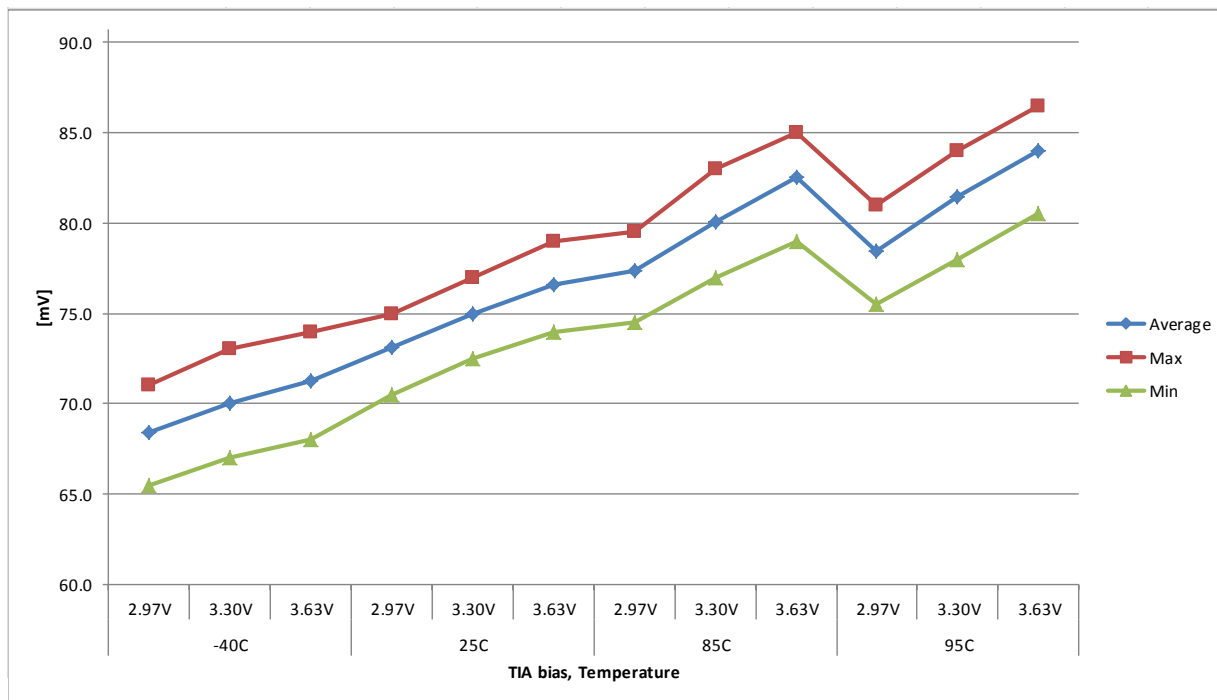
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	29.9	29.6	29.5	31.7	31.6	31.5	33.3	33.3	33.3	33.6	33.8	33.7
<b>Std. Dev.</b>	0.4	0.5	0.5	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7
<b>Max</b>	30.6	30.6	30.6	32.8	32.8	33.0	34.6	34.6	34.6	34.8	35.0	35.4
<b>Min</b>	29.2	28.6	28.6	30.4	30.4	30.0	32.2	32.4	32.4	32.8	32.8	32.4
<b>Range</b>	1.4	2.0	2.0	2.4	2.4	3.0	2.4	2.2	2.2	2.0	2.2	3.0
<b>Median</b>	29.8	29.4	29.4	31.6	31.8	31.6	33.2	33.4	33.2	33.6	33.6	33.6
1	29.2	28.6	28.6	30.6	30.4	30.0	32.2	32.4	32.4	32.8	33.0	32.4
2	29.8	29.4	29.2	31.8	31.8	31.8	33.0	33.0	33.0	33.4	33.4	33.6
3	30.4	30.4	30.6	32.4	32.8	32.4	34.0	34.2	34.2	34.6	34.8	34.6
4	30.4	30.0	30.4	32.2	32.4	32.2	34.2	34.0	34.2	34.2	34.6	34.6
5	30.0	29.4	29.4	32.4	31.8	31.8	33.6	33.6	34.0	34.0	34.2	34.2
6	29.2	28.6	28.6	30.4	30.4	30.0	32.4	32.4	32.4	32.8	32.8	32.4
7	29.8	29.4	29.4	31.8	31.8	31.8	33.6	34.0	33.4	33.6	34.0	34.2
8	30.0	29.4	29.4	31.2	31.2	31.2	33.0	33.0	33.0	33.4	33.4	33.0
9	29.8	29.2	29.4	31.6	31.8	31.2	32.4	33.4	33.0	33.0	33.6	33.4
10	29.8	29.4	29.0	31.6	31.0	31.0	32.8	32.4	33.0	33.0	33.4	33.6
11	29.8	29.4	29.4	31.6	31.6	31.2	33.4	33.0	33.4	33.6	34.0	33.4
12	30.6	30.4	30.0	32.4	31.8	32.2	33.6	34.0	33.6	34.0	34.0	34.0
13	29.8	29.4	29.2	31.2	31.0	31.0	33.0	33.0	33.0	33.0	33.0	33.4
14	29.4	29.2	29.2	31.2	31.2	31.0	32.8	32.8	32.4	32.8	33.0	33.0
15	30.4	30.4	30.0	32.4	32.4	32.4	34.0	34.0	34.0	34.2	34.2	34.2
16	29.8	29.2	29.2	31.6	31.2	31.6	33.0	33.4	33.6	33.6	34.0	34.0
17	29.4	29.8	29.4	31.6	31.6	31.2	33.0	33.0	33.0	33.6	33.6	33.4
18	29.4	29.8	29.4	31.2	31.6	31.6	33.4	33.4	32.8	33.4	33.4	33.6
19	29.8	29.8	29.4	31.6	31.8	31.6	33.0	33.0	32.8	33.0	33.6	33.0
20	30.4	29.8	30.0	32.2	31.8	31.8	33.6	33.6	33.6	34.0	34.0	34.0
21	29.8	29.4	29.8	31.8	31.8	31.6	33.6	33.4	33.4	33.6	33.6	34.0
22	30.6	30.6	30.0	32.8	32.8	33.0	34.6	34.6	34.6	34.8	35.0	35.4

### 3.6.22. Fall Time at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



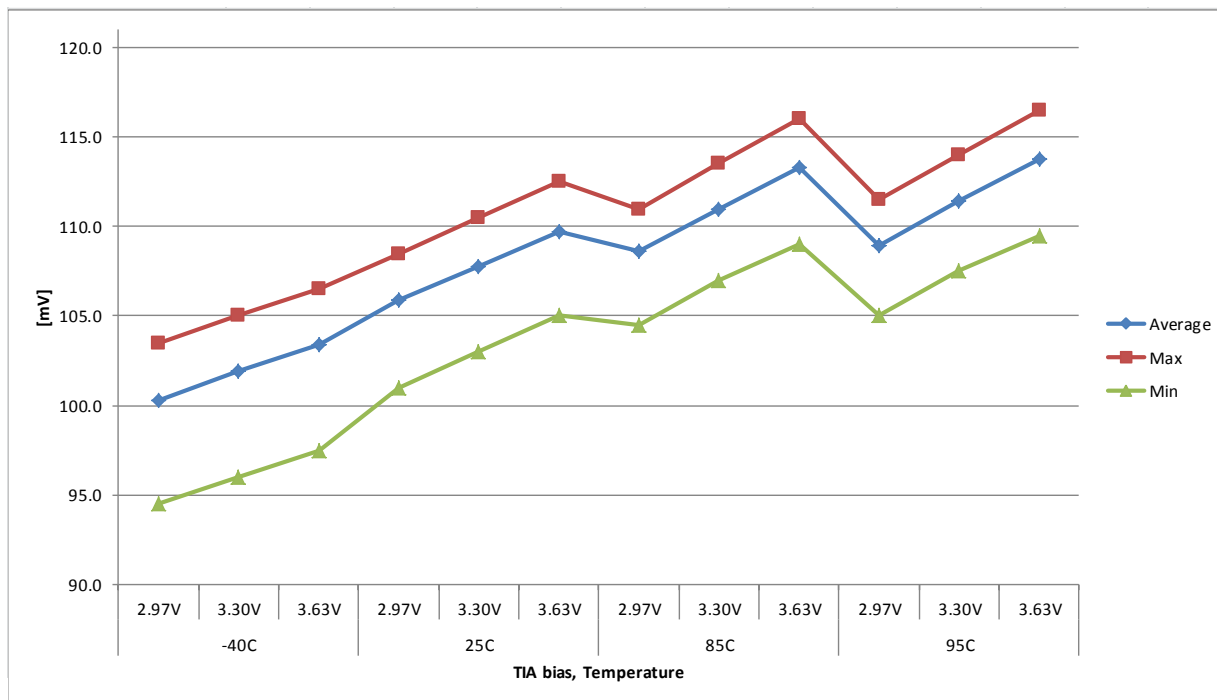
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	24.7	24.5	24.5	25.3	25.2	25.1	26.3	26.2	26.3	26.6	26.7	26.8
<b>Std. Dev.</b>	0.6	0.6	0.6	0.6	0.5	0.6	0.4	0.5	0.6	0.5	0.4	0.5
<b>Max</b>	26.0	25.6	25.6	26.6	26.2	26.6	27.2	27.2	27.2	27.4	27.4	27.8
<b>Min</b>	23.6	23.6	23.2	24.2	24.2	24.2	25.4	25.4	25.4	25.6	26.0	26.0
<b>Range</b>	2.4	2.0	2.4	2.4	2.0	2.4	1.8	1.8	1.8	1.8	1.4	1.8
<b>Median</b>	24.8	24.4	24.4	25.4	25.4	25.0	26.2	26.2	26.2	26.6	26.6	26.8
1	23.6	23.6	23.6	24.2	24.4	24.2	25.6	25.6	25.6	26.0	26.2	26.2
2	24.8	24.8	24.4	25.6	25.4	25.4	26.6	26.6	26.8	26.8	26.8	27.2
3	25.4	25.0	25.0	26.0	26.0	25.6	26.6	26.8	26.8	27.2	27.2	27.4
4	25.4	24.8	24.8	25.4	25.6	25.0	26.8	26.6	26.6	27.2	26.8	26.8
5	24.4	24.4	24.4	25.6	25.0	25.0	26.2	26.2	26.0	26.6	26.6	26.8
6	23.8	23.6	23.8	24.4	24.2	24.2	25.6	25.6	25.4	26.0	26.0	26.0
7	24.2	24.2	24.4	25.4	25.0	25.0	26.2	26.2	26.2	26.6	26.6	26.8
8	24.4	24.4	24.4	25.0	24.8	24.8	26.0	26.2	26.0	26.2	26.6	26.6
9	25.0	24.4	24.8	25.4	25.4	25.0	26.2	26.2	26.2	26.6	26.6	26.6
10	23.6	23.8	23.2	24.2	24.2	24.2	25.4	25.4	25.6	25.6	26.0	26.2
11	24.4	24.2	24.4	25.4	25.0	25.0	26.2	25.6	26.0	26.2	26.6	26.2
12	25.4	25.4	25.4	26.6	25.6	26.0	26.8	27.2	27.2	27.4	27.2	27.2
13	24.8	24.8	24.8	25.6	25.0	25.0	26.2	26.2	26.0	26.8	26.6	26.6
14	24.2	23.8	23.8	24.4	24.8	24.4	26.0	25.6	25.4	25.6	26.2	26.2
15	26.0	25.6	25.6	26.2	26.2	26.6	27.2	27.2	27.2	27.2	27.2	27.4
16	25.0	24.4	24.2	25.6	25.4	25.0	26.2	26.0	26.6	26.6	26.8	27.2
17	24.8	24.4	24.4	25.4	25.0	25.0	26.2	26.0	26.2	26.8	26.6	26.8
18	24.8	24.8	24.8	25.6	25.6	25.4	26.6	26.6	26.2	26.6	26.6	27.2
19	24.8	24.8	24.8	25.4	25.4	25.4	26.6	26.2	26.2	26.8	26.6	26.6
20	25.4	25.4	25.0	25.6	25.6	26.0	26.8	26.6	27.2	27.4	27.2	27.4
21	24.2	23.8	24.2	25.0	25.4	24.8	26.2	25.6	26.0	26.2	26.2	26.2
22	25.0	25.4	25.0	25.6	25.6	26.0	26.8	26.8	26.8	27.4	27.4	27.8

### 3.6.23. Height at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	68.4	70.0	71.3	73.1	75.0	76.6	77.4	80.1	82.6	78.5	81.5	84.0
<b>Std. Dev.</b>	1.3	1.3	1.3	1.2	1.2	1.3	1.3	1.5	1.6	1.4	1.6	1.6
<b>Max</b>	71.0	73.0	74.0	75.0	77.0	79.0	79.5	83.0	85.0	81.0	84.0	86.5
<b>Min</b>	65.5	67.0	68.0	70.5	72.5	74.0	74.5	77.0	79.0	75.5	78.0	80.5
<b>Range</b>	5.5	6.0	6.0	4.5	4.5	5.0	5.0	6.0	6.0	5.5	6.0	6.0
<b>Median</b>	68.5	70.0	71.3	73.0	75.0	76.5	77.8	80.5	83.0	79.0	81.8	84.5
1	68.0	70.0	71.0	73.0	75.0	76.5	78.0	81.0	83.5	79.0	82.5	85.0
2	69.5	71.0	72.5	74.5	76.5	78.5	79.0	82.0	84.5	80.0	83.5	86.0
3	68.0	69.5	70.5	72.0	74.0	75.5	76.0	79.0	81.0	77.0	80.0	82.5
4	67.5	69.5	70.5	72.5	74.5	76.0	76.5	79.0	81.5	77.0	80.0	82.0
5	67.5	69.5	70.5	71.5	73.0	74.5	75.0	77.5	79.5	76.0	78.5	81.0
6	68.5	70.0	71.0	73.0	75.0	76.5	77.5	80.5	83.0	79.0	82.0	84.5
7	68.0	69.5	71.0	72.5	74.0	76.0	77.0	79.5	82.0	78.0	81.0	83.5
8	71.0	73.0	74.0	75.0	77.0	79.0	79.5	83.0	85.0	81.0	84.0	86.5
9	69.0	71.0	72.0	73.5	76.0	77.0	78.0	81.0	83.5	79.0	82.5	85.0
10	67.0	68.5	70.0	72.0	74.0	75.5	76.5	79.5	82.0	78.0	81.0	84.0
11	69.0	70.5	72.0	74.0	75.5	77.5	78.0	81.0	83.5	79.5	82.5	85.0
12	70.5	72.0	73.0	74.5	76.5	78.0	78.5	81.0	83.5	79.0	82.0	84.5
13	67.5	69.0	70.5	72.5	74.5	76.0	76.5	79.0	81.5	77.5	80.5	83.0
14	68.5	70.0	71.5	73.5	75.5	77.0	78.5	81.0	84.0	79.5	83.0	85.5
15	65.5	67.0	68.0	70.5	72.5	74.0	74.5	77.0	79.0	75.5	78.0	80.5
16	68.0	69.5	71.0	73.0	75.0	76.5	77.5	80.0	82.5	78.5	81.5	84.0
17	68.5	70.0	71.5	73.5	75.5	77.0	78.0	81.0	83.5	79.5	82.5	85.5
18	70.0	71.5	72.5	75.0	76.5	78.0	78.5	81.0	83.5	79.5	82.5	85.0
19	69.0	70.5	72.0	74.0	76.0	77.5	79.0	81.5	84.5	80.0	83.5	85.5
20	66.5	68.5	69.5	71.5	73.5	75.0	76.0	78.0	81.0	77.0	79.5	82.0
21	68.5	70.0	71.5	72.5	74.5	76.0	76.5	79.0	81.5	77.5	80.5	83.0
22	69.5	71.0	72.5	74.0	75.5	77.5	78.0	80.5	83.0	79.0	81.5	84.5

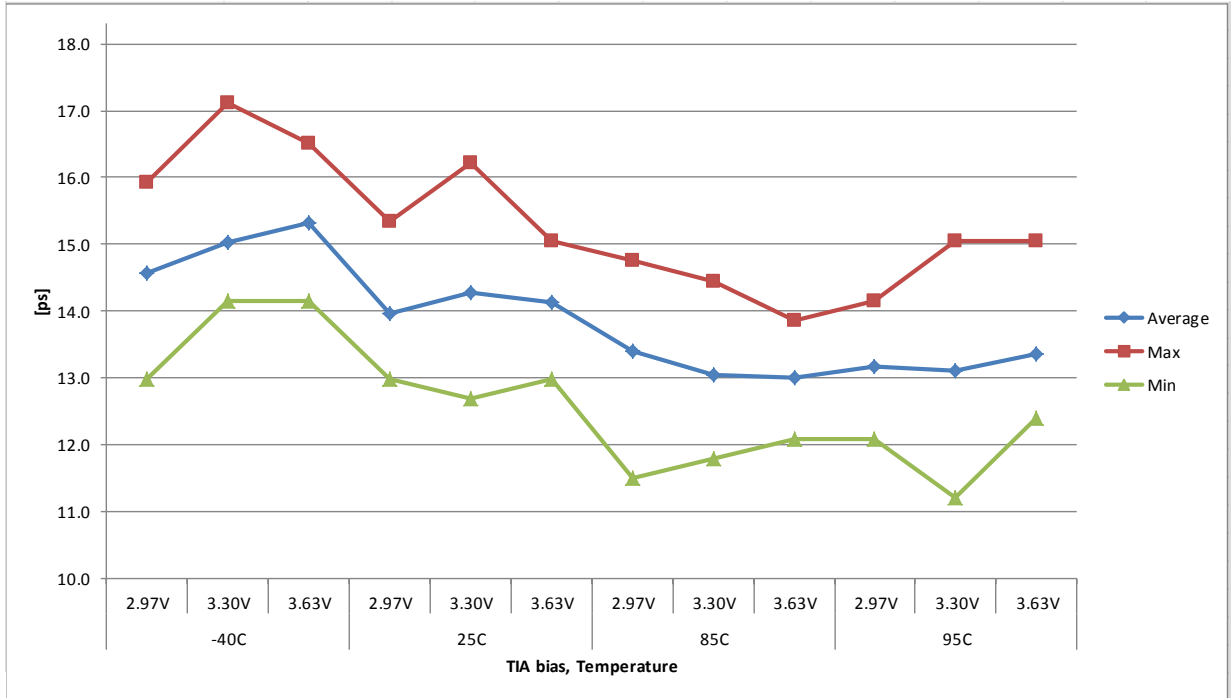
### 3.6.24. Amplitude at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	100.3	101.9	103.4	105.9	107.8	109.7	108.6	111.0	113.3	109.0	111.5	113.8
<b>Std. Dev.</b>	1.9	1.9	1.9	1.6	1.6	1.6	1.4	1.5	1.6	1.4	1.5	1.6
<b>Max</b>	103.5	105.0	106.5	108.5	110.5	112.5	111.0	113.5	116.0	111.5	114.0	116.5
<b>Min</b>	94.5	96.0	97.5	101.0	103.0	105.0	104.5	107.0	109.0	105.0	107.5	109.5
<b>Range</b>	9.0	9.0	9.0	7.5	7.5	7.5	6.5	6.5	7.0	6.5	6.5	7.0
<b>Median</b>	100.5	102.0	103.5	106.0	108.0	110.0	108.8	111.3	113.3	109.0	111.5	114.0
1	101.0	102.5	104.0	106.5	108.5	110.5	109.5	112.0	114.5	110.0	112.5	115.0
2	102.0	103.5	105.0	107.0	109.0	111.0	110.0	112.0	114.5	110.0	112.5	115.0
3	99.5	101.5	102.5	105.0	107.0	108.5	107.5	110.0	112.0	108.0	110.5	112.5
4	99.5	101.5	103.0	105.5	107.0	109.0	108.0	110.5	112.5	108.0	110.5	113.0
5	99.5	101.0	102.5	105.0	106.5	108.5	107.5	109.5	111.5	107.5	110.0	112.0
6	100.0	102.0	103.5	106.0	108.0	110.0	108.5	111.0	113.0	109.0	111.5	114.0
7	101.5	103.0	104.5	106.5	108.5	110.5	109.0	111.5	113.5	109.0	111.5	114.0
8	103.5	105.0	106.5	108.5	110.5	112.5	111.0	113.5	116.0	111.5	114.0	116.5
9	100.0	101.5	103.5	105.5	107.5	109.5	108.5	111.0	113.0	109.0	111.5	113.5
10	100.5	102.0	104.0	107.0	109.0	110.5	109.5	112.0	114.5	110.0	112.5	115.0
11	102.5	104.0	106.0	108.0	109.5	111.5	110.5	113.0	115.5	111.0	113.5	116.0
12	102.0	103.5	105.0	107.0	109.0	111.0	109.5	112.0	114.5	109.5	112.0	114.5
13	99.0	100.5	102.0	105.0	106.5	108.5	107.5	109.5	112.0	108.0	110.0	112.5
14	100.5	102.0	103.5	106.0	108.0	110.0	109.5	112.0	114.5	109.5	112.5	115.0
15	94.5	96.0	97.5	101.0	103.0	105.0	104.5	107.0	109.0	105.0	107.5	109.5
16	99.5	101.0	102.5	105.0	107.0	109.0	107.5	110.0	112.0	108.0	110.5	112.5
17	101.0	102.5	104.0	106.5	108.5	110.5	109.0	111.5	114.0	109.5	112.0	114.5
18	100.0	102.0	103.5	106.0	108.0	110.0	108.5	110.5	113.0	108.5	111.0	113.5
19	101.0	102.5	104.0	106.5	108.5	110.5	110.0	112.0	114.5	110.0	113.0	115.0
20	97.0	98.5	100.0	103.5	105.5	107.5	107.0	109.0	111.5	107.5	109.5	112.0
21	100.5	102.0	103.5	105.5	107.5	109.5	108.0	110.5	112.5	108.5	111.0	113.0
22	102.0	103.5	105.0	107.0	109.0	110.5	109.5	112.0	114.5	110.0	112.5	114.5

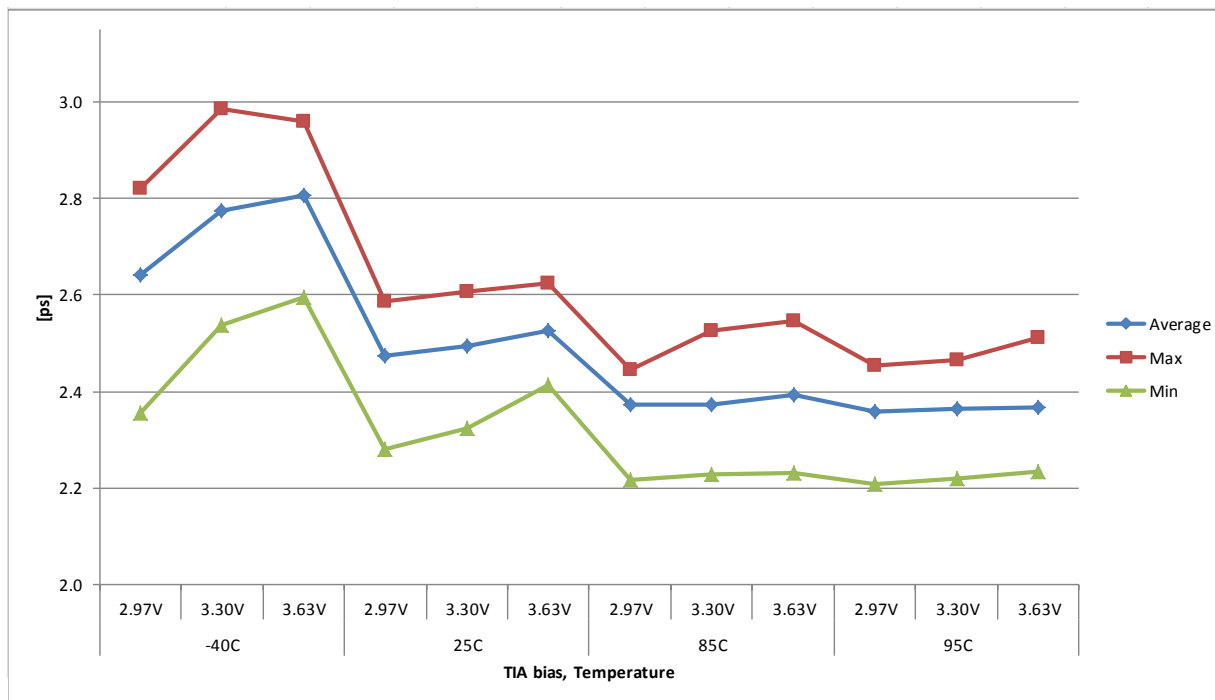


### 3.6.25. Jitter pk-pk at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
Average	14.6	15.0	15.3	14.0	14.3	14.1	13.4	13.0	13.0	13.2	13.1	13.4
Std. Dev.	0.8	0.8	0.7	0.7	0.9	0.6	0.9	0.7	0.5	0.6	0.9	0.8
Max	15.9	17.1	16.5	15.3	16.2	15.0	14.7	14.5	13.9	14.2	15.0	15.0
Min	13.0	14.2	14.2	13.0	12.7	13.0	11.5	11.8	12.1	12.1	11.2	12.4
Range	2.9	3.0	2.4	2.4	3.5	2.1	3.2	2.7	1.8	2.1	3.8	2.7
Median	14.5	14.9	15.0	13.9	14.2	14.3	13.4	13.1	13.0	13.1	13.0	13.3
1	13.6	14.2	15.0	14.2	15.0	15.0	13.6	12.4	12.4	12.4	11.8	12.4
2	14.5	15.3	16.2	13.0	15.6	14.7	14.5	13.3	13.9	13.3	13.3	13.6
3	14.5	15.6	15.0	13.6	13.6	14.5	14.5	13.6	13.6	13.0	12.7	14.5
4	15.9	17.1	15.9	13.6	15.3	14.7	14.5	14.5	13.3	12.7	12.7	13.9
5	15.3	15.6	15.9	15.3	14.2	14.5	14.5	12.7	12.4	12.7	13.3	13.3
6	14.7	14.2	14.5	13.9	12.7	14.7	11.5	12.1	13.0	12.1	11.2	12.4
7	15.0	14.7	15.6	14.5	13.6	13.9	13.6	13.3	13.6	14.2	12.7	13.3
8	13.0	15.6	15.0	13.9	13.6	13.9	14.7	13.0	13.0	14.2	12.4	13.3
9	14.5	15.6	15.9	13.3	16.2	14.5	14.2	13.3	12.4	12.4	14.7	15.0
10	15.3	14.2	15.6	14.2	14.2	13.9	13.0	12.7	13.0	13.0	14.2	14.2
11	15.3	14.7	16.5	13.9	14.2	13.9	13.3	13.3	13.6	13.9	14.5	12.4
12	15.3	15.9	15.0	15.3	14.7	14.7	14.2	13.9	13.9	13.6	13.6	13.6
13	13.9	15.3	16.2	14.7	14.2	14.2	12.7	13.0	12.4	13.6	12.7	13.0
14	14.5	15.9	14.7	13.0	14.7	14.5	13.6	14.2	13.0	13.3	13.3	12.4
15	13.9	14.2	15.3	14.5	14.5	13.3	12.1	12.1	12.4	13.6	13.0	13.0
16	15.3	14.5	15.0	13.6	15.3	13.6	12.7	13.0	13.6	12.7	15.0	12.4
17	14.5	14.5	14.5	13.6	14.2	14.5	12.7	13.6	13.0	13.0	12.7	14.2
18	13.9	14.2	15.0	13.0	14.2	13.3	13.0	12.4	13.0	13.3	13.0	13.3
19	14.2	14.5	15.9	15.3	13.0	13.6	13.3	12.4	12.1	13.0	12.4	13.3
20	13.9	14.7	14.5	13.9	14.5	13.0	13.0	13.3	13.0	14.2	13.3	13.3
21	15.6	15.0	15.0	13.9	12.7	14.7	12.4	11.8	12.7	12.4	13.6	14.5
22	14.2	15.0	14.2	13.6	14.2	13.6	13.6	13.6	13.3	13.9	12.7	13.0

### 3.6.26. Jitter RMS at +1.6 dBm avg. Power at 1310nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.8	2.8	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Max</b>	2.8	3.0	3.0	2.6	2.6	2.6	2.4	2.5	2.5	2.5	2.5	2.5
<b>Min</b>	2.4	2.5	2.6	2.3	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2
<b>Range</b>	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.3
<b>Median</b>	2.7	2.7	2.8	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4
1	2.7	2.7	2.8	2.4	2.5	2.4	2.4	2.2	2.2	2.3	2.3	2.2
2	2.6	2.7	2.8	2.5	2.5	2.6	2.4	2.4	2.4	2.4	2.3	2.4
3	2.6	2.7	2.8	2.5	2.5	2.5	2.4	2.4	2.5	2.4	2.4	2.4
4	2.8	2.9	3.0	2.6	2.6	2.6	2.4	2.5	2.5	2.4	2.4	2.4
5	2.8	2.9	2.9	2.5	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
6	2.6	2.7	2.8	2.4	2.4	2.5	2.2	2.3	2.3	2.2	2.2	2.3
7	2.7	2.7	2.8	2.6	2.5	2.6	2.4	2.5	2.4	2.4	2.5	2.5
8	2.7	2.9	2.9	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.3	2.3
9	2.7	2.9	2.8	2.5	2.5	2.6	2.4	2.3	2.3	2.4	2.4	2.3
10	2.7	2.7	2.8	2.5	2.6	2.5	2.4	2.3	2.4	2.3	2.4	2.4
11	2.7	2.9	2.8	2.5	2.6	2.5	2.3	2.5	2.5	2.4	2.4	2.4
12	2.8	3.0	2.9	2.6	2.6	2.6	2.4	2.4	2.5	2.5	2.5	2.5
13	2.7	2.7	2.9	2.6	2.5	2.6	2.4	2.4	2.4	2.3	2.4	2.4
14	2.6	2.8	2.8	2.4	2.5	2.5	2.3	2.3	2.4	2.3	2.3	2.3
15	2.4	2.5	2.6	2.3	2.3	2.4	2.3	2.3	2.4	2.3	2.3	2.3
16	2.6	2.7	2.7	2.4	2.5	2.6	2.3	2.4	2.4	2.3	2.4	2.4
17	2.6	2.8	2.7	2.5	2.5	2.5	2.4	2.5	2.4	2.4	2.4	2.4
18	2.5	2.6	2.8	2.3	2.5	2.5	2.3	2.3	2.4	2.4	2.4	2.4
19	2.6	2.7	2.8	2.4	2.3	2.5	2.3	2.3	2.3	2.3	2.4	2.3
20	2.5	2.6	2.7	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.3	2.4
21	2.7	2.9	2.9	2.5	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.4
22	2.7	2.9	2.8	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4

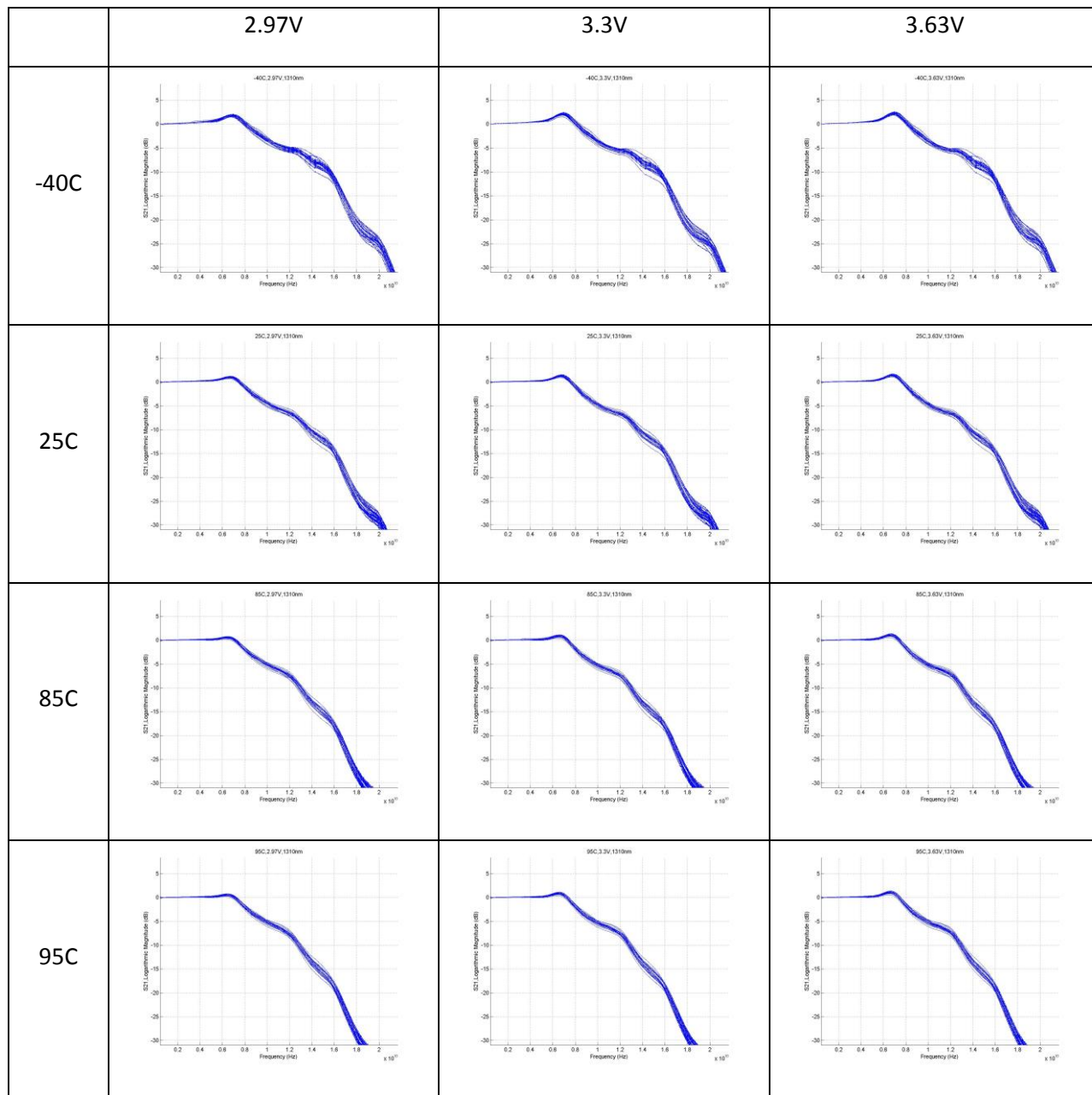


## 3.7. S-parameters

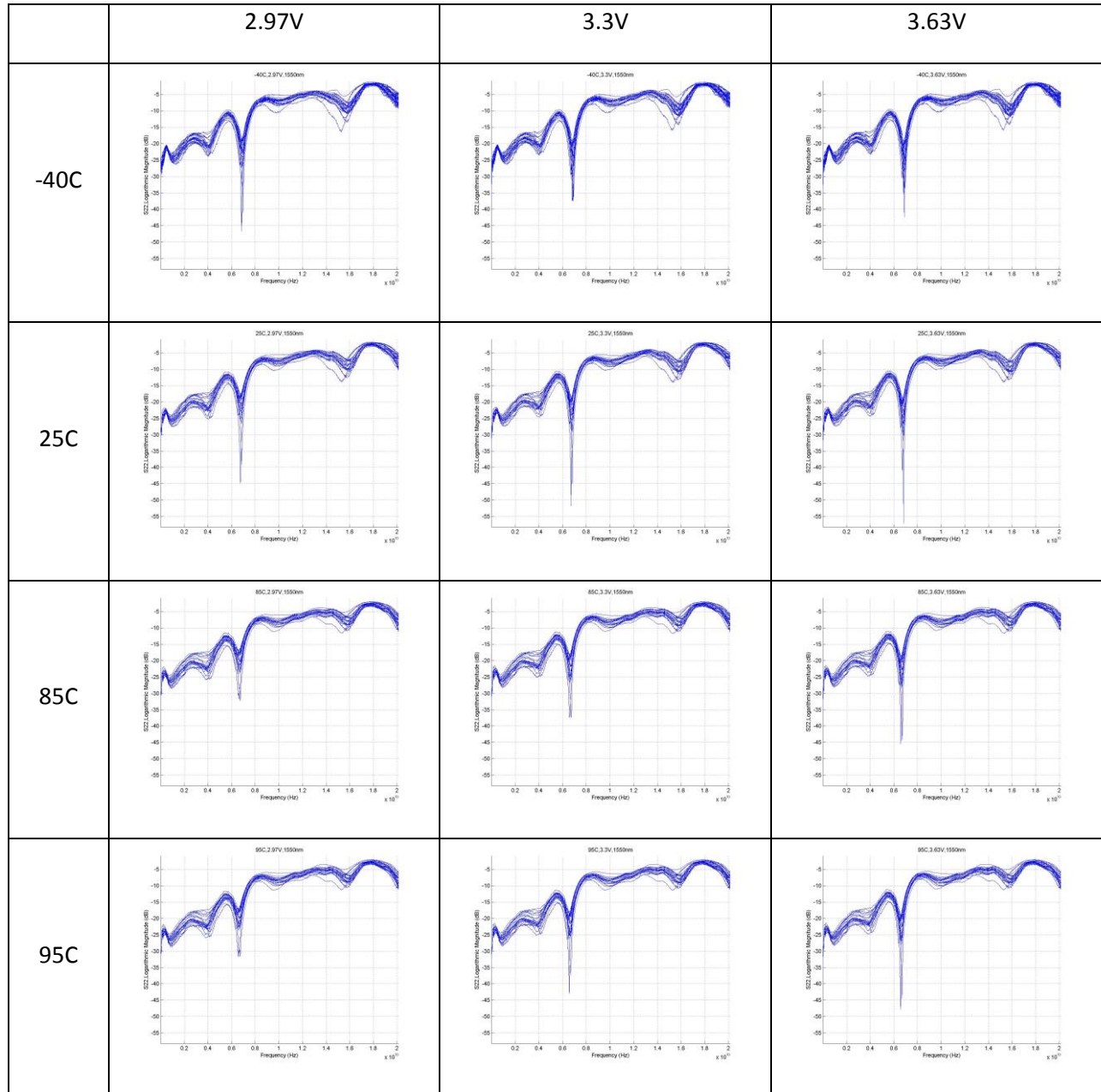
### 3.7.1. Test Descriptions

An s-parameter sweep was performed with an input optical power of -19dBm and electrical power of 0dBm at 1310nm.

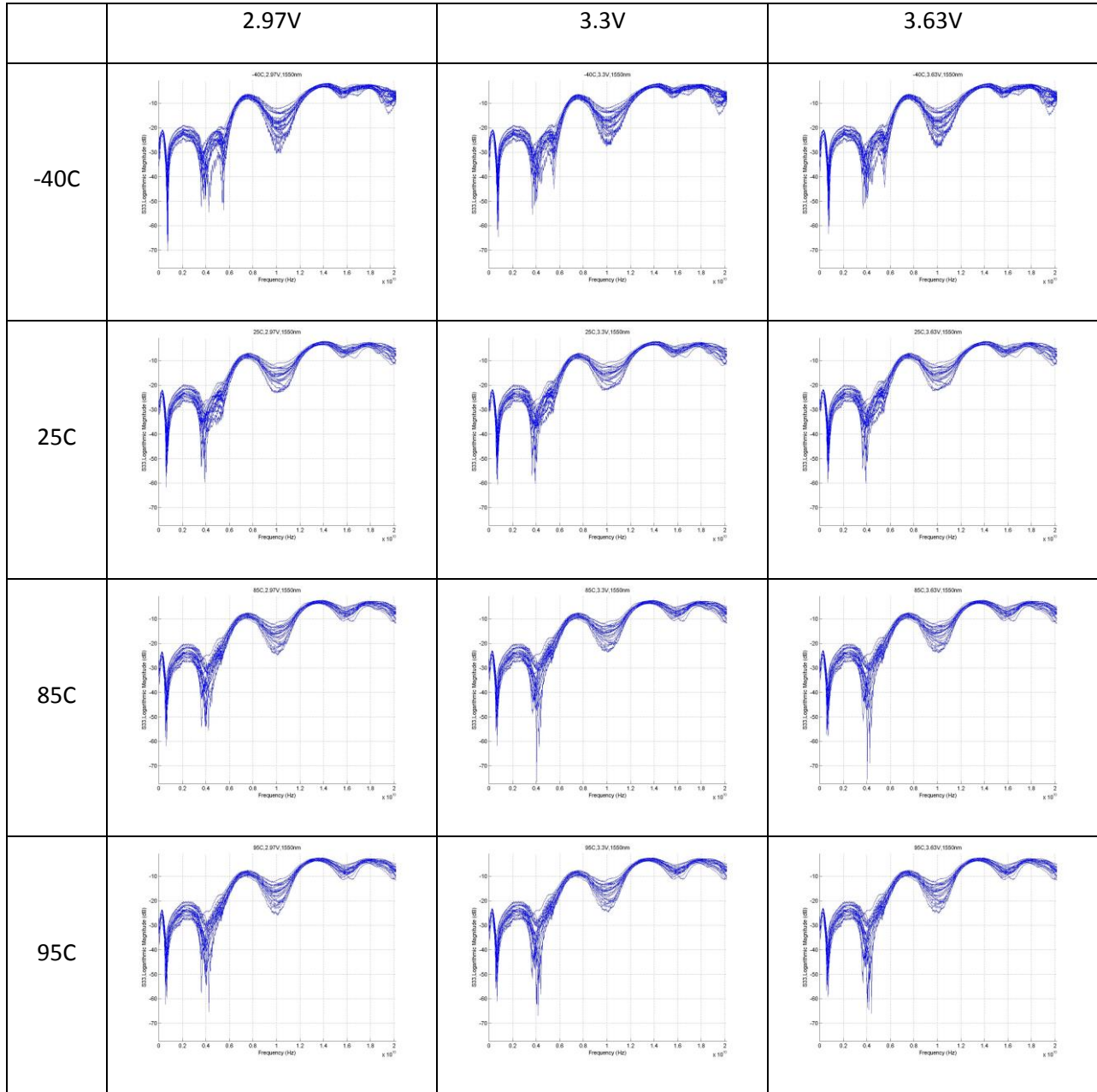
### 3.7.2. S21 plots at 1310nm and -19dBm Optical Input Power



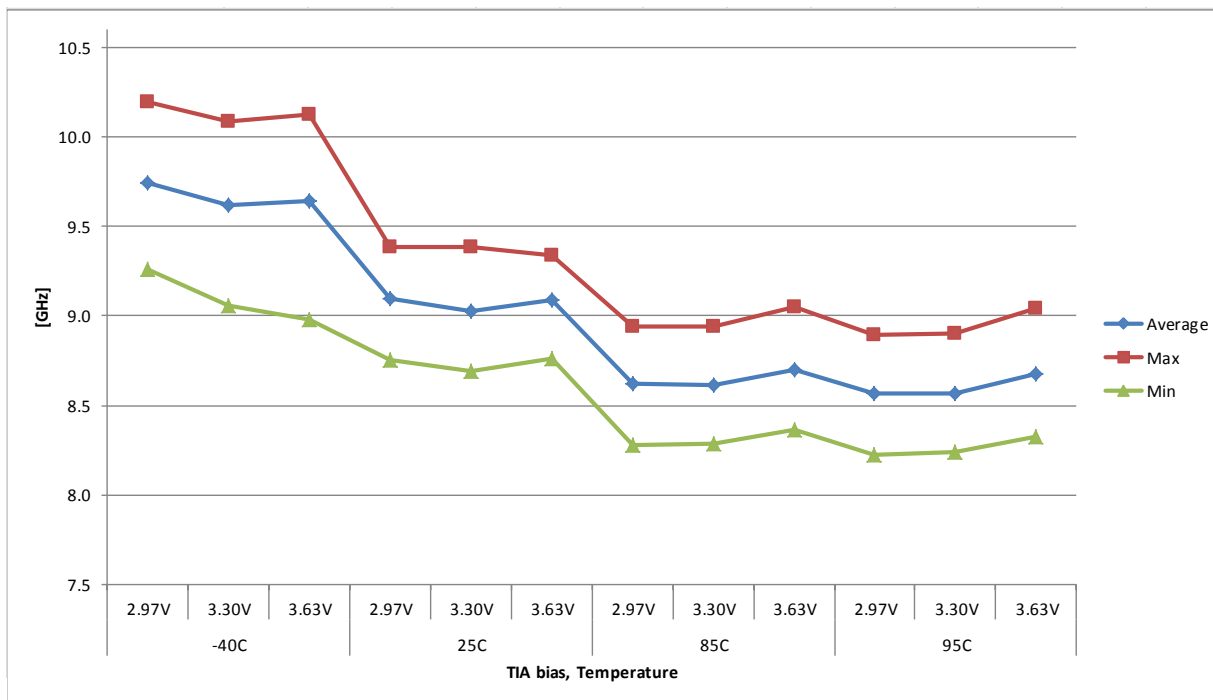
### 3.7.3. P-Channel S22 plots at 0dBm electrical input power



3.7.4. N-Channel S22 plots at 0dBm electrical input power

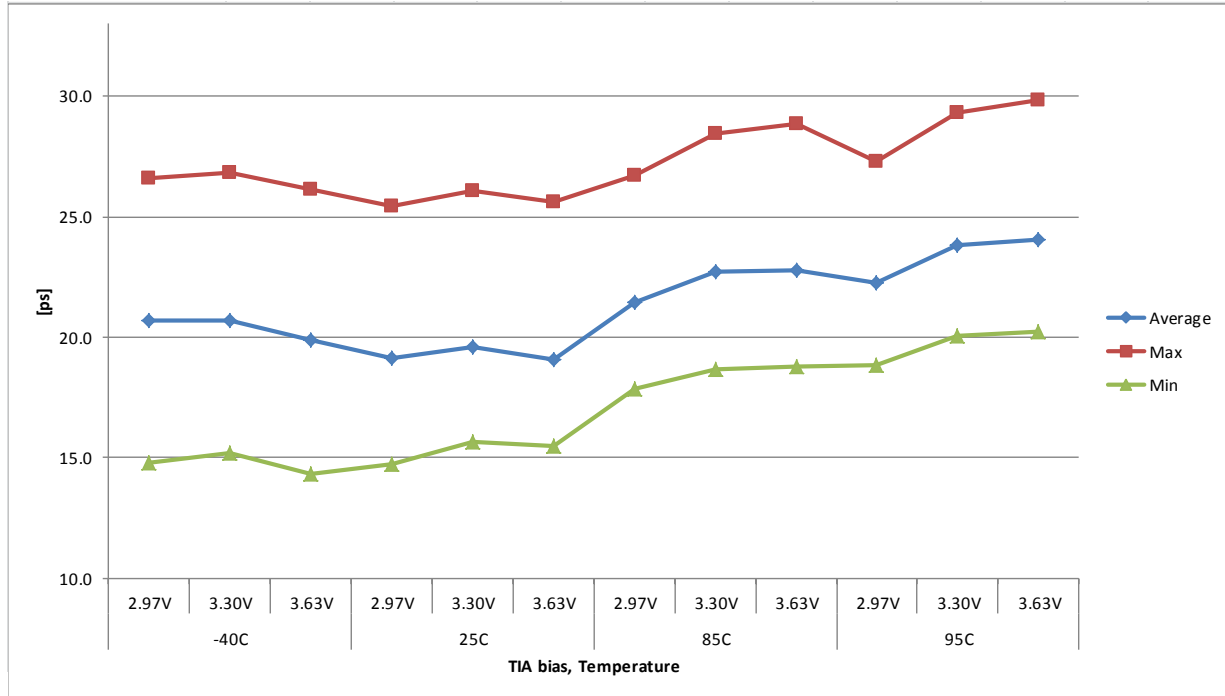


### 3.7.5. S21 -3dB Bandwidth (GHz) at 1310nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	9.7	9.6	9.6	9.1	9.0	9.1	8.6	8.6	8.7	8.6	8.6	8.7
<b>Std. Dev.</b>	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	10.2	10.1	10.1	9.4	9.4	9.3	8.9	8.9	9.1	8.9	8.9	9.0
<b>Min</b>	9.3	9.1	9.0	8.8	8.7	8.8	8.3	8.3	8.4	8.2	8.2	8.3
<b>Range</b>	0.9	1.0	1.1	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7
<b>Median</b>	9.8	9.6	9.7	9.1	9.0	9.1	8.6	8.6	8.6	8.5	8.5	8.6
1	10.2	10.1	10.1	9.3	9.4	9.3	8.9	8.9	9.1	8.9	8.9	9.0
2	9.7	9.6	9.7	9.1	9.0	9.1	8.5	8.7	8.6	8.5	8.5	8.7
3	9.3	9.3	9.3	8.8	8.8	8.8	8.4	8.4	8.5	8.3	8.4	8.5
4	9.9	9.5	9.6	9.1	8.9	9.0	8.5	8.5	8.6	8.5	8.5	8.6
5	9.8	9.7	9.7	8.9	8.8	8.9	8.5	8.5	8.6	8.4	8.4	8.5
6	9.7	9.6	9.6	9.3	9.2	9.3	8.8	8.8	8.9	8.7	8.7	8.8
7	9.9	9.8	9.7	9.2	9.1	9.2	8.6	8.7	8.8	8.6	8.6	8.8
8	10.0	9.8	9.9	9.3	9.2	9.3	8.8	8.8	8.9	8.8	8.8	8.9
9	9.8	9.4	9.7	8.8	8.9	8.9	8.4	8.4	8.5	8.4	8.4	8.5
10	9.8	9.8	9.7	9.3	9.3	9.3	8.8	8.8	8.9	8.8	8.8	8.9
11	10.1	9.9	9.9	9.4	9.2	9.3	8.9	8.8	8.9	8.8	8.8	8.9
12	9.7	9.7	9.7	9.1	9.1	9.1	8.6	8.6	8.7	8.6	8.6	8.7
13	9.7	9.6	9.5	9.1	9.0	9.1	8.6	8.6	8.6	8.5	8.5	8.6
14	10.0	9.9	9.9	9.2	9.2	9.1	8.7	8.6	8.9	8.7	8.7	8.8
15	9.3	9.1	9.1	8.8	8.7	8.8	8.3	8.3	8.4	8.2	8.2	8.3
16	9.8	9.6	9.5	9.1	9.0	9.0	8.6	8.6	8.6	8.5	8.5	8.6
17	9.8	9.9	10.0	9.3	9.3	9.3	8.9	8.9	9.0	8.9	8.9	9.0
18	9.7	9.5	9.6	9.0	8.9	9.0	8.5	8.5	8.6	8.5	8.5	8.6
19	9.8	9.7	9.6	9.1	9.0	9.1	8.7	8.5	8.8	8.5	8.5	8.6
20	9.6	9.5	9.0	8.9	8.9	8.9	8.5	8.5	8.5	8.4	8.4	8.5
21	9.6	9.4	9.7	9.1	9.0	9.1	8.6	8.5	8.6	8.5	8.5	8.6
22	9.3	9.3	9.4	8.9	8.8	8.9	8.5	8.5	8.6	8.4	8.5	8.5

### 3.7.6. Group Delay (ps) at 1310 nm (6GHz)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	20.7	20.7	19.9	19.1	19.6	19.1	21.4	22.7	22.8	22.3	23.8	24.1
<b>Std. Dev.</b>	2.7	2.7	2.6	2.5	2.5	2.5	2.2	2.4	2.5	2.2	2.4	2.5
<b>Max</b>	26.6	26.8	26.1	25.4	26.1	25.6	26.7	28.5	28.9	27.3	29.3	29.8
<b>Min</b>	14.8	15.2	14.3	14.8	15.7	15.5	17.9	18.7	18.8	18.8	20.0	20.2
<b>Range</b>	11.8	11.6	11.8	10.7	10.4	10.1	8.8	9.8	10.1	8.5	9.3	9.6
<b>Median</b>	21.0	20.8	20.0	19.0	19.6	19.2	21.2	22.7	22.7	22.0	23.5	24.1
1	14.8	16.2	15.6	16.9	16.6	15.9	19.9	20.5	20.2	20.8	21.8	21.8
2	22.2	22.2	21.5	21.8	22.3	21.5	24.5	26.0	25.9	25.5	27.2	27.4
3	23.6	23.4	22.7	21.7	22.4	21.9	23.6	25.3	25.4	24.4	26.5	26.8
4	21.2	21.5	20.5	19.6	20.4	19.9	21.8	23.8	23.9	22.8	24.9	25.0
5	20.7	21.0	20.6	19.0	19.6	19.1	21.2	22.9	22.9	22.1	23.7	24.2
6	18.5	18.4	17.5	16.2	16.2	15.7	18.4	19.3	19.3	19.4	20.4	20.5
7	21.2	20.8	20.0	19.7	20.0	19.6	22.1	23.5	23.6	23.2	24.7	24.9
8	19.8	19.4	18.4	18.6	18.9	18.3	21.1	22.4	22.5	21.8	23.4	24.0
9	26.6	26.8	26.1	25.4	26.1	25.6	26.7	28.5	28.9	27.3	29.3	29.8
10	16.0	15.2	14.3	14.8	15.7	15.5	17.9	18.7	18.8	18.8	20.0	20.2
11	16.9	17.5	17.4	15.3	16.7	16.6	18.6	19.7	19.7	19.6	20.9	21.1
12	23.9	23.7	23.1	21.4	22.1	21.6	23.4	25.2	25.4	24.5	26.3	26.7
13	21.2	21.8	20.8	18.8	19.7	19.2	20.6	22.1	22.3	21.4	23.2	23.3
14	20.4	20.1	19.3	20.2	20.3	19.7	22.6	23.5	23.4	23.4	24.7	24.6
15	21.3	21.2	20.6	19.0	19.4	18.9	20.7	21.6	21.8	21.3	22.7	22.7
16	19.2	19.5	18.5	17.8	18.4	17.9	20.1	21.4	21.7	20.8	22.5	22.8
17	19.3	18.7	17.8	17.9	18.0	17.2	20.5	21.5	21.5	21.6	22.7	23.1
18	24.4	24.5	23.4	21.2	21.8	21.4	22.3	23.9	24.0	23.0	24.5	25.1
19	21.2	20.8	20.0	20.6	20.6	19.8	22.9	23.8	23.4	23.7	25.2	24.9
20	20.8	20.4	19.6	17.7	18.0	17.3	19.9	20.7	20.9	20.6	21.9	21.8
21	19.8	19.7	19.0	16.8	17.2	16.6	19.2	20.2	20.4	19.9	21.3	21.7
22	21.9	22.3	21.2	20.4	21.2	20.3	23.6	25.1	25.3	24.4	26.5	26.9





#### 4. Notes and Conclusions

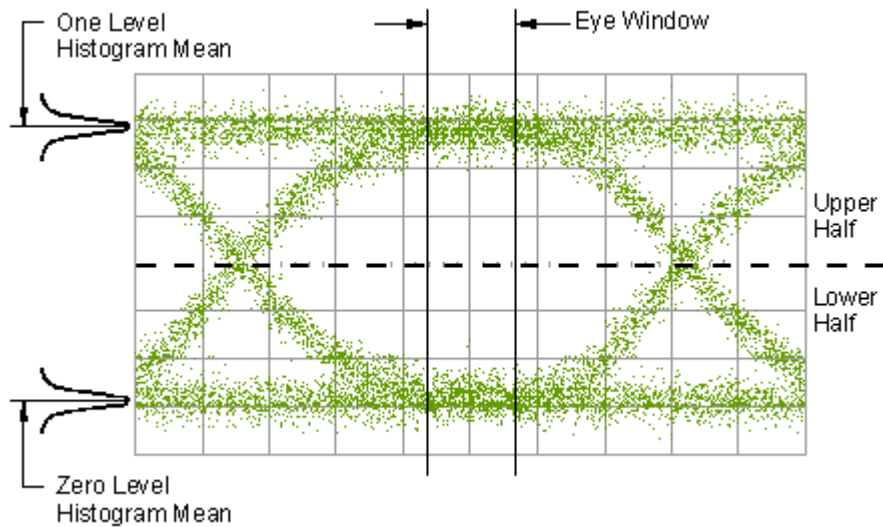
GN3050 ROSA using GCS PD shows comparable performance to GN3050 ROSA using Albis PD.

All results satisfy the datasheet.

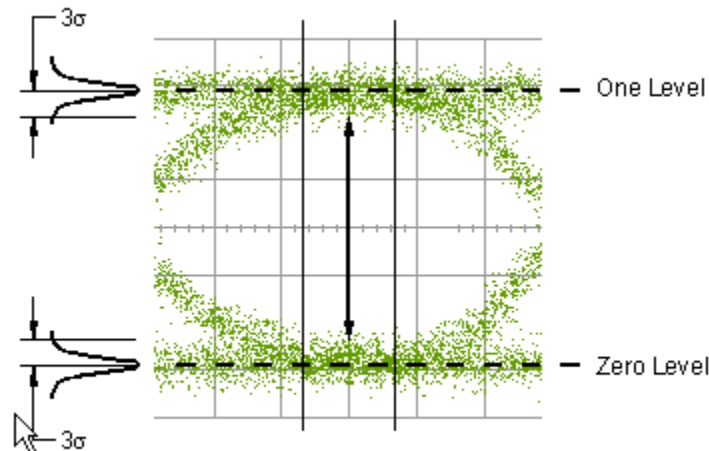
## 5. Appendix 1: Eye Diagram Measurement Definitions

### a. Eye Heights

Eye height is a measure of the vertical opening of an eye diagram. Histograms are constructed to characterize both the one and zero levels *and* their noise levels within the eye window boundaries. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.



The one and zero levels are the relative means of the histograms. The noise is measured through the histograms as three standard deviations from both the one level and zero level into the eye opening.



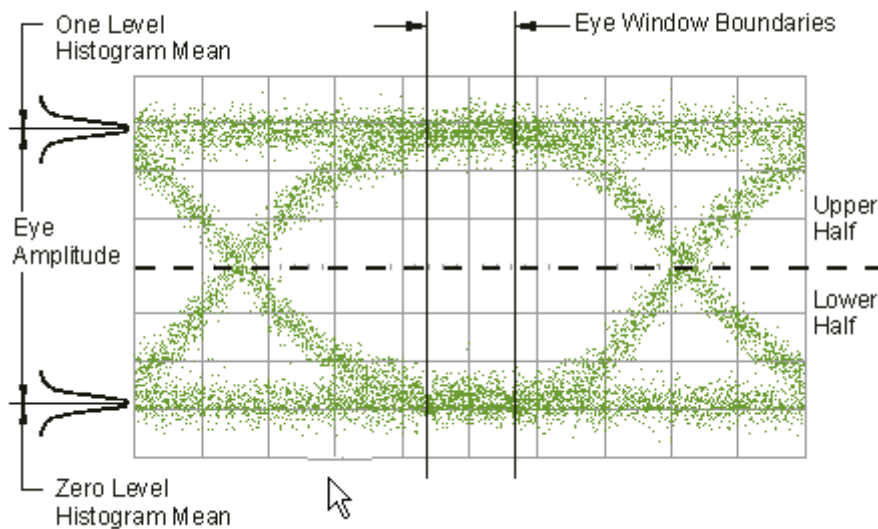


The eye height is determined as follows, eye height = (one level -  $3\sigma$ ) - (zero level +  $3\sigma$ )

b. Eye Amplitudes

Eye amplitude is the difference between the logic 1 level and the logic 0 level histogram mean values of an eye diagram. This measurement is made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

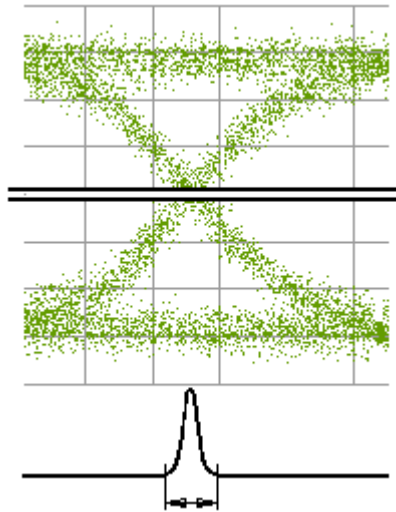
A histogram is constructed using the sampled portion of the eye diagram within the eye window. This histogram is comprised of data points from the upper and lower halves of the eye diagram and is used to determine the mean values of the logic 1 and logic 0 levels. The eye amplitude is determined as follows:



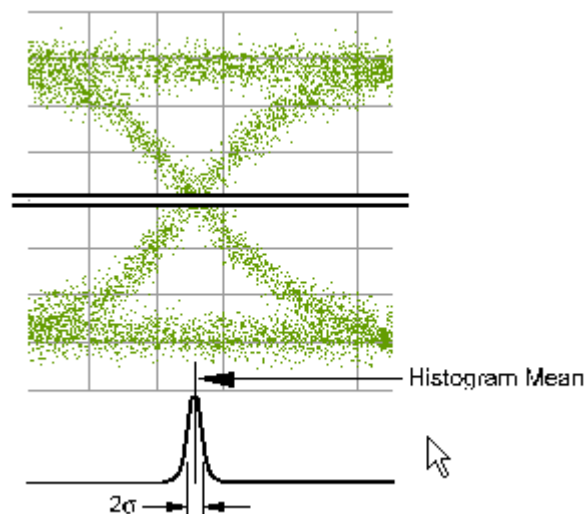
c. Jitter RMS and pk-pk

Eye Jitter is the measure of the time variances of the rising and falling edges of an eye diagram, as these edges affect the crossing point of the eye. To compute jitter, the level of the crossing point of the eye is first determined. Then a vertically thin measurement window is placed horizontally through the crossing point, and a time histogram is generated.

Jitter pk-pk is equal to the full width of the histogram at the eye crossing point.



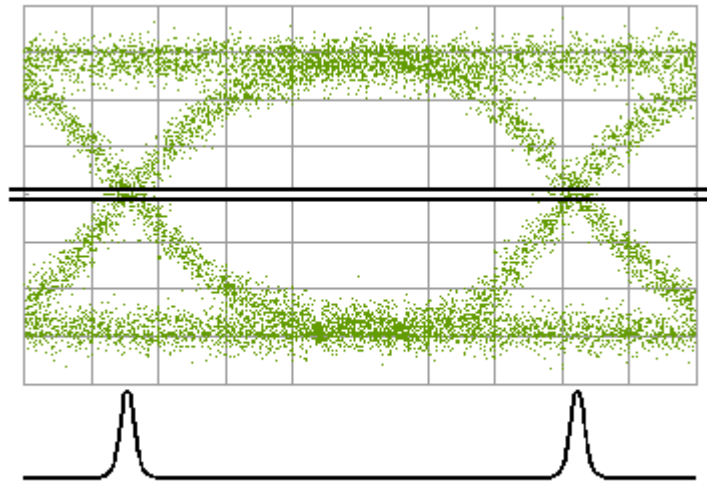
Jitter RMS is defined as  $1 \sigma$  (standard deviation) of the crossing point histogram



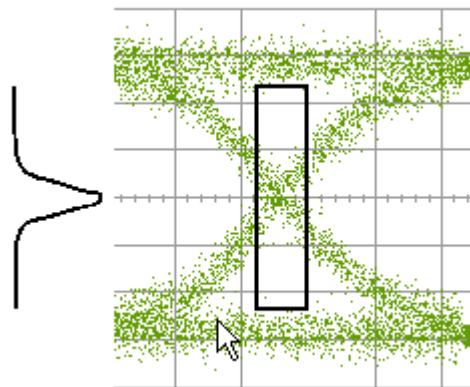
d. Crossing percentage

Crossing percentage is a measure of the amplitude of the crossing points relative to the one level and zero level. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

A vertically thin measurement window is placed horizontally through the crossing points, and a horizontal histogram is used to determine the mean location (in time) of the crossing point.



A narrow vertical histogram is used to determine the amplitude of crossing points.

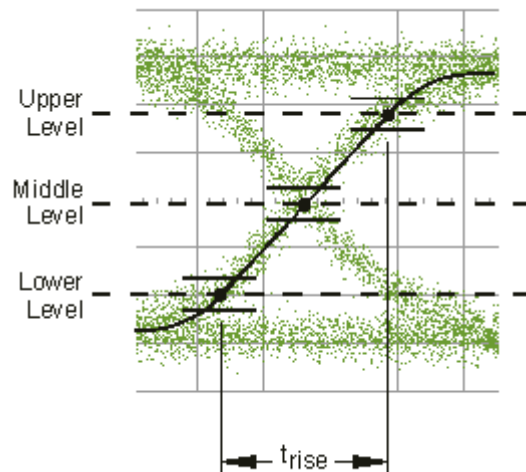


The mean derived from the horizontal and vertical histogram results in  $V_{\text{cross}}$ . Crossing percentage is then determined by the following:

$$\text{Crossing percent} = 100 (V_{\text{cross}} - V_{\text{zero level}}) / (V_{\text{one level}} - V_{\text{zero level}})$$

e. Rise Time and Fall Time

Rise time is a measure of the mean transition time of the data on the upward slope of an eye diagram. The data crosses through the following three thresholds: the lower, middle, and upper thresholds, as well as through the eye crossing point. The settings for the threshold levels are the 20% to 80% points on the transition.



Rise time= time at the upper threshold crossing – time at the lower threshold crossing

Fall times are similarly calculated except on the downward slope of an eye diagram.



GN3250 (featuring GCS photodiode)  
Characterization Report  
(PCN-000356)

Author: Goran Perosevic





Revision List

Revision	Author	Description of change	Revision Date (mm/dd/yyyy)	ECO#
A	Goran Perosevic	First Issue	28/01/2015	ECO-029407



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## 1. Scope

This document contains a summary of the results of the characterization testing performed on GN3250 ROSA featuring GCS (PN: DO262\_45um\_E1) photodiode.

## 2. Method

The GN3250 ROSA featuring GCS photodiode (PN: DO262\_45um\_E1) with LC optical receptacles (barrels) were tested using a Semtech designed evaluation board. These evaluation boards feature controlled impedance lines that are terminated in SMA connectors, and permit full assessment of the electrical properties of the ROSA using input from optical excitation at a wide range of frequencies.

Characterization plan is Gendoc 53406.

## 3. Results



### 3.1. Supply Current ( $I_{CC}$ )

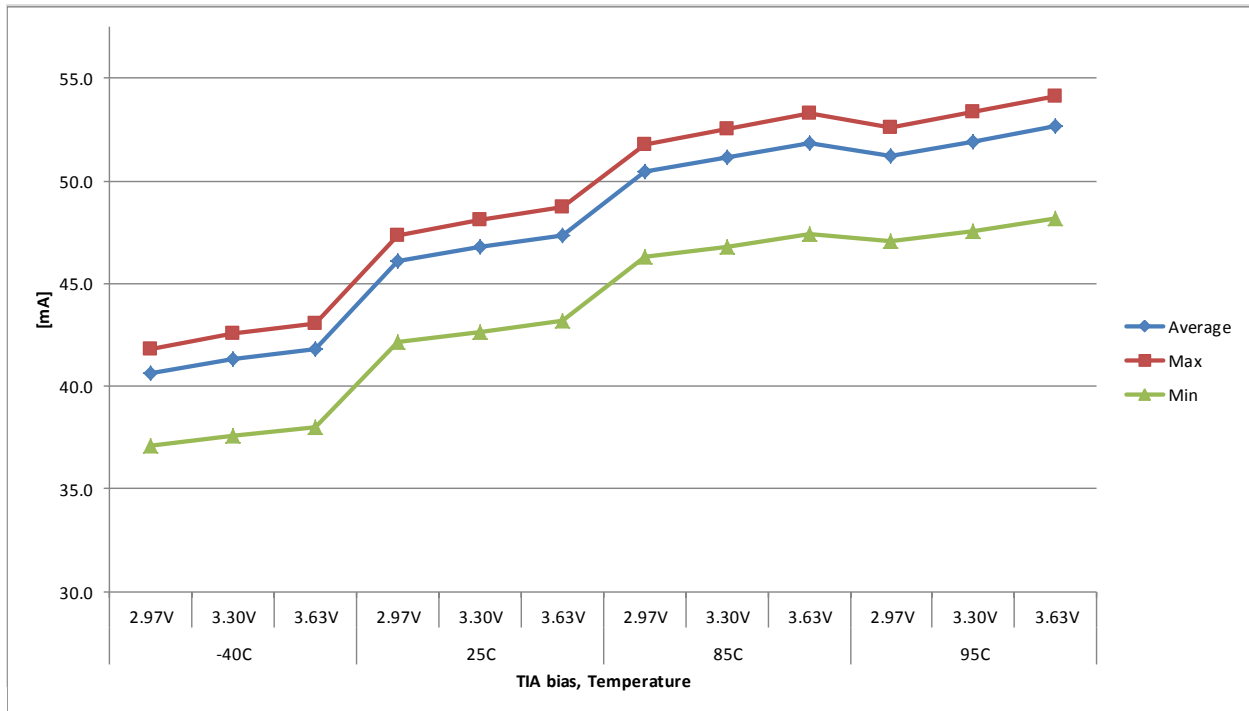
#### 3.1.1. Test Descriptions

In these tests the ROSA was powered up and the current into the  $V_{CC}$  pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

- 1) No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
- 2) 0.5dBm of avg. optical power

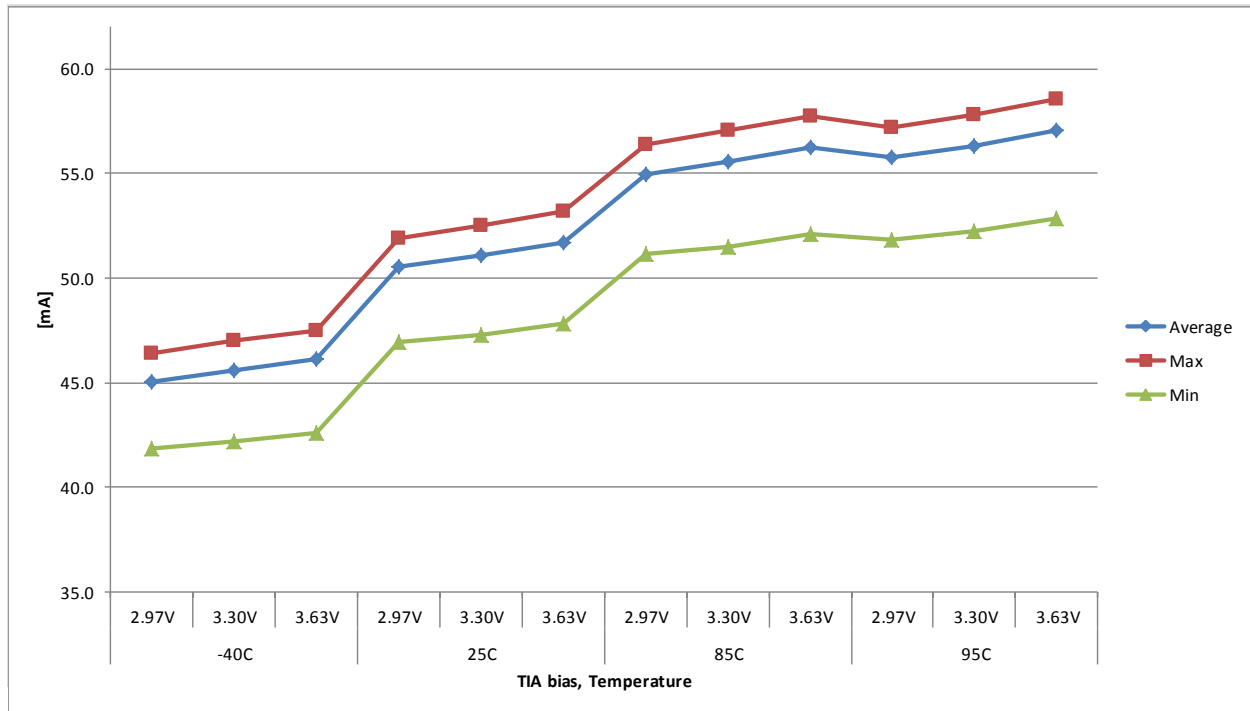
The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

### 3.1.2. $I_{CC}$ (no optical input)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	40.6	41.3	41.8	46.1	46.8	47.4	50.5	51.2	51.9	51.3	51.9	52.7
<b>Std. Dev.</b>	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.3	1.4	1.4
<b>Max</b>	41.8	42.6	43.1	47.3	48.1	48.7	51.8	52.6	53.3	52.6	53.3	54.1
<b>Min</b>	37.1	37.6	38.0	42.2	42.7	43.2	46.3	46.8	47.4	47.1	47.6	48.2
<b>Range</b>	4.7	5.0	5.1	5.1	5.4	5.5	5.5	5.8	5.9	5.5	5.8	5.9
<b>Median</b>	41.0	41.7	42.2	46.5	47.1	47.7	50.9	51.5	52.2	51.6	52.3	53.0
1	41.0	41.7	42.2	46.6	47.3	47.9	51.1	51.8	52.6	51.9	52.6	53.3
2	41.0	41.7	42.2	46.5	47.1	47.7	50.9	51.5	52.2	51.6	52.3	53.0
3	40.1	40.8	41.3	45.5	46.3	46.9	49.9	50.7	51.4	50.7	51.4	52.2
4	40.8	41.5	42.0	46.2	46.9	47.5	50.7	51.4	52.2	51.5	52.3	53.0
5	40.2	40.9	41.4	45.5	46.2	46.8	49.8	50.5	51.2	50.6	51.2	52.0
6	40.6	41.3	41.8	46.1	46.8	47.4	50.5	51.3	51.9	51.3	52.0	52.7
7	41.5	42.2	42.7	46.9	47.6	48.2	51.3	52.0	52.7	52.1	52.7	53.5
8	37.1	37.6	38.0	42.2	42.7	43.2	46.3	46.8	47.4	47.1	47.6	48.2
9	41.2	41.9	42.4	46.7	47.4	48.0	51.2	51.9	52.6	51.9	52.6	53.4
10	41.3	42.1	42.6	46.8	47.6	48.3	51.3	52.1	52.8	52.1	52.9	53.6
11	40.2	40.9	41.4	45.6	46.3	46.9	50.0	50.7	51.4	50.8	51.5	52.2
12	40.3	40.9	41.4	45.7	46.3	47.0	50.0	50.7	51.4	50.8	51.4	52.2
13	41.2	41.9	42.4	46.9	47.6	48.2	51.3	52.0	52.7	52.1	52.8	53.5
14	41.1	41.8	42.3	46.5	47.2	47.9	51.0	51.6	52.4	51.8	52.5	53.2
15	41.8	42.6	43.1	47.3	48.1	48.7	51.8	52.6	53.3	52.6	53.3	54.1

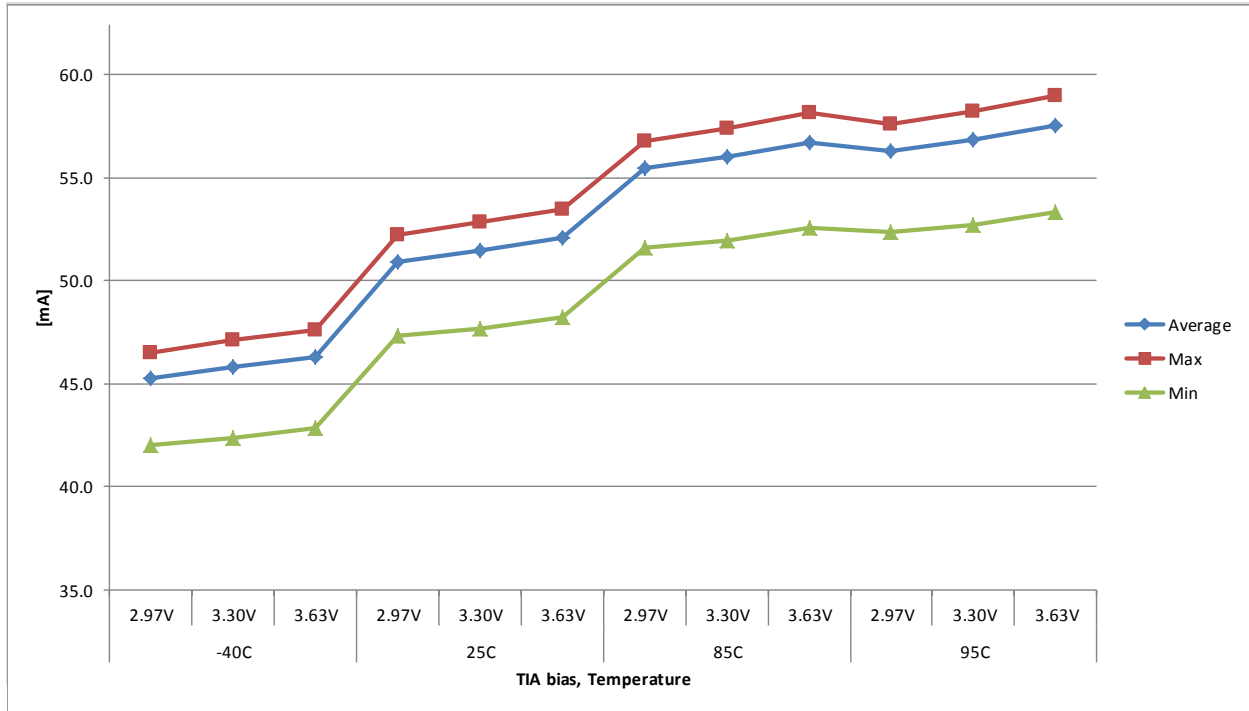
### 3.1.3. $I_{CC}$ (0.5dBm avg. optical power @ 1310nm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	45.0	45.6	46.1	50.5	51.1	51.7	55.0	55.6	56.3	55.8	56.3	57.0
<b>Std. Dev.</b>	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3
<b>Max</b>	46.4	47.0	47.5	51.9	52.5	53.2	56.4	57.0	57.7	57.2	57.8	58.6
<b>Min</b>	41.8	42.2	42.6	46.9	47.3	47.8	51.1	51.5	52.1	51.9	52.2	52.8
<b>Range</b>	4.6	4.8	4.9	5.0	5.2	5.4	5.3	5.5	5.7	5.3	5.6	5.7
<b>Median</b>	45.4	46.0	46.5	50.9	51.4	52.0	55.3	55.9	56.6	56.1	56.7	57.4
1	45.4	46.0	46.5	51.1	51.6	52.3	55.6	56.2	56.9	56.4	57.0	57.7
2	45.4	46.0	46.5	50.9	51.4	52.0	55.3	55.9	56.6	56.1	56.7	57.4
3	44.2	44.8	45.3	49.8	50.4	51.0	54.3	54.9	55.6	55.1	55.7	56.4
4	45.1	45.7	46.2	50.6	51.2	51.8	55.2	55.8	56.5	56.0	56.6	57.3
5	44.7	45.2	45.7	50.1	50.6	51.2	54.4	54.9	55.6	55.2	55.7	56.4
6	44.8	45.4	45.9	50.3	51.0	51.5	54.8	55.4	56.1	55.5	56.1	56.8
7	45.9	46.4	46.9	51.4	51.9	52.6	55.8	56.3	57.0	56.5	57.1	57.8
8	41.8	42.2	42.6	46.9	47.3	47.8	51.1	51.5	52.1	51.9	52.2	52.8
9	45.6	46.2	46.7	51.2	51.8	52.4	55.7	56.3	57.0	56.5	57.1	57.8
10	45.7	46.4	46.9	51.3	52.0	52.6	55.8	56.5	57.2	56.6	57.3	58.0
11	44.6	45.1	45.6	50.0	50.6	51.2	54.5	55.0	55.7	55.3	55.8	56.5
12	44.8	45.4	45.8	50.2	50.8	51.3	54.6	55.2	55.8	55.3	55.9	56.6
13	45.6	46.2	46.7	51.3	51.9	52.5	55.8	56.4	57.1	56.6	57.2	57.9
14	45.5	46.1	46.6	51.0	51.6	52.2	55.5	56.0	56.8	56.3	56.9	57.6
15	46.4	47.0	47.5	51.9	52.5	53.2	56.4	57.0	57.7	57.2	57.8	58.6



### 3.1.4. $I_{CC}$ (0.5dBm avg. optical power @ 1550nm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	45.2	45.8	46.3	50.9	51.5	52.1	55.5	56.0	56.7	56.3	56.8	57.5
<b>Std. Dev.</b>	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3
<b>Max</b>	46.5	47.1	47.6	52.2	52.8	53.5	56.8	57.4	58.1	57.6	58.2	59.0
<b>Min</b>	42.0	42.4	42.8	47.3	47.7	48.2	51.6	52.0	52.6	52.3	52.7	53.3
<b>Range</b>	4.4	4.7	4.8	4.9	5.1	5.2	5.2	5.5	5.6	5.3	5.5	5.6
<b>Median</b>	45.5	46.1	46.6	51.3	51.9	52.5	55.9	56.5	57.2	56.7	57.3	58.0
1	45.5	46.1	46.6	51.3	51.9	52.6	56.0	56.6	57.3	56.8	57.4	58.1
2	45.8	46.3	46.8	51.4	51.9	52.5	55.9	56.5	57.2	56.7	57.3	58.0
3	44.4	45.0	45.5	50.2	50.8	51.4	54.8	55.4	56.1	55.6	56.2	56.9
4	45.4	46.0	46.5	51.0	51.6	52.2	55.6	56.2	56.9	56.5	57.1	57.8
5	44.8	45.4	45.9	50.4	51.0	51.6	54.9	55.4	56.1	55.6	56.2	56.8
6	44.8	45.4	45.9	50.5	51.1	51.7	55.1	55.7	56.4	55.8	56.4	57.1
7	46.1	46.6	47.1	51.8	52.3	52.9	56.3	56.8	57.5	57.0	57.6	58.3
8	42.0	42.4	42.8	47.3	47.7	48.2	51.6	52.0	52.6	52.3	52.7	53.3
9	45.9	46.4	47.0	51.6	52.2	52.8	56.2	56.8	57.5	57.0	57.6	58.4
10	46.0	46.7	47.2	51.8	52.5	53.1	56.5	57.1	57.8	57.3	57.9	58.6
11	44.9	45.5	45.9	50.5	51.1	51.7	55.1	55.6	56.3	55.9	56.4	57.1
12	45.1	45.6	46.1	50.6	51.2	51.8	55.1	55.7	56.4	55.9	56.4	57.1
13	45.8	46.4	47.0	51.7	52.3	52.9	56.2	56.9	57.6	57.0	57.7	58.4
14	45.7	46.3	46.8	51.3	51.9	52.5	55.9	56.5	57.2	56.7	57.3	58.0
15	46.5	47.1	47.6	52.2	52.8	53.5	56.8	57.4	58.1	57.6	58.2	59.0

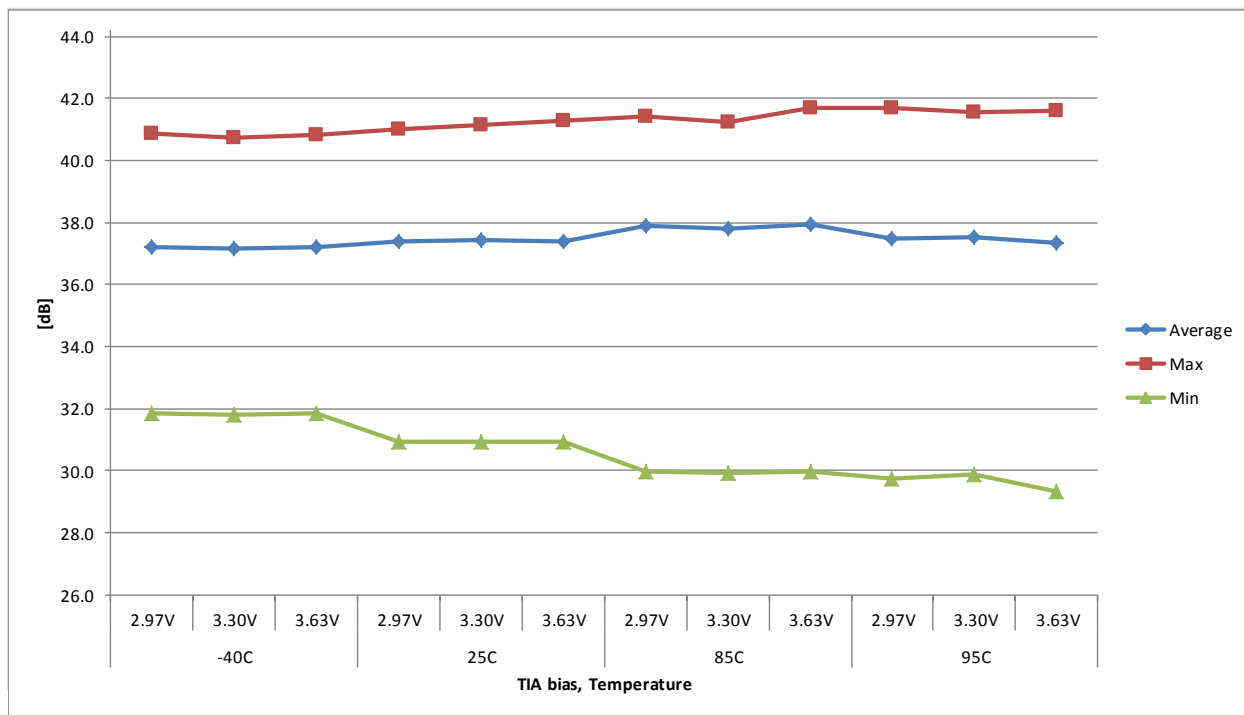


## 3.2. Optical Return Loss

### 3.2.1. Test Descriptions

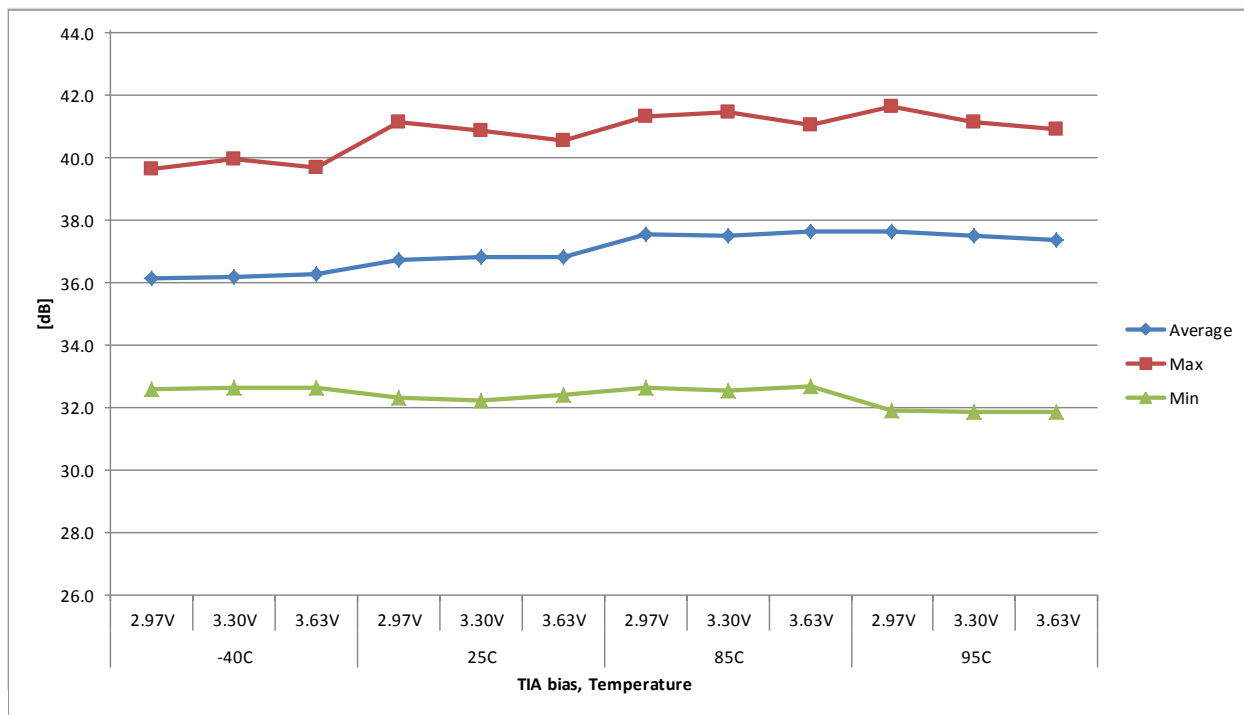
Optical return losses of the ROSAs were measured at 1550nm and 1310nm.

### 3.2.2. Optical Return Loss (dB) at 1310nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	37.2	37.2	37.2	37.4	37.4	37.4	37.9	37.8	37.9	37.5	37.5	37.4
<b>Std. Dev.</b>	3.0	3.0	3.0	3.1	3.1	3.1	3.3	3.3	3.4	4.1	4.0	4.2
<b>Max</b>	40.9	40.7	40.8	41.0	41.2	41.3	41.4	41.2	41.7	41.7	41.6	41.6
<b>Min</b>	31.8	31.8	31.8	30.9	30.9	30.9	30.0	29.9	30.0	29.7	29.9	29.3
<b>Range</b>	9.0	8.9	9.0	10.1	10.2	10.3	11.5	11.3	11.7	12.0	11.7	12.3
<b>Median</b>	38.1	38.2	38.2	37.5	37.6	37.6	38.4	38.2	38.4	38.5	38.5	38.6
1	38.8	38.7	38.7	39.1	39.3	39.1	39.8	39.5	39.9	40.1	40.1	40.0
2	34.8	34.8	34.8	34.8	34.9	34.9	35.2	35.2	35.2	35.2	35.3	35.3
3	34.3	34.3	34.3	36.0	35.9	35.9	37.4	37.3	37.3	29.7	30.3	29.3
4	36.6	36.6	36.5	37.5	37.6	37.6	38.0	38.2	38.2	38.3	38.3	38.3
5	39.6	39.6	39.7	40.5	40.5	40.4	41.0	41.0	41.2	41.3	41.3	41.3
6	39.4	39.4	39.4	40.2	40.2	40.2	40.8	40.8	40.9	41.5	41.4	41.5
7	40.5	40.5	40.4	39.8	39.9	39.7	40.9	40.9	41.0	40.6	40.7	40.6
8	40.9	40.7	40.8	40.8	40.6	40.7	41.4	41.2	41.7	41.5	41.6	41.6
9	31.8	31.8	31.8	30.9	30.9	30.9	30.0	29.9	30.0	29.9	29.9	29.9
10	33.9	33.9	33.9	35.4	35.4	35.5	36.1	36.0	36.1	36.1	36.1	34.4
11	38.1	38.2	38.2	37.0	37.6	37.1	38.4	37.8	38.4	38.5	38.5	38.6
12	37.8	37.8	37.6	36.8	36.8	36.7	36.6	36.5	36.6	36.6	36.6	36.6
13	32.7	32.6	32.7	32.4	32.4	32.4	32.8	32.8	32.8	32.7	32.7	32.7
14	38.5	38.5	38.5	38.4	38.4	38.4	38.7	38.7	38.7	38.7	38.8	38.7
15	40.1	40.1	40.2	41.0	41.2	41.3	41.1	41.1	41.1	41.7	41.6	41.5

### 3.2.3. Optical Return Loss (dB) at 1550nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	36.2	36.2	36.3	36.8	36.8	36.8	37.6	37.5	37.6	37.6	37.5	37.4
<b>Std. Dev.</b>	2.1	2.0	2.0	2.4	2.4	2.4	2.6	2.4	2.6	2.9	2.8	3.0
<b>Max</b>	39.7	40.0	39.7	41.1	40.9	40.6	41.3	41.5	41.1	41.6	41.1	40.9
<b>Min</b>	32.6	32.6	32.6	32.3	32.2	32.4	32.6	32.5	32.7	31.9	31.8	31.9
<b>Range</b>	7.1	7.3	7.0	8.8	8.7	8.2	8.7	8.9	8.4	9.7	9.3	9.1
<b>Median</b>	36.2	36.4	36.8	36.6	36.6	36.6	38.2	38.2	38.2	38.0	38.1	38.0
1	38.5	38.7	38.6	38.9	38.8	38.9	39.9	39.1	40.1	40.6	40.2	39.8
2	37.0	37.0	37.1	37.6	37.7	37.7	38.2	38.2	38.2	38.0	38.1	38.0
3	34.6	34.7	34.6	36.4	36.4	36.6	39.2	39.0	39.1	35.0	35.5	34.8
4	34.2	34.3	34.5	35.9	35.7	35.6	36.9	37.5	37.6	38.8	38.4	38.2
5	36.2	36.4	36.8	36.8	36.8	38.1	40.2	39.3	38.8	39.0	39.1	38.7
6	37.0	37.1	37.8	38.9	39.1	39.0	39.5	39.7	39.8	41.0	39.3	40.5
7	37.5	37.6	37.6	38.6	38.4	38.7	39.0	39.1	39.0	40.1	40.6	40.5
8	39.1	38.2	38.3	38.9	39.6	39.6	39.5	38.5	41.0	38.9	39.6	40.3
9	36.0	35.6	36.0	35.2	35.2	35.2	35.6	35.4	35.5	36.7	36.4	36.6
10	34.2	34.2	34.2	35.7	35.7	35.5	35.3	35.5	35.3	35.2	34.9	33.0
11	35.5	35.9	36.2	35.8	36.6	36.0	36.2	37.3	36.4	37.1	37.0	37.3
12	36.5	36.6	36.9	36.6	36.5	36.1	36.3	36.5	36.7	37.7	37.5	37.4
13	33.6	33.5	33.6	32.6	32.6	32.7	33.6	33.5	33.5	32.9	32.8	32.7
14	32.6	32.6	32.6	32.3	32.2	32.4	32.6	32.5	32.7	31.9	31.8	31.9
15	39.7	40.0	39.7	41.1	40.9	40.6	41.3	41.5	41.1	41.6	41.1	40.9



### 3.3. Responsivity, RSSI Dark

#### 3.3.1. Test Descriptions

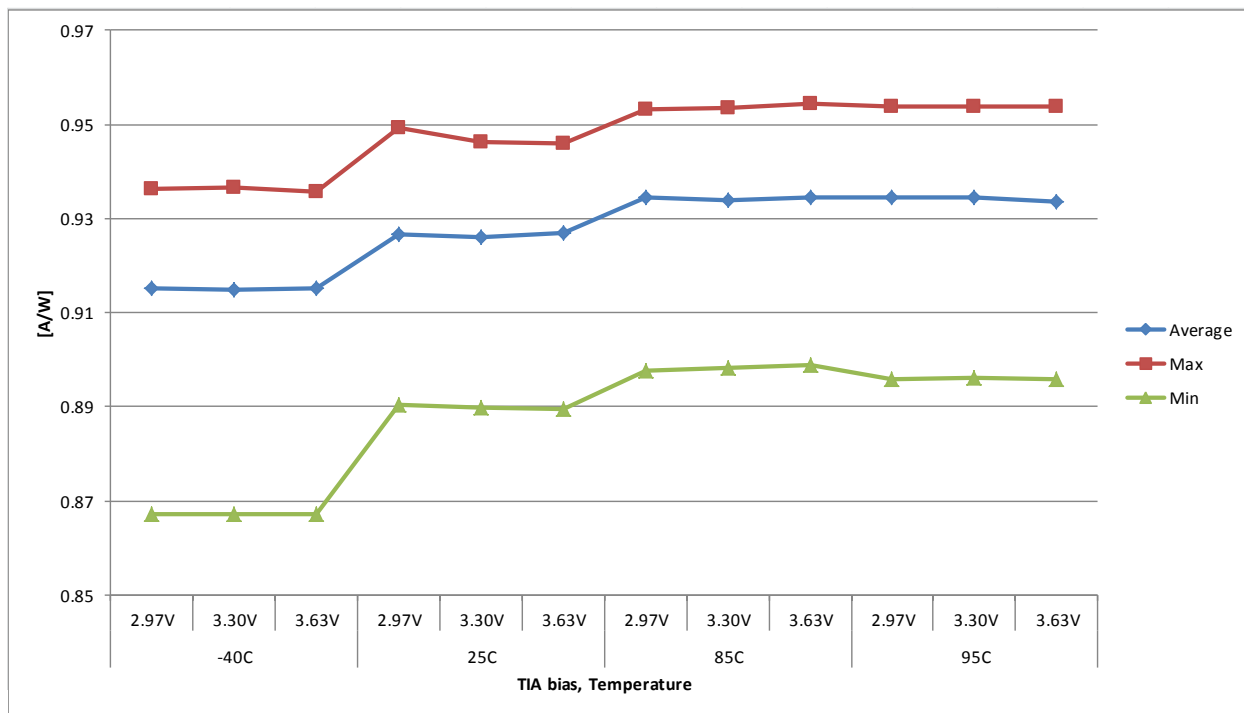
Responsivity is calculated by dividing the measured the RSSI current by the input optical power at an input optical power of -10dBm (100uW). The input optical signal is unmodulated.

In these tests the ROSA was powered up and the current sunk from the RSSI pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

- 1) No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
- 2) -30dBm of avg. optical power
- 3) -20dBm of avg. optical power
- 4) -10dBm of avg. optical power
- 5) 0dBm of avg. optical power
- 6) 0.5dBm of avg. optical power
- 7) 1.14dBm of avg. optical power
- 8) 2.04dBm of avg. optical power

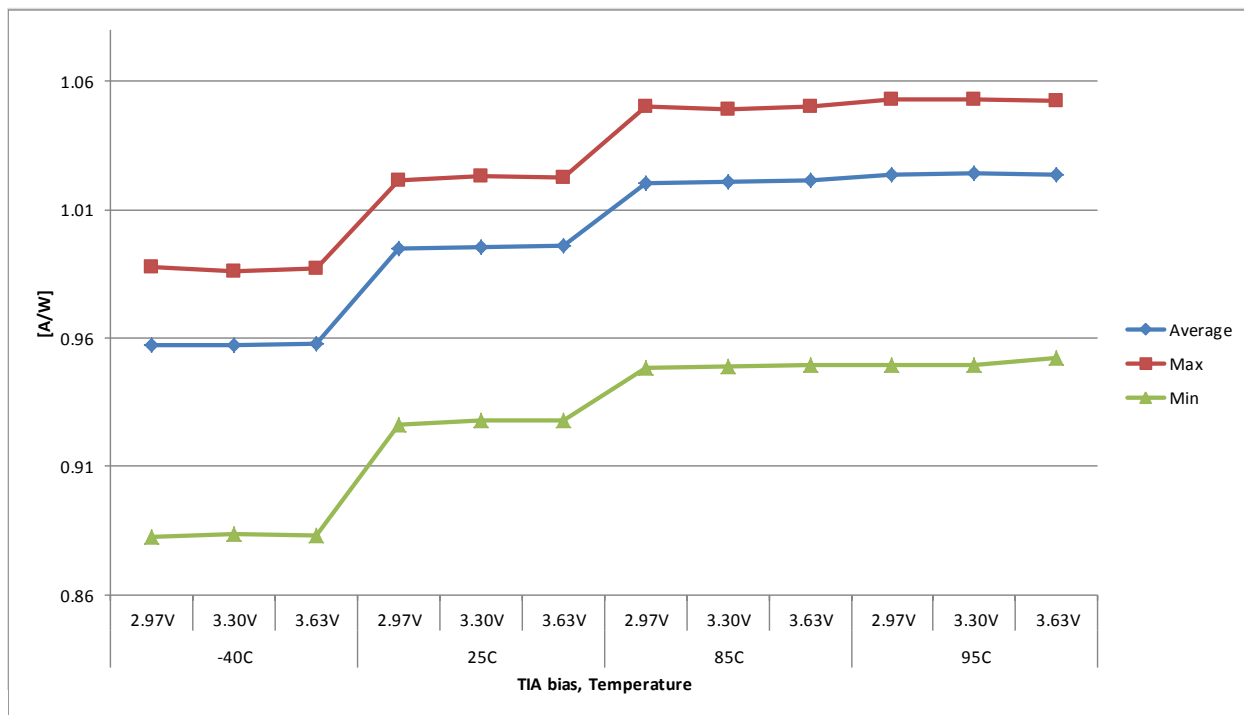
The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

### 3.3.2. Responsivity (A/W) at 1310nm



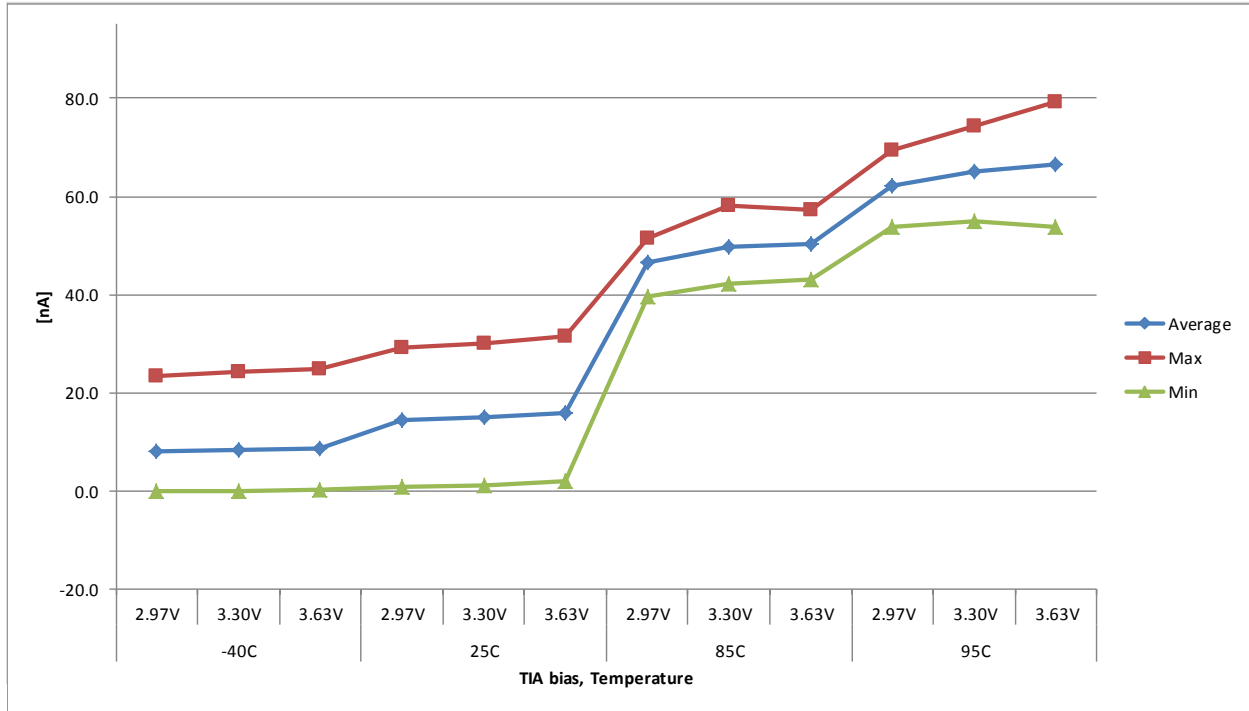
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	0.92	0.91	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
<b>Std. Dev.</b>	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02
<b>Max</b>	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
<b>Min</b>	0.87	0.87	0.87	0.89	0.89	0.89	0.90	0.90	0.90	0.90	0.90	0.90
<b>Range</b>	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
<b>Median</b>	0.92	0.92	0.92	0.93	0.93	0.93	0.94	0.93	0.94	0.94	0.94	0.93
1	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.92	0.93	0.93	0.93	0.93
2	0.92	0.92	0.92	0.93	0.93	0.93	0.94	0.94	0.94	0.94	0.94	0.94
3	0.87	0.87	0.87	0.89	0.89	0.89	0.92	0.91	0.92	0.91	0.91	0.91
4	0.90	0.90	0.90	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92
5	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
6	0.89	0.89	0.89	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
7	0.92	0.92	0.92	0.93	0.93	0.93	0.94	0.94	0.94	0.94	0.94	0.93
8	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
9	0.93	0.93	0.93	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
10	0.91	0.91	0.91	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
11	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93
12	0.93	0.93	0.93	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
13	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93
14	0.93	0.92	0.93	0.93	0.93	0.93	0.94	0.93	0.94	0.94	0.94	0.94
15	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94

### 3.3.3. Responsivity (A/W) at 1550nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	0.96	0.96	0.96	0.99	1.00	1.00	1.02	1.02	1.02	1.02	1.02	1.02
<b>Std. Dev.</b>	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
<b>Max</b>	0.99	0.99	0.99	1.02	1.02	1.02	1.05	1.05	1.05	1.05	1.05	1.05
<b>Min</b>	0.88	0.88	0.88	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95
<b>Range</b>	0.11	0.10	0.10	0.10	0.10	0.09	0.10	0.10	0.10	0.10	0.10	0.10
<b>Median</b>	0.96	0.96	0.96	1.00	1.00	1.00	1.03	1.03	1.03	1.03	1.03	1.03
1	0.94	0.94	0.94	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
2	0.99	0.99	0.99	1.02	1.02	1.02	1.04	1.04	1.04	1.05	1.05	1.05
3	0.89	0.89	0.90	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.01	1.00
4	0.95	0.95	0.95	0.98	0.98	0.98	1.01	1.01	1.01	1.01	1.01	1.01
5	0.97	0.97	0.97	1.01	1.02	1.01	1.04	1.04	1.04	1.04	1.04	1.04
6	0.88	0.88	0.88	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95
7	0.96	0.96	0.96	1.00	1.00	1.00	1.03	1.03	1.03	1.03	1.03	1.03
8	0.98	0.98	0.98	1.01	1.01	1.01	1.04	1.04	1.04	1.04	1.04	1.04
9	0.98	0.99	0.99	1.02	1.02	1.02	1.05	1.05	1.05	1.05	1.05	1.05
10	0.98	0.98	0.98	1.02	1.02	1.02	1.04	1.04	1.04	1.05	1.05	1.05
11	0.98	0.98	0.98	1.01	1.02	1.01	1.04	1.04	1.04	1.04	1.04	1.04
12	0.98	0.98	0.98	1.01	1.02	1.02	1.04	1.04	1.04	1.04	1.04	1.04
13	0.95	0.95	0.95	0.99	0.99	0.99	1.01	1.01	1.02	1.02	1.02	1.02
14	0.96	0.96	0.96	0.99	0.99	1.00	1.01	1.01	1.02	1.02	1.02	1.02
15	0.96	0.96	0.96	0.99	0.99	0.99	1.01	1.01	1.01	1.02	1.02	1.02

### 3.3.4. RSSI dark (nA)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	8.1	8.4	8.6	14.5	14.9	15.9	46.5	49.7	50.2	62.2	65.1	66.4
<b>Std. Dev.</b>	6.0	6.0	6.1	5.9	6.0	6.1	3.6	4.6	4.2	4.3	5.5	7.2
<b>Max</b>	23.4	24.2	24.9	29.0	29.9	31.3	51.4	58.1	57.3	69.5	74.2	79.2
<b>Min</b>	0.0	0.0	0.2	0.8	1.0	2.0	39.7	42.1	43.1	53.8	55.0	53.7
<b>Range</b>	23.4	24.1	24.7	28.3	29.0	29.3	11.7	16.0	14.2	15.7	19.2	25.5
<b>Median</b>	9.1	9.3	9.1	14.2	14.8	15.6	46.8	49.8	50.2	62.0	64.0	67.0
1	10.1	10.4	10.6	13.8	13.9	15.2	46.9	50.5	51.0	62.0	65.4	65.3
2	9.1	9.3	9.7	16.2	16.5	17.7	49.6	52.9	53.1	67.3	72.7	72.6
3	10.6	10.8	9.1	13.7	13.7	15.0	44.6	47.0	46.7	59.1	61.3	62.3
4	3.8	7.0	6.1	14.5	14.9	15.8	46.8	49.8	50.0	63.1	65.8	68.1
5	12.4	10.1	11.0	12.3	12.5	13.6	41.6	42.5	43.7	53.8	55.0	55.7
6	11.1	11.3	11.6	16.3	16.8	17.8	51.4	55.3	57.3	69.5	74.2	79.2
7	2.1	2.3	2.8	11.3	11.5	12.7	41.1	42.1	43.1	55.1	57.8	57.7
8	23.4	24.2	24.9	29.0	29.9	31.3	50.3	58.1	52.9	63.0	62.5	63.1
9	12.2	12.6	13.0	19.9	20.2	21.4	51.2	54.8	55.4	68.1	73.0	74.2
10	11.2	11.4	11.8	17.7	17.9	19.0	47.8	50.0	50.6	62.0	63.7	53.7
11	6.0	6.4	6.8	14.2	14.8	15.6	46.7	49.5	50.2	60.7	62.9	65.8
12	0.0	0.1	0.3	9.5	10.1	11.3	48.4	52.9	54.3	65.5	70.5	75.2
13	0.0	0.0	0.2	0.8	1.0	2.0	39.7	44.5	45.1	60.4	64.0	69.1
14	5.4	5.8	6.0	13.4	13.7	13.8	46.5	49.1	50.2	62.5	64.9	67.3
15	4.5	4.8	5.1	14.9	15.6	16.2	45.1	47.1	49.1	61.1	63.0	67.0



### 3.4. Optical Receiver Sensitivity

#### 3.4.1. Test Descriptions

The receiver sensitivity tests were performed by performing a sweep of optical powers and recording the BER for those optical powers.

In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT. This is done because the sensitivity of the GN2013 CDR is much better than the BERT inputs and allows for a much better measurement of the true sensitivity of the ROSA.

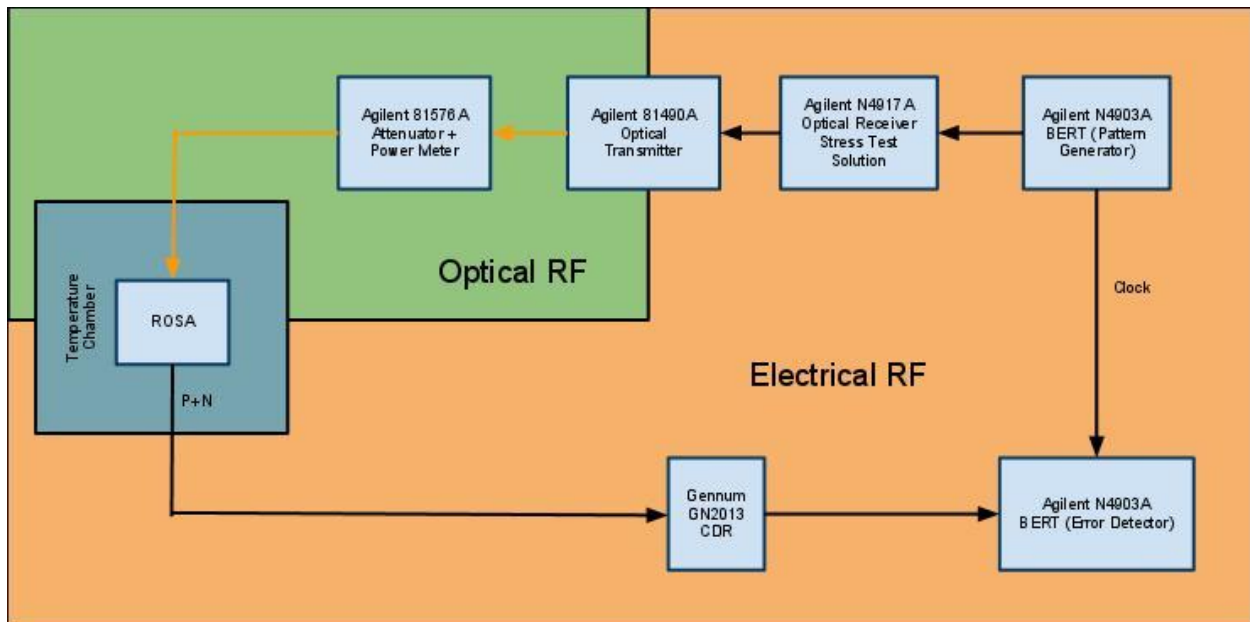


Figure 1. Sensitivity testing Block Diagram.

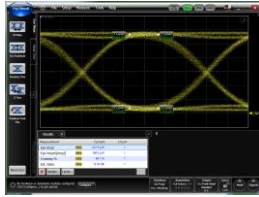


Figure 2. 1310nm 11.3Gbps Input Eye

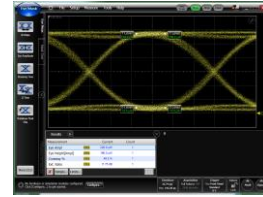


Figure 3. 1550nm 11.3Gbps Input Eye

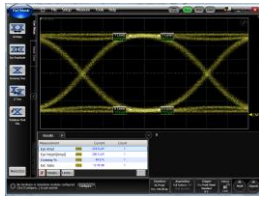


Figure 4. 1310nm 10.3125Gbps Input Eye

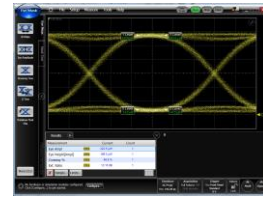


Figure 5. 1550nm 10.3125Gbps Input Eye

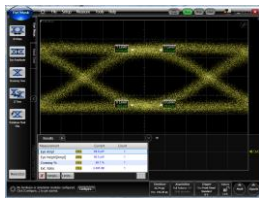


Figure 6. 1310 BaseL Input Eye

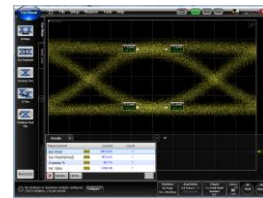


Figure 7. 1550 BaseL Input Eye

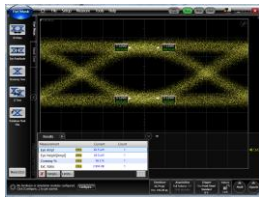


Figure 8. 1310 BaseE Input Eye

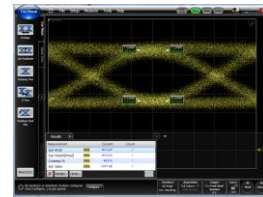
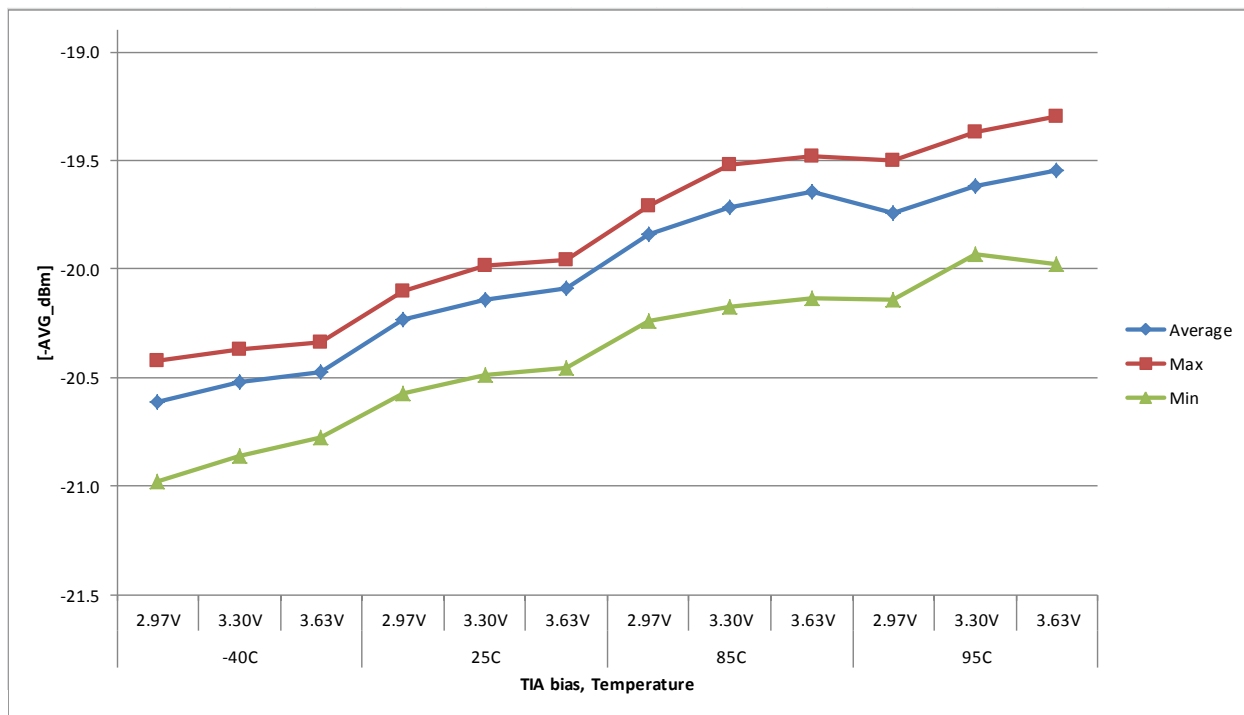


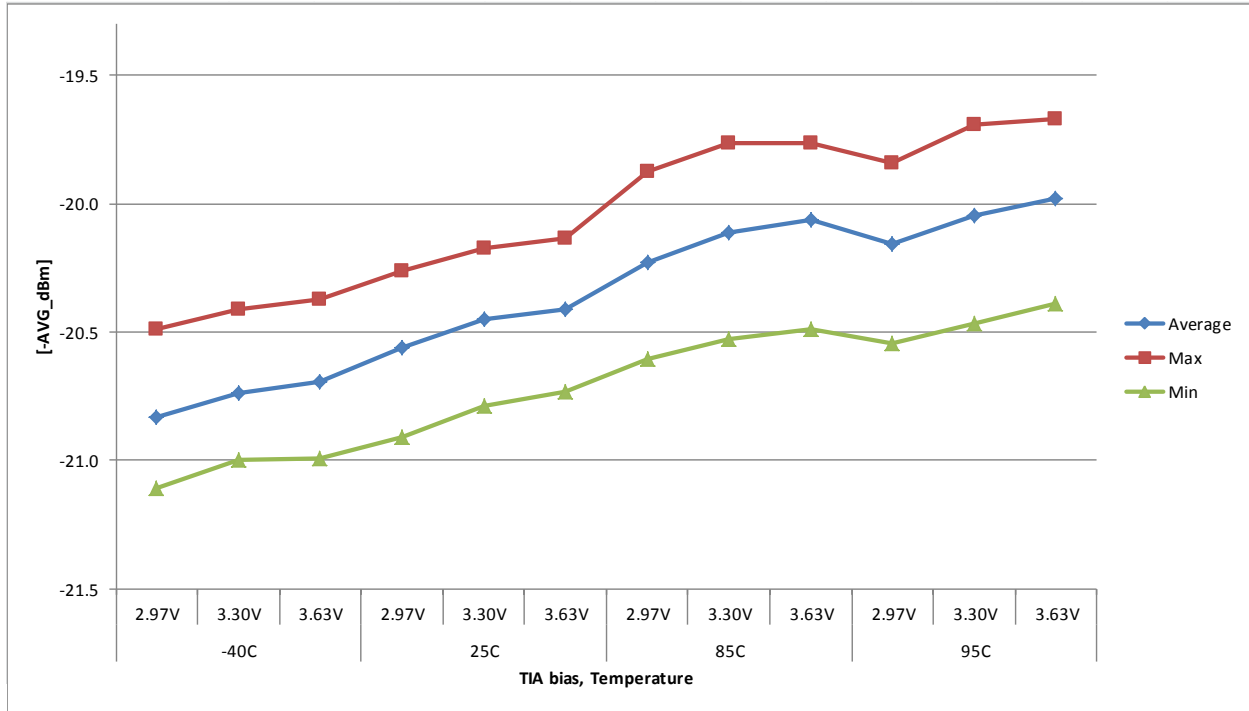
Figure 9. 1550 BaseE Input Eye

### 3.4.2. Unstressed Receiver Sensitivity at 1310nm and 11.3Gbps (Avg. power dBm)



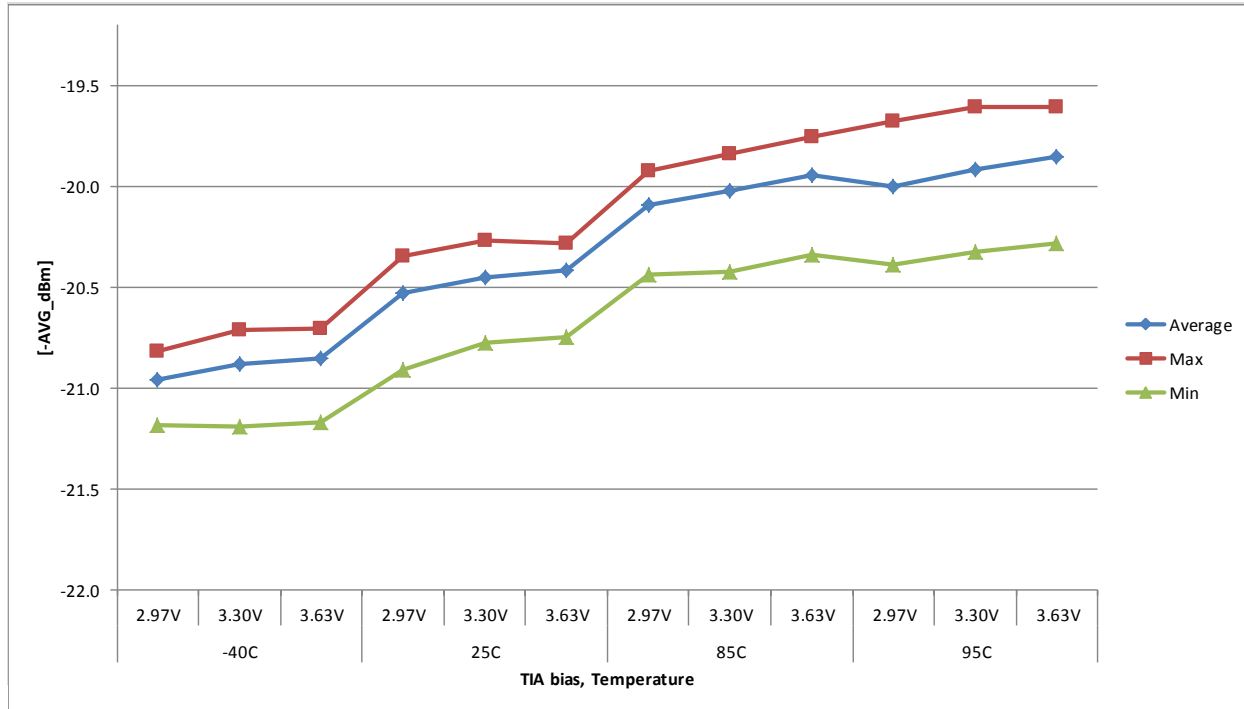
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-20.6	-20.5	-20.5	-20.2	-20.1	-20.1	-19.8	-19.7	-19.6	-19.7	-19.6	-19.5
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2
<b>Max</b>	-20.4	-20.4	-20.3	-20.1	-20.0	-20.0	-19.7	-19.5	-19.5	-19.5	-19.4	-19.3
<b>Min</b>	-21.0	-20.9	-20.8	-20.6	-20.5	-20.5	-20.2	-20.2	-20.1	-20.1	-19.9	-20.0
<b>Range</b>	0.6	0.5	0.4	0.5	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.7
<b>Median</b>	-20.6	-20.5	-20.5	-20.2	-20.1	-20.1	-19.8	-19.7	-19.6	-19.7	-19.6	-19.5
1	-20.5	-20.5	-20.4	-20.2	-20.1	-20.0	-19.7	-19.6	-19.6	-19.6	-19.5	-19.5
2	-20.6	-20.5	-20.4	-20.2	-20.1	-20.1	-19.8	-19.7	-19.6	-19.8	-19.6	-19.5
3	-20.4	-20.4	-20.3	-20.1	-20.1	-20.0	-19.8	-19.6	-19.6	-19.7	-19.6	-19.5
4	-20.5	-20.4	-20.4	-20.1	-20.0	-20.0	-19.8	-19.6	-19.6	-19.7	-19.6	-19.5
5	-20.7	-20.6	-20.6	-20.4	-20.2	-20.2	-19.9	-19.8	-19.7	-19.8	-19.7	-19.8
6	-20.5	-20.4	-20.4	-20.1	-20.0	-20.0	-19.7	-19.5	-19.5	-19.5	-19.4	-19.3
7	-20.6	-20.4	-20.5	-20.2	-20.2	-20.1	-19.8	-19.7	-19.7	-19.7	-19.6	-19.6
8	-21.0	-20.9	-20.8	-20.6	-20.5	-20.5	-20.2	-20.2	-20.1	-20.1	-19.9	-20.0
9	-20.6	-20.6	-20.5	-20.3	-20.2	-20.1	-19.9	-19.7	-19.7	-19.8	-19.7	-19.6
10	-20.6	-20.5	-20.5	-20.2	-20.1	-20.0	-19.8	-19.7	-19.6	-19.7	-19.6	-19.4
11	-20.7	-20.6	-20.6	-20.3	-20.2	-20.1	-19.9	-19.8	-19.7	-19.8	-19.7	-19.6
12	-20.6	-20.5	-20.5	-20.3	-20.2	-20.1	-19.9	-19.7	-19.7	-19.8	-19.7	-19.6
13	-20.6	-20.4	-20.4	-20.2	-20.1	-20.0	-19.8	-19.7	-19.6	-19.6	-19.6	-19.5
14	-20.5	-20.4	-20.3	-20.1	-20.0	-20.0	-19.7	-19.6	-19.5	-19.6	-19.5	-19.4
15	-20.7	-20.6	-20.5	-20.3	-20.2	-20.1	-19.9	-19.7	-19.6	-19.8	-19.6	-19.6

### 3.4.3. Unstressed Receiver Sensitivity at 1550nm and 11.3Gbps (Avg. power dBm)



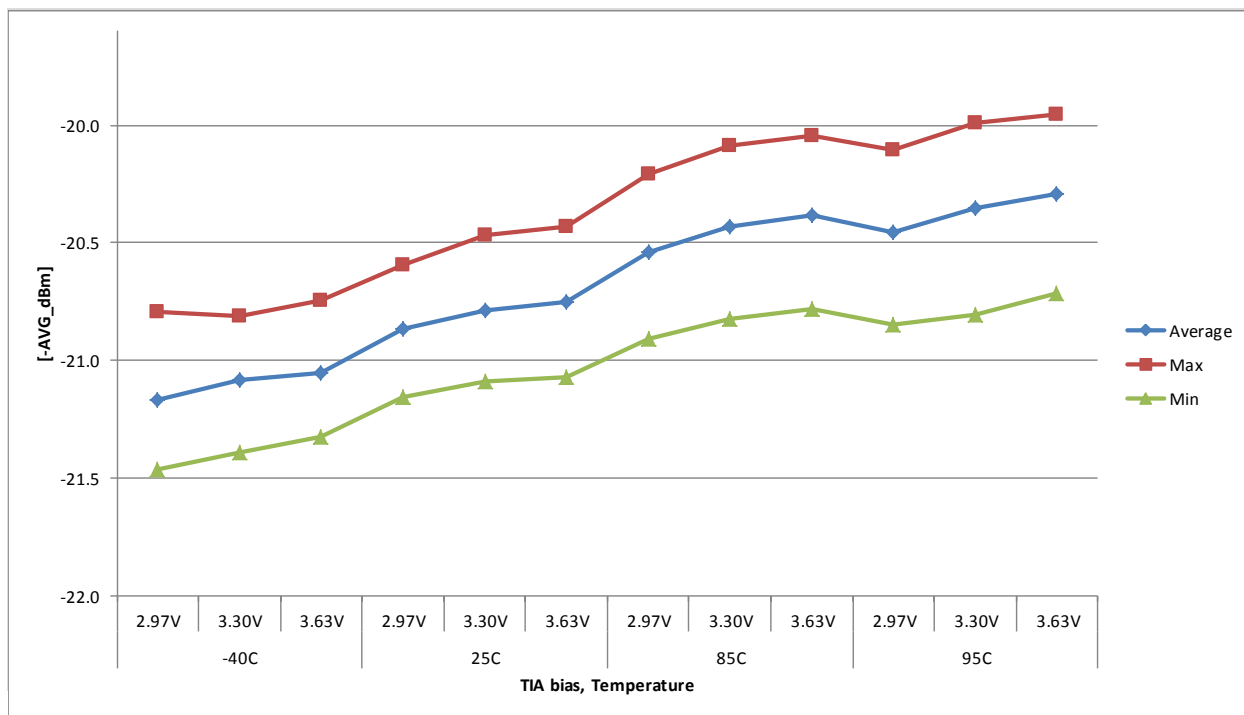
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-20.8	-20.7	-20.7	-20.6	-20.4	-20.4	-20.2	-20.1	-20.1	-20.2	-20.0	-20.0
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-20.5	-20.4	-20.4	-20.3	-20.2	-20.1	-19.9	-19.8	-19.8	-19.8	-19.7	-19.7
<b>Min</b>	-21.1	-21.0	-21.0	-20.9	-20.8	-20.7	-20.6	-20.5	-20.5	-20.5	-20.5	-20.4
<b>Range</b>	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.7	0.7	0.8	0.7
<b>Median</b>	-20.9	-20.8	-20.7	-20.6	-20.5	-20.4	-20.2	-20.1	-20.0	-20.2	-20.0	-20.0
1	-20.7	-20.6	-20.6	-20.4	-20.3	-20.2	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
2	-20.9	-20.8	-20.8	-20.6	-20.5	-20.5	-20.2	-20.1	-20.0	-20.2	-20.2	-20.0
3	-20.6	-20.5	-20.4	-20.4	-20.3	-20.3	-20.2	-20.1	-20.0	-20.1	-20.0	-19.9
4	-20.8	-20.7	-20.7	-20.5	-20.4	-20.4	-20.2	-20.0	-20.0	-20.2	-20.0	-20.0
5	-20.9	-20.8	-20.7	-20.6	-20.5	-20.5	-20.3	-20.2	-20.1	-20.2	-20.2	-20.1
6	-20.5	-20.4	-20.4	-20.3	-20.2	-20.1	-19.9	-19.8	-19.8	-19.8	-19.7	-19.7
7	-20.9	-20.8	-20.7	-20.6	-20.5	-20.4	-20.2	-20.1	-20.1	-20.2	-20.0	-19.9
8	-21.1	-21.0	-21.0	-20.9	-20.8	-20.7	-20.6	-20.5	-20.5	-20.5	-20.5	-20.4
9	-20.9	-20.8	-20.8	-20.7	-20.5	-20.5	-20.3	-20.2	-20.2	-20.2	-19.9	-20.1
10	-21.0	-20.9	-20.8	-20.7	-20.6	-20.5	-20.4	-20.2	-20.2	-20.3	-20.2	-20.0
11	-21.0	-20.9	-20.9	-20.7	-20.6	-20.6	-20.4	-20.2	-20.2	-20.3	-20.2	-20.2
12	-20.9	-20.8	-20.8	-20.6	-20.5	-20.5	-20.3	-20.2	-20.2	-20.2	-20.1	-20.1
13	-20.8	-20.7	-20.7	-20.5	-20.4	-20.4	-20.2	-20.1	-20.0	-20.1	-20.0	-19.9
14	-20.7	-20.6	-20.6	-20.5	-20.3	-20.3	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
15	-20.8	-20.7	-20.7	-20.5	-20.4	-20.4	-20.1	-20.1	-20.0	-20.0	-20.0	-19.9

### 3.4.4. Unstressed Receiver Sensitivity at 1310nm and 10.3125Gbps (Avg. power dBm)



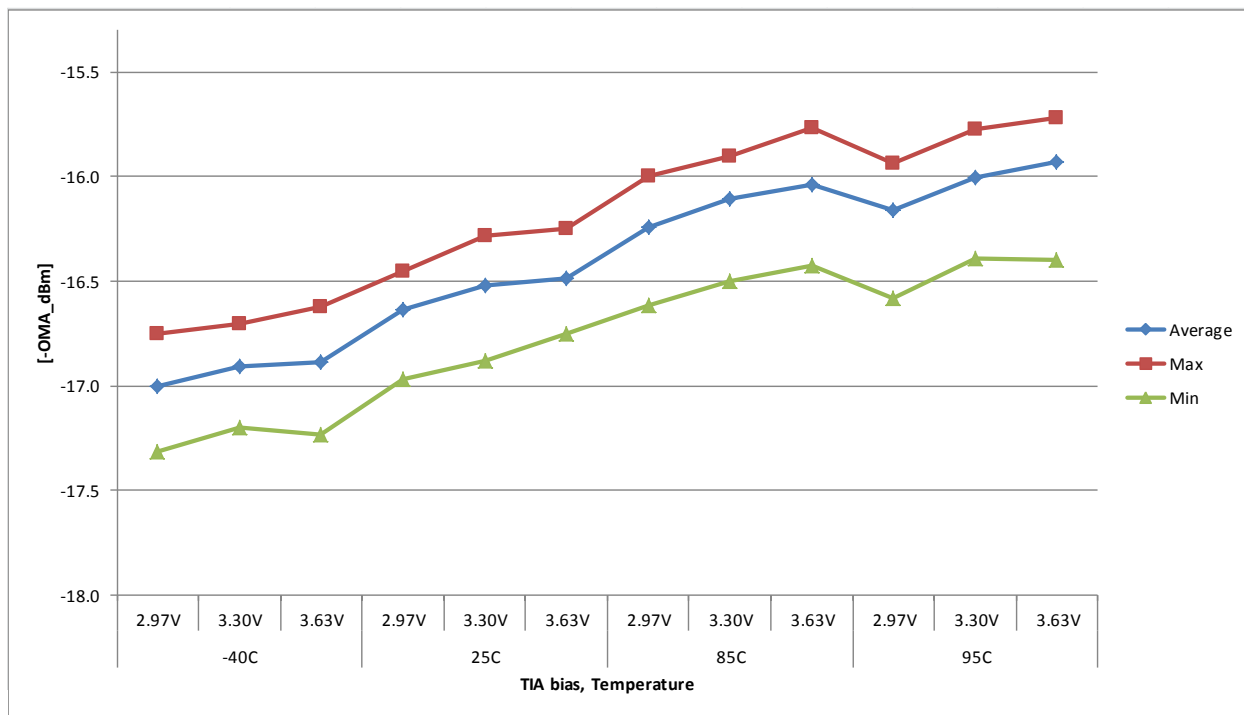
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-21.0	-20.9	-20.9	-20.5	-20.5	-20.4	-20.1	-20.0	-19.9	-20.0	-19.9	-19.9
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
<b>Max</b>	-20.8	-20.7	-20.7	-20.3	-20.3	-20.3	-19.9	-19.8	-19.8	-19.7	-19.6	-19.6
<b>Min</b>	-21.2	-21.2	-21.2	-20.9	-20.8	-20.7	-20.4	-20.4	-20.3	-20.4	-20.3	-20.3
<b>Range</b>	0.4	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7
<b>Median</b>	-21.0	-20.9	-20.8	-20.5	-20.4	-20.4	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
1	-20.8	-20.7	-20.8	-20.4	-20.4	-20.4	-20.0	-20.0	-19.9	-19.9	-19.8	-19.8
2	-20.9	-20.8	-20.8	-20.5	-20.4	-20.4	-20.1	-20.0	-19.9	-20.0	-19.9	-19.8
3	-20.8	-20.7	-20.7	-20.3	-20.3	-20.3	-20.0	-19.9	-19.8	-19.9	-19.8	-19.8
4	-20.9	-20.8	-20.8	-20.4	-20.4	-20.3	-20.0	-20.0	-19.9	-19.9	-19.9	-19.7
5	-21.1	-20.9	-21.0	-20.6	-20.5	-20.5	-20.2	-20.2	-20.1	-20.1	-20.0	-20.0
6	-20.9	-20.8	-20.7	-20.4	-20.3	-20.3	-19.9	-19.8	-19.8	-19.7	-19.6	-19.6
7	-21.0	-20.9	-20.9	-20.5	-20.5	-20.4	-20.1	-20.0	-20.0	-20.0	-20.0	-19.9
8	-21.2	-21.2	-21.2	-20.9	-20.8	-20.7	-20.4	-20.4	-20.3	-20.4	-20.3	-20.3
9	-21.1	-20.9	-20.9	-20.6	-20.5	-20.4	-20.2	-20.1	-20.0	-20.0	-20.0	-19.9
10	-21.0	-20.9	-20.8	-20.5	-20.5	-20.4	-20.1	-20.0	-19.9	-20.0	-19.9	-19.7
11	-21.1	-21.0	-20.9	-20.6	-20.5	-20.4	-20.2	-20.1	-20.0	-20.1	-20.0	-20.0
12	-21.0	-20.9	-20.9	-20.5	-20.4	-20.5	-20.1	-20.1	-20.0	-20.1	-20.0	-19.9
13	-20.9	-20.8	-20.8	-20.5	-20.4	-20.4	-20.0	-19.9	-19.9	-20.0	-19.9	-19.8
14	-20.9	-20.8	-20.7	-20.5	-20.3	-20.3	-20.0	-19.9	-19.8	-19.9	-19.8	-19.8
15	-21.0	-21.0	-21.0	-20.6	-20.5	-20.5	-20.1	-20.0	-20.0	-20.1	-19.9	-19.8

### 3.4.5. Unstressed Receiver Sensitivity at 1550nm and 10.3125Gbps (Avg. power dBm)



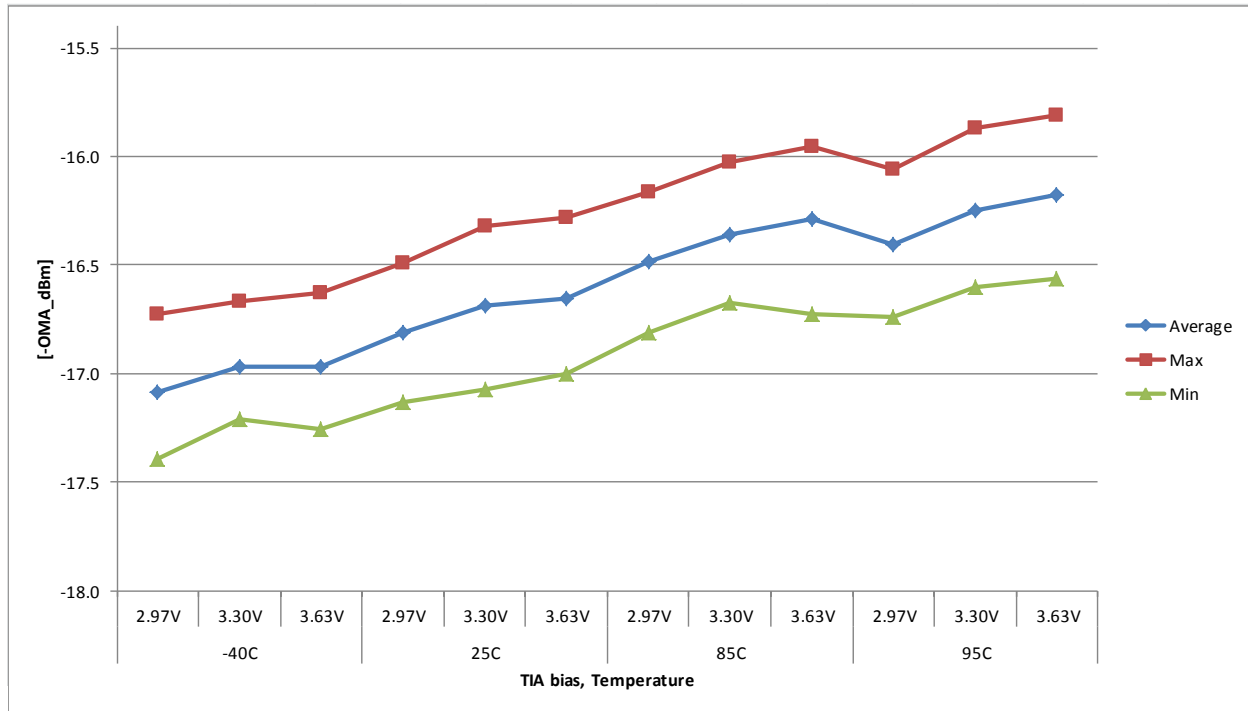
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-21.2	-21.1	-21.1	-20.9	-20.8	-20.8	-20.5	-20.4	-20.4	-20.5	-20.4	-20.3
<b>Std. Dev.</b>	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-20.8	-20.8	-20.7	-20.6	-20.5	-20.4	-20.2	-20.1	-20.0	-20.1	-20.0	-20.0
<b>Min</b>	-21.5	-21.4	-21.3	-21.2	-21.1	-21.1	-20.9	-20.8	-20.8	-20.8	-20.8	-20.7
<b>Range</b>	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8
<b>Median</b>	-21.2	-21.1	-21.1	-20.9	-20.8	-20.7	-20.5	-20.4	-20.4	-20.4	-20.4	-20.3
1	-21.0	-20.9	-20.9	-20.7	-20.6	-20.6	-20.4	-20.3	-20.2	-20.3	-20.2	-20.2
2	-21.3	-21.2	-21.1	-20.9	-20.8	-20.8	-20.5	-20.5	-20.4	-20.5	-20.4	-20.3
3	-20.9	-20.9	-20.9	-20.7	-20.7	-20.6	-20.4	-20.3	-20.4	-20.4	-20.3	-20.3
4	-21.1	-21.0	-21.0	-20.8	-20.7	-20.7	-20.5	-20.4	-20.3	-20.4	-20.3	-20.2
5	-21.2	-21.1	-21.1	-21.0	-20.9	-20.9	-20.7	-20.6	-20.5	-20.6	-20.4	-20.4
6	-20.8	-20.8	-20.7	-20.6	-20.5	-20.4	-20.2	-20.1	-20.0	-20.1	-20.0	-20.0
7	-21.1	-21.1	-21.1	-20.9	-20.8	-20.7	-20.6	-20.4	-20.4	-20.4	-20.4	-20.3
8	-21.5	-21.4	-21.3	-21.2	-21.1	-21.1	-20.9	-20.8	-20.8	-20.8	-20.8	-20.7
9	-21.3	-21.2	-21.2	-21.0	-20.9	-20.8	-20.6	-20.5	-20.5	-20.5	-20.4	-20.3
10	-21.3	-21.2	-21.1	-21.0	-20.9	-20.8	-20.7	-20.5	-20.5	-20.5	-20.4	-20.3
11	-21.3	-21.2	-21.2	-21.0	-21.0	-20.9	-20.7	-20.6	-20.5	-20.6	-20.5	-20.4
12	-21.3	-21.2	-21.1	-20.9	-20.8	-20.8	-20.6	-20.5	-20.4	-20.5	-20.4	-20.3
13	-21.1	-21.1	-21.0	-20.8	-20.7	-20.7	-20.5	-20.4	-20.3	-20.4	-20.3	-20.2
14	-21.1	-20.9	-21.0	-20.7	-20.7	-20.6	-20.4	-20.3	-20.2	-20.4	-20.2	-20.2
15	-21.2	-21.1	-21.0	-20.8	-20.8	-20.7	-20.5	-20.4	-20.3	-20.4	-20.2	-20.2

### 3.4.6. Stressed Receiver Sensitivity at 1310nm and BaseL (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-17.0	-16.9	-16.9	-16.6	-16.5	-16.5	-16.2	-16.1	-16.0	-16.2	-16.0	-15.9
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2
<b>Max</b>	-16.8	-16.7	-16.6	-16.5	-16.3	-16.2	-16.0	-15.9	-15.8	-15.9	-15.8	-15.7
<b>Min</b>	-17.3	-17.2	-17.2	-17.0	-16.9	-16.8	-16.6	-16.5	-16.4	-16.6	-16.4	-16.4
<b>Range</b>	0.6	0.5	0.6	0.5	0.6	0.5	0.6	0.6	0.7	0.6	0.6	0.7
<b>Median</b>	-17.0	-16.9	-16.9	-16.6	-16.5	-16.5	-16.3	-16.1	-16.0	-16.2	-16.0	-15.9
1	-17.1	-16.9	-16.9	-16.6	-16.5	-16.5	-16.3	-16.1	-16.0	-16.1	-16.0	-15.8
2	-16.9	-16.8	-16.8	-16.6	-16.5	-16.4	-16.3	-16.1	-16.0	-16.1	-16.0	-15.8
3	-17.0	-16.9	-16.8	-16.6	-16.5	-16.5	-16.2	-16.1	-16.1	-16.2	-16.0	-15.9
4	-16.8	-16.7	-16.7	-16.5	-16.4	-16.3	-16.1	-15.9	-15.8	-16.0	-15.8	-15.8
5	-17.1	-17.0	-17.0	-16.8	-16.7	-16.6	-16.3	-16.3	-16.2	-16.3	-16.2	-16.1
6	-16.8	-16.8	-16.8	-16.5	-16.3	-16.3	-16.1	-15.9	-15.9	-16.0	-15.8	-15.7
7	-17.1	-17.1	-17.0	-16.7	-16.6	-16.6	-16.3	-16.2	-16.1	-16.2	-16.1	-16.0
8	-17.3	-17.2	-17.2	-17.0	-16.9	-16.8	-16.6	-16.5	-16.4	-16.6	-16.4	-16.4
9	-17.1	-17.0	-17.0	-16.7	-16.6	-16.6	-16.3	-16.1	-16.1	-16.2	-16.1	-16.0
10	-17.0	-16.9	-16.7	-16.6	-16.5	-16.4	-16.2	-16.1	-16.0	-16.1	-15.9	-15.8
11	-17.0	-16.9	-16.9	-16.6	-16.5	-16.5	-16.3	-16.1	-16.1	-16.2	-16.1	-16.0
12	-17.0	-16.9	-16.9	-16.7	-16.5	-16.5	-16.3	-16.2	-16.1	-16.2	-16.0	-16.0
13	-17.0	-16.9	-16.9	-16.6	-16.5	-16.5	-16.2	-16.0	-15.9	-16.2	-16.0	-15.9
14	-16.8	-16.7	-16.6	-16.5	-16.3	-16.2	-16.0	-15.9	-15.8	-15.9	-15.8	-15.8
15	-17.0	-16.9	-17.0	-16.7	-16.5	-16.5	-16.2	-16.1	-16.0	-16.2	-16.0	-15.9

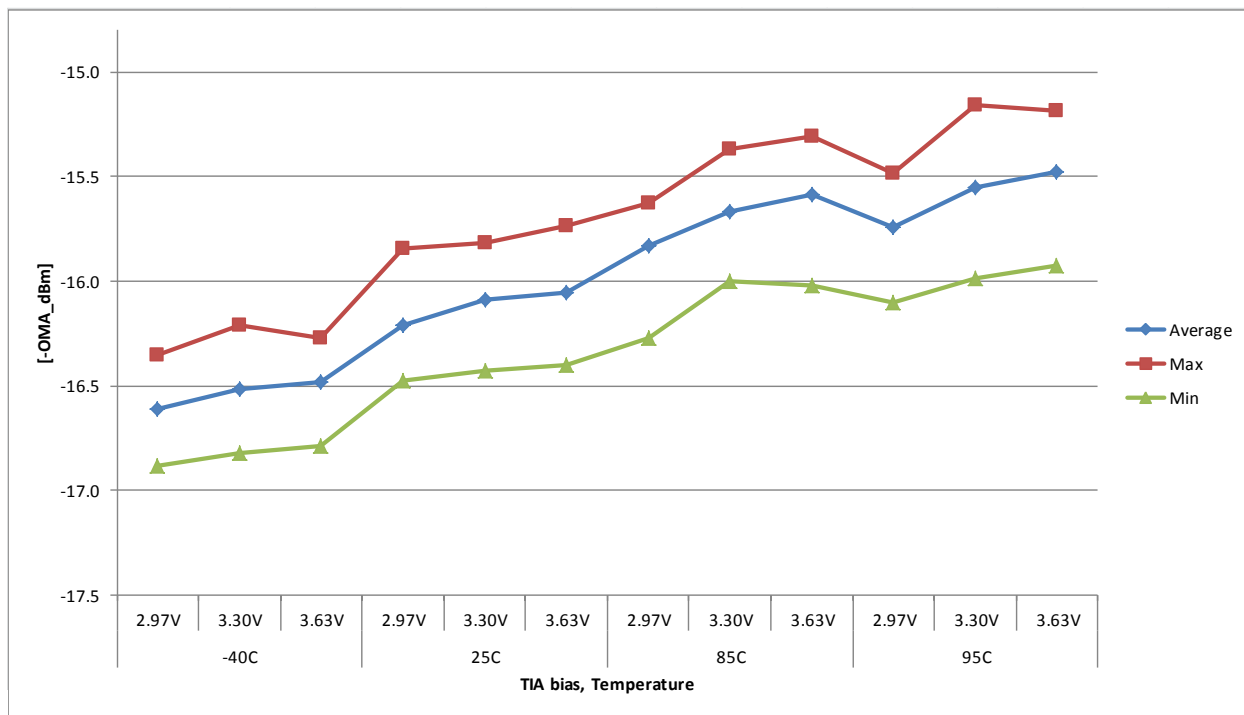
### 3.4.7. Stressed Receiver Sensitivity at 1550nm and BaseL (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-17.1	-17.0	-17.0	-16.8	-16.7	-16.7	-16.5	-16.4	-16.3	-16.4	-16.3	-16.2
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-16.7	-16.7	-16.6	-16.5	-16.3	-16.3	-16.2	-16.0	-16.0	-16.1	-15.9	-15.8
<b>Min</b>	-17.4	-17.2	-17.3	-17.1	-17.1	-17.0	-16.8	-16.7	-16.7	-16.7	-16.6	-16.6
<b>Range</b>	0.7	0.5	0.6	0.6	0.8	0.7	0.7	0.6	0.8	0.7	0.7	0.7
<b>Median</b>	-17.1	-17.0	-17.0	-16.8	-16.7	-16.7	-16.6	-16.4	-16.3	-16.5	-16.3	-16.2
1	-17.0	-17.0	-16.9	-16.8	-16.6	-16.6	-16.4	-16.3	-16.2	-16.3	-16.2	-16.0
2	-17.2	-17.0	-17.1	-16.9	-16.7	-16.6	-16.6	-16.4	-16.3	-16.5	-16.3	-16.3
3	-17.0	-16.9	-16.9	-16.9	-16.7	-16.7	-16.5	-16.4	-16.4	-16.4	-16.3	-16.3
4	-16.9	-16.8	-16.8	-16.7	-16.5	-16.5	-16.3	-16.2	-16.0	-16.3	-16.2	-16.0
5	-17.2	-17.0	-17.1	-16.9	-16.9	-16.8	-16.6	-16.6	-16.4	-16.5	-16.3	-16.3
6	-16.7	-16.7	-16.7	-16.5	-16.3	-16.3	-16.2	-16.0	-16.0	-16.1	-15.9	-15.8
7	-17.2	-17.2	-17.1	-17.0	-16.9	-16.8	-16.6	-16.5	-16.4	-16.5	-16.4	-16.3
8	-17.4	-17.2	-17.3	-17.1	-17.1	-17.0	-16.8	-16.7	-16.7	-16.7	-16.6	-16.6
9	-17.3	-17.1	-17.1	-16.9	-16.9	-16.8	-16.6	-16.4	-16.4	-16.5	-16.4	-16.3
10	-17.2	-17.0	-17.0	-16.8	-16.7	-16.7	-16.6	-16.5	-16.3	-16.5	-16.3	-16.2
11	-17.2	-17.1	-17.1	-16.9	-16.8	-16.7	-16.6	-16.4	-16.4	-16.5	-16.4	-16.3
12	-17.1	-17.0	-16.9	-16.8	-16.7	-16.7	-16.6	-16.4	-16.3	-16.5	-16.3	-16.2
13	-17.1	-17.0	-17.0	-16.8	-16.6	-16.6	-16.4	-16.3	-16.3	-16.4	-16.2	-16.2
14	-16.8	-16.7	-16.6	-16.6	-16.4	-16.4	-16.2	-16.1	-16.0	-16.2	-16.0	-15.9
15	-17.0	-16.9	-16.9	-16.7	-16.6	-16.6	-16.4	-16.2	-16.1	-16.3	-16.1	-16.0

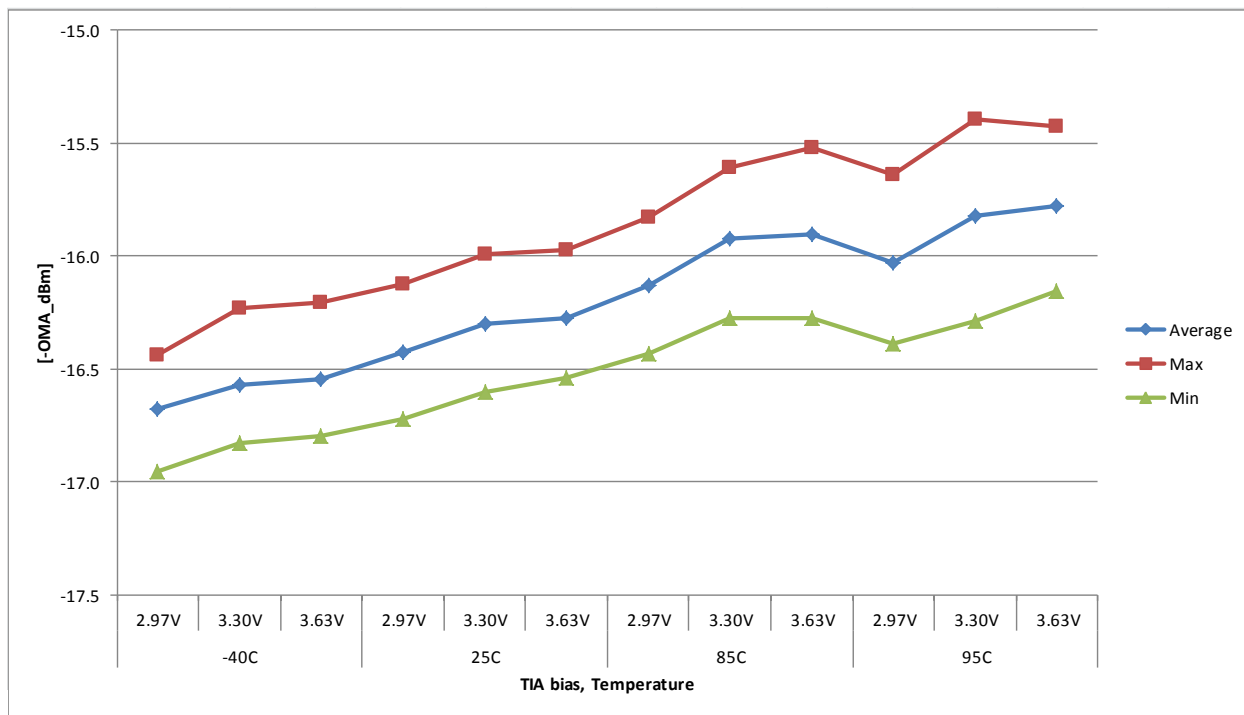


### 3.4.8. Stressed Receiver Sensitivity at 1310nm and BaseE (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-16.6	-16.5	-16.5	-16.2	-16.1	-16.1	-15.8	-15.7	-15.6	-15.7	-15.6	-15.5
<b>Std. Dev.</b>	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-16.4	-16.2	-16.3	-15.8	-15.8	-15.7	-15.6	-15.4	-15.3	-15.5	-15.2	-15.2
<b>Min</b>	-16.9	-16.8	-16.8	-16.5	-16.4	-16.4	-16.3	-16.0	-16.0	-16.1	-16.0	-15.9
<b>Range</b>	0.5	0.6	0.5	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.8	0.7
<b>Median</b>	-16.6	-16.5	-16.5	-16.2	-16.1	-16.0	-15.8	-15.7	-15.6	-15.7	-15.6	-15.5
1	-16.6	-16.5	-16.5	-16.2	-16.0	-16.0	-15.8	-15.6	-15.5	-15.7	-15.6	-15.4
2	-16.7	-16.5	-16.4	-16.1	-16.1	-15.9	-15.8	-15.6	-15.6	-15.7	-15.5	-15.5
3	-16.6	-16.5	-16.5	-16.3	-16.1	-16.0	-15.9	-15.7	-15.7	-15.8	-15.6	-15.5
4	-16.4	-16.3	-16.3	-15.8	-15.9	-15.8	-15.7	-15.5	-15.4	-15.6	-15.4	-15.3
5	-16.7	-16.7	-16.5	-16.4	-16.3	-16.2	-16.0	-15.9	-15.8	-15.9	-15.8	-15.7
6	-16.5	-16.5	-16.4	-16.0	-15.9	-15.9	-15.7	-15.5	-15.4	-15.5	-15.3	-15.3
7	-16.8	-16.8	-16.7	-16.3	-16.2	-16.2	-15.9	-15.9	-15.7	-15.8	-15.6	-15.6
8	-16.9	-16.8	-16.8	-16.5	-16.4	-16.4	-16.3	-16.0	-16.0	-16.1	-16.0	-15.9
9	-16.7	-16.6	-16.6	-16.2	-16.3	-16.2	-15.9	-15.7	-15.7	-15.8	-15.7	-15.6
10	-16.6	-16.5	-16.4	-16.2	-16.0	-16.0	-15.8	-15.7	-15.5	-15.7	-15.5	-15.3
11	-16.6	-16.5	-16.5	-16.3	-16.1	-16.1	-15.7	-15.7	-15.6	-15.8	-15.6	-15.4
12	-16.5	-16.5	-16.4	-16.2	-16.0	-16.1	-15.9	-15.7	-15.6	-15.8	-15.6	-15.5
13	-16.7	-16.6	-16.4	-16.2	-16.1	-16.0	-15.8	-15.6	-15.5	-15.7	-15.5	-15.5
14	-16.4	-16.2	-16.3	-16.1	-15.8	-15.7	-15.6	-15.4	-15.3	-15.5	-15.2	-15.2
15	-16.6	-16.5	-16.5	-16.2	-16.1	-16.1	-15.7	-15.6	-15.4	-15.7	-15.5	-15.4

### 3.4.9. Stressed Receiver Sensitivity at 1550nm and BaseE (OMA power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	-16.7	-16.6	-16.5	-16.4	-16.3	-16.3	-16.1	-15.9	-15.9	-16.0	-15.8	-15.8
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	-16.4	-16.2	-16.2	-16.1	-16.0	-16.0	-15.8	-15.6	-15.5	-15.6	-15.4	-15.4
<b>Min</b>	-17.0	-16.8	-16.8	-16.7	-16.6	-16.5	-16.4	-16.3	-16.3	-16.4	-16.3	-16.2
<b>Range</b>	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.7	0.9	0.7
<b>Median</b>	-16.7	-16.6	-16.6	-16.5	-16.3	-16.3	-16.2	-16.0	-15.9	-16.0	-15.9	-15.8
1	-16.7	-16.5	-16.5	-16.4	-16.3	-16.2	-16.1	-15.8	-15.9	-15.9	-15.7	-15.7
2	-16.7	-16.7	-16.6	-16.4	-16.3	-16.3	-16.2	-16.0	-15.9	-16.1	-16.0	-15.8
3	-16.7	-16.6	-16.5	-16.5	-16.3	-16.3	-16.1	-15.8	-15.9	-16.1	-16.0	-15.9
4	-16.4	-16.4	-16.3	-16.2	-16.1	-16.1	-15.9	-15.8	-15.7	-16.0	-15.6	-15.6
5	-16.8	-16.7	-16.6	-16.5	-16.5	-16.4	-16.3	-16.1	-16.1	-16.1	-16.0	-15.9
6	-16.4	-16.3	-16.3	-16.1	-16.0	-16.0	-15.8	-15.7	-15.5	-15.6	-15.5	-15.4
7	-16.9	-16.8	-16.7	-16.6	-16.5	-16.5	-16.2	-16.2	-16.1	-16.2	-16.0	-15.9
8	-17.0	-16.8	-16.8	-16.7	-16.6	-16.5	-16.4	-16.3	-16.3	-16.4	-16.3	-16.2
9	-16.8	-16.7	-16.7	-16.5	-16.5	-16.4	-16.2	-16.0	-16.1	-16.1	-16.0	-16.0
10	-16.7	-16.6	-16.6	-16.5	-16.3	-16.3	-16.2	-16.0	-16.0	-16.0	-16.0	-15.8
11	-16.8	-16.7	-16.6	-16.5	-16.4	-16.4	-16.2	-16.0	-16.0	-16.0	-15.9	-16.0
12	-16.7	-16.6	-16.5	-16.5	-16.3	-16.3	-16.2	-16.0	-16.0	-16.1	-15.4	-15.8
13	-16.7	-16.6	-16.6	-16.4	-16.3	-16.2	-16.1	-15.8	-15.8	-16.0	-15.8	-15.7
14	-16.5	-16.2	-16.2	-16.1	-16.0	-16.0	-15.9	-15.6	-15.5	-15.8	-15.5	-15.4
15	-16.6	-16.5	-16.4	-16.3	-16.2	-16.2	-16.0	-15.9	-15.7	-16.0	-15.6	-15.6



## 3.5. Optical Overload

### 3.5.1. Test Descriptions

The optical overload is measured by decreasing the average optical power to the ROSA in steps from a suitable power level.

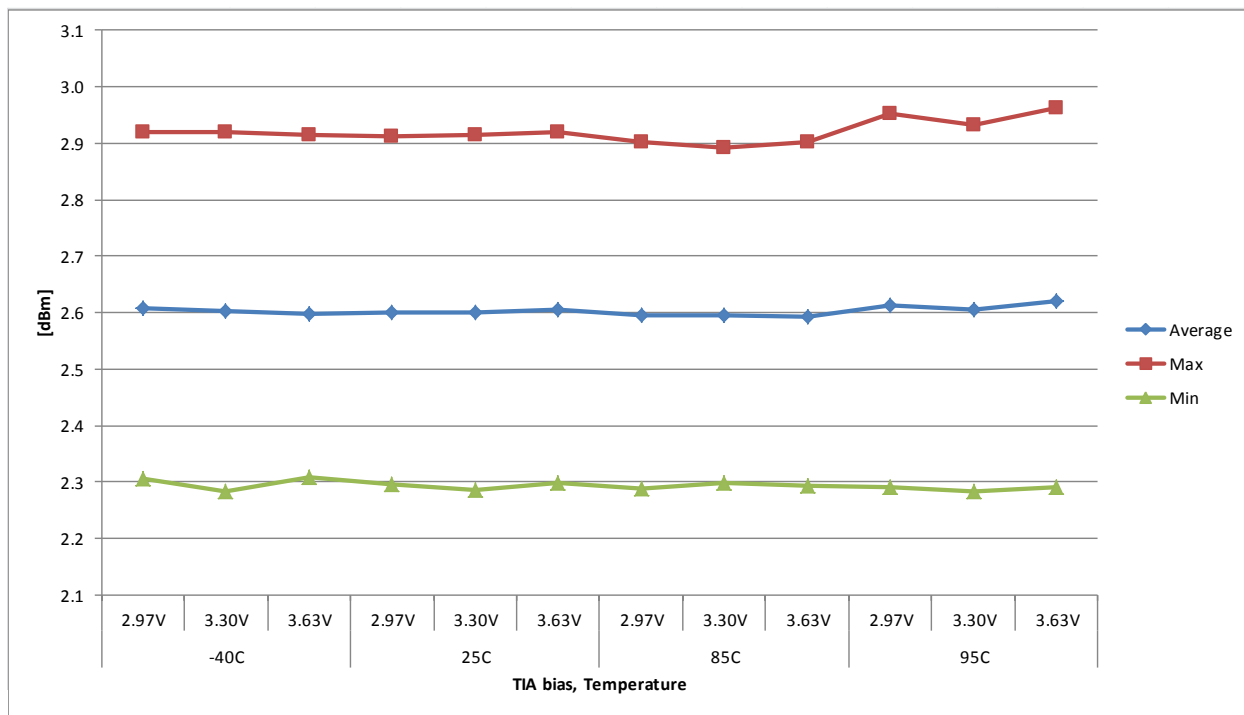
In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT.

**In most cases the overload test was limited by the maximum optical power of the optical transmitter. As a result the results in the report only represent a lower bound to the performance of the ROSAs. The ROSA performance is better than results presented.**

The input eyes used are the same as for the sensitivity tests.

The equipment setup is the same as for the sensitivity tests.

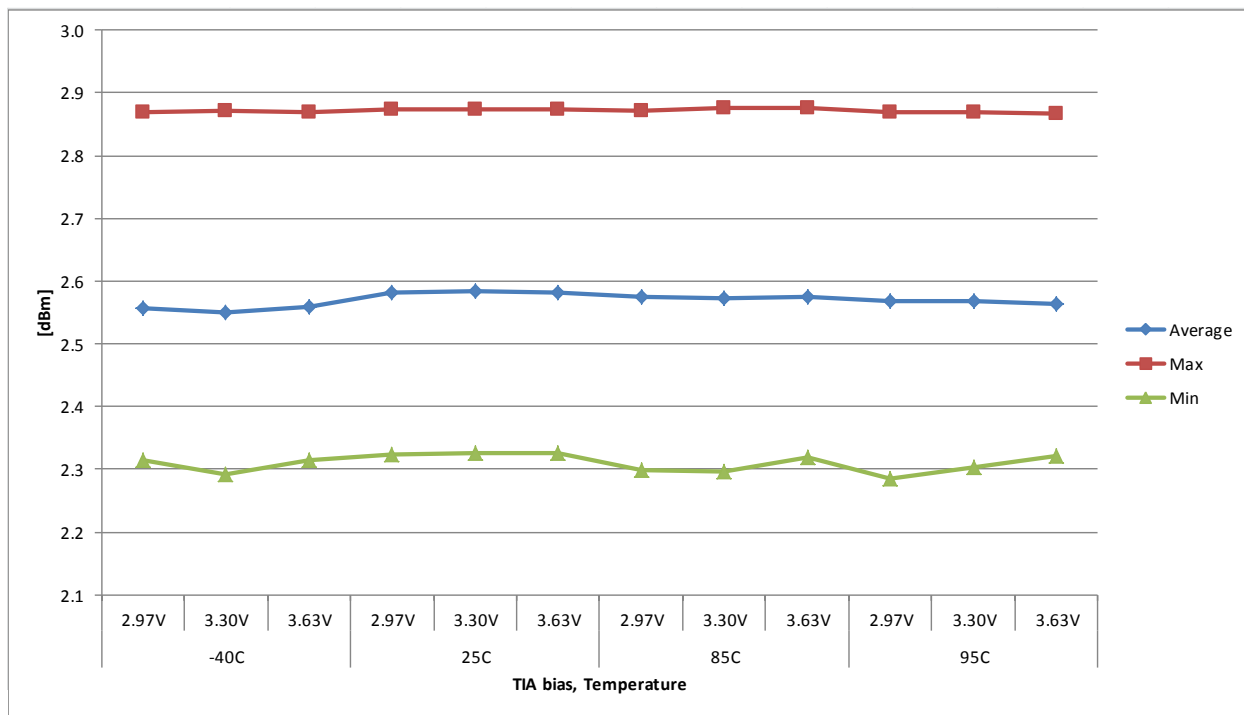
### 3.5.2. Overload at 1310nm and 11.3Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.0	2.9	3.0
<b>Min</b>	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Range</b>	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7
<b>Median</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
1	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7
2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
4	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.9	2.9
5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.8	2.7
6	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.0	2.9
7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
8	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.8	2.8
9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
10	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.5	2.5	2.6
11	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
12	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
13	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
15	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9

**Note: Reported results are limited by maximum input power achievable. Minimum overload measured at 2.6 dBm at -40C for sample 8.**

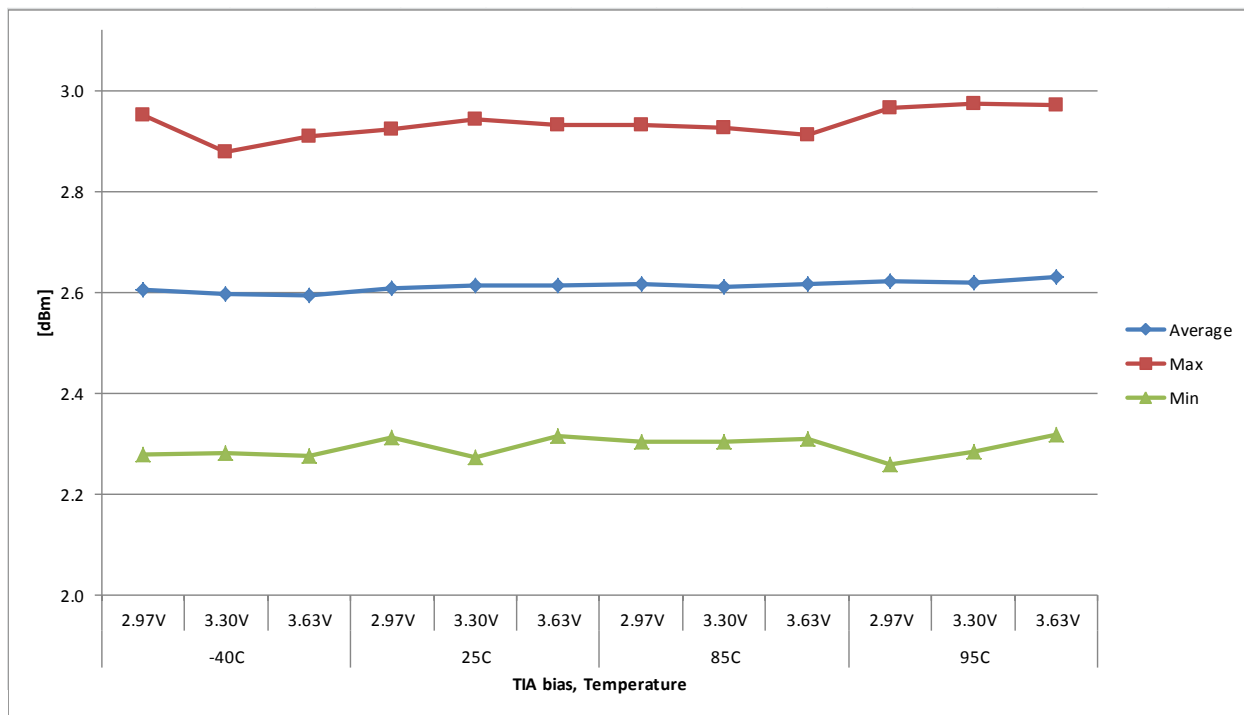
### 3.5.3. Overload at 1550nm and 11.3Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
<b>Min</b>	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Range</b>	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5
<b>Median</b>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
4	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6
6	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8
7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
8	2.4	2.3	2.5	2.7	2.7	2.7	2.6	2.7	2.6	2.7	2.6	2.7
9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
10	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4
11	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
12	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.7	2.7	2.7	2.7
13	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
15	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.9	2.8	2.9

**Note: Reported results are limited by maximum input power achievable. Minimum overload measured at 2.3 dBm at -40C for sample 8.**

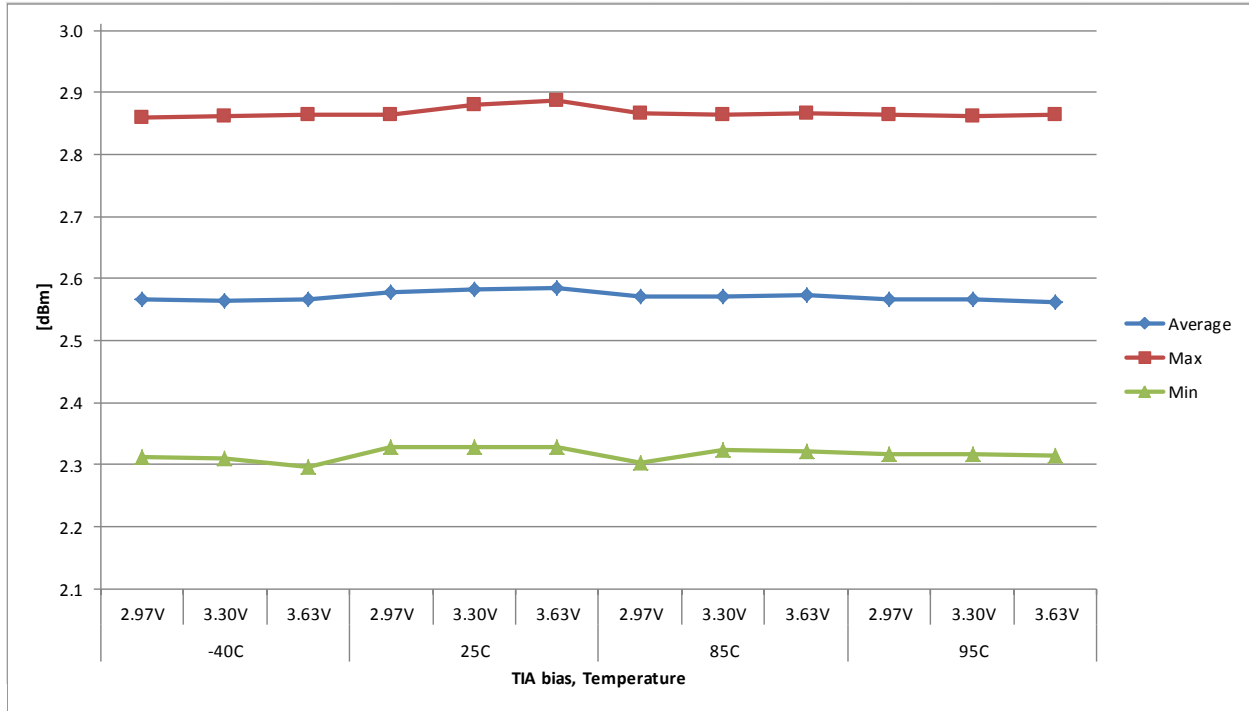
### 3.5.4. Overload at 1310nm and 10.3125Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	3.0	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.0	3.0	3.0
<b>Min</b>	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Range</b>	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.7
<b>Median</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
1	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7
2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3
3	2.5	2.5	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
4	2.9	2.9	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.9
5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.8	2.8
6	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.0	3.0
7	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3
8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
10	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6
11	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.6	2.6	2.6
12	2.8	2.7	2.7	2.7	2.8	2.7	2.8	2.7	2.7	2.7	2.7	2.7
13	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.6	2.6	2.6	2.6	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6
15	3.0	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9

**Note: Reported results are limited by maximum input power achievable. Neither sample reached overload.**

### 3.5.5. Overload at 1550nm and 10.3125Gbps (Avg. power dBm)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
<b>Std. Dev.</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
<b>Min</b>	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Range</b>	0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
<b>Median</b>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
4	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
5	2.6	2.7	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6
6	2.8	2.9	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8
7	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3
8	2.6	2.5	2.6	2.7	2.7	2.7	2.6	2.7	2.7	2.6	2.6	2.6
9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
10	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
11	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
12	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
13	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
14	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
15	2.8	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.9	2.9	2.9	2.9

**Note: Reported results are limited by maximum input power achievable. Minimum overload measured at 2.5 dBm at -40C, 3.3V for sample 8.**

### 3.6. Electrical Output Eyes

#### 3.6.1. Test Descriptions

Electrical output eyes of the P and N channel for the following conditions were measured at 11.3G data rate, unstressed eye at 1550nm wavelength.

- 1) Average power of -18dBm
- 2) Average power of -10dBm
- 3) Average power of 1.6dBm

Single-ended measurements were made of the P and N channel eyes for the following parameters after displaying 512 waveforms with 1350 points per waveform. The following was measured.

- 1) Crossing Percentage
- 2) Rise Time
- 3) Fall Time
- 4) Eye Height
- 5) Eye Amplitude
- 6) Peak to Peak Jitter
- 7) RMS Jitter

The following tables contain P channel measurements obtained.

The input eyes used are the same as for the sensitivity tests.

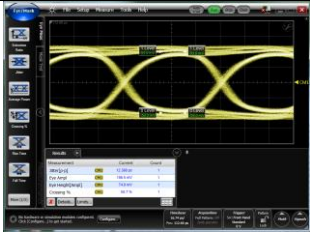
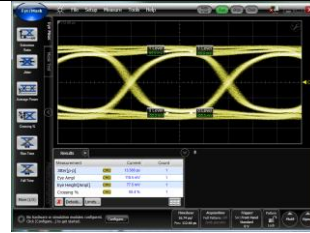
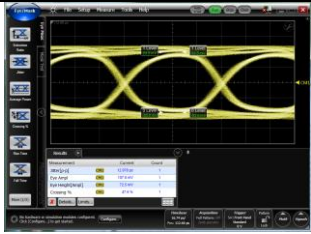
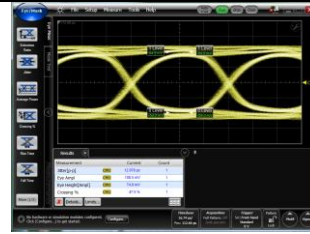
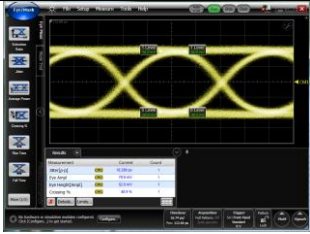
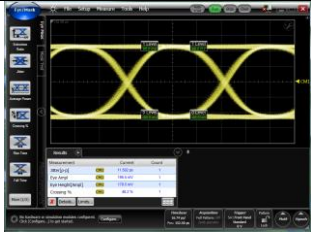
The Jitter measurements are uncorrected for jitter of the source.

Long RF cables had to be used to test the ROSAs in a temperature chamber. Due to the attenuation in the RF cables from the ROSA to the scope, the measured parameters of the output eyes are negatively affected. The measured heights and amplitudes are lower than if the signal was directly measured at the output of the ROSA.

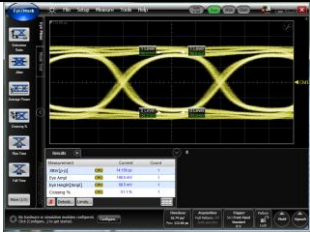
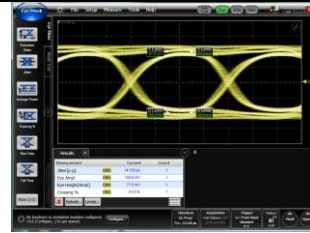
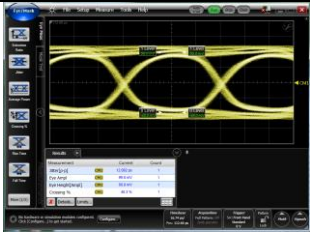
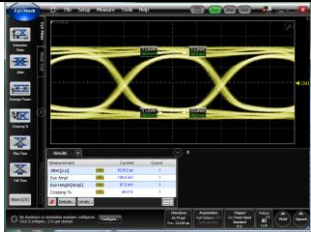
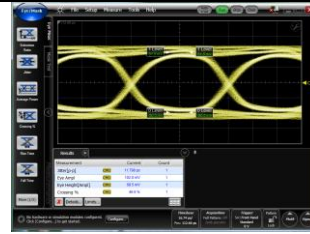
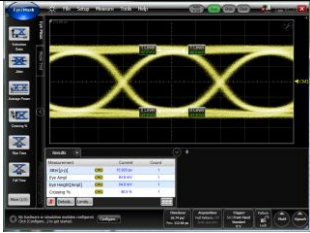
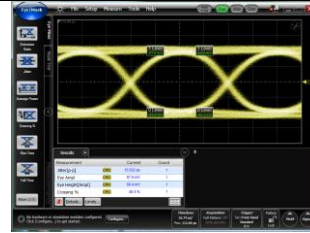
For information on the definitions of the eye diagram measurements see Appendix 1



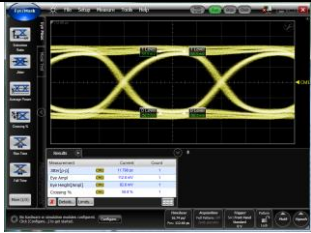
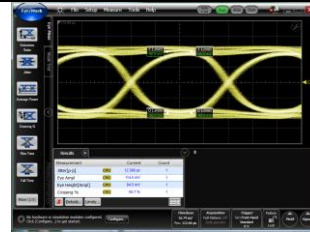
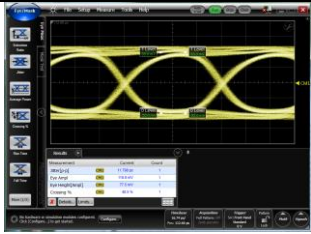
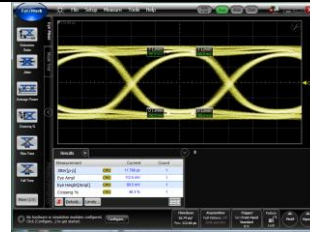
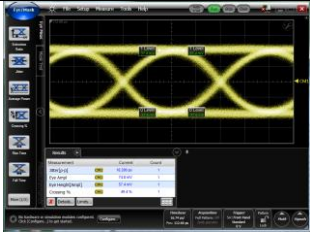
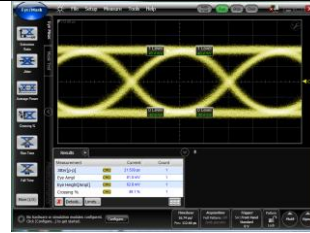
### 3.6.2. Typical Eye Diagrams at 25C

Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

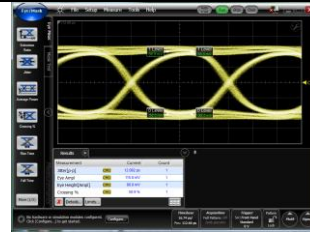
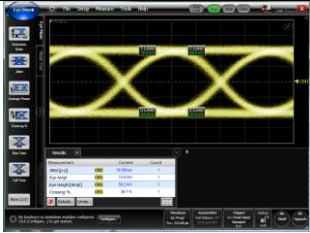
### 3.6.3. Typical Eye Diagrams at -40C

Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

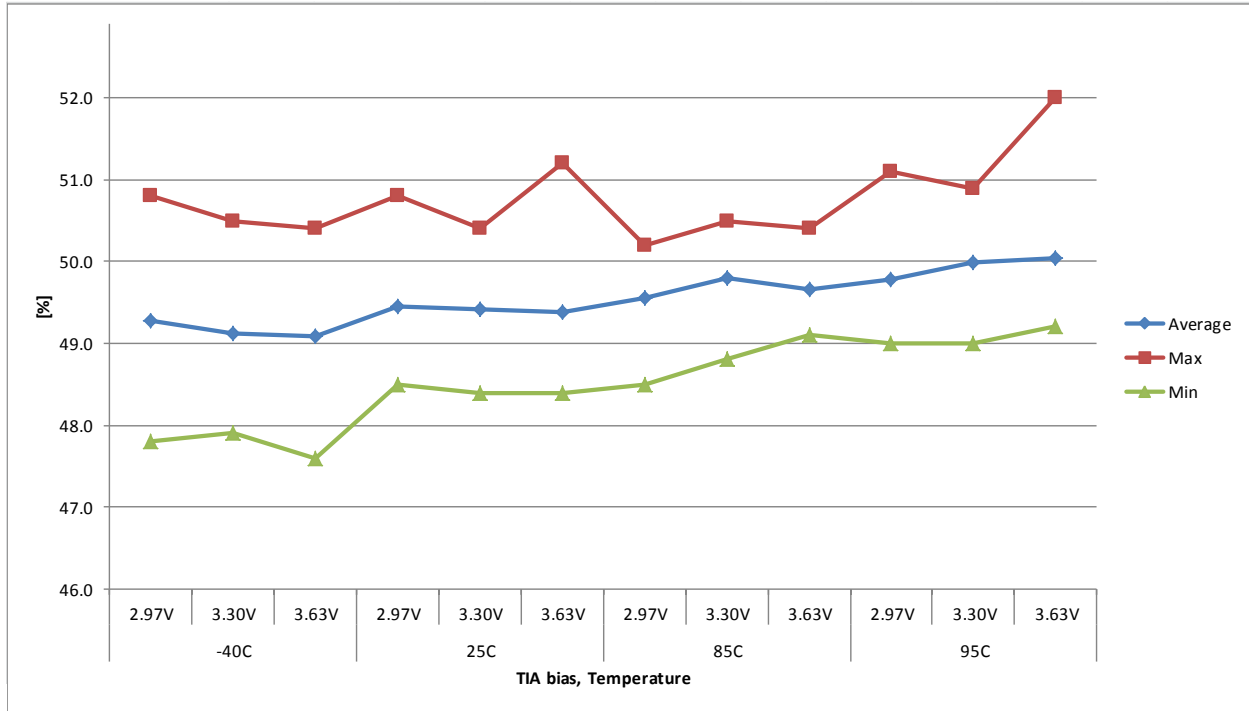
### 3.6.4. Typical Eye Diagrams at 85C

Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

3.6.5. Typical Eye Diagrams at 95C

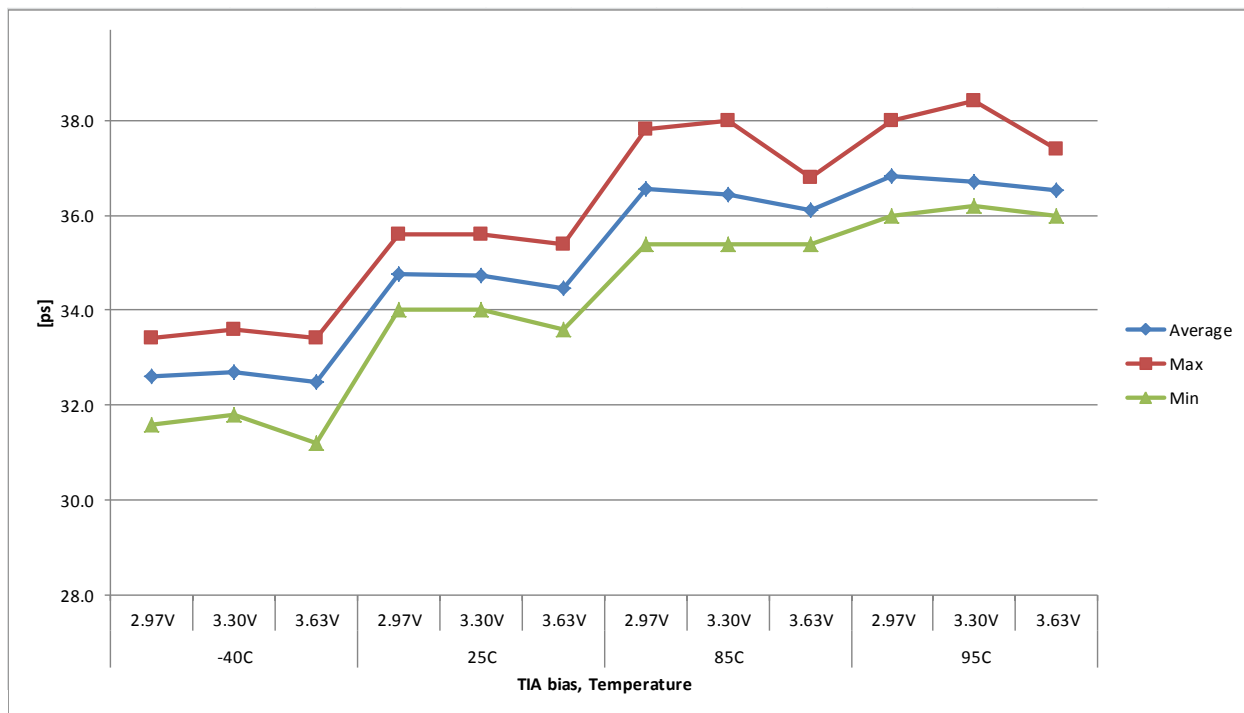
Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.6. Crossing Percentage at -18 dBm avg. Power at 1550nm and 11.3Gbps



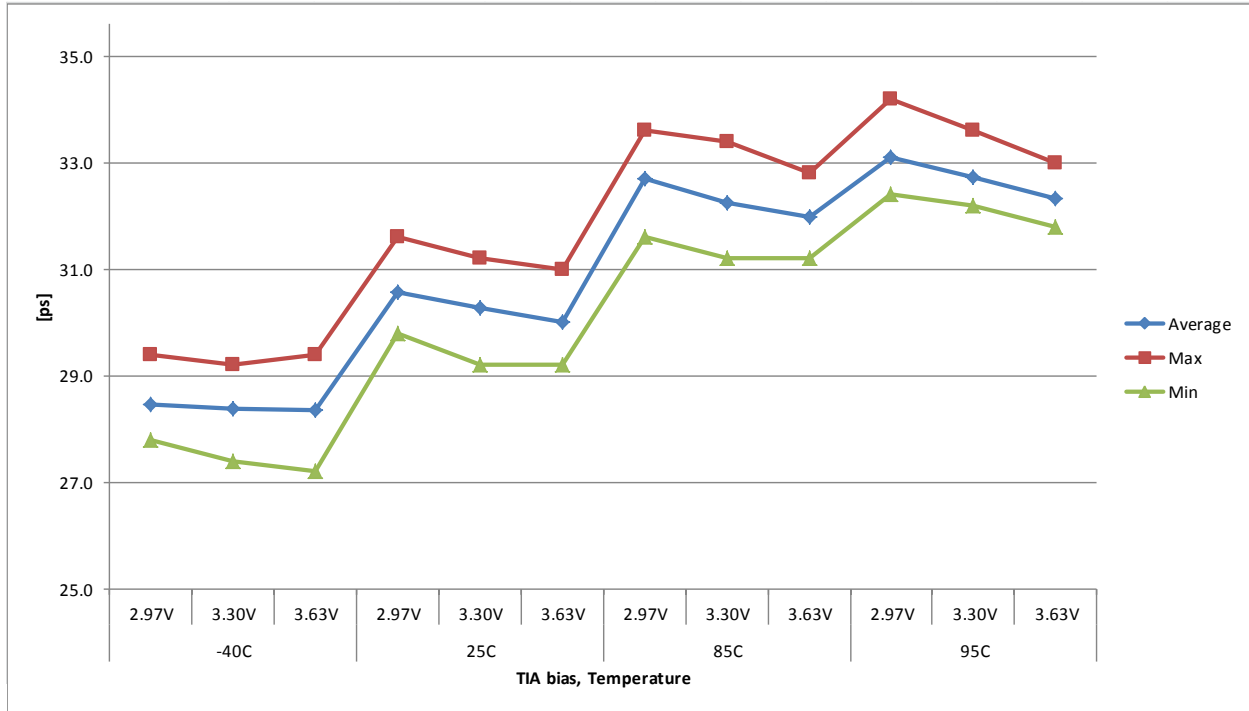
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	49.3	49.1	49.1	49.5	49.4	49.4	49.5	49.8	49.7	49.8	50.0	50.0
<b>Std. Dev.</b>	0.9	0.8	0.9	0.6	0.6	0.7	0.4	0.5	0.5	0.6	0.6	0.8
<b>Max</b>	50.8	50.5	50.4	50.8	50.4	51.2	50.2	50.5	50.4	51.1	50.9	52.0
<b>Min</b>	47.8	47.9	47.6	48.5	48.4	48.4	48.5	48.8	49.1	49.0	49.0	49.2
<b>Range</b>	3.0	2.6	2.8	2.3	2.0	2.8	1.7	1.7	1.3	2.1	1.9	2.8
<b>Median</b>	49.2	48.9	48.8	49.3	49.3	49.2	49.5	49.7	49.6	49.7	50.0	49.9
1	48.5	48.2	48.4	48.9	49.2	48.7	49.4	49.7	49.1	49.7	49.8	50.0
2	49.8	49.5	49.7	49.3	49.3	49.1	49.7	49.8	49.7	50.4	50.9	49.8
3	47.8	47.9	47.6	48.6	48.6	48.4	48.5	48.8	49.1	49.0	49.1	49.2
4	50.3	50.1	50.1	50.3	50.4	50.3	50.2	50.1	50.2	50.2	50.6	50.5
5	48.7	48.6	48.6	48.5	48.9	48.7	49.3	49.2	49.2	49.6	50.0	49.9
6	49.2	48.8	48.6	49.6	49.5	49.2	49.4	49.7	49.4	51.1	50.8	51.3
7	47.8	48.1	47.9	48.8	49.0	48.7	49.4	49.7	49.3	49.0	49.0	49.2
8	49.2	48.9	49.2	49.3	49.4	49.6	49.6	49.5	50.1	49.6	49.8	49.6
9	48.7	48.6	48.6	49.3	49.1	49.0	49.5	49.4	49.1	49.2	49.5	49.4
10	49.9	49.6	50.1	49.6	50.0	49.7	49.6	50.3	49.8	50.0	50.5	52.0
11	49.1	49.2	48.8	49.3	49.0	49.6	49.4	50.1	50.1	50.2	50.2	50.2
12	49.8	49.5	49.5	49.9	50.1	49.3	49.6	50.2	49.6	49.5	49.4	49.7
13	49.0	48.7	48.8	49.4	48.4	49.2	49.4	49.5	49.6	49.3	49.3	49.2
14	50.8	50.5	50.4	50.8	50.4	51.2	50.1	50.5	50.3	50.2	50.5	50.2
15	50.5	50.5	50.0	50.2	50.0	50.0	50.1	50.5	50.4	49.7	50.4	50.3

### 3.6.7. Rise Time at -18 dBm avg. Power at 1550nm and 11.3Gbps



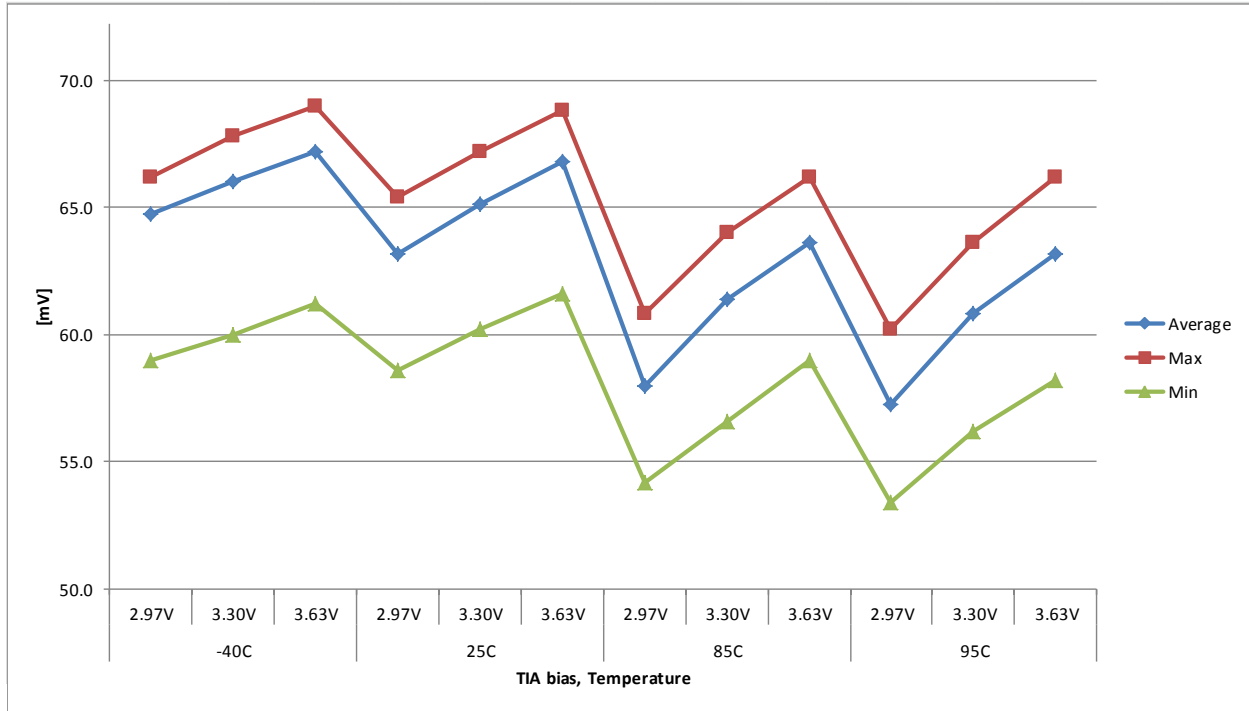
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	32.6	32.7	32.5	34.7	34.7	34.5	36.6	36.4	36.1	36.8	36.7	36.5
<b>Std. Dev.</b>	0.5	0.5	0.6	0.5	0.4	0.5	0.5	0.6	0.4	0.5	0.6	0.5
<b>Max</b>	33.4	33.6	33.4	35.6	35.6	35.4	37.8	38.0	36.8	38.0	38.4	37.4
<b>Min</b>	31.6	31.8	31.2	34.0	34.0	33.6	35.4	35.4	35.4	36.0	36.2	36.0
<b>Range</b>	1.8	1.8	2.2	1.6	1.6	1.8	2.4	2.6	1.4	2.0	2.2	1.4
<b>Median</b>	32.8	32.8	32.4	34.6	34.8	34.6	36.6	36.2	36.2	36.8	36.6	36.6
1	32.8	32.8	32.2	34.6	34.6	34.0	36.0	36.2	36.0	36.2	36.2	36.0
2	32.8	32.8	32.8	35.0	34.8	34.6	36.6	36.6	36.2	36.8	36.6	36.8
3	32.8	32.8	32.8	34.6	34.8	34.6	36.8	36.2	36.2	36.8	36.6	36.2
4	32.4	32.8	32.4	34.6	34.6	34.2	36.2	36.6	36.2	36.6	36.2	36.6
5	32.8	33.0	32.4	35.0	34.6	34.8	36.8	36.6	36.6	37.2	37.2	37.2
6	32.4	32.4	32.2	34.6	34.6	34.6	36.6	36.2	36.0	36.8	36.6	36.0
7	31.8	32.2	31.8	34.2	34.0	34.0	36.2	35.6	35.6	36.2	36.2	36.0
8	33.4	33.6	33.4	35.6	35.6	35.4	37.8	38.0	36.8	38.0	38.4	37.4
9	32.4	32.4	32.4	34.6	34.8	34.2	36.2	36.2	35.6	36.6	36.6	36.2
10	32.8	32.8	32.4	34.6	34.8	34.6	36.8	36.2	36.2	37.2	36.8	36.2
11	33.4	33.6	33.4	35.6	35.6	35.0	37.2	37.2	36.8	37.8	37.4	37.4
12	32.4	32.4	32.4	34.2	34.6	34.8	36.6	36.2	36.0	36.8	36.8	36.6
13	33.0	32.4	33.0	35.0	34.8	34.0	36.6	36.6	36.2	36.8	36.2	36.6
14	32.4	32.8	32.4	35.0	34.8	34.6	36.6	36.6	36.0	36.6	36.6	36.6
15	31.6	31.8	31.2	34.0	34.0	33.6	35.4	35.4	35.4	36.0	36.2	36.0

### 3.6.8. Fall Time at -18 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	28.5	28.4	28.3	30.6	30.3	30.0	32.7	32.2	32.0	33.1	32.7	32.3
<b>Std. Dev.</b>	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4
<b>Max</b>	29.4	29.2	29.4	31.6	31.2	31.0	33.6	33.4	32.8	34.2	33.6	33.0
<b>Min</b>	27.8	27.4	27.2	29.8	29.2	29.2	31.6	31.2	31.2	32.4	32.2	31.8
<b>Range</b>	1.6	1.8	2.2	1.8	2.0	1.8	2.0	2.2	1.6	1.8	1.4	1.2
<b>Median</b>	28.4	28.4	28.4	30.6	30.4	30.0	32.8	32.4	31.8	33.0	32.8	32.2
1	28.4	28.4	28.4	30.6	30.4	30.0	32.4	31.8	31.8	32.8	32.2	32.2
2	28.4	28.6	28.4	30.6	30.4	30.0	32.4	32.4	31.8	32.8	33.0	32.4
3	28.6	29.0	28.4	30.6	30.6	30.0	33.4	32.4	32.2	33.0	32.8	32.2
4	28.0	28.0	28.0	30.4	29.8	29.8	32.4	31.8	31.8	33.0	32.4	32.4
5	29.0	28.6	28.6	31.0	30.4	30.4	33.0	32.4	32.2	33.4	33.0	32.8
6	28.6	28.4	28.4	30.4	30.0	30.0	33.0	32.4	32.2	33.4	32.8	31.8
7	28.0	28.0	28.0	30.4	30.0	29.8	32.4	32.2	31.6	33.0	32.2	31.8
8	29.4	29.2	29.4	31.6	31.2	31.0	33.6	33.4	32.8	34.2	33.6	33.0
9	28.4	28.4	28.4	30.4	30.0	30.4	32.8	32.2	31.8	33.0	32.8	32.2
10	28.6	28.6	28.4	30.6	30.4	30.0	32.8	32.4	32.2	33.0	32.8	32.4
11	29.0	29.2	29.2	31.2	31.2	30.6	33.0	33.0	32.4	33.6	33.4	33.0
12	28.0	27.4	27.8	30.0	30.0	29.8	32.4	31.8	31.6	32.8	32.4	32.2
13	28.6	28.4	28.6	31.0	30.6	30.0	33.0	32.4	32.4	33.4	33.0	32.8
14	28.0	27.8	28.0	30.0	29.8	29.2	32.4	31.8	31.6	32.8	32.2	31.8
15	27.8	27.8	27.2	29.8	29.2	29.2	31.6	31.2	31.2	32.4	32.2	31.8

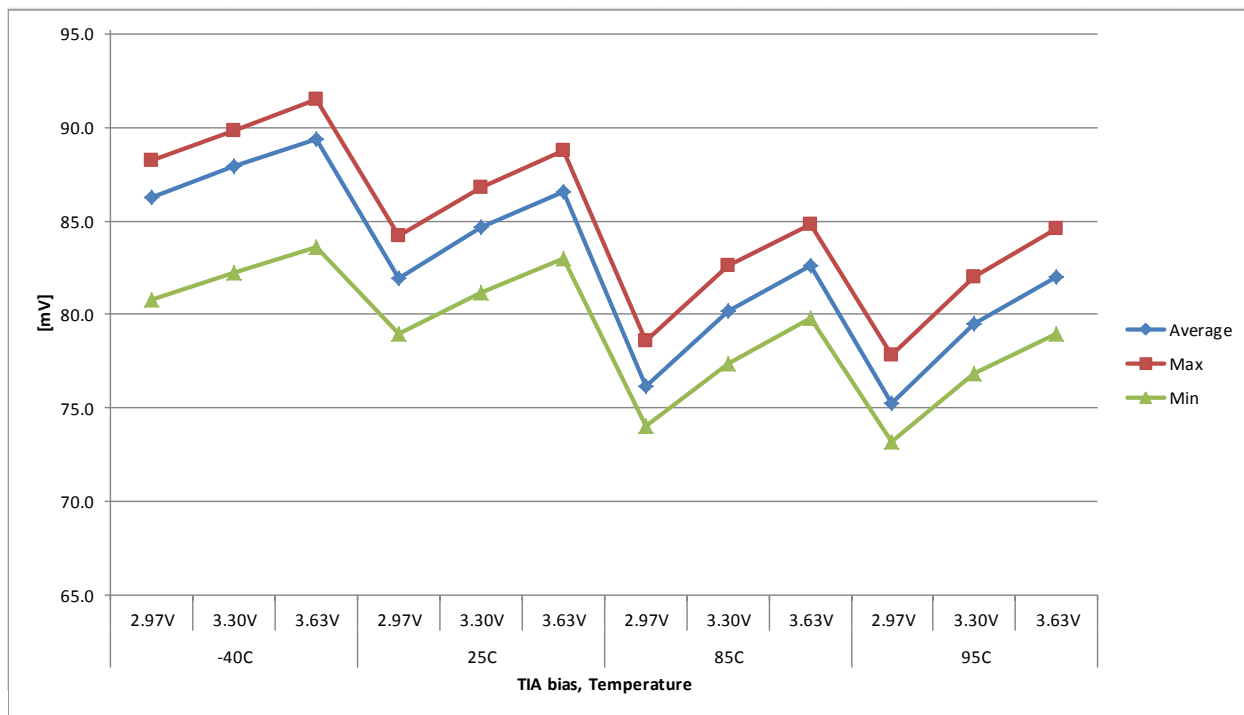
### 3.6.9. Height at -18 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	64.7	66.0	67.2	63.2	65.1	66.8	58.0	61.4	63.6	57.2	60.8	63.2
<b>Std. Dev.</b>	1.8	1.9	1.9	1.6	1.7	1.8	1.6	1.8	1.8	1.6	1.8	1.9
<b>Max</b>	66.2	67.8	69.0	65.4	67.2	68.8	60.8	64.0	66.2	60.2	63.6	66.2
<b>Min</b>	59.0	60.0	61.2	58.6	60.2	61.6	54.2	56.6	59.0	53.4	56.2	58.2
<b>Range</b>	7.2	7.8	7.8	6.8	7.0	7.2	6.6	7.4	7.2	6.8	7.4	8.0
<b>Median</b>	65.4	66.6	67.8	63.8	65.8	67.4	58.2	61.6	64.0	57.2	60.8	63.2
1	64.0	65.2	66.4	62.0	64.2	65.6	57.4	60.6	62.8	56.2	59.8	62.4
2	65.0	66.4	67.4	63.8	65.8	67.4	58.8	62.4	64.6	58.8	62.2	64.4
3	63.8	65.2	66.2	62.0	64.0	65.4	56.6	59.8	62.2	56.0	59.6	61.8
4	65.4	66.6	67.8	63.6	65.6	67.2	57.8	61.2	63.4	56.8	60.6	62.8
5	63.6	64.8	66.0	62.0	64.0	65.6	57.4	60.4	62.6	56.8	60.0	62.6
6	65.0	66.4	67.6	62.4	64.6	66.2	55.8	59.4	61.6	55.6	59.4	61.6
7	66.0	67.6	68.5	64.6	66.6	68.4	59.8	63.0	65.0	58.4	62.0	64.4
8	59.0	60.0	61.2	58.6	60.2	61.6	54.2	56.6	59.0	53.4	56.2	58.2
9	66.0	67.4	68.5	65.4	67.2	68.8	60.8	64.0	66.2	60.2	63.6	66.2
10	65.4	66.8	68.0	64.0	66.2	68.0	59.0	62.8	65.2	58.6	62.6	65.6
11	64.8	66.0	67.2	62.8	64.6	66.4	57.6	61.2	63.4	57.2	60.4	63.0
12	65.4	66.6	67.8	63.8	66.0	67.4	58.6	62.4	64.2	57.6	61.2	63.4
13	66.2	67.8	69.0	64.4	66.2	68.2	58.8	62.4	64.6	57.8	61.4	63.8
14	65.6	67.0	68.2	64.0	65.8	67.8	58.2	61.6	64.0	57.2	60.8	63.2
15	65.4	66.8	67.8	64.0	66.2	68.0	59.0	62.8	65.2	58.0	62.4	64.4

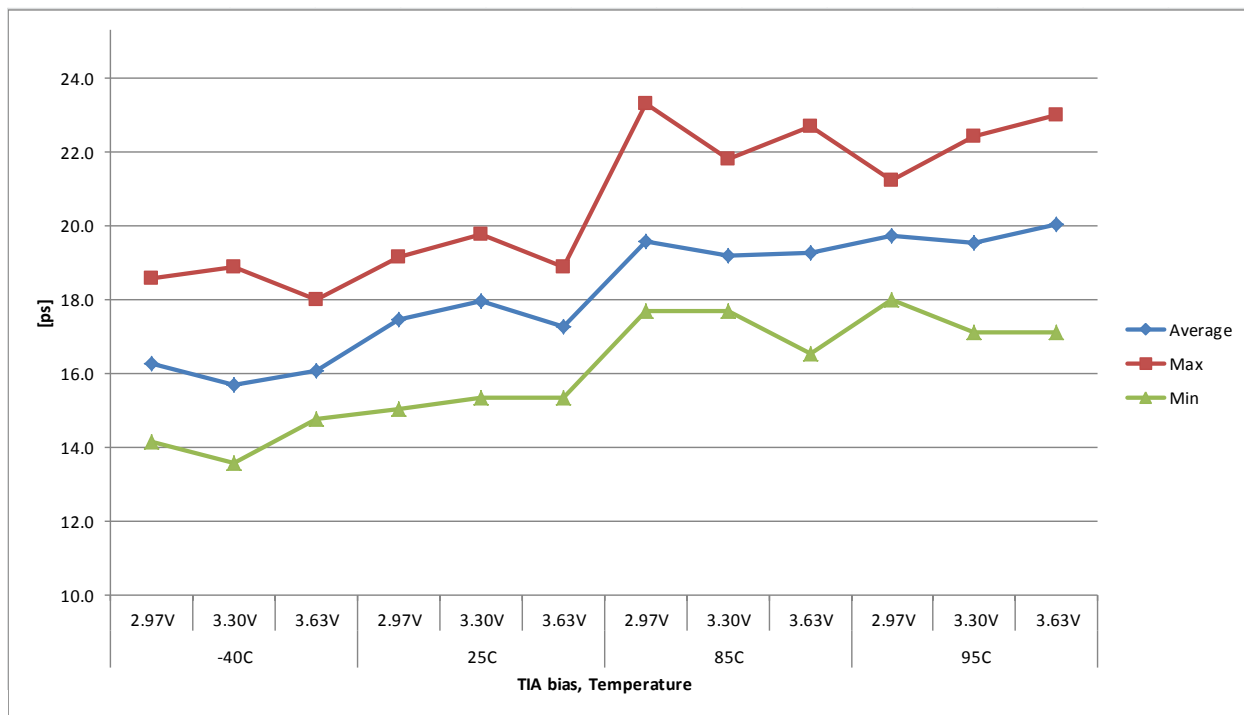


### 3.6.10. Amplitude at -18 dBm avg. Power at 1550nm and 11.3Gbps



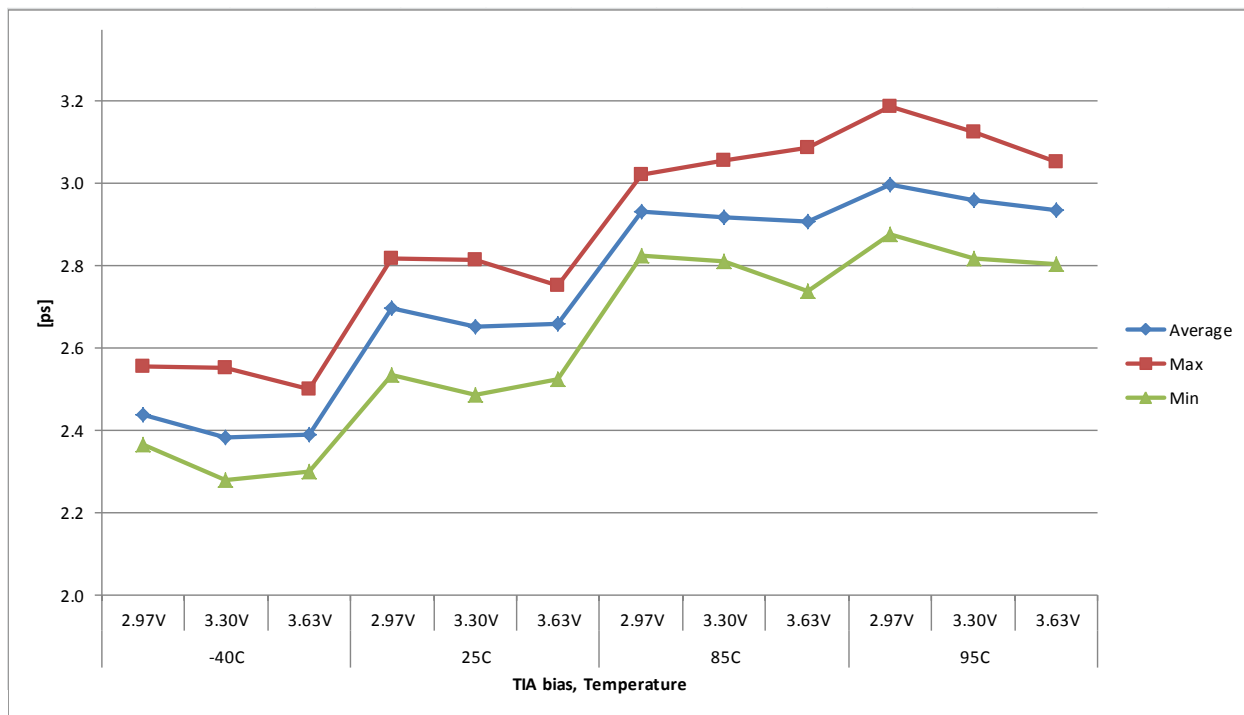
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	86.2	87.9	89.4	81.9	84.6	86.5	76.1	80.2	82.6	75.2	79.5	82.0
<b>Std. Dev.</b>	2.2	2.2	2.3	1.5	1.6	1.7	1.4	1.5	1.5	1.4	1.5	1.6
<b>Max</b>	88.2	89.8	91.5	84.2	86.8	88.8	78.6	82.6	84.8	77.8	82.0	84.6
<b>Min</b>	80.8	82.2	83.6	79.0	81.2	83.0	74.0	77.4	79.8	73.2	76.8	79.0
<b>Range</b>	7.4	7.6	7.9	5.2	5.6	5.8	4.6	5.2	5.0	4.6	5.2	5.6
<b>Median</b>	86.8	88.4	90.0	82.4	84.8	87.0	76.6	80.6	83.0	75.4	79.6	82.0
1	83.8	85.4	87.0	79.8	82.4	84.2	74.8	78.6	81.0	73.8	77.6	80.6
2	87.8	89.6	91.0	83.2	86.0	88.0	77.2	81.4	84.0	77.0	81.2	83.6
3	83.0	84.8	86.0	79.8	82.4	84.2	74.2	78.2	80.6	73.4	77.8	80.0
4	86.6	88.4	89.8	81.8	84.6	86.4	75.6	79.6	82.0	74.6	79.0	81.4
5	85.4	87.0	88.4	81.2	84.0	85.8	75.8	79.4	81.8	74.8	78.8	81.2
6	85.6	87.4	88.8	80.6	83.6	85.4	74.0	78.4	80.8	73.6	78.0	80.6
7	87.6	89.6	91.0	83.2	86.0	88.0	77.6	81.6	83.8	76.2	80.4	83.0
8	80.8	82.2	83.6	79.0	81.2	83.0	74.2	77.4	79.8	73.2	76.8	79.0
9	88.2	89.8	91.5	84.2	86.8	88.8	78.6	82.6	84.8	77.8	82.0	84.6
10	88.0	89.8	91.5	83.2	86.4	88.4	77.4	82.0	84.4	76.6	81.6	84.6
11	86.8	88.4	90.0	82.4	84.8	86.8	76.6	80.6	83.0	75.8	79.6	82.2
12	87.2	88.8	90.2	82.6	85.4	87.0	76.6	81.0	83.0	75.4	79.6	82.0
13	88.0	89.6	91.2	83.0	85.6	87.8	76.8	81.0	83.6	75.8	80.2	82.6
14	86.8	88.4	90.0	82.2	84.8	87.0	76.0	80.0	82.6	74.8	79.4	81.8
15	87.8	89.8	91.0	82.4	85.6	87.4	76.6	81.0	83.6	75.6	80.4	82.8

### 3.6.11. Jitter pk-pk at -18 dBm avg. Power at 1550nm and 11.3Gbps



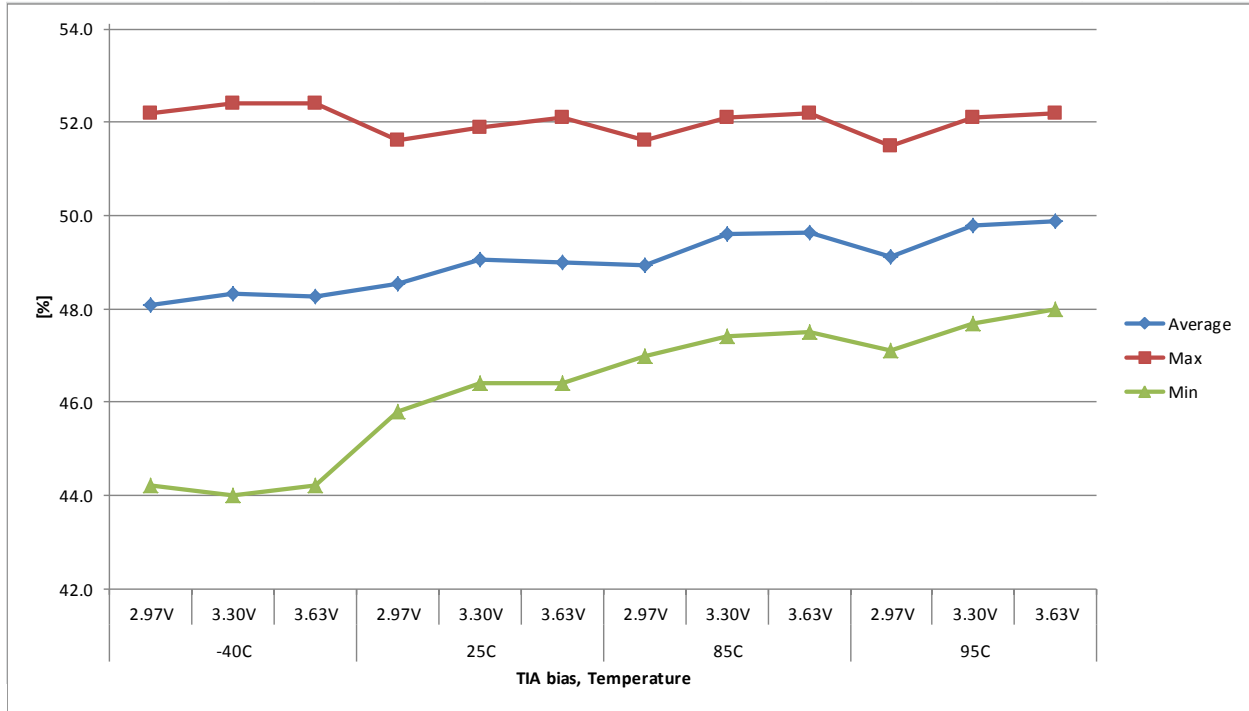
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	16.3	15.7	16.1	17.4	18.0	17.3	19.6	19.2	19.2	19.7	19.5	20.1
<b>Std. Dev.</b>	1.3	1.4	1.1	1.2	1.5	1.0	1.6	1.2	1.8	1.1	1.4	1.6
<b>Max</b>	18.6	18.9	18.0	19.2	19.8	18.9	23.3	21.8	22.7	21.2	22.4	23.0
<b>Min</b>	14.2	13.6	14.7	15.0	15.3	15.3	17.7	17.7	16.5	18.0	17.1	17.1
<b>Range</b>	4.4	5.3	3.2	4.1	4.4	3.5	5.6	4.1	6.2	3.2	5.3	5.9
<b>Median</b>	16.2	15.6	15.9	17.4	18.0	17.1	19.2	19.2	19.2	19.8	19.5	20.1
1	15.9	13.6	15.6	18.3	19.8	17.1	18.3	18.0	21.5	18.6	20.1	18.9
2	15.3	14.5	15.0	19.2	17.1	16.8	21.8	19.2	19.2	20.9	19.5	19.2
3	17.7	15.6	16.8	17.4	17.4	18.9	18.0	18.3	19.8	19.8	19.2	23.0
4	18.6	14.7	17.1	18.6	16.2	18.6	18.6	20.4	21.8	21.2	20.9	17.1
5	16.2	17.7	17.4	17.4	18.6	17.1	20.4	20.6	18.0	19.5	18.6	19.5
6	14.7	18.9	18.0	17.4	18.0	18.3	20.4	20.4	22.7	18.6	19.8	20.9
7	17.4	15.6	16.2	15.6	15.3	16.2	18.0	19.8	16.8	19.5	17.7	18.6
8	16.5	17.1	15.6	18.6	17.1	18.0	19.2	18.0	18.6	21.2	19.5	21.5
9	14.2	14.2	15.0	18.6	19.8	16.2	19.5	18.0	16.5	20.9	21.5	18.0
10	15.9	15.9	14.7	16.8	19.8	16.8	19.8	19.2	18.3	18.0	19.2	21.5
11	16.2	15.9	17.1	17.1	18.0	16.5	19.2	17.7	20.1	19.8	20.4	20.9
12	14.2	14.7	14.7	16.5	19.8	17.7	23.3	21.8	19.2	20.1	17.1	19.8
13	16.5	14.7	16.8	16.8	17.7	18.3	17.7	18.0	17.7	18.9	22.4	20.6
14	18.3	16.2	15.9	18.3	19.2	17.4	20.9	19.2	18.6	20.6	17.7	21.2
15	16.5	15.6	14.7	15.0	15.6	15.3	18.6	19.8	20.1	18.3	19.8	20.1

### 3.6.12. Jitter RMS at -18 dBm avg. Power at 1550nm and 11.3Gbps



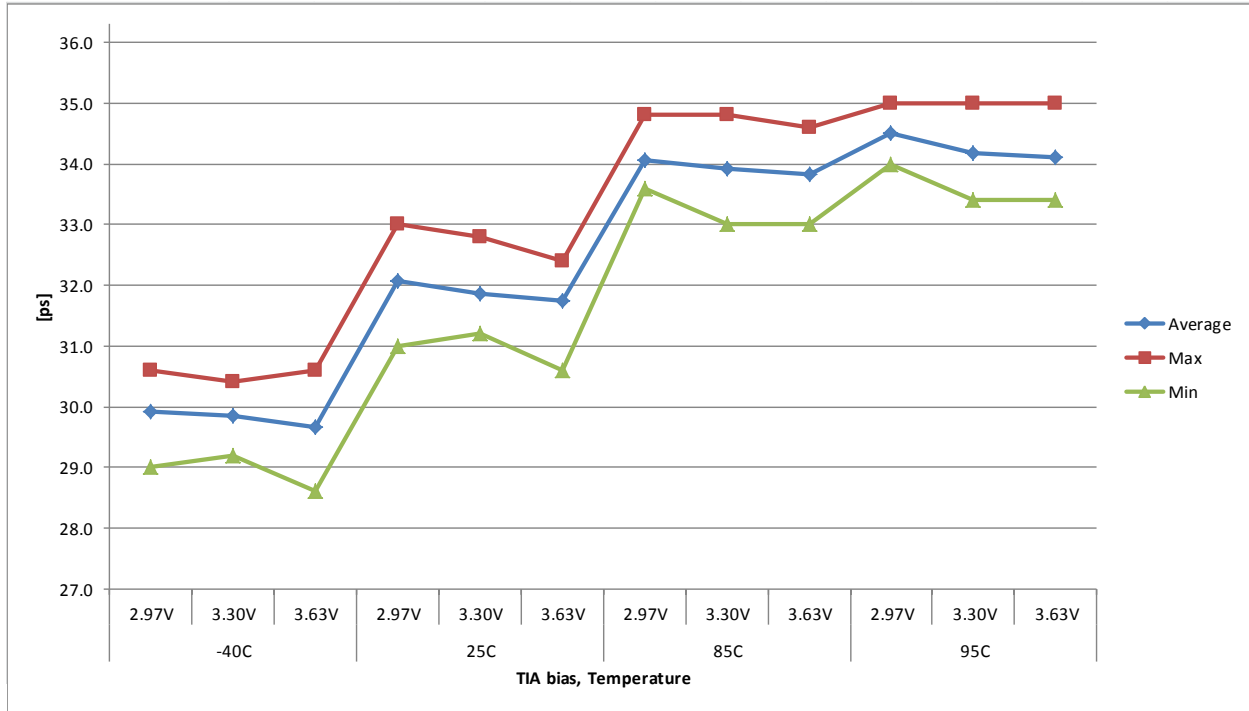
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.4	2.4	2.4	2.7	2.6	2.7	2.9	2.9	2.9	3.0	3.0	2.9
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Max</b>	2.6	2.6	2.5	2.8	2.8	2.8	3.0	3.1	3.1	3.2	3.1	3.1
<b>Min</b>	2.4	2.3	2.3	2.5	2.5	2.5	2.8	2.8	2.7	2.9	2.8	2.8
<b>Range</b>	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2
<b>Median</b>	2.4	2.3	2.4	2.7	2.7	2.7	2.9	2.9	2.9	3.0	3.0	2.9
1	2.5	2.4	2.4	2.7	2.7	2.7	3.0	2.9	3.0	2.9	3.1	2.9
2	2.4	2.4	2.4	2.7	2.7	2.6	3.0	2.9	3.0	2.9	2.9	2.9
3	2.6	2.5	2.4	2.7	2.8	2.7	2.8	2.9	2.9	2.9	2.9	2.9
4	2.5	2.3	2.4	2.7	2.6	2.7	3.0	2.9	3.0	3.1	2.9	3.0
5	2.4	2.3	2.4	2.7	2.6	2.7	2.9	2.9	2.9	3.0	3.0	2.9
6	2.5	2.6	2.5	2.8	2.8	2.8	3.0	3.1	3.1	3.2	3.1	3.0
7	2.4	2.3	2.3	2.7	2.5	2.6	2.9	2.9	2.7	3.0	2.9	2.9
8	2.5	2.5	2.4	2.7	2.7	2.6	3.0	2.9	3.0	3.1	3.0	3.0
9	2.4	2.3	2.3	2.6	2.5	2.6	2.9	2.8	2.8	2.9	2.8	2.8
10	2.4	2.3	2.3	2.7	2.6	2.7	2.8	2.9	2.9	2.9	3.0	3.0
11	2.4	2.5	2.5	2.8	2.7	2.7	3.0	2.9	2.9	3.0	3.0	3.0
12	2.4	2.3	2.3	2.7	2.7	2.6	3.0	3.0	2.9	3.0	2.9	2.9
13	2.5	2.3	2.4	2.6	2.6	2.7	2.9	2.9	2.9	3.1	3.1	2.9
14	2.4	2.4	2.4	2.7	2.8	2.7	2.9	3.0	2.9	3.1	3.0	3.1
15	2.4	2.3	2.3	2.5	2.6	2.5	2.8	2.8	2.8	2.9	2.9	2.9

### 3.6.13. Crossing Percentage at -10 dBm avg. Power at 1550nm and 11.3Gbps



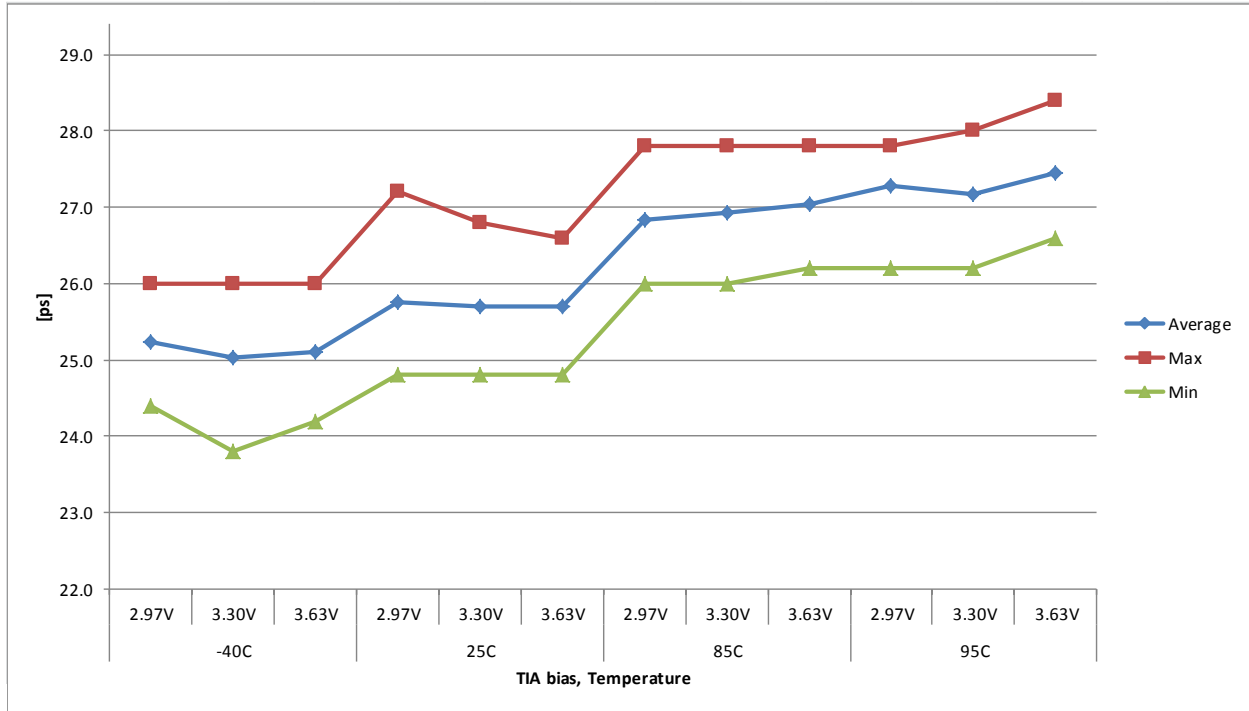
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	48.1	48.3	48.3	48.5	49.0	49.0	48.9	49.6	49.6	49.1	49.8	49.9
<b>Std. Dev.</b>	2.3	2.5	2.4	1.7	1.7	1.8	1.4	1.5	1.5	1.4	1.4	1.3
<b>Max</b>	52.2	52.4	52.4	51.6	51.9	52.1	51.6	52.1	52.2	51.5	52.1	52.2
<b>Min</b>	44.2	44.0	44.2	45.8	46.4	46.4	47.0	47.4	47.5	47.1	47.7	48.0
<b>Range</b>	8.0	8.4	8.2	5.8	5.5	5.7	4.6	4.7	4.7	4.4	4.4	4.2
<b>Median</b>	47.9	48.0	48.1	48.7	49.0	49.1	49.1	49.7	49.8	49.0	49.9	49.9
1	46.3	46.4	46.6	47.4	47.6	47.5	47.7	48.5	48.3	48.1	48.5	48.9
2	49.1	49.4	49.5	49.5	49.8	49.9	49.3	50.2	50.2	49.5	50.2	50.1
3	44.2	44.0	44.2	46.1	46.6	46.4	47.0	47.4	47.5	47.2	47.7	48.0
4	51.2	51.9	51.5	51.2	51.9	51.8	51.1	52.0	52.1	51.2	52.1	52.2
5	47.5	48.0	47.5	47.7	48.2	48.0	48.0	48.8	48.7	48.4	49.1	48.9
6	47.1	47.4	47.2	48.1	48.8	48.6	48.4	49.1	49.3	48.9	49.6	49.5
7	44.5	44.8	44.5	45.8	46.4	46.4	47.0	47.7	47.8	47.1	47.9	48.1
8	47.9	48.0	48.1	48.7	49.0	49.3	49.1	49.7	49.8	49.2	50.0	49.9
9	47.5	47.7	47.6	47.9	48.4	48.4	48.5	49.3	49.4	48.8	49.5	49.6
10	49.7	50.2	50.1	49.7	50.3	50.3	50.0	50.6	50.7	50.3	50.7	51.1
11	48.4	48.5	48.4	49.2	49.3	49.1	49.5	50.0	50.1	49.7	50.4	50.5
12	49.3	49.7	49.5	48.7	49.5	49.3	49.2	49.7	49.8	49.0	49.9	49.9
13	45.6	45.8	45.9	46.5	47.2	46.9	47.2	47.8	47.7	47.4	48.0	48.2
14	52.2	52.4	52.4	51.6	51.9	52.1	51.6	52.1	52.2	51.5	51.9	52.1
15	50.5	50.9	51.0	50.1	50.8	50.7	50.3	51.1	51.1	50.4	51.1	51.0

### 3.6.14. Rise Time at -10 dBm avg. Power at 1550nm and 11.3Gbps



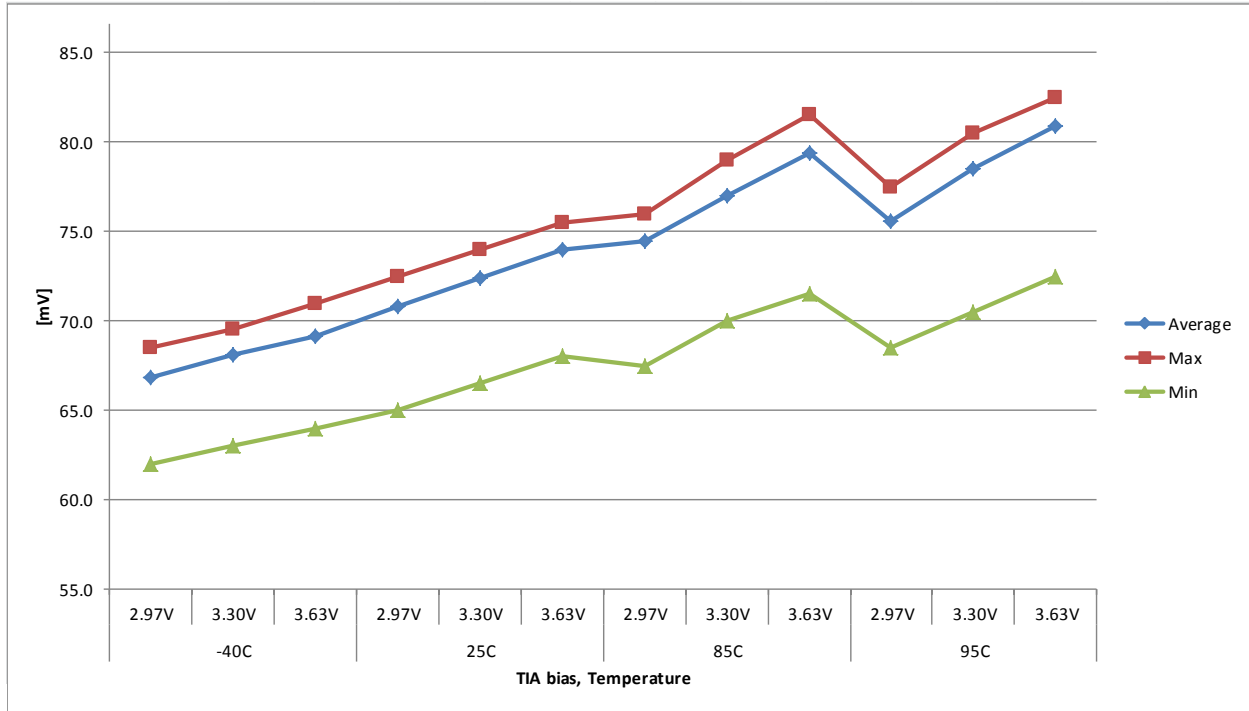
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	29.9	29.8	29.7	32.1	31.9	31.7	34.1	33.9	33.8	34.5	34.2	34.1
<b>Std. Dev.</b>	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.5
<b>Max</b>	30.6	30.4	30.6	33.0	32.8	32.4	34.8	34.8	34.6	35.0	35.0	35.0
<b>Min</b>	29.0	29.2	28.6	31.0	31.2	30.6	33.6	33.0	33.0	34.0	33.4	33.4
<b>Range</b>	1.6	1.2	2.0	2.0	1.6	1.8	1.2	1.8	1.6	1.0	1.6	1.6
<b>Median</b>	30.0	29.8	29.4	32.2	31.8	31.8	34.0	34.0	34.0	34.6	34.2	34.0
1	30.0	29.8	29.4	32.2	31.8	31.6	33.6	34.0	34.0	34.2	34.2	34.0
2	30.0	30.0	29.8	32.2	31.8	32.2	34.2	34.0	34.0	34.6	34.6	34.6
3	30.4	30.0	30.0	32.2	31.8	31.8	34.0	34.0	34.0	34.6	34.2	34.2
4	29.4	29.4	29.4	31.6	31.2	31.2	33.6	33.6	33.4	34.0	33.4	33.4
5	30.0	29.8	29.4	32.2	31.6	31.6	34.0	34.0	34.0	34.6	34.2	34.0
6	29.8	29.4	29.4	31.6	31.6	31.6	34.0	33.4	33.6	34.0	34.0	33.6
7	29.4	29.4	29.4	31.6	31.6	31.2	33.6	33.6	33.4	34.2	33.6	33.6
8	30.4	30.0	30.0	32.8	32.4	32.2	34.2	34.2	33.6	34.8	34.2	34.2
9	30.0	30.4	29.8	31.8	31.8	31.8	34.2	34.0	34.0	34.8	34.2	34.0
10	30.0	30.4	30.0	32.2	32.4	32.2	34.6	34.2	34.0	35.0	34.8	34.2
11	30.6	30.4	30.4	33.0	32.4	32.4	34.6	34.6	34.2	34.8	34.6	35.0
12	29.2	29.2	29.2	31.6	31.6	31.2	33.6	33.4	33.6	34.0	34.0	33.6
13	30.6	30.4	30.6	32.8	32.8	32.4	34.8	34.8	34.6	35.0	35.0	35.0
14	30.0	29.8	29.4	32.2	31.8	32.2	34.2	34.0	34.0	34.8	34.2	34.6
15	29.0	29.2	28.6	31.0	31.2	30.6	33.6	33.0	33.0	34.2	33.6	33.6

### 3.6.15. Fall Time at -10 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	25.2	25.0	25.1	25.8	25.7	25.7	26.8	26.9	27.0	27.3	27.2	27.5
<b>Std. Dev.</b>	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.4	0.5	0.5
<b>Max</b>	26.0	26.0	26.0	27.2	26.8	26.6	27.8	27.8	27.8	27.8	28.0	28.4
<b>Min</b>	24.4	23.8	24.2	24.8	24.8	24.8	26.0	26.0	26.2	26.2	26.2	26.6
<b>Range</b>	1.6	2.2	1.8	2.4	2.0	1.8	1.8	1.8	1.6	1.6	1.8	1.8
<b>Median</b>	25.0	25.0	25.0	25.6	25.6	25.6	26.6	26.8	27.2	27.4	27.4	27.4
1	25.0	24.8	24.8	25.6	25.6	25.6	26.6	26.6	27.2	27.2	26.8	27.2
2	25.6	25.4	25.4	26.0	25.6	26.0	27.2	26.8	27.2	27.4	27.4	27.8
3	24.8	24.8	24.8	25.6	25.6	25.6	26.6	26.6	27.2	27.2	26.8	27.2
4	25.0	24.8	24.8	25.6	25.0	25.4	26.8	26.8	26.8	27.4	27.4	27.2
5	25.6	25.4	25.4	26.2	25.6	26.0	26.6	27.4	26.8	27.2	27.2	27.4
6	24.8	24.4	24.4	25.0	25.6	25.0	26.2	26.2	26.6	26.6	26.6	26.8
7	24.8	25.0	25.0	25.6	25.6	25.4	26.6	26.8	26.8	27.2	26.8	27.2
8	26.0	26.0	26.0	26.8	26.6	26.6	27.4	27.8	27.4	27.4	27.4	27.8
9	25.4	25.4	25.6	26.0	26.0	26.2	27.4	27.4	27.2	27.4	27.4	27.4
10	25.6	25.4	25.4	25.6	26.2	26.2	27.4	27.4	27.4	27.8	28.0	28.0
11	26.0	26.0	26.0	27.2	26.8	26.6	27.8	27.8	27.8	27.8	28.0	28.4
12	24.4	23.8	24.2	24.8	24.8	24.8	26.0	26.0	26.2	26.2	26.2	26.6
13	26.0	25.0	25.6	26.0	26.2	26.0	27.2	27.4	27.8	27.8	27.4	28.0
14	25.0	24.8	25.0	25.4	25.4	25.4	26.6	26.8	26.6	27.2	27.4	27.4
15	24.4	24.4	24.2	25.0	25.0	24.8	26.2	26.2	26.6	27.4	26.8	27.4

### 3.6.16. Height at -10 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	66.8	68.1	69.2	70.8	72.4	74.0	74.5	77.0	79.4	75.6	78.5	80.9
<b>Std. Dev.</b>	1.5	1.6	1.7	1.8	1.8	1.9	2.1	2.2	2.4	2.2	2.5	2.5
<b>Max</b>	68.5	69.5	71.0	72.5	74.0	75.5	76.0	79.0	81.5	77.5	80.5	82.5
<b>Min</b>	62.0	63.0	64.0	65.0	66.5	68.0	67.5	70.0	71.5	68.5	70.5	72.5
<b>Range</b>	6.5	6.5	7.0	7.5	7.5	7.5	8.5	9.0	10.0	9.0	10.0	10.0
<b>Median</b>	67.0	68.5	69.5	71.0	72.5	74.5	75.0	77.5	80.0	76.0	79.0	81.5
1	66.0	67.5	68.5	71.0	72.5	74.0	75.5	77.5	80.5	76.5	79.5	82.0
2	67.0	68.0	69.0	71.0	72.5	74.0	74.5	77.0	79.5	75.5	78.5	81.0
3	67.0	68.5	69.5	71.5	73.0	74.5	74.5	77.0	79.5	75.5	78.5	81.0
4	67.5	69.0	70.0	71.5	73.0	75.0	75.5	78.0	80.0	76.5	79.5	82.0
5	65.5	66.5	67.5	69.0	70.5	72.0	72.5	74.5	77.0	73.5	76.0	78.5
6	67.5	68.5	70.0	71.5	73.0	74.5	75.0	77.5	80.0	76.0	79.0	81.5
7	67.5	69.0	70.0	71.5	73.0	75.0	75.0	78.0	80.0	76.0	79.0	81.5
8	62.0	63.0	64.0	65.0	66.5	68.0	67.5	70.0	71.5	68.5	70.5	72.5
9	68.0	69.0	70.5	72.0	73.5	75.5	76.0	78.5	81.0	77.0	80.0	82.5
10	67.0	68.5	69.5	71.0	72.5	74.5	75.0	78.0	80.0	76.5	79.5	82.0
11	67.5	68.5	69.5	71.0	72.5	74.0	74.5	77.0	79.5	75.5	78.5	81.0
12	67.0	68.5	69.5	71.0	72.5	74.0	74.5	77.0	79.5	75.5	78.5	81.0
13	68.5	69.5	71.0	72.5	74.0	75.5	75.5	78.5	81.0	77.0	80.0	82.5
14	68.0	69.0	70.0	72.0	74.0	75.0	76.0	79.0	81.5	77.5	80.5	82.5
15	66.5	68.0	69.0	71.0	72.5	74.0	75.5	78.0	80.5	77.0	80.0	82.5

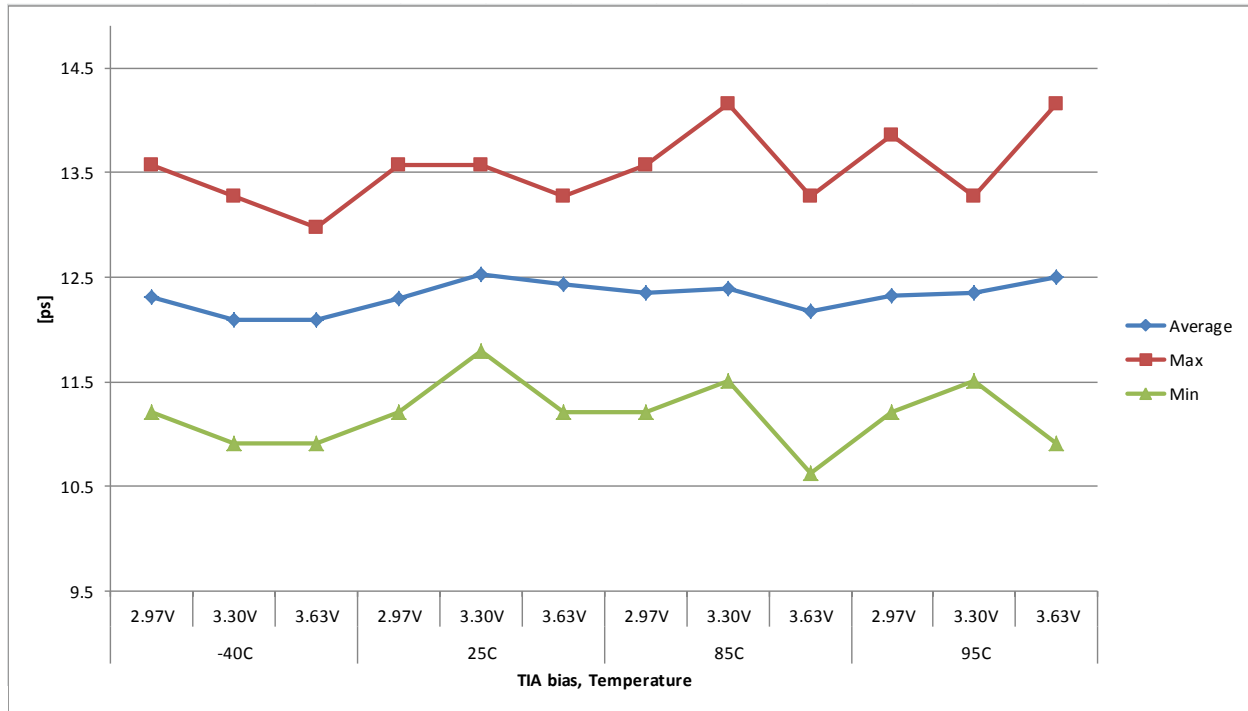
### 3.6.17. Amplitude at -10 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	99.3	100.8	102.2	104.3	106.2	108.0	106.8	109.2	111.5	107.1	109.8	112.1
<b>Std. Dev.</b>	2.6	2.7	2.6	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.4
<b>Max</b>	101.5	103.0	104.5	106.0	108.0	110.0	108.5	111.0	113.5	109.0	112.0	114.5
<b>Min</b>	90.5	92.0	93.5	97.0	98.5	100.5	99.5	102.0	104.0	100.0	102.5	104.5
<b>Range</b>	11.0	11.0	11.0	9.0	9.5	9.5	9.0	9.0	9.5	9.0	9.5	10.0
<b>Median</b>	100.0	101.5	103.0	105.0	107.0	108.5	107.5	110.0	112.5	108.0	110.5	113.0
1	99.0	100.5	102.0	105.0	107.0	108.5	107.5	110.0	112.5	108.0	110.5	113.0
2	100.0	102.0	103.0	105.5	107.5	109.0	107.5	110.0	112.5	108.0	111.0	113.5
3	98.0	99.5	101.0	103.5	105.5	107.0	106.0	108.5	110.5	106.5	109.0	111.0
4	100.0	101.5	103.0	105.0	106.5	108.5	107.0	109.5	112.0	107.5	110.0	112.5
5	98.0	99.5	101.0	102.5	104.5	106.5	105.0	107.5	109.5	105.5	108.0	110.0
6	100.0	101.5	103.0	105.0	107.0	108.5	107.5	110.0	112.0	107.5	110.5	112.5
7	101.0	102.5	104.0	106.0	107.5	109.5	108.0	110.5	113.0	108.5	111.0	113.5
8	90.5	92.0	93.5	97.0	98.5	100.5	99.5	102.0	104.0	100.0	102.5	104.5
9	100.5	102.0	103.5	105.5	107.5	109.5	108.0	110.5	113.0	108.5	111.0	113.5
10	100.5	102.0	103.5	105.5	107.5	109.5	108.0	110.5	112.5	108.5	111.0	113.5
11	99.0	100.5	102.0	103.5	105.5	107.5	106.5	108.5	111.0	106.5	109.0	111.5
12	99.5	101.0	102.0	104.0	106.0	107.5	106.5	109.0	111.0	106.5	109.0	111.5
13	101.0	102.5	104.0	105.5	107.5	109.5	108.0	110.5	112.5	108.5	111.0	113.5
14	100.5	102.0	103.5	105.0	107.0	109.0	108.0	110.0	112.5	108.0	111.0	113.0
15	101.5	103.0	104.5	106.0	108.0	110.0	108.5	111.0	113.5	109.0	112.0	114.5

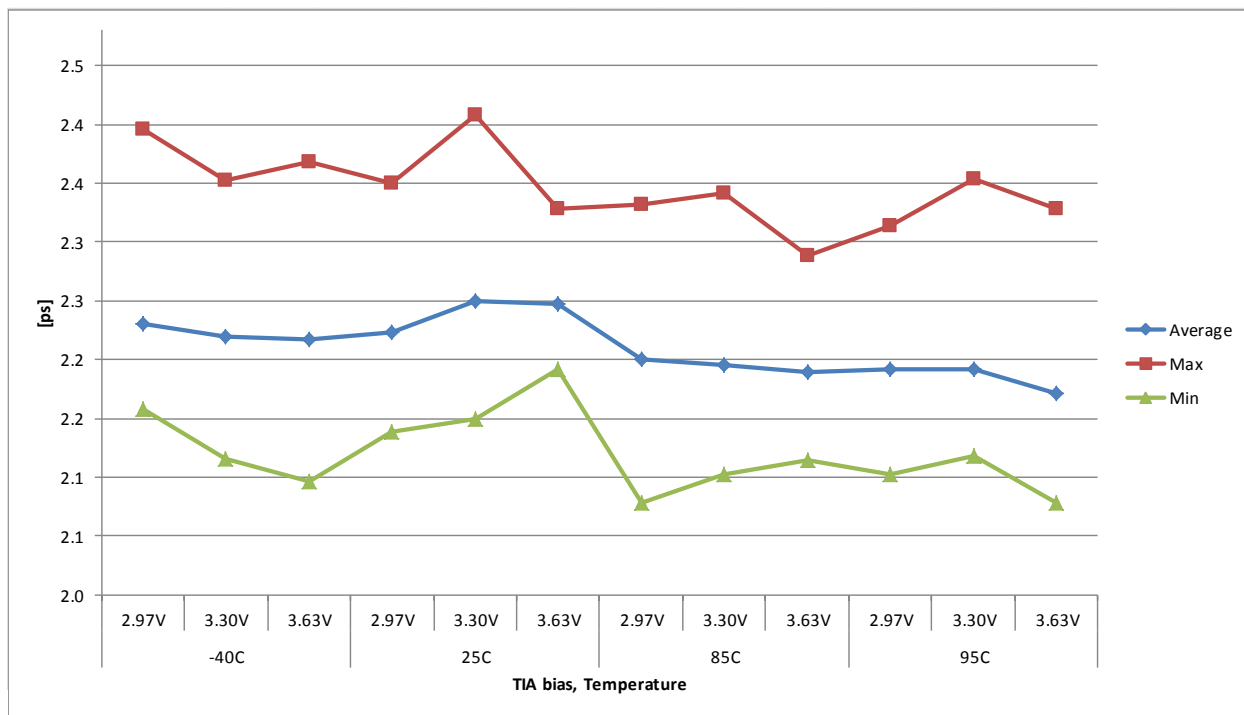


### 3.6.18. Jitter pk-pk at -10 dBm avg. Power at 1550nm and 11.3Gbps



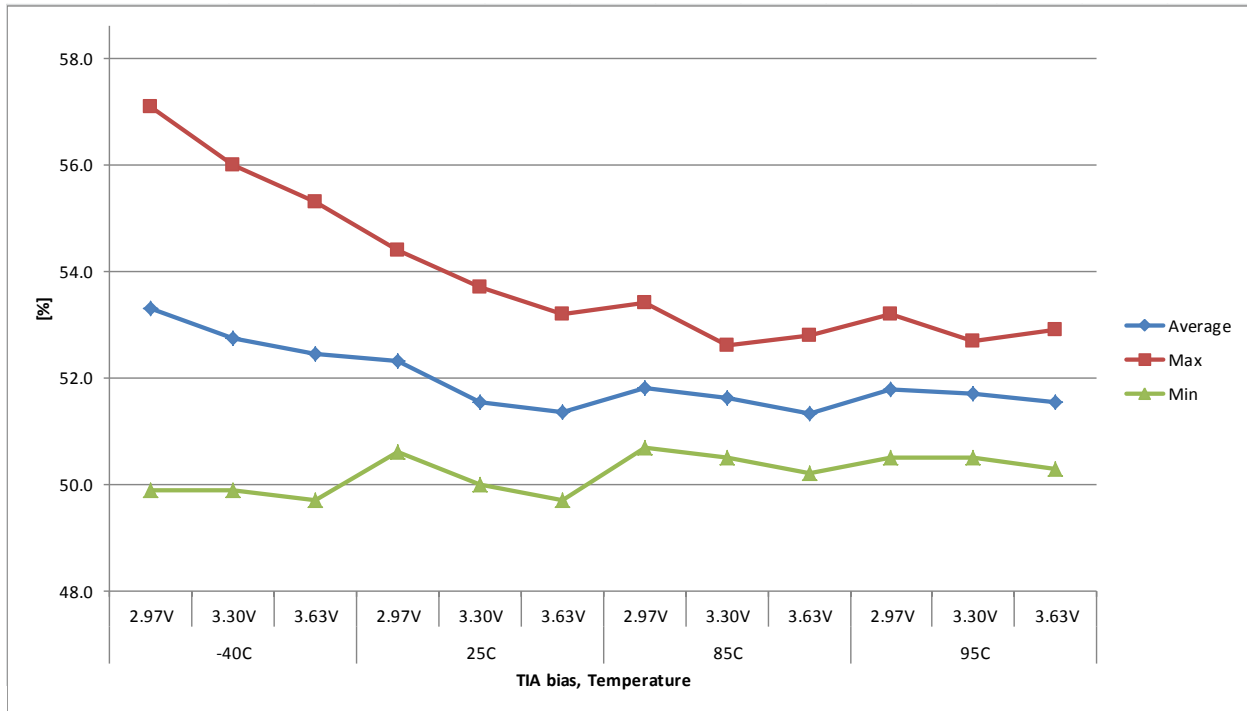
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	12.3	12.1	12.1	12.3	12.5	12.4	12.3	12.4	12.2	12.3	12.3	12.5
<b>Std. Dev.</b>	0.7	0.8	0.7	0.8	0.5	0.7	0.7	0.8	0.7	0.8	0.6	0.9
<b>Max</b>	13.6	13.3	13.0	13.6	13.6	13.3	13.6	14.2	13.3	13.9	13.3	14.2
<b>Min</b>	11.2	10.9	10.9	11.2	11.8	11.2	11.2	11.5	10.6	11.2	11.5	10.9
<b>Range</b>	2.4	2.4	2.1	2.4	1.8	2.1	2.4	2.7	2.7	2.7	1.8	3.2
<b>Median</b>	12.1	11.8	12.1	12.1	12.4	12.7	12.4	12.1	12.1	12.1	12.4	12.4
1	12.1	10.9	11.8	11.5	13.0	13.0	13.6	11.8	11.8	12.1	12.7	12.4
2	13.3	11.8	13.0	11.8	13.6	12.4	13.0	12.1	13.3	12.4	11.8	13.0
3	13.0	11.8	10.9	11.2	12.7	11.2	12.4	13.0	11.5	12.1	11.8	11.5
4	12.1	11.2	11.8	13.6	12.1	12.7	12.4	12.1	11.8	12.7	13.0	11.8
5	12.1	12.1	12.4	13.6	12.4	12.7	13.0	13.3	13.0	13.9	11.5	12.1
6	11.8	11.8	11.2	13.0	12.4	13.3	11.2	12.1	11.5	11.2	12.1	12.7
7	12.1	11.5	12.7	11.8	11.8	11.8	12.1	12.1	10.6	12.4	11.8	13.9
8	13.6	13.3	13.0	12.4	12.4	13.0	13.0	13.6	12.1	13.3	12.4	14.2
9	12.7	10.9	11.5	12.4	12.7	12.1	12.1	12.1	12.4	12.1	12.1	11.8
10	12.1	12.7	12.1	11.8	12.7	13.3	13.0	14.2	12.1	11.2	13.3	13.3
11	12.7	12.7	12.7	13.3	12.7	12.1	12.4	13.0	13.0	13.3	13.3	13.3
12	11.2	13.3	11.8	12.4	12.4	11.5	11.2	11.8	12.4	11.8	11.8	12.4
13	12.7	13.0	12.1	12.1	13.0	12.7	12.1	11.5	12.1	13.3	12.7	11.8
14	11.8	11.8	13.0	12.1	12.4	13.3	11.8	11.8	12.4	11.8	12.4	12.7
15	11.5	12.7	11.5	11.5	11.8	11.5	12.1	11.5	12.7	11.5	12.7	10.9

### 3.6.19. Jitter RMS at -10 dBm avg. Power at 1550nm and 11.3Gbps



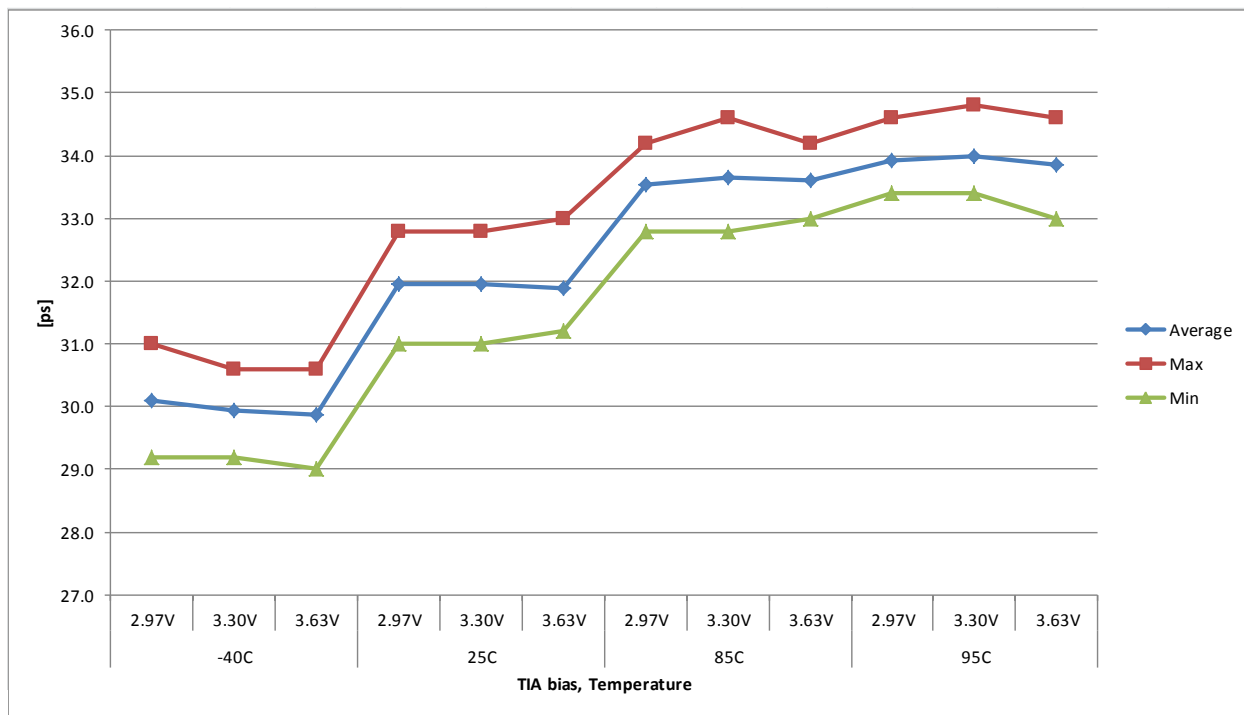
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
<b>Max</b>	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.3
<b>Min</b>	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1
<b>Range</b>	0.2	0.2	0.3	0.2	0.3	0.1	0.3	0.2	0.2	0.2	0.2	0.3
<b>Median</b>	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2
2	2.2	2.3	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.1
3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1
4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1
5	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.2
6	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.1
7	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2
8	2.4	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.3	2.4	2.3
9	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.1
10	2.2	2.4	2.2	2.2	2.4	2.3	2.2	2.3	2.2	2.3	2.3	2.3
11	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
12	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
13	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2
14	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.2	2.2	2.2	2.2	2.2
15	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1

### 3.6.20. Crossing Percentage at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



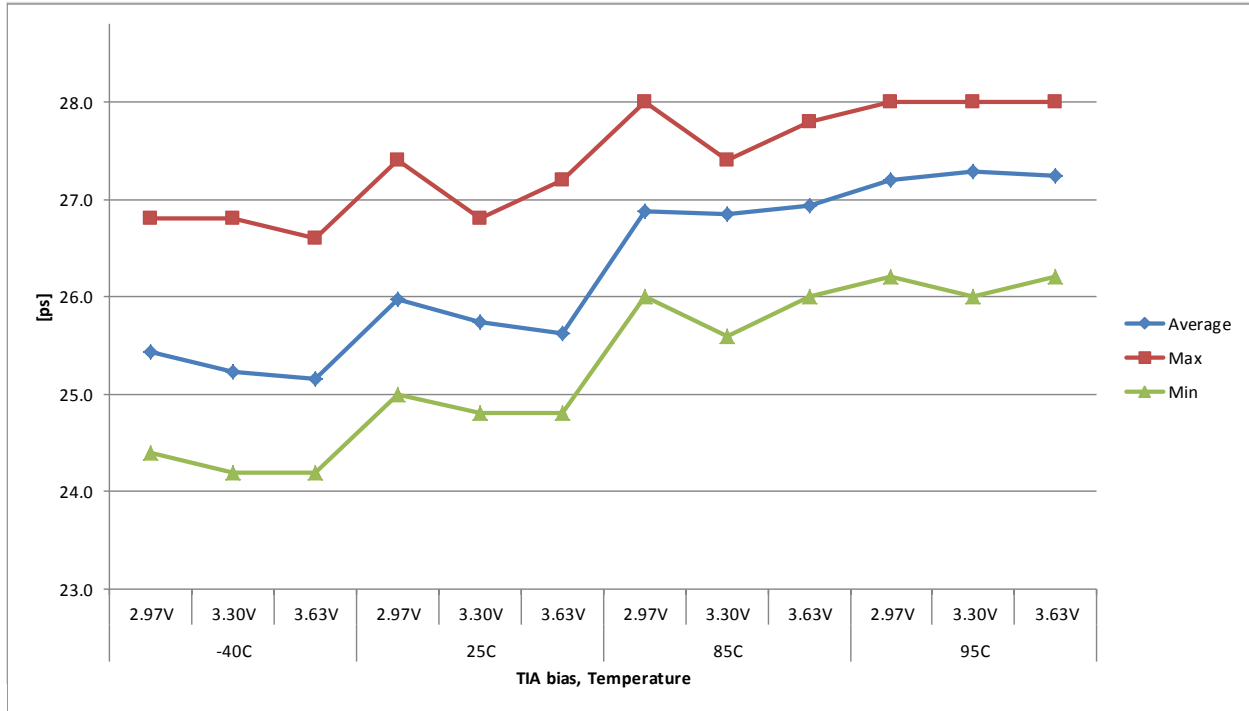
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	53.3	52.8	52.4	52.3	51.5	51.4	51.8	51.6	51.3	51.8	51.7	51.5
<b>Std. Dev.</b>	1.9	1.6	1.5	1.2	1.1	1.1	0.7	0.7	0.8	0.7	0.8	0.8
<b>Max</b>	57.1	56.0	55.3	54.4	53.7	53.2	53.4	52.6	52.8	53.2	52.7	52.9
<b>Min</b>	49.9	49.9	49.7	50.6	50.0	49.7	50.7	50.5	50.2	50.5	50.5	50.3
<b>Range</b>	7.2	6.1	5.6	3.8	3.7	3.5	2.7	2.1	2.6	2.7	2.2	2.6
<b>Median</b>	53.6	53.2	53.1	52.7	51.8	51.5	51.7	51.7	51.4	51.9	51.9	51.7
1	51.1	51.2	51.0	50.7	50.4	50.4	50.9	50.8	50.7	51.0	50.7	50.9
2	54.3	53.3	53.3	52.7	51.8	51.5	51.7	51.7	51.4	52.1	52.2	51.7
3	49.9	49.9	49.7	50.8	50.0	49.7	50.7	50.5	50.2	50.9	50.5	50.3
4	54.6	53.8	53.4	53.3	52.4	52.3	52.4	52.2	52.0	52.4	52.5	52.2
5	52.9	52.6	52.3	51.6	51.2	50.9	51.5	51.2	51.0	51.9	51.6	51.8
6	52.1	51.3	51.4	51.6	50.9	50.9	51.1	51.2	50.7	51.9	51.9	51.7
7	50.8	50.9	50.0	50.6	50.2	49.9	51.3	51.1	50.3	50.5	50.7	50.4
8	57.1	56.0	55.3	54.4	53.7	53.2	53.4	52.6	52.8	53.2	52.7	52.5
9	53.0	52.4	52.5	52.3	51.4	51.0	51.7	51.3	51.1	51.6	51.4	51.1
10	54.3	53.4	53.3	53.1	52.4	52.0	52.3	52.2	52.0	51.8	52.3	52.9
11	53.6	53.2	53.1	52.7	51.9	51.8	51.9	51.9	51.7	52.4	52.1	51.9
12	54.3	53.8	53.2	53.1	52.2	51.7	51.9	52.0	51.6	51.6	51.5	51.4
13	51.9	51.3	51.0	51.1	50.0	50.3	51.2	50.8	50.6	50.9	50.5	50.5
14	55.0	54.3	54.1	53.9	52.5	53.1	52.9	52.4	52.2	52.5	52.6	52.3
15	54.8	53.9	53.1	52.8	52.2	51.6	52.1	52.4	51.8	51.9	52.3	51.6

### 3.6.21. Rise Time at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



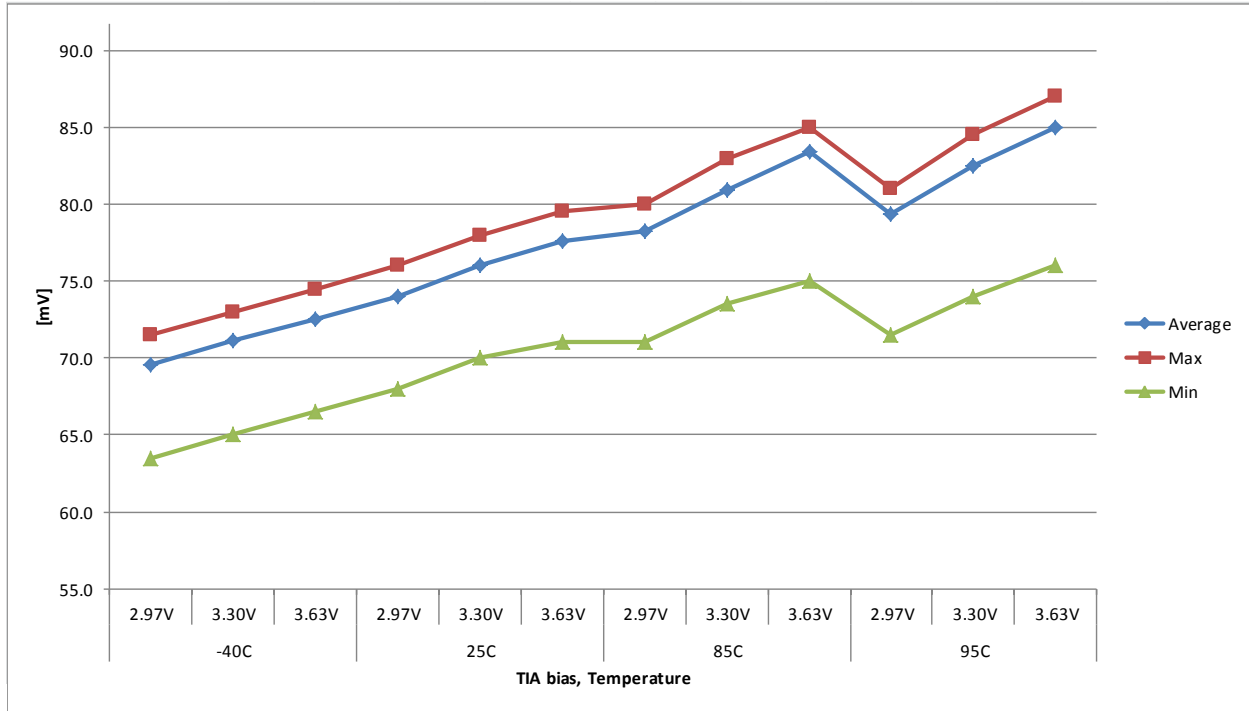
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	30.1	29.9	29.9	32.0	32.0	31.9	33.5	33.7	33.6	33.9	34.0	33.9
<b>Std. Dev.</b>	0.5	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5
<b>Max</b>	31.0	30.6	30.6	32.8	32.8	33.0	34.2	34.6	34.2	34.6	34.8	34.6
<b>Min</b>	29.2	29.2	29.0	31.0	31.0	31.2	32.8	32.8	33.0	33.4	33.4	33.0
<b>Range</b>	1.8	1.4	1.6	1.8	1.8	1.8	1.4	1.8	1.2	1.2	1.4	1.6
<b>Median</b>	30.0	30.0	29.8	31.8	31.8	31.8	33.6	33.6	33.6	34.0	34.0	34.0
1	30.0	30.0	29.8	32.2	32.2	31.8	33.4	33.4	33.4	33.6	33.6	33.6
2	30.0	29.8	30.0	32.2	32.2	32.2	34.0	34.0	34.0	34.0	34.2	34.0
3	30.4	30.0	30.0	31.8	31.8	31.6	33.4	33.6	33.4	34.0	34.2	33.6
4	29.4	29.8	29.8	31.6	31.6	31.6	32.8	33.0	33.0	33.4	33.4	33.4
5	30.0	30.0	29.8	32.2	31.6	32.2	34.0	33.6	33.6	34.2	34.0	34.2
6	30.4	29.8	29.8	31.2	31.6	31.6	33.0	33.4	33.4	34.0	33.6	33.4
7	29.4	29.8	29.2	31.6	31.6	31.6	32.8	33.4	33.4	33.4	33.6	33.6
8	30.4	30.0	30.0	32.4	32.4	32.2	34.2	33.6	34.0	34.0	34.2	34.0
9	30.0	30.0	30.0	31.8	31.8	31.6	33.6	34.0	33.6	34.0	34.0	34.0
10	30.4	30.0	30.4	32.8	32.4	32.2	34.0	34.2	34.0	34.2	34.6	34.6
11	31.0	30.6	30.6	32.8	32.8	33.0	34.2	34.6	34.2	34.6	34.8	34.6
12	29.8	29.8	29.4	31.6	31.2	31.2	33.0	32.8	33.0	33.4	33.6	33.4
13	30.6	30.4	30.4	32.4	32.8	32.4	34.2	34.2	34.2	34.2	34.6	34.2
14	30.4	30.0	29.8	31.8	32.4	31.8	33.6	34.0	33.6	34.2	34.2	34.2
15	29.2	29.2	29.0	31.0	31.0	31.2	33.0	33.0	33.4	33.6	33.4	33.0

### 3.6.22. Fall Time at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



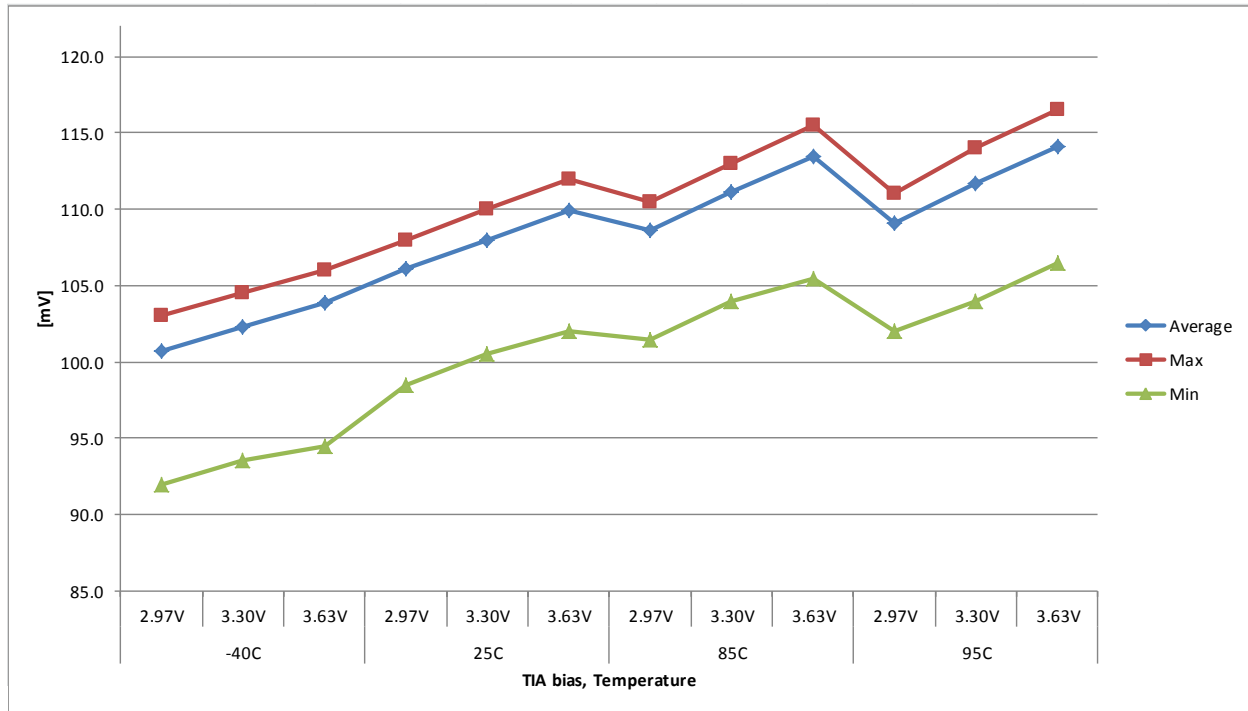
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	25.4	25.2	25.2	26.0	25.7	25.6	26.9	26.9	26.9	27.2	27.3	27.2
<b>Std. Dev.</b>	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.5	0.5	0.5	0.6	0.5
<b>Max</b>	26.8	26.8	26.6	27.4	26.8	27.2	28.0	27.4	27.8	28.0	28.0	28.0
<b>Min</b>	24.4	24.2	24.2	25.0	24.8	24.8	26.0	25.6	26.0	26.2	26.0	26.2
<b>Range</b>	2.4	2.6	2.4	2.4	2.0	2.4	2.0	1.8	1.8	1.8	2.0	1.8
<b>Median</b>	25.0	25.4	24.8	26.0	26.0	25.6	26.8	26.8	26.8	27.4	27.4	27.4
1	25.0	24.8	24.8	25.6	25.4	25.0	26.2	26.6	26.6	26.6	26.8	26.8
2	25.6	25.0	25.4	26.0	26.0	26.0	27.2	27.2	27.2	27.4	27.8	27.4
3	25.0	24.8	24.8	25.6	25.4	25.0	26.6	26.6	26.6	27.2	27.2	26.8
4	24.8	25.0	24.8	26.0	25.4	25.4	26.6	26.6	26.6	27.4	27.4	27.4
5	25.6	25.4	25.4	26.6	26.0	26.2	27.2	27.4	27.4	27.4	27.4	27.4
6	24.8	24.4	24.4	25.0	24.8	25.0	26.0	26.0	26.2	26.6	26.6	26.6
7	25.0	25.4	24.8	25.6	26.0	25.6	26.8	26.8	26.8	27.4	26.8	27.2
8	26.8	26.8	26.6	27.4	26.8	26.6	28.0	27.4	27.8	28.0	28.0	27.4
9	26.0	25.4	25.6	26.2	26.2	26.0	27.4	27.4	27.4	27.4	27.8	27.8
10	26.0	25.6	25.6	26.2	26.0	26.0	27.4	27.2	27.2	27.4	27.8	27.8
11	26.6	26.2	26.2	27.2	26.8	27.2	27.4	27.4	27.8	28.0	28.0	28.0
12	24.8	24.4	24.4	25.0	24.8	24.8	26.0	25.6	26.0	26.2	26.0	26.2
13	26.0	25.6	25.6	26.2	26.0	25.6	27.2	27.2	27.2	27.4	27.4	27.4
14	25.0	25.4	24.8	25.6	25.6	25.0	26.6	26.8	26.6	26.8	27.4	27.2
15	24.4	24.2	24.2	25.4	25.0	25.0	26.6	26.6	26.6	26.8	26.8	27.2

### 3.6.23. Height at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



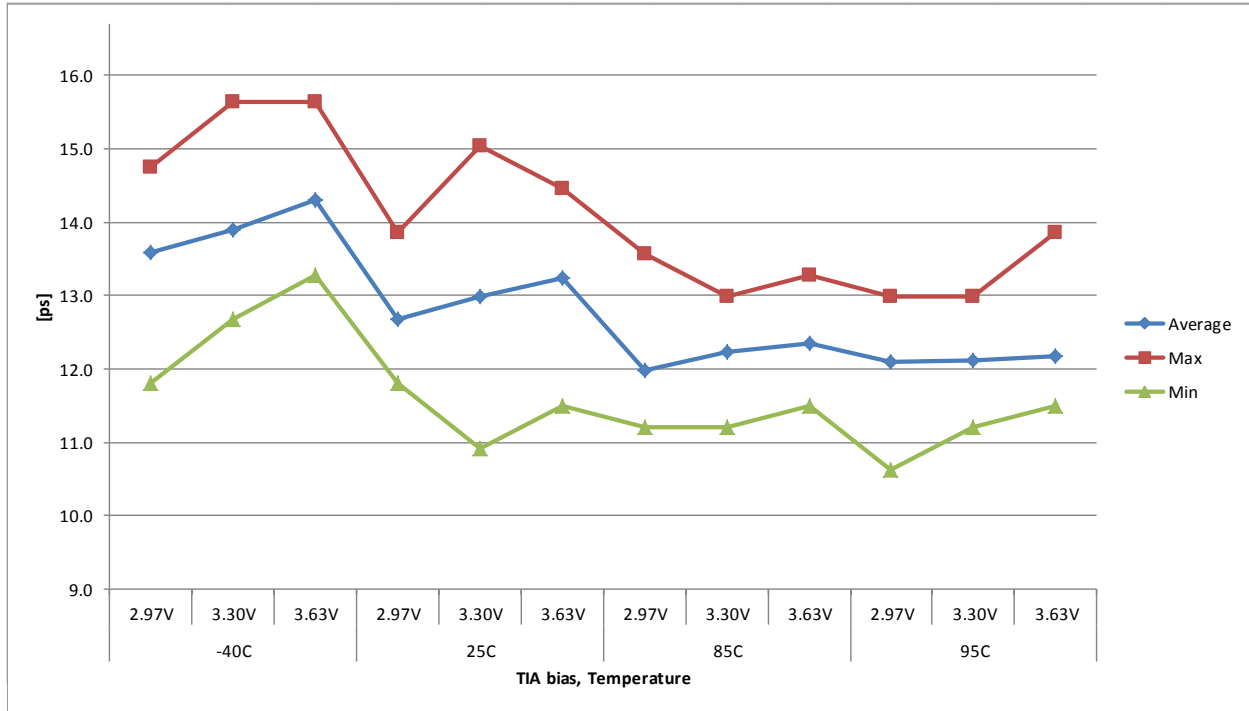
Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	69.5	71.1	72.5	74.0	76.0	77.6	78.2	80.9	83.4	79.4	82.5	85.0
<b>Std. Dev.</b>	1.9	1.9	1.9	1.8	1.8	2.0	2.2	2.3	2.5	2.3	2.6	2.7
<b>Max</b>	71.5	73.0	74.5	76.0	78.0	79.5	80.0	83.0	85.0	81.0	84.5	87.0
<b>Min</b>	63.5	65.0	66.5	68.0	70.0	71.0	71.0	73.5	75.0	71.5	74.0	76.0
<b>Range</b>	8.0	8.0	8.0	8.0	8.0	8.5	9.0	9.5	10.0	9.5	10.5	11.0
<b>Median</b>	70.0	71.5	73.0	74.5	76.5	78.0	78.5	81.5	84.0	80.0	83.0	85.5
1	68.5	70.0	71.5	74.0	76.0	77.5	79.5	82.0	84.5	80.5	83.5	86.0
2	70.0	71.5	73.0	74.0	76.0	78.0	78.0	81.0	83.5	79.5	82.5	85.5
3	69.5	71.0	72.5	74.5	76.5	78.0	78.5	81.0	83.5	79.5	82.5	85.0
4	70.0	71.5	73.0	74.5	76.5	78.0	78.5	81.5	84.0	80.0	83.0	85.5
5	68.5	70.0	71.0	72.5	74.5	76.0	76.5	78.5	81.5	77.5	80.5	83.0
6	70.0	71.5	73.0	74.5	76.5	78.0	78.5	81.5	83.5	80.0	83.0	85.5
7	71.0	72.5	74.0	75.0	77.0	78.5	79.5	82.0	84.5	80.5	83.5	86.0
8	63.5	65.0	66.5	68.0	70.0	71.0	71.0	73.5	75.0	71.5	74.0	76.0
9	71.0	72.5	74.0	75.5	77.5	79.5	80.0	83.0	85.0	81.0	84.5	87.0
10	70.0	71.5	73.0	74.5	76.5	78.0	78.5	81.5	84.0	80.0	83.5	86.5
11	70.0	71.5	73.0	74.0	76.0	77.5	78.0	80.5	83.5	79.5	82.0	85.0
12	69.5	71.5	72.5	74.0	76.0	77.5	78.5	81.0	83.5	79.0	82.5	85.0
13	71.5	73.0	74.5	76.0	78.0	79.5	80.0	82.5	85.0	81.0	84.5	86.5
14	70.5	72.0	73.5	75.0	77.0	79.0	79.5	82.5	85.0	80.5	84.0	86.5
15	69.5	71.5	72.5	74.5	76.0	77.5	79.0	82.0	85.0	80.5	84.0	86.5

### 3.6.24. Amplitude at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	100.7	102.3	103.9	106.1	108.0	109.9	108.7	111.2	113.4	109.1	111.7	114.1
<b>Std. Dev.</b>	2.7	2.7	2.8	2.3	2.3	2.5	2.2	2.2	2.4	2.2	2.4	2.4
<b>Max</b>	103.0	104.5	106.0	108.0	110.0	112.0	110.5	113.0	115.5	111.0	114.0	116.5
<b>Min</b>	92.0	93.5	94.5	98.5	100.5	102.0	101.5	104.0	105.5	102.0	104.0	106.5
<b>Range</b>	11.0	11.0	11.5	9.5	9.5	10.0	9.0	9.0	10.0	9.0	10.0	10.0
<b>Median</b>	101.5	103.0	104.5	107.0	108.5	110.5	109.5	112.0	114.5	110.0	112.5	115.0
1	100.5	102.0	104.0	106.5	108.5	110.5	109.5	112.0	114.5	110.0	112.5	115.0
2	102.0	103.5	105.0	107.0	109.0	111.0	109.5	112.0	114.5	110.0	113.0	115.5
3	99.5	101.0	102.5	105.5	107.0	109.0	108.0	110.5	112.5	108.5	111.0	113.0
4	101.5	103.0	104.5	106.5	108.5	110.5	109.0	111.5	114.0	109.5	112.0	114.5
5	99.5	101.0	102.5	104.5	106.5	108.0	107.0	109.5	111.5	107.5	110.0	112.0
6	101.5	103.0	104.5	107.0	108.5	110.5	109.5	111.5	114.0	109.5	112.5	114.5
7	102.5	104.0	105.5	107.5	109.5	111.5	110.0	112.5	115.0	110.5	113.0	115.5
8	92.0	93.5	94.5	98.5	100.5	102.0	101.5	104.0	105.5	102.0	104.0	106.5
9	102.0	104.0	105.5	107.5	109.5	111.5	110.0	113.0	115.0	110.5	113.0	115.5
10	102.0	103.5	105.5	107.0	109.0	111.0	109.5	112.5	114.5	110.5	113.0	115.5
11	100.0	102.0	103.5	105.5	107.0	109.0	108.0	110.5	113.0	108.5	111.0	113.5
12	100.5	102.0	104.0	105.5	107.5	109.5	108.5	110.5	113.0	108.5	111.0	113.5
13	102.5	104.0	105.5	107.5	109.5	111.5	110.0	112.5	114.5	110.5	113.0	115.5
14	102.0	103.5	105.0	107.0	109.0	111.0	109.5	112.0	114.5	110.0	112.5	115.0
15	103.0	104.5	106.0	108.0	110.0	112.0	110.5	113.0	115.5	111.0	114.0	116.5

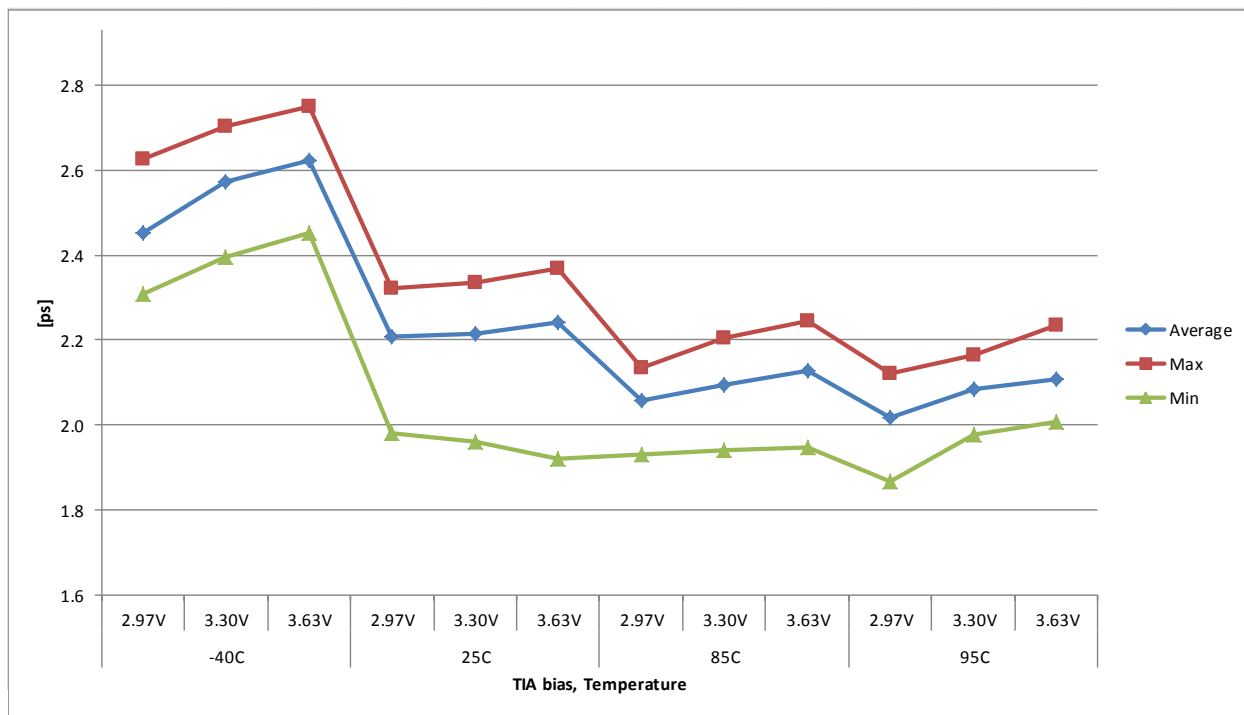
### 3.6.25. Jitter pk-pk at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	13.6	13.9	14.3	12.7	13.0	13.2	12.0	12.2	12.3	12.1	12.1	12.2
<b>Std. Dev.</b>	0.7	0.8	0.7	0.6	1.0	0.8	0.6	0.6	0.6	0.6	0.6	0.6
<b>Max</b>	14.7	15.6	15.6	13.9	15.0	14.5	13.6	13.0	13.3	13.0	13.0	13.9
<b>Min</b>	11.8	12.7	13.3	11.8	10.9	11.5	11.2	11.2	11.5	10.6	11.2	11.5
<b>Range</b>	2.9	3.0	2.4	2.1	4.1	3.0	2.4	1.8	1.8	2.4	1.8	2.4
<b>Median</b>	13.6	13.9	14.2	12.7	13.0	13.3	12.1	12.1	12.4	12.1	12.1	12.1
1	14.2	14.2	14.2	12.4	14.2	13.6	11.8	11.8	12.4	12.1	12.1	12.1
2	13.9	13.3	15.0	12.7	15.0	13.3	12.4	12.7	12.1	12.1	12.7	12.1
3	13.3	13.9	14.2	11.8	13.3	12.7	11.5	11.8	13.0	12.1	12.7	12.1
4	12.7	13.3	14.7	13.6	13.0	12.4	13.6	12.1	12.4	11.5	12.4	12.1
5	13.9	14.2	14.7	12.7	13.6	13.9	12.1	12.4	13.3	12.4	11.2	13.3
6	14.7	14.5	14.7	13.3	12.7	13.0	12.4	12.7	11.5	11.8	12.1	12.4
7	13.6	14.5	15.0	12.7	12.7	12.7	11.5	11.8	11.8	12.4	13.0	11.8
8	13.3	13.6	13.6	12.1	10.9	11.5	11.5	11.8	11.5	13.0	11.5	11.8
9	13.6	13.9	14.2	13.0	11.8	13.6	12.4	13.0	12.4	11.5	12.4	11.5
10	14.2	13.6	15.6	12.4	13.3	14.2	12.1	12.1	12.1	13.0	11.2	12.1
11	13.0	13.0	13.3	12.4	12.1	13.3	12.1	12.7	13.0	10.6	12.1	11.8
12	11.8	13.6	13.9	11.8	13.3	13.6	11.2	11.5	11.8	12.4	11.8	13.9
13	13.9	15.6	13.6	13.6	13.0	13.9	11.5	13.0	13.0	12.1	11.5	11.8
14	13.6	12.7	13.9	12.1	12.7	12.7	11.5	13.0	12.4	11.8	13.0	11.5
15	14.5	15.0	13.9	13.9	13.3	14.5	12.1	11.2	12.7	12.7	12.1	12.4



### 3.6.26. Jitter RMS at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	2.5	2.6	2.6	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.1
<b>Std. Dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
<b>Max</b>	2.6	2.7	2.8	2.3	2.3	2.4	2.1	2.2	2.2	2.1	2.2	2.2
<b>Min</b>	2.3	2.4	2.5	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0
<b>Range</b>	0.3	0.3	0.3	0.3	0.4	0.4	0.2	0.3	0.3	0.3	0.2	0.2
<b>Median</b>	2.4	2.6	2.6	2.2	2.3	2.3	2.1	2.1	2.1	2.0	2.1	2.1
1	2.4	2.6	2.7	2.2	2.3	2.3	2.1	2.1	2.2	2.1	2.1	2.2
2	2.5	2.5	2.6	2.2	2.3	2.3	2.1	2.1	2.1	2.0	2.1	2.1
3	2.4	2.6	2.6	2.1	2.1	2.2	2.0	2.1	2.1	2.0	2.1	2.1
4	2.4	2.5	2.6	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1
5	2.4	2.5	2.6	2.2	2.2	2.3	2.0	2.1	2.1	2.0	2.0	2.1
6	2.6	2.7	2.8	2.3	2.3	2.3	2.1	2.0	2.1	2.0	2.1	2.0
7	2.5	2.7	2.7	2.3	2.3	2.2	2.1	2.1	2.2	2.0	2.1	2.1
8	2.6	2.5	2.5	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0
9	2.4	2.5	2.6	2.1	2.2	2.3	2.1	2.1	2.1	2.0	2.1	2.1
10	2.5	2.6	2.7	2.3	2.2	2.3	2.1	2.2	2.2	2.0	2.1	2.1
11	2.3	2.4	2.5	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1
12	2.3	2.5	2.5	2.1	2.2	2.2	1.9	2.0	2.1	2.0	2.1	2.1
13	2.6	2.6	2.7	2.3	2.3	2.3	2.1	2.2	2.1	2.0	2.1	2.2
14	2.4	2.6	2.7	2.3	2.3	2.3	2.1	2.1	2.2	2.1	2.1	2.2
15	2.6	2.7	2.6	2.3	2.3	2.4	2.1	2.1	2.2	2.1	2.2	2.2

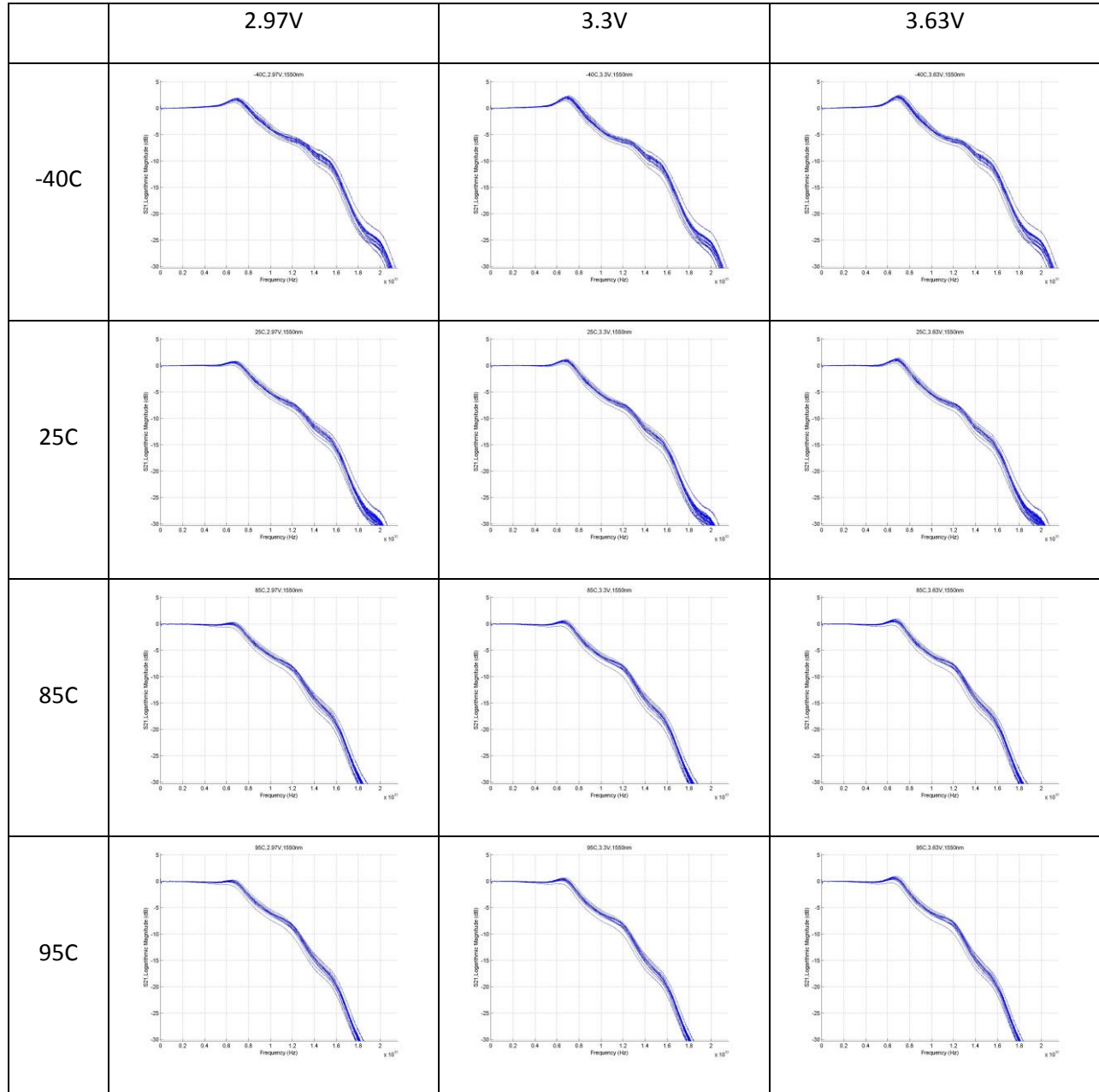


### 3.7. S-parameters

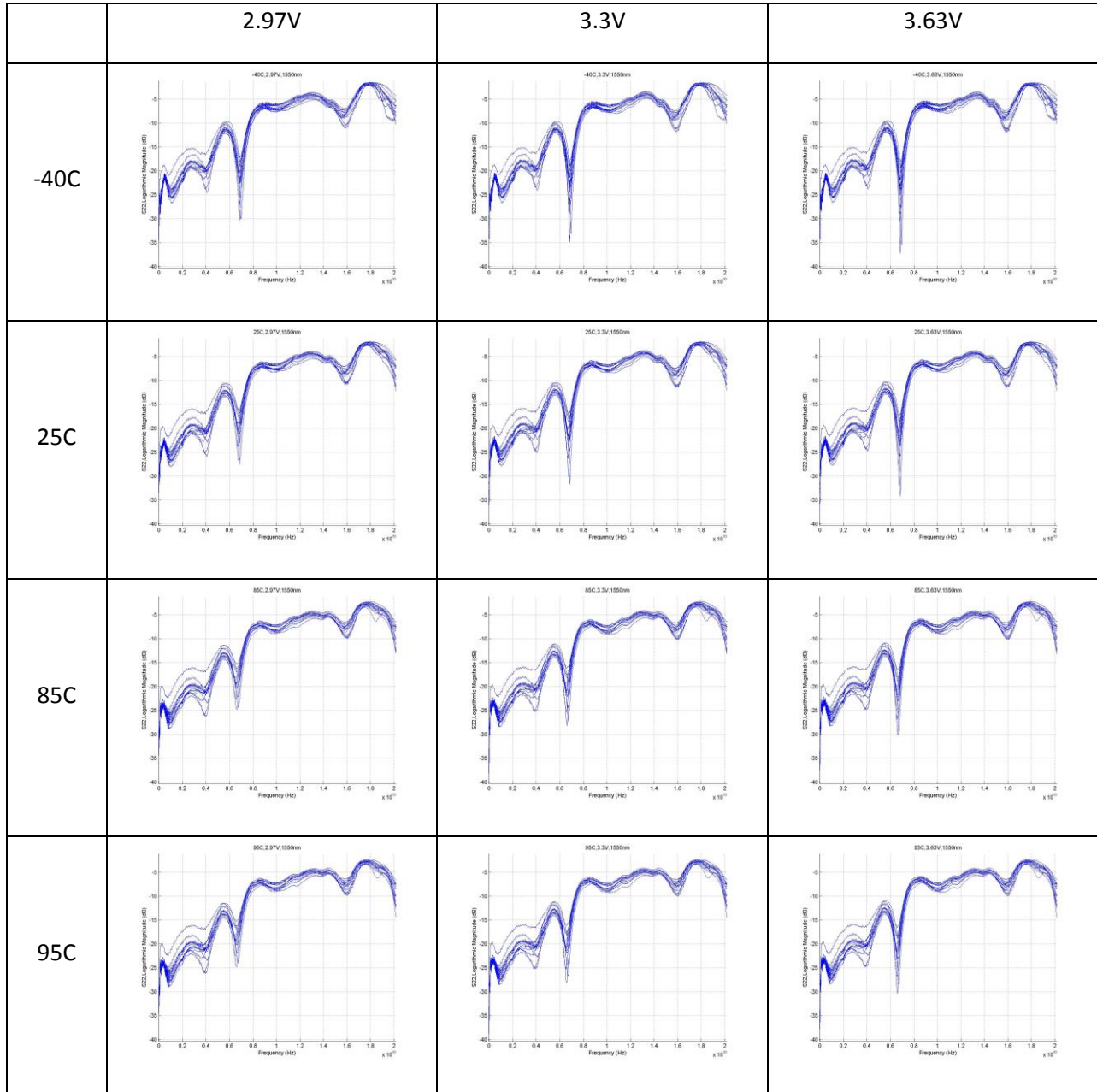
#### 3.7.1. Test Descriptions

An s-parameter sweep was performed with an input optical power of -19dBm and electrical power of 0dBm at 1550nm.

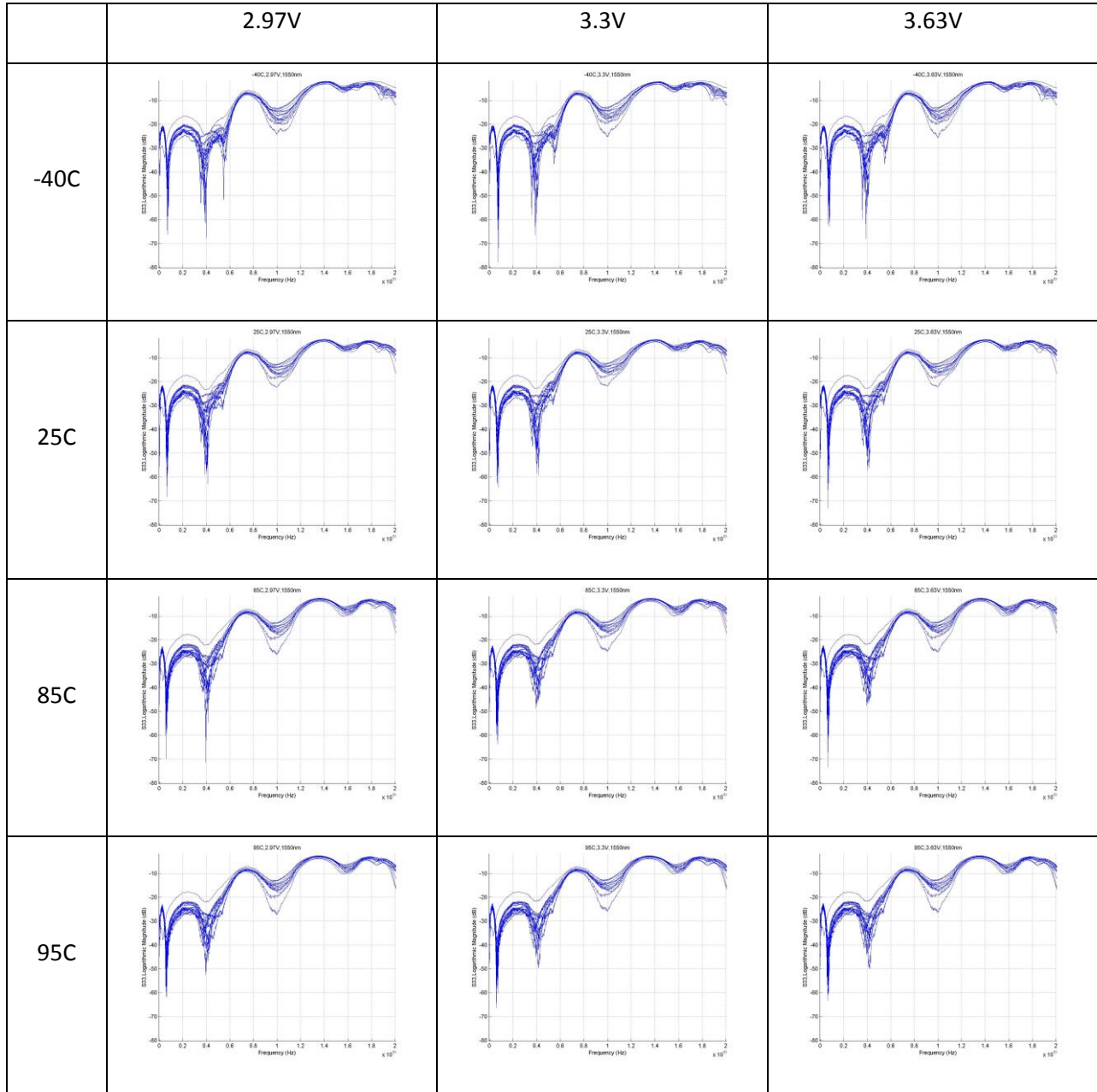
### 3.7.2. P-Channel S21 plots at 1550nm and -19dBm Optical Input Power



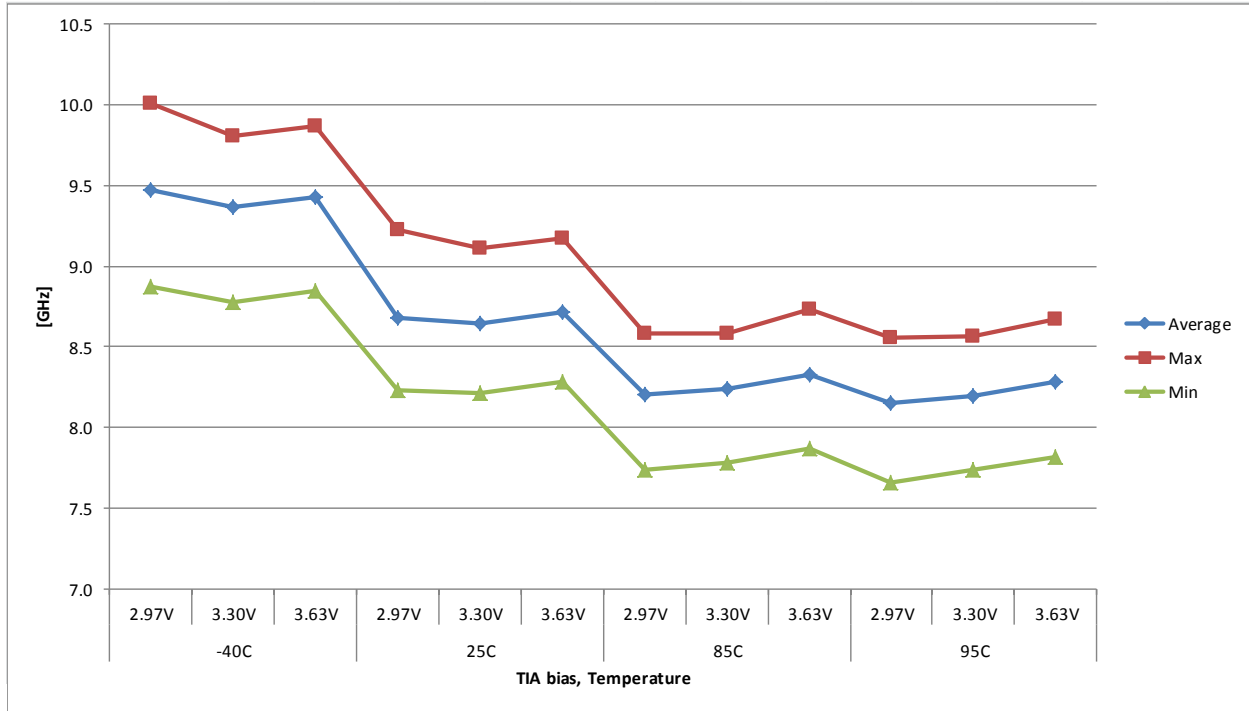
### 3.7.3. P-Channel S22 plots at 0dBm electrical input power



3.7.4. N-Channel S22 plots at 0dBm electrical input power

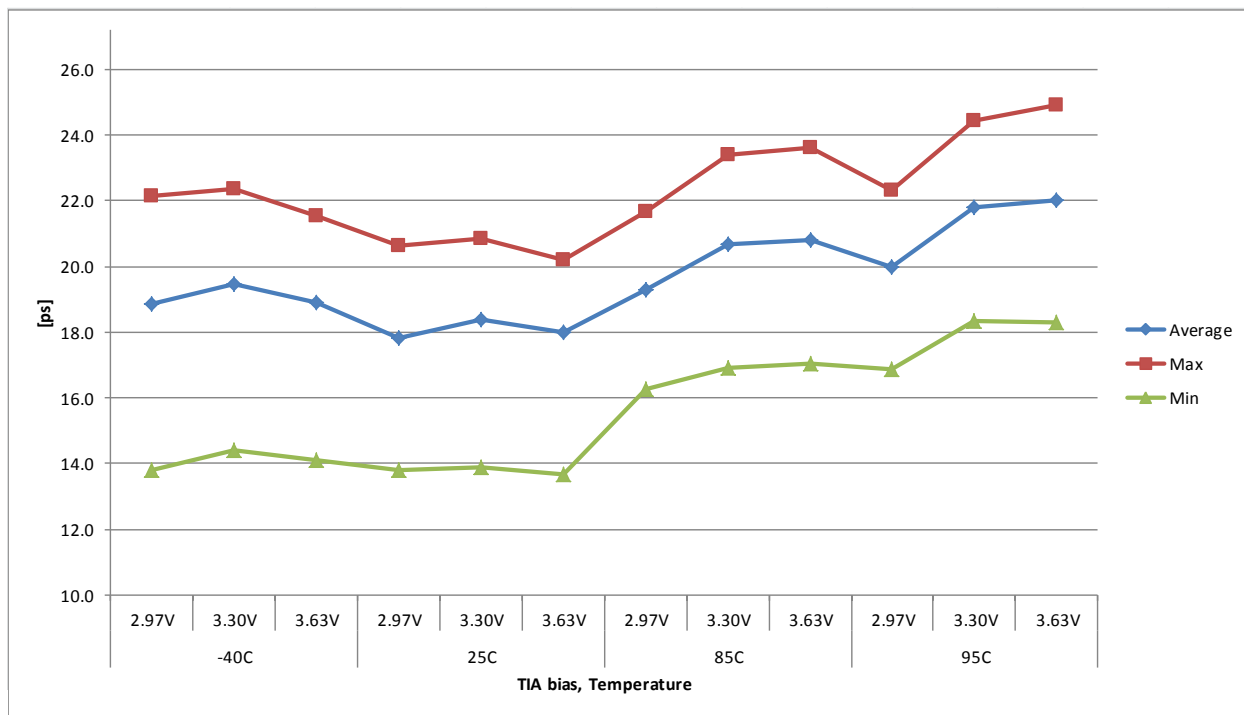


### 3.7.5. S21 -3dB Bandwidth (GHz) at 1550nm



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	9.5	9.4	9.4	8.7	8.6	8.7	8.2	8.2	8.3	8.2	8.2	8.3
<b>Std. Dev.</b>	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Max</b>	10.0	9.8	9.9	9.2	9.1	9.2	8.6	8.6	8.7	8.6	8.6	8.7
<b>Min</b>	8.9	8.8	8.8	8.2	8.2	8.3	7.7	7.8	7.9	7.7	7.7	7.8
<b>Range</b>	1.1	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.9	0.9	0.8	0.9
<b>Median</b>	9.5	9.4	9.4	8.6	8.6	8.7	8.2	8.2	8.3	8.1	8.2	8.3
1	9.8	9.7	9.8	9.0	9.0	9.0	8.4	8.5	8.6	8.4	8.4	8.5
2	9.5	9.4	9.4	8.6	8.6	8.7	8.2	8.2	8.3	8.1	8.2	8.2
3	9.4	9.3	9.4	8.7	8.6	8.8	8.2	8.3	8.3	8.2	8.2	8.3
4	9.5	9.4	9.4	8.8	8.7	8.8	8.3	8.3	8.4	8.2	8.2	8.3
5	9.4	9.3	9.3	8.6	8.5	8.6	8.1	8.1	8.2	8.0	8.0	8.1
6	9.4	9.3	9.3	8.6	8.6	8.7	8.2	8.2	8.3	8.1	8.2	8.3
7	9.7	9.6	9.7	8.9	8.9	8.9	8.4	8.4	8.5	8.3	8.3	8.4
8	8.9	8.8	8.8	8.2	8.2	8.3	7.7	7.8	7.9	7.7	7.7	7.8
9	9.5	9.4	9.5	8.8	8.8	8.9	8.3	8.4	8.5	8.3	8.3	8.4
10	9.5	9.4	9.4	8.6	8.6	8.6	8.1	8.2	8.3	8.1	8.2	8.2
11	9.1	9.0	9.1	8.4	8.4	8.5	8.0	8.0	8.1	7.9	8.0	8.1
12	9.4	9.3	9.4	8.6	8.6	8.6	8.2	8.2	8.3	8.1	8.2	8.2
13	9.3	9.2	9.3	8.6	8.5	8.6	8.1	8.2	8.2	8.1	8.1	8.2
14	9.6	9.5	9.5	8.8	8.7	8.8	8.3	8.3	8.4	8.2	8.3	8.4
15	10.0	9.8	9.9	9.2	9.1	9.2	8.6	8.6	8.7	8.6	8.6	8.7

### 3.7.6. Group Delay (ps) at 1550 nm (6GHz)



Temp [C]	-40C			25C			85C			95C		
TIA Bias [V]	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V	2.97V	3.30V	3.63V
<b>Average</b>	18.9	19.5	18.9	17.8	18.4	18.0	19.3	20.7	20.8	20.0	21.8	22.0
<b>Std. Dev.</b>	2.7	2.4	2.3	2.1	2.1	2.0	1.6	1.9	1.9	1.6	1.8	1.9
<b>Max</b>	22.1	22.4	21.5	20.6	20.9	20.2	21.7	23.4	23.6	22.3	24.4	24.9
<b>Min</b>	13.8	14.4	14.1	13.8	13.9	13.7	16.3	16.9	17.1	16.9	18.4	18.3
<b>Range</b>	8.3	8.0	7.5	6.8	7.0	6.6	5.4	6.5	6.6	5.4	6.1	6.6
<b>Median</b>	18.5	18.9	18.6	17.3	17.8	17.6	18.9	20.5	20.5	19.5	21.5	21.7
1	17.4	17.8	17.3	16.6	16.9	16.9	18.4	19.4	19.7	19.3	21.0	20.8
2	17.4	18.6	18.6	17.0	17.4	17.4	18.8	20.5	20.5	19.5	21.5	21.5
3	17.9	17.9	17.1	16.6	17.1	16.3	17.5	19.1	19.1	18.0	20.1	20.1
4	18.5	18.9	18.5	17.1	17.8	17.6	18.5	20.1	19.9	19.2	21.1	21.2
5	20.8	21.5	20.6	19.7	20.8	20.1	21.0	22.8	23.0	21.8	23.7	24.1
6	21.8	21.9	21.3	19.9	20.7	20.0	21.0	22.6	22.5	21.6	23.8	23.9
7	14.9	16.1	15.2	14.9	15.9	15.6	17.5	18.1	18.6	18.4	19.4	19.5
8	20.9	22.0	21.3	18.7	19.6	19.3	18.9	20.3	20.7	19.1	21.2	21.4
9	18.4	18.7	18.4	17.3	17.4	17.3	19.4	20.6	20.5	20.3	21.9	22.1
10	16.2	18.1	17.5	15.9	16.9	16.9	18.4	19.7	19.9	19.3	21.1	21.7
11	22.1	22.4	21.4	20.6	20.8	20.2	21.0	22.5	22.6	21.7	23.8	23.8
12	22.1	22.2	21.5	19.9	20.2	19.7	20.2	21.8	21.9	20.9	22.4	23.0
13	21.3	21.4	20.6	20.2	20.9	20.0	21.7	23.4	23.6	22.3	24.4	24.9
14	19.5	20.3	20.2	18.8	19.5	19.1	20.8	22.3	22.6	21.4	23.3	23.9
15	13.8	14.4	14.1	13.8	13.9	13.7	16.3	16.9	17.1	16.9	18.4	18.3



#### 4. Notes and Conclusions

GN3250 ROSA using GCS PD shows comparable performance to GN3250 ROSA using Albis PD.

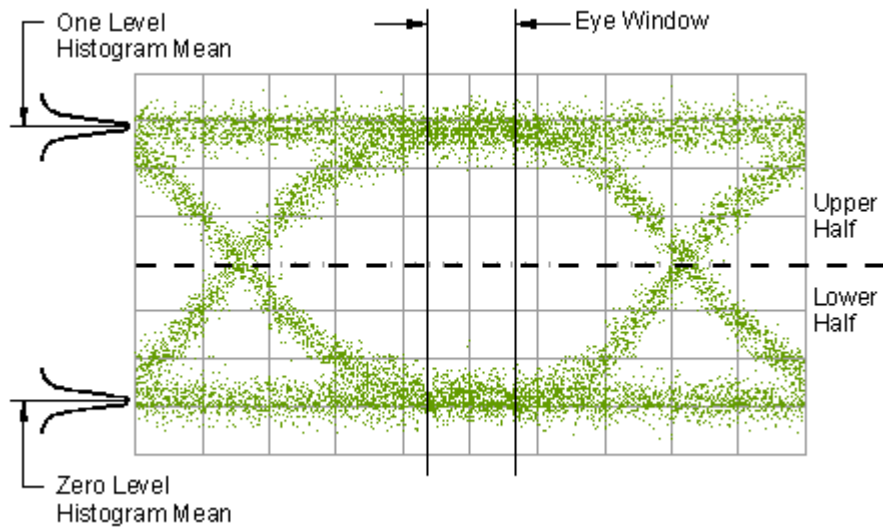
All results satisfy the datasheet.



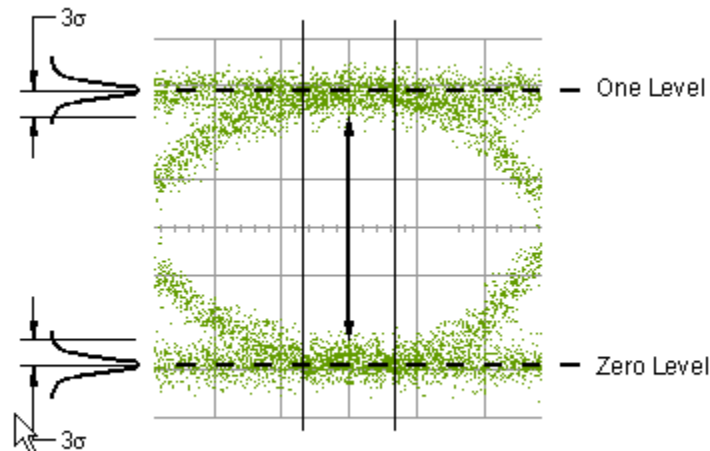
## 5. Appendix 1: Eye Diagram Measurement Definitions

### a. Eye Heights

Eye height is a measure of the vertical opening of an eye diagram. Histograms are constructed to characterize both the one and zero levels *and* their noise levels within the eye window boundaries. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.



The one and zero levels are the relative means of the histograms. The noise is measured through the histograms as three standard deviations from both the one level and zero level into the eye opening.



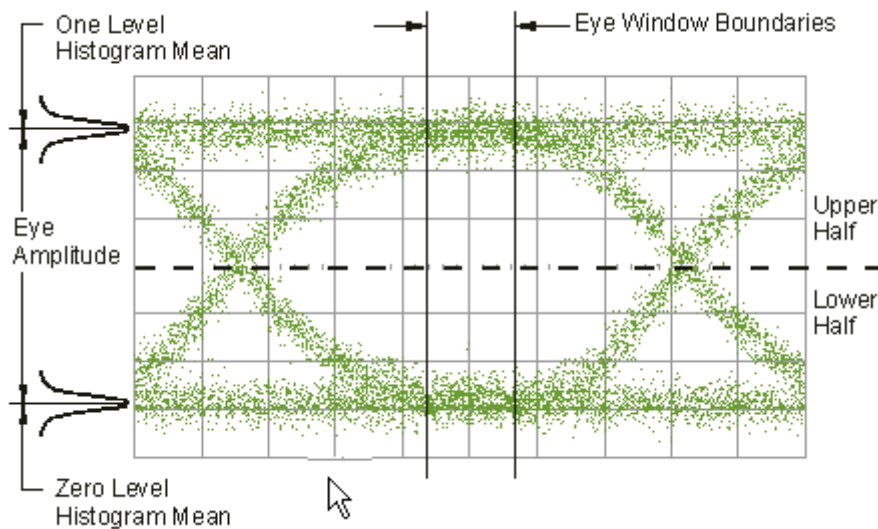


The eye height is determined as follows, eye height = (one level -  $3\sigma$ ) - (zero level +  $3\sigma$ )

b. Eye Amplitudes

Eye amplitude is the difference between the logic 1 level and the logic 0 level histogram mean values of an eye diagram. This measurement is made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

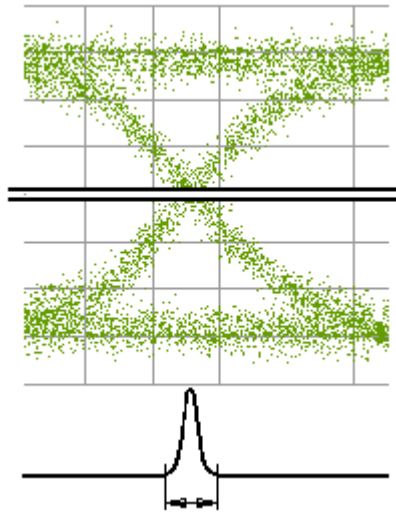
A histogram is constructed using the sampled portion of the eye diagram within the eye window. This histogram is comprised of data points from the upper and lower halves of the eye diagram and is used to determine the mean values of the logic 1 and logic 0 levels. The eye amplitude is determined as follows:



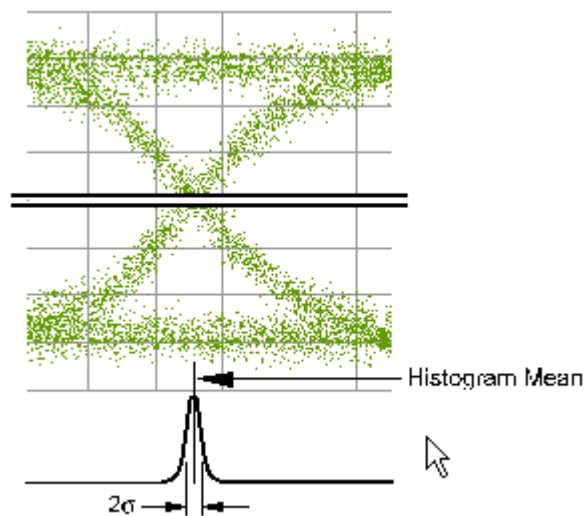
c. Jitter RMS and pk-pk

Eye Jitter is the measure of the time variances of the rising and falling edges of an eye diagram, as these edges affect the crossing point of the eye. To compute jitter, the level of the crossing point of the eye is first determined. Then a vertically thin measurement window is placed horizontally through the crossing point, and a time histogram is generated.

Jitter pk-pk is equal to the full width of the histogram at the eye crossing point.



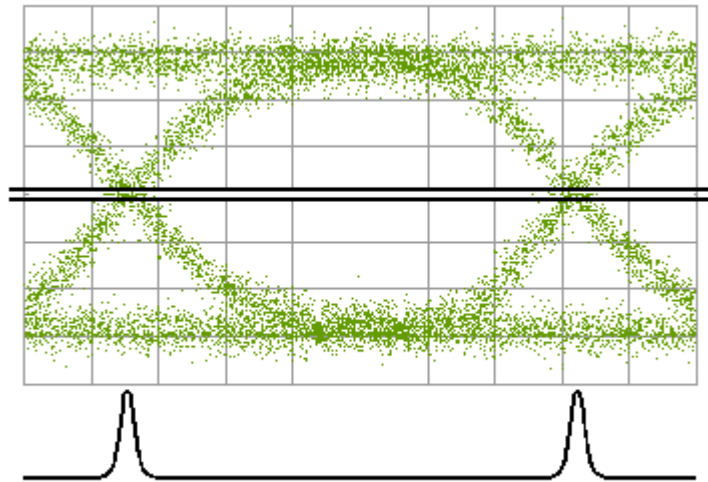
Jitter RMS is defined as  $1 \sigma$  (standard deviation) of the crossing point histogram



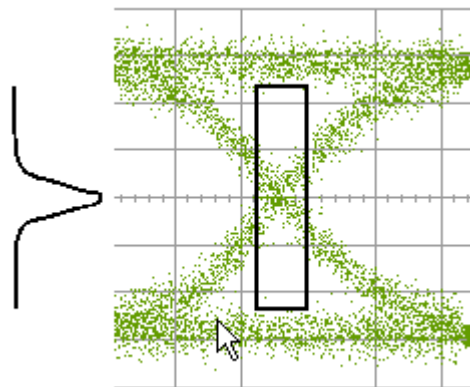
d. Crossing percentage

Crossing percentage is a measure of the amplitude of the crossing points relative to the one level and zero level. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

A vertically thin measurement window is placed horizontally through the crossing points, and a horizontal histogram is used to determine the mean location (in time) of the crossing point.



A narrow vertical histogram is used to determine the amplitude of crossing points.

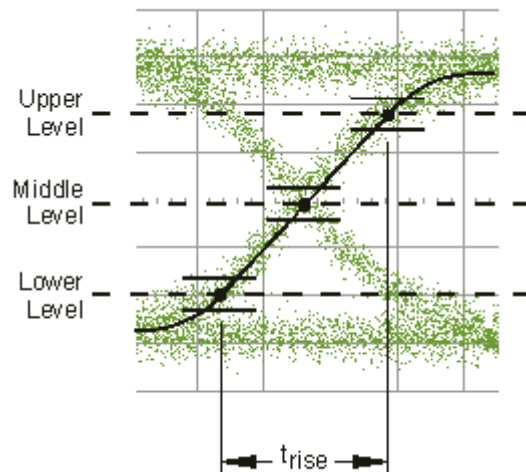


The mean derived from the horizontal and vertical histogram results in  $V_{\text{cross}}$ . Crossing percentage is then determined by the following:

$$\text{Crossing percent} = 100 (V_{\text{cross}} - V_{\text{zero level}}) / (V_{\text{one level}} - V_{\text{zero level}})$$

e. Rise Time and Fall Time

Rise time is a measure of the mean transition time of the data on the upward slope of an eye diagram. The data crosses through the following three thresholds: the lower, middle, and upper thresholds, as well as through the eye crossing point. The settings for the threshold levels are the 20% to 80% points on the transition.



Rise time= time at the upper threshold crossing – time at the lower threshold crossing

Fall times are similarly calculated except on the downward slope of an eye diagram.



GN3068 (featuring GCS photodiode))  
Characterization Report  
(PCN-000356)

Author: Goran Perosevic



Revision List

Revision	Author	Description of change	Revision Date (mm/dd/yyyy)	ECO#
A	Goran Perosevic	First Issue	28/01/2015	ECO-029407





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## 1. Scope

This document contains a summary of the results of the characterization testing performed on GN3068 ROSA featuring GCS (PN: DO262\_45um\_E1) photodiode.

## 2. Method

The GN3068 ROSA featuring GCS photodiode (PN: DO262\_45um\_E1) with LC optical receptacles (barrels) were tested using a Semtech designed evaluation board. These evaluation boards feature controlled impedance lines that are terminated in SMA connectors, and permit full assessment of the electrical properties of the ROSA using input from optical excitation at a wide range of frequencies.

Characterization plan is Gendoc 057166.

## 3. Results



### 3.1. Supply Current ( $I_{CC}$ )

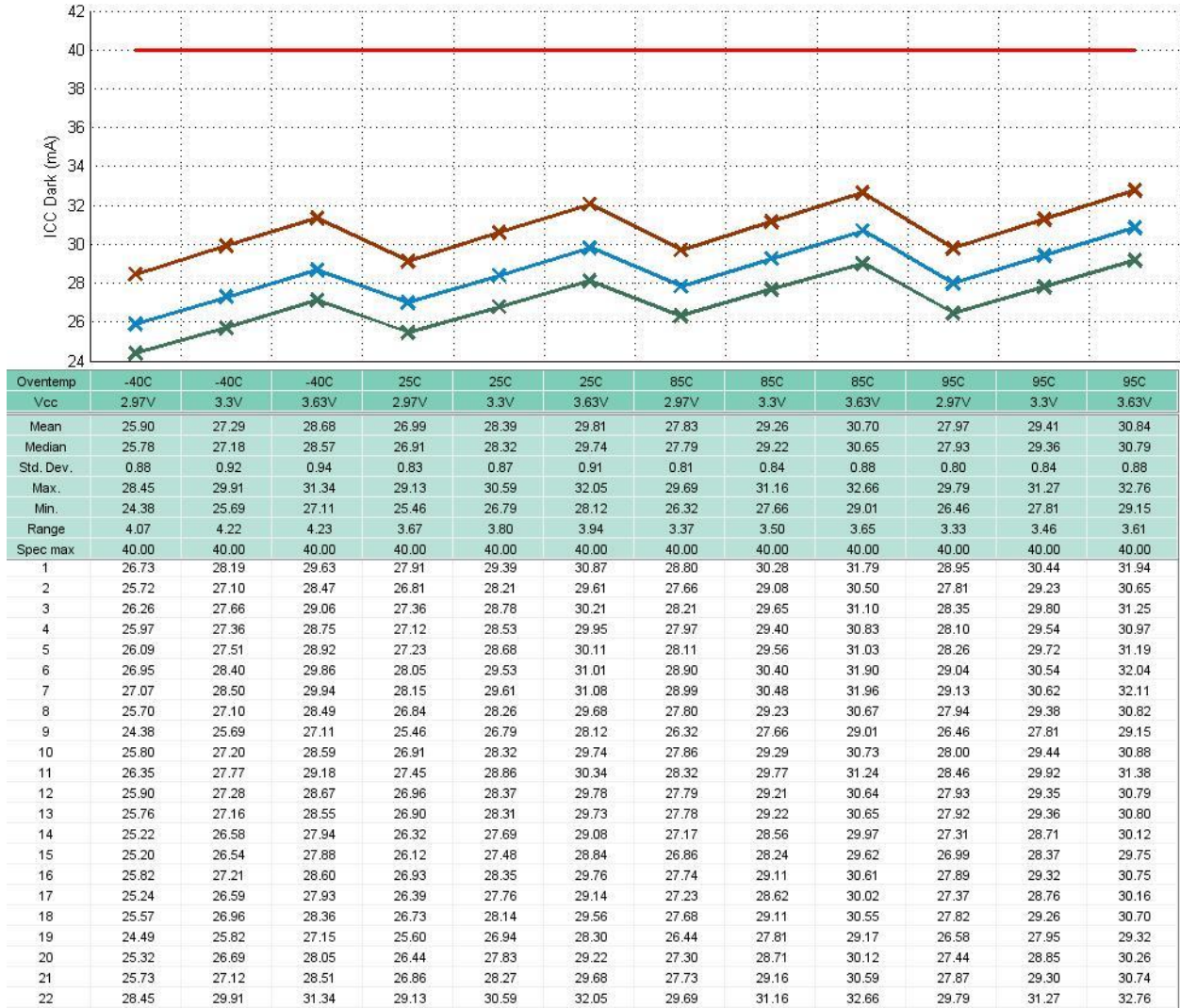
#### 3.1.1. Test Descriptions

In these tests the ROSA was powered up and the current into the  $V_{CC}$  pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

1. No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
2. 0.5 dBm of avg. optical power

The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

### 3.1.2. $I_{CC}$ (no optical input)



### 3.1.3. $I_{CC}$ (0.5dBm avg. optical power @ 1310nm)



### 3.1.4. $I_{CC}$ (0.5dBm avg. optical power @ 1550nm)





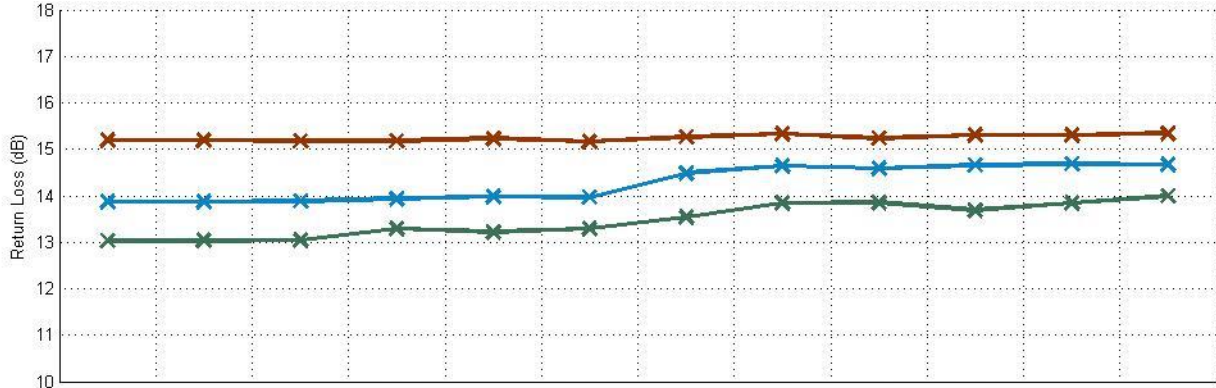


## 3.2. Optical Return Loss

### 3.2.1. Test Descriptions

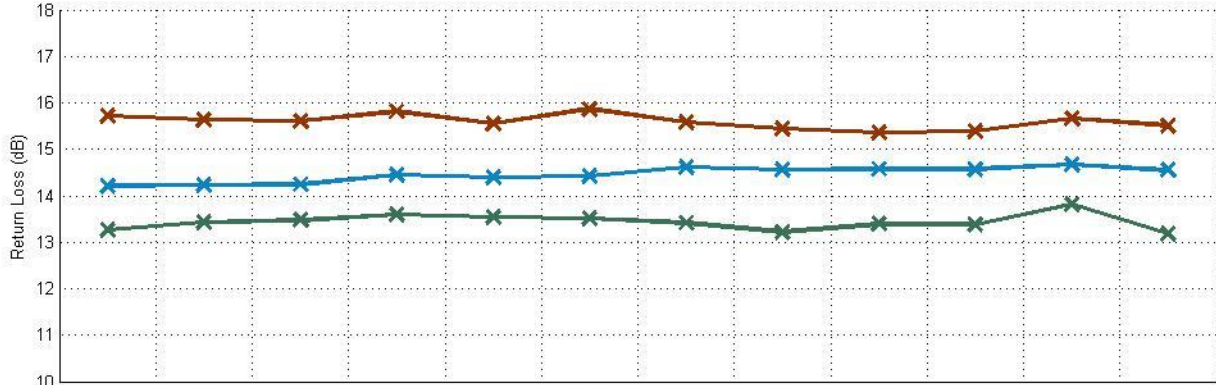
Optical return losses of the ROSAs were measured at 1310nm and 1550nm.

### 3.2.2. Optical Return Loss (dB) at 1310nm



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	13.86	13.87	13.89	13.94	13.98	13.97	14.49	14.64	14.59	14.66	14.68	14.67
Median	13.83	13.82	13.87	13.82	13.84	13.94	14.44	14.59	14.65	14.70	14.70	14.67
Std. Dev.	0.46	0.46	0.45	0.51	0.50	0.48	0.45	0.45	0.38	0.43	0.40	0.39
Max.	15.19	15.19	15.18	15.18	15.23	15.17	15.27	15.33	15.24	15.30	15.30	15.34
Min.	13.03	13.03	13.04	13.29	13.22	13.29	13.53	13.84	13.85	13.69	13.84	13.99
Range	2.16	2.16	2.14	1.89	2.01	1.88	1.73	1.48	1.38	1.62	1.45	1.35
1	14.43	14.42	14.43	13.57	13.62	13.63	14.32	14.24	14.79	14.66	14.42	14.93
2	13.03	13.03	13.04	13.53	13.78	13.54	13.99	14.17	14.47	13.99	14.28	14.06
3	13.87	13.86	13.88	13.82	13.66	13.97	14.35	14.63	14.79	14.83	15.01	14.60
4	13.53	13.53	13.49	14.05	14.00	14.06	14.45	14.30	14.68	14.76	14.51	14.83
5	14.01	14.02	14.00	13.52	13.71	13.67	14.10	14.56	14.76	14.74	14.79	14.39
6	13.85	13.86	13.89	13.59	13.79	13.56	13.83	14.29	13.85	14.43	14.15	14.36
7	14.05	14.03	14.01	14.59	14.50	14.63	15.11	15.27	14.91	15.30	15.19	15.28
8	13.70	13.71	13.85	14.08	14.01	14.05	14.80	15.05	14.62	14.61	14.77	14.59
9	13.76	13.79	13.86	14.43	14.59	14.43	15.15	15.30	14.92	15.11	15.24	15.08
10	13.93	13.84	13.90	14.56	14.62	14.37	14.85	15.11	14.91	14.64	15.14	14.78
11	13.46	13.53	13.67	13.82	14.26	13.90	14.42	14.55	14.15	14.24	14.33	14.45
12	14.08	14.18	14.23	14.51	14.53	14.58	14.94	15.18	15.02	15.26	15.05	15.34
13	13.61	13.61	13.59	14.16	13.89	14.23	14.66	14.84	14.87	14.84	14.96	14.75
14	14.30	14.29	14.30	13.42	13.47	13.57	14.13	14.25	14.29	14.40	14.26	14.43
15	13.44	13.48	13.50	13.36	13.22	13.29	13.53	13.88	13.91	13.69	13.84	14.01
16	13.33	13.34	13.33	13.29	13.31	13.39	14.02	13.84	13.88	13.95	14.15	13.99
17	15.19	15.19	15.18	15.18	15.23	15.17	15.27	15.33	15.24	15.30	15.30	15.30
18	14.02	14.02	14.00	13.38	13.48	13.47	14.57	14.62	14.56	14.61	14.58	14.75
19	13.81	13.80	13.80	14.28	14.29	14.34	14.65	14.75	14.60	14.77	14.68	14.81
20	13.57	13.61	13.62	13.59	13.65	13.62	14.36	14.55	14.62	14.59	14.65	14.49
21	14.46	14.46	14.41	14.27	14.30	14.22	14.87	14.95	14.74	15.01	14.96	14.99
22	13.58	13.55	13.50	13.60	13.73	13.65	14.32	14.45	14.35	14.74	14.73	14.60

### 3.2.3. Optical Return Loss (dB) at 1550nm



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	14.21	14.23	14.24	14.45	14.39	14.43	14.62	14.56	14.57	14.57	14.67	14.55
Median	14.14	14.14	14.20	14.41	14.43	14.48	14.71	14.63	14.56	14.59	14.67	14.69
Std. Dev.	0.54	0.53	0.51	0.54	0.49	0.56	0.52	0.61	0.45	0.57	0.52	0.64
Max.	15.71	15.63	15.61	15.82	15.56	15.86	15.58	15.45	15.35	15.38	15.66	15.51
Min.	13.26	13.42	13.47	13.59	13.54	13.51	13.41	13.22	13.39	13.38	13.81	13.18
Range	2.45	2.21	2.14	2.23	2.02	2.35	2.17	2.23	1.96	2.00	1.85	2.33
1	14.67	14.77	14.61	15.08	14.72	14.98	15.05	15.01	14.49	14.97	14.78	15.03
2	14.36	14.38	14.34	13.85	13.92	13.84	14.64	14.45	14.13	14.28	14.39	14.31
3	13.61	13.68	13.80	14.16	14.30	14.22	14.71	14.63	15.02	15.15	15.26	14.97
4	14.13	14.13	14.17	14.32	14.55	14.42	13.41	13.25	13.39	13.38	14.07	13.41
5	14.56	14.68	14.67	15.12	14.63	15.06	15.40	15.14	14.97	14.99	15.16	14.65
6	13.97	13.98	14.00	13.97	14.07	13.98	14.49	14.15	14.56	13.72	13.92	13.64
7	15.05	15.08	15.05	14.55	14.62	14.56	14.94	15.30	14.50	14.64	14.62	14.77
8	14.02	14.09	14.21	13.92	13.99	13.96	14.60	14.78	14.56	14.25	14.22	14.18
9	14.20	14.19	14.19	14.28	14.04	14.07	14.07	13.89	14.35	14.93	15.17	15.05
10	14.45	14.46	14.46	14.94	15.14	14.95	15.58	15.45	15.35	15.38	15.66	15.23
11	13.76	13.61	13.48	14.44	13.73	14.52	14.41	14.47	14.44	14.33	14.15	14.45
12	15.71	15.63	15.61	15.82	15.56	15.86	14.86	15.05	14.93	15.36	15.25	15.51
13	14.12	14.12	14.11	14.40	14.51	14.36	14.90	14.63	14.28	14.21	14.50	14.13
14	13.50	13.51	13.61	14.76	14.50	14.53	14.35	13.91	14.57	14.50	14.75	14.25
15	13.96	13.84	13.81	13.79	14.01	13.61	13.87	13.22	14.19	13.83	13.81	13.18
16	13.26	13.42	13.47	13.59	13.80	13.51	13.70	13.99	13.99	13.78	13.90	13.73
17	14.39	14.38	14.36	13.83	13.54	13.64	14.78	15.12	14.65	15.25	15.39	15.31
18	14.16	14.15	14.17	14.51	14.38	14.60	14.89	14.80	14.92	14.82	14.72	14.72
19	14.35	14.40	14.38	14.42	14.33	14.50	14.45	14.58	14.61	14.71	14.59	14.86
20	13.70	13.83	13.83	14.63	14.47	14.64	14.72	14.60	14.41	14.54	14.76	14.50
21	14.63	14.65	14.76	15.04	15.01	15.08	15.02	14.89	15.30	15.18	15.06	15.14
22	14.10	13.98	14.26	14.41	14.73	14.47	14.82	14.98	14.99	14.32	14.61	15.11



### 3.3. Responsivity, RSSI Dark

#### 3.3.1. Test Descriptions

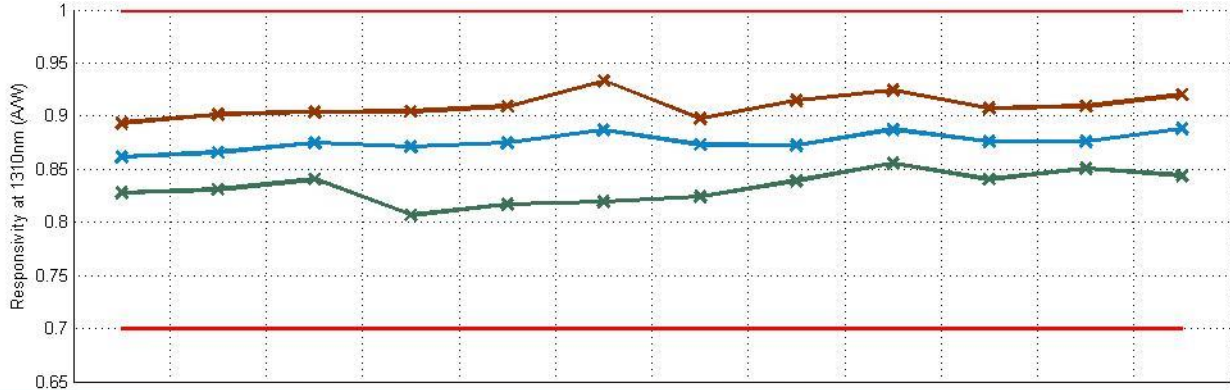
Responsivity is calculated by dividing the measured the RSSI current by the input optical power at an input optical power of -10dBm (100uW). The input optical signal is unmodulated.

In these tests the ROSA was powered up and the current sunk from the RSSI pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

- 1) No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
- 2) -30dBm of avg. optical power
- 3) -20dBm of avg. optical power
- 4) -10dBm of avg. optical power
- 5) 0dBm of avg. optical power
- 6) 0.5dBm of avg. optical power
- 7) 1.14dBm of avg. optical power
- 8) 2.04dBm of avg. optical power

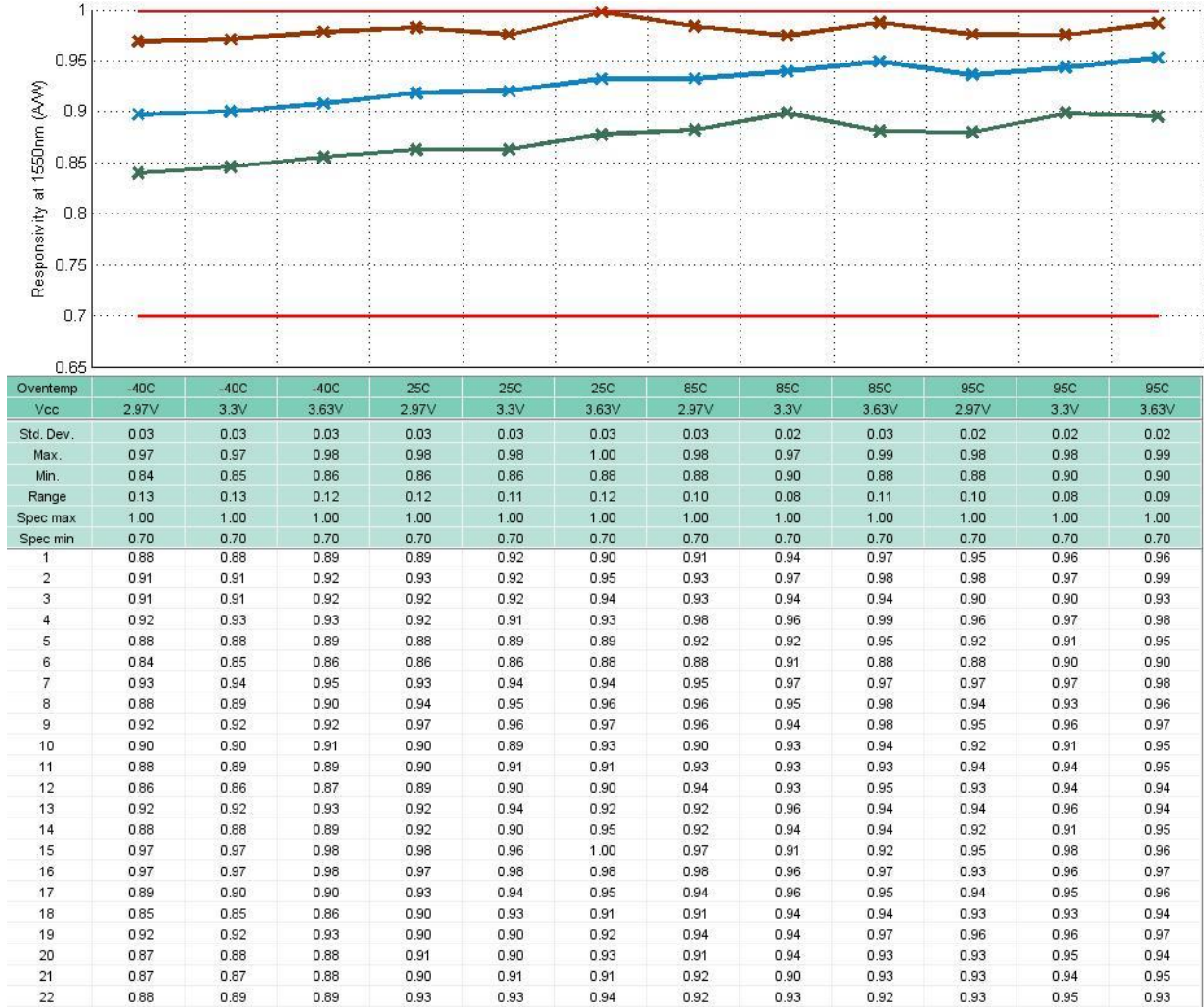
The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

### 3.3.2. Responsivity (A/W) at 1310nm

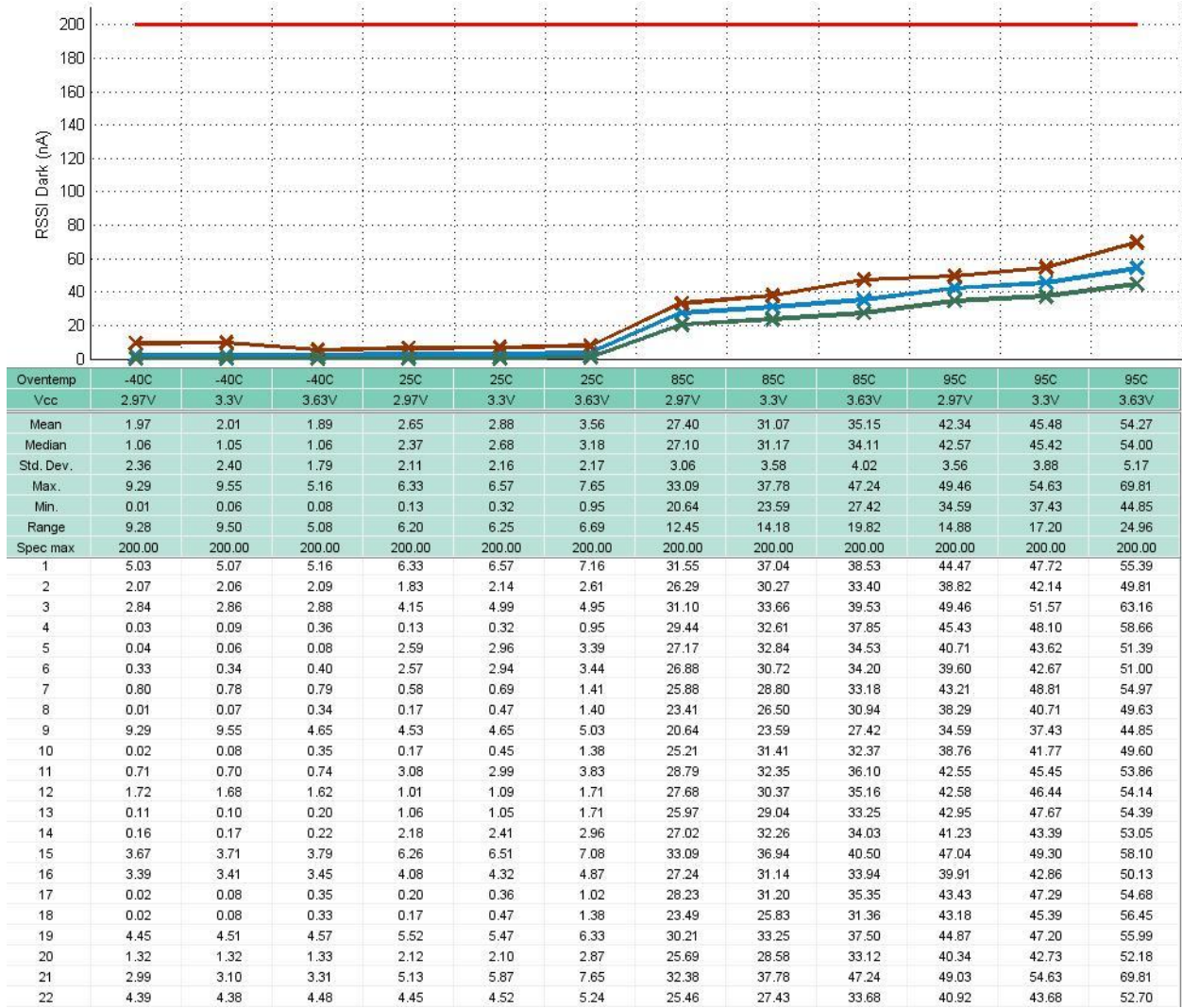


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Std. Dev.	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.02
Max.	0.89	0.90	0.90	0.90	0.91	0.93	0.90	0.91	0.92	0.91	0.91	0.92
Min.	0.83	0.83	0.84	0.81	0.82	0.82	0.82	0.84	0.86	0.84	0.85	0.84
Range	0.07	0.07	0.06	0.10	0.09	0.11	0.07	0.08	0.07	0.07	0.06	0.08
Spec max	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spec min	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
1	0.86	0.87	0.87	0.85	0.88	0.87	0.87	0.89	0.92	0.90	0.88	0.91
2	0.85	0.87	0.88	0.85	0.85	0.87	0.89	0.85	0.86	0.88	0.85	0.91
3	0.89	0.89	0.90	0.90	0.89	0.92	0.88	0.85	0.91	0.86	0.89	0.86
4	0.87	0.88	0.89	0.90	0.90	0.91	0.89	0.87	0.89	0.88	0.89	0.88
5	0.84	0.83	0.85	0.84	0.86	0.85	0.85	0.90	0.91	0.90	0.89	0.90
6	0.83	0.84	0.84	0.81	0.82	0.82	0.82	0.84	0.86	0.85	0.87	0.84
7	0.88	0.88	0.89	0.90	0.91	0.91	0.88	0.87	0.91	0.87	0.89	0.89
8	0.88	0.88	0.89	0.88	0.88	0.89	0.85	0.87	0.88	0.88	0.86	0.90
9	0.83	0.83	0.84	0.89	0.89	0.90	0.87	0.87	0.89	0.87	0.87	0.88
10	0.87	0.88	0.89	0.86	0.89	0.86	0.88	0.86	0.88	0.89	0.86	0.91
11	0.89	0.90	0.90	0.87	0.85	0.89	0.86	0.85	0.90	0.88	0.87	0.89
12	0.87	0.88	0.89	0.88	0.89	0.89	0.87	0.88	0.87	0.86	0.87	0.87
13	0.86	0.87	0.88	0.87	0.89	0.87	0.86	0.89	0.91	0.88	0.89	0.88
14	0.85	0.84	0.85	0.86	0.87	0.90	0.89	0.89	0.87	0.85	0.88	0.88
15	0.87	0.87	0.88	0.90	0.87	0.93	0.90	0.87	0.88	0.91	0.91	0.89
16	0.86	0.87	0.87	0.89	0.87	0.92	0.87	0.91	0.92	0.90	0.88	0.91
17	0.87	0.88	0.89	0.87	0.88	0.88	0.85	0.86	0.87	0.85	0.86	0.86
18	0.87	0.87	0.88	0.87	0.85	0.89	0.87	0.86	0.86	0.84	0.87	0.87
19	0.85	0.86	0.87	0.90	0.89	0.91	0.89	0.90	0.88	0.90	0.90	0.92
20	0.83	0.84	0.85	0.86	0.86	0.88	0.87	0.89	0.86	0.87	0.86	0.90
21	0.83	0.84	0.85	0.86	0.88	0.86	0.89	0.86	0.89	0.86	0.86	0.89
22	0.89	0.90	0.90	0.87	0.88	0.88	0.90	0.86	0.90	0.88	0.89	0.88

### 3.3.3. Responsivity (A/W) at 1550nm



### 3.3.4. RSSI dark (nA)



### 3.4. Optical Receiver Sensitivity

#### 3.4.1. Test Descriptions

The receiver sensitivity tests were performed by performing a sweep of optical powers and recording the BER for those optical powers.

In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT. This is done because the sensitivity of the GN2013 CDR is much better than the BERT inputs and allows for a much better measurement of the true sensitivity of the ROSA.

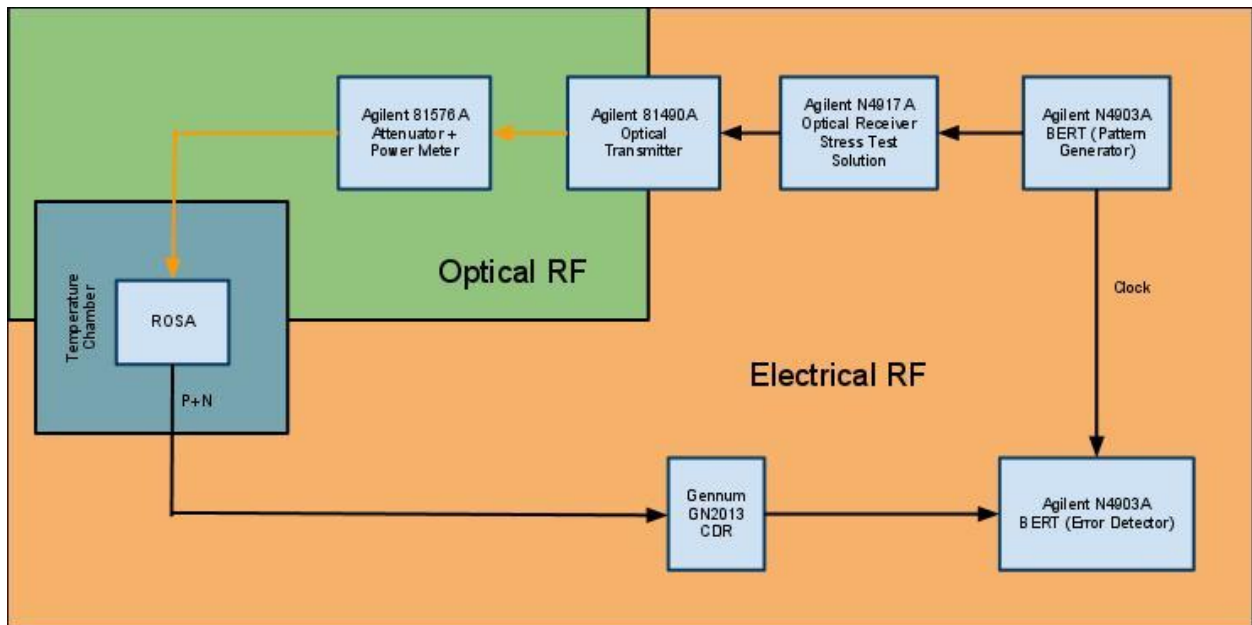


Figure 1. Sensitivity testing Block Diagram.



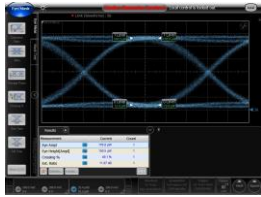


Figure 2. 1310nm 11.3Gbps Input Eye

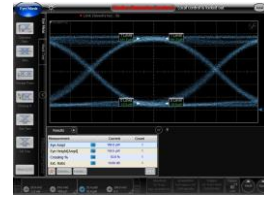


Figure 3. 1550nm 11.3Gbps Input Eye

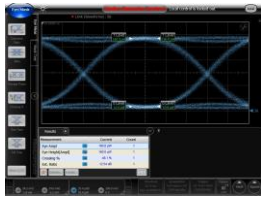


Figure 4. 1310nm 10.3125Gbps Input Eye

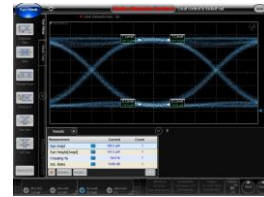


Figure 5. 1550nm 10.3125Gbps Input Eye

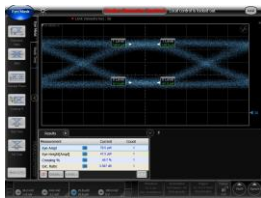


Figure 6. 1310 BaseL Input Eye

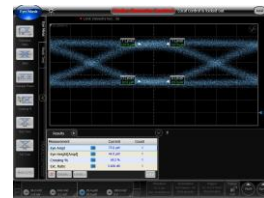


Figure 7. 1550 BaseL Input Eye

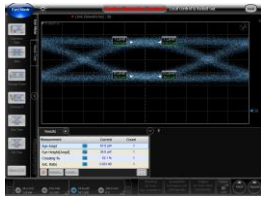
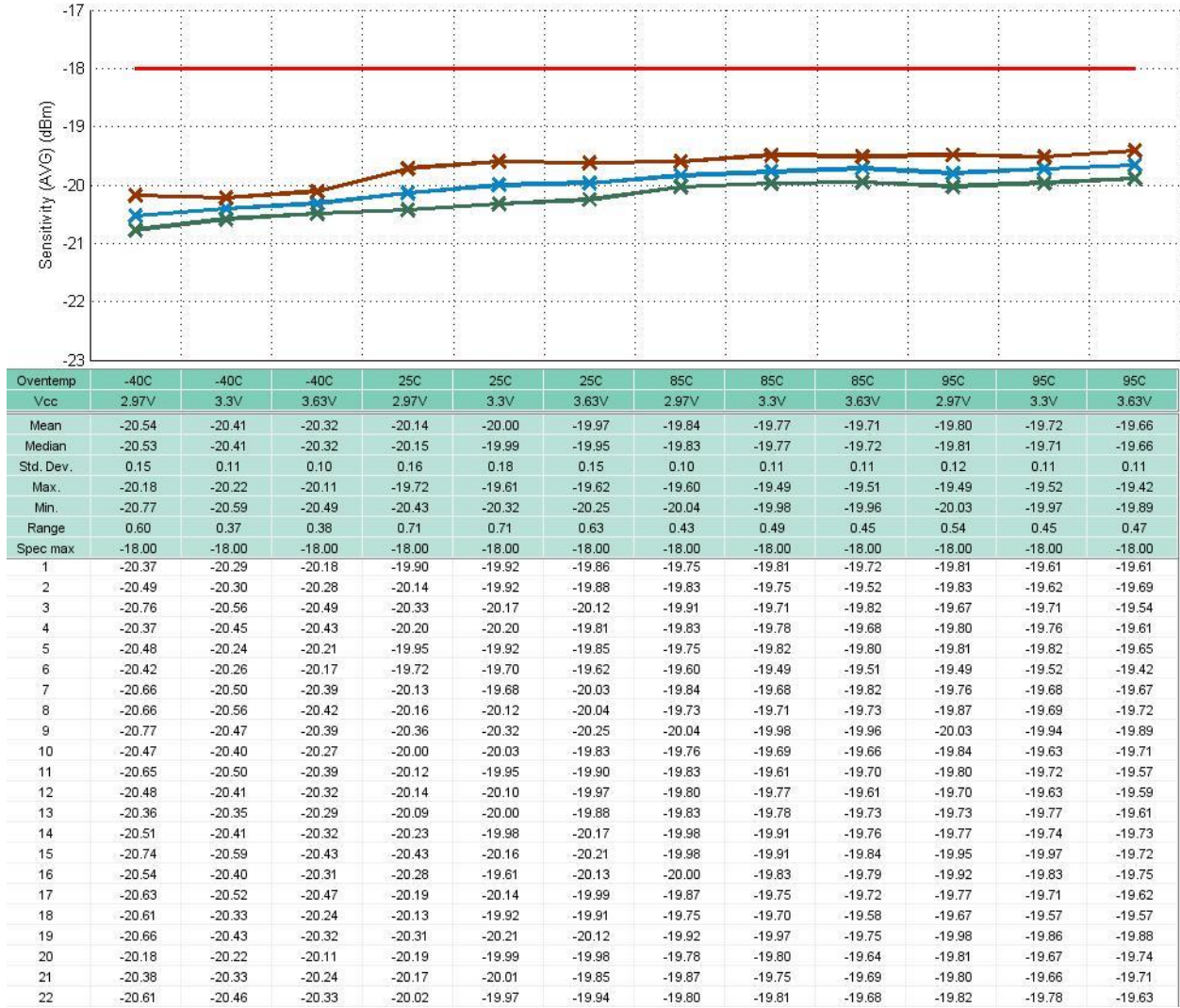


Figure 8. 1310 BaseE Input Eye

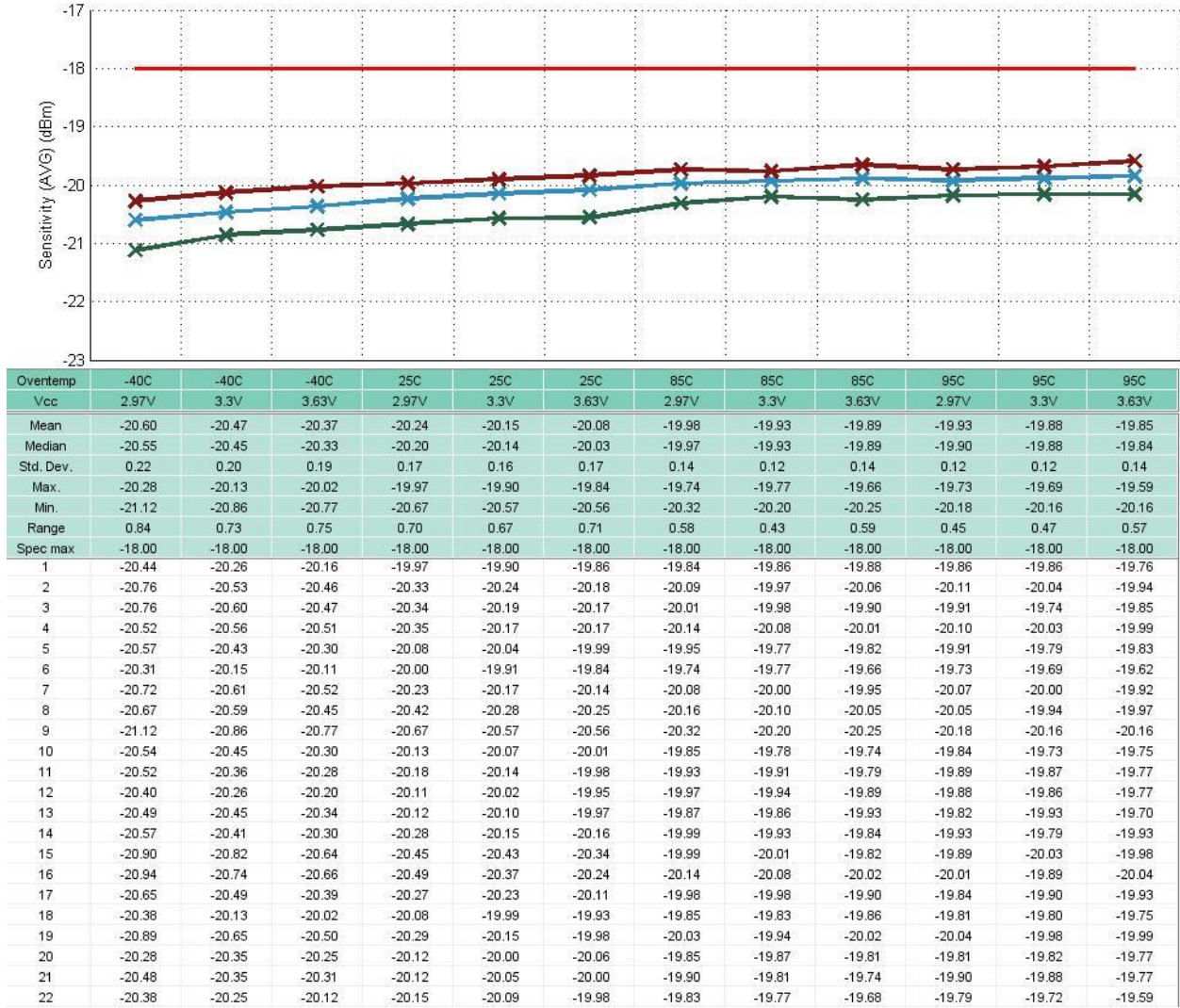


Figure 9. 1550 BaseE Input Eye

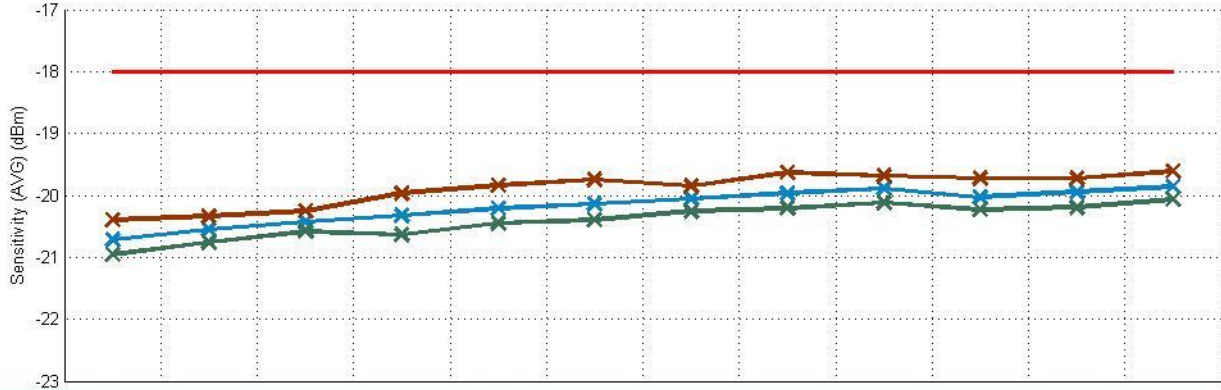
### 3.4.2. Unstressed Receiver Sensitivity at 1310nm and 11.3Gbps (Avg. power dBm)



### 3.4.3. Unstressed Receiver Sensitivity at 1550nm and 11.3Gbps (Avg. power dBm)

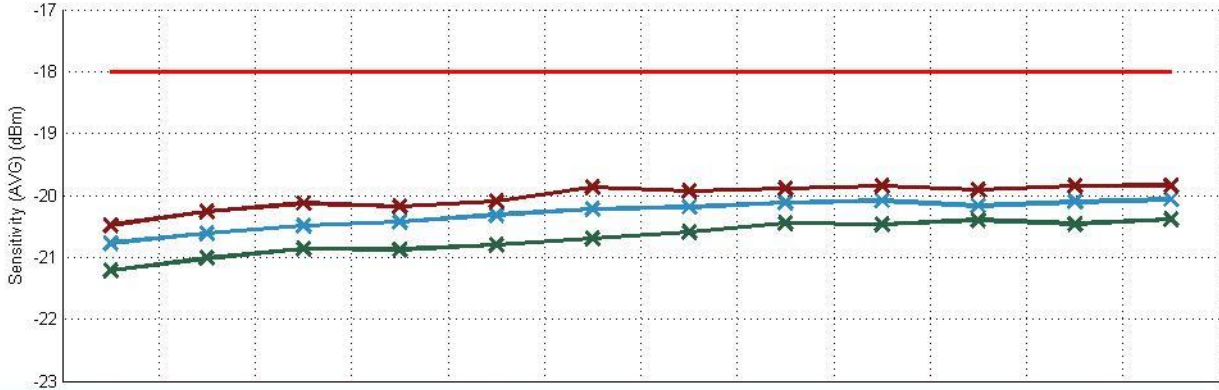


### 3.4.4. Unstressed Receiver Sensitivity at 1310nm and 10.3125Gbps (Avg. power dBm)



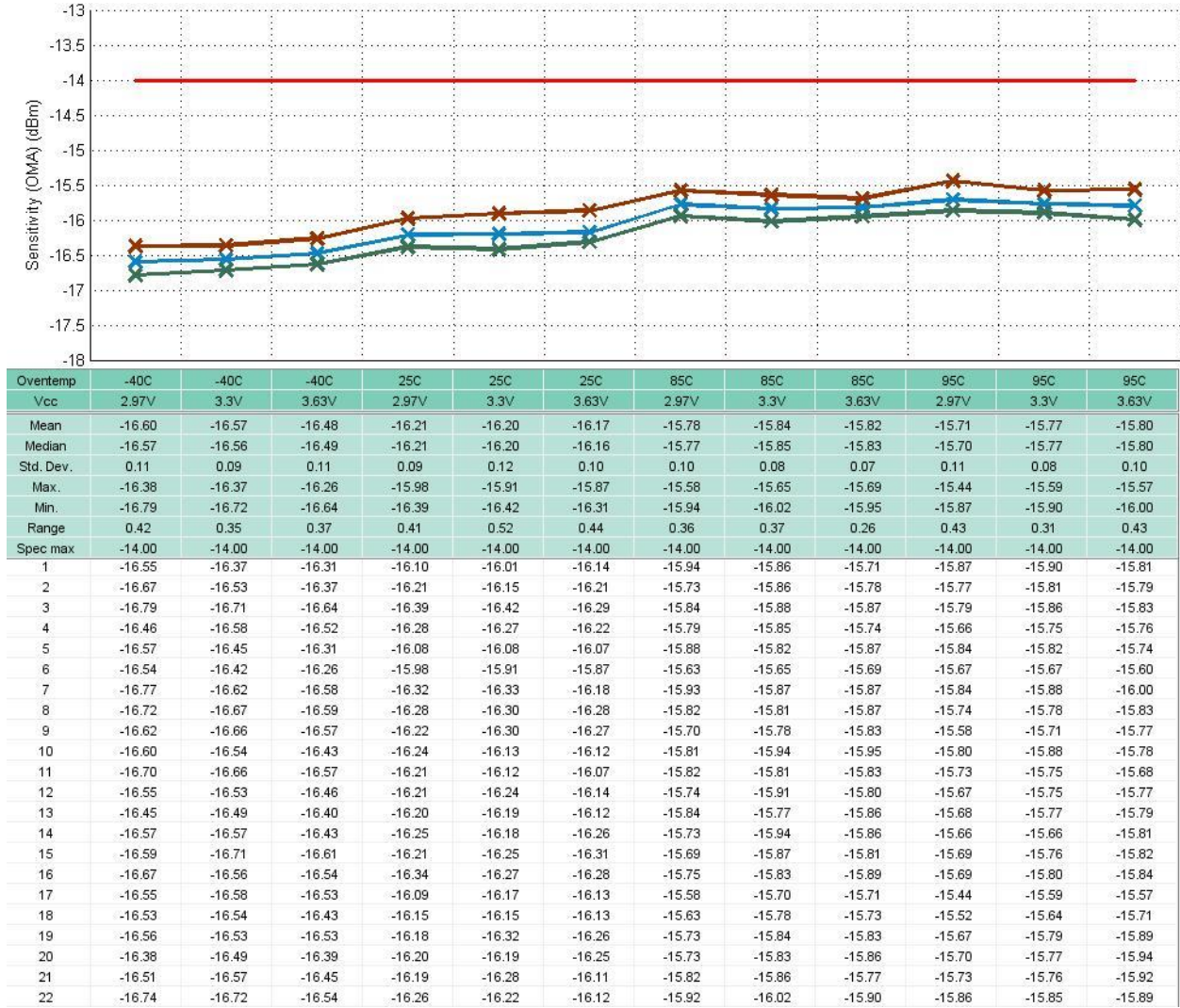
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-20.72	-20.55	-20.42	-20.32	-20.21	-20.13	-20.06	-19.97	-19.89	-20.03	-19.95	-19.86
Median	-20.74	-20.55	-20.43	-20.31	-20.19	-20.14	-20.08	-19.96	-19.88	-20.02	-19.93	-19.85
Std. Dev.	0.15	0.11	0.11	0.15	0.14	0.15	0.11	0.14	0.11	0.11	0.11	0.11
Max.	-20.40	-20.34	-20.25	-19.97	-19.84	-19.75	-19.85	-19.63	-19.68	-19.72	-19.72	-19.61
Min.	-20.96	-20.76	-20.58	-20.64	-20.45	-20.39	-20.26	-20.21	-20.12	-20.23	-20.19	-20.07
Range	0.56	0.42	0.33	0.67	0.61	0.65	0.40	0.58	0.44	0.51	0.47	0.46
Spec max	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00
1	-20.54	-20.34	-20.26	-20.20	-20.00	-20.03	-20.09	-19.90	-19.78	-20.05	-19.90	-19.71
2	-20.69	-20.46	-20.38	-20.29	-20.15	-20.08	-19.93	-20.02	-19.73	-20.08	-19.89	-19.85
3	-20.87	-20.68	-20.58	-20.49	-20.34	-20.27	-20.17	-19.94	-19.90	-19.90	-19.92	-19.82
4	-20.57	-20.60	-20.49	-20.36	-20.35	-20.22	-20.08	-20.06	-19.82	-20.01	-19.99	-19.79
5	-20.59	-20.39	-20.25	-20.16	-20.05	-20.00	-20.12	-19.89	-19.88	-19.99	-19.98	-19.78
6	-20.64	-20.39	-20.25	-19.97	-19.84	-19.75	-19.85	-19.63	-19.68	-19.72	-19.72	-19.61
7	-20.86	-20.66	-20.43	-20.31	-20.27	-20.17	-20.12	-19.95	-19.92	-19.97	-19.88	-19.85
8	-20.87	-20.67	-20.57	-20.34	-20.27	-20.15	-20.02	-19.83	-19.88	-20.07	-19.94	-19.90
9	-20.96	-20.64	-20.58	-20.54	-20.45	-20.35	-20.26	-20.20	-20.12	-20.23	-20.19	-20.05
10	-20.71	-20.54	-20.40	-20.18	-20.10	-19.99	-19.93	-20.04	-19.94	-20.10	-19.94	-19.86
11	-20.77	-20.67	-20.54	-20.27	-20.13	-20.08	-20.09	-19.81	-19.89	-19.99	-19.97	-19.77
12	-20.66	-20.58	-20.46	-20.29	-20.25	-20.16	-20.02	-19.99	-19.83	-19.94	-19.84	-19.84
13	-20.48	-20.49	-20.31	-20.19	-20.16	-20.05	-20.15	-19.90	-19.87	-19.99	-19.93	-19.77
14	-20.73	-20.55	-20.43	-20.44	-20.18	-20.32	-19.96	-19.95	-19.98	-20.02	-19.90	-19.97
15	-20.92	-20.76	-20.56	-20.64	-20.41	-20.39	-20.12	-20.21	-20.12	-20.16	-20.19	-19.90
16	-20.75	-20.54	-20.43	-20.44	-20.27	-20.28	-20.24	-19.87	-19.87	-20.17	-20.08	-19.91
17	-20.80	-20.65	-20.57	-20.39	-20.33	-20.13	-20.09	-19.98	-19.96	-19.99	-19.92	-19.84
18	-20.78	-20.52	-20.37	-20.34	-20.19	-20.12	-19.92	-19.98	-19.83	-19.92	-19.78	-19.80
19	-20.86	-20.55	-20.46	-20.51	-20.38	-20.26	-20.12	-20.17	-20.02	-20.22	-20.11	-20.07
20	-20.40	-20.38	-20.30	-20.31	-20.13	-20.18	-19.93	-20.05	-19.88	-20.08	-19.90	-19.93
21	-20.58	-20.48	-20.32	-20.21	-20.16	-19.97	-20.05	-20.08	-19.85	-20.08	-19.98	-19.96
22	-20.79	-20.63	-20.38	-20.26	-20.18	-19.99	-20.03	-19.85	-19.84	-19.99	-19.89	-19.94

### 3.4.5. Unstressed Receiver Sensitivity at 1550nm and 10.3125Gbps (Avg. power dBm)

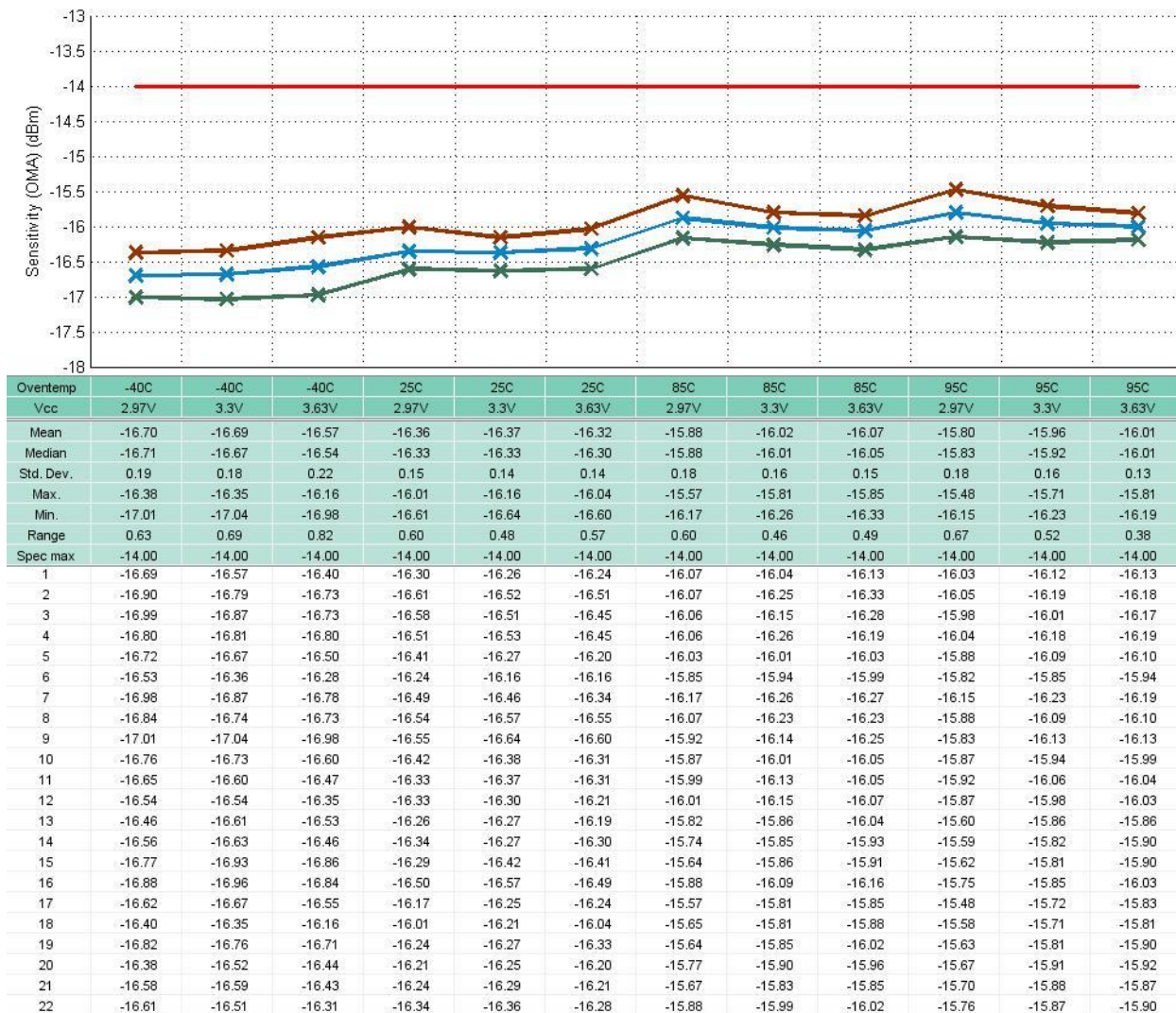


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-20.77	-20.62	-20.49	-20.43	-20.32	-20.23	-20.19	-20.12	-20.09	-20.17	-20.10	-20.06
Median	-20.74	-20.59	-20.47	-20.41	-20.27	-20.22	-20.16	-20.12	-20.07	-20.17	-20.08	-20.07
Std. Dev.	0.21	0.20	0.19	0.17	0.17	0.19	0.14	0.15	0.14	0.13	0.14	0.14
Max.	-20.48	-20.26	-20.13	-20.18	-20.10	-19.87	-19.94	-19.89	-19.85	-19.91	-19.85	-19.84
Min.	-21.21	-21.01	-20.87	-20.88	-20.80	-20.70	-20.60	-20.45	-20.47	-20.40	-20.46	-20.39
Range	0.73	0.75	0.74	0.69	0.70	0.83	0.66	0.56	0.62	0.49	0.61	0.54
Spec max	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00
1	-20.62	-20.43	-20.30	-20.18	-20.12	-20.00	-20.16	-19.95	-19.99	-20.12	-20.07	-20.07
2	-20.90	-20.67	-20.53	-20.62	-20.39	-20.36	-20.32	-20.12	-20.24	-20.34	-20.23	-20.16
3	-20.92	-20.74	-20.56	-20.52	-20.40	-20.33	-20.17	-20.11	-20.07	-20.16	-19.95	-20.07
4	-20.65	-20.76	-20.60	-20.51	-20.35	-20.30	-20.30	-20.33	-20.18	-20.34	-20.27	-20.22
5	-20.76	-20.61	-20.45	-20.26	-20.21	-20.10	-20.13	-19.97	-20.01	-20.17	-20.02	-20.06
6	-20.49	-20.28	-20.18	-20.20	-20.10	-20.02	-19.97	-19.89	-19.85	-19.96	-19.85	-19.85
7	-20.93	-20.81	-20.65	-20.45	-20.38	-20.25	-20.24	-20.21	-20.17	-20.29	-20.20	-20.10
8	-20.86	-20.73	-20.57	-20.66	-20.48	-20.38	-20.39	-20.27	-20.26	-20.33	-20.21	-20.20
9	-21.21	-21.01	-20.87	-20.88	-20.80	-20.70	-20.60	-20.45	-20.47	-20.40	-20.46	-20.39
10	-20.77	-20.55	-20.49	-20.36	-20.22	-20.19	-20.08	-19.92	-19.98	-20.14	-20.00	-19.98
11	-20.68	-20.55	-20.37	-20.37	-20.23	-20.18	-20.09	-20.16	-20.03	-20.11	-20.12	-20.00
12	-20.51	-20.41	-20.38	-20.29	-20.21	-19.87	-20.26	-20.21	-20.07	-20.17	-20.10	-19.98
13	-20.69	-20.58	-20.45	-20.37	-20.17	-20.11	-20.13	-20.06	-20.09	-20.05	-20.09	-19.87
14	-20.72	-20.55	-20.43	-20.49	-20.30	-20.32	-20.18	-20.02	-20.01	-20.20	-20.02	-20.11
15	-21.08	-20.90	-20.79	-20.63	-20.61	-20.49	-20.11	-20.25	-20.07	-20.20	-20.25	-20.17
16	-21.10	-20.89	-20.76	-20.61	-20.48	-20.41	-20.31	-20.31	-20.24	-20.23	-20.07	-20.22
17	-20.86	-20.68	-20.58	-20.47	-20.39	-20.32	-20.15	-20.21	-20.11	-20.11	-20.17	-20.08
18	-20.59	-20.26	-20.13	-20.20	-20.20	-19.99	-20.15	-19.96	-20.05	-20.08	-19.99	-19.94
19	-21.05	-20.78	-20.61	-20.46	-20.31	-20.30	-20.28	-20.16	-20.19	-20.28	-20.23	-20.16
20	-20.48	-20.48	-20.35	-20.36	-20.23	-20.13	-20.13	-20.00	-20.03	-20.09	-20.05	-19.94
21	-20.60	-20.56	-20.45	-20.32	-20.24	-20.11	-20.11	-20.06	-19.90	-20.05	-20.07	-20.01
22	-20.52	-20.33	-20.30	-20.30	-20.18	-20.14	-19.94	-19.96	-19.88	-19.91	-19.87	-19.84

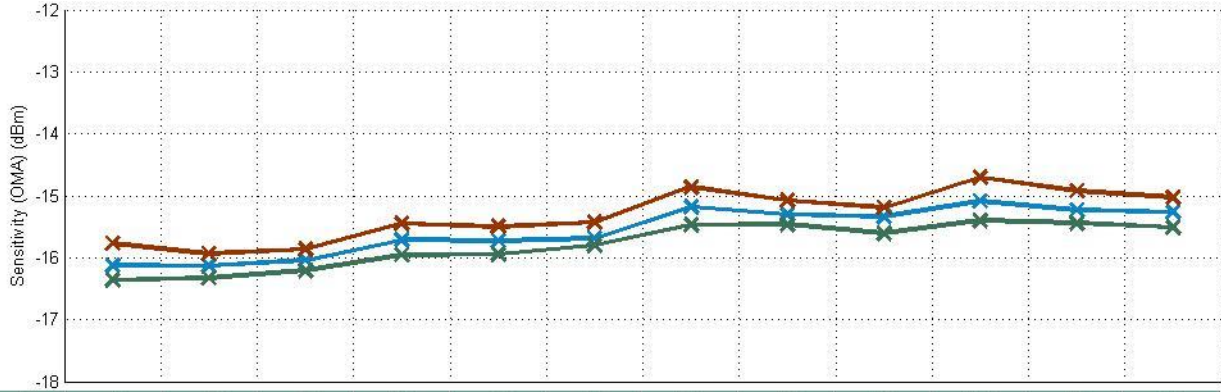
### 3.4.6. Stressed Receiver Sensitivity at 1310nm and BaseL (OMA power dBm)



### 3.4.7. Stressed Receiver Sensitivity at 1550nm and BaseL (OMA power dBm)



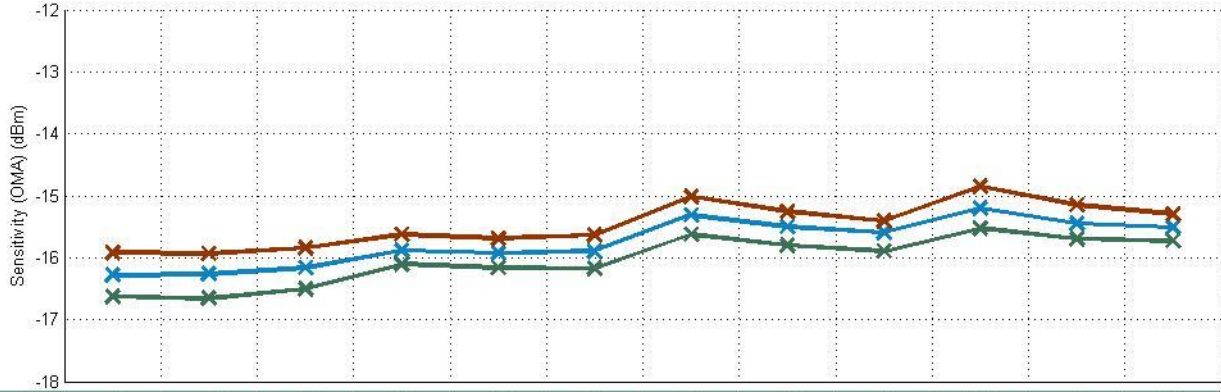
### 3.4.8. Stressed Receiver Sensitivity at 1310nm and BaseE (OMA power dBm)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-16.12	-16.13	-16.04	-15.71	-15.73	-15.69	-15.18	-15.30	-15.34	-15.09	-15.23	-15.27
Median	-16.13	-16.12	-16.04	-15.72	-15.73	-15.72	-15.18	-15.32	-15.31	-15.12	-15.24	-15.25
Std. Dev.	0.14	0.11	0.11	0.13	0.12	0.09	0.16	0.10	0.10	0.17	0.13	0.11
Max.	-15.77	-15.94	-15.87	-15.45	-15.50	-15.43	-14.86	-15.08	-15.19	-14.70	-14.92	-15.03
Min.	-16.36	-16.33	-16.21	-15.96	-15.95	-15.80	-15.47	-15.46	-15.61	-15.40	-15.44	-15.51
Range	0.59	0.39	0.34	0.50	0.45	0.37	0.61	0.39	0.42	0.70	0.52	0.48
1	-16.13	-16.02	-15.87	-15.78	-15.66	-15.69	-15.44	-15.39	-15.35	-15.33	-15.36	-15.33
2	-16.19	-16.14	-15.99	-15.72	-15.76	-15.75	-15.17	-15.36	-15.36	-15.17	-15.35	-15.34
3	-16.34	-16.33	-16.20	-15.96	-15.95	-15.58	-15.37	-15.43	-15.50	-15.28	-15.35	-15.40
4	-16.10	-16.22	-16.17	-15.87	-15.90	-15.80	-15.18	-15.33	-15.29	-15.15	-15.27	-15.26
5	-16.13	-15.99	-15.92	-15.74	-15.66	-15.68	-15.34	-15.37	-15.42	-15.25	-15.39	-15.35
6	-16.18	-15.97	-15.90	-15.53	-15.50	-15.43	-15.20	-15.22	-15.29	-15.10	-15.23	-15.22
7	-16.36	-16.28	-16.12	-15.91	-15.92	-15.75	-15.47	-15.46	-15.61	-15.40	-15.44	-15.51
8	-16.27	-16.25	-16.21	-15.77	-15.86	-15.75	-15.23	-15.34	-15.50	-15.16	-15.29	-15.34
9	-16.09	-16.26	-16.17	-15.69	-15.81	-15.79	-15.00	-15.27	-15.30	-14.87	-15.13	-15.22
10	-16.21	-16.12	-16.02	-15.79	-15.71	-15.63	-15.29	-15.42	-15.48	-15.21	-15.36	-15.33
11	-16.25	-16.28	-16.19	-15.78	-15.75	-15.72	-15.25	-15.31	-15.35	-15.14	-15.30	-15.32
12	-16.17	-16.12	-16.08	-15.79	-15.79	-15.71	-15.22	-15.34	-15.32	-15.13	-15.24	-15.30
13	-15.96	-16.09	-15.98	-15.66	-15.64	-15.64	-15.11	-15.33	-15.31	-15.05	-15.17	-15.21
14	-16.09	-16.12	-16.05	-15.64	-15.66	-15.68	-15.12	-15.23	-15.27	-14.98	-15.15	-15.20
15	-16.12	-16.17	-16.15	-15.65	-15.74	-15.74	-15.04	-15.17	-15.24	-14.98	-15.07	-15.17
16	-16.15	-16.11	-16.04	-15.75	-15.81	-15.80	-15.18	-15.29	-15.30	-14.99	-15.24	-15.24
17	-15.99	-16.11	-16.03	-15.45	-15.53	-15.57	-14.86	-15.08	-15.19	-14.70	-14.92	-15.03
18	-15.93	-16.01	-15.88	-15.49	-15.61	-15.56	-14.93	-15.15	-15.23	-14.85	-15.00	-15.08
19	-16.03	-16.12	-16.01	-15.60	-15.65	-15.72	-15.04	-15.17	-15.25	-14.90	-15.10	-15.24
20	-15.77	-15.94	-15.90	-15.70	-15.67	-15.73	-15.10	-15.28	-15.29	-15.02	-15.22	-15.22
21	-16.01	-16.05	-15.90	-15.64	-15.71	-15.64	-15.04	-15.29	-15.24	-15.02	-15.18	-15.22
22	-16.27	-16.19	-16.05	-15.72	-15.77	-15.75	-15.36	-15.39	-15.39	-15.27	-15.35	-15.35



### 3.4.9. Stressed Receiver Sensitivity at 1550nm and BaseE (OMA power dBm)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-16.28	-16.26	-16.16	-15.89	-15.92	-15.90	-15.31	-15.50	-15.60	-15.20	-15.45	-15.52
Median	-16.25	-16.24	-16.14	-15.90	-15.89	-15.88	-15.34	-15.52	-15.59	-15.25	-15.44	-15.51
Std. Dev.	0.18	0.19	0.18	0.13	0.13	0.16	0.17	0.15	0.13	0.18	0.14	0.13
Max.	-15.92	-15.94	-15.84	-15.62	-15.69	-15.63	-15.02	-15.25	-15.40	-14.85	-15.15	-15.30
Min.	-16.63	-16.66	-16.51	-16.10	-16.16	-16.17	-15.63	-15.80	-15.89	-15.52	-15.70	-15.73
Range	0.71	0.72	0.67	0.48	0.47	0.54	0.61	0.54	0.49	0.67	0.55	0.43
1	-16.20	-16.06	-15.99	-15.84	-15.82	-15.72	-15.51	-15.57	-15.63	-15.44	-15.64	-15.67
2	-16.44	-16.38	-16.22	-16.01	-16.11	-16.12	-15.48	-15.68	-15.84	-15.41	-15.68	-15.73
3	-16.47	-16.40	-16.34	-16.10	-16.05	-16.03	-15.49	-15.73	-15.74	-15.28	-15.54	-15.62
4	-16.30	-16.42	-16.30	-16.02	-16.04	-16.04	-15.43	-15.64	-15.68	-15.33	-15.58	-15.66
5	-16.35	-16.17	-16.16	-15.83	-15.87	-15.78	-15.48	-15.56	-15.61	-15.36	-15.45	-15.55
6	-16.14	-15.98	-15.92	-15.81	-15.74	-15.69	-15.33	-15.43	-15.53	-15.28	-15.42	-15.50
7	-16.63	-16.41	-16.30	-16.00	-16.03	-15.94	-15.63	-15.80	-15.89	-15.52	-15.70	-15.73
8	-16.44	-16.35	-16.25	-16.07	-16.16	-16.12	-15.43	-15.65	-15.71	-15.30	-15.51	-15.66
9	-16.61	-16.66	-16.51	-16.00	-16.16	-16.17	-15.15	-15.50	-15.67	-15.12	-15.53	-15.58
10	-16.26	-16.26	-16.10	-15.90	-15.91	-15.96	-15.32	-15.49	-15.54	-15.31	-15.42	-15.54
11	-16.24	-16.20	-16.09	-15.91	-15.90	-15.85	-15.36	-15.56	-15.61	-15.28	-15.51	-15.58
12	-16.10	-16.04	-15.97	-15.81	-15.83	-15.74	-15.44	-15.54	-15.64	-15.23	-15.45	-15.49
13	-16.16	-16.24	-16.15	-15.91	-15.88	-15.79	-15.24	-15.40	-15.58	-15.11	-15.40	-15.40
14	-16.22	-16.24	-16.12	-15.90	-15.87	-15.98	-15.18	-15.37	-15.52	-15.03	-15.30	-15.38
15	-16.38	-16.47	-16.41	-15.88	-15.93	-16.07	-15.07	-15.29	-15.40	-15.02	-15.36	-15.41
16	-16.53	-16.57	-16.44	-16.06	-16.06	-16.04	-15.43	-15.57	-15.62	-15.09	-15.35	-15.48
17	-16.17	-16.20	-16.13	-15.71	-15.83	-15.79	-15.02	-15.30	-15.41	-14.85	-15.15	-15.30
18	-15.92	-15.94	-15.84	-15.62	-15.69	-15.63	-15.08	-15.25	-15.46	-14.95	-15.28	-15.31
19	-16.26	-16.36	-16.30	-15.77	-15.86	-15.90	-15.08	-15.34	-15.55	-15.00	-15.25	-15.48
20	-16.07	-16.16	-16.06	-15.73	-15.76	-15.79	-15.21	-15.39	-15.55	-15.11	-15.43	-15.39
21	-16.16	-16.19	-16.07	-15.73	-15.83	-15.77	-15.16	-15.33	-15.41	-15.07	-15.40	-15.38
22	-16.20	-16.09	-15.89	-15.93	-15.93	-15.81	-15.34	-15.57	-15.57	-15.34	-15.51	-15.52



## 3.5. Optical Overload

### 3.5.1. Test Descriptions

The optical overload is measured by decreasing the average optical power to the ROSA in steps from a suitable power level.

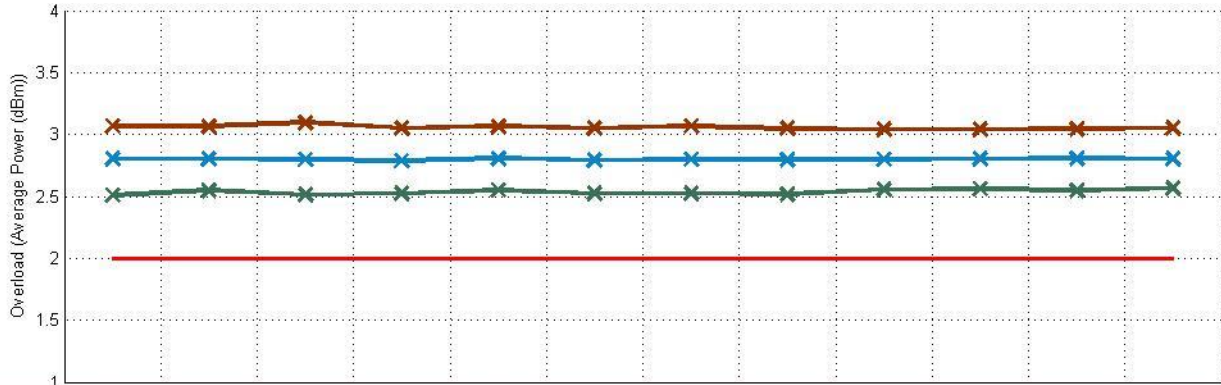
In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT.

**In most cases the overload test was limited by the maximum optical power of the optical transmitter. As a result the results in the report only represent a lower bound to the performance of the ROSAs. The ROSA performance is better than results presented.**

The input eyes used are the same as for the sensitivity tests.

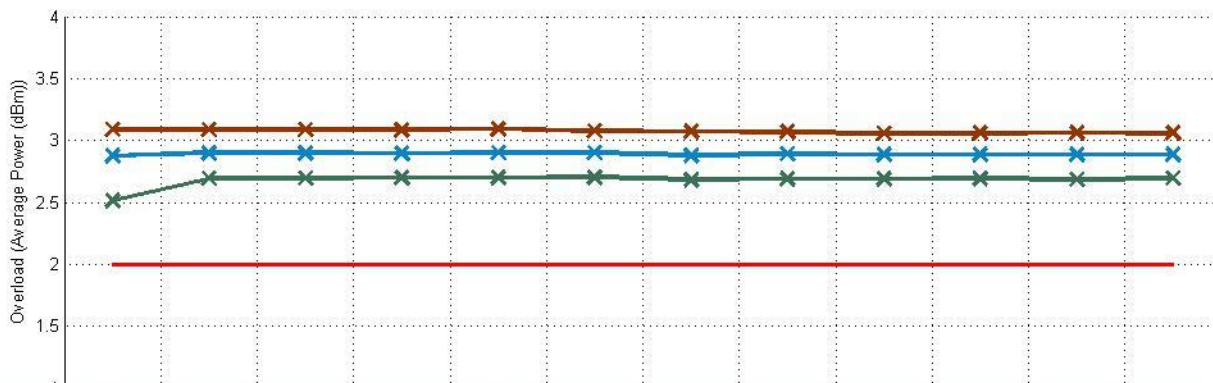
The equipment setup is the same as for the sensitivity tests.

### 3.5.2. Overload at 1310nm and 11.3Gbps (Avg. power dBm)



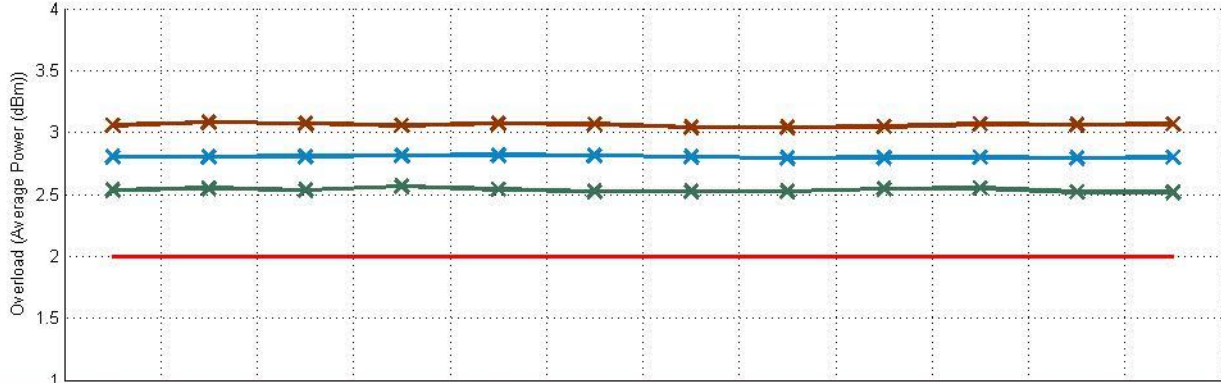
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.80	2.80	2.80	2.79	2.81	2.79	2.80	2.80	2.80	2.80	2.81	2.80
Median	2.81	2.81	2.80	2.78	2.81	2.80	2.81	2.80	2.80	2.81	2.81	2.80
Std. Dev.	0.16	0.15	0.16	0.16	0.15	0.15	0.16	0.15	0.15	0.15	0.15	0.15
Max.	3.07	3.07	3.10	3.05	3.06	3.05	3.07	3.05	3.04	3.04	3.04	3.05
Min.	2.51	2.55	2.51	2.53	2.55	2.53	2.52	2.52	2.56	2.56	2.55	2.57
Range	0.56	0.52	0.58	0.53	0.51	0.53	0.54	0.53	0.49	0.48	0.50	0.48
Spec min	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1	3.05	3.05	3.01	3.05	2.99	2.99	3.04	3.05	3.01	3.02	3.02	3.01
2	2.85	2.85	2.85	2.85	2.86	2.86	2.82	2.82	2.82	2.84	2.83	2.85
3	2.61	2.60	2.56	2.55	2.55	2.56	2.56	2.57	2.57	2.62	2.60	2.62
4	2.86	2.86	2.81	2.82	2.81	2.82	2.83	2.83	2.84	2.88	2.87	2.83
5	3.07	3.07	3.10	3.04	3.04	3.01	3.07	3.03	3.04	3.04	3.04	3.02
6	2.86	2.86	2.86	2.82	2.82	2.86	2.86	2.85	2.89	2.86	2.89	2.88
7	2.60	2.61	2.60	2.57	2.61	2.62	2.56	2.60	2.57	2.58	2.57	2.57
8	2.85	2.85	2.87	2.86	2.87	2.83	2.86	2.82	2.82	2.82	2.87	2.82
9	2.80	2.80	2.80	2.75	2.77	2.76	2.81	2.81	2.81	2.76	2.77	2.77
10	3.05	3.03	3.05	3.05	3.06	3.05	3.04	3.03	3.04	3.03	2.99	3.05
11	2.85	2.86	2.85	2.86	2.82	2.85	2.84	2.83	2.83	2.86	2.85	2.85
12	2.60	2.59	2.60	2.57	2.60	2.61	2.59	2.59	2.60	2.60	2.60	2.59
13	2.51	2.57	2.51	2.57	2.60	2.53	2.52	2.52	2.56	2.56	2.55	2.57
14	2.98	2.98	2.99	2.97	3.03	2.97	3.01	3.00	3.03	3.03	3.02	3.02
15	2.75	2.75	2.76	2.74	2.80	2.78	2.80	2.78	2.77	2.79	2.78	2.80
16	2.81	2.80	2.79	2.77	2.81	2.81	2.77	2.77	2.74	2.78	2.77	2.77
17	2.73	2.73	2.73	2.76	2.76	2.77	2.76	2.76	2.79	2.77	2.77	2.78
18	2.55	2.55	2.54	2.53	2.58	2.58	2.56	2.58	2.56	2.58	2.58	2.58
19	2.80	2.79	2.83	2.77	2.82	2.77	2.80	2.79	2.79	2.83	2.82	2.79
20	2.80	2.83	2.77	2.78	2.78	2.79	2.79	2.78	2.80	2.80	2.81	2.80
21	2.77	2.78	2.76	2.74	2.80	2.73	2.78	2.79	2.79	2.76	2.80	2.76
22	2.92	2.90	2.92	2.93	2.97	2.92	2.89	2.92	2.90	2.89	2.93	2.89

### 3.5.3. Overload at 1550nm and 11.3Gbps (Avg. power dBm)



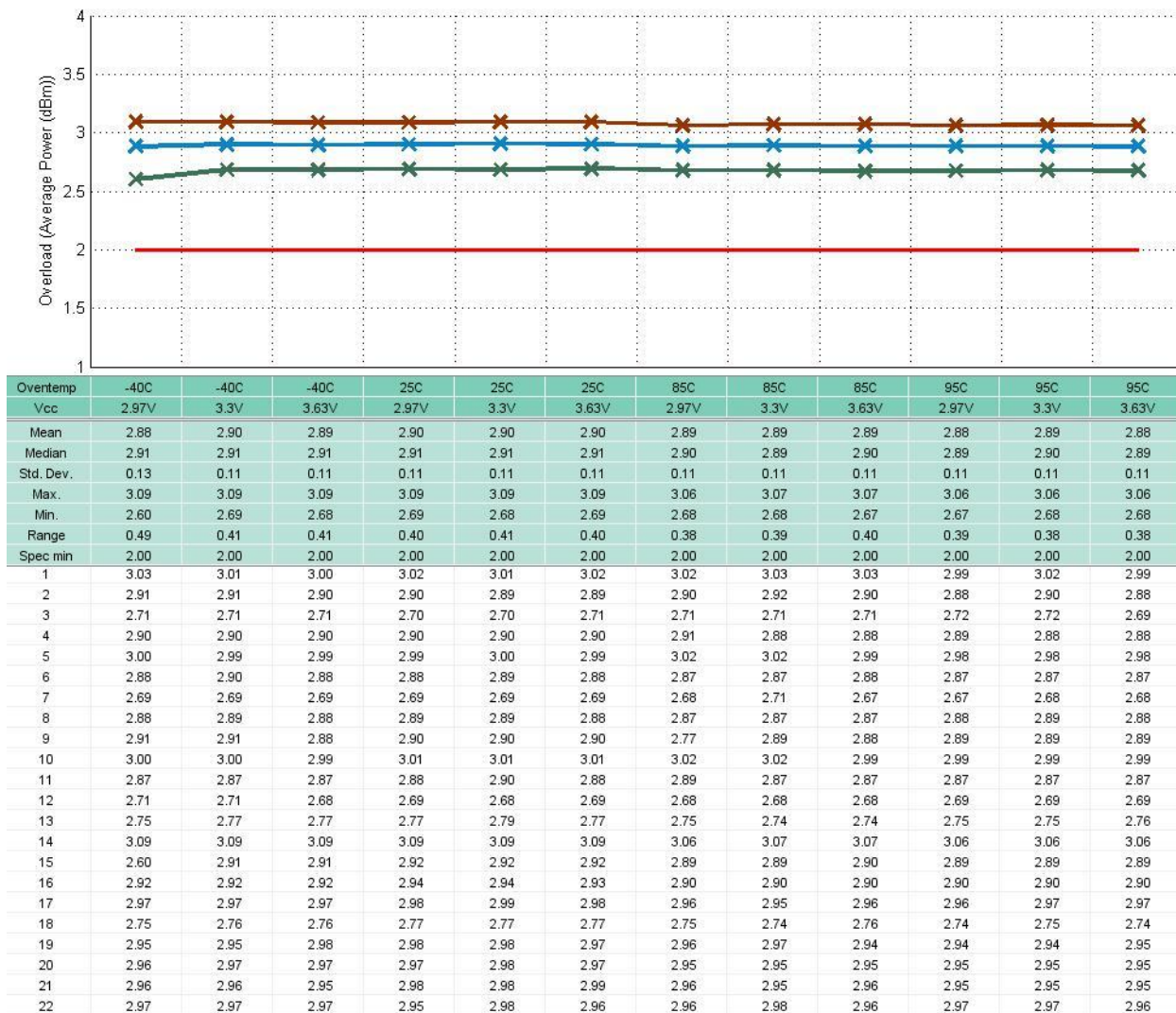
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.88	2.90	2.90	2.90	2.90	2.90	2.88	2.89	2.89	2.89	2.89	2.89
Median	2.90	2.91	2.91	2.91	2.91	2.91	2.89	2.90	2.90	2.89	2.89	2.90
Std. Dev.	0.14	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.11
Max.	3.09	3.09	3.09	3.09	3.09	3.08	3.07	3.07	3.06	3.06	3.06	3.06
Min.	2.51	2.69	2.69	2.70	2.70	2.70	2.68	2.69	2.69	2.69	2.68	2.69
Range	0.57	0.39	0.39	0.39	0.39	0.37	0.39	0.38	0.37	0.36	0.38	0.36
Spec min	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1	3.02	3.03	3.03	3.03	3.03	3.03	3.02	3.03	3.01	3.01	3.02	3.01
2	2.91	2.90	2.91	2.91	2.88	2.91	2.89	2.90	2.90	2.89	2.89	2.88
3	2.70	2.70	2.70	2.71	2.70	2.72	2.71	2.71	2.71	2.70	2.70	2.70
4	2.89	2.91	2.89	2.91	2.91	2.91	2.90	2.91	2.89	2.89	2.89	2.89
5	3.01	3.01	3.00	3.01	3.01	3.01	3.00	3.02	3.00	3.00	3.00	3.00
6	2.88	2.89	2.88	2.89	2.88	2.89	2.88	2.88	2.88	2.88	2.89	2.87
7	2.69	2.69	2.69	2.70	2.70	2.70	2.68	2.69	2.69	2.69	2.68	2.69
8	2.89	2.89	2.89	2.89	2.91	2.89	2.88	2.89	2.89	2.89	2.89	2.89
9	2.91	2.90	2.90	2.90	2.90	2.90	2.89	2.90	2.90	2.90	2.90	2.90
10	3.00	3.01	3.01	3.02	3.00	3.01	3.00	3.00	3.01	3.01	3.01	3.01
11	2.89	2.88	2.89	2.89	2.89	2.89	2.88	2.89	2.89	2.87	2.88	2.88
12	2.70	2.70	2.70	2.70	2.70	2.70	2.69	2.69	2.69	2.70	2.69	2.70
13	2.76	2.76	2.76	2.77	2.77	2.77	2.75	2.74	2.74	2.75	2.74	2.75
14	3.09	3.09	3.09	3.09	3.09	3.08	3.07	3.07	3.06	3.06	3.06	3.06
15	2.51	2.91	2.91	2.82	2.92	2.91	2.89	2.90	2.89	2.89	2.89	2.89
16	2.82	2.92	2.92	2.92	2.92	2.92	2.90	2.89	2.90	2.89	2.89	2.90
17	2.98	2.98	2.98	2.98	2.98	2.99	2.95	2.95	2.95	2.96	2.96	2.96
18	2.76	2.76	2.76	2.76	2.77	2.76	2.74	2.74	2.75	2.73	2.73	2.74
19	2.96	2.96	2.95	2.97	2.97	2.98	2.96	2.96	2.94	2.94	2.94	2.94
20	2.97	2.97	2.97	2.98	2.97	2.97	2.95	2.94	2.94	2.95	2.94	2.94
21	2.97	2.96	2.96	2.97	2.98	2.98	2.95	2.96	2.96	2.95	2.95	2.95
22	2.96	2.97	2.96	2.95	2.96	2.97	2.96	2.97	2.96	2.97	2.96	2.97

### 3.5.4. Overload at 1310nm and 10.3125Gbps (Avg. power dBm)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.80	2.80	2.81	2.81	2.82	2.81	2.80	2.79	2.80	2.80	2.79	2.80
Median	2.80	2.81	2.82	2.81	2.84	2.83	2.81	2.80	2.80	2.80	2.80	2.81
Std. Dev.	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.15	0.15	0.16	0.16
Max.	3.06	3.08	3.07	3.06	3.07	3.07	3.04	3.04	3.05	3.07	3.06	3.07
Min.	2.54	2.55	2.54	2.57	2.54	2.52	2.53	2.52	2.54	2.55	2.52	2.52
Range	0.52	0.53	0.54	0.49	0.53	0.55	0.51	0.52	0.50	0.52	0.54	0.55
Spec min	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1	3.06	3.07	3.04	3.04	3.04	3.05	3.03	3.03	2.99	2.99	2.99	3.01
2	2.84	2.84	2.84	2.85	2.85	2.86	2.83	2.80	2.80	2.83	2.83	2.82
3	2.59	2.59	2.60	2.60	2.60	2.60	2.55	2.54	2.57	2.62	2.58	2.59
4	2.78	2.84	2.86	2.86	2.85	2.86	2.82	2.82	2.82	2.86	2.84	2.86
5	3.06	3.08	3.07	3.06	3.06	3.06	3.03	3.04	3.05	3.07	3.06	3.07
6	2.85	2.86	2.85	2.87	2.88	2.87	2.87	2.86	2.85	2.87	2.88	2.88
7	2.59	2.59	2.63	2.62	2.61	2.62	2.62	2.62	2.63	2.62	2.61	2.61
8	2.87	2.85	2.83	2.90	2.87	2.88	2.88	2.88	2.88	2.86	2.87	2.86
9	2.79	2.80	2.81	2.80	2.81	2.81	2.81	2.81	2.81	2.81	2.80	2.82
10	3.01	3.00	3.01	3.01	3.07	3.07	3.04	3.03	3.04	3.02	3.00	3.02
11	2.82	2.82	2.83	2.83	2.87	2.83	2.81	2.81	2.82	2.82	2.82	2.83
12	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.57	2.57	2.58	2.57	2.57
13	2.59	2.58	2.59	2.60	2.54	2.52	2.53	2.53	2.54	2.55	2.54	2.55
14	2.99	2.98	3.00	3.02	3.02	3.01	3.03	3.00	3.02	3.01	3.03	3.01
15	2.75	2.76	2.75	2.78	2.79	2.78	2.79	2.77	2.79	2.77	2.78	2.78
16	2.79	2.80	2.81	2.82	2.82	2.81	2.81	2.82	2.75	2.76	2.76	2.76
17	2.81	2.80	2.80	2.76	2.77	2.75	2.74	2.74	2.74	2.77	2.76	2.76
18	2.54	2.55	2.54	2.57	2.56	2.57	2.58	2.52	2.58	2.57	2.52	2.52
19	2.78	2.78	2.78	2.81	2.81	2.83	2.81	2.77	2.81	2.76	2.81	2.81
20	2.84	2.84	2.85	2.79	2.85	2.80	2.77	2.79	2.77	2.79	2.80	2.81
21	2.76	2.77	2.77	2.79	2.79	2.83	2.77	2.73	2.77	2.73	2.74	2.73
22	2.92	2.91	2.92	2.92	2.91	2.93	2.91	2.93	2.89	2.88	2.90	2.90

### 3.5.5. Overload at 1550nm and 10.3125Gbps (Avg. power dBm)



### 3.6. Electrical Output Eyes

#### 3.6.1. Test Descriptions

Electrical output eyes of the P and N channel for the following conditions were measured at 11.3G data rate, unstressed eye at 1550nm wavelength.

- 1) Average power of -18dBm
- 2) Average power of -10dBm
- 3) Average power of 1.6dBm

Output eyes differential measurements were made for the following parameters after displaying 512 waveforms with 1350 points per waveform. The following was measured.

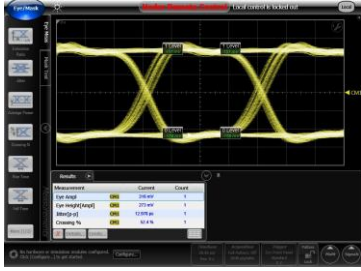
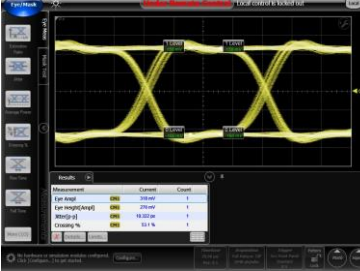
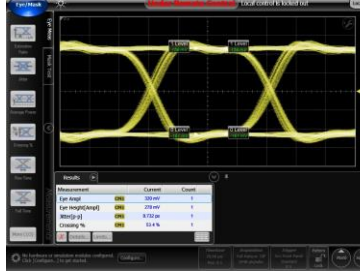
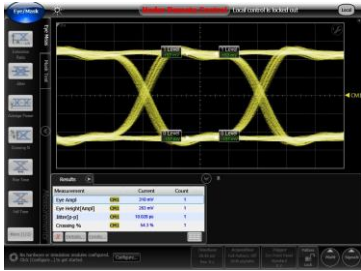
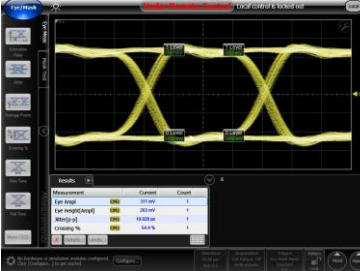
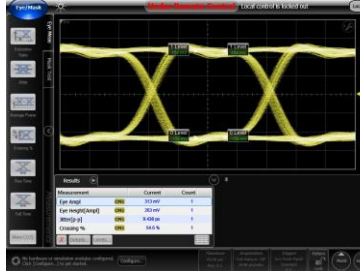
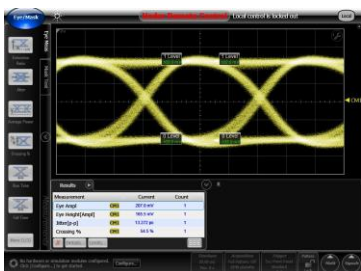
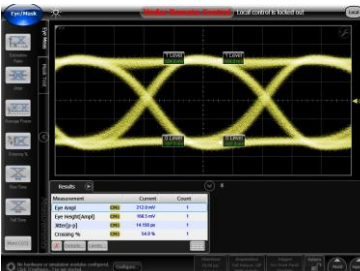
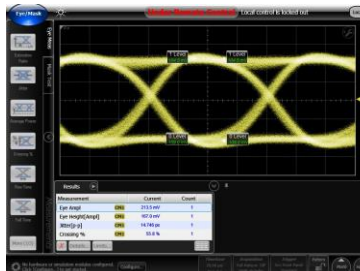
- 1) Crossing Percentage
- 2) Rise Time
- 3) Fall Time
- 4) Eye Height
- 5) Eye Amplitude
- 6) Peak to Peak Jitter
- 7) RMS Jitter

The input eyes used are the same as for the sensitivity tests.

The Jitter measurements are uncorrected for jitter of the source.

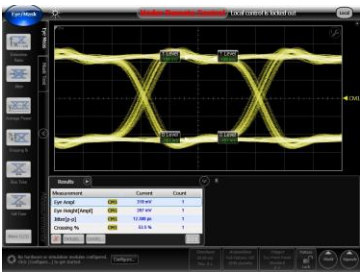
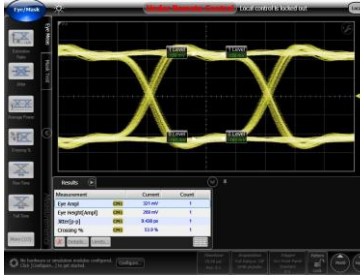
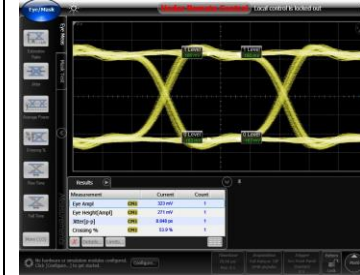
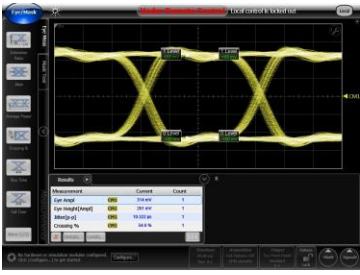
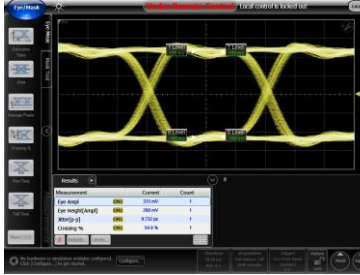
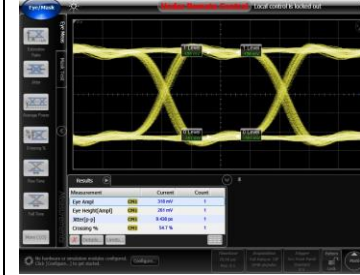
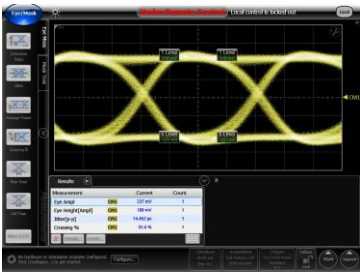
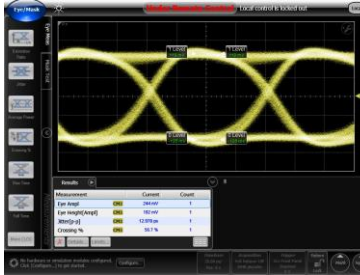
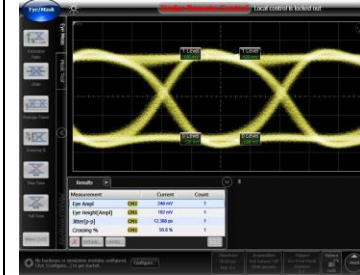
For information on the definitions of the eye diagram measurements see Appendix 1

### 3.6.2. Typical Eye Diagrams at 25C

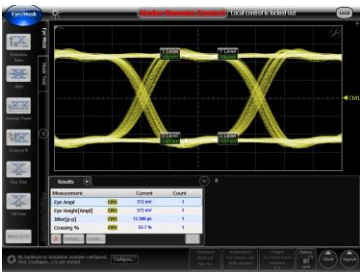
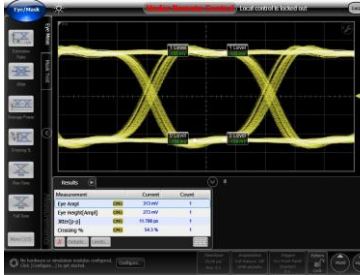
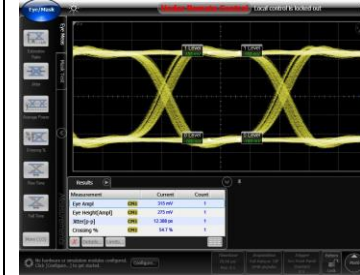
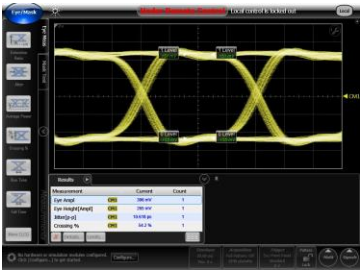
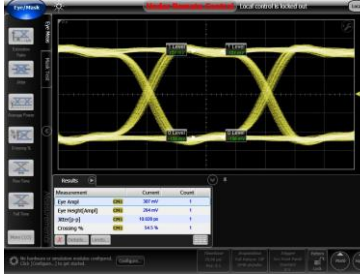
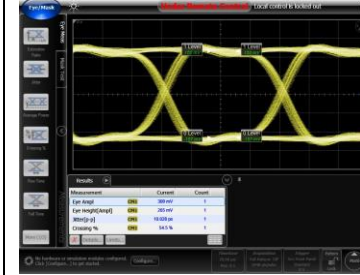
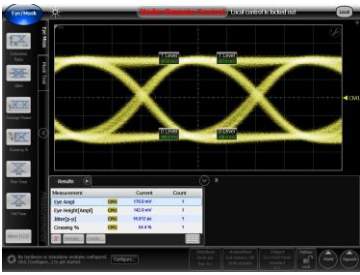
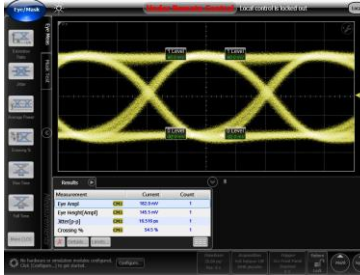
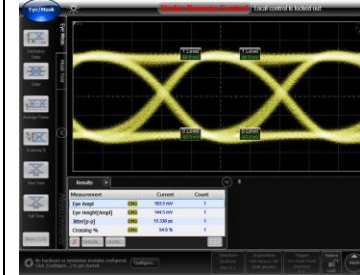
Optical Power\Vcc	2.97V	3.3V	3.63V																																													
1.6dBm	 <table border="1" data-bbox="363 646 721 743"> <thead> <tr> <th>Measurement</th> <th>Current</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Eye Avg</td> <td>275mV</td> <td>1</td> </tr> <tr> <td>Eye mag(Avg)</td> <td>1200mV</td> <td>1</td> </tr> <tr> <td>Mag(D-0)</td> <td>18.00mV</td> <td>1</td> </tr> <tr> <td>Crossing %</td> <td>84.6%</td> <td>1</td> </tr> </tbody> </table>	Measurement	Current	Count	Eye Avg	275mV	1	Eye mag(Avg)	1200mV	1	Mag(D-0)	18.00mV	1	Crossing %	84.6%	1	 <table border="1" data-bbox="750 646 1107 743"> <thead> <tr> <th>Measurement</th> <th>Current</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Eye Avg</td> <td>300mV</td> <td>1</td> </tr> <tr> <td>Eye mag(Avg)</td> <td>2000mV</td> <td>1</td> </tr> <tr> <td>Mag(D-0)</td> <td>18.00mV</td> <td>1</td> </tr> <tr> <td>Crossing %</td> <td>84.6%</td> <td>1</td> </tr> </tbody> </table>	Measurement	Current	Count	Eye Avg	300mV	1	Eye mag(Avg)	2000mV	1	Mag(D-0)	18.00mV	1	Crossing %	84.6%	1	 <table border="1" data-bbox="1141 646 1498 743"> <thead> <tr> <th>Measurement</th> <th>Current</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Eye Avg</td> <td>300mV</td> <td>1</td> </tr> <tr> <td>Eye mag(Avg)</td> <td>2000mV</td> <td>1</td> </tr> <tr> <td>Mag(D-0)</td> <td>18.00mV</td> <td>1</td> </tr> <tr> <td>Crossing %</td> <td>84.6%</td> <td>1</td> </tr> </tbody> </table>	Measurement	Current	Count	Eye Avg	300mV	1	Eye mag(Avg)	2000mV	1	Mag(D-0)	18.00mV	1	Crossing %	84.6%	1
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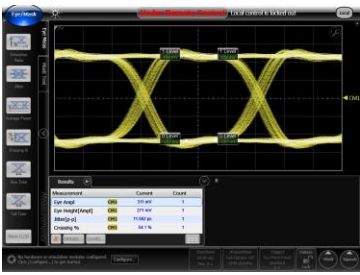
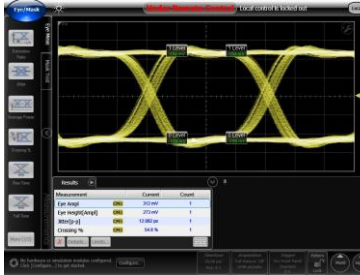
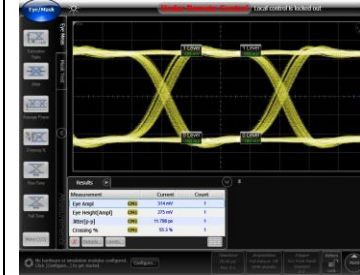
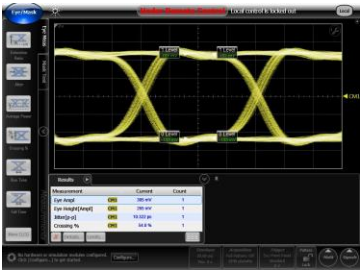
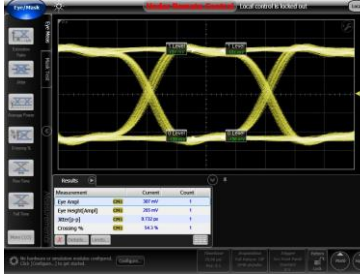
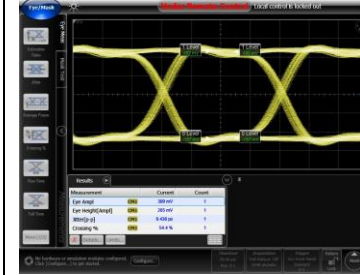
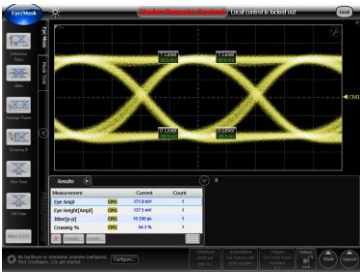
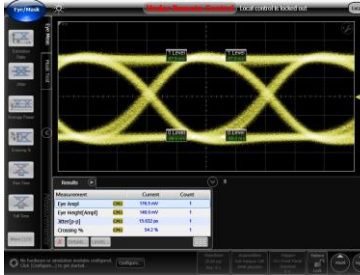
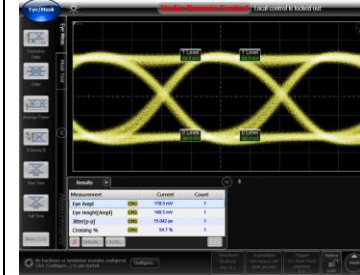
### 3.6.3. Typical Eye Diagrams at -40C

Optical Power \ Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

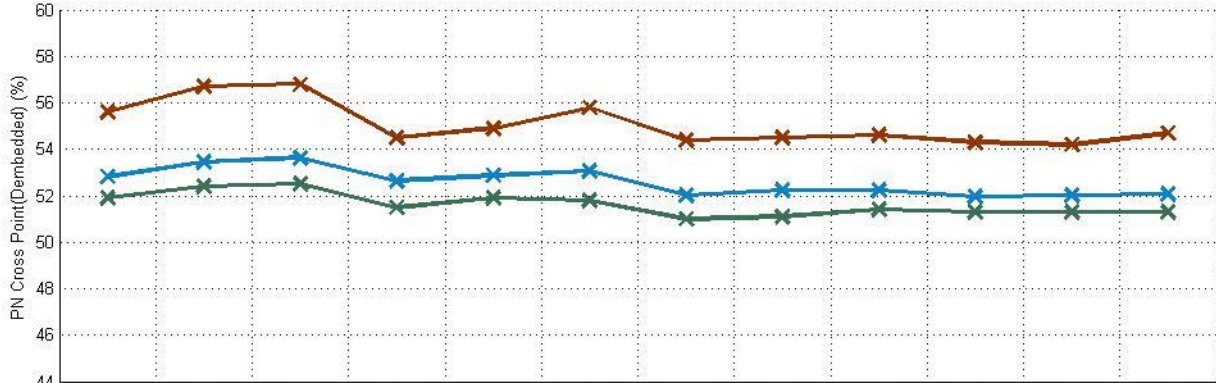
### 3.6.4. Typical Eye Diagrams at 85C

Optical Power \ Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.5. Typical Eye Diagrams at 95C

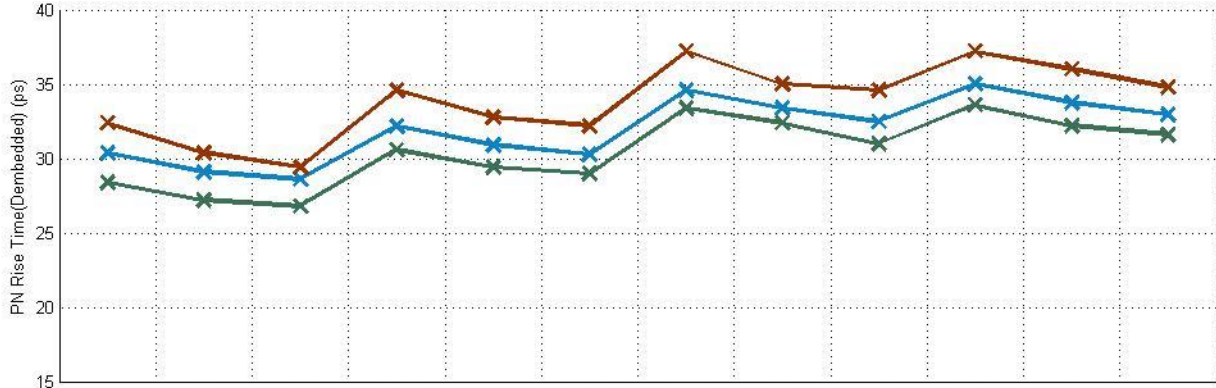
Optical Power \ Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.6. Crossing Percentage at -18 dBm avg. Power at 1550nm and 11.3Gbps



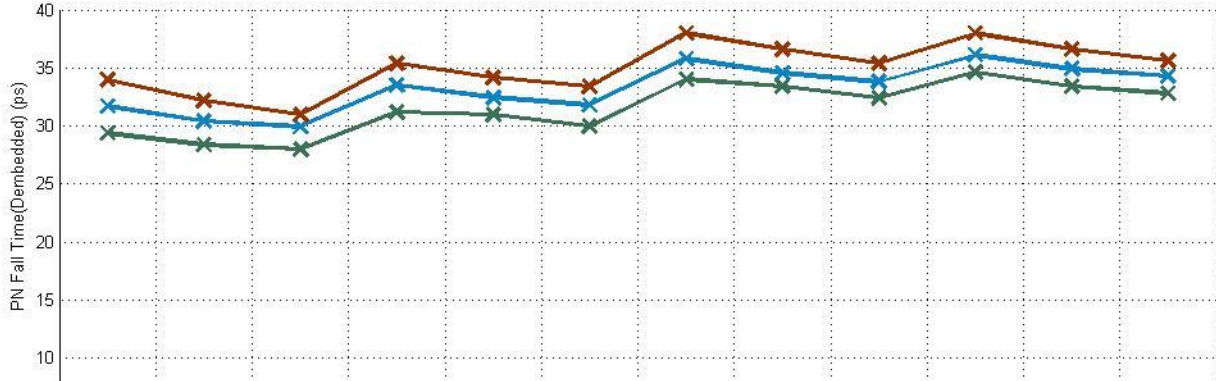
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	52.82	53.44	53.64	52.64	52.88	53.05	52.01	52.22	52.23	51.96	52.01	52.07
Median	52.85	53.35	53.45	52.50	52.95	53.00	51.90	52.20	52.10	51.85	52.00	51.90
Std. Dev.	0.77	0.92	0.91	0.65	0.72	0.81	0.67	0.64	0.63	0.61	0.60	0.67
Max.	55.60	56.70	56.80	54.50	54.90	55.80	54.40	54.50	54.60	54.30	54.20	54.70
Min.	51.90	52.40	52.50	51.50	51.90	51.80	51.00	51.10	51.40	51.30	51.30	51.30
Range	3.70	4.30	4.30	3.00	3.00	4.00	3.40	3.40	3.20	3.00	2.90	3.40
1	52.90	53.40	53.50	52.80	53.00	53.10	51.90	52.20	51.80	51.90	52.00	52.20
2	52.90	53.30	53.70	52.40	52.00	52.90	51.80	52.00	52.20	51.90	52.10	51.80
3	52.40	53.20	53.20	52.30	52.40	52.70	51.90	52.00	52.10	51.80	51.70	51.90
4	52.30	53.20	53.00	52.40	52.50	52.70	51.80	52.20	51.70	51.80	51.80	51.80
5	52.20	52.60	52.90	52.40	52.30	52.50	51.50	52.40	51.90	51.60	51.60	51.60
6	52.30	52.80	52.80	52.20	52.10	52.70	51.90	51.70	51.80	51.30	51.60	51.30
7	52.40	53.10	53.00	52.40	52.40	52.70	51.50	51.80	52.00	51.40	51.40	51.70
8	52.10	52.40	52.90	51.70	52.50	52.00	51.30	51.10	51.70	51.30	51.60	51.60
9	51.90	52.40	52.50	51.50	51.90	51.80	51.00	51.60	51.40	51.60	51.30	51.40
10	52.10	52.90	53.00	52.30	52.40	52.60	51.80	51.90	52.10	51.80	52.00	51.90
11	52.80	52.60	53.40	52.20	52.90	52.40	51.40	52.10	52.10	51.70	51.70	51.80
12	52.20	52.60	53.20	51.90	52.00	52.40	51.60	51.60	51.90	51.70	51.40	51.80
13	53.60	54.40	54.60	53.40	53.70	53.60	52.60	52.40	52.50	52.30	52.40	52.40
14	53.10	53.70	53.80	53.00	53.40	53.20	52.40	52.60	52.20	52.00	52.40	52.20
15	52.90	53.50	54.10	53.00	53.40	53.30	52.20	52.70	52.50	52.30	52.00	52.30
16	53.30	54.10	54.40	53.30	53.60	53.80	52.50	52.60	52.70	52.40	52.50	52.40
17	52.90	53.80	54.00	52.60	53.00	53.70	52.00	52.30	52.20	51.90	52.00	52.00
18	53.10	53.90	54.20	52.90	53.40	53.20	52.50	52.30	52.70	52.30	52.30	52.40
19	52.70	53.40	53.20	52.90	53.00	53.20	52.10	52.20	52.10	51.80	51.90	51.80
20	53.20	53.80	54.00	53.20	53.20	53.20	52.20	52.20	52.30	52.00	52.00	52.30
21	53.20	53.80	53.80	52.70	53.30	53.60	52.00	52.50	52.50	52.10	52.40	52.20
22	55.60	56.70	56.80	54.50	54.90	55.80	54.40	54.50	54.60	54.30	54.20	54.70

### 3.6.7. Rise Time at -18 dBm avg. Power at 1550nm and 11.3Gbps



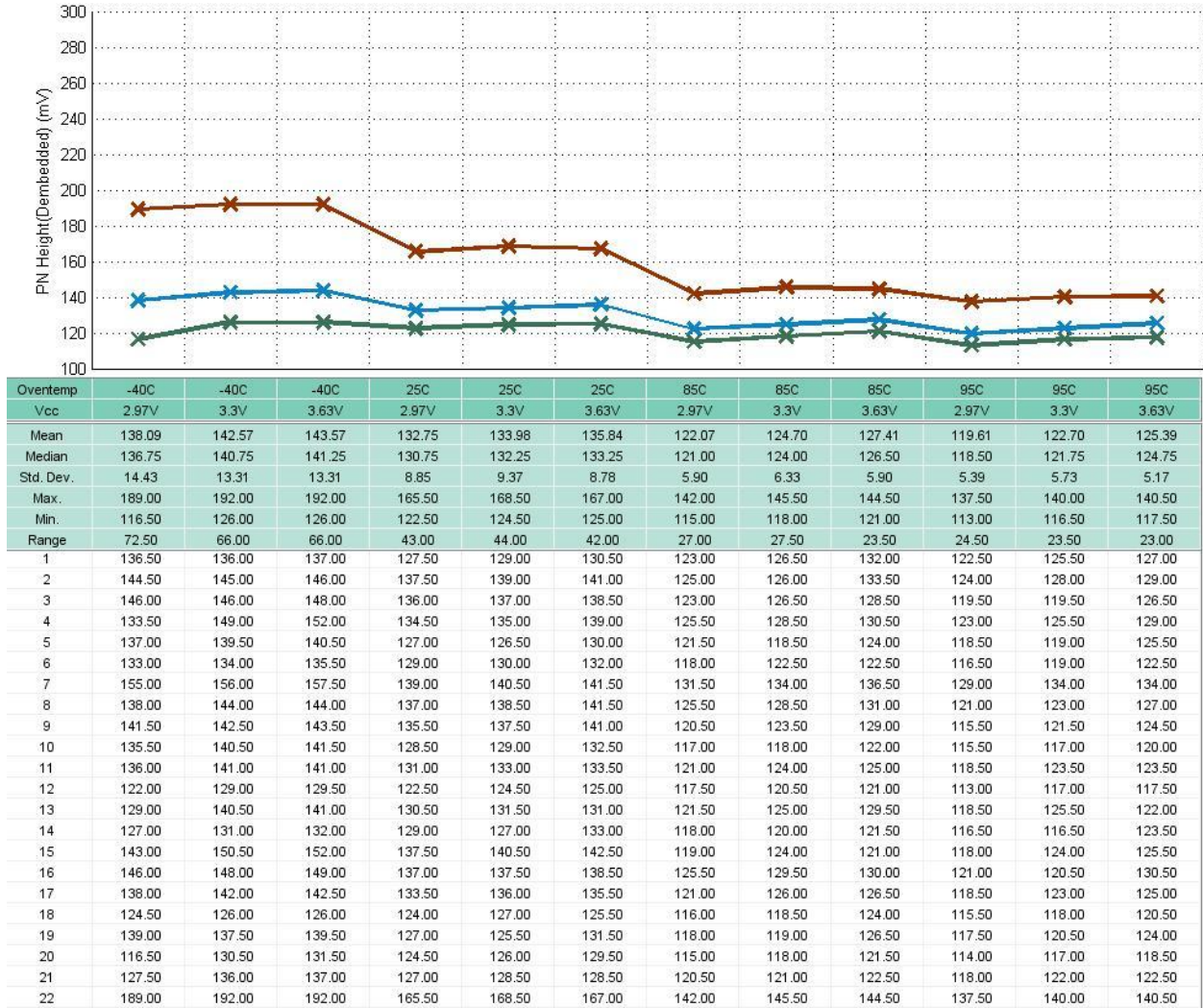
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	30.36	29.10	28.61	32.19	30.91	30.30	34.57	33.37	32.48	35.00	33.76	32.95
Median	30.40	29.10	28.60	32.30	31.00	30.40	34.60	33.40	32.40	35.00	33.80	33.00
Std. Dev.	0.86	0.75	0.61	0.95	0.76	0.75	0.87	0.65	0.75	0.78	0.81	0.68
Max.	32.40	30.40	29.40	34.60	32.80	32.20	37.20	35.00	34.60	37.20	36.00	34.80
Min.	28.40	27.20	26.80	30.60	29.40	29.00	33.40	32.40	31.00	33.60	32.20	31.60
Range	4.00	3.20	2.60	4.00	3.40	3.20	3.80	2.60	3.60	3.60	3.80	3.20
1	29.20	28.00	28.00	31.00	30.40	29.00	33.40	33.00	31.80	34.00	33.00	32.20
2	30.00	29.00	28.00	32.40	30.60	30.40	34.80	33.40	32.40	35.00	34.00	32.80
3	30.40	29.40	29.00	31.80	30.60	30.40	34.20	33.00	32.20	34.80	33.00	33.40
4	30.60	29.40	29.00	32.40	31.20	30.40	35.00	34.60	32.80	35.00	34.00	33.00
5	30.60	29.40	29.00	31.80	30.60	30.00	34.60	32.80	32.40	35.00	33.40	33.40
6	29.40	28.40	28.40	31.20	30.40	30.00	34.00	32.80	31.60	34.00	33.00	32.20
7	29.80	28.40	28.00	30.60	30.00	29.40	33.40	32.80	31.60	34.00	33.00	32.20
8	30.00	29.00	28.60	32.40	31.20	30.40	34.80	33.60	33.00	35.40	34.20	33.00
9	32.40	30.40	29.40	34.60	32.80	32.20	37.20	35.00	34.60	37.20	36.00	34.80
10	31.00	29.80	29.40	32.80	31.20	31.00	34.80	33.00	33.00	35.40	34.20	33.00
11	30.40	29.20	28.60	32.20	31.00	30.40	34.20	33.40	32.20	35.00	34.00	33.00
12	31.00	29.40	29.00	32.40	31.60	30.40	35.00	33.60	33.00	35.40	34.60	33.00
13	29.80	29.00	28.40	31.80	30.00	29.40	33.60	32.80	32.40	34.20	33.40	32.20
14	30.60	29.20	29.00	32.40	31.00	30.60	35.00	33.40	32.40	35.40	33.60	33.60
15	31.80	30.40	29.40	33.40	32.20	31.60	35.00	34.00	32.80	35.40	34.20	33.40
16	30.40	29.00	28.40	31.80	30.40	30.00	34.20	33.60	32.20	35.00	33.00	33.00
17	31.00	29.80	29.00	32.80	31.80	30.60	34.80	34.00	32.80	35.60	34.60	33.40
18	30.40	28.60	28.40	31.80	31.00	30.00	34.60	32.80	33.00	35.00	33.40	33.00
19	31.00	29.80	29.00	33.40	31.20	31.00	36.00	34.00	33.40	36.00	34.60	33.60
20	30.00	29.00	28.60	33.00	31.00	30.40	34.00	33.40	32.20	35.00	34.00	32.80
21	29.80	28.40	28.00	31.60	30.40	29.80	34.60	32.80	31.80	34.60	33.40	32.20
22	28.40	27.20	26.80	30.60	29.40	29.20	33.40	32.40	31.00	33.60	32.20	31.60

### 3.6.8. Fall Time at -18 dBm avg. Power at 1550nm and 11.3Gbps

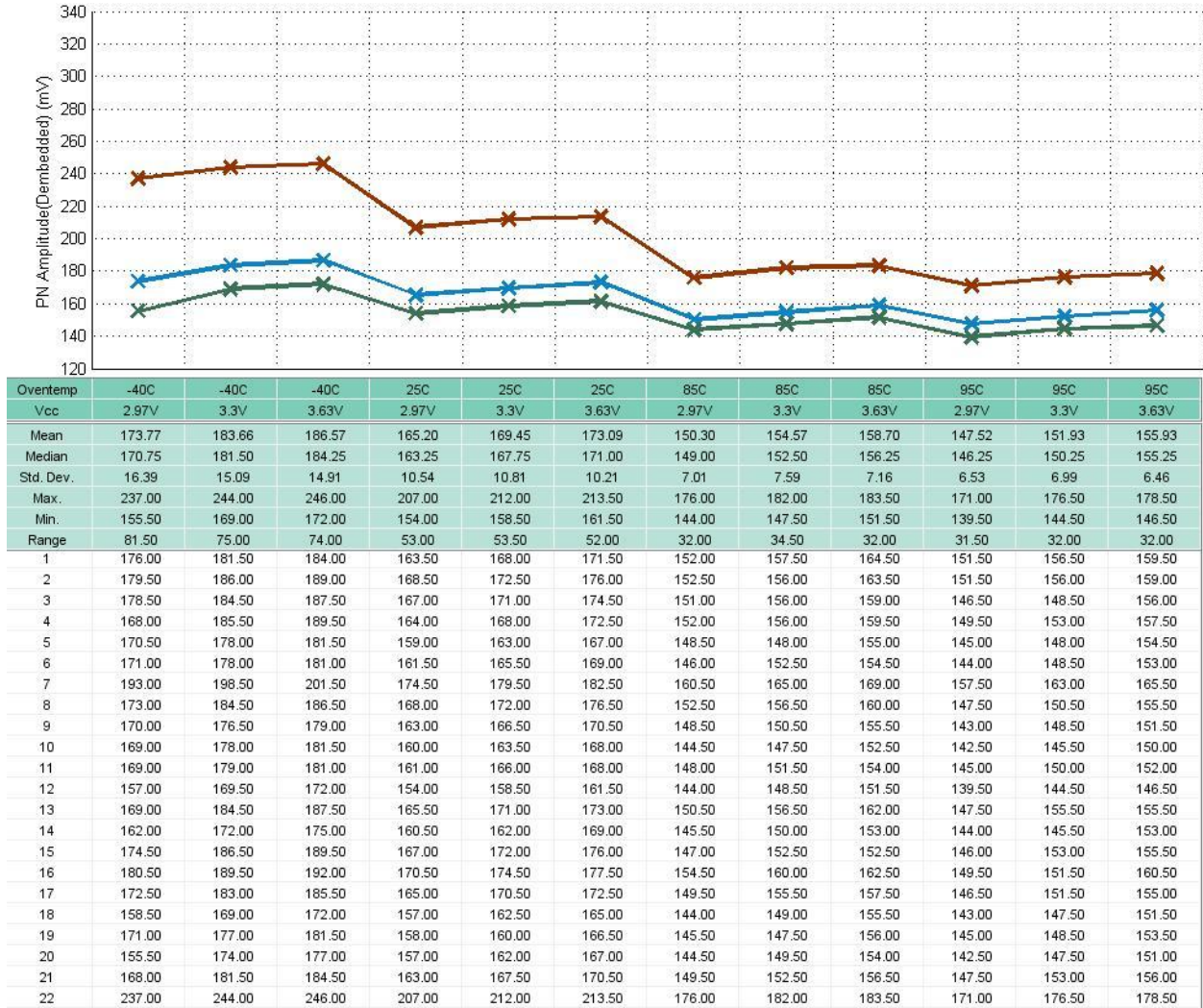


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	31.71	30.45	29.95	33.53	32.45	31.81	35.77	34.56	33.82	36.11	34.92	34.26
Median	31.80	30.40	29.90	33.50	32.40	31.80	35.80	34.60	34.00	36.10	34.90	34.20
Std. Dev.	0.90	0.73	0.66	0.83	0.64	0.62	0.76	0.67	0.63	0.73	0.64	0.59
Max.	34.00	32.20	31.00	35.40	34.20	33.40	38.00	36.60	35.40	38.00	36.60	35.60
Min.	29.40	28.40	28.00	31.20	31.00	30.00	34.00	33.40	32.40	34.60	33.40	32.80
Range	4.60	3.80	3.00	4.20	3.20	3.40	4.00	3.20	3.00	3.40	3.20	2.80
1	31.00	29.80	29.40	32.80	31.60	31.20	34.80	33.60	32.80	34.80	34.00	33.40
2	32.20	30.40	29.80	33.60	32.40	31.80	36.00	34.20	33.60	36.20	34.80	34.20
3	31.80	30.40	30.00	33.40	32.20	31.80	35.40	34.80	33.60	36.00	34.80	34.20
4	31.60	30.40	29.40	33.60	32.80	31.80	36.20	34.80	34.00	36.20	35.00	34.60
5	31.60	30.40	30.00	33.60	32.40	31.80	35.40	34.20	34.00	36.00	34.80	34.20
6	31.20	30.00	29.80	32.80	32.20	31.20	35.40	34.20	33.40	35.60	34.80	34.00
7	30.60	29.80	29.20	32.80	32.20	31.20	35.40	34.20	33.00	35.60	34.80	33.60
8	31.80	30.60	30.40	34.00	32.40	31.80	36.00	34.80	34.20	36.60	35.40	34.60
9	34.00	32.20	31.00	35.40	34.20	33.40	38.00	36.60	35.40	38.00	36.60	35.60
10	31.80	30.40	29.80	33.40	32.80	32.20	36.00	34.60	34.00	36.00	35.00	34.60
11	31.80	30.40	29.80	33.40	32.40	31.80	36.00	34.60	34.00	36.20	34.80	34.60
12	32.20	31.00	30.40	34.20	33.00	32.20	36.20	34.80	34.00	36.20	35.60	34.60
13	31.00	29.80	29.40	32.80	32.20	31.60	35.60	34.00	33.60	35.60	34.20	34.20
14	31.80	31.00	30.40	33.60	32.80	31.80	35.60	34.60	33.60	36.00	35.00	34.20
15	32.80	31.00	30.40	34.60	33.00	32.40	36.20	35.00	34.80	36.80	35.40	35.00
16	31.60	30.00	29.80	33.40	32.20	31.80	35.40	34.60	33.60	36.20	35.00	34.00
17	31.80	31.00	30.40	34.00	32.40	32.20	36.20	35.00	34.20	36.80	35.40	34.80
18	32.40	31.00	30.40	33.60	32.20	32.20	36.00	34.20	34.00	36.00	34.80	34.20
19	32.80	31.20	31.00	34.60	33.40	32.20	36.60	35.60	34.20	37.20	35.40	34.60
20	31.20	30.40	30.40	33.40	32.20	31.60	35.60	34.60	34.00	36.20	35.00	34.20
21	31.20	30.40	29.80	33.40	31.80	31.80	35.00	34.00	33.60	35.60	34.20	33.60
22	29.40	28.40	28.00	31.20	31.00	30.00	34.00	33.40	32.40	34.60	33.40	32.80

### 3.6.9. Height at -18 dBm avg. Power at 1550nm and 11.3Gbps

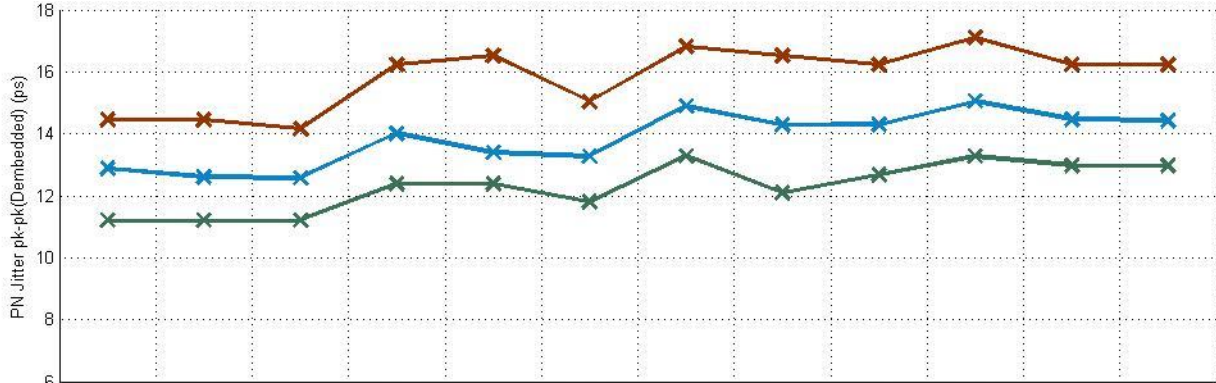


### 3.6.10. Amplitude at -18 dBm avg. Power at 1550nm and 11.3Gbps



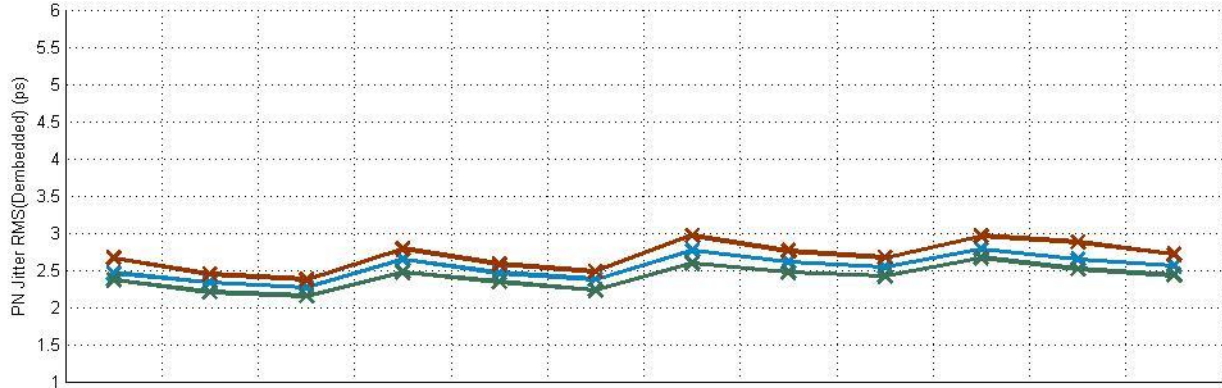


### 3.6.11. Jitter pk-pk at -18 dBm avg. Power at 1550nm and 11.3Gbps



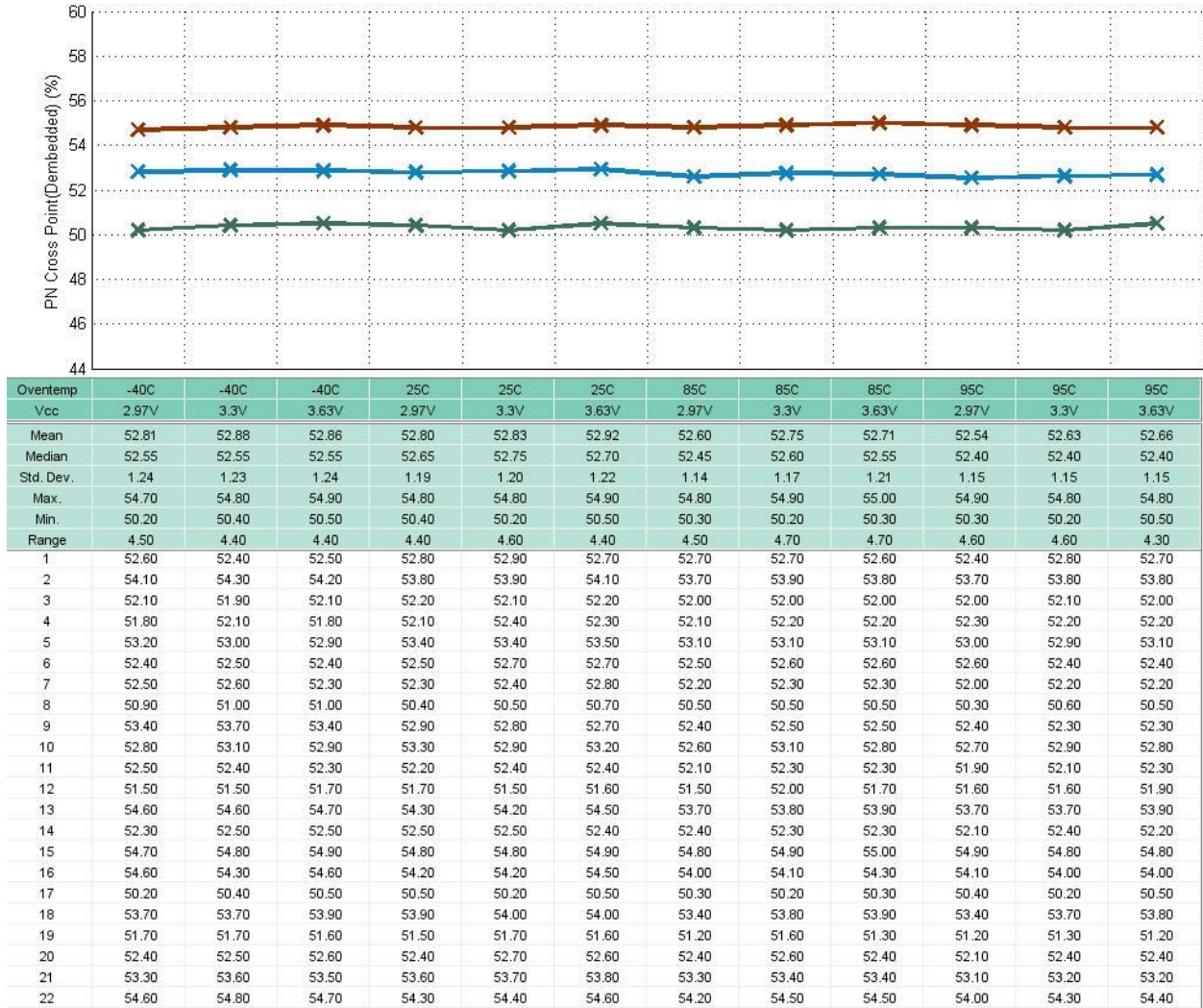
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	12.87	12.60	12.58	14.01	13.41	13.27	14.89	14.28	14.30	15.05	14.46	14.42
Median	12.83	12.39	12.53	13.86	13.27	12.98	14.75	14.30	14.16	15.19	14.16	14.30
Std. Dev.	0.77	0.98	0.70	0.95	0.92	1.01	0.82	0.95	0.95	0.99	0.81	0.95
Max.	14.45	14.45	14.16	16.22	16.52	15.04	16.81	16.52	16.22	17.11	16.22	16.22
Min.	11.21	11.21	11.21	12.39	12.39	11.80	13.27	12.09	12.68	13.27	12.98	12.98
Range	3.24	3.24	2.95	3.83	4.13	3.24	3.54	4.42	3.54	3.83	3.24	3.24
1	11.21	11.50	12.39	12.39	13.57	12.68	14.45	13.86	14.16	13.86	12.98	12.98
2	12.39	12.39	13.27	13.86	13.27	11.80	14.75	13.86	14.75	13.57	13.86	13.86
3	12.68	11.21	12.98	13.86	12.68	12.39	14.16	14.45	13.57	15.34	13.86	13.27
4	13.27	12.98	13.27	16.22	12.98	12.98	14.45	13.27	14.75	14.45	13.27	15.93
5	12.68	14.45	11.50	13.27	12.98	14.16	14.16	12.09	14.16	14.16	14.16	14.75
6	12.68	11.50	12.68	13.86	12.68	13.86	15.34	15.04	13.27	15.93	15.04	13.57
7	12.39	12.98	11.80	12.68	13.57	12.68	13.27	13.57	12.68	14.75	14.75	13.27
8	11.80	12.68	11.21	13.57	12.39	14.16	14.16	13.57	13.86	13.27	14.16	14.16
9	13.57	12.09	12.39	15.04	12.98	12.68	15.34	14.45	15.04	17.11	15.34	14.16
10	11.80	12.39	14.16	13.57	13.27	14.16	16.52	13.57	14.75	15.93	14.16	13.57
11	13.27	11.80	11.80	13.27	12.68	12.09	14.16	14.16	13.57	15.93	14.75	16.22
12	12.98	12.39	12.68	13.27	14.45	14.75	14.75	13.86	12.68	16.52	14.16	15.04
13	13.86	11.80	12.68	14.16	12.68	13.57	15.34	14.75	14.45	14.16	15.34	14.45
14	12.98	14.16	12.98	14.45	13.57	12.68	15.93	15.04	13.27	15.04	13.57	13.27
15	12.68	14.45	12.39	14.45	13.57	15.04	14.45	14.45	13.86	14.45	14.16	14.75
16	12.98	11.80	12.09	12.98	12.39	12.09	14.45	14.45	13.86	14.16	13.86	14.16
17	14.16	12.39	13.57	14.45	14.16	14.45	14.45	15.04	14.16	15.93	16.22	13.57
18	13.27	13.27	12.09	14.75	13.57	12.39	15.04	15.34	15.63	14.75	14.45	15.34
19	12.39	11.80	12.39	14.16	14.16	13.57	15.34	15.63	15.63	15.34	14.16	15.93
20	13.27	12.09	12.68	15.63	16.52	12.09	15.34	13.57	16.22	15.93	15.34	15.04
21	12.39	14.16	13.27	15.04	12.68	12.98	15.04	13.57	15.04	15.34	15.04	15.04
22	14.45	12.98	12.39	13.27	14.16	14.75	16.81	16.52	15.34	15.34	15.63	15.04

### 3.6.12. Jitter RMS at -18 dBm avg. Power at 1550nm and 11.3Gbps

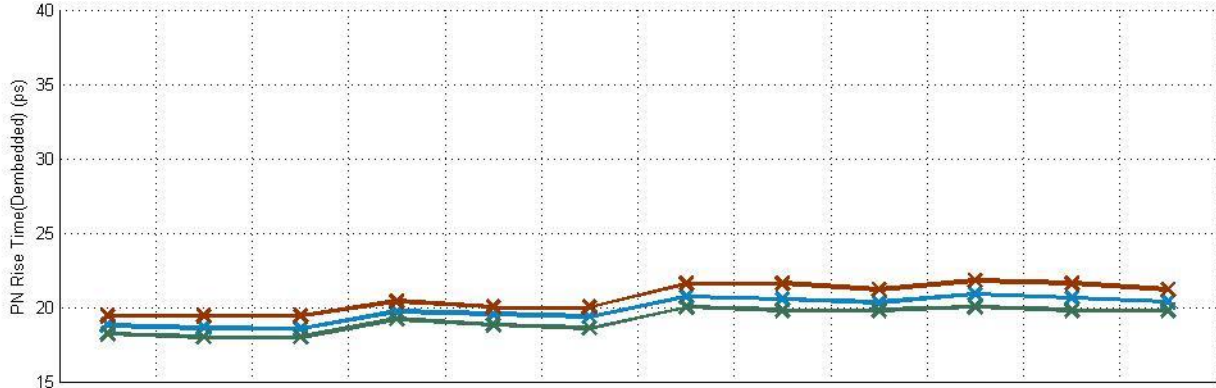


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.46	2.33	2.27	2.64	2.46	2.37	2.76	2.60	2.54	2.78	2.64	2.56
Median	2.45	2.32	2.26	2.62	2.46	2.38	2.76	2.60	2.54	2.77	2.61	2.57
Std. Dev.	0.07	0.06	0.06	0.08	0.07	0.06	0.08	0.07	0.06	0.08	0.10	0.06
Max.	2.66	2.45	2.37	2.79	2.58	2.48	2.96	2.76	2.67	2.96	2.88	2.71
Min.	2.36	2.20	2.15	2.47	2.34	2.23	2.59	2.47	2.41	2.66	2.51	2.43
Range	0.30	0.24	0.22	0.32	0.24	0.25	0.37	0.29	0.26	0.30	0.36	0.28
1	2.36	2.20	2.15	2.47	2.34	2.31	2.59	2.47	2.43	2.67	2.51	2.43
2	2.41	2.26	2.15	2.56	2.44	2.30	2.74	2.55	2.51	2.70	2.55	2.48
3	2.43	2.25	2.19	2.57	2.40	2.38	2.71	2.56	2.55	2.78	2.54	2.51
4	2.45	2.40	2.32	2.61	2.46	2.36	2.73	2.61	2.56	2.73	2.57	2.60
5	2.50	2.31	2.23	2.61	2.45	2.43	2.76	2.55	2.51	2.77	2.59	2.53
6	2.37	2.32	2.24	2.59	2.44	2.38	2.71	2.56	2.50	2.67	2.62	2.51
7	2.39	2.24	2.20	2.54	2.36	2.23	2.66	2.49	2.41	2.66	2.52	2.54
8	2.44	2.32	2.20	2.56	2.42	2.38	2.76	2.54	2.46	2.69	2.57	2.58
9	2.66	2.42	2.36	2.78	2.58	2.48	2.96	2.76	2.67	2.96	2.88	2.71
10	2.38	2.30	2.25	2.67	2.39	2.39	2.69	2.62	2.56	2.79	2.55	2.58
11	2.42	2.33	2.29	2.60	2.46	2.35	2.79	2.61	2.58	2.76	2.62	2.56
12	2.45	2.27	2.25	2.62	2.50	2.34	2.74	2.66	2.48	2.77	2.68	2.57
13	2.44	2.32	2.25	2.62	2.42	2.36	2.70	2.64	2.49	2.75	2.59	2.55
14	2.47	2.35	2.30	2.69	2.47	2.42	2.80	2.65	2.59	2.78	2.61	2.58
15	2.59	2.41	2.37	2.76	2.55	2.46	2.95	2.66	2.60	2.91	2.78	2.64
16	2.53	2.30	2.29	2.66	2.44	2.39	2.79	2.58	2.52	2.78	2.62	2.58
17	2.51	2.45	2.33	2.75	2.57	2.48	2.82	2.68	2.51	2.82	2.62	2.65
18	2.47	2.36	2.30	2.69	2.51	2.35	2.78	2.59	2.61	2.82	2.64	2.52
19	2.53	2.36	2.27	2.79	2.54	2.42	2.86	2.66	2.60	2.87	2.76	2.57
20	2.45	2.30	2.26	2.68	2.48	2.29	2.73	2.60	2.54	2.91	2.69	2.47
21	2.38	2.32	2.28	2.67	2.39	2.41	2.78	2.60	2.56	2.82	2.58	2.57
22	2.46	2.43	2.35	2.61	2.51	2.34	2.75	2.67	2.56	2.73	2.76	2.58

### 3.6.13. Crossing Percentage at -10 dBm avg. Power at 1550nm and 11.3Gbps

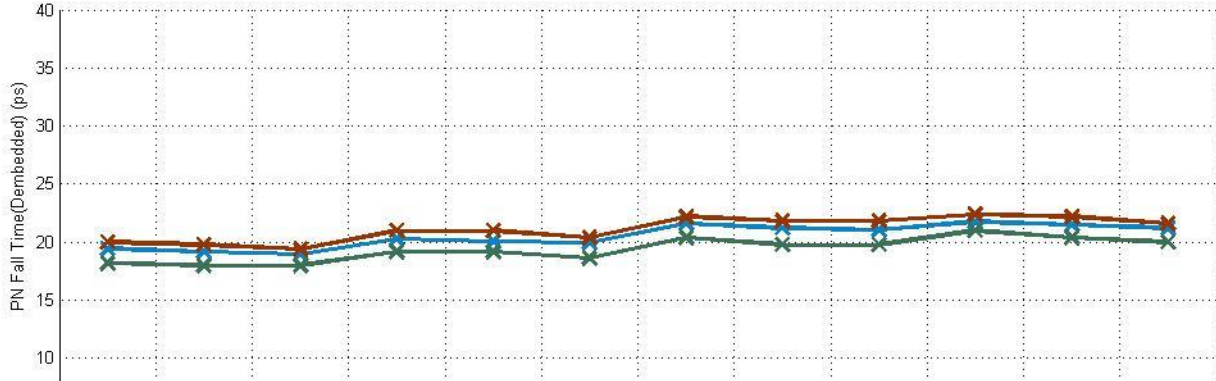


### 3.6.14. Rise Time at -10 dBm avg. Power at 1550nm and 11.3Gbps



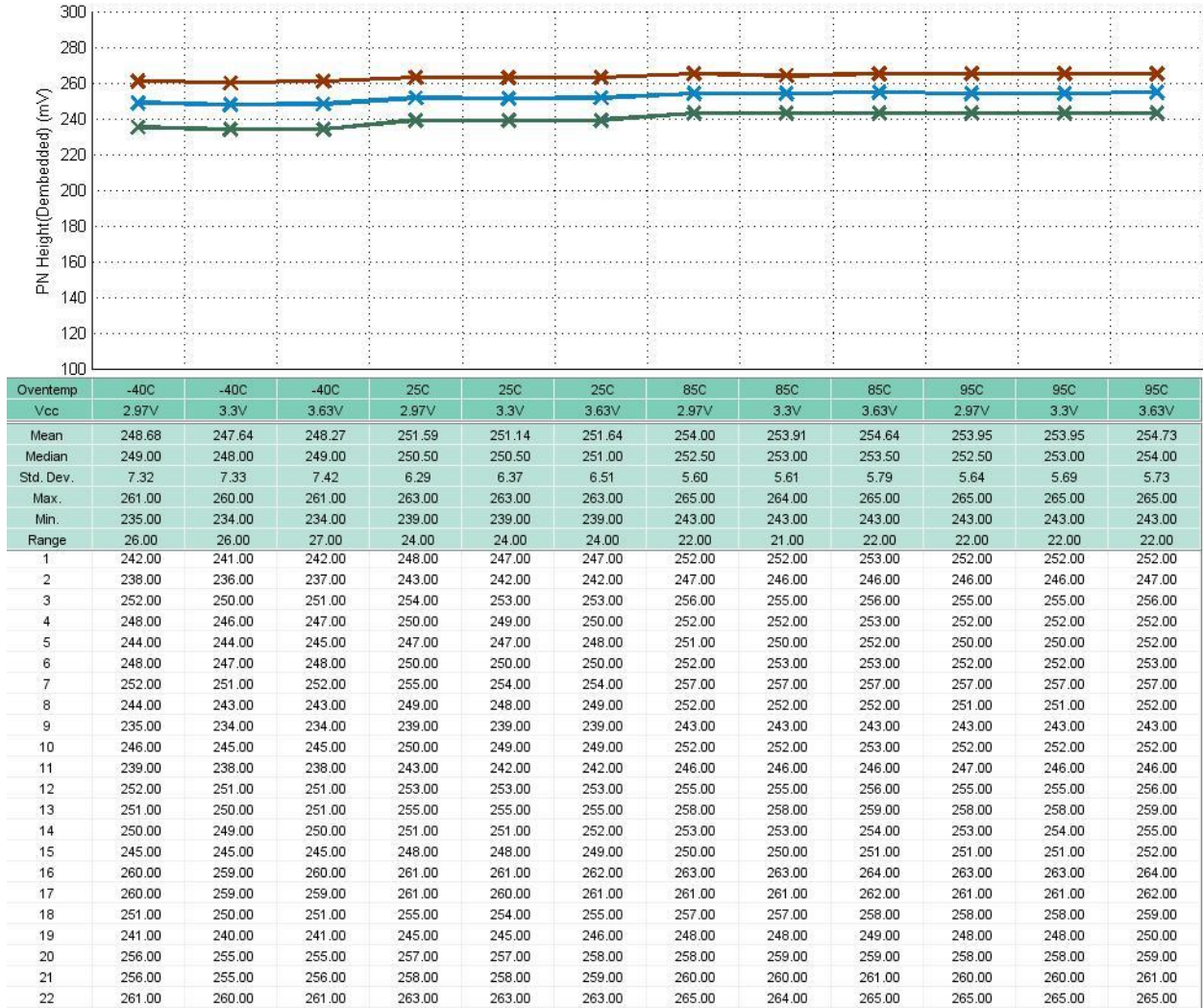
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	18.79	18.62	18.54	19.71	19.53	19.37	20.70	20.52	20.32	20.88	20.64	20.36
Median	18.80	18.60	18.60	19.80	19.40	19.40	20.60	20.60	20.40	21.00	20.60	20.40
Std. Dev.	0.37	0.37	0.39	0.35	0.32	0.39	0.39	0.41	0.35	0.45	0.43	0.34
Max.	19.40	19.40	19.40	20.40	20.00	20.00	21.60	21.60	21.20	21.80	21.60	21.20
Min.	18.20	18.00	18.00	19.20	18.80	18.60	20.00	19.80	19.80	20.00	19.80	19.80
Range	1.20	1.40	1.40	1.20	1.20	1.40	1.60	1.80	1.40	1.80	1.80	1.40
1	18.80	18.60	18.60	19.40	19.40	19.40	20.60	20.40	20.00	20.60	20.60	20.00
2	18.20	18.20	18.00	19.20	19.40	19.20	20.00	20.00	20.00	20.40	20.40	20.00
3	18.80	18.60	18.60	19.40	19.40	19.20	21.00	20.60	20.40	21.00	20.60	20.40
4	19.20	18.80	18.80	20.00	20.00	19.40	21.20	21.00	20.60	21.20	21.00	20.60
5	18.60	18.80	18.80	20.00	19.80	19.80	21.00	20.60	20.60	21.00	21.00	20.40
6	18.80	18.60	18.60	19.80	19.40	19.20	20.60	20.40	20.40	21.00	20.40	20.40
7	18.60	18.60	18.20	19.20	19.20	18.80	20.40	20.40	20.00	20.40	20.00	20.00
8	18.80	18.60	18.80	19.80	19.40	19.80	20.60	20.60	20.60	21.20	20.60	20.60
9	19.40	19.40	19.40	20.40	20.00	20.00	21.60	21.60	21.20	21.80	21.60	21.20
10	19.20	19.20	19.20	20.00	19.80	19.80	21.00	20.60	20.60	21.20	21.00	20.60
11	18.60	18.60	18.20	19.80	19.80	19.40	20.60	20.60	20.00	21.00	20.60	20.40
12	19.20	18.80	18.80	20.00	19.80	19.80	20.60	21.00	20.40	21.60	21.20	20.60
13	18.20	18.00	18.00	19.20	19.20	18.80	20.40	20.00	19.80	20.00	20.00	19.80
14	18.80	18.80	18.60	19.80	19.80	19.40	21.00	20.60	20.60	21.00	21.00	20.60
15	19.20	18.60	18.60	20.00	19.80	19.40	21.00	20.60	20.40	21.00	20.40	20.60
16	18.80	18.60	18.60	19.80	19.40	19.40	20.60	20.60	20.40	21.00	20.60	20.60
17	19.20	19.20	18.80	20.00	19.40	19.80	21.00	21.00	20.60	21.00	21.00	20.60
18	18.80	18.60	18.20	19.80	19.40	19.20	20.40	20.40	20.00	20.60	20.40	20.00
19	18.20	18.00	18.00	19.40	18.80	18.80	20.40	20.00	20.00	20.60	20.40	20.00
20	19.20	18.80	18.80	20.00	20.00	19.80	21.00	20.60	20.60	21.20	21.00	20.60
21	18.60	18.20	18.20	19.40	19.20	19.20	20.40	20.00	20.00	20.60	20.40	20.00
22	18.20	18.00	18.00	19.20	19.20	18.60	20.00	19.80	19.80	20.00	19.80	20.00

### 3.6.15. Fall Time at -10 dBm avg. Power at 1550nm and 11.3Gbps

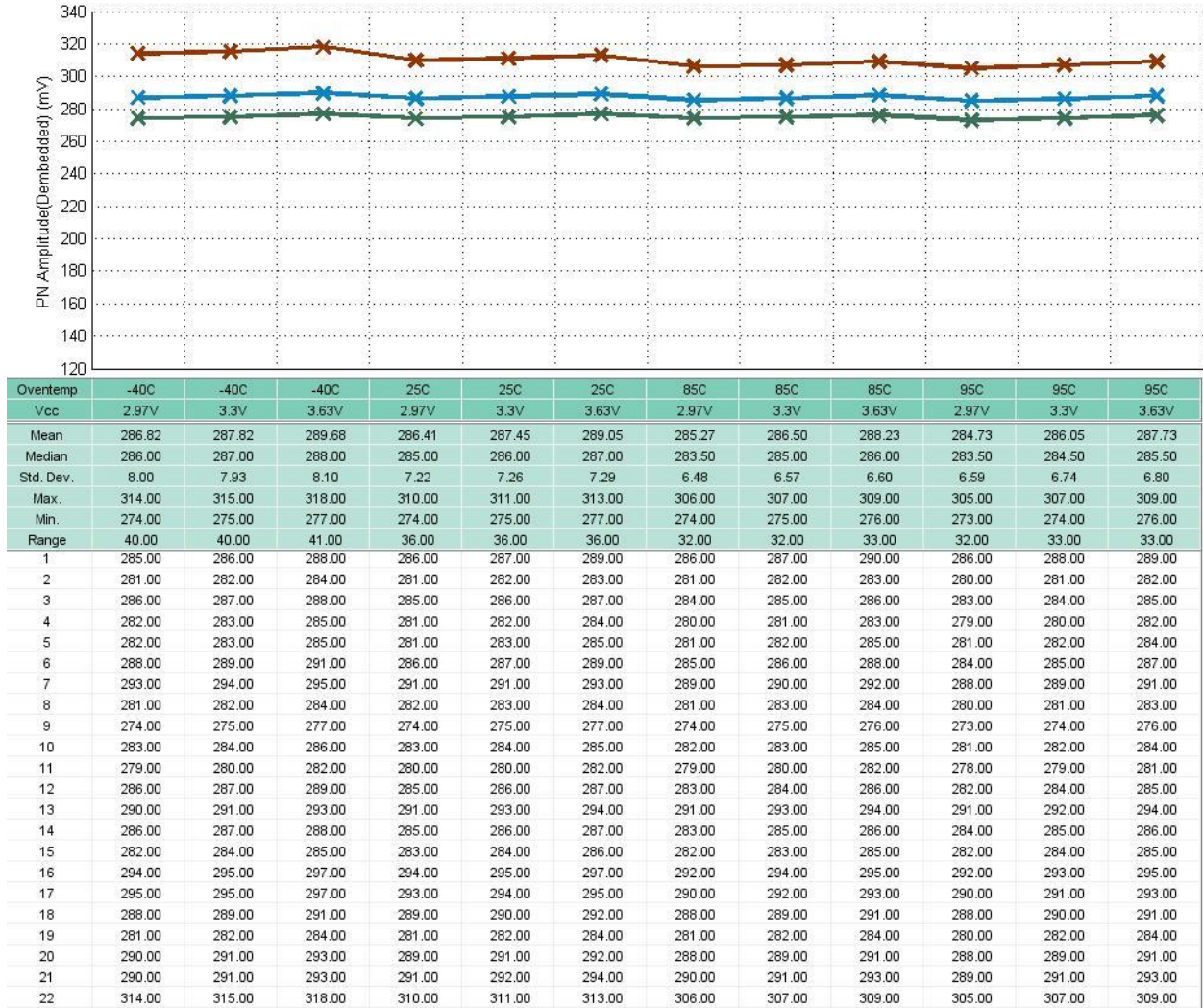


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	19.44	19.15	18.94	20.28	20.06	19.93	21.59	21.22	21.05	21.75	21.48	21.19
Median	19.40	19.20	19.00	20.40	20.00	20.00	21.60	21.20	21.10	21.80	21.60	21.20
Std. Dev.	0.42	0.41	0.38	0.38	0.36	0.43	0.45	0.45	0.47	0.41	0.39	0.36
Max.	20.00	19.80	19.40	21.00	21.00	20.40	22.20	21.80	21.80	22.40	22.20	21.60
Min.	18.20	18.00	18.00	19.20	19.20	18.60	20.40	19.80	19.80	21.00	20.40	20.00
Range	1.80	1.80	1.40	1.80	1.80	1.80	1.80	2.00	2.00	1.40	1.80	1.60
1	19.80	19.20	18.80	20.00	20.00	19.80	21.20	21.00	20.60	21.20	21.20	21.00
2	18.80	18.80	18.60	20.00	19.80	19.80	21.00	21.00	21.00	21.20	21.00	21.00
3	19.40	19.40	19.20	20.60	20.00	20.40	21.80	21.20	21.20	21.80	21.80	21.60
4	19.80	19.20	19.20	20.60	20.60	20.40	21.80	21.60	21.20	21.80	21.80	21.60
5	19.40	19.80	19.40	20.40	20.60	20.40	22.20	21.80	21.60	22.20	21.80	21.20
6	19.80	19.20	19.20	20.40	20.00	20.00	21.60	21.20	21.60	21.80	21.80	21.20
7	19.20	19.20	18.80	20.40	20.00	19.80	21.60	21.00	21.00	21.60	21.20	21.00
8	19.40	19.20	18.80	20.40	20.00	20.00	21.60	21.60	21.20	22.20	21.20	21.60
9	20.00	19.40	19.40	20.60	20.40	20.40	22.20	21.80	21.60	22.40	22.20	21.60
10	19.40	19.40	19.20	20.60	20.40	20.40	22.20	21.80	21.60	22.40	21.80	21.60
11	19.40	19.40	19.20	20.40	19.80	20.00	21.60	21.20	21.00	21.80	21.60	21.20
12	20.00	19.80	19.40	21.00	21.00	20.40	22.20	21.80	21.80	22.40	21.80	21.60
13	19.40	18.60	18.60	19.80	19.80	19.40	21.20	20.60	20.40	21.20	21.00	21.00
14	19.80	19.20	18.60	20.00	20.00	20.00	21.20	21.00	21.20	21.60	21.60	21.20
15	19.40	18.60	19.20	20.40	20.00	20.00	21.80	21.20	21.20	21.80	21.60	21.20
16	19.20	19.40	18.80	20.40	20.00	19.80	21.80	21.20	21.00	21.80	21.60	21.20
17	19.20	19.20	18.80	20.40	20.00	20.00	21.80	21.20	21.20	21.80	21.60	21.20
18	19.80	19.40	19.20	20.00	20.00	19.80	21.80	21.20	20.60	21.60	21.60	21.00
19	19.20	18.60	18.20	20.00	20.00	19.40	21.20	21.20	20.60	21.20	21.20	21.00
20	19.80	19.20	19.20	20.60	20.00	19.80	21.60	21.20	21.00	21.80	21.60	21.20
21	19.20	19.20	18.80	20.00	19.80	19.80	21.20	21.20	20.60	21.80	21.20	21.00
22	18.20	18.00	18.00	19.20	19.20	18.60	20.40	19.80	19.80	21.00	20.40	20.00

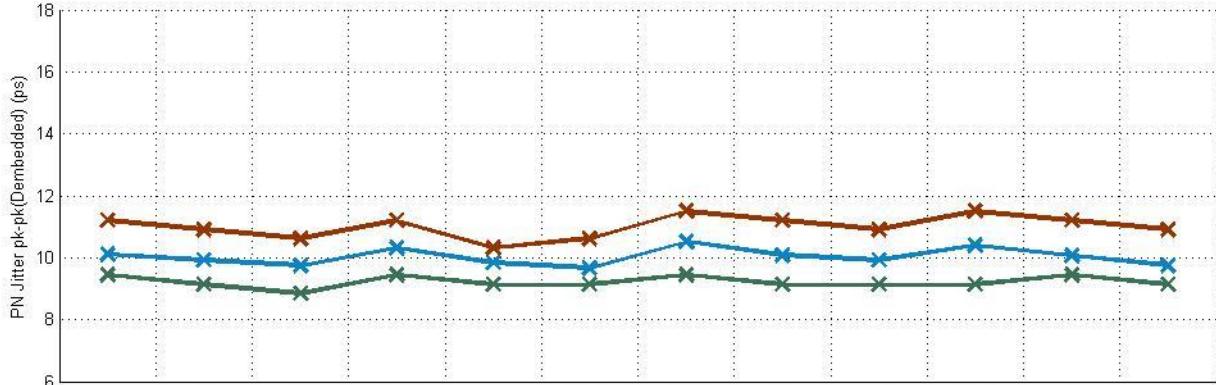
### 3.6.16. Height at -10 dBm avg. Power at 1550nm and 11.3Gbps



### 3.6.17. Amplitude at -10 dBm avg. Power at 1550nm and 11.3Gbps



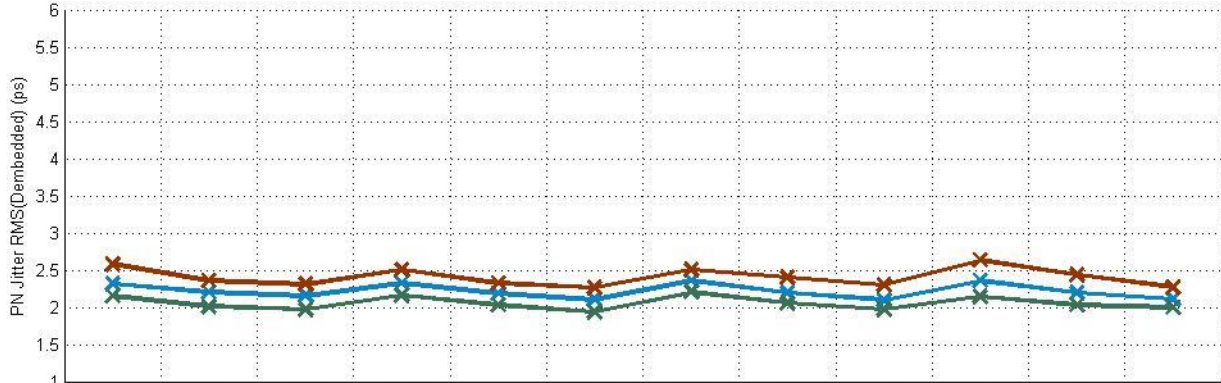
### 3.6.18. Jitter pk-pk at -10 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	10.11	9.92	9.75	10.31	9.84	9.67	10.51	10.08	9.92	10.39	10.07	9.75
Median	10.03	9.88	9.73	10.32	10.03	9.44	10.62	10.03	10.03	10.32	10.03	9.73
Std. Dev.	0.45	0.49	0.39	0.47	0.36	0.40	0.54	0.58	0.54	0.65	0.52	0.53
Max.	11.21	10.91	10.62	11.21	10.32	10.62	11.50	11.21	10.91	11.50	11.21	10.91
Min.	9.44	9.14	8.85	9.44	9.14	9.14	9.44	9.14	9.14	9.14	9.44	9.14
Range	1.77	1.77	1.77	1.77	1.18	1.48	2.06	2.07	1.77	2.36	1.77	1.77
1	9.73	9.14	8.85	9.44	9.44	9.44	9.73	9.14	9.44	9.44	10.03	9.14
2	9.73	9.73	9.73	9.73	9.14	9.44	10.91	9.44	10.32	10.03	10.03	9.14
3	10.03	9.73	9.73	10.62	9.44	9.14	9.73	9.73	10.32	9.73	9.73	9.73
4	9.73	10.32	9.73	9.73	9.73	10.03	10.03	10.03	10.03	10.32	9.44	9.44
5	10.62	9.73	9.73	10.62	9.44	10.03	10.32	9.44	9.14	9.73	9.73	9.73
6	10.03	9.44	9.73	10.03	9.44	9.44	9.44	9.14	9.14	10.32	9.44	9.44
7	10.03	9.44	9.73	9.73	9.73	9.44	10.03	10.03	9.14	9.44	9.44	9.14
8	9.73	9.44	10.32	10.03	10.32	9.44	10.62	9.73	9.14	10.03	9.73	9.73
9	10.03	10.03	10.03	10.62	10.32	10.32	11.50	10.91	10.91	11.50	10.62	10.91
10	9.44	10.03	9.14	10.03	10.03	9.14	10.03	9.73	9.14	10.32	9.73	10.03
11	9.73	9.73	10.03	9.73	10.03	9.73	10.32	10.03	10.03	9.14	10.03	9.14
12	10.32	10.62	9.73	10.62	10.03	10.03	10.32	10.03	9.73	10.32	10.03	9.14
13	10.32	10.91	9.73	10.91	9.14	9.44	10.62	10.62	9.73	10.62	9.73	9.44
14	10.03	10.32	9.73	10.32	10.03	9.14	10.91	9.73	10.62	10.62	10.32	9.73
15	10.91	10.32	10.32	10.91	10.03	10.62	11.21	11.21	10.32	10.91	11.21	10.03
16	11.21	10.32	9.44	10.62	10.03	10.03	10.32	10.62	10.62	10.32	11.21	10.62
17	10.62	10.03	10.62	11.21	10.03	9.73	10.91	10.62	10.03	10.91	10.32	10.62
18	10.32	9.14	9.44	10.32	10.03	9.44	10.62	10.91	10.03	11.50	10.03	10.32
19	10.03	10.62	10.03	10.62	10.03	10.03	11.21	10.32	10.32	11.21	10.62	10.32
20	9.44	10.03	9.44	10.62	10.32	9.44	10.62	9.73	9.73	10.91	10.62	9.44
21	10.03	9.44	9.73	10.32	9.73	9.73	11.21	10.62	10.32	10.91	9.73	9.73
22	10.32	9.73	9.44	10.03	10.03	9.44	10.62	10.03	10.03	10.32	9.73	9.44

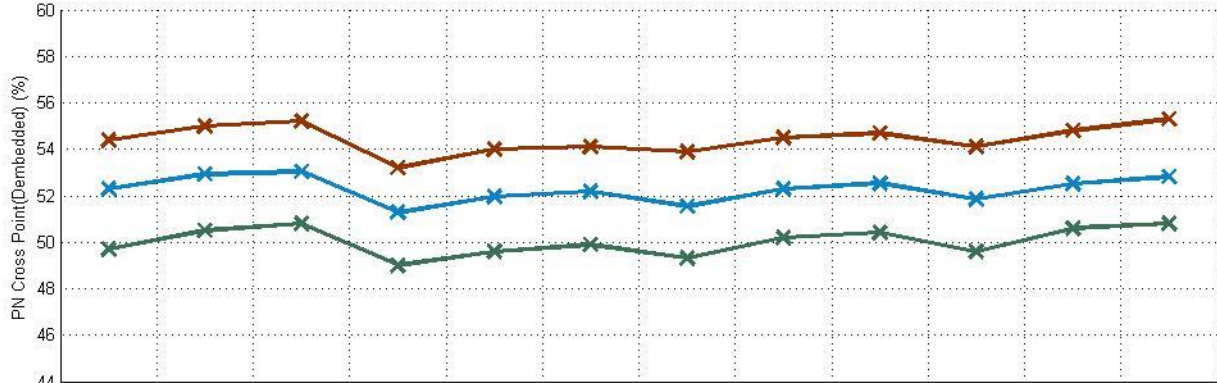


### 3.6.19. Jitter RMS at -10 dBm avg. Power at 1550nm and 11.3Gbps



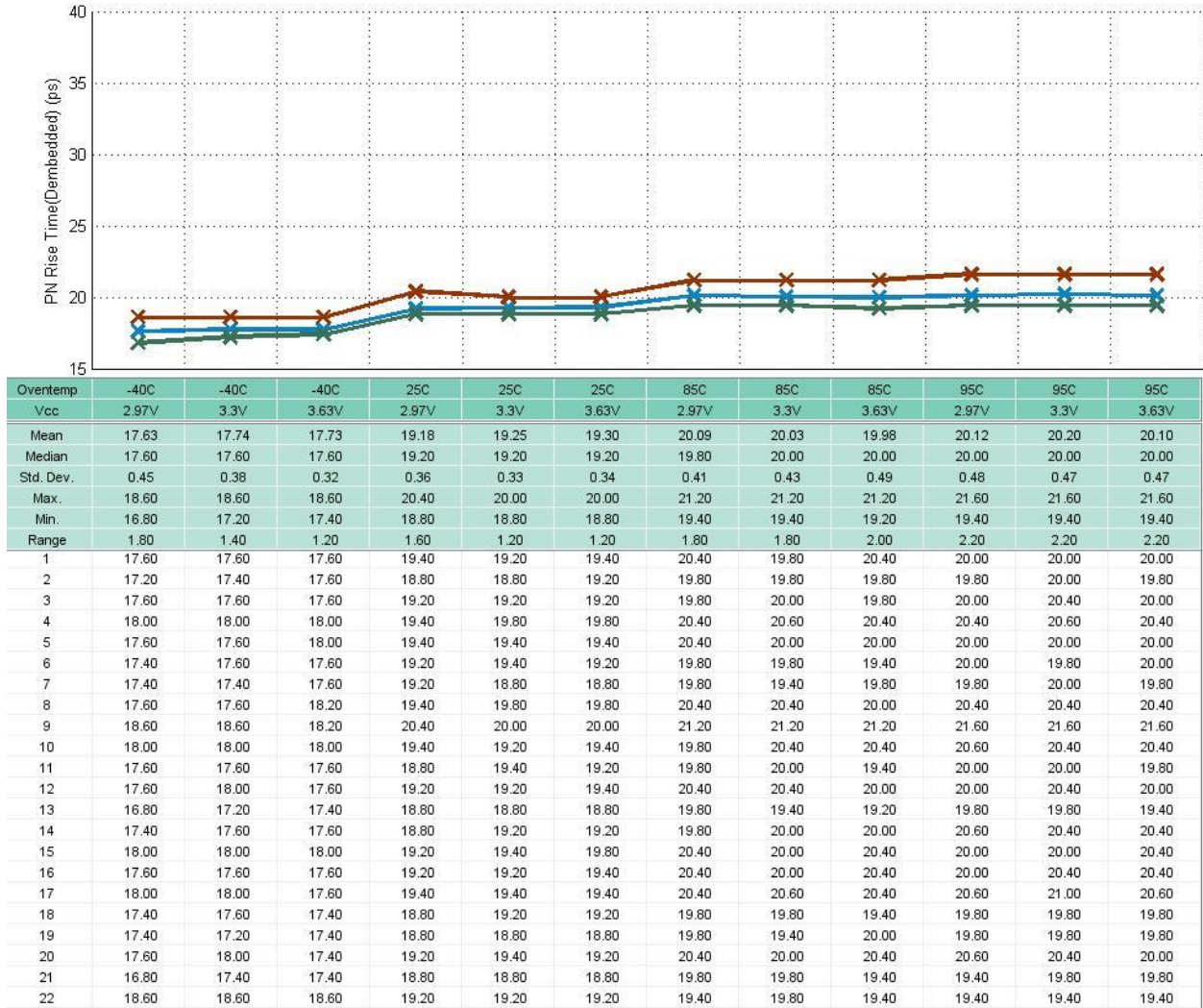
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.31	2.20	2.15	2.33	2.19	2.10	2.36	2.19	2.10	2.36	2.20	2.11
Median	2.31	2.20	2.17	2.32	2.18	2.10	2.36	2.18	2.09	2.35	2.18	2.12
Std. Dev.	0.10	0.09	0.08	0.09	0.07	0.08	0.08	0.09	0.08	0.11	0.10	0.08
Max.	2.58	2.36	2.31	2.50	2.33	2.26	2.51	2.40	2.30	2.64	2.43	2.27
Min.	2.15	2.01	1.97	2.16	2.03	1.94	2.21	2.06	1.97	2.14	2.03	2.00
Range	0.43	0.35	0.34	0.34	0.30	0.32	0.30	0.34	0.33	0.49	0.40	0.27
1	2.15	2.01	1.97	2.16	2.03	1.94	2.23	2.06	2.02	2.14	2.03	2.00
2	2.21	2.11	2.08	2.34	2.12	2.04	2.32	2.13	2.07	2.31	2.16	2.00
3	2.27	2.10	2.12	2.33	2.13	2.09	2.28	2.14	1.97	2.29	2.12	2.04
4	2.34	2.31	2.22	2.29	2.21	2.09	2.36	2.21	2.14	2.35	2.22	2.12
5	2.29	2.19	2.19	2.28	2.21	2.11	2.37	2.17	2.06	2.33	2.16	2.08
6	2.18	2.11	2.06	2.26	2.12	2.10	2.21	2.11	2.01	2.23	2.08	2.03
7	2.24	2.18	2.10	2.22	2.09	2.08	2.26	2.16	1.98	2.19	2.07	2.00
8	2.38	2.21	2.19	2.23	2.16	2.10	2.37	2.20	2.06	2.34	2.16	2.12
9	2.46	2.30	2.26	2.44	2.33	2.16	2.50	2.40	2.30	2.64	2.41	2.22
10	2.33	2.22	2.07	2.38	2.11	2.04	2.31	2.09	2.07	2.31	2.13	2.09
11	2.23	2.17	2.15	2.34	2.19	2.09	2.32	2.17	2.02	2.31	2.14	2.01
12	2.30	2.22	2.17	2.37	2.15	2.01	2.35	2.16	2.05	2.36	2.18	2.05
13	2.31	2.11	2.22	2.31	2.17	2.14	2.41	2.22	2.12	2.37	2.22	2.14
14	2.35	2.25	2.24	2.28	2.23	2.18	2.35	2.19	2.19	2.39	2.22	2.14
15	2.58	2.36	2.31	2.50	2.28	2.26	2.51	2.37	2.25	2.54	2.43	2.27
16	2.32	2.30	2.22	2.38	2.28	2.17	2.41	2.28	2.14	2.40	2.23	2.23
17	2.47	2.33	2.20	2.45	2.31	2.24	2.46	2.32	2.14	2.42	2.31	2.22
18	2.26	2.17	2.08	2.25	2.17	1.98	2.34	2.16	2.11	2.37	2.14	2.15
19	2.40	2.32	2.16	2.42	2.23	2.15	2.49	2.21	2.17	2.49	2.29	2.14
20	2.28	2.20	2.16	2.32	2.18	2.09	2.38	2.19	2.12	2.41	2.18	2.12
21	2.37	2.20	2.17	2.38	2.22	2.09	2.43	2.23	2.13	2.48	2.27	2.15
22	2.16	2.10	2.02	2.23	2.16	2.11	2.27	2.08	2.05	2.24	2.18	2.06

### 3.6.20. Crossing Percentage at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

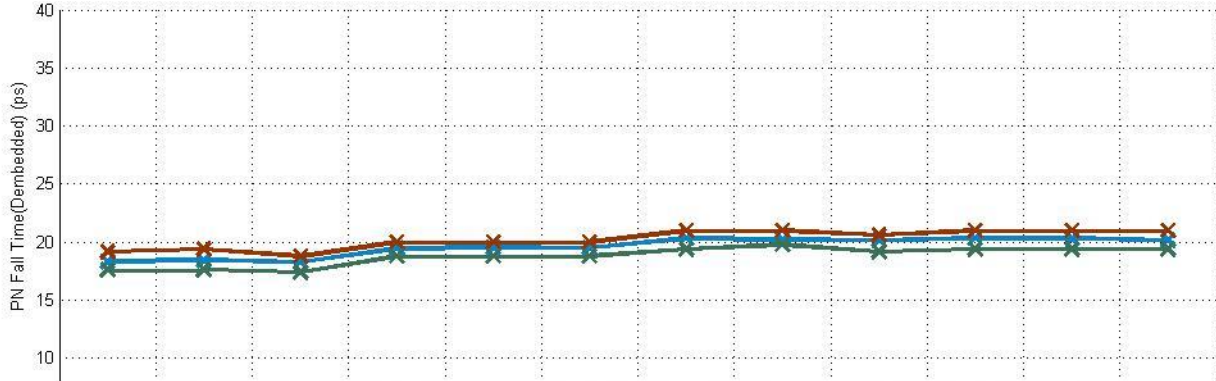


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	52.28	52.92	53.04	51.28	51.95	52.17	51.55	52.30	52.53	51.84	52.51	52.82
Median	52.25	52.90	52.85	51.25	52.00	52.20	51.45	52.10	52.30	51.80	52.25	52.70
Std. Dev.	1.33	1.30	1.23	1.11	1.16	1.16	1.20	1.09	1.07	1.16	1.07	1.12
Max.	54.40	55.00	55.20	53.20	54.00	54.10	53.90	54.50	54.70	54.10	54.80	55.30
Min.	49.70	50.50	50.80	49.00	49.60	49.90	49.30	50.20	50.40	49.60	50.60	50.80
Range	4.70	4.50	4.40	4.20	4.40	4.20	4.60	4.30	4.30	4.50	4.20	4.50
1	51.60	52.40	52.60	51.30	51.80	52.20	51.50	52.20	52.50	52.10	52.70	52.90
2	53.30	54.10	54.00	52.20	52.70	53.20	52.80	53.40	53.60	52.80	53.30	53.90
3	51.50	52.90	52.80	50.60	51.40	51.80	51.10	51.60	52.00	51.30	52.10	52.00
4	51.20	52.30	52.30	50.60	51.60	51.50	50.60	51.70	51.70	50.80	51.80	52.20
5	52.60	52.90	53.20	51.60	52.20	52.50	51.70	52.60	52.90	51.90	52.90	53.00
6	51.40	52.20	52.30	51.10	51.40	51.80	51.90	52.20	52.10	51.80	52.40	52.70
7	51.50	52.50	52.10	51.10	51.40	51.40	51.20	52.10	52.40	51.80	52.20	52.90
8	49.90	50.60	51.10	49.10	49.80	50.00	49.30	50.20	50.40	49.60	50.80	50.80
9	53.20	53.50	53.60	50.70	52.00	52.20	51.00	51.90	52.30	51.20	51.90	52.20
10	52.40	52.40	52.50	51.50	52.00	52.20	51.50	52.10	52.30	51.80	52.00	52.60
11	51.70	52.20	52.40	51.20	51.50	51.30	51.20	52.00	52.30	51.50	52.10	52.50
12	50.70	51.30	51.70	50.20	50.50	50.90	50.40	51.10	51.70	50.70	51.60	51.80
13	54.40	55.00	55.10	53.20	53.50	53.80	52.80	53.30	53.30	52.90	53.60	53.90
14	52.10	53.00	53.10	50.80	52.20	52.30	50.80	51.80	52.00	51.30	52.00	52.20
15	54.20	54.80	55.20	52.80	54.00	54.10	53.90	54.50	54.40	54.00	54.40	54.70
16	54.30	55.00	55.00	52.80	53.60	53.60	52.60	53.30	53.90	53.20	53.80	54.00
17	49.70	50.50	50.80	49.00	49.60	49.90	49.50	50.40	50.90	50.00	50.60	51.00
18	52.90	53.90	54.10	51.90	53.10	53.40	52.50	53.00	53.70	52.60	53.40	53.70
19	51.90	51.70	52.00	50.30	50.70	51.10	50.40	51.70	51.60	50.60	51.40	51.70
20	52.50	52.90	52.90	51.40	52.10	51.90	51.40	52.00	52.10	51.80	52.30	52.70
21	53.60	54.30	54.20	52.40	52.80	53.20	52.40	53.20	52.90	52.70	53.10	53.30
22	53.50	53.90	53.90	52.40	53.10	53.40	53.70	54.30	54.70	54.10	54.80	55.30

### 3.6.21. Rise Time at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

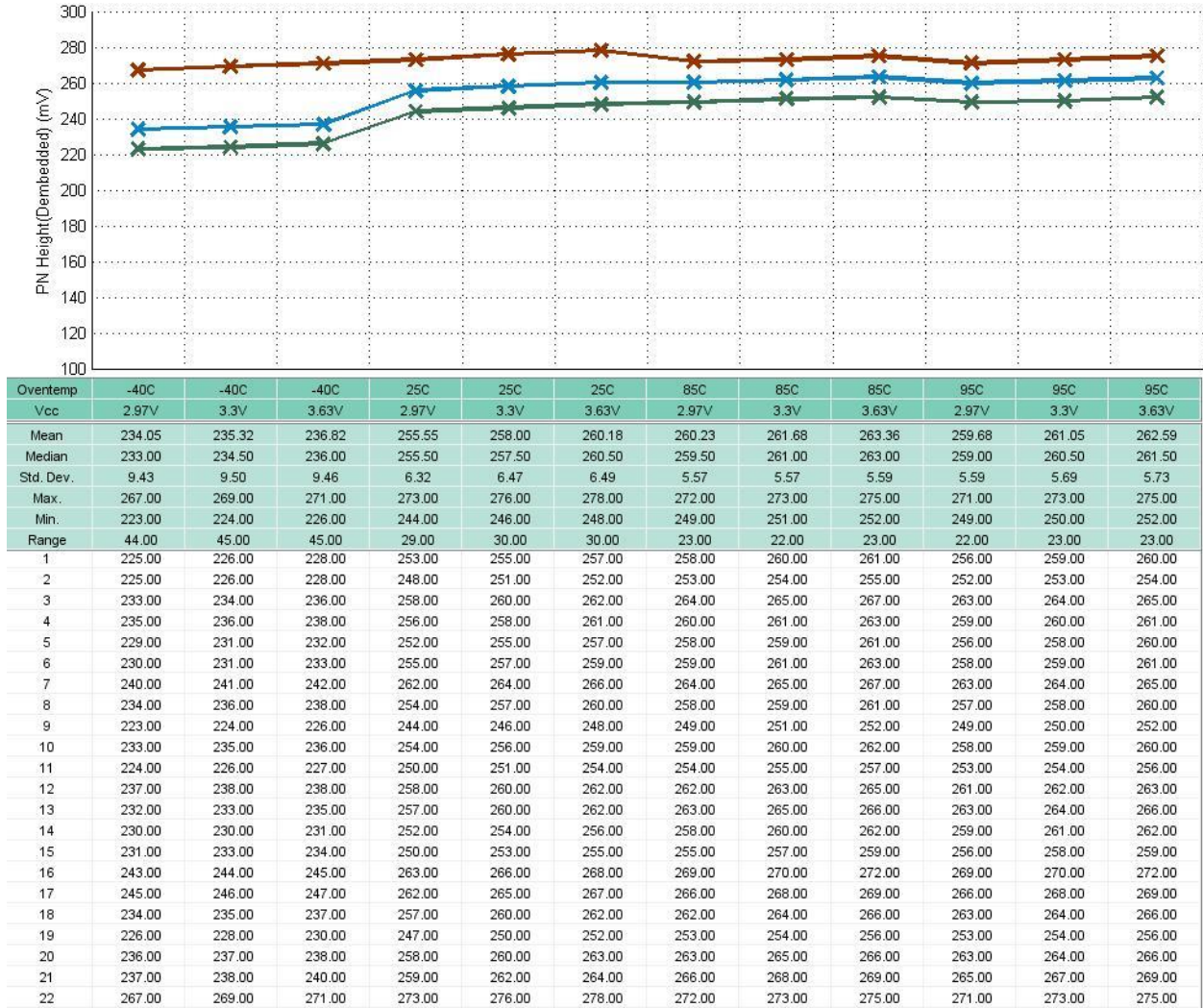


### 3.6.22. Fall Time at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

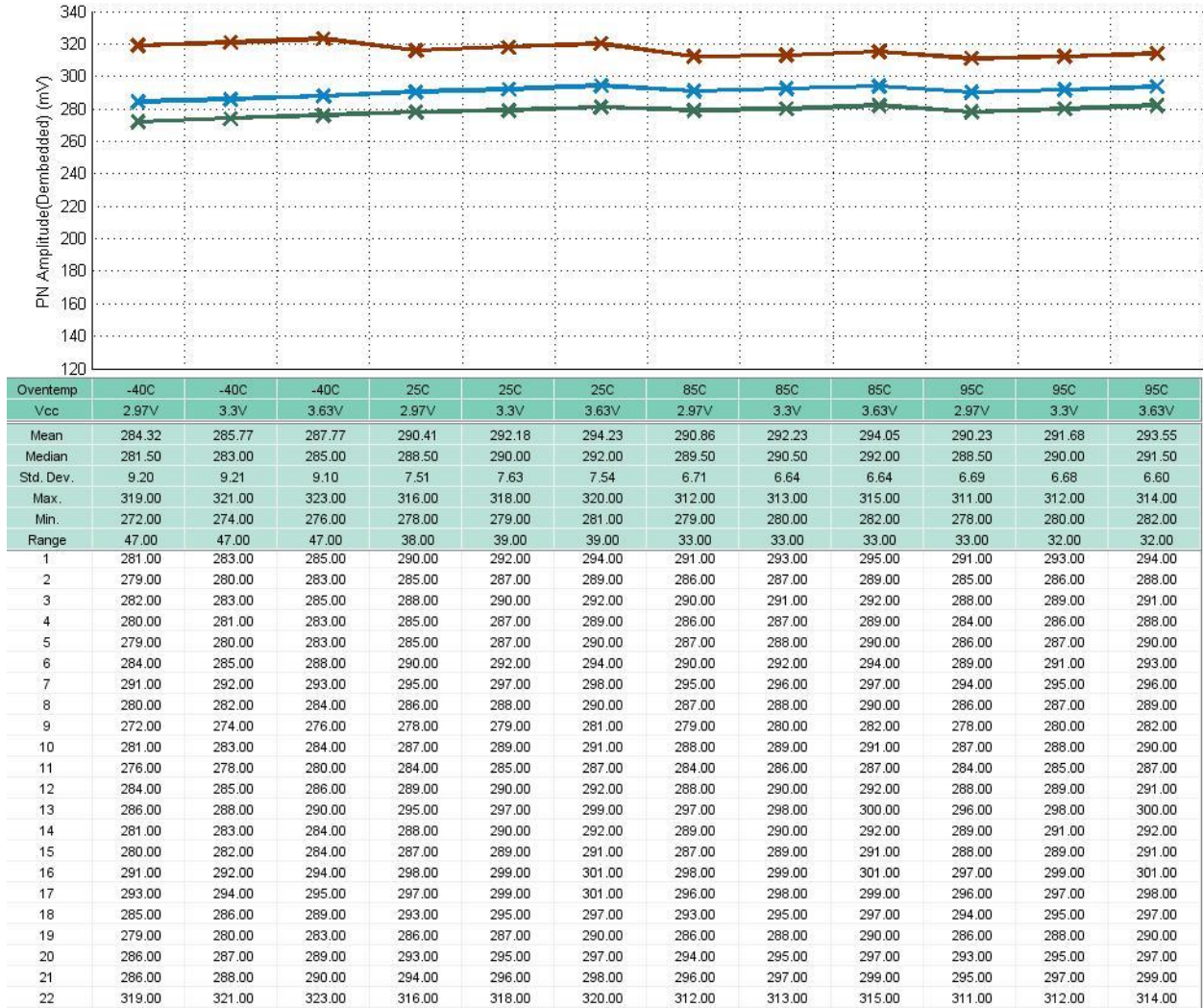


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	18.33	18.44	18.26	19.47	19.54	19.51	20.33	20.24	20.18	20.35	20.31	20.18
Median	18.20	18.60	18.20	19.40	19.40	19.40	20.40	20.20	20.20	20.40	20.40	20.00
Std. Dev.	0.37	0.41	0.38	0.31	0.33	0.34	0.34	0.35	0.36	0.38	0.35	0.36
Max.	19.20	19.40	18.80	20.00	20.00	20.00	21.00	21.00	20.60	21.00	21.00	21.00
Min.	17.60	17.60	17.40	18.80	18.80	18.80	19.40	19.80	19.20	19.40	19.40	19.40
Range	1.60	1.80	1.40	1.20	1.20	1.20	1.60	1.20	1.40	1.60	1.60	1.60
1	18.20	18.00	18.00	19.40	19.40	19.40	20.40	20.00	20.00	20.40	20.40	20.00
2	18.20	18.20	18.20	19.20	19.20	19.20	20.40	20.00	20.00	20.00	20.40	19.80
3	18.20	18.60	18.20	19.80	19.80	20.00	21.00	20.60	20.60	20.60	21.00	20.60
4	18.80	18.80	18.60	20.00	20.00	20.00	20.60	21.00	20.60	21.00	20.60	20.60
5	18.60	18.60	18.60	19.80	19.80	19.80	20.60	20.60	20.60	20.60	20.60	20.40
6	18.00	18.00	18.20	19.40	19.80	19.40	20.40	20.40	20.40	20.40	20.40	20.00
7	18.20	18.60	18.20	19.80	19.40	19.40	20.40	20.40	20.60	20.40	20.00	20.00
8	18.80	18.80	18.60	19.80	19.40	19.80	20.40	20.40	20.60	20.40	20.40	21.00
9	19.20	19.40	18.80	19.80	20.00	19.80	20.40	20.40	20.40	20.60	20.60	20.60
10	18.60	18.80	18.80	19.40	19.80	19.80	20.60	20.60	20.40	20.60	20.60	20.40
11	18.00	18.60	18.00	19.80	19.80	19.80	20.60	20.60	20.00	20.60	20.40	20.40
12	18.60	18.80	18.60	19.80	20.00	19.80	20.40	20.40	20.00	20.60	20.60	20.00
13	17.60	17.60	17.40	19.20	19.20	18.80	20.00	19.80	19.80	20.00	20.00	20.00
14	18.00	18.60	18.00	19.20	19.20	19.20	20.00	20.00	19.80	20.40	20.00	19.80
15	18.60	18.80	18.80	19.40	19.80	20.00	20.60	20.60	20.40	21.00	20.60	20.40
16	18.20	18.20	18.60	19.40	19.80	19.40	20.40	20.00	20.40	20.60	20.00	20.40
17	18.80	18.60	18.20	19.20	19.40	19.40	20.60	20.00	20.40	20.00	20.40	20.00
18	18.20	18.20	18.00	19.40	19.20	19.40	20.00	20.00	20.00	20.00	20.40	20.00
19	18.20	18.20	18.20	19.20	19.40	19.20	20.00	20.00	19.80	20.00	20.00	20.00
20	18.20	18.20	18.00	19.20	19.20	19.20	20.00	19.80	20.00	20.40	20.00	20.40
21	18.00	18.00	17.60	19.40	19.40	19.20	20.00	19.80	20.00	20.00	20.00	19.80
22	18.00	18.00	18.20	18.80	18.80	19.20	19.40	19.80	19.20	19.40	19.40	19.40

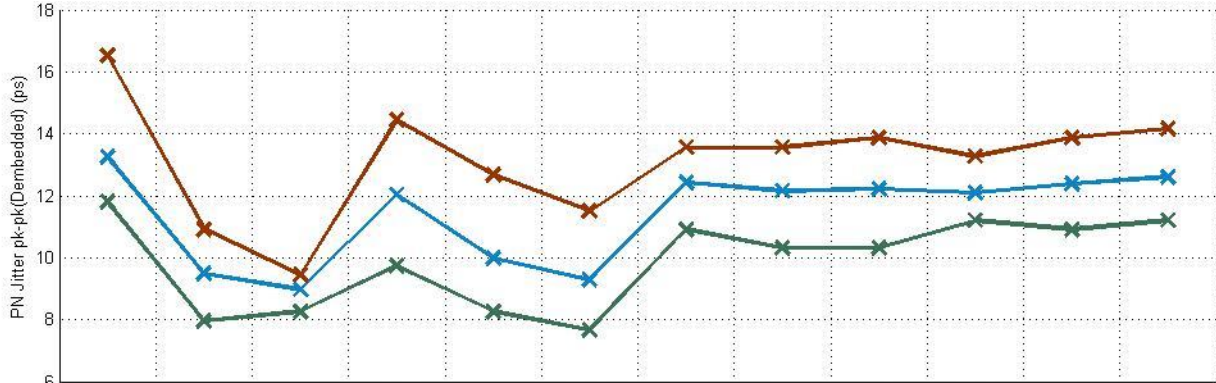
### 3.6.23. Height at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



### 3.6.24. Amplitude at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

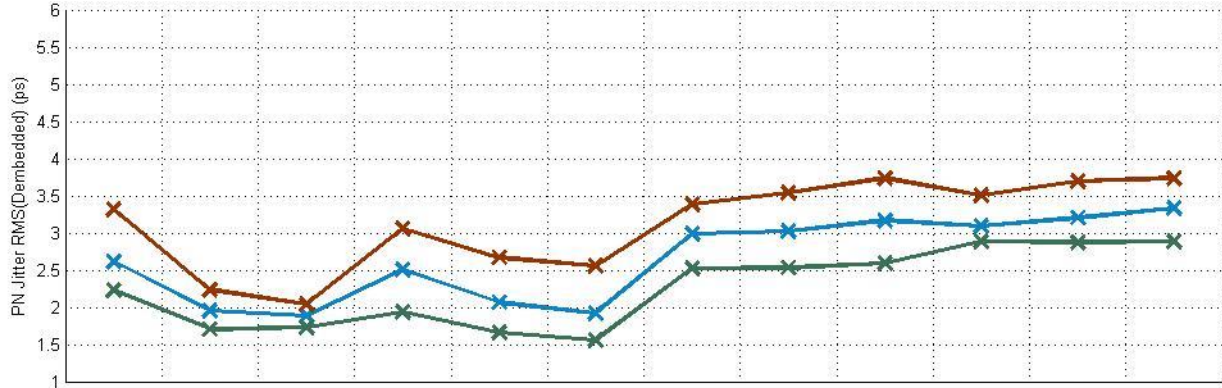


### 3.6.25. Jitter pk-pk at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	13.26	9.49	8.97	12.04	9.97	9.29	12.41	12.16	12.23	12.09	12.37	12.60
Median	12.83	9.44	8.85	11.95	9.73	9.14	12.39	12.39	12.24	12.09	12.39	12.53
Std. Dev.	1.32	0.68	0.28	1.28	1.07	0.74	0.56	0.85	0.86	0.57	0.73	0.71
Max.	16.52	10.91	9.44	14.45	12.68	11.50	13.57	13.57	13.86	13.27	13.86	14.16
Min.	11.80	7.96	8.26	9.73	8.26	7.67	10.91	10.32	10.32	11.21	10.91	11.21
Range	4.72	2.95	1.18	4.72	4.42	3.83	2.65	3.24	3.54	2.06	2.95	2.95
1	11.80	7.96	8.85	9.73	8.55	7.67	12.09	10.32	10.32	12.09	10.91	11.50
2	14.16	9.14	8.55	12.09	9.44	9.14	12.09	11.80	12.39	11.80	11.80	13.27
3	13.57	8.85	8.85	11.80	8.55	8.85	11.50	10.91	11.50	11.50	11.50	12.68
4	13.27	8.85	9.44	12.09	9.73	9.73	12.39	11.21	12.39	12.39	12.98	12.39
5	13.27	8.55	9.14	10.91	9.14	8.55	12.39	11.50	11.50	11.50	12.39	11.21
6	11.80	8.85	8.85	9.73	8.26	8.85	10.91	10.62	10.32	11.21	11.80	12.09
7	12.39	9.14	9.14	10.91	9.73	9.14	12.09	12.68	12.98	11.50	12.39	12.68
8	12.39	9.44	9.14	11.50	10.03	9.14	12.68	12.09	12.09	12.09	12.98	12.68
9	16.52	10.91	8.85	14.45	12.68	11.50	12.68	13.57	13.86	13.27	13.57	14.16
10	12.09	9.44	8.26	11.50	9.73	9.14	12.68	11.80	11.80	11.50	12.39	12.68
11	11.80	9.73	8.85	11.50	10.03	9.14	12.68	12.39	11.50	12.98	12.68	12.39
12	12.68	9.44	8.85	13.57	10.32	9.14	12.68	12.98	12.98	12.09	13.86	12.39
13	12.39	9.73	9.44	12.39	9.44	9.44	12.39	12.68	12.09	12.09	12.09	12.39
14	12.68	9.44	9.14	12.09	9.44	8.55	12.68	12.68	12.09	12.98	11.50	12.09
15	15.34	10.32	8.85	14.45	11.80	9.73	13.57	12.98	12.68	12.98	12.09	13.27
16	15.34	10.32	8.85	12.09	10.91	9.73	12.39	12.09	12.09	11.80	11.50	12.39
17	14.16	10.03	8.85	13.57	10.91	9.73	12.39	12.39	12.98	11.80	12.39	12.98
18	12.98	9.44	9.14	11.50	9.44	9.14	12.09	12.39	12.09	12.09	12.39	12.09
19	15.04	10.62	9.14	13.27	11.50	10.32	12.39	12.68	13.27	12.39	13.27	13.27
20	12.39	9.44	8.85	11.50	9.73	8.85	13.57	13.27	12.98	12.39	12.98	12.98
21	13.27	9.73	9.44	11.21	9.73	9.14	12.39	12.68	12.68	12.09	12.68	13.86
22	12.39	9.44	8.85	12.98	10.32	9.73	12.39	11.80	12.39	11.50	12.09	11.80

### 3.6.26. Jitter RMS at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.61	1.95	1.89	2.51	2.07	1.92	2.98	3.02	3.17	3.09	3.20	3.33
Median	2.57	1.94	1.89	2.48	2.02	1.89	3.02	2.98	3.18	3.09	3.19	3.34
Std. Dev.	0.29	0.14	0.08	0.31	0.24	0.21	0.21	0.29	0.30	0.15	0.21	0.23
Max.	3.31	2.23	2.04	3.06	2.67	2.56	3.38	3.54	3.73	3.50	3.69	3.73
Min.	2.22	1.70	1.73	1.94	1.66	1.55	2.52	2.53	2.59	2.88	2.87	2.88
Range	1.09	0.53	0.31	1.12	1.01	1.01	0.86	1.01	1.14	0.62	0.82	0.85
1	2.24	1.70	1.79	1.94	1.66	1.55	2.58	2.53	2.68	2.95	2.97	2.92
2	2.60	1.76	1.73	2.46	2.02	1.96	3.03	3.20	3.28	2.97	3.12	3.50
3	2.47	1.88	1.87	2.13	1.85	1.66	2.75	2.76	2.94	2.91	3.02	3.25
4	2.61	1.99	1.86	2.67	2.02	1.91	2.98	2.92	3.25	3.11	3.22	3.30
5	2.43	1.87	1.88	2.23	1.83	1.75	2.81	2.65	2.81	3.00	3.04	3.07
6	2.22	1.87	1.94	1.97	1.75	1.68	2.52	2.59	2.59	2.88	2.93	3.07
7	2.46	1.95	1.89	2.27	1.94	1.85	3.08	3.30	3.42	3.11	3.31	3.41
8	2.56	1.94	1.81	2.67	2.21	2.04	3.21	3.27	3.50	3.16	3.35	3.46
9	3.31	2.23	1.99	2.90	2.67	2.56	3.10	3.54	3.73	3.22	3.52	3.73
10	2.41	1.85	1.82	2.49	1.97	1.92	3.06	3.10	3.18	3.19	3.32	3.35
11	2.36	1.91	1.90	2.43	2.02	1.84	3.13	3.03	3.10	3.18	3.22	3.32
12	2.74	2.04	1.84	3.00	2.23	1.93	3.38	3.53	3.58	3.50	3.69	3.70
13	2.55	1.92	1.90	2.47	1.96	1.82	2.95	2.93	3.01	3.06	3.11	3.26
14	2.61	2.02	1.90	2.48	1.86	1.76	2.86	2.72	2.88	2.89	3.01	3.08
15	3.02	2.05	1.97	2.80	2.36	2.06	3.11	3.07	3.24	3.22	3.16	3.47
16	2.88	2.06	1.94	2.59	2.13	1.92	2.83	2.93	3.18	2.94	3.07	3.26
17	3.03	2.17	2.04	3.06	2.43	2.18	3.21	3.27	3.36	3.31	3.37	3.50
18	2.38	1.88	1.89	2.36	2.00	1.87	2.92	2.91	3.03	2.98	3.13	3.29
19	3.08	2.20	1.97	2.93	2.37	2.19	3.12	3.43	3.60	3.15	3.50	3.66
20	2.58	1.96	1.92	2.54	2.09	1.87	3.14	3.10	3.31	3.19	3.32	3.39
21	2.61	1.95	1.93	2.29	1.96	1.82	3.02	2.86	3.05	3.04	3.21	3.38
22	2.36	1.78	1.75	2.43	2.14	1.99	2.86	2.92	2.92	2.96	2.87	2.88



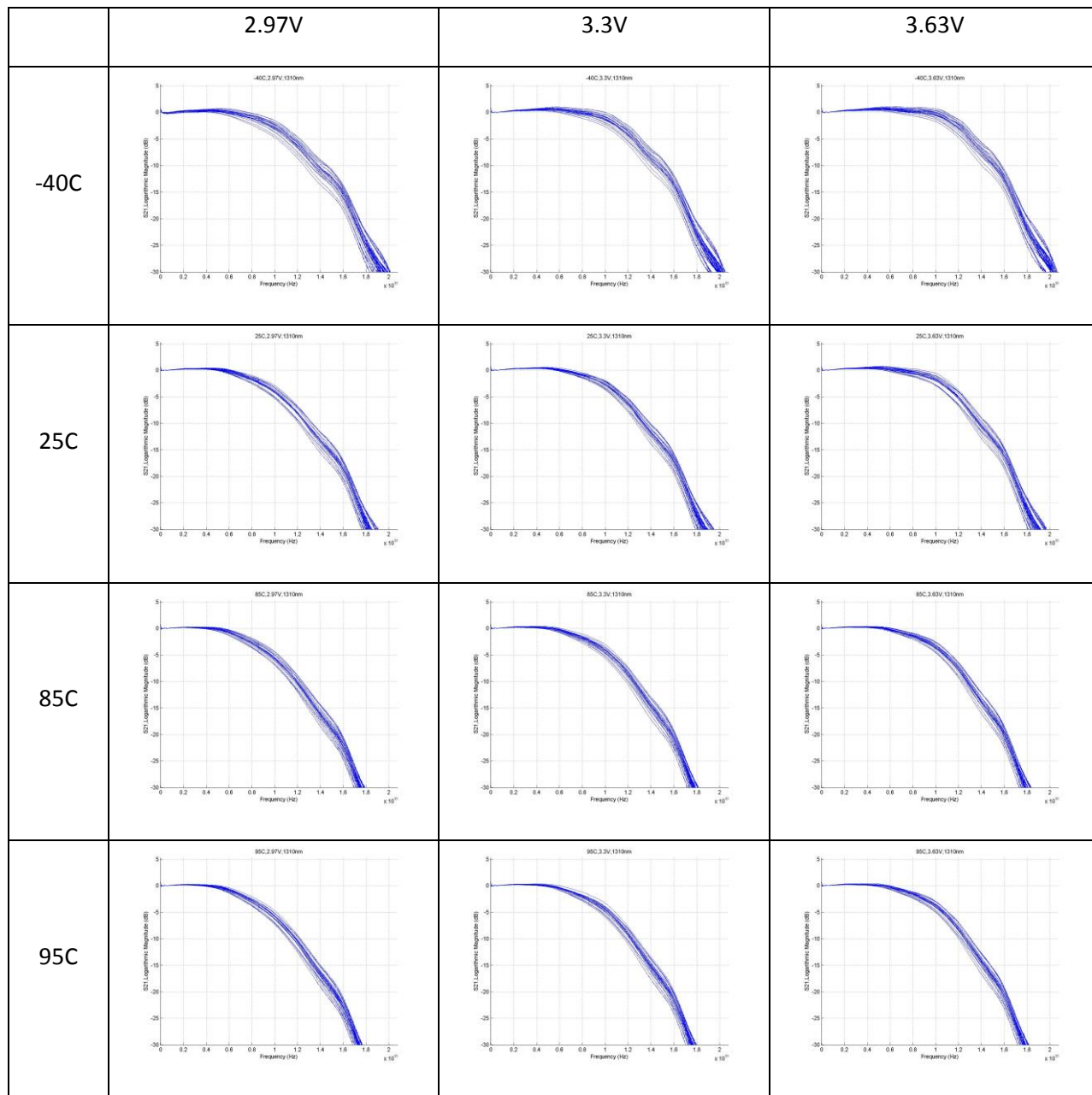


### 3.7. S-parameters

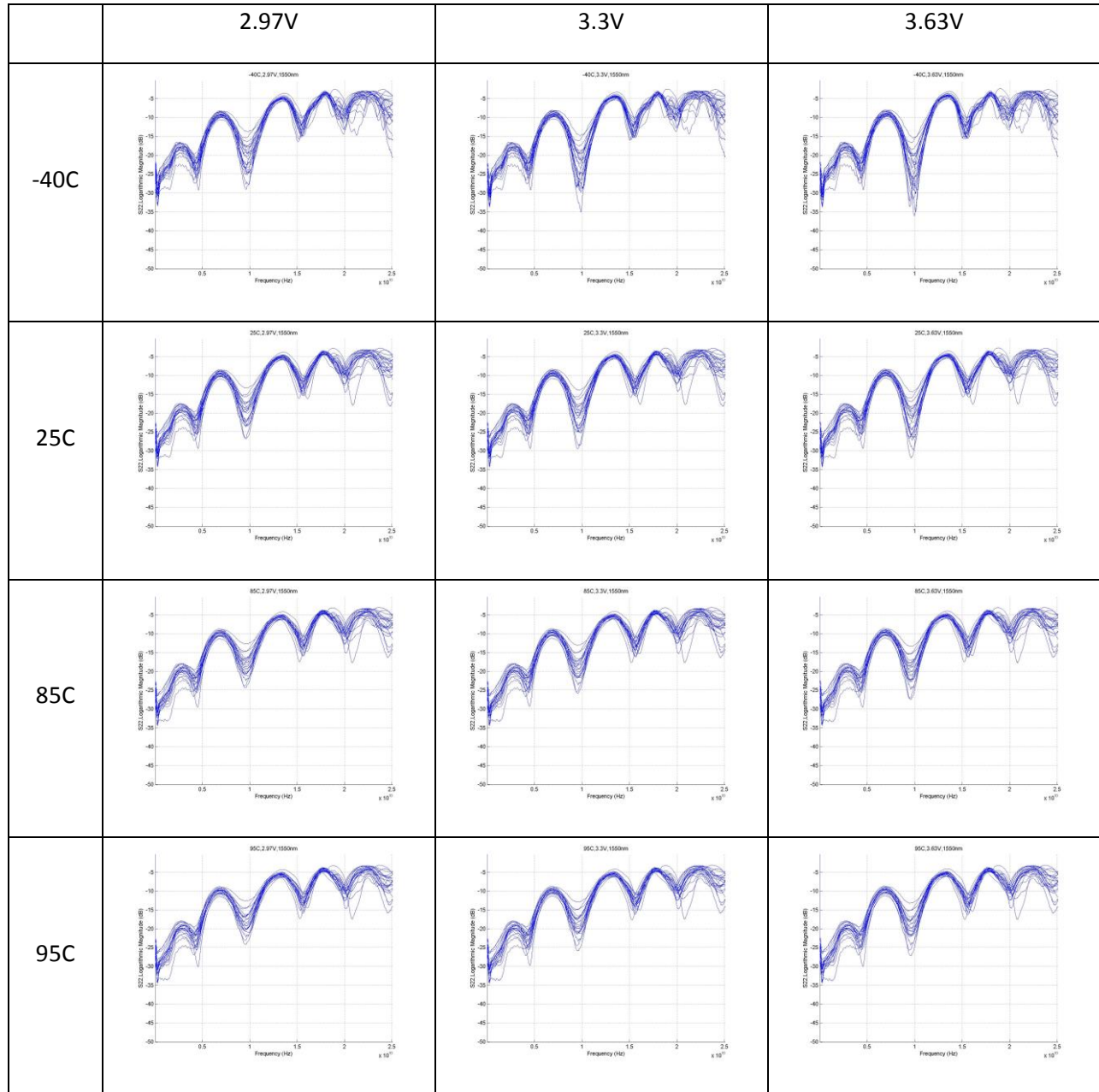
#### 3.7.1. Test Descriptions

An s-parameter sweep was performed with an input optical power of -19dBm and electrical power of 0dBm at 1310nm.

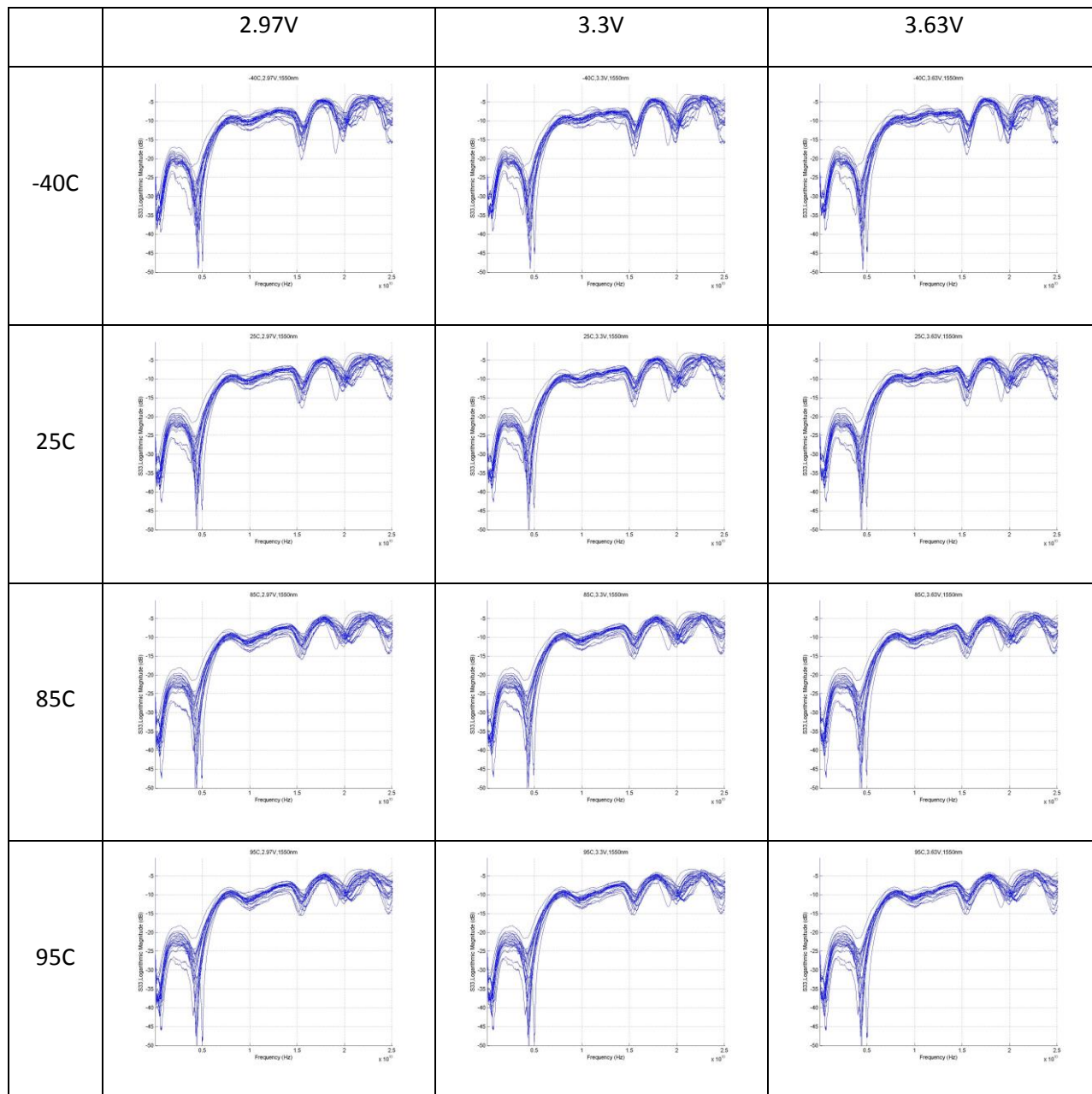
3.7.2. S21 plots at 1310nm and -19dBm Optical Input Power



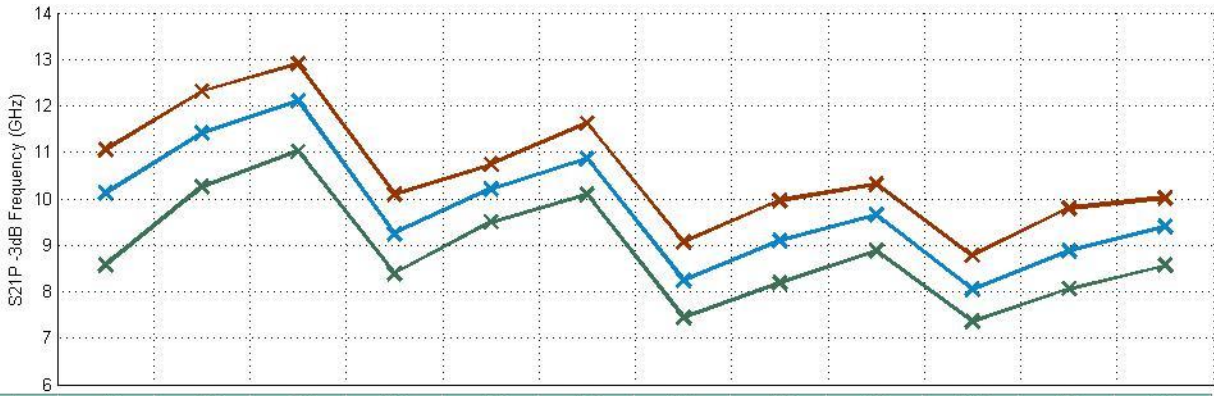
### 3.7.3. P-Channel S22 plots at 0dBm electrical input power



3.7.4. N-Channel S22 plots at 0dBm electrical input power

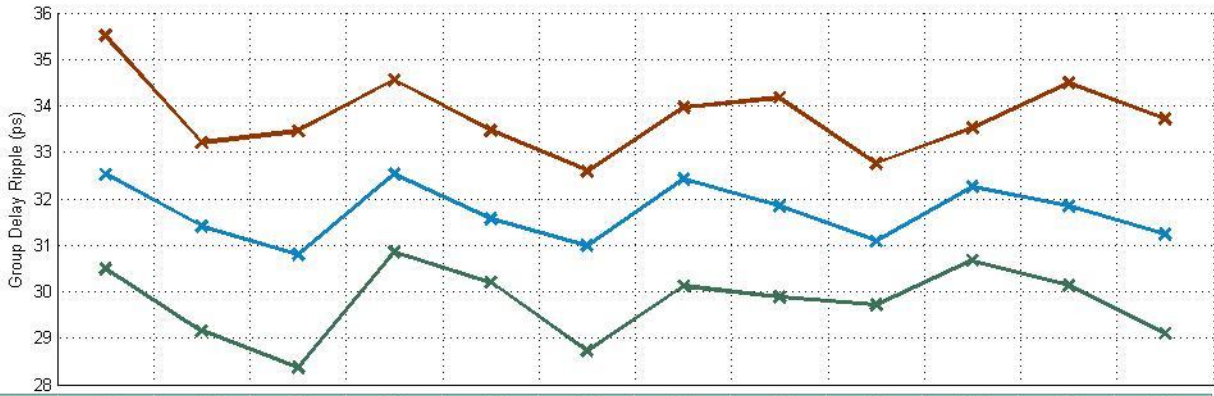


### 3.7.5. S21 -3dB Bandwidth (GHz) at 1310nm



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	10.13	11.41	12.11	9.25	10.21	10.86	8.25	9.10	9.66	8.05	8.87	9.40
Median	10.16	11.34	12.10	9.25	10.25	10.89	8.25	9.20	9.65	8.14	8.88	9.45
Std. Dev.	0.63	0.52	0.49	0.45	0.36	0.43	0.43	0.43	0.39	0.37	0.42	0.42
Max.	11.06	12.32	12.90	10.10	10.74	11.63	9.06	9.96	10.31	8.78	9.80	10.02
Min.	8.57	10.25	11.02	8.39	9.50	10.09	7.44	8.19	8.88	7.36	8.07	8.57
Range	2.48	2.06	1.88	1.71	1.24	1.53	1.62	1.77	1.42	1.42	1.73	1.45
1	10.87	12.01	12.65	10.10	10.74	11.63	9.06	9.96	10.28	8.78	9.80	10.02
2	9.84	11.29	11.97	9.42	10.30	11.07	8.24	9.27	9.64	8.25	8.98	9.53
3	10.27	11.71	12.44	9.53	10.60	11.11	8.57	9.28	9.82	8.18	8.88	9.63
4	10.19	11.27	11.93	9.05	10.22	10.77	8.24	9.22	9.53	7.90	8.85	9.20
5	10.74	11.92	12.60	9.79	10.39	11.42	8.61	9.30	9.87	8.21	9.25	9.66
6	11.06	12.22	12.82	9.88	10.72	11.45	8.93	9.45	10.31	8.40	9.29	9.91
7	11.02	12.32	12.90	9.75	10.65	11.29	8.77	9.54	10.21	8.52	9.27	9.94
8	10.41	11.62	12.31	9.18	10.31	10.84	8.26	8.96	9.76	8.15	8.88	9.53
9	8.57	10.25	11.02	8.39	9.50	10.10	7.60	8.19	8.88	7.41	8.07	8.57
10	10.12	11.30	12.06	9.26	10.18	10.95	8.26	9.35	9.90	8.24	9.06	9.46
11	10.61	11.76	12.40	9.29	10.52	10.93	8.56	9.19	9.89	8.25	9.17	9.55
12	10.00	11.28	12.14	9.04	10.12	10.76	8.14	9.11	9.52	8.01	8.75	9.37
13	10.55	11.65	12.36	9.16	10.30	10.87	8.28	9.27	9.88	8.13	9.08	9.43
14	9.88	11.17	11.94	9.12	9.85	10.70	8.05	8.86	9.55	7.85	8.58	9.28
15	9.46	10.87	11.58	8.54	9.79	10.13	7.44	8.59	9.33	7.36	8.28	8.86
16	10.13	11.35	12.00	9.23	10.28	10.74	8.19	8.74	9.42	7.78	8.75	9.15
17	9.43	10.69	11.34	8.60	9.67	10.21	7.74	8.51	9.12	7.57	8.31	8.78
18	9.80	11.32	12.05	9.28	10.11	10.91	8.08	9.04	9.45	7.91	8.59	9.36
19	8.90	10.56	11.28	8.53	9.57	10.09	7.53	8.47	8.89	7.43	8.23	8.58
20	10.06	11.13	11.79	9.27	10.12	10.84	7.96	8.90	9.56	8.00	8.74	9.25
21	10.46	11.54	12.23	9.21	10.18	10.92	8.39	9.30	9.66	8.24	9.01	9.64
22	10.42	11.83	12.56	9.77	10.54	11.25	8.53	9.73	9.99	8.47	9.33	10.02

### 3.7.6. Group Delay Ripple (ps) at 1310 nm (6GHz)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	32.52	31.41	30.80	32.53	31.57	30.99	32.42	31.84	31.09	32.26	31.84	31.23
Median	32.59	31.34	30.88	32.40	31.49	31.17	32.57	31.91	31.07	32.29	31.72	31.28
Std. Dev.	1.46	1.25	1.26	0.98	0.85	1.13	1.02	0.99	0.71	0.90	0.91	0.92
Max.	35.51	33.21	33.45	34.55	33.47	32.60	33.97	34.17	32.76	33.53	34.49	33.72
Min.	30.48	29.15	28.36	30.86	30.20	28.73	30.12	29.89	29.72	30.67	30.14	29.10
Range	5.03	4.06	5.09	3.70	3.26	3.86	3.85	4.28	3.04	2.86	4.35	4.63
1	30.86	30.23	29.85	31.31	30.58	31.16	32.95	33.15	31.07	33.22	32.27	30.38
2	30.69	30.33	29.51	33.11	31.94	31.83	32.24	31.96	30.75	32.48	31.71	31.61
3	31.07	30.96	30.20	32.16	32.77	31.18	32.96	30.07	30.42	30.67	30.56	30.41
4	32.65	30.24	29.02	31.90	31.76	29.55	32.91	31.33	30.75	31.23	30.14	29.10
5	32.38	32.76	30.56	33.10	30.20	32.01	32.71	31.45	30.63	31.84	32.29	30.85
6	33.60	33.21	31.84	31.74	30.76	31.50	33.04	30.95	32.36	31.72	31.22	31.64
7	32.36	31.12	30.81	30.86	30.79	29.61	32.42	30.96	30.72	31.23	31.15	30.87
8	33.87	32.97	32.36	31.77	31.74	30.29	31.93	29.89	30.57	31.78	31.43	31.25
9	30.48	30.41	29.90	33.83	33.42	32.60	33.97	32.53	32.76	33.45	32.63	31.31
10	31.36	30.43	30.00	32.06	30.94	31.02	32.00	32.77	31.63	33.05	32.10	31.38
11	33.51	32.33	31.50	31.60	31.16	30.60	32.35	30.93	31.39	33.32	31.91	30.43
12	31.18	29.15	28.36	31.31	31.20	29.11	31.31	31.30	30.18	31.13	31.66	31.15
13	34.98	31.10	31.03	32.49	31.84	29.95	30.64	31.96	31.35	31.66	32.71	31.37
14	33.12	32.03	31.66	33.27	31.81	31.77	33.80	31.93	32.10	32.27	31.66	31.78
15	32.92	31.56	31.38	32.35	31.39	28.73	30.12	31.37	31.58	31.31	30.97	30.54
16	32.78	32.03	31.28	33.95	33.47	32.54	33.57	32.42	31.07	32.52	32.14	32.17
17	34.11	33.12	33.45	33.39	32.30	31.04	31.53	32.45	30.87	32.32	31.26	30.87
18	31.17	31.92	30.94	32.74	30.63	32.39	32.75	31.89	30.49	32.77	32.58	32.17
19	30.58	29.44	28.93	32.05	31.72	29.95	32.08	31.65	29.72	31.52	31.17	30.48
20	35.51	30.18	30.76	33.74	31.54	31.75	31.13	32.56	31.23	33.26	34.49	31.35
21	33.72	32.50	31.93	32.46	31.19	31.19	33.23	32.70	31.09	33.47	31.74	32.28
22	32.53	33.03	32.34	34.55	31.43	32.12	33.55	34.17	31.18	33.53	32.76	33.72



#### 4. Notes and Conclusions

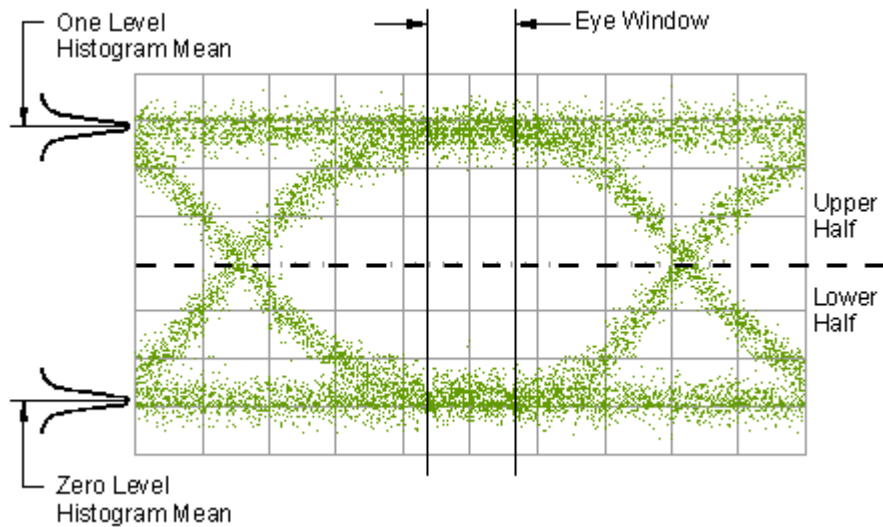
GN3068 ROSA using GCS PD shows comparable performance to GN3068 ROSA using Albis PD.

All results satisfy the datasheet.

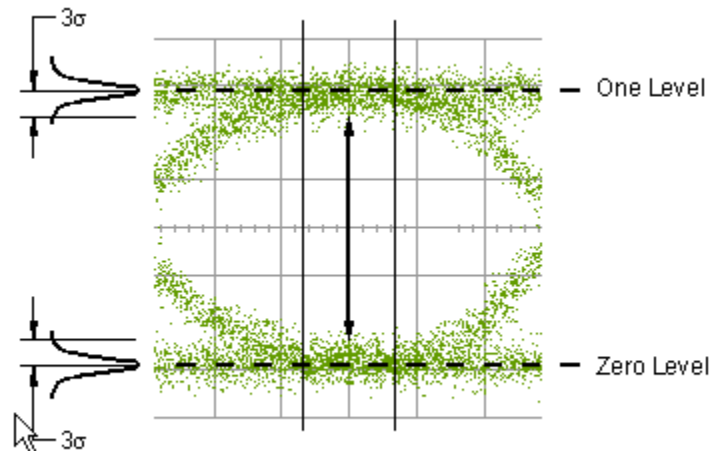
## 5. Appendix 1: Eye Diagram Measurement Definitions

### a. Eye Heights

Eye height is a measure of the vertical opening of an eye diagram. Histograms are constructed to characterize both the one and zero levels *and* their noise levels within the eye window boundaries. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.



The one and zero levels are the relative means of the histograms. The noise is measured through the histograms as three standard deviations from both the one level and zero level into the eye opening.





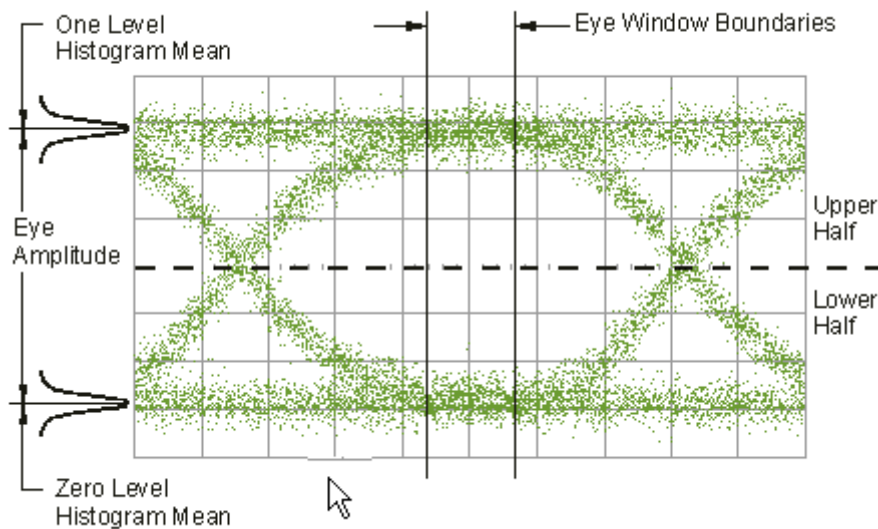


The eye height is determined as follows, eye height = (one level -  $3\sigma$ ) - (zero level +  $3\sigma$ )

b. Eye Amplitudes

Eye amplitude is the difference between the logic 1 level and the logic 0 level histogram mean values of an eye diagram. This measurement is made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

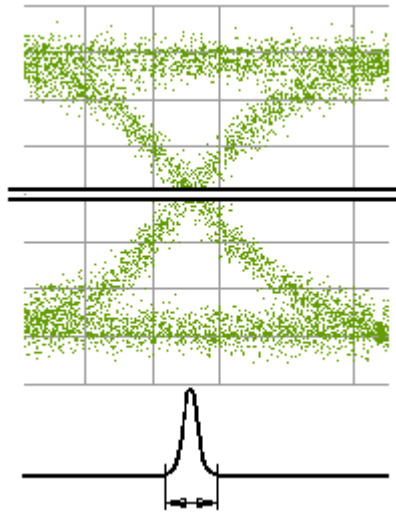
A histogram is constructed using the sampled portion of the eye diagram within the eye window. This histogram is comprised of data points from the upper and lower halves of the eye diagram and is used to determine the mean values of the logic 1 and logic 0 levels. The eye amplitude is determined as follows:



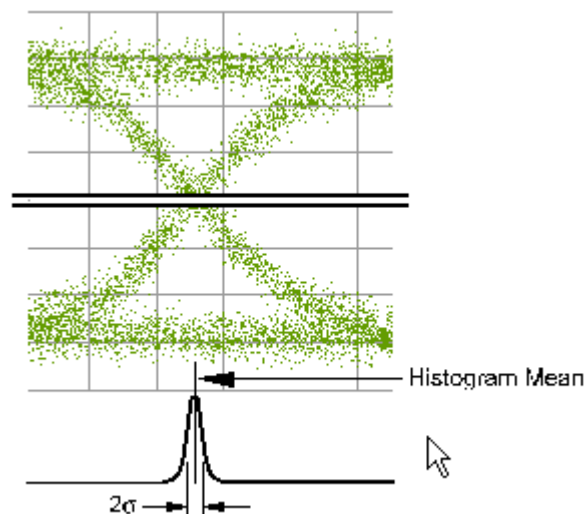
c. Jitter RMS and pk-pk

Eye Jitter is the measure of the time variances of the rising and falling edges of an eye diagram, as these edges affect the crossing point of the eye. To compute jitter, the level of the crossing point of the eye is first determined. Then a vertically thin measurement window is placed horizontally through the crossing point, and a time histogram is generated.

Jitter pk-pk is equal to the full width of the histogram at the eye crossing point.



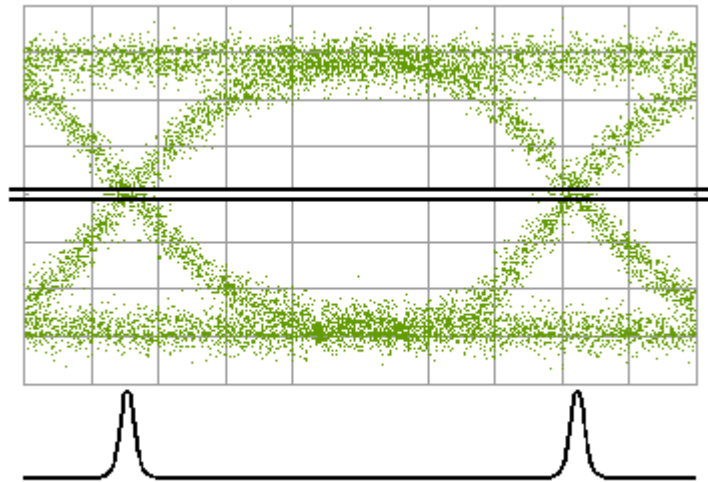
Jitter RMS is defined as  $1 \sigma$  (standard deviation) of the crossing point histogram



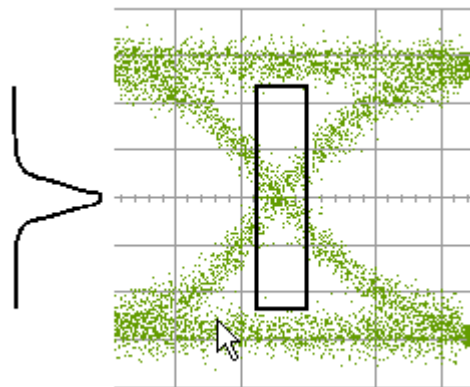
d. Crossing percentage

Crossing percentage is a measure of the amplitude of the crossing points relative to the one level and zero level. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

A vertically thin measurement window is placed horizontally through the crossing points, and a horizontal histogram is used to determine the mean location (in time) of the crossing point.



A narrow vertical histogram is used to determine the amplitude of crossing points.

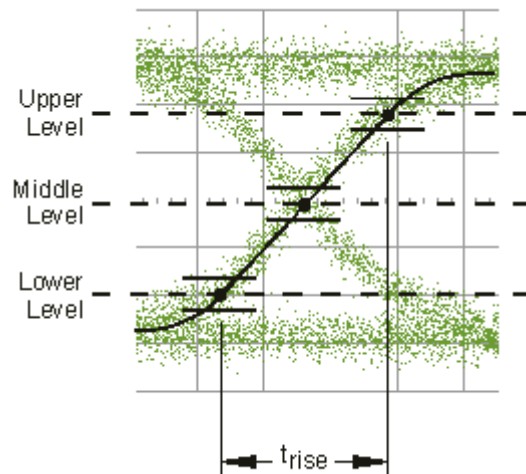


The mean derived from the horizontal and vertical histogram results in  $V_{\text{cross}}$ . Crossing percentage is then determined by the following:

$$\text{Crossing percent} = 100 (V_{\text{cross}} - V_{\text{zero level}}) / (V_{\text{one level}} - V_{\text{zero level}})$$

e. Rise Time and Fall Time

Rise time is a measure of the mean transition time of the data on the upward slope of an eye diagram. The data crosses through the following three thresholds: the lower, middle, and upper thresholds, as well as through the eye crossing point. The settings for the threshold levels are the 20% to 80% points on the transition.



Rise time= time at the upper threshold crossing – time at the lower threshold crossing

Fall times are similarly calculated except on the downward slope of an eye diagram.



GN3268 (featuring GCS photodiode)  
Characterization Report  
(PCN-000356)

Authors: Goran Perosevic



Revision List

Revision	Author	Description of change	Revision Date (mm/dd/yyyy)	ECO#
A	Goran Perosevic	First Issue	28/01/2015	ECO-029407



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## 1. Scope

This document contains a summary of the results of the characterization testing performed on GN3268 ROSA featuring GCS (PN: DO262\_45um\_E1) photodiode.

## 2. Method

The GN3268 ROSA featuring GCS photodiode (PN: DO262\_45um\_E1) with LC optical receptacles (barrels) were tested using a Semtech designed evaluation board. These evaluation boards feature controlled impedance lines that are terminated in SMA connectors, and permit full assessment of the electrical properties of the ROSA using input from optical excitation at a wide range of frequencies.

Characterization plan is Gendoc 057166.

## 3. Results



### 3.1. Supply Current ( $I_{CC}$ )

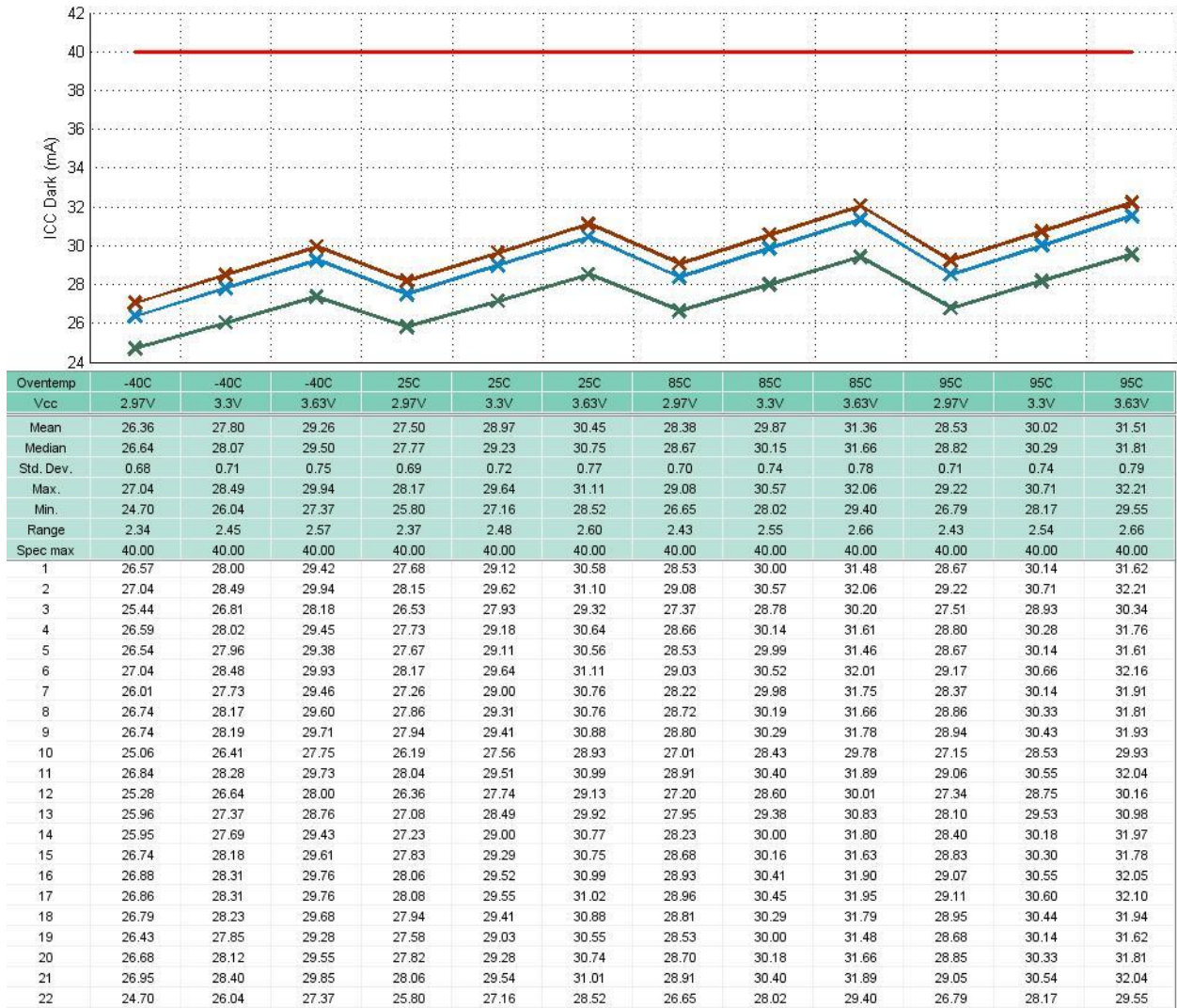
#### 3.1.1. Test Descriptions

In these tests the ROSA was powered up and the current into the  $V_{CC}$  pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

1. No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
2. 0.5dBm of avg. optical power

The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

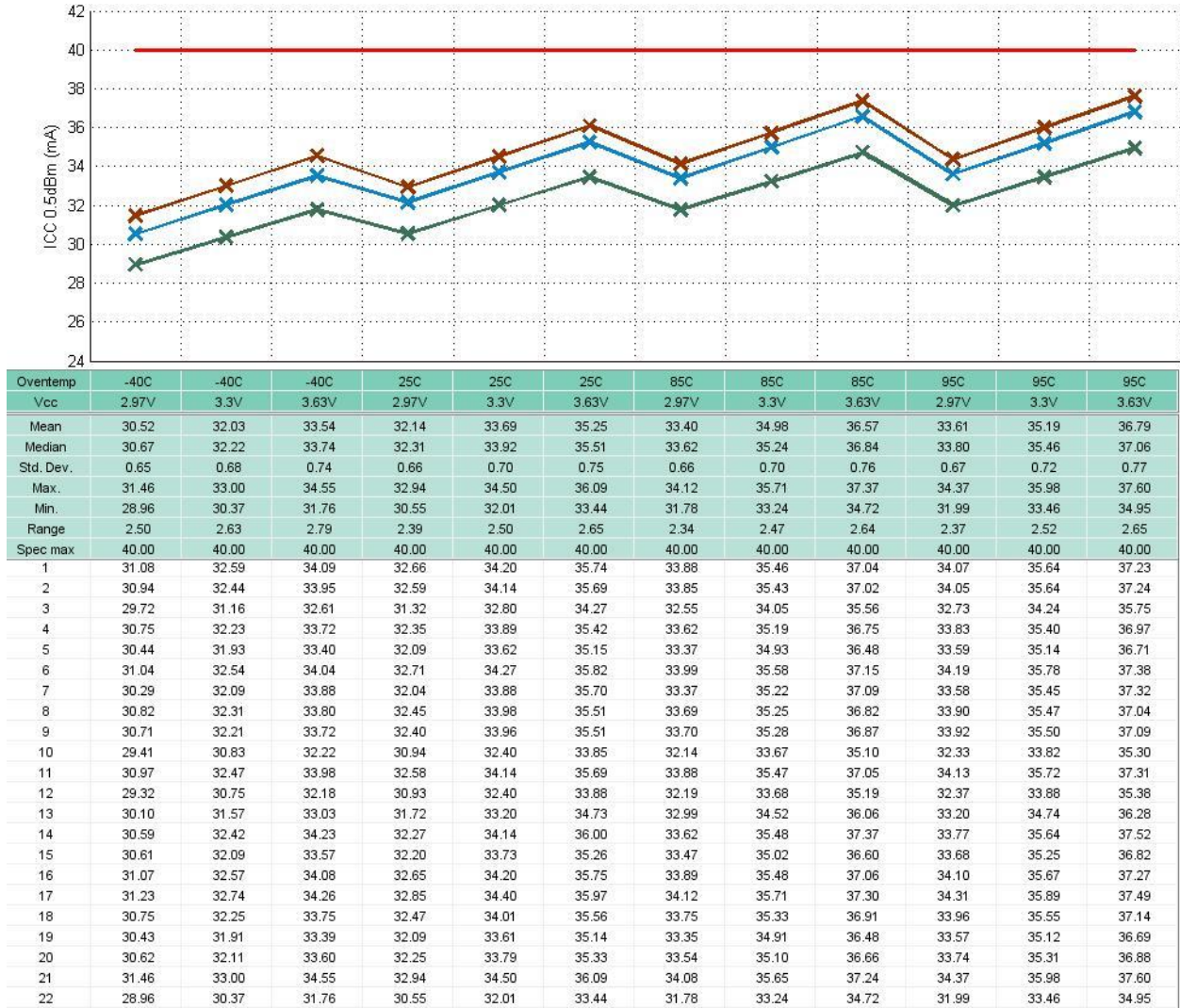
### 3.1.2. $I_{CC}$ (no optical input)



### 3.1.3. $I_{CC}$ (0.5dBm avg. optical power @ 1310nm)



### 3.1.4. $I_{CC}$ (0.5dBm avg. optical power @ 1550nm)





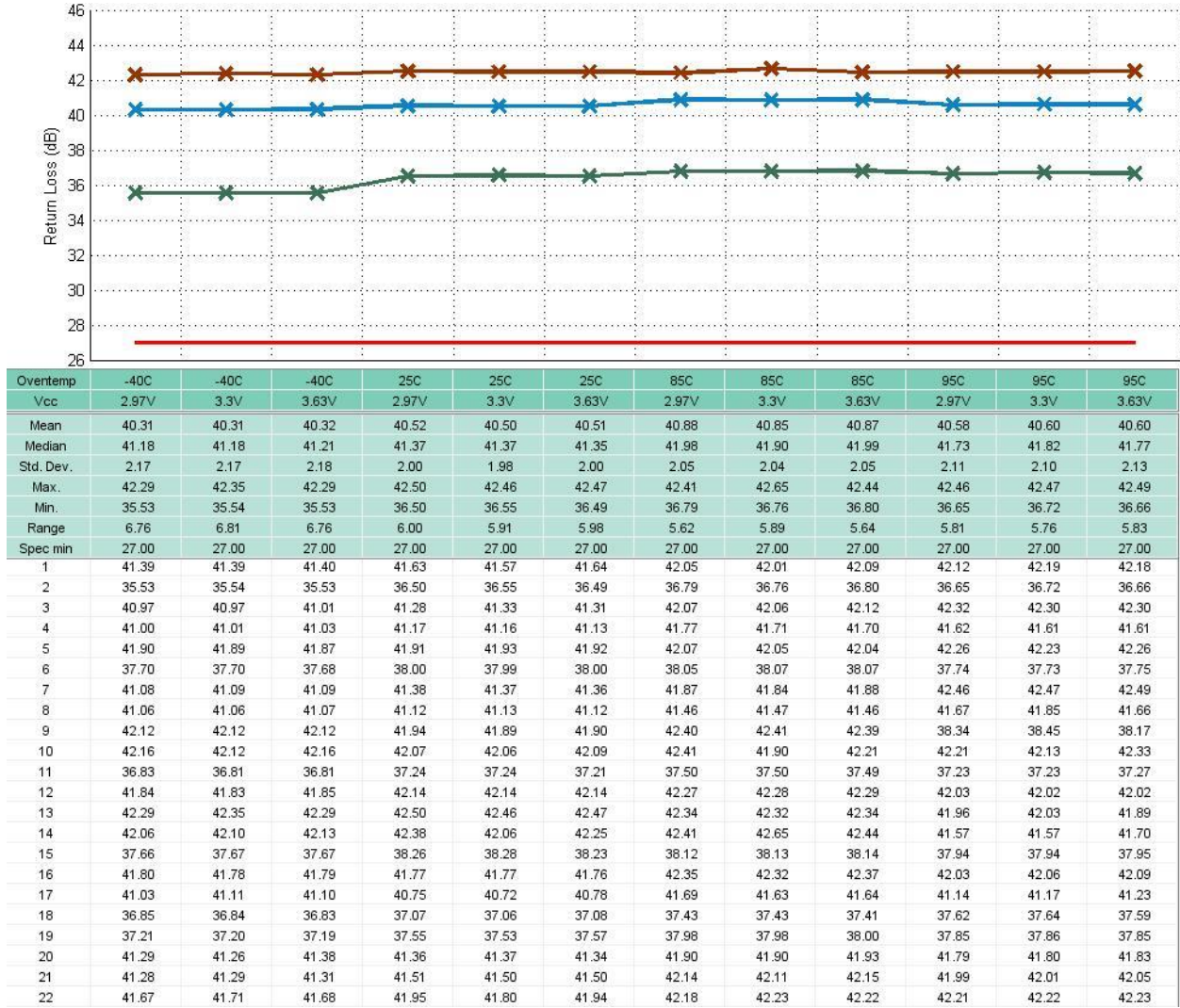
## 3.2. Optical Return Loss

### 3.2.1. Test Descriptions

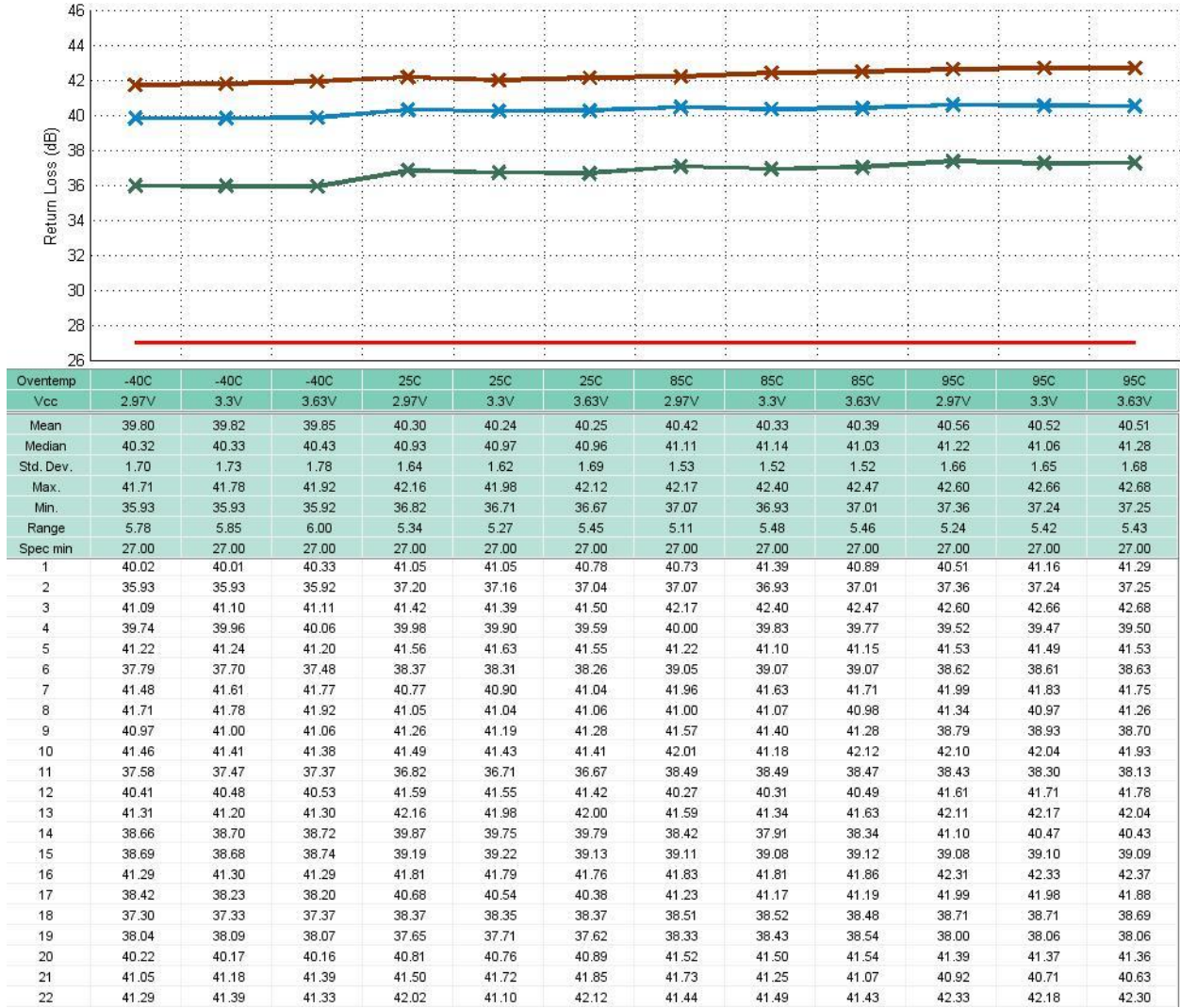
Optical return losses of the ROSAs were measured at 1310nm and 1550nm.



### 3.2.2. Optical Return Loss (dB) at 1310nm



### 3.2.3. Optical Return Loss (dB) at 1550nm





### 3.3. Responsivity, RSSI Dark

#### 3.3.1. Test Descriptions

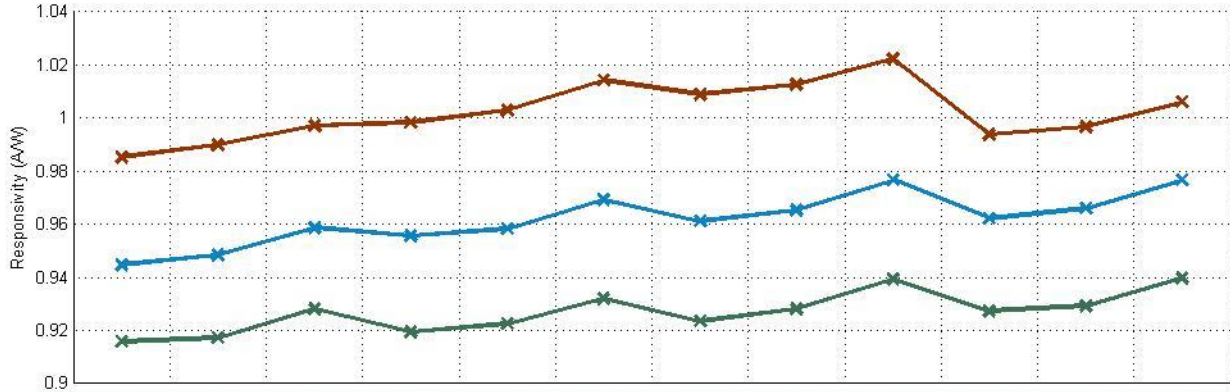
Responsivity is calculated by dividing the measured the RSSI current by the input optical power at an input optical power of -10dBm (100uW). The input optical signal is unmodulated.

In these tests the ROSA was powered up and the current sunk from the RSSI pin was measured. During the test the RSSI pin was pulled to ground. The test was performed under the following conditions:

- 1) No optical power input into the ROSA, i.e.  $P_o=0mW$ . This is to test the dark condition.
- 2) -30dBm of avg. optical power
- 3) -20dBm of avg. optical power
- 4) -10dBm of avg. optical power
- 5) 0dBm of avg. optical power
- 6) 0.5dBm of avg. optical power
- 7) 1.14dBm of avg. optical power
- 8) 2.04dBm of avg. optical power

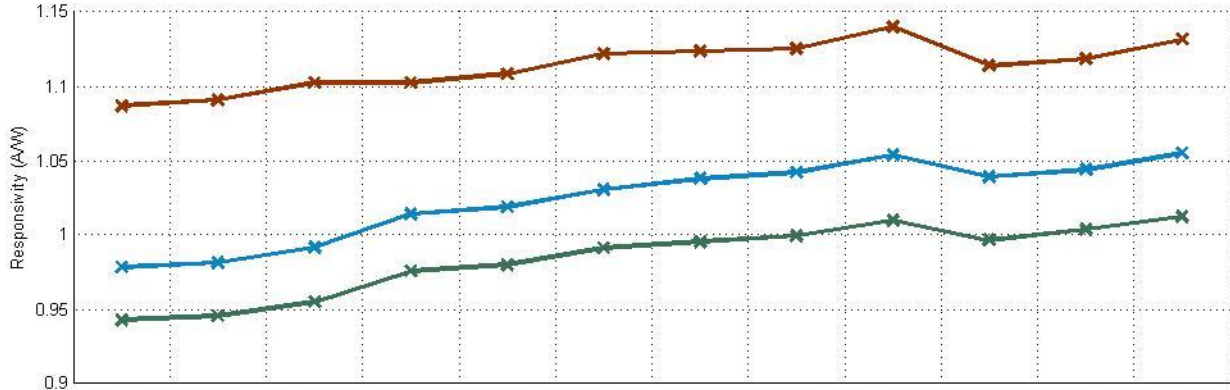
The optical signal input to the ROSA was unmodulated. Test was done at both 1310nm and 1550nm.

### 3.3.2. Responsivity (A/W) at 1310nm



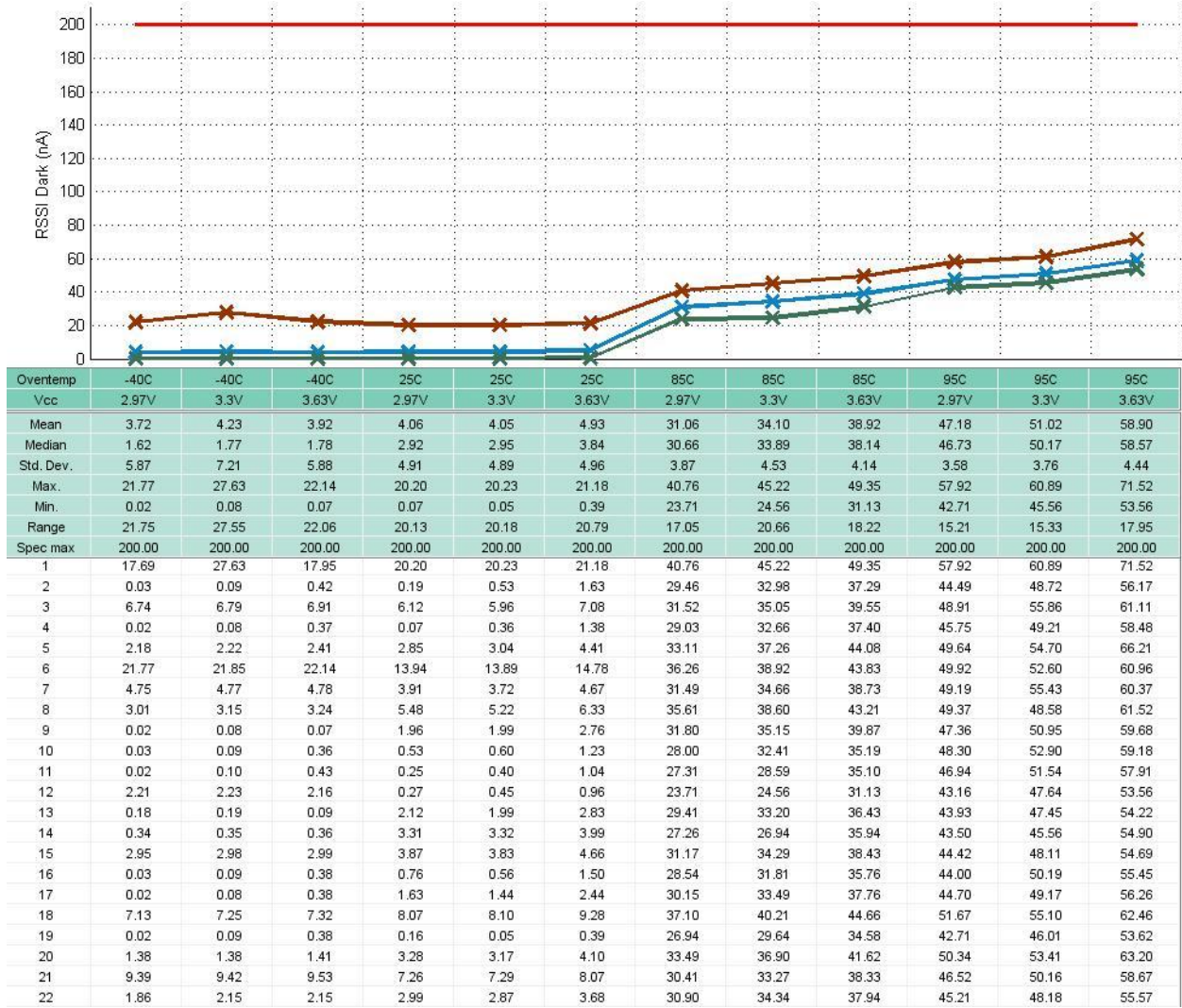
Ovtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	2.97V
Mean	0.94	0.95	0.96	0.96	0.96	0.97	0.96	0.97	0.98	0.96	0.97	0.98
Median	0.94	0.95	0.96	0.95	0.96	0.97	0.96	0.97	0.98	0.96	0.97	0.98
Std. Dev.	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Max.	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.01	1.02	0.99	1.00	1.01
Min.	0.92	0.92	0.93	0.92	0.92	0.93	0.92	0.93	0.94	0.93	0.93	0.94
Range	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.08	0.08	0.07	0.07	0.07
1	0.98	0.98	0.99	0.98	0.98	0.99	0.99	0.99	1.01	0.99	0.99	1.01
2	0.92	0.92	0.93	0.93	0.93	0.95	0.94	0.95	0.96	0.94	0.94	0.95
3	0.96	0.96	0.97	0.97	0.98	0.99	0.97	0.98	0.99	0.97	0.98	0.99
4	0.94	0.95	0.96	0.95	0.95	0.96	0.96	0.96	0.97	0.96	0.96	0.98
5	0.92	0.92	0.93	0.92	0.92	0.93	0.92	0.93	0.94	0.93	0.93	0.94
6	0.95	0.96	0.97	0.97	0.97	0.98	0.97	0.98	0.99	0.98	0.98	0.99
7	0.96	0.96	0.97	0.97	0.97	0.98	0.97	0.97	0.98	0.97	0.98	0.99
8	0.94	0.94	0.95	0.95	0.95	0.96	0.95	0.96	0.97	0.96	0.96	0.97
9	0.92	0.93	0.94	0.93	0.94	0.94	0.94	0.94	0.95	0.94	0.94	0.95
10	0.93	0.93	0.94	0.94	0.94	0.95	0.94	0.94	0.95	0.94	0.94	0.95
11	0.96	0.96	0.98	0.97	0.97	0.98	0.98	0.98	0.99	0.98	0.98	0.99
12	0.93	0.93	0.94	0.94	0.95	0.96	0.95	0.96	0.97	0.95	0.96	0.97
13	0.95	0.96	0.97	0.96	0.96	0.98	0.97	0.97	0.98	0.97	0.97	0.98
14	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00	0.98	0.99	1.00
15	0.93	0.93	0.94	0.94	0.95	0.96	0.95	0.95	0.96	0.95	0.95	0.97
16	0.95	0.95	0.96	0.95	0.96	0.96	0.96	0.96	0.97	0.96	0.97	0.97
17	0.95	0.96	0.97	0.96	0.96	0.98	0.97	0.97	0.98	0.97	0.98	0.99
18	0.93	0.93	0.95	0.95	0.96	0.97	0.97	0.97	0.99	0.97	0.97	0.98
19	0.93	0.93	0.94	0.94	0.94	0.95	0.94	0.95	0.96	0.94	0.95	0.96
20	0.93	0.93	0.95	0.94	0.95	0.96	0.95	0.95	0.96	0.95	0.95	0.96
21	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.01	1.02	0.99	1.00	1.00
22	0.96	0.96	0.97	0.97	0.97	0.98	0.97	0.98	0.99	0.98	0.98	0.99

### 3.3.3. Responsivity (A/W) at 1550nm



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	2.97V
Mean	0.98	0.98	0.99	1.01	1.02	1.03	1.04	1.04	1.05	1.04	1.04	1.05
Median	0.97	0.97	0.98	1.01	1.01	1.02	1.03	1.04	1.05	1.04	1.04	1.05
Std. Dev.	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Max.	1.09	1.09	1.10	1.10	1.11	1.12	1.12	1.13	1.14	1.11	1.12	1.13
Min.	0.94	0.95	0.95	0.98	0.98	0.99	1.00	1.00	1.01	1.00	1.00	1.01
Range	0.14	0.15	0.15	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.11	0.12
1	1.07	1.07	1.08	1.09	1.10	1.11	1.11	1.12	1.13	1.11	1.12	1.13
2	0.95	0.95	0.96	0.99	0.99	1.00	1.01	1.02	1.03	1.01	1.02	1.03
3	1.00	1.00	1.01	1.04	1.04	1.06	1.06	1.07	1.08	1.06	1.07	1.08
4	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.04	1.05	1.04	1.05	1.06
5	0.95	0.95	0.96	0.98	0.99	1.00	1.01	1.01	1.02	1.01	1.02	1.03
6	0.96	0.97	0.97	1.00	1.01	1.02	1.03	1.04	1.05	1.04	1.05	1.06
7	0.98	0.98	0.99	1.02	1.03	1.04	1.04	1.05	1.06	1.05	1.05	1.06
8	0.98	0.98	0.99	1.02	1.02	1.03	1.03	1.04	1.05	1.04	1.04	1.06
9	0.97	0.98	0.99	1.01	1.02	1.03	1.03	1.04	1.05	1.03	1.04	1.05
10	0.94	0.95	0.95	0.99	0.99	1.00	1.01	1.02	1.03	1.02	1.02	1.03
11	0.98	0.98	0.99	1.02	1.02	1.03	1.04	1.04	1.05	1.04	1.04	1.05
12	1.02	1.02	1.03	1.04	1.05	1.06	1.07	1.07	1.08	1.08	1.08	1.09
13	0.95	0.95	0.96	0.99	0.99	1.00	1.02	1.02	1.03	1.01	1.02	1.03
14	0.96	0.97	0.98	1.00	1.00	1.01	1.02	1.03	1.04	1.03	1.03	1.04
15	1.09	1.09	1.10	1.10	1.11	1.12	1.12	1.13	1.14	1.11	1.11	1.12
16	0.94	0.95	0.96	0.98	0.98	0.99	1.00	1.00	1.01	1.00	1.00	1.01
17	0.95	0.95	0.96	0.99	0.99	1.01	1.02	1.02	1.03	1.02	1.02	1.03
18	0.98	0.98	0.99	1.00	1.01	1.02	1.02	1.03	1.04	1.02	1.03	1.04
19	1.01	1.01	1.02	1.04	1.05	1.06	1.07	1.07	1.08	1.07	1.07	1.08
20	0.96	0.97	0.98	1.01	1.02	1.03	1.04	1.05	1.06	1.04	1.05	1.06
21	0.95	0.96	0.96	0.99	0.99	1.00	1.01	1.01	1.02	1.01	1.01	1.02
22	0.96	0.96	0.98	1.00	1.00	1.01	1.02	1.02	1.04	1.02	1.02	1.04

### 3.3.4. RSSI dark (nA)



### 3.4. Optical Receiver Sensitivity

#### 3.4.1. Test Descriptions

The receiver sensitivity tests were performed by performing a sweep of optical powers and recording the BER for those optical powers.

In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT. This is done because the sensitivity of the GN2013 CDR is much better than the BERT inputs and allows for a much better measurement of the true sensitivity of the ROSA.

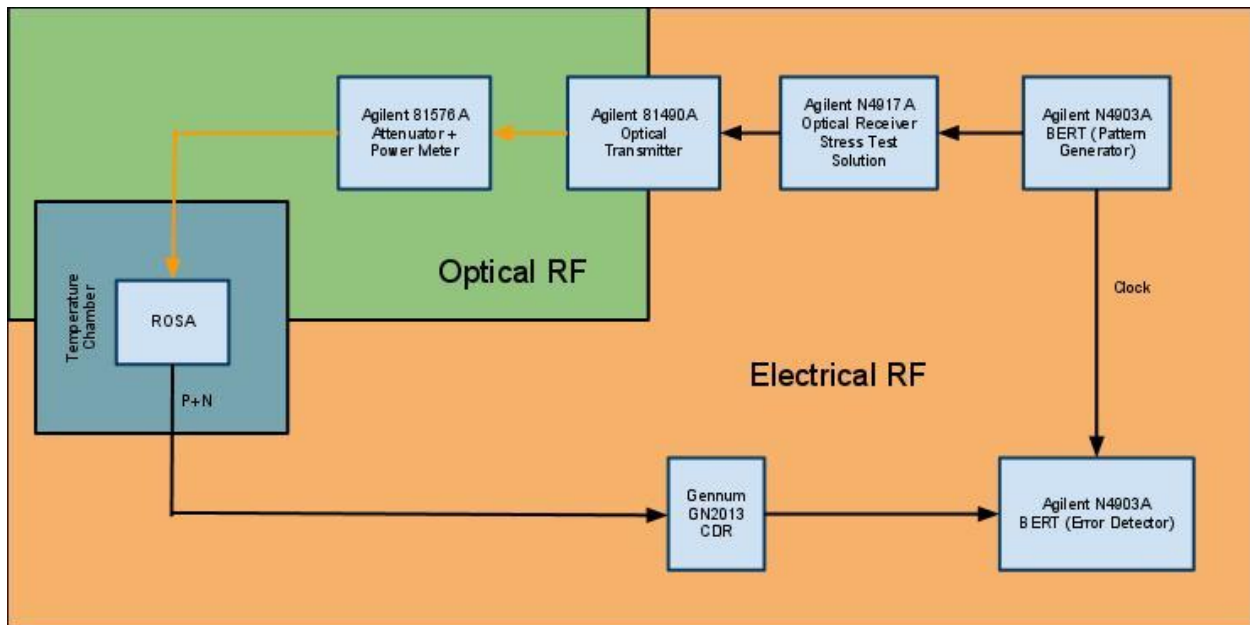


Figure 1. Sensitivity testing Block Diagram.

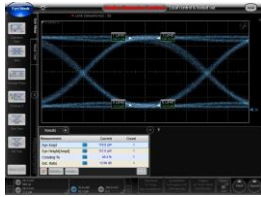


Figure 2. 1310nm 11.3Gbps Input Eye

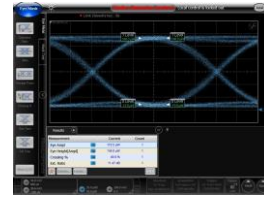


Figure 3. 1550nm 11.3Gbps Input Eye

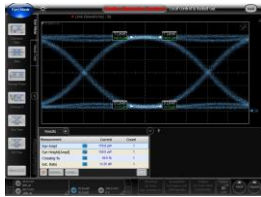


Figure 4. 1310nm 10.3125Gbps Input Eye

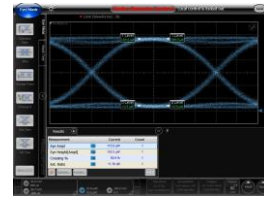


Figure 5. 1550nm 10.3125Gbps Input Eye

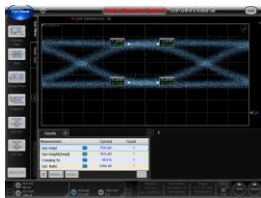


Figure 6. 1310 BaseL Input Eye

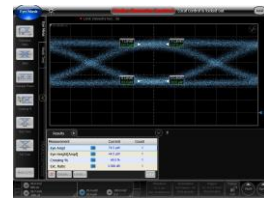


Figure 7. 1550 BaseL Input Eye

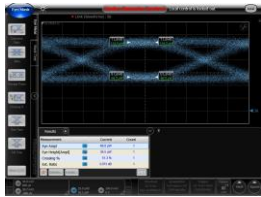


Figure 8. 1310 BaseE Input Eye

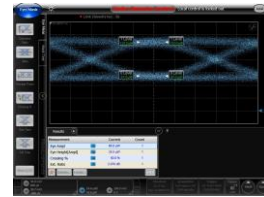
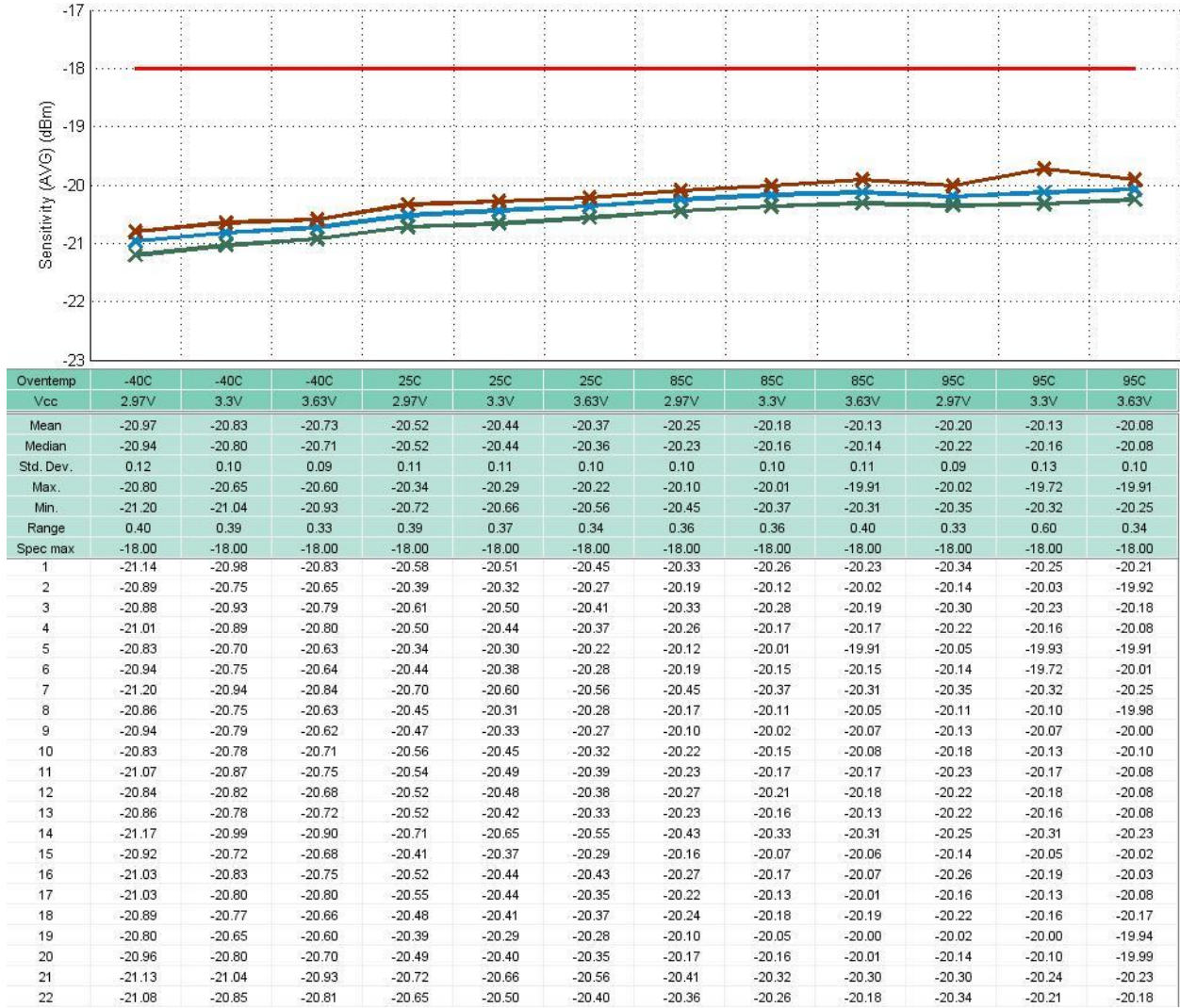


Figure 9. 1550 BaseE Input Eye



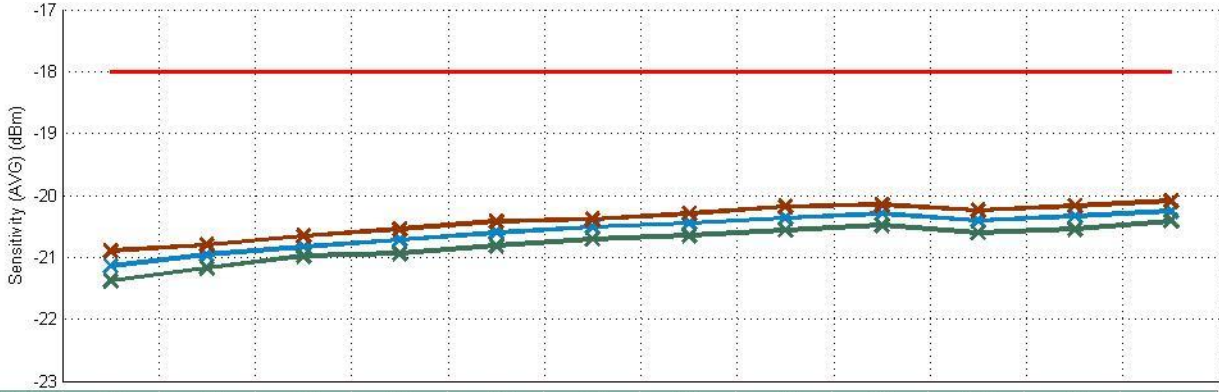
### 3.4.2. Unstressed Receiver Sensitivity at 1310nm and 11.3Gbps (Avg. power dBm)



### 3.4.3. Unstressed Receiver Sensitivity at 1550nm and 11.3Gbps (Avg. power dBm)

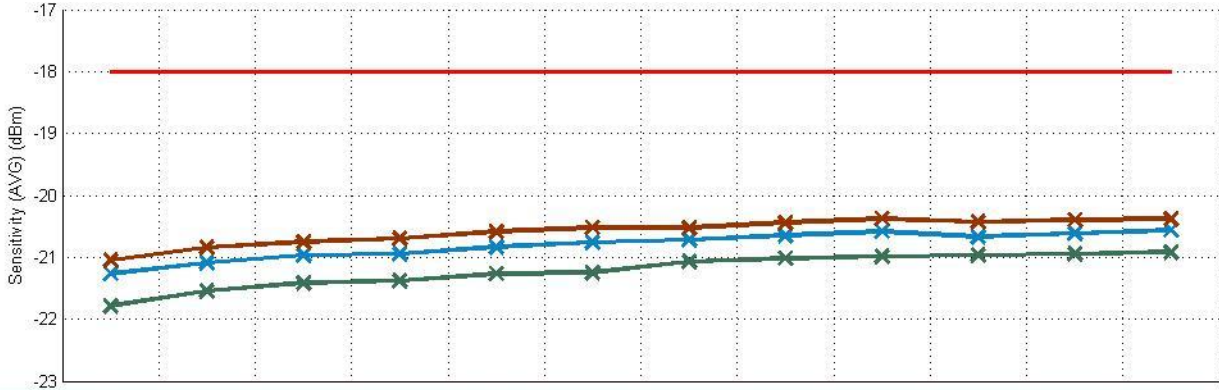


### 3.4.4. Unstressed Receiver Sensitivity at 1310nm and 10.3125Gbps (Avg. power dBm)



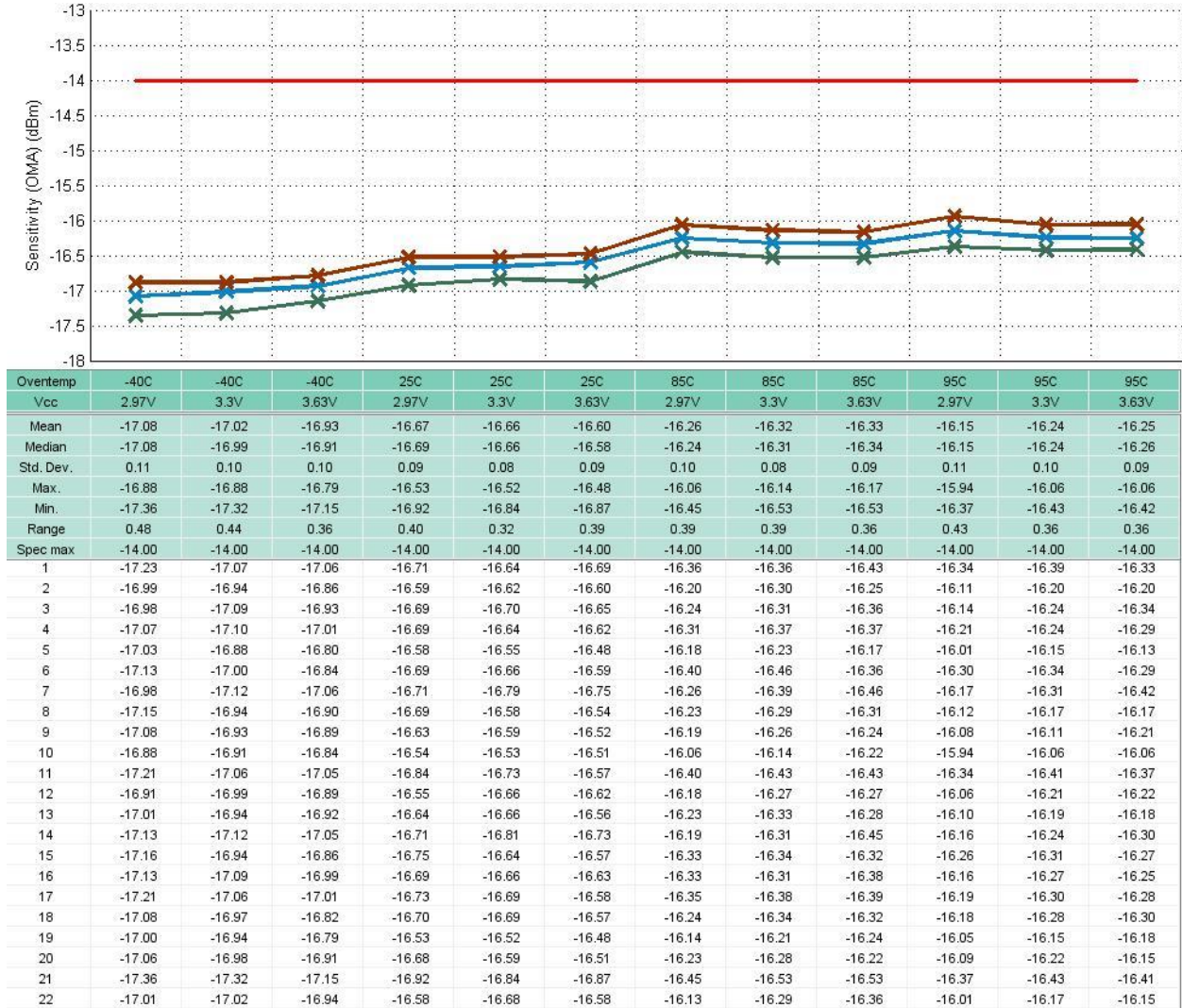
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-21.14	-20.96	-20.83	-20.72	-20.60	-20.51	-20.45	-20.37	-20.29	-20.41	-20.33	-20.26
Median	-21.10	-20.94	-20.81	-20.72	-20.60	-20.51	-20.44	-20.37	-20.28	-20.42	-20.32	-20.23
Std. Dev.	0.13	0.10	0.09	0.11	0.11	0.10	0.11	0.11	0.10	0.11	0.10	0.10
Max.	-20.90	-20.80	-20.66	-20.55	-20.42	-20.39	-20.30	-20.18	-20.15	-20.24	-20.17	-20.09
Min.	-21.39	-21.17	-20.98	-20.94	-20.82	-20.71	-20.65	-20.56	-20.48	-20.60	-20.55	-20.41
Range	0.49	0.37	0.32	0.39	0.39	0.32	0.35	0.38	0.33	0.36	0.38	0.32
Spec max	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00
1	-21.29	-21.07	-20.90	-20.82	-20.64	-20.55	-20.54	-20.40	-20.41	-20.51	-20.45	-20.34
2	-21.05	-20.92	-20.77	-20.63	-20.48	-20.40	-20.30	-20.30	-20.17	-20.31	-20.26	-20.17
3	-21.09	-21.00	-20.93	-20.78	-20.68	-20.57	-20.45	-20.50	-20.32	-20.50	-20.36	-20.32
4	-21.27	-20.99	-20.88	-20.70	-20.57	-20.52	-20.34	-20.42	-20.31	-20.41	-20.34	-20.29
5	-21.01	-20.85	-20.68	-20.55	-20.45	-20.40	-20.30	-20.21	-20.15	-20.24	-20.17	-20.09
6	-21.09	-20.90	-20.78	-20.56	-20.50	-20.43	-20.45	-20.32	-20.25	-20.33	-20.26	-20.20
7	-21.39	-21.13	-20.97	-20.86	-20.76	-20.67	-20.65	-20.56	-20.47	-20.57	-20.55	-20.41
8	-21.10	-20.88	-20.81	-20.60	-20.53	-20.40	-20.37	-20.30	-20.28	-20.31	-20.28	-20.16
9	-21.14	-20.90	-20.78	-20.63	-20.47	-20.40	-20.37	-20.24	-20.20	-20.29	-20.21	-20.22
10	-21.06	-20.96	-20.81	-20.77	-20.64	-20.50	-20.47	-20.40	-20.26	-20.42	-20.32	-20.26
11	-21.22	-20.96	-20.88	-20.76	-20.63	-20.56	-20.52	-20.38	-20.29	-20.43	-20.43	-20.33
12	-21.04	-20.89	-20.79	-20.74	-20.62	-20.54	-20.51	-20.40	-20.30	-20.50	-20.37	-20.33
13	-21.05	-20.88	-20.79	-20.70	-20.64	-20.49	-20.46	-20.36	-20.30	-20.43	-20.33	-20.22
14	-21.31	-21.16	-20.98	-20.94	-20.81	-20.71	-20.64	-20.56	-20.48	-20.60	-20.48	-20.41
15	-21.00	-20.85	-20.73	-20.61	-20.55	-20.39	-20.34	-20.26	-20.18	-20.32	-20.27	-20.17
16	-21.20	-21.01	-20.87	-20.76	-20.62	-20.53	-20.43	-20.35	-20.27	-20.33	-20.32	-20.22
17	-21.14	-20.97	-20.86	-20.74	-20.58	-20.53	-20.43	-20.33	-20.27	-20.36	-20.32	-20.21
18	-21.09	-20.86	-20.70	-20.69	-20.56	-20.46	-20.44	-20.37	-20.29	-20.45	-20.36	-20.24
19	-20.90	-20.80	-20.66	-20.56	-20.42	-20.42	-20.33	-20.18	-20.20	-20.26	-20.17	-20.10
20	-21.06	-20.92	-20.81	-20.62	-20.50	-20.46	-20.41	-20.30	-20.23	-20.35	-20.21	-20.21
21	-21.35	-21.17	-20.97	-20.91	-20.82	-20.70	-20.64	-20.53	-20.45	-20.58	-20.48	-20.39
22	-21.23	-21.01	-20.91	-20.85	-20.74	-20.65	-20.53	-20.47	-20.39	-20.48	-20.41	-20.39

### 3.4.5. Unstressed Receiver Sensitivity at 1550nm and 10.3125Gbps (Avg. power dBm)

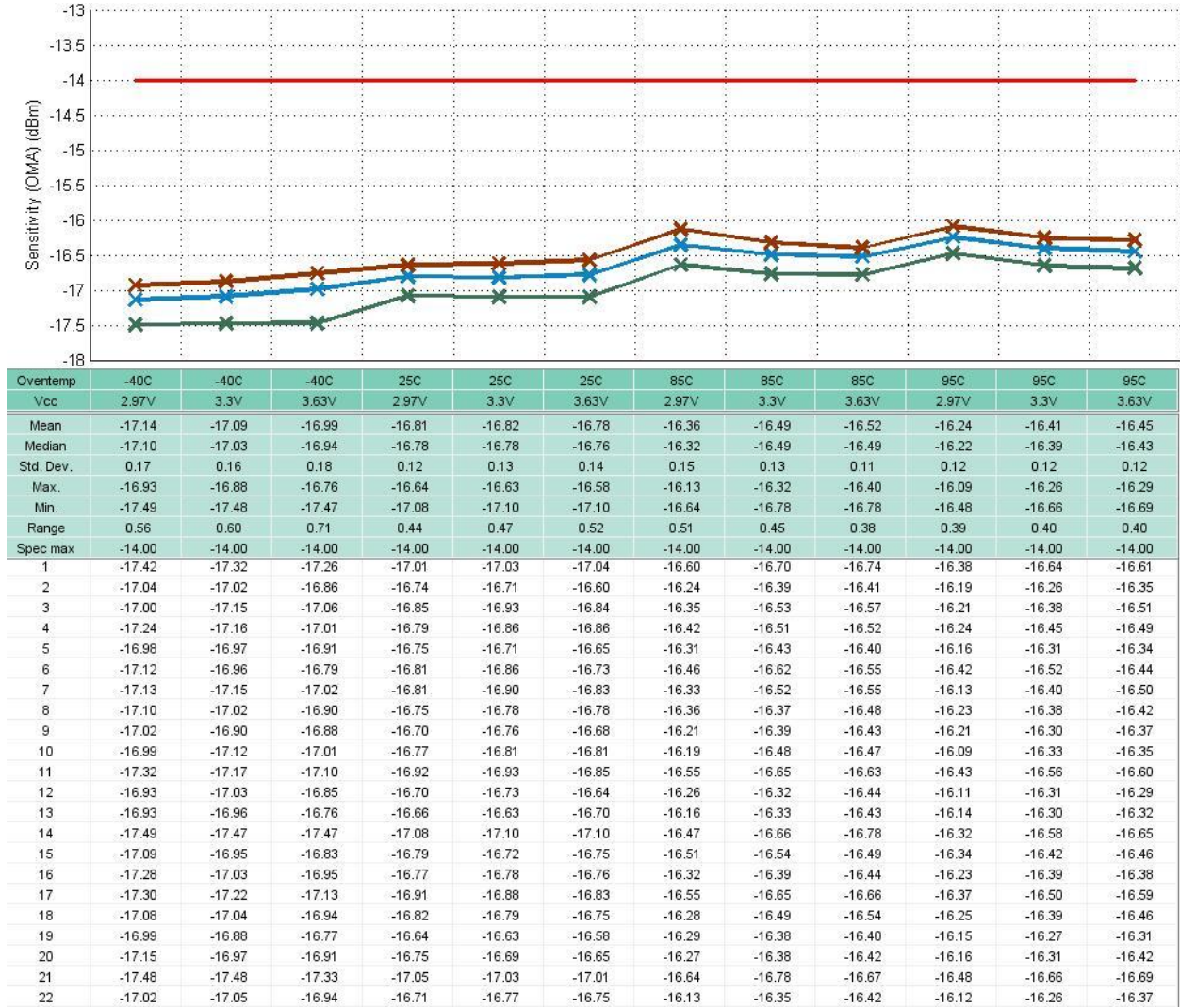


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-21.27	-21.09	-20.97	-20.95	-20.83	-20.76	-20.72	-20.65	-20.58	-20.67	-20.61	-20.56
Median	-21.22	-21.04	-20.95	-20.91	-20.81	-20.71	-20.70	-20.62	-20.56	-20.63	-20.61	-20.53
Std. Dev.	0.20	0.17	0.17	0.16	0.16	0.17	0.14	0.14	0.14	0.14	0.14	0.14
Max.	-21.05	-20.85	-20.75	-20.69	-20.59	-20.52	-20.52	-20.44	-20.38	-20.43	-20.40	-20.38
Min.	-21.79	-21.54	-21.41	-21.38	-21.26	-21.25	-21.08	-21.02	-20.99	-20.97	-20.94	-20.92
Range	0.74	0.70	0.66	0.68	0.68	0.73	0.55	0.57	0.61	0.54	0.55	0.54
Spec max	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00	-18.00
1	-21.55	-21.33	-21.25	-21.10	-20.95	-20.94	-20.96	-20.88	-20.81	-20.93	-20.88	-20.81
2	-21.09	-20.85	-20.79	-20.69	-20.59	-20.57	-20.58	-20.50	-20.47	-20.57	-20.49	-20.38
3	-21.18	-21.14	-21.00	-21.00	-20.90	-20.79	-20.80	-20.75	-20.67	-20.77	-20.71	-20.64
4	-21.32	-21.14	-21.01	-20.90	-20.76	-20.70	-20.75	-20.69	-20.61	-20.74	-20.64	-20.60
5	-21.07	-20.96	-20.82	-20.73	-20.63	-20.52	-20.59	-20.50	-20.45	-20.49	-20.47	-20.44
6	-21.21	-20.99	-20.89	-20.92	-20.83	-20.71	-20.70	-20.62	-20.55	-20.68	-20.60	-20.50
7	-21.49	-21.23	-21.11	-21.13	-21.04	-20.90	-20.87	-20.80	-20.76	-20.82	-20.74	-20.73
8	-21.25	-21.05	-20.93	-20.95	-20.84	-20.74	-20.71	-20.62	-20.55	-20.64	-20.61	-20.52
9	-21.20	-20.96	-20.85	-20.86	-20.78	-20.68	-20.69	-20.59	-20.54	-20.59	-20.52	-20.50
10	-21.24	-21.16	-21.00	-21.07	-20.92	-20.84	-20.81	-20.76	-20.70	-20.79	-20.75	-20.64
11	-21.42	-21.16	-21.06	-21.01	-20.90	-20.82	-20.83	-20.77	-20.65	-20.81	-20.71	-20.68
12	-21.10	-21.02	-20.88	-20.88	-20.79	-20.68	-20.66	-20.67	-20.59	-20.61	-20.62	-20.53
13	-21.07	-20.95	-20.84	-20.83	-20.75	-20.63	-20.64	-20.55	-20.48	-20.59	-20.52	-20.43
14	-21.79	-21.54	-21.41	-21.38	-21.26	-21.25	-21.08	-21.02	-20.99	-20.97	-20.94	-20.92
15	-21.09	-20.94	-20.80	-20.79	-20.69	-20.63	-20.60	-20.54	-20.45	-20.53	-20.47	-20.43
16	-21.24	-21.04	-20.98	-20.90	-20.78	-20.71	-20.70	-20.58	-20.57	-20.59	-20.53	-20.48
17	-21.34	-21.18	-21.03	-21.03	-20.86	-20.79	-20.79	-20.75	-20.60	-20.72	-20.63	-20.60
18	-21.19	-21.01	-20.82	-20.90	-20.76	-20.71	-20.56	-20.48	-20.43	-20.54	-20.54	-20.44
19	-21.05	-20.86	-20.75	-20.76	-20.62	-20.53	-20.53	-20.44	-20.38	-20.43	-20.40	-20.38
20	-21.06	-20.98	-20.78	-20.85	-20.72	-20.64	-20.52	-20.49	-20.41	-20.59	-20.40	-20.45
21	-21.60	-21.36	-21.27	-21.19	-21.09	-20.97	-20.80	-20.68	-20.62	-20.75	-20.75	-20.71
22	-21.33	-21.07	-20.97	-21.04	-20.88	-20.86	-20.67	-20.63	-20.56	-20.62	-20.61	-20.53

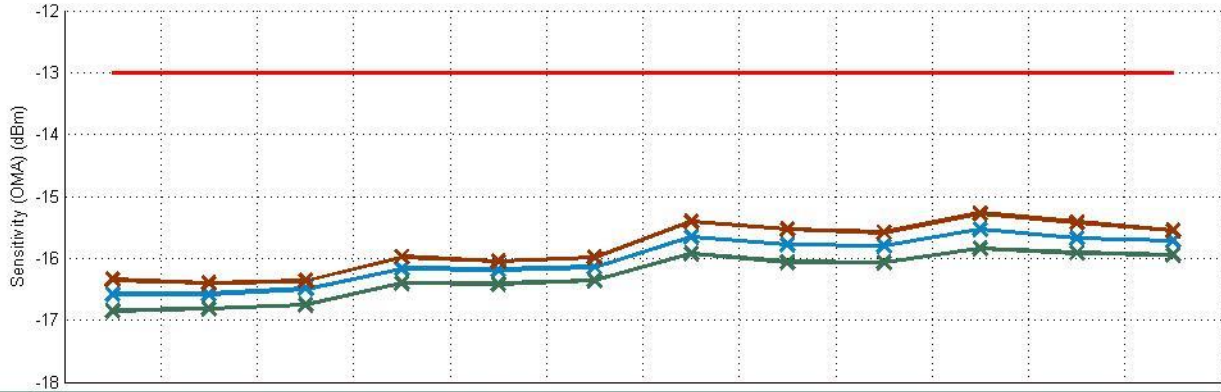
### 3.4.6. Stressed Receiver Sensitivity at 1310nm and BaseL (OMA power dBm)



### 3.4.7. Stressed Receiver Sensitivity at 1550nm and BaseL (OMA power dBm)

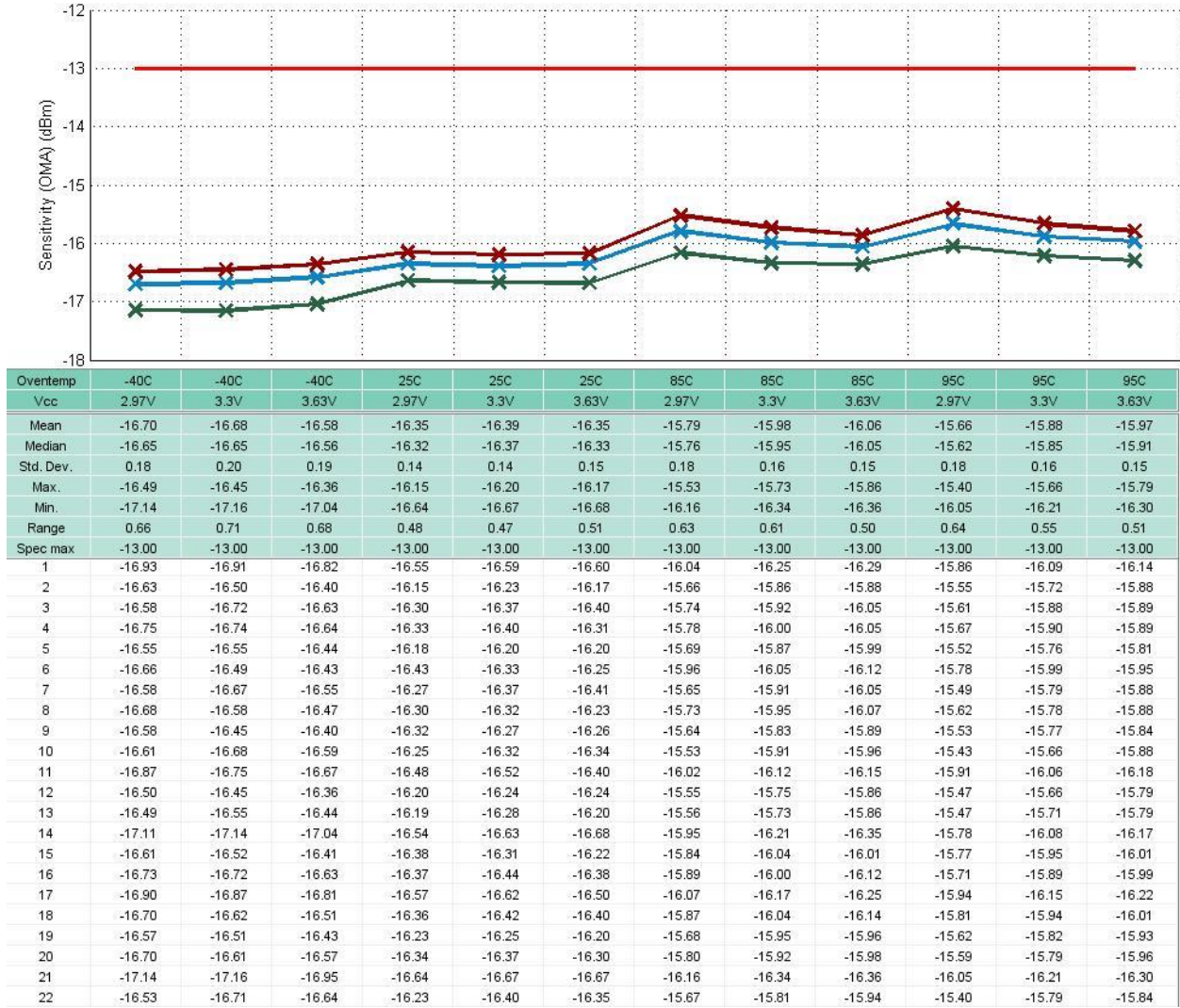


### 3.4.8. Stressed Receiver Sensitivity at 1310nm and BaseE (OMA power dBm)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	-16.58	-16.58	-16.49	-16.17	-16.19	-16.14	-15.66	-15.78	-15.80	-15.54	-15.67	-15.72
Median	-16.59	-16.56	-16.47	-16.15	-16.19	-16.13	-15.62	-15.78	-15.79	-15.51	-15.66	-15.70
Std. Dev.	0.14	0.09	0.09	0.11	0.09	0.09	0.14	0.13	0.12	0.16	0.12	0.10
Max.	-16.35	-16.41	-16.37	-15.98	-16.05	-15.99	-15.41	-15.53	-15.58	-15.28	-15.42	-15.56
Min.	-16.85	-16.82	-16.75	-16.40	-16.42	-16.36	-15.93	-16.06	-16.08	-15.85	-15.91	-15.95
Range	0.50	0.41	0.38	0.42	0.36	0.37	0.52	0.53	0.49	0.57	0.49	0.39
Spec max	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00	-13.00
1	-16.68	-16.66	-16.54	-16.26	-16.27	-16.20	-15.76	-15.89	-15.91	-15.66	-15.70	-15.79
2	-16.55	-16.57	-16.43	-16.15	-16.12	-16.06	-15.57	-15.66	-15.71	-15.49	-15.63	-15.69
3	-16.44	-16.58	-16.50	-16.27	-16.22	-16.21	-15.60	-15.75	-15.81	-15.43	-15.59	-15.76
4	-16.68	-16.61	-16.52	-16.18	-16.20	-16.14	-15.67	-15.91	-15.73	-15.60	-15.78	-15.74
5	-16.48	-16.47	-16.37	-16.01	-16.06	-16.02	-15.52	-15.64	-15.64	-15.46	-15.54	-15.60
6	-16.68	-16.57	-16.47	-16.25	-16.20	-16.14	-15.91	-15.88	-15.90	-15.78	-15.87	-15.82
7	-16.62	-16.65	-16.62	-16.12	-16.26	-16.27	-15.63	-15.84	-15.87	-15.44	-15.71	-15.71
8	-16.61	-16.55	-16.44	-16.16	-16.21	-16.16	-15.59	-15.79	-15.77	-15.51	-15.67	-15.73
9	-16.53	-16.52	-16.40	-16.13	-16.09	-16.09	-15.59	-15.69	-15.75	-15.45	-15.62	-15.58
10	-16.36	-16.48	-16.41	-15.98	-16.13	-16.02	-15.41	-15.53	-15.63	-15.31	-15.42	-15.56
11	-16.76	-16.65	-16.54	-16.30	-16.27	-16.26	-15.86	-15.96	-15.94	-15.75	-15.83	-15.87
12	-16.35	-16.52	-16.48	-16.08	-16.10	-16.09	-15.51	-15.67	-15.67	-15.32	-15.51	-15.65
13	-16.46	-16.56	-16.46	-16.14	-16.12	-16.12	-15.58	-15.68	-15.74	-15.55	-15.62	-15.67
14	-16.58	-16.67	-16.57	-16.14	-16.25	-16.27	-15.61	-15.80	-15.89	-15.43	-15.72	-15.85
15	-16.65	-16.53	-16.48	-16.28	-16.31	-16.12	-15.79	-15.90	-15.89	-15.75	-15.83	-15.80
16	-16.70	-16.67	-16.53	-16.24	-16.17	-16.18	-15.75	-15.82	-15.83	-15.63	-15.66	-15.70
17	-16.75	-16.68	-16.56	-16.22	-16.19	-16.19	-15.76	-15.90	-15.87	-15.65	-15.78	-15.80
18	-16.59	-16.51	-16.45	-16.15	-16.18	-16.12	-15.76	-15.76	-15.77	-15.58	-15.72	-15.67
19	-16.54	-16.41	-16.41	-16.07	-16.05	-15.99	-15.56	-15.65	-15.74	-15.43	-15.61	-15.65
20	-16.57	-16.53	-16.45	-16.14	-16.14	-16.08	-15.70	-15.75	-15.81	-15.51	-15.53	-15.66
21	-16.85	-16.82	-16.75	-16.40	-16.42	-16.36	-15.93	-16.06	-16.08	-15.85	-15.91	-15.95
22	-16.37	-16.55	-16.43	-15.99	-16.15	-16.09	-15.48	-15.69	-15.58	-15.28	-15.58	-15.61

### 3.4.9. Stressed Receiver Sensitivity at 1550nm and BaseE (OMA power dBm)







## 3.5. Optical Overload

### 3.5.1. Test Descriptions

The optical overload is measured by decreasing the average optical power to the ROSA in steps from a suitable power level.

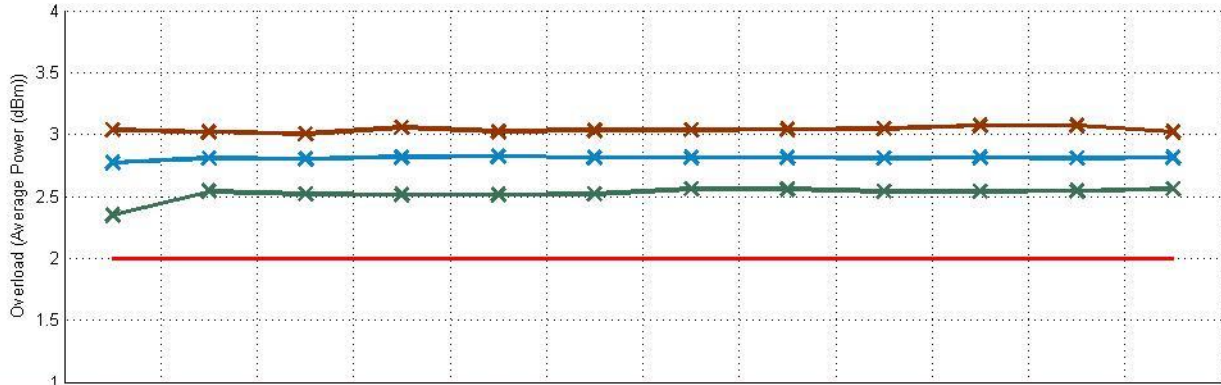
In the case of 10.3125 and 11.3 data rates, the output of the ROSA is passed through a GN2013 CDR before reaching the BERT.

**In most cases the overload test was limited by the maximum optical power of the optical transmitter. As a result the results in the report only represent a lower bound to the performance of the ROSAs. The ROSA performance is better than results presented.**

The input eyes used are the same as for the sensitivity tests.

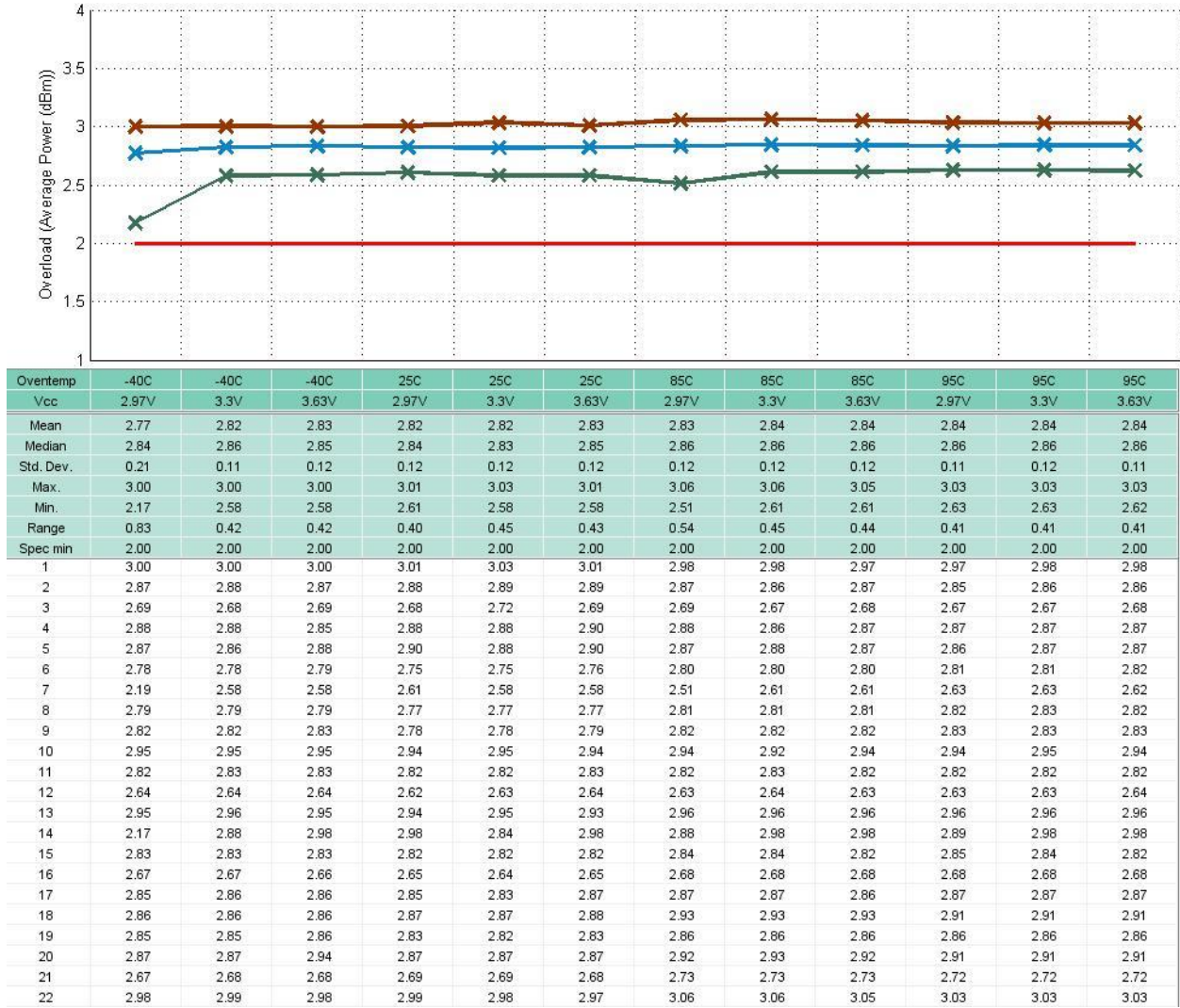
The equipment setup is the same as for the sensitivity tests.

### 3.5.2. Overload at 1310nm and 11.3Gbps (Avg. power dBm)

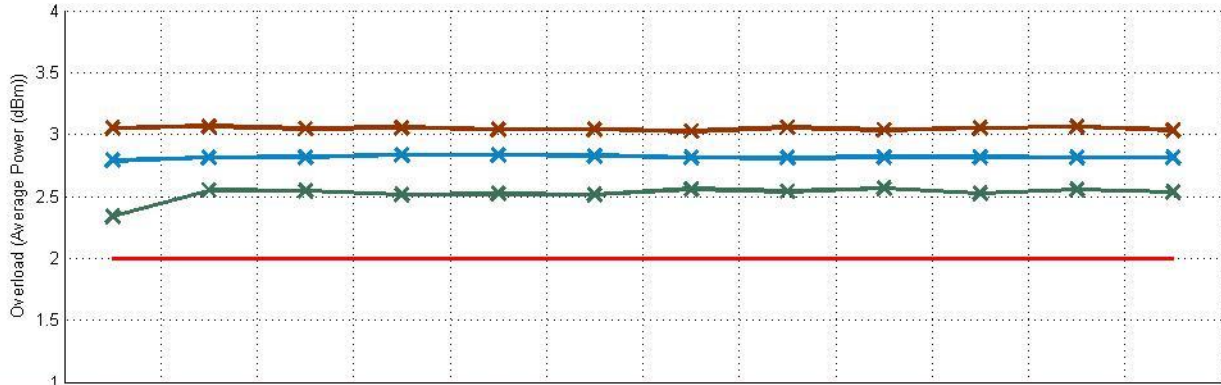


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.77	2.81	2.80	2.82	2.82	2.81	2.81	2.81	2.81	2.81	2.81	2.81
Median	2.81	2.82	2.82	2.84	2.83	2.81	2.81	2.82	2.81	2.82	2.82	2.83
Std. Dev.	0.18	0.15	0.15	0.16	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.14
Max.	3.04	3.02	3.00	3.06	3.02	3.03	3.04	3.04	3.04	3.05	3.07	3.02
Min.	2.35	2.54	2.52	2.51	2.52	2.52	2.56	2.56	2.54	2.54	2.54	2.56
Range	0.69	0.48	0.48	0.54	0.51	0.51	0.48	0.48	0.51	0.53	0.53	0.46
Spec min	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1	2.99	2.98	2.99	3.06	3.01	3.02	3.00	3.00	2.98	2.98	2.98	3.00
2	2.80	2.79	2.81	2.88	2.88	2.84	2.81	2.80	2.79	2.80	2.80	2.84
3	2.56	2.55	2.52	2.58	2.63	2.62	2.57	2.56	2.54	2.56	2.54	2.56
4	2.79	2.81	2.77	2.82	2.87	2.81	2.80	2.82	2.80	2.80	2.81	2.81
5	2.71	2.77	2.71	2.78	2.78	2.77	2.73	2.76	2.76	2.76	2.76	2.76
6	2.88	2.85	2.87	2.92	2.93	2.91	2.87	2.87	2.86	2.88	2.88	2.87
7	2.35	2.64	2.64	2.65	2.70	2.65	2.61	2.61	2.62	2.61	2.62	2.64
8	2.89	2.88	2.91	2.90	2.95	2.90	2.90	2.87	2.90	2.89	2.81	2.86
9	2.81	2.81	2.81	2.83	2.87	2.87	2.81	2.80	2.78	2.78	2.82	2.82
10	3.00	2.99	3.00	3.02	3.01	3.02	3.03	3.02	3.05	3.07	3.07	3.02
11	2.80	2.80	2.83	2.84	2.80	2.81	2.85	2.83	2.81	2.83	2.82	2.85
12	2.55	2.54	2.58	2.55	2.56	2.55	2.61	2.60	2.56	2.59	2.59	2.60
13	3.04	2.99	3.00	3.02	3.02	3.01	2.99	3.04	3.00	3.00	3.00	3.01
14	2.52	2.99	2.98	3.03	2.98	2.98	3.04	3.02	3.04	3.06	3.02	2.98
15	2.82	2.83	2.82	2.81	2.82	2.82	2.81	2.82	2.81	2.83	2.83	2.82
16	2.56	2.60	2.55	2.51	2.52	2.52	2.58	2.57	2.62	2.54	2.60	2.61
17	2.82	2.85	2.82	2.79	2.77	2.75	2.84	2.83	2.84	2.88	2.85	2.81
18	2.80	2.86	2.84	2.84	2.82	2.80	2.81	2.80	2.81	2.80	2.78	2.80
19	2.81	2.83	2.83	2.75	2.77	2.74	2.82	2.85	2.82	2.84	2.84	2.84
20	2.81	2.82	2.80	2.84	2.84	2.85	2.78	2.82	2.84	2.82	2.82	2.83
21	2.61	2.59	2.57	2.57	2.59	2.59	2.56	2.58	2.57	2.58	2.56	2.56
22	3.01	3.02	3.00	3.01	3.02	3.03	3.03	2.98	2.99	2.98	2.97	2.96

### 3.5.3. Overload at 1550nm and 11.3Gbps (Avg. power dBm)

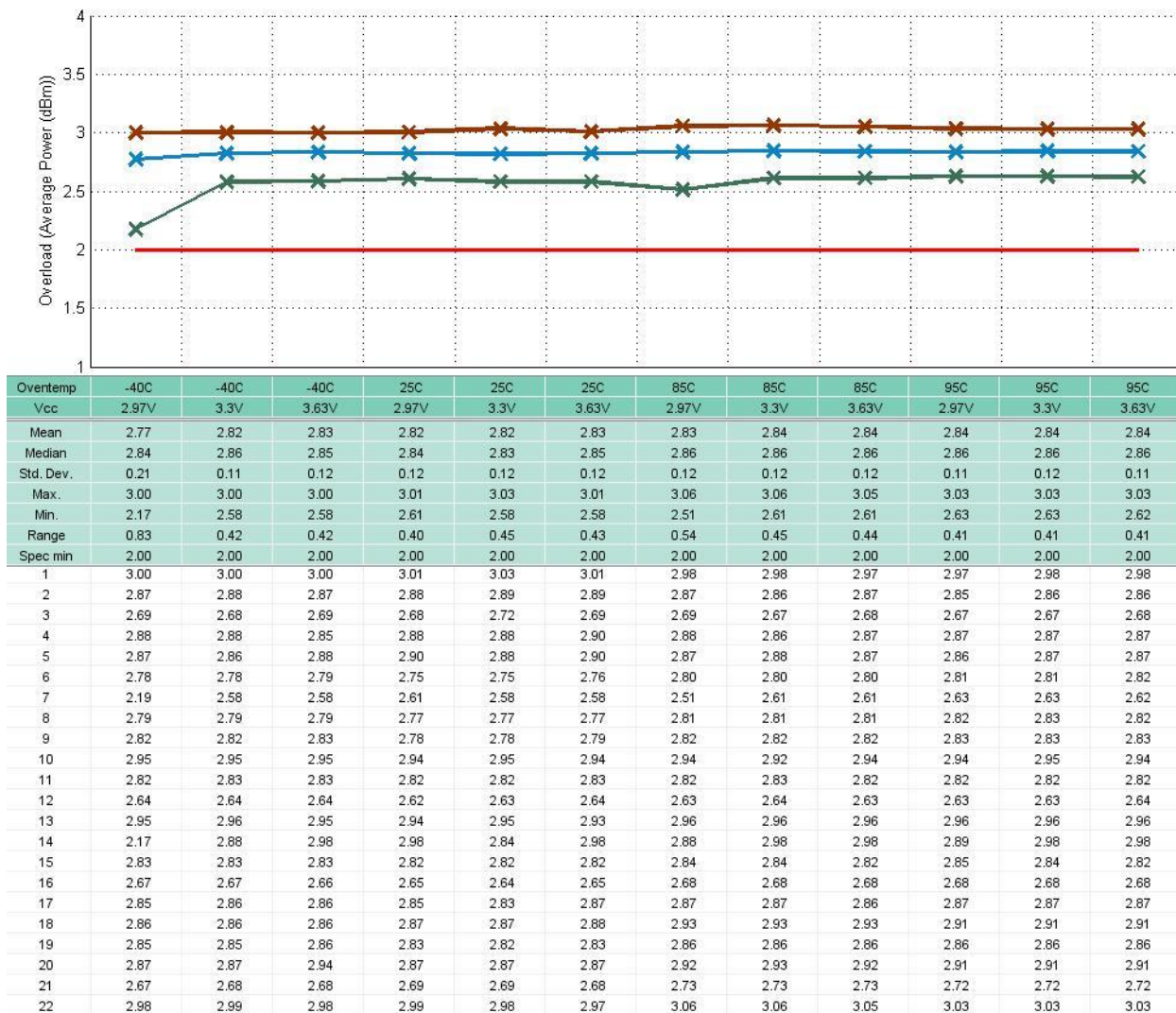


### 3.5.4. Overload at 1310nm and 10.3125Gbps (Avg. power dBm)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.79	2.81	2.82	2.83	2.83	2.83	2.81	2.81	2.82	2.82	2.81	2.81
Median	2.83	2.83	2.82	2.86	2.85	2.85	2.83	2.83	2.84	2.83	2.82	2.83
Std. Dev.	0.18	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.16	0.15	0.16
Max.	3.05	3.06	3.05	3.05	3.04	3.04	3.03	3.06	3.04	3.05	3.06	3.03
Min.	2.34	2.55	2.54	2.51	2.52	2.51	2.56	2.54	2.57	2.52	2.55	2.53
Range	0.72	0.51	0.50	0.54	0.52	0.53	0.47	0.52	0.47	0.52	0.51	0.50
Spec min	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1	2.98	2.99	2.99	3.05	3.04	3.04	3.03	3.06	2.98	3.01	2.99	3.00
2	2.80	2.79	2.81	2.86	2.86	2.86	2.86	2.79	2.86	2.81	2.81	2.80
3	2.58	2.55	2.56	2.61	2.60	2.62	2.63	2.54	2.61	2.57	2.55	2.57
4	2.81	2.82	2.80	2.86	2.87	2.86	2.86	2.81	2.86	2.83	2.81	2.83
5	2.77	2.75	2.78	2.77	2.77	2.77	2.72	2.75	2.72	2.75	2.77	2.77
6	2.88	2.86	2.90	2.95	2.96	2.97	2.88	2.89	2.85	2.89	2.89	2.88
7	2.34	2.65	2.63	2.69	2.69	2.69	2.61	2.60	2.63	2.62	2.62	2.63
8	2.87	2.88	2.86	2.95	2.93	2.94	2.87	2.86	2.88	2.87	2.85	2.88
9	2.79	2.80	2.81	2.87	2.87	2.87	2.81	2.83	2.80	2.83	2.83	2.83
10	3.01	3.01	3.02	3.00	3.00	3.01	2.99	2.98	3.04	3.05	3.06	3.03
11	2.82	2.81	2.83	2.82	2.82	2.82	2.80	2.85	2.84	2.81	2.82	2.81
12	2.56	2.56	2.54	2.57	2.56	2.54	2.59	2.59	2.60	2.58	2.58	2.54
13	3.04	3.02	3.03	3.04	3.03	3.03	2.98	2.97	2.99	2.99	2.98	3.03
14	2.65	2.99	3.02	2.99	3.02	2.96	3.01	3.02	3.01	3.03	3.03	3.03
15	2.85	2.84	2.85	2.86	2.84	2.86	2.84	2.84	2.85	2.84	2.80	2.86
16	2.59	2.57	2.58	2.51	2.52	2.51	2.58	2.58	2.60	2.59	2.60	2.60
17	2.83	2.84	2.82	2.77	2.77	2.79	2.84	2.84	2.84	2.85	2.84	2.85
18	2.85	2.85	2.86	2.84	2.82	2.84	2.82	2.82	2.82	2.81	2.79	2.80
19	2.84	2.85	2.81	2.80	2.82	2.76	2.82	2.85	2.83	2.84	2.84	2.85
20	2.87	2.82	2.80	2.88	2.89	2.82	2.81	2.82	2.81	2.81	2.84	2.81
21	2.58	2.57	2.60	2.61	2.60	2.61	2.56	2.55	2.57	2.52	2.56	2.53
22	3.05	3.06	3.05	3.01	3.02	3.01	3.01	2.99	3.00	3.05	3.03	2.97

### 3.5.5. Overload at 1550nm and 10.3125Gbps (Avg. power dBm)



### 3.6. Electrical Output Eyes

#### 3.6.1. Test Descriptions

Electrical output eyes of the P and N channel for the following conditions were measured at 11.3G data rate, unstressed eye at 1550nm wavelength.

- 1) Average power of -18dBm
- 2) Average power of -10dBm
- 3) Average power of 1.6dBm

Output eyes differential measurements were made for the following parameters after displaying 512 waveforms with 1350 points per waveform. The following was measured.

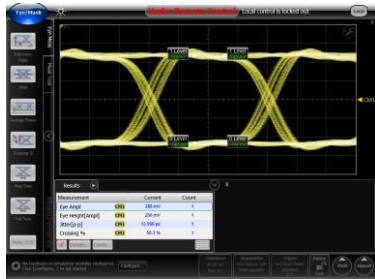
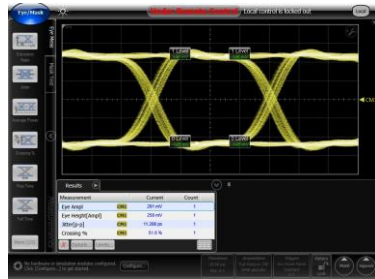
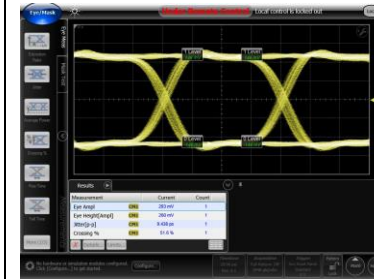
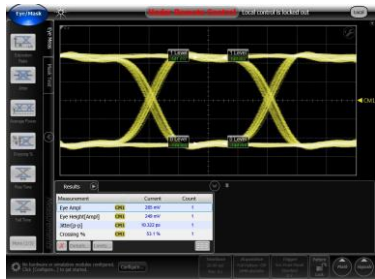
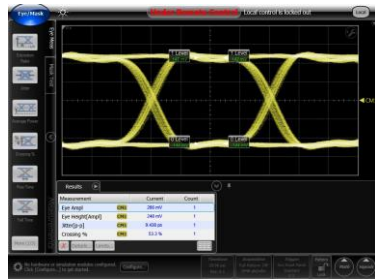
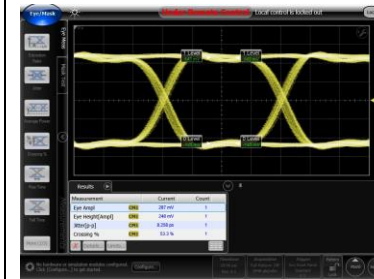
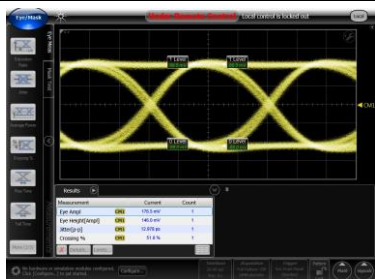
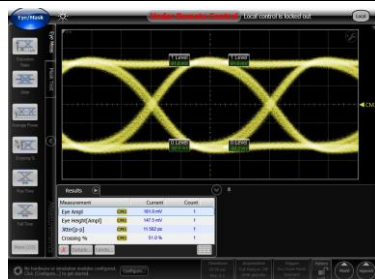
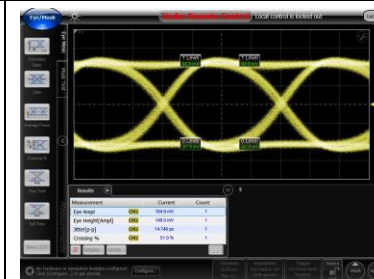
- 1) Crossing Percentage
- 2) Rise Time
- 3) Fall Time
- 4) Eye Height
- 5) Eye Amplitude
- 6) Peak to Peak Jitter
- 7) RMS Jitter

The input eyes used are the same as for the sensitivity tests.

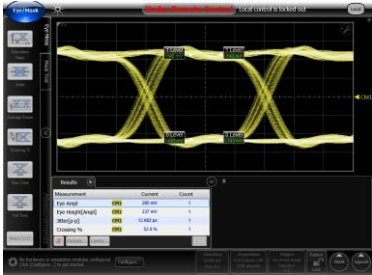
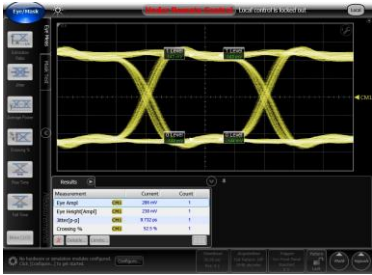
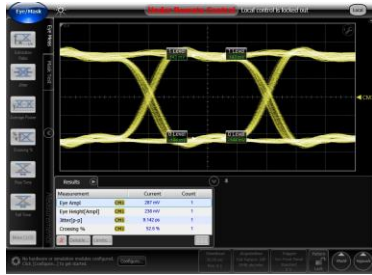
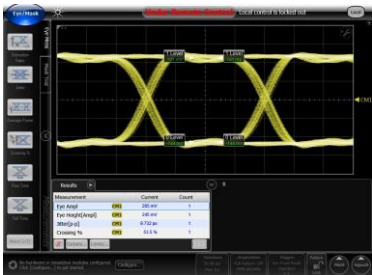
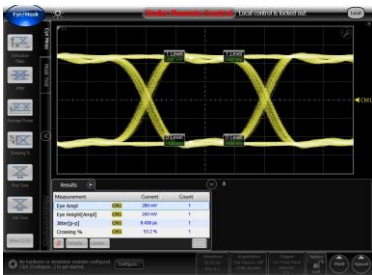
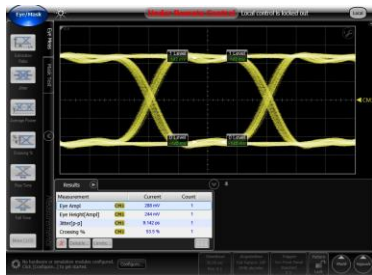
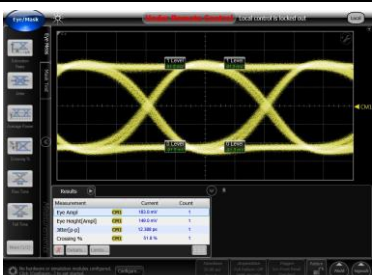
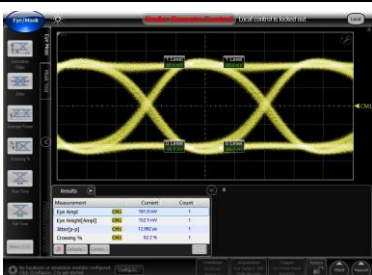
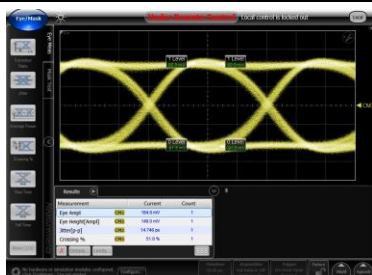
The Jitter measurements are uncorrected for jitter of the source.

For information on the definitions of the eye diagram measurements see Appendix 1

### 3.6.2. Typical Eye Diagrams at 25C

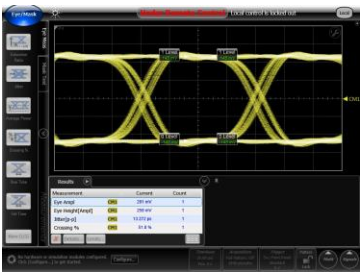
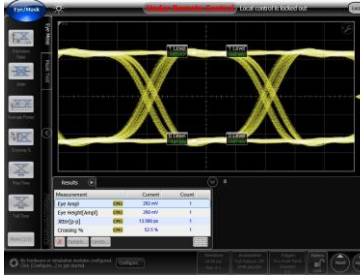
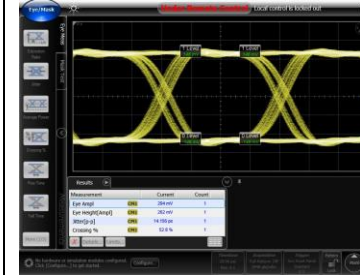
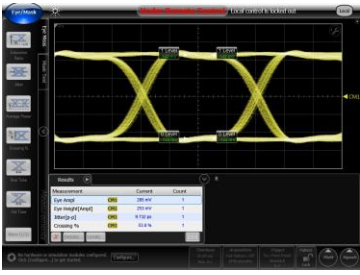
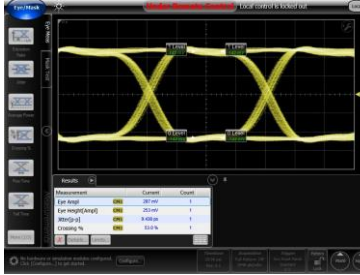
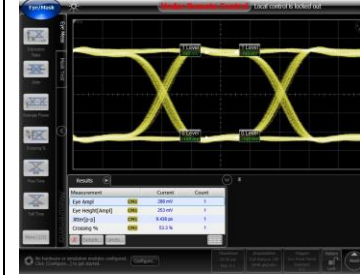
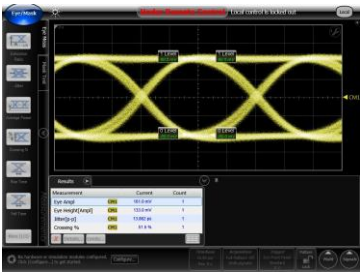
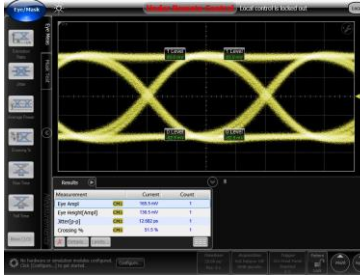
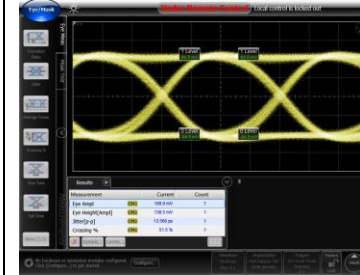
Optical Power\Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.3. Typical Eye Diagrams at -40C

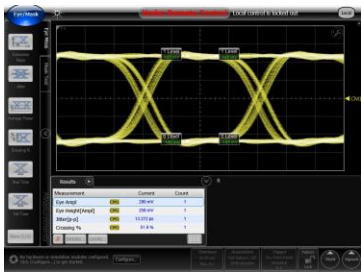
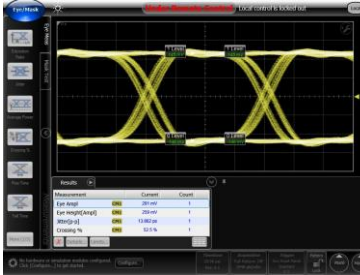
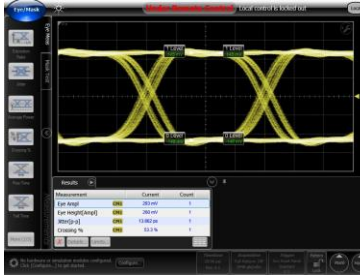
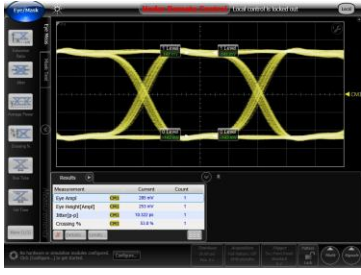
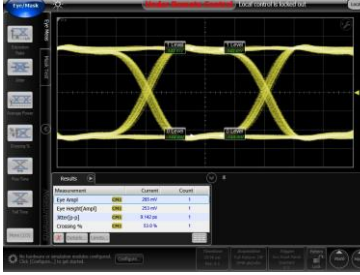
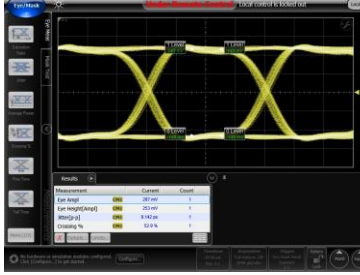
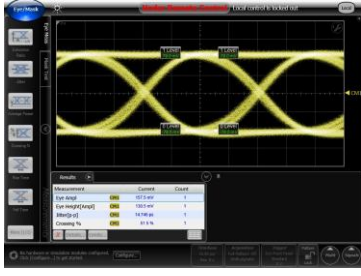
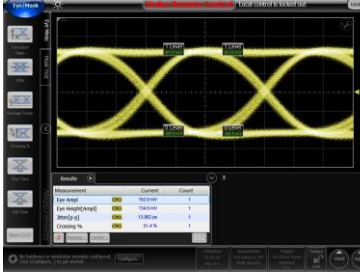
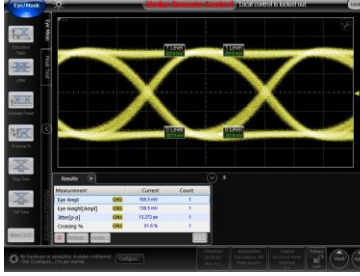
Optical Power \ Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			



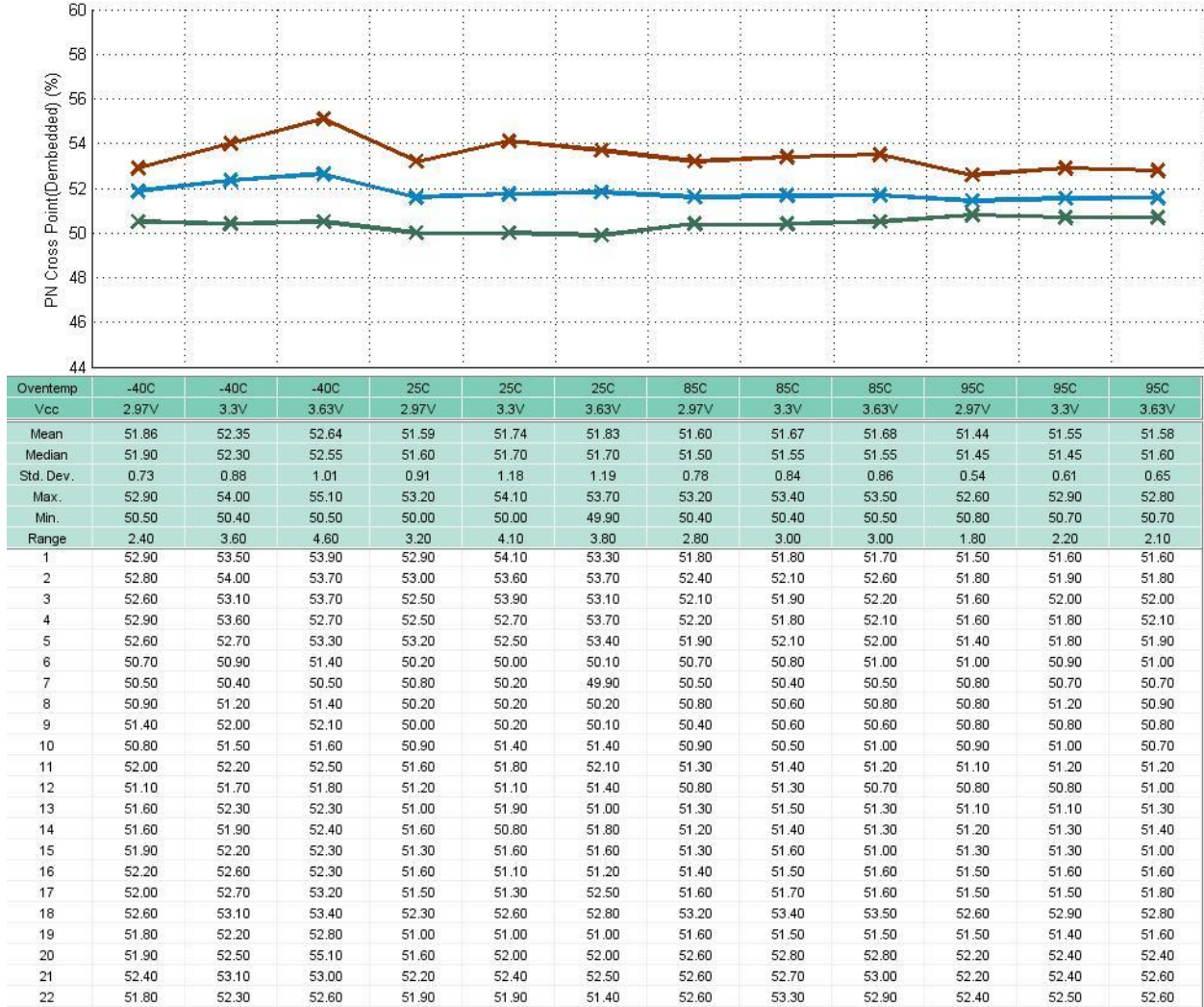
### 3.6.4. Typical Eye Diagrams at 85C

Optical Power \ Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

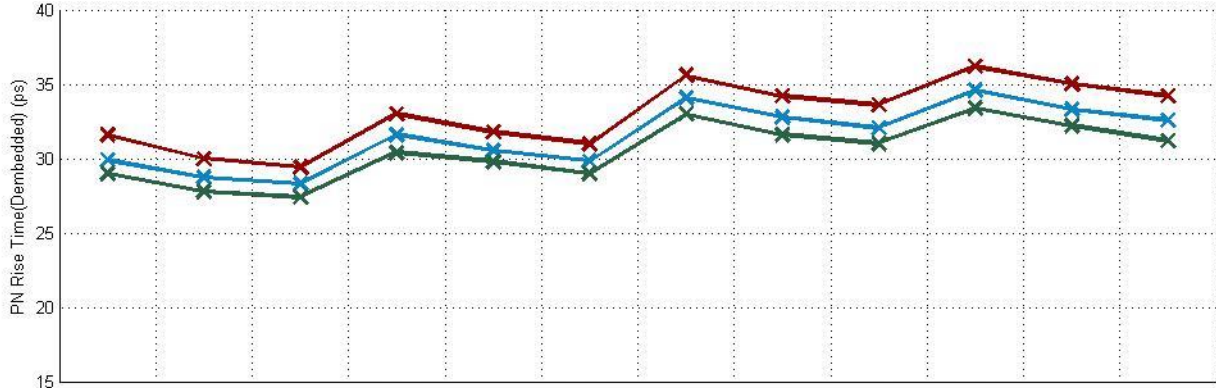
### 3.6.5. Typical Eye Diagrams at 95C

Optical Power \ Vcc	2.97V	3.3V	3.63V
1.6dBm			
-10dBm			
-18dBm			

### 3.6.6. Crossing Percentage at -18 dBm avg. Power at 1550nm and 11.3Gbps

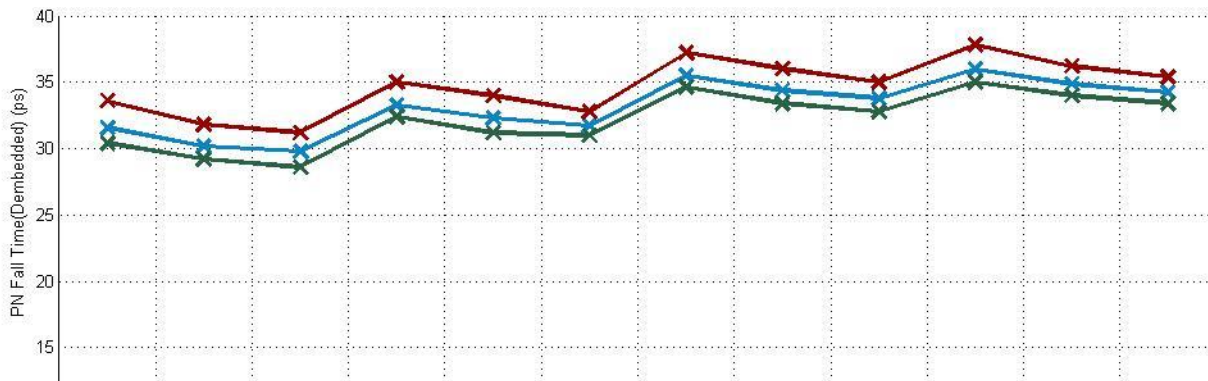


### 3.6.7. Rise Time at -18 dBm avg. Power at 1550nm and 11.3Gbps



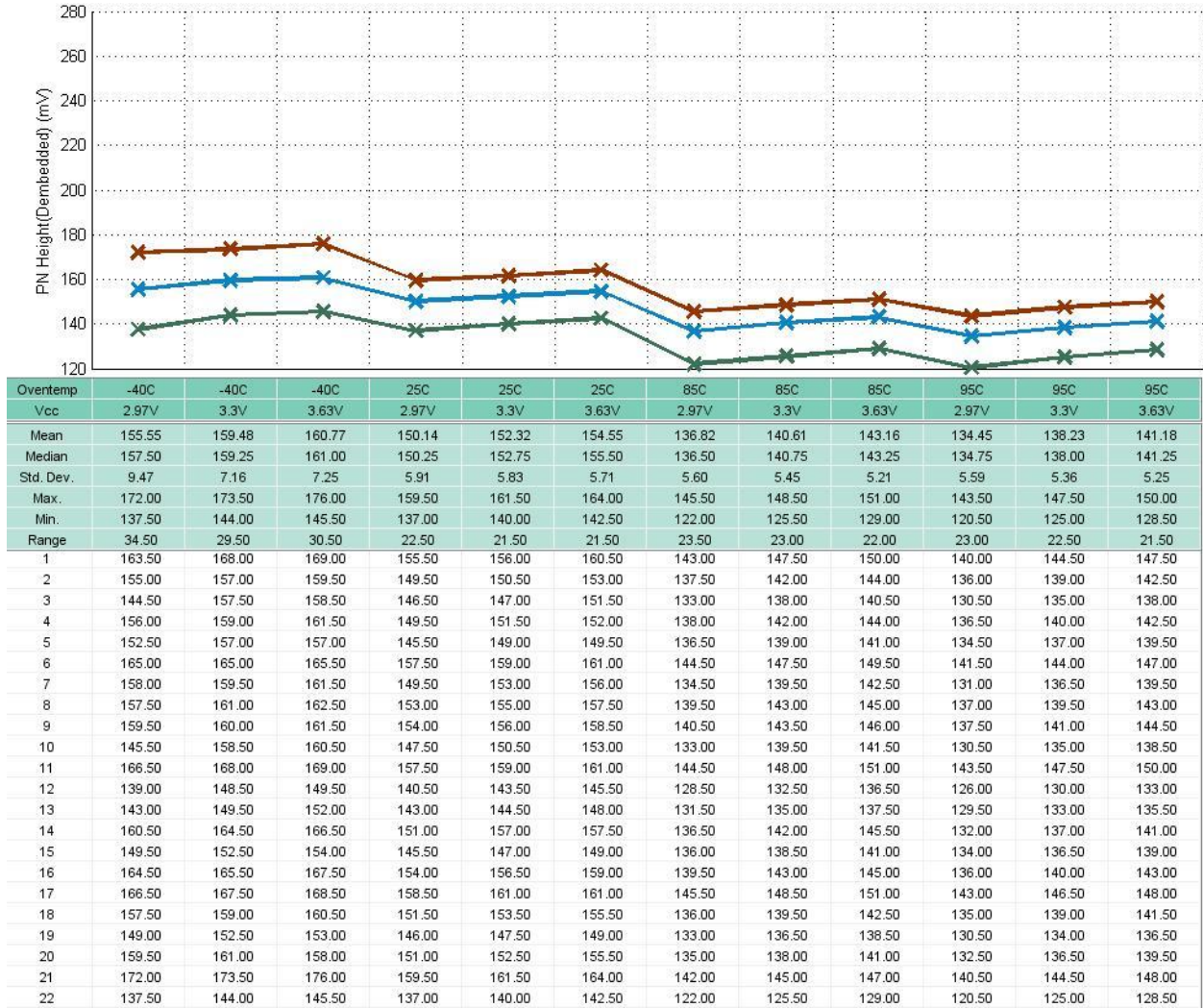
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	29.89	28.74	28.29	31.60	30.52	29.83	34.07	32.80	32.05	34.61	33.31	32.56
Median	29.60	28.60	28.00	31.40	30.40	29.80	33.80	32.40	31.70	34.20	33.00	32.40
Std. Dev.	0.87	0.64	0.58	0.88	0.73	0.65	0.80	0.81	0.84	0.87	0.91	0.79
Max.	31.60	30.00	29.40	33.00	31.80	31.00	35.60	34.20	33.60	36.20	35.00	34.20
Min.	29.00	27.80	27.40	30.40	29.80	29.00	33.00	31.60	31.00	33.40	32.20	31.20
Range	2.60	2.20	2.00	2.60	2.00	2.00	2.60	2.60	2.60	2.80	2.80	3.00
1	29.80	29.00	28.40	31.80	30.40	30.00	34.20	32.40	31.80	34.60	33.40	32.40
2	29.80	28.60	28.40	31.60	30.40	29.80	34.00	32.40	31.80	34.20	33.00	32.40
3	30.60	29.20	29.00	32.80	31.20	30.60	34.80	33.40	32.80	36.00	34.20	33.40
4	29.40	28.60	28.00	31.60	30.40	29.80	34.00	32.40	31.60	34.20	33.00	32.40
5	29.20	28.40	28.00	31.20	30.00	29.40	33.60	32.20	31.20	34.00	32.80	31.80
6	29.00	27.80	27.80	30.40	29.80	29.00	33.00	31.80	31.20	33.40	32.20	31.60
7	31.60	29.80	29.40	33.00	31.80	31.00	35.60	34.20	33.40	36.20	34.80	33.60
8	30.00	28.60	28.00	31.20	30.40	29.80	33.60	32.80	31.80	34.60	33.00	32.80
9	29.40	28.60	28.00	31.20	30.00	29.40	33.60	32.20	31.60	34.00	32.80	32.20
10	31.20	29.80	29.20	32.80	31.80	30.60	35.40	33.60	33.00	35.60	34.80	33.60
11	29.20	28.40	27.80	31.00	30.00	29.40	33.60	32.40	31.60	34.00	33.00	32.40
12	31.00	29.40	29.20	32.40	31.60	30.60	34.80	34.00	33.40	35.40	34.60	33.60
13	30.00	29.20	28.60	32.20	31.00	29.80	34.20	33.40	32.40	34.80	33.60	32.80
14	31.00	29.20	28.60	32.80	31.20	30.60	35.00	34.00	33.40	36.00	34.20	33.40
15	29.00	28.40	28.00	30.60	29.80	29.00	33.00	31.60	31.00	33.60	32.20	31.20
16	29.20	28.40	27.80	31.20	30.00	29.40	33.40	32.80	31.60	34.20	32.40	32.20
17	29.20	28.00	27.80	30.40	29.80	29.00	33.60	31.80	31.20	33.60	32.40	31.80
18	29.20	28.40	27.80	30.60	29.80	29.40	33.40	32.20	31.20	34.00	32.80	31.80
19	29.80	28.60	28.00	31.20	30.00	29.40	33.60	32.40	31.60	34.20	33.00	32.20
20	29.40	28.00	28.00	31.60	30.40	30.00	34.20	33.00	32.20	34.60	33.40	32.80
21	29.00	27.80	27.40	30.60	29.80	29.20	33.40	32.40	31.60	34.20	32.20	31.80
22	31.60	30.00	29.20	33.00	31.80	31.00	35.60	34.20	33.60	36.00	35.00	34.20

### 3.6.8. Fall Time at -18 dBm avg. Power at 1550nm and 11.3Gbps

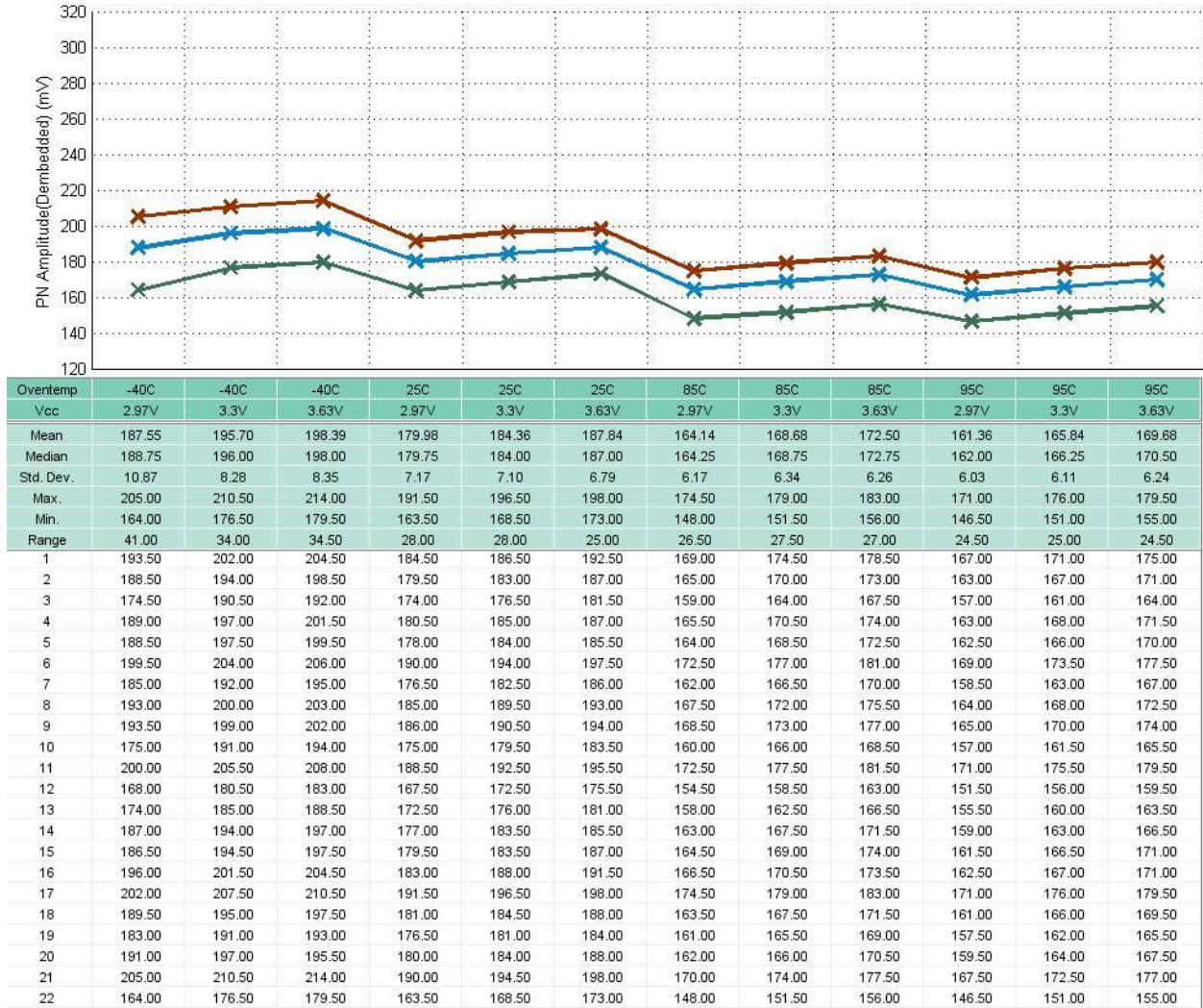


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	31.56	30.18	29.80	33.27	32.28	31.73	35.50	34.37	33.78	35.95	34.85	34.25
Median	31.20	29.90	29.40	33.00	32.20	31.60	35.20	34.20	33.60	35.80	34.80	34.10
Std. Dev.	0.95	0.84	0.75	0.85	0.78	0.67	0.77	0.71	0.74	0.80	0.73	0.65
Max.	33.60	31.80	31.20	35.00	34.00	32.80	37.20	36.00	35.00	37.80	36.20	35.40
Min.	30.40	29.20	28.60	32.40	31.20	31.00	34.60	33.40	32.80	35.00	34.00	33.40
Range	3.20	2.60	2.60	2.60	2.80	1.80	2.60	2.60	2.20	2.80	2.20	2.00
1	31.20	30.00	29.80	33.00	32.20	31.80	35.40	34.20	33.60	36.00	34.80	34.20
2	31.60	29.40	29.80	33.00	32.20	31.60	35.00	34.20	33.60	35.60	34.80	34.20
3	32.40	31.00	30.60	34.20	32.80	32.40	36.20	35.40	34.80	37.20	35.40	35.00
4	31.20	30.00	29.40	32.40	31.60	31.20	35.00	34.00	33.40	35.60	34.60	33.60
5	30.60	29.40	29.40	32.40	31.20	31.00	35.00	34.00	32.80	35.40	34.00	33.60
6	30.60	29.20	29.20	32.40	31.60	31.20	35.00	33.60	33.40	35.00	34.20	33.40
7	33.60	31.80	31.20	35.00	34.00	32.80	37.20	36.00	35.00	37.80	36.00	35.40
8	31.80	30.00	29.80	33.40	32.20	31.80	35.40	34.20	34.00	36.00	35.00	34.80
9	31.20	29.80	29.40	32.80	32.20	31.20	35.00	34.00	33.60	36.00	34.80	34.00
10	32.80	31.60	31.20	34.60	33.60	32.80	36.60	35.40	35.00	37.20	36.00	35.40
11	31.20	29.80	29.20	33.00	32.20	31.20	35.40	34.20	33.60	35.40	34.80	34.60
12	32.80	31.60	31.00	34.80	33.40	32.40	36.60	35.40	34.80	36.80	36.00	35.00
13	31.80	30.60	30.40	33.60	32.40	32.20	35.60	34.80	34.00	36.00	35.00	34.20
14	32.40	31.20	30.40	34.20	33.00	32.80	36.60	35.00	34.80	36.60	36.20	34.80
15	30.40	29.80	29.20	32.40	31.20	31.00	34.60	33.40	33.00	35.00	34.00	33.40
16	31.00	29.40	29.20	33.00	31.80	31.00	35.40	34.00	33.40	35.60	34.20	34.00
17	30.60	29.40	29.20	32.40	31.80	31.00	34.80	33.60	33.00	35.00	34.00	33.40
18	31.00	29.80	29.40	32.80	31.80	31.60	34.80	34.00	32.80	35.00	34.20	34.00
19	31.20	30.00	29.40	33.00	32.20	31.60	35.00	34.20	33.60	35.60	34.60	34.00
20	31.20	29.80	29.20	33.00	31.80	31.60	35.00	34.00	33.40	36.00	34.60	34.00
21	30.40	29.20	28.60	32.40	31.60	31.00	34.80	33.60	33.00	35.40	34.00	33.60
22	33.40	31.20	30.60	34.20	33.40	32.80	36.60	35.00	34.60	36.80	35.60	35.00

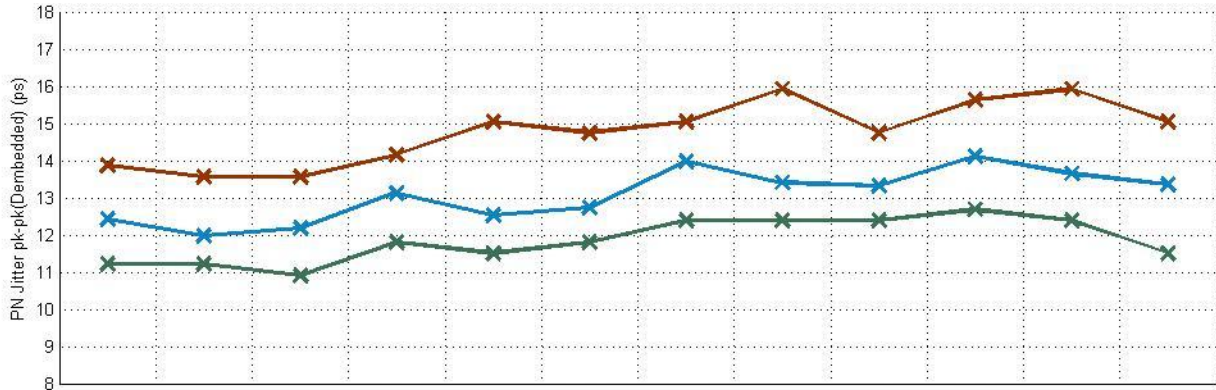
### 3.6.9. Height at -18 dBm avg. Power at 1550nm and 11.3Gbps



### 3.6.10. Amplitude at -18 dBm avg. Power at 1550nm and 11.3Gbps



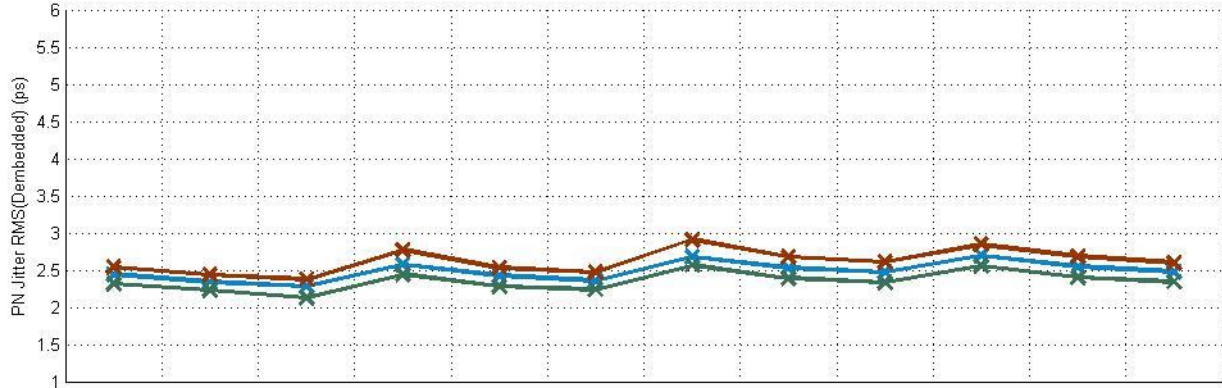
### 3.6.11. Jitter pk-pk at -18 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	12.41	11.97	12.19	13.12	12.52	12.74	13.97	13.41	13.31	14.12	13.65	13.35
Median	12.39	12.09	12.09	13.27	12.39	12.53	14.16	13.13	13.27	14.16	13.27	13.27
Std. Dev.	0.76	0.66	0.69	0.62	0.79	0.76	0.79	0.80	0.55	0.76	1.02	0.68
Max.	13.86	13.57	13.57	14.16	15.04	14.75	15.04	15.93	14.75	15.63	15.93	15.04
Min.	11.21	11.21	10.91	11.80	11.50	11.80	12.39	12.39	12.39	12.68	12.39	11.50
Range	2.65	2.36	2.65	2.36	3.54	2.95	2.65	3.54	2.36	2.95	3.54	3.54
1	12.09	11.21	13.57	12.98	12.68	11.80	12.98	12.68	12.68	12.68	13.27	14.45
2	12.68	11.50	10.91	14.16	15.04	12.09	12.39	14.45	12.98	14.16	12.98	12.68
3	12.68	13.57	11.50	12.09	12.68	13.27	13.86	12.98	13.57	13.57	14.16	13.86
4	12.98	12.09	11.50	13.57	12.09	11.80	14.16	12.68	12.68	14.45	12.68	13.27
5	12.09	11.50	12.68	14.16	13.27	12.68	15.04	12.98	13.57	14.16	13.27	12.98
6	12.98	11.21	11.80	13.27	12.09	13.27	12.98	12.39	14.16	12.68	13.57	13.57
7	12.68	11.50	12.09	13.57	12.09	12.39	15.04	13.86	13.27	13.86	14.75	15.04
8	13.57	12.09	11.80	13.86	13.57	12.39	14.75	13.27	13.57	13.27	12.68	12.98
9	13.86	12.98	12.09	13.27	12.39	12.39	14.16	15.93	14.75	14.75	13.27	13.27
10	12.68	12.39	12.39	12.68	12.98	12.09	12.68	13.57	13.27	14.75	14.45	12.68
11	12.39	11.21	12.98	12.39	12.68	12.09	13.57	12.98	12.39	14.16	12.39	13.27
12	13.27	12.98	12.09	12.98	13.27	12.98	14.45	12.98	12.98	15.04	13.86	12.98
13	11.21	12.09	12.68	13.27	12.39	13.57	14.75	13.57	13.86	14.16	12.98	13.27
14	12.39	12.09	12.68	12.98	11.50	12.39	13.27	12.98	12.98	13.57	13.27	13.57
15	11.80	11.50	11.80	12.68	12.68	11.80	13.27	13.27	12.68	13.57	14.75	13.57
16	11.80	12.39	12.09	13.27	11.80	12.39	14.16	12.98	13.27	14.75	12.68	13.86
17	12.39	11.50	12.09	12.39	12.09	12.98	14.16	12.98	13.57	14.45	12.39	11.50
18	11.21	12.09	12.98	13.57	11.80	12.98	14.75	13.86	12.98	15.04	12.68	13.27
19	12.39	12.09	11.80	12.98	11.50	14.75	13.86	12.68	13.57	14.75	13.86	13.27
20	11.50	12.68	11.50	13.27	12.09	12.68	15.04	13.27	13.27	13.57	15.04	13.86
21	11.21	11.21	11.50	11.80	12.39	13.27	13.86	14.16	12.98	13.57	15.34	13.27
22	13.27	11.50	13.57	13.57	12.39	14.16	14.16	14.45	13.86	15.63	15.93	13.27

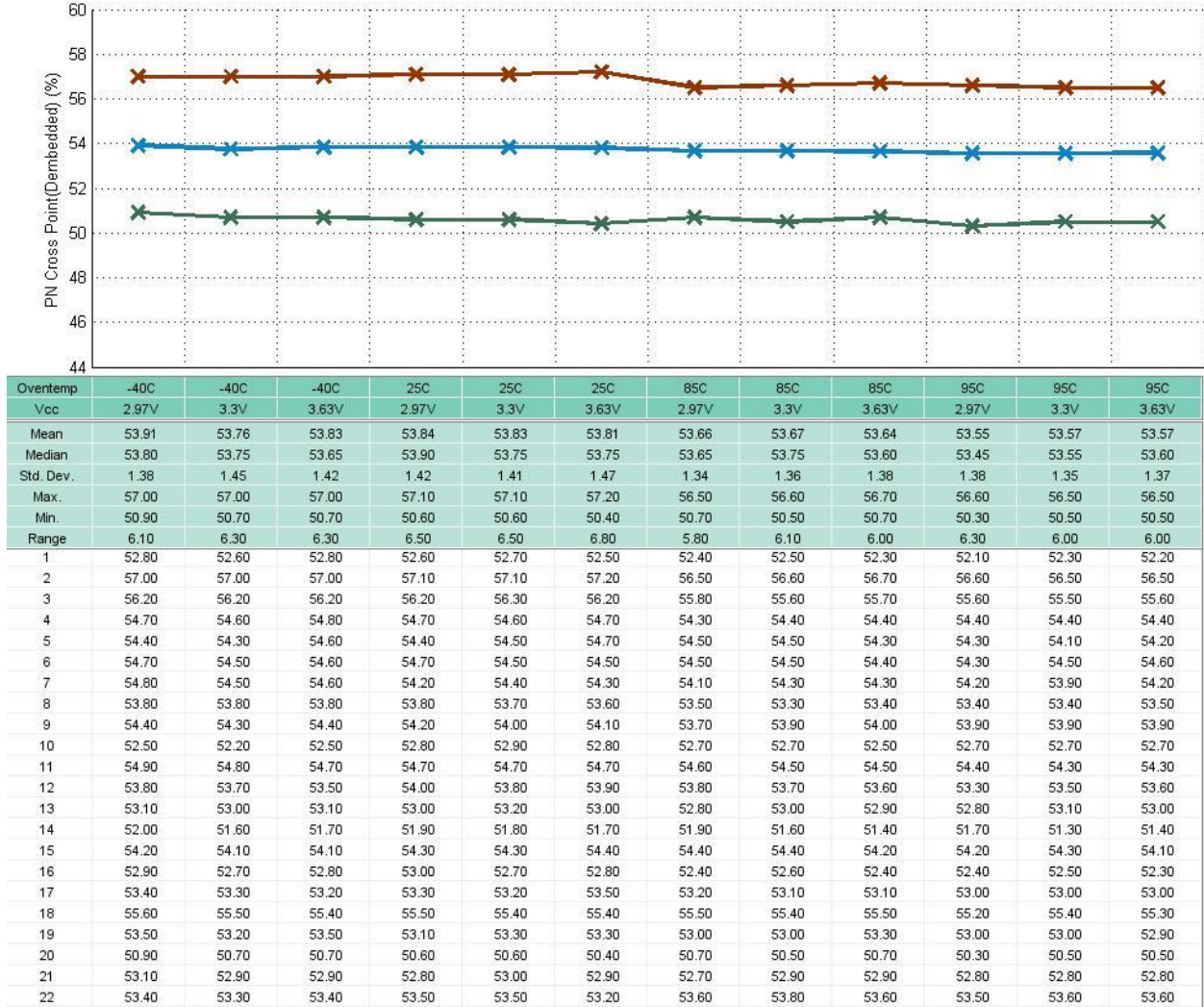


### 3.6.12. Jitter RMS at -18 dBm avg. Power at 1550nm and 11.3Gbps

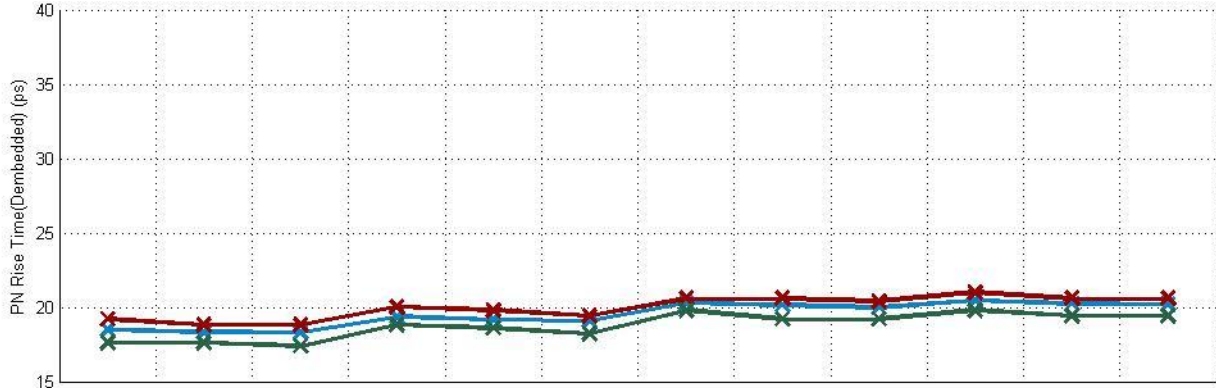


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.44	2.34	2.28	2.57	2.42	2.36	2.68	2.53	2.47	2.69	2.54	2.48
Median	2.46	2.35	2.29	2.56	2.43	2.36	2.66	2.55	2.46	2.68	2.54	2.47
Std. Dev.	0.06	0.05	0.06	0.07	0.06	0.05	0.08	0.07	0.06	0.07	0.07	0.07
Max.	2.54	2.43	2.38	2.77	2.53	2.47	2.91	2.68	2.61	2.84	2.68	2.60
Min.	2.31	2.23	2.13	2.44	2.28	2.24	2.57	2.39	2.33	2.56	2.40	2.34
Range	0.23	0.20	0.25	0.33	0.25	0.23	0.34	0.29	0.28	0.29	0.28	0.26
1	2.41	2.36	2.29	2.56	2.45	2.39	2.63	2.41	2.45	2.59	2.48	2.44
2	2.39	2.37	2.28	2.56	2.45	2.39	2.58	2.58	2.45	2.67	2.50	2.48
3	2.47	2.35	2.27	2.56	2.46	2.38	2.73	2.55	2.47	2.67	2.57	2.48
4	2.32	2.27	2.19	2.56	2.31	2.30	2.61	2.39	2.43	2.63	2.42	2.43
5	2.47	2.35	2.30	2.55	2.41	2.34	2.63	2.47	2.55	2.66	2.54	2.47
6	2.47	2.32	2.26	2.57	2.45	2.36	2.63	2.50	2.43	2.65	2.51	2.47
7	2.51	2.43	2.30	2.77	2.52	2.47	2.91	2.68	2.61	2.84	2.68	2.60
8	2.49	2.34	2.33	2.61	2.43	2.27	2.68	2.54	2.42	2.72	2.54	2.47
9	2.53	2.42	2.37	2.61	2.53	2.33	2.70	2.56	2.56	2.75	2.61	2.56
10	2.46	2.34	2.29	2.64	2.43	2.37	2.69	2.58	2.47	2.75	2.61	2.54
11	2.49	2.28	2.25	2.57	2.43	2.36	2.69	2.53	2.44	2.70	2.52	2.45
12	2.54	2.37	2.32	2.56	2.51	2.39	2.73	2.58	2.54	2.74	2.58	2.56
13	2.44	2.36	2.32	2.61	2.42	2.35	2.74	2.55	2.44	2.70	2.59	2.52
14	2.51	2.38	2.35	2.61	2.46	2.41	2.74	2.59	2.54	2.80	2.65	2.56
15	2.31	2.23	2.13	2.44	2.28	2.24	2.57	2.42	2.33	2.56	2.54	2.34
16	2.43	2.34	2.24	2.52	2.45	2.40	2.66	2.55	2.45	2.76	2.51	2.44
17	2.41	2.33	2.25	2.48	2.36	2.35	2.63	2.48	2.45	2.63	2.40	2.39
18	2.44	2.36	2.29	2.49	2.38	2.31	2.63	2.50	2.49	2.66	2.54	2.45
19	2.37	2.32	2.27	2.53	2.37	2.33	2.63	2.49	2.48	2.67	2.51	2.35
20	2.47	2.37	2.30	2.61	2.38	2.40	2.66	2.56	2.52	2.69	2.52	2.47
21	2.34	2.24	2.26	2.53	2.39	2.32	2.64	2.55	2.40	2.59	2.43	2.44
22	2.49	2.38	2.38	2.65	2.51	2.38	2.61	2.57	2.47	2.80	2.68	2.57

### 3.6.13. Crossing Percentage at -10 dBm avg. Power at 1550nm and 11.3Gbps

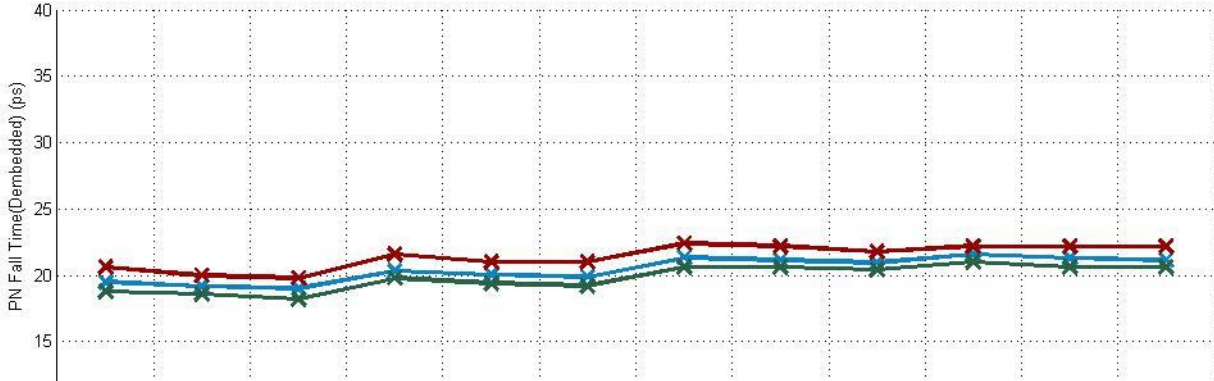


### 3.6.14. Rise Time at -10 dBm avg. Power at 1550nm and 11.3Gbps



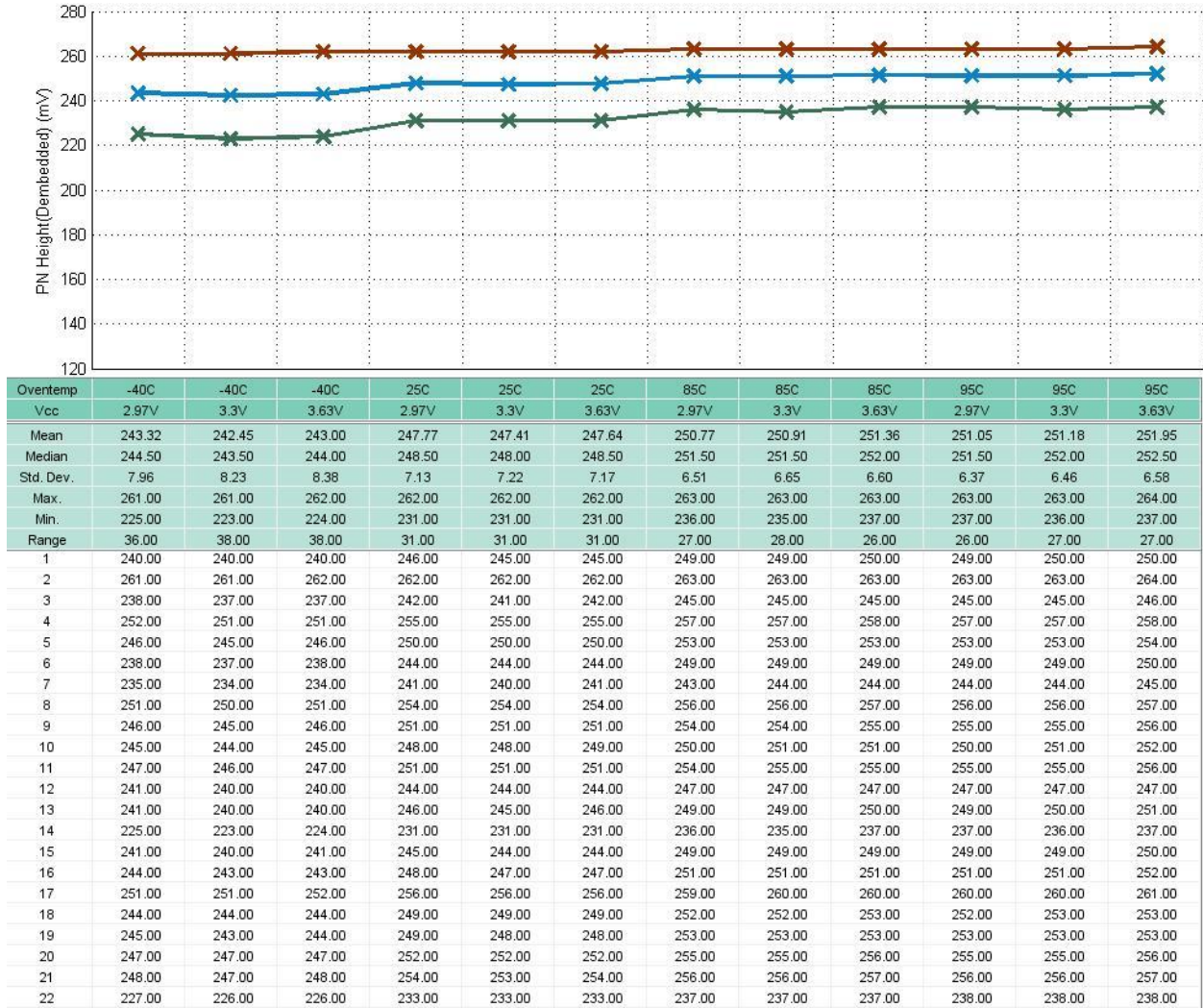
Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	18.49	18.34	18.31	19.35	19.16	19.07	20.29	20.15	19.99	20.45	20.24	20.21
Median	18.60	18.20	18.20	19.40	19.20	19.20	20.40	20.20	20.00	20.60	20.40	20.40
Std. Dev.	0.34	0.30	0.34	0.33	0.36	0.32	0.30	0.32	0.32	0.28	0.31	0.34
Max.	19.20	18.80	18.80	20.00	19.80	19.40	20.60	20.60	20.40	21.00	20.60	20.60
Min.	17.60	17.60	17.40	18.80	18.60	18.20	19.80	19.20	19.20	19.80	19.40	19.40
Range	1.60	1.20	1.40	1.20	1.20	1.20	0.80	1.40	1.20	1.20	1.20	1.20
1	18.60	18.20	18.20	19.40	19.20	18.80	20.00	20.00	20.40	20.40	20.40	20.40
2	18.80	18.80	18.80	19.40	19.20	19.40	20.40	20.00	20.40	20.60	20.40	20.40
3	18.60	18.80	18.60	19.40	19.40	19.40	20.60	20.40	20.40	20.60	20.60	20.40
4	18.60	18.60	18.60	19.80	19.40	19.40	20.40	20.40	20.00	20.40	20.40	20.00
5	18.20	18.00	18.00	18.80	18.80	18.80	19.80	20.00	19.40	20.00	19.80	19.80
6	17.60	17.60	17.40	18.80	18.60	18.20	19.80	19.20	19.20	19.80	19.40	19.40
7	18.60	18.20	18.20	19.20	19.20	19.40	20.40	20.40	19.80	20.40	20.40	20.40
8	18.80	18.80	18.80	19.80	19.80	19.40	20.60	20.40	20.40	21.00	20.40	20.60
9	18.20	18.20	18.20	19.20	18.80	18.80	20.00	20.00	19.80	20.00	20.00	20.00
10	18.80	18.60	18.60	19.80	19.80	19.20	20.60	20.40	20.40	20.60	20.40	20.60
11	18.20	18.20	18.20	19.20	18.80	18.80	20.00	20.00	19.80	20.40	19.80	19.80
12	19.20	18.60	18.60	20.00	19.80	19.40	20.60	20.40	20.40	20.60	20.60	20.60
13	18.80	18.20	18.60	19.80	19.40	19.20	20.60	20.00	20.40	20.60	20.40	20.60
14	18.20	18.20	18.20	19.40	19.20	19.20	20.60	20.40	20.00	20.40	20.40	20.40
15	18.20	18.20	18.00	19.20	18.80	18.80	20.00	19.80	19.80	20.00	19.80	19.80
16	18.60	18.20	18.20	19.40	19.20	18.80	20.60	20.40	20.00	20.60	20.40	20.40
17	18.60	18.60	18.20	19.20	18.80	19.20	20.00	19.80	20.00	20.60	20.40	19.80
18	18.20	18.20	18.20	18.80	18.80	18.80	20.00	20.00	19.80	20.60	20.00	20.40
19	18.60	18.60	18.00	19.20	18.80	18.80	20.00	20.40	19.80	20.40	20.00	20.00
20	18.60	18.20	18.80	19.40	19.20	19.20	20.40	20.60	20.00	20.60	20.40	20.40
21	18.60	18.20	18.20	19.40	19.40	19.40	20.60	20.00	20.00	20.60	20.40	20.40
22	18.20	18.20	18.20	19.20	19.20	19.20	20.40	20.40	20.00	20.60	20.40	20.00

### 3.6.15. Fall Time at -10 dBm avg. Power at 1550nm and 11.3Gbps

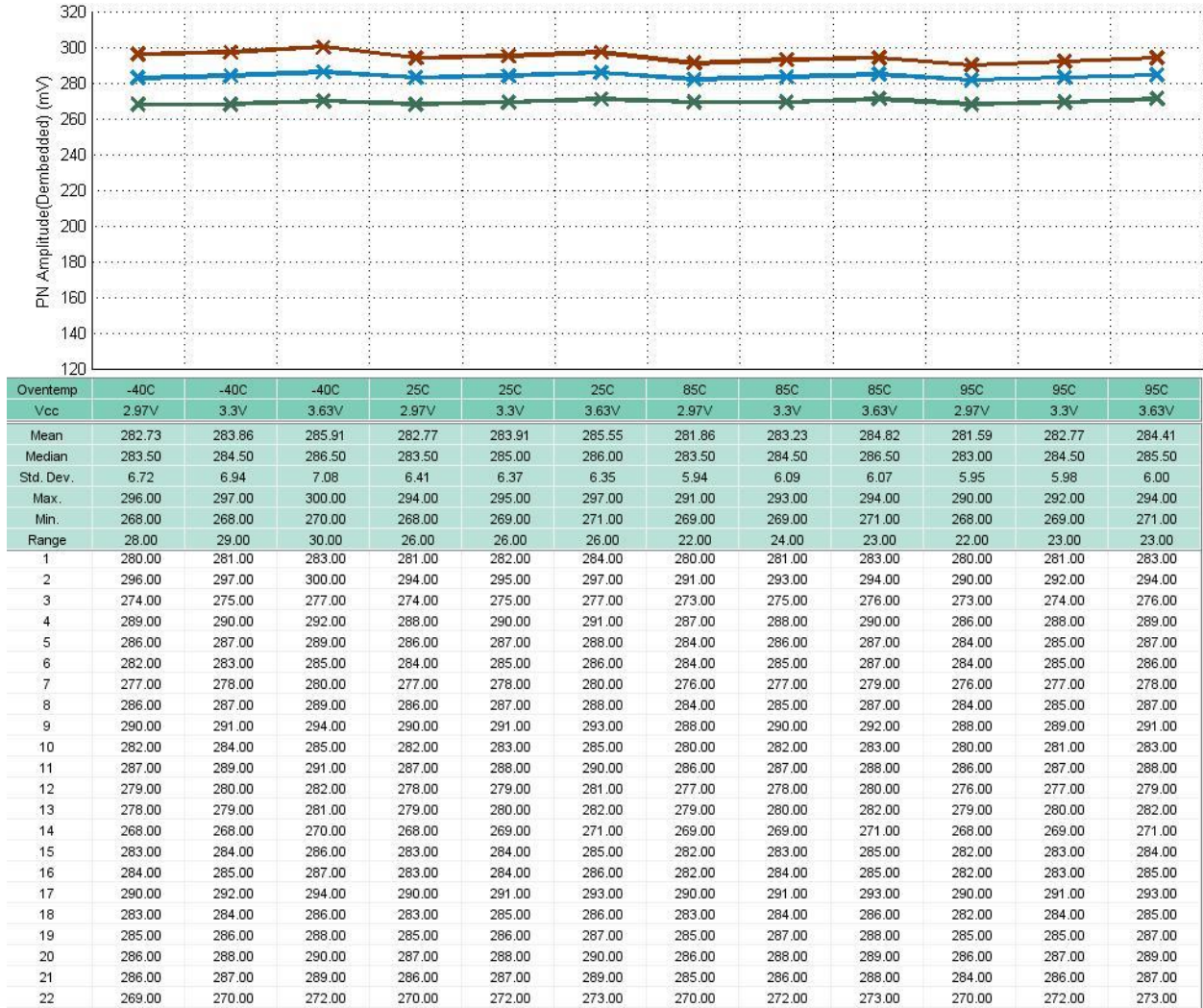


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	19.50	19.16	19.02	20.31	20.04	19.89	21.35	21.15	20.95	21.56	21.29	21.16
Median	19.40	19.20	18.80	20.40	20.00	19.80	21.20	21.10	20.80	21.60	21.20	21.10
Std. Dev.	0.47	0.44	0.47	0.45	0.46	0.51	0.56	0.49	0.50	0.44	0.44	0.52
Max.	20.60	20.00	19.80	21.60	21.00	21.00	22.40	22.20	21.80	22.20	22.20	22.20
Min.	18.80	18.60	18.20	19.80	19.40	19.20	20.60	20.60	20.40	21.00	20.60	20.60
Range	1.80	1.40	1.60	1.80	1.60	1.80	1.80	1.60	1.40	1.20	1.60	1.60
1	19.40	19.20	18.80	20.00	20.40	19.80	21.20	21.20	21.20	21.80	21.60	21.60
2	20.00	19.80	19.80	20.60	20.60	20.40	22.20	21.80	21.60	22.20	21.80	21.60
3	20.40	20.00	19.80	21.00	20.60	21.00	22.40	22.20	21.80	22.20	21.80	22.20
4	19.40	19.20	18.80	20.40	20.00	20.00	21.20	21.00	21.00	21.60	21.60	21.20
5	19.20	18.60	18.80	20.00	19.40	19.40	20.60	20.60	20.40	21.00	20.60	20.60
6	19.20	18.80	18.80	20.40	19.80	19.40	21.00	20.60	20.60	21.00	21.00	20.60
7	19.80	19.80	19.40	20.60	20.60	20.60	22.20	21.60	21.20	21.80	21.80	21.60
8	20.00	19.40	19.40	20.60	20.40	20.40	21.80	21.60	21.60	21.80	21.60	21.60
9	19.20	18.80	18.80	20.00	19.80	19.40	21.00	20.60	20.60	21.00	20.60	20.60
10	19.80	19.40	19.40	20.60	20.40	20.00	21.80	21.60	21.60	22.20	21.80	21.20
11	20.00	19.80	19.80	20.60	20.40	20.60	21.80	21.60	21.60	22.20	21.20	21.80
12	20.60	19.80	19.80	21.60	21.00	20.60	22.20	21.80	21.60	22.20	22.20	22.20
13	19.40	19.20	18.80	20.40	20.00	20.00	21.20	21.00	21.20	21.20	21.20	21.20
14	19.20	18.80	18.80	20.40	20.00	19.80	21.60	21.20	21.00	21.20	21.20	21.00
15	18.80	18.80	18.60	20.00	19.40	19.40	20.60	20.60	20.40	21.20	20.60	20.60
16	19.20	19.20	19.20	20.00	19.80	19.80	21.00	21.20	20.60	21.60	21.20	21.00
17	19.20	18.80	18.20	19.80	19.40	19.40	20.60	20.60	20.40	21.00	21.00	20.60
18	19.40	19.20	18.80	19.80	19.80	19.40	21.20	21.20	20.60	21.60	21.20	21.00
19	19.40	18.80	18.60	19.80	19.40	19.20	21.00	20.60	20.40	21.20	21.20	20.60
20	18.80	18.80	18.60	20.40	19.80	19.40	21.00	21.00	20.40	21.20	21.20	21.20
21	19.40	18.60	18.80	19.80	19.80	19.80	21.00	20.60	20.60	21.60	21.00	20.60
22	19.20	18.80	18.60	20.00	20.00	19.80	21.20	21.00	20.60	21.60	21.00	21.00

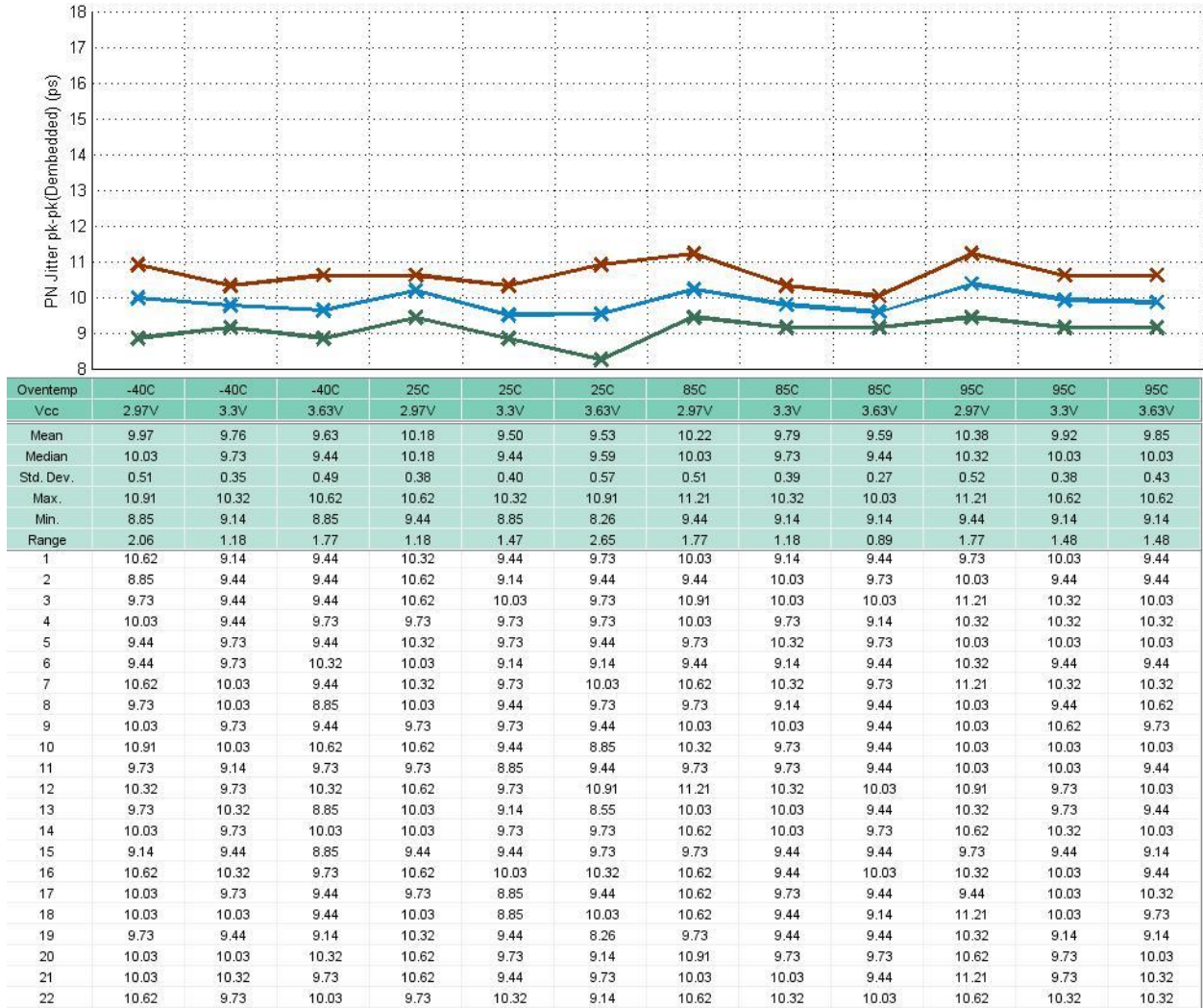
### 3.6.16. Height at -10 dBm avg. Power at 1550nm and 11.3Gbps



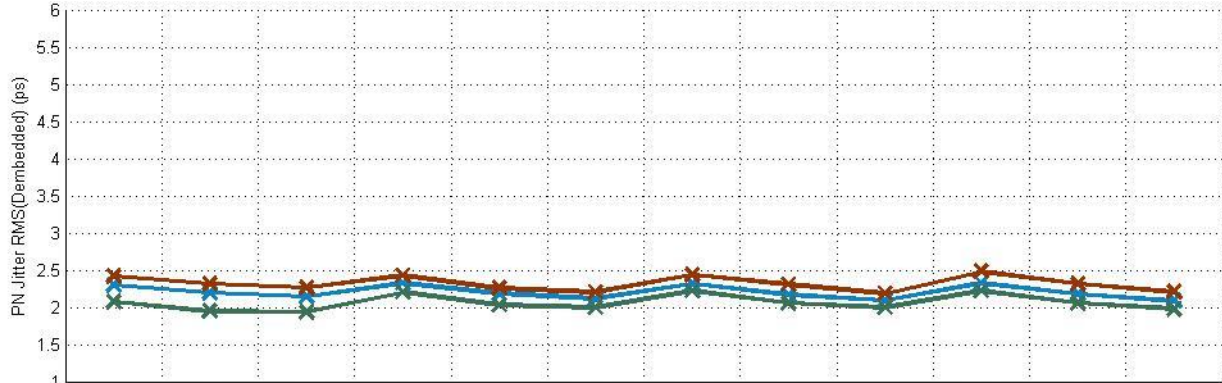
### 3.6.17. Amplitude at -10 dBm avg. Power at 1550nm and 11.3Gbps



### 3.6.18. Jitter pk-pk at -10 dBm avg. Power at 1550nm and 11.3Gbps



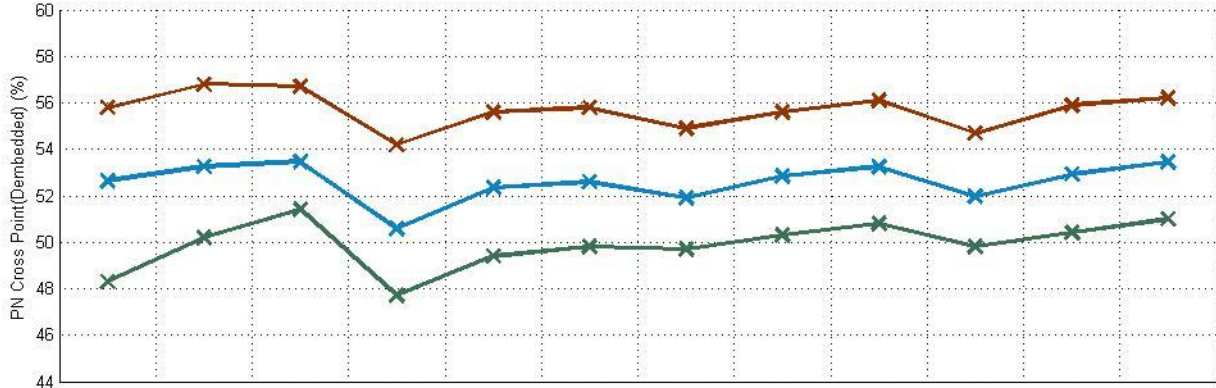
### 3.6.19. Jitter RMS at -10 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	2.30	2.19	2.14	2.32	2.18	2.12	2.31	2.17	2.09	2.33	2.18	2.09
Median	2.29	2.20	2.13	2.33	2.18	2.12	2.31	2.16	2.09	2.31	2.19	2.08
Std. Dev.	0.08	0.08	0.07	0.06	0.05	0.05	0.07	0.06	0.05	0.07	0.07	0.07
Max.	2.42	2.31	2.26	2.43	2.26	2.20	2.44	2.31	2.19	2.48	2.31	2.21
Min.	2.07	1.95	1.93	2.20	2.03	2.00	2.22	2.06	2.00	2.22	2.05	1.98
Range	0.34	0.36	0.33	0.22	0.23	0.21	0.22	0.25	0.19	0.26	0.26	0.23
1	2.34	2.21	2.20	2.35	2.22	2.19	2.30	2.22	2.06	2.29	2.16	2.11
2	2.23	2.14	2.09	2.33	2.14	2.10	2.29	2.23	2.15	2.34	2.18	2.11
3	2.28	2.22	2.12	2.33	2.18	2.10	2.31	2.23	2.13	2.41	2.21	2.13
4	2.23	2.09	2.09	2.30	2.15	2.04	2.24	2.12	2.06	2.27	2.11	2.02
5	2.26	2.20	2.13	2.27	2.17	2.09	2.25	2.13	2.06	2.23	2.07	2.04
6	2.27	2.13	2.10	2.28	2.20	2.13	2.26	2.14	2.00	2.22	2.18	2.09
7	2.39	2.30	2.19	2.42	2.24	2.16	2.44	2.24	2.18	2.48	2.31	2.20
8	2.31	2.29	2.19	2.34	2.18	2.10	2.26	2.11	2.10	2.30	2.11	2.07
9	2.27	2.17	2.11	2.36	2.17	2.13	2.34	2.19	2.08	2.34	2.19	2.02
10	2.34	2.27	2.24	2.39	2.24	2.20	2.42	2.22	2.15	2.41	2.24	2.16
11	2.29	2.12	2.17	2.33	2.19	2.15	2.25	2.12	2.06	2.32	2.19	2.08
12	2.33	2.26	2.19	2.38	2.17	2.11	2.41	2.21	2.11	2.35	2.26	2.15
13	2.36	2.18	2.17	2.30	2.18	2.12	2.31	2.17	2.07	2.31	2.20	2.07
14	2.41	2.31	2.26	2.43	2.26	2.16	2.41	2.31	2.19	2.45	2.31	2.21
15	2.07	1.95	1.93	2.20	2.03	2.00	2.23	2.10	2.01	2.25	2.08	1.98
16	2.32	2.29	2.10	2.29	2.14	2.14	2.32	2.13	2.10	2.33	2.13	2.08
17	2.28	2.17	2.10	2.26	2.14	2.11	2.24	2.06	2.06	2.28	2.10	1.98
18	2.24	2.16	2.11	2.28	2.18	2.09	2.31	2.14	2.13	2.31	2.16	2.05
19	2.24	2.15	2.05	2.27	2.17	2.00	2.22	2.11	2.01	2.25	2.05	1.99
20	2.38	2.21	2.22	2.32	2.23	2.16	2.32	2.10	2.07	2.29	2.21	2.10
21	2.29	2.19	2.13	2.35	2.25	2.14	2.32	2.23	2.10	2.30	2.21	2.18
22	2.42	2.25	2.23	2.39	2.22	2.11	2.41	2.24	2.15	2.42	2.23	2.08

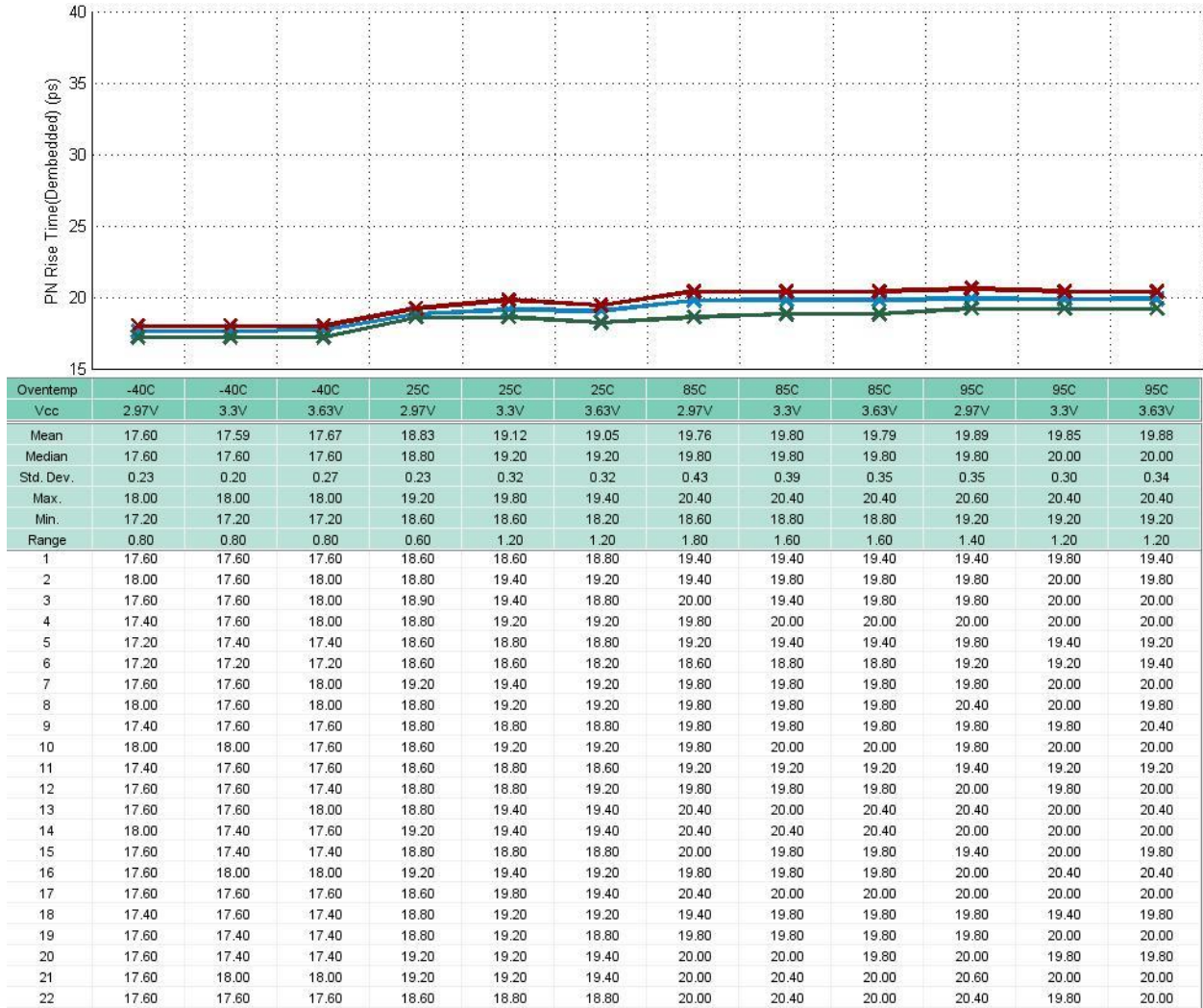


### 3.6.20. Crossing Percentage at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

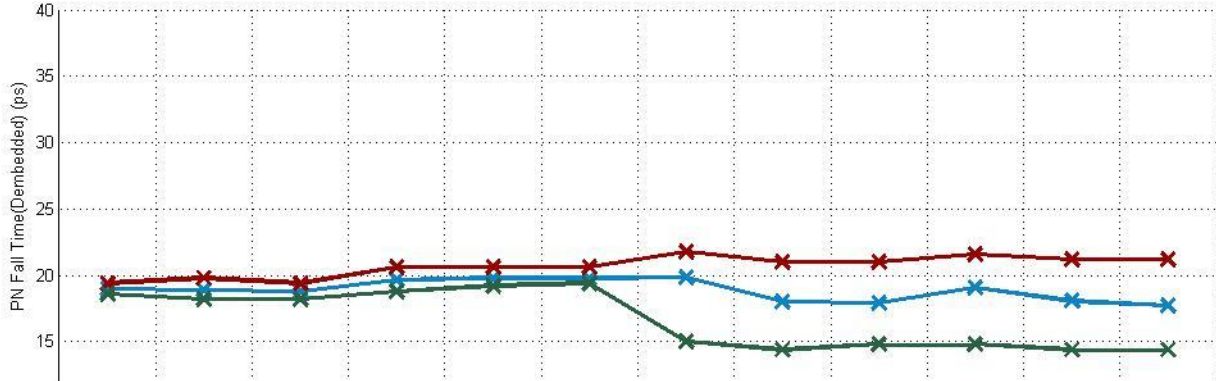


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	52.64	53.26	53.47	50.59	52.35	52.59	51.90	52.84	53.25	51.98	52.93	53.45
Median	52.95	53.20	53.25	50.20	52.10	52.30	51.85	52.75	53.05	51.85	52.60	53.25
Std. Dev.	1.64	1.43	1.35	1.51	1.36	1.32	1.32	1.27	1.26	1.27	1.36	1.30
Max.	55.80	56.80	56.70	54.20	55.60	55.80	54.90	55.60	56.10	54.70	55.90	56.20
Min.	48.30	50.20	51.40	47.70	49.40	49.80	49.70	50.30	50.80	49.80	50.40	51.00
Range	7.50	6.60	5.30	6.50	6.20	6.00	5.20	5.30	5.30	4.90	5.50	5.20
1	51.50	52.50	53.30	49.80	51.60	51.70	50.20	51.30	52.00	50.40	51.60	52.10
2	55.80	56.80	56.70	54.20	55.60	55.80	54.90	55.60	56.10	54.70	55.90	56.20
3	55.80	56.00	56.60	52.40	55.00	54.70	52.90	54.10	54.70	52.60	54.10	54.70
4	53.10	54.20	54.10	51.40	53.00	53.70	52.60	53.50	54.00	52.70	53.60	54.30
5	53.30	53.80	54.00	52.50	53.00	53.50	52.90	53.80	54.00	52.90	54.10	54.20
6	53.80	53.50	53.30	51.60	52.80	53.10	52.90	53.80	54.40	53.30	54.30	54.80
7	53.60	53.80	54.80	51.10	52.90	53.10	52.10	52.90	53.10	52.30	52.60	53.10
8	53.00	53.30	53.30	49.80	51.90	51.90	51.30	52.60	53.00	51.70	52.50	53.20
9	53.00	53.30	53.50	49.90	52.20	52.30	52.40	53.20	53.60	52.60	53.30	54.00
10	52.20	52.00	52.60	49.20	51.40	51.80	50.40	51.30	51.70	50.40	51.50	51.80
11	53.10	54.60	54.80	50.60	53.40	53.60	53.20	54.10	54.40	53.10	54.50	55.00
12	53.10	53.70	52.60	51.60	53.00	53.10	51.90	52.90	53.20	51.80	53.00	53.40
13	52.40	52.10	52.40	48.90	51.50	51.60	50.50	52.10	52.30	50.90	51.90	52.50
14	50.50	52.30	52.70	49.50	50.90	51.40	49.90	50.30	50.80	49.80	50.40	51.00
15	52.90	53.10	53.10	50.70	52.70	52.90	52.50	53.50	53.70	52.80	54.00	54.20
16	51.70	51.80	51.90	49.80	51.40	51.40	51.50	52.30	52.60	51.80	52.60	52.90
17	51.60	52.50	52.50	50.10	51.50	52.20	51.40	52.20	52.90	51.60	52.50	53.00
18	54.00	54.40	54.40	52.90	53.70	54.00	54.00	54.70	55.10	53.90	54.70	55.20
19	52.00	52.50	52.60	50.30	51.60	51.60	51.80	52.50	52.80	51.90	52.50	53.30
20	48.30	50.20	51.40	47.70	49.40	49.80	49.70	50.80	51.30	49.90	50.90	51.50
21	50.80	52.40	52.60	49.80	51.30	51.50	51.50	52.50	53.00	51.50	52.20	52.90
22	52.50	52.90	53.20	49.10	52.00	52.30	51.20	52.50	52.80	50.90	51.80	52.60

### 3.6.21. Rise Time at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

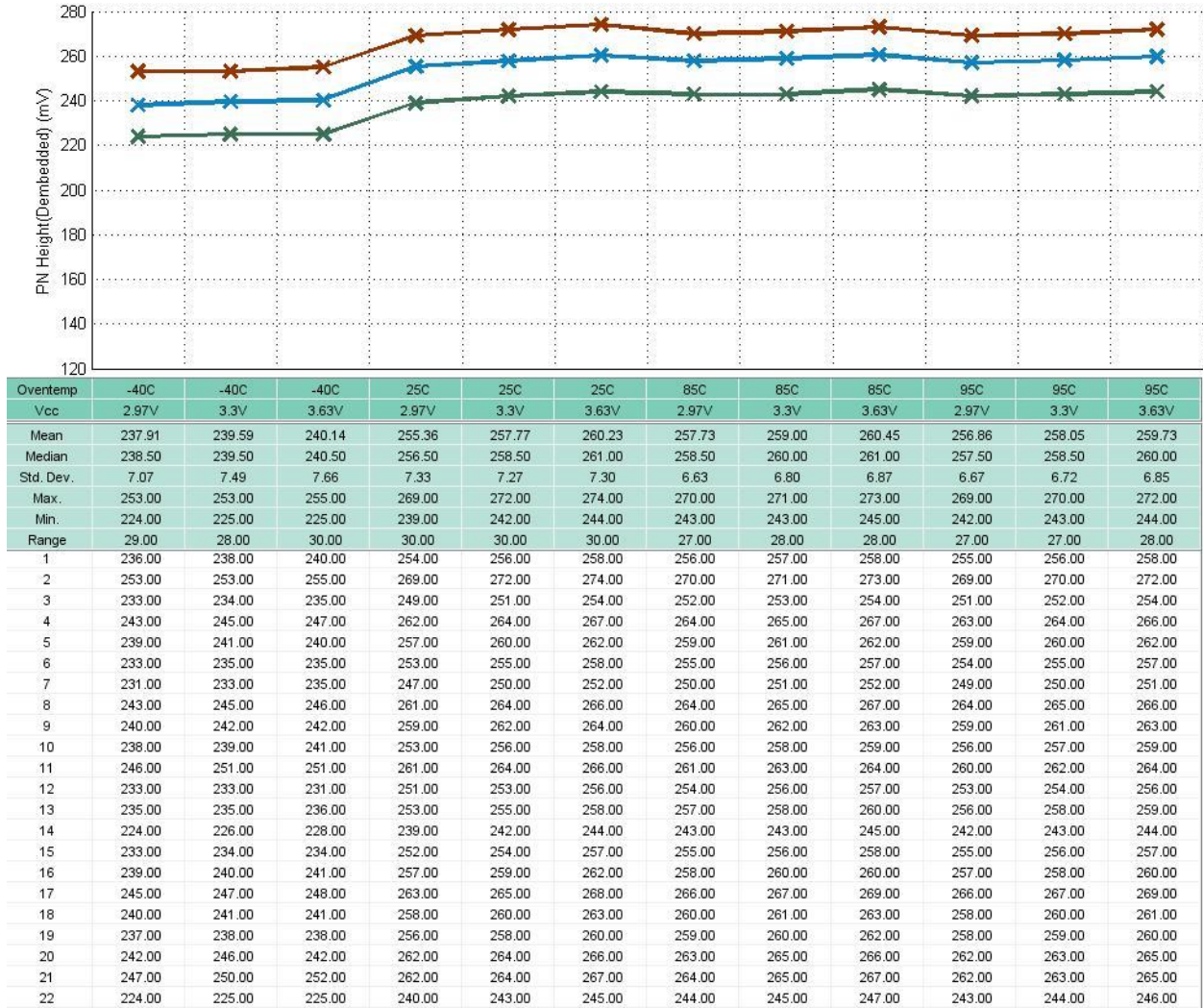


### 3.6.22. Fall Time at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

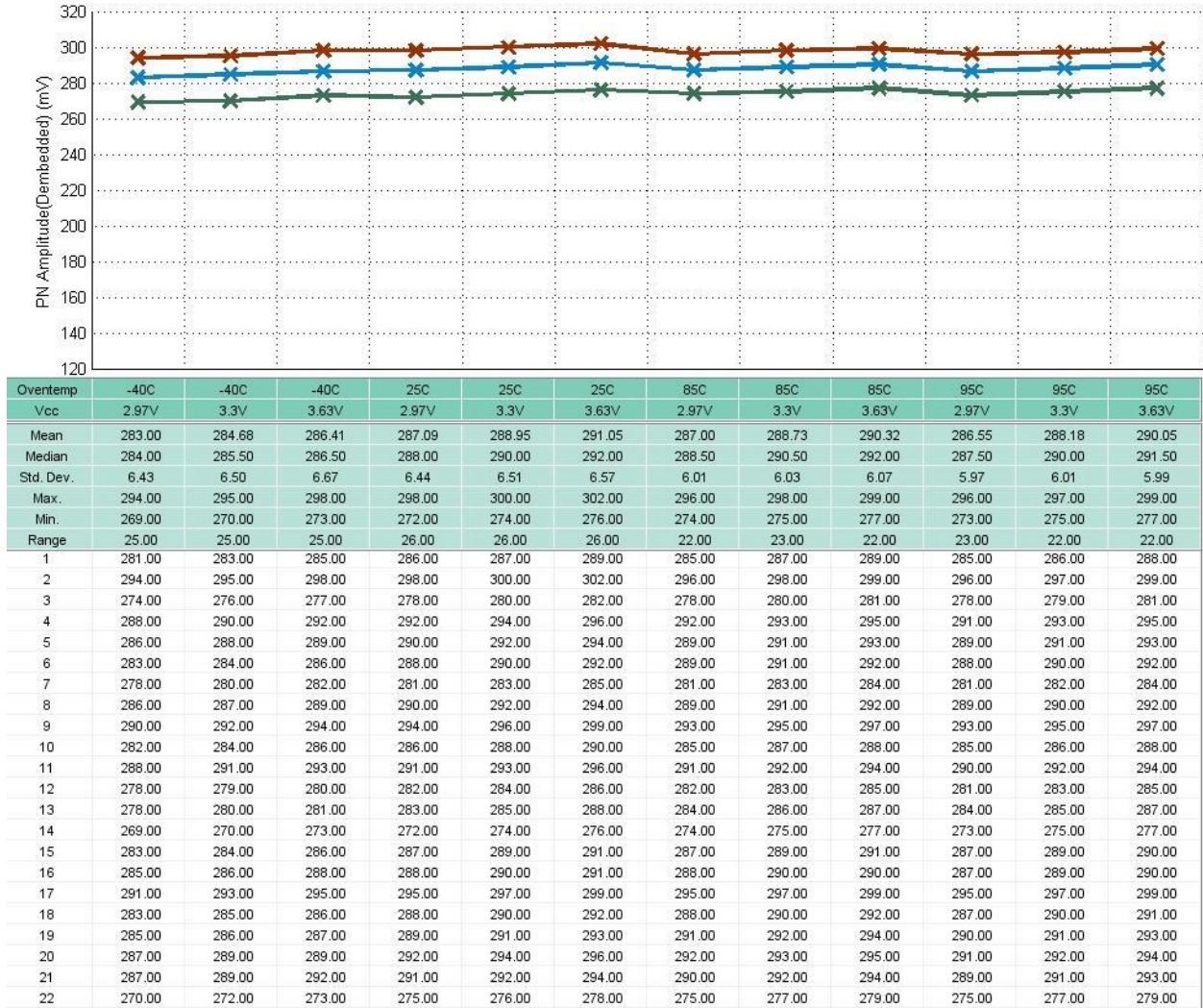


Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	18.95	18.90	18.78	19.65	19.77	19.80	19.84	18.01	17.94	19.05	18.08	17.74
Median	18.80	18.80	18.80	19.60	19.80	19.80	20.40	18.20	18.30	20.40	18.60	16.70
Std. Dev.	0.32	0.39	0.27	0.52	0.46	0.41	2.04	2.49	2.28	2.31	2.40	2.39
Max.	19.40	19.80	19.40	20.60	20.60	20.60	21.80	21.00	21.00	21.60	21.20	21.20
Min.	18.60	18.20	18.20	18.80	19.20	19.40	15.00	14.40	14.80	14.80	14.40	14.40
Range	0.80	1.60	1.20	1.80	1.40	1.20	6.80	6.60	6.20	6.80	6.80	6.80
1	18.80	18.60	18.60	20.00	20.00	20.00	21.00	16.20	15.40	21.00	20.60	15.60
2	19.20	19.20	19.20	20.40	20.40	20.40	21.20	21.00	21.00	21.00	21.20	21.20
3	19.40	19.80	19.40	20.40	20.60	20.60	21.80	16.60	17.20	17.40	17.40	17.20
4	18.60	18.80	18.60	19.80	19.80	19.80	21.00	20.60	20.60	21.00	20.60	21.00
5	18.60	18.20	18.20	19.20	19.40	19.40	20.00	19.80	20.40	20.00	20.40	19.80
6	18.80	18.60	18.60	19.80	19.80	19.40	15.60	15.60	15.00	16.00	15.60	15.60
7	19.20	19.20	19.40	20.00	20.00	20.00	16.60	16.50	17.20	21.60	20.00	19.50
8	19.20	19.20	18.80	20.00	20.00	20.00	16.00	16.00	16.00	16.00	16.60	16.00
9	18.60	18.60	18.60	19.40	19.20	19.40	19.80	14.80	14.80	15.60	14.80	14.80
10	19.40	19.20	18.80	19.80	20.00	20.00	21.20	15.40	16.00	16.80	16.00	16.00
11	19.40	19.20	18.80	20.60	20.60	20.60	21.60	16.20	15.60	16.80	16.60	16.00
12	19.20	19.40	18.80	20.40	20.60	20.40	21.80	21.00	16.20	21.60	16.80	16.20
13	19.20	18.80	18.80	19.40	19.80	19.80	20.60	20.00	20.00	16.00	15.40	15.60
14	19.20	18.80	18.80	19.80	19.80	19.80	20.60	15.60	15.40	20.60	15.60	15.80
15	18.60	18.20	18.80	18.80	19.40	19.40	15.00	14.40	19.40	14.80	14.40	14.40
16	18.80	19.20	18.80	19.40	19.40	19.40	20.40	20.40	20.00	20.60	20.00	20.00
17	18.60	18.60	18.60	19.20	19.20	19.40	20.00	14.80	15.00	20.00	15.00	15.00
18	18.60	18.80	18.80	19.40	19.40	19.80	20.40	20.60	20.00	20.60	20.40	20.00
19	18.60	18.60	18.60	18.80	19.40	19.40	20.00	20.00	19.40	20.40	19.80	20.00
20	18.80	18.80	18.60	19.20	19.40	19.40	20.40	19.80	20.00	20.40	20.40	20.00
21	18.80	18.80	18.80	19.40	19.40	19.80	20.40	20.40	20.00	20.40	20.40	20.60
22	19.40	19.20	18.80	19.20	19.40	19.40	21.00	20.60	20.00	20.60	19.80	20.00

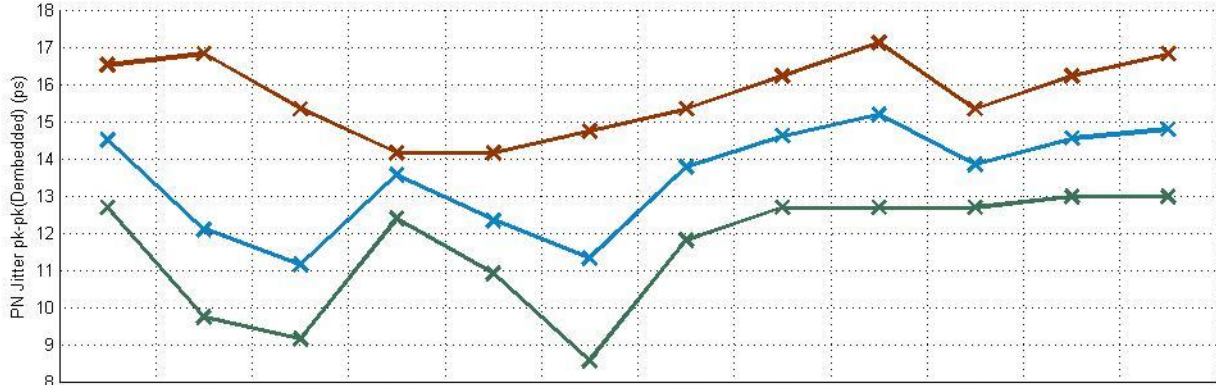
### 3.6.23. Height at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



### 3.6.24. Amplitude at +1.6 dBm avg. Power at 1550nm and 11.3Gbps

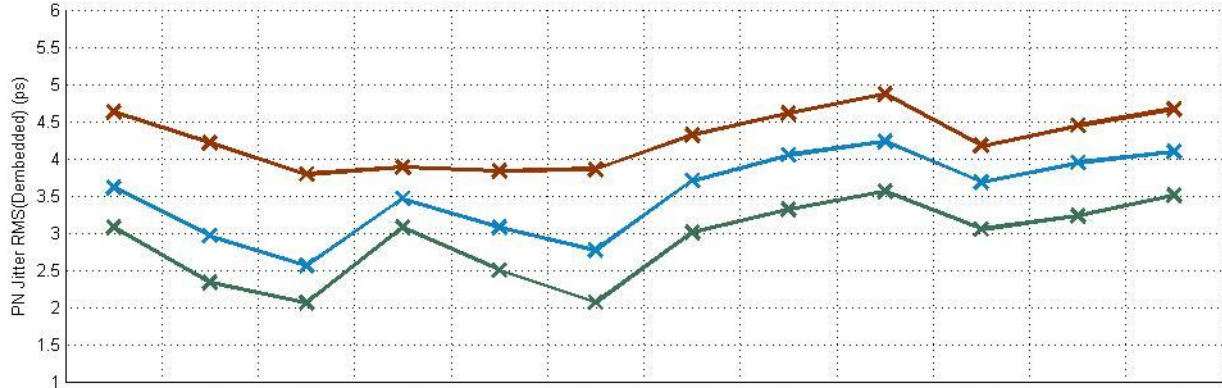


### 3.6.25. Jitter pk-pk at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	14.51	12.09	11.15	13.57	12.33	11.31	13.78	14.61	15.19	13.83	14.55	14.79
Median	14.60	11.80	10.77	13.57	12.24	11.35	13.86	14.89	15.48	13.86	14.60	14.89
Std. Dev.	0.97	1.64	1.73	0.40	1.02	1.58	0.91	1.02	1.15	0.76	0.90	0.96
Max.	16.52	16.81	15.34	14.16	14.16	14.75	15.34	16.22	17.11	15.34	16.22	16.81
Min.	12.68	9.73	9.14	12.39	10.91	8.55	11.80	12.68	12.68	12.68	12.98	12.98
Range	3.83	7.08	6.19	1.77	3.24	6.19	3.54	3.54	4.42	2.65	3.24	3.83
1	15.93	12.09	11.50	13.27	12.68	11.80	13.86	15.04	15.93	13.57	14.16	14.75
2	13.27	10.91	10.32	13.57	10.91	8.55	13.57	15.04	14.45	15.04	14.75	15.04
3	15.04	11.80	10.03	13.57	13.86	11.80	13.57	14.75	15.63	13.86	14.45	15.34
4	15.04	11.80	11.21	13.57	11.21	9.73	12.98	14.45	14.45	13.86	14.16	14.16
5	13.57	10.62	9.14	13.86	11.50	9.14	13.27	13.57	14.16	13.57	12.98	13.57
6	14.16	12.68	10.91	13.27	12.39	11.50	14.75	15.34	15.63	14.16	14.75	14.75
7	14.75	14.45	14.75	12.98	14.16	14.75	15.34	16.22	17.11	15.34	16.22	16.81
8	14.45	13.86	12.09	13.57	12.09	11.50	14.45	15.63	16.22	14.16	15.63	15.63
9	14.16	11.80	11.21	13.86	12.09	11.80	15.04	15.93	15.93	15.04	15.93	15.04
10	15.04	11.80	10.62	13.57	13.27	13.27	14.16	15.34	16.22	13.86	15.04	15.34
11	16.52	16.81	15.34	13.57	12.98	12.68	14.16	15.63	16.52	14.45	15.04	15.63
12	15.04	11.50	10.32	14.16	12.68	11.21	13.86	15.34	15.34	14.16	14.16	15.63
13	15.34	10.62	10.03	14.16	12.39	10.62	14.16	14.16	14.45	13.57	15.34	15.04
14	13.86	14.16	14.16	12.39	14.16	14.16	14.16	15.04	15.93	14.16	15.34	15.34
15	14.45	12.68	11.50	13.57	11.80	10.91	15.04	15.63	16.81	14.45	15.34	16.22
16	14.45	10.91	9.44	13.27	11.21	10.62	14.16	14.16	14.16	13.27	14.75	14.45
17	14.75	11.50	11.21	13.57	12.09	10.62	13.57	14.16	15.93	13.57	13.86	14.45
18	12.98	10.32	10.03	13.57	11.50	10.03	12.68	13.57	13.57	12.68	13.27	13.57
19	12.68	9.73	9.14	13.57	11.21	9.44	13.27	13.57	14.16	13.27	13.86	13.86
20	13.27	10.91	9.73	13.86	10.91	10.03	13.27	13.27	14.75	12.98	13.86	12.98
21	15.63	13.57	12.68	13.57	12.68	11.80	11.80	12.68	12.68	12.68	12.98	13.27
22	14.75	11.50	10.03	14.16	13.57	12.98	12.09	12.98	14.16	12.68	14.16	14.45

### 3.6.26. Jitter RMS at +1.6 dBm avg. Power at 1550nm and 11.3Gbps



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	3.60	2.96	2.56	3.46	3.08	2.77	3.70	4.05	4.23	3.68	3.94	4.09
Median	3.62	2.84	2.47	3.43	3.08	2.73	3.67	4.02	4.18	3.68	3.97	4.05
Std. Dev.	0.34	0.50	0.46	0.22	0.36	0.47	0.29	0.34	0.35	0.26	0.26	0.27
Max.	4.62	4.21	3.79	3.89	3.84	3.85	4.31	4.61	4.86	4.17	4.45	4.67
Min.	3.07	2.33	2.06	3.08	2.50	2.06	3.01	3.31	3.55	3.05	3.23	3.51
Range	1.55	1.88	1.73	0.81	1.34	1.79	1.30	1.30	1.31	1.12	1.21	1.16
1	3.69	3.01	2.56	3.38	2.99	2.86	3.52	3.95	4.32	3.51	3.81	3.82
2	3.31	2.63	2.37	3.16	2.50	2.07	3.84	4.23	4.12	4.09	4.19	4.34
3	3.78	2.91	2.22	3.72	3.07	2.86	3.64	4.05	4.21	3.71	3.97	4.04
4	3.61	2.70	2.50	3.37	2.72	2.23	3.57	4.07	4.08	3.59	3.83	4.05
5	3.19	2.43	2.06	3.08	2.59	2.06	3.60	3.87	3.96	3.65	3.75	3.89
6	3.71	3.21	2.64	3.63	3.20	2.99	4.03	4.48	4.54	3.86	4.03	4.21
7	3.62	3.76	3.30	3.41	3.82	3.85	3.80	4.61	4.86	3.73	4.31	4.67
8	3.87	3.10	2.79	3.54	3.23	2.82	3.98	4.28	4.48	3.97	4.11	4.24
9	3.44	2.76	2.52	3.65	3.15	2.83	4.05	4.43	4.52	4.03	4.25	4.30
10	3.82	3.14	2.50	3.89	3.29	3.11	3.69	4.22	4.39	3.59	3.98	4.22
11	4.62	4.21	3.79	3.67	3.44	3.11	4.10	4.59	4.72	3.91	4.19	4.30
12	3.71	2.73	2.27	3.60	3.14	2.64	3.67	3.94	4.21	3.70	3.98	4.20
13	3.59	2.46	2.19	3.70	2.87	2.58	3.67	3.98	4.13	3.73	4.00	4.05
14	3.69	4.05	3.52	3.37	3.84	3.77	3.38	3.90	4.45	3.44	3.92	4.12
15	3.92	3.19	2.67	3.65	2.99	2.63	4.31	4.44	4.82	4.17	4.45	4.58
16	3.25	2.52	2.29	3.33	2.86	2.54	3.80	3.99	4.12	3.67	3.82	3.87
17	3.63	2.78	2.45	3.40	3.21	2.63	3.68	4.07	4.14	3.51	3.84	3.99
18	3.07	2.45	2.30	3.14	2.73	2.35	3.55	3.65	3.73	3.46	3.72	3.78
19	3.09	2.33	2.08	3.29	2.71	2.36	3.72	3.81	3.94	3.70	3.96	3.99
20	3.34	2.71	2.13	3.44	2.78	2.44	3.60	3.65	3.82	3.60	3.77	3.88
21	3.83	3.21	2.93	3.17	3.09	2.92	3.01	3.31	3.55	3.05	3.23	3.51
22	3.51	2.90	2.27	3.63	3.49	3.26	3.30	3.60	3.83	3.33	3.66	3.84



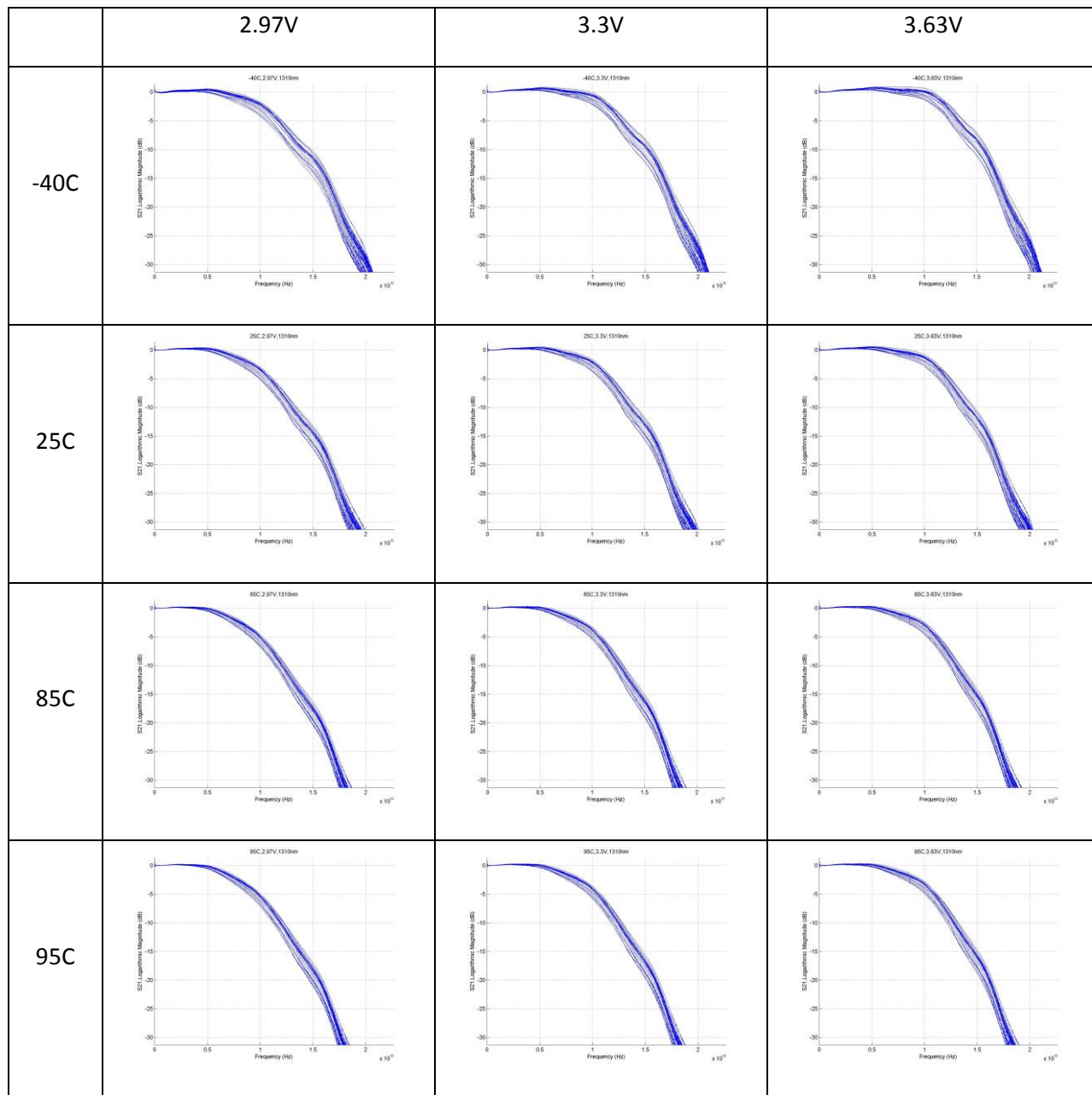
## 3.7. S-parameters

### 3.7.1. Test Descriptions

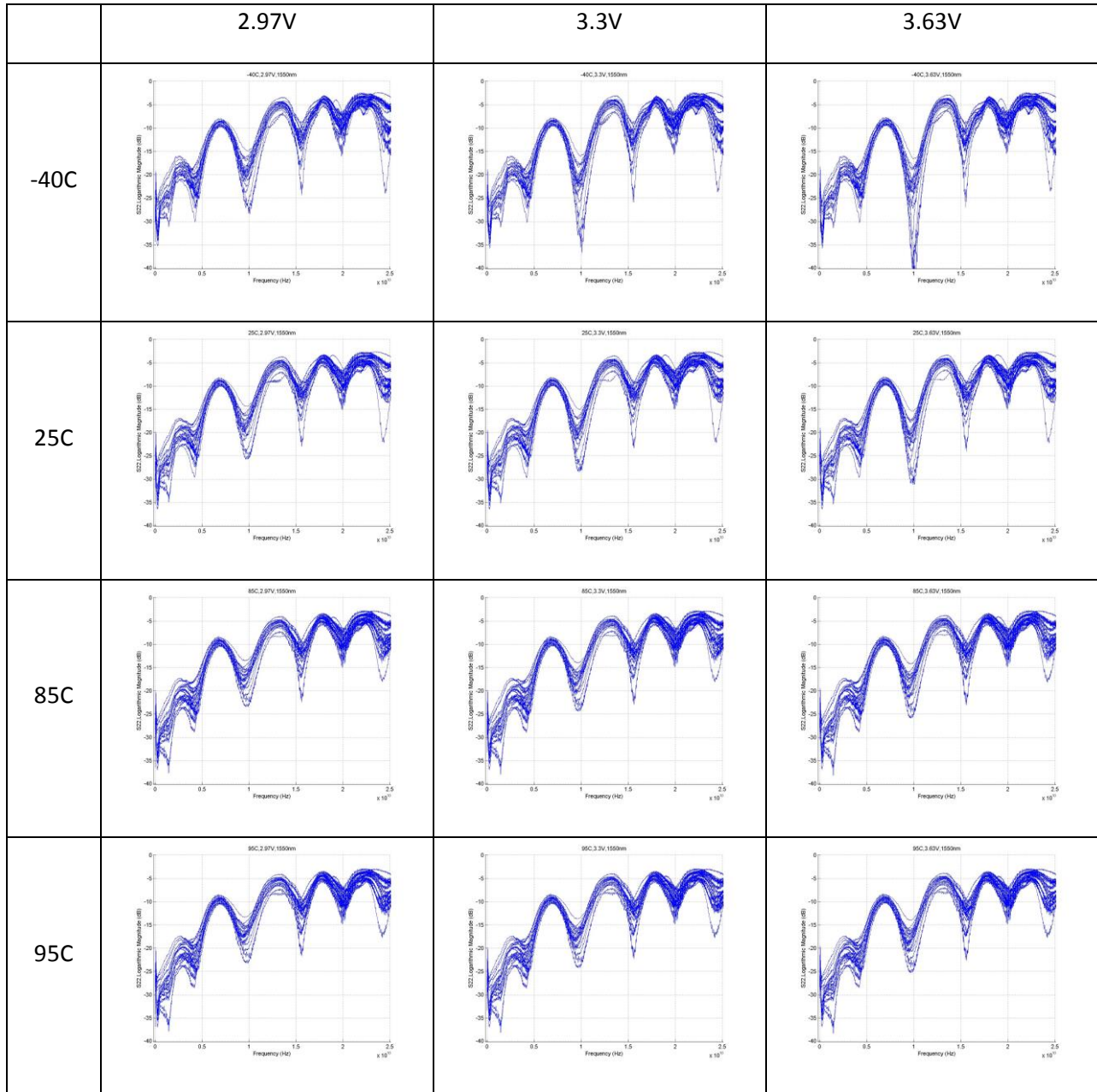
An s-parameter sweep was performed with an input optical power of -19dBm and electrical power of 0dBm at 1550nm.



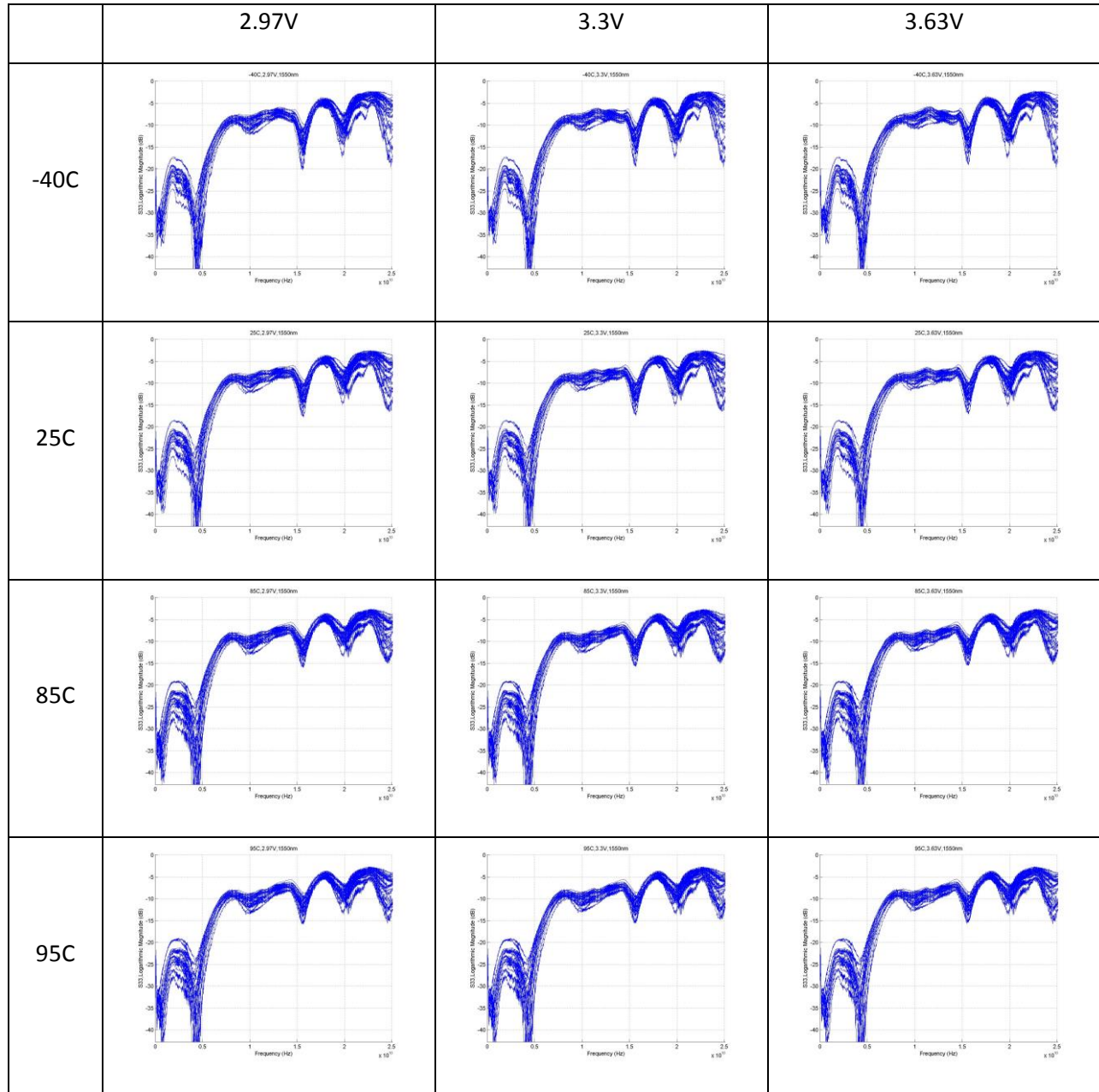
### 3.7.2. S21 plots at 1550nm and -19dBm Optical Input Power



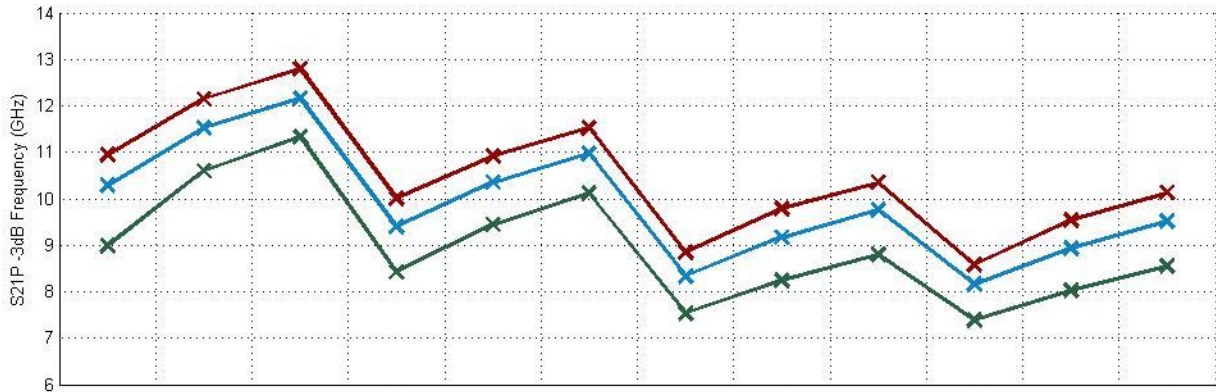
### 3.7.3. P-Channel S22 plots at 0dBm electrical input power



3.7.4. N-Channel S22 plots at 0dBm electrical input power

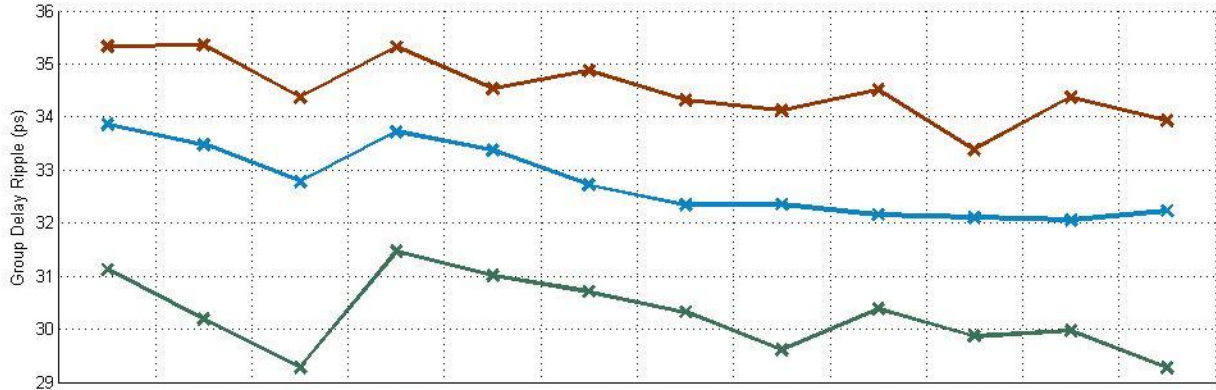


### 3.7.5. S21 -3dB Bandwidth (GHz) at 1550nm



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V
Mean	10.29	11.52	12.16	9.40	10.35	10.97	8.33	9.17	9.75	8.15	8.94	9.52
Median	10.56	11.73	12.32	9.61	10.56	11.15	8.52	9.34	9.92	8.28	9.08	9.71
Std. Dev.	0.59	0.49	0.46	0.49	0.46	0.43	0.38	0.44	0.46	0.38	0.43	0.47
Max.	10.94	12.15	12.80	10.01	10.91	11.53	8.84	9.79	10.35	8.58	9.54	10.14
Min.	8.99	10.60	11.33	8.42	9.44	10.11	7.53	8.25	8.80	7.38	8.03	8.55
Range	1.95	1.55	1.47	1.58	1.47	1.42	1.31	1.54	1.55	1.20	1.51	1.58
1	10.50	11.84	12.38	9.56	10.62	11.26	8.41	9.31	9.96	8.20	9.03	9.70
2	10.69	11.81	12.44	9.75	10.68	11.26	8.58	9.50	10.12	8.44	9.25	9.85
3	9.85	11.00	11.66	8.89	10.00	10.61	7.99	8.74	9.35	7.80	8.55	9.08
4	10.43	11.43	11.97	9.57	10.45	10.96	8.53	9.31	9.87	8.29	9.07	9.66
5	10.66	11.95	12.68	9.62	10.61	11.30	8.55	9.35	9.97	8.35	9.13	9.73
6	10.91	12.15	12.80	9.89	10.88	11.53	8.79	9.66	10.28	8.57	9.44	10.04
7	8.99	10.60	11.33	8.42	9.44	10.11	7.53	8.25	8.80	7.38	8.03	8.55
8	10.29	11.57	12.29	9.29	10.26	10.89	8.28	9.04	9.62	8.09	8.78	9.38
9	10.56	11.76	12.31	9.63	10.59	11.19	8.49	9.35	9.97	8.23	9.07	9.72
10	9.58	10.84	11.44	8.72	9.77	10.41	7.78	8.55	9.18	7.60	8.37	8.91
11	10.69	12.04	12.77	9.75	10.68	11.31	8.57	9.47	10.09	8.43	9.26	9.84
12	9.89	11.03	11.61	9.02	10.02	10.60	8.02	8.85	9.46	7.84	8.58	9.23
13	10.10	11.35	12.11	9.19	10.19	10.84	8.22	9.02	9.62	8.03	8.79	9.38
14	9.24	10.66	11.38	8.51	9.45	10.13	7.60	8.31	8.85	7.49	8.16	8.59
15	10.94	12.01	12.59	10.01	10.91	11.49	8.84	9.79	10.35	8.58	9.54	10.14
16	10.64	11.74	12.34	9.75	10.61	11.16	8.56	9.47	10.05	8.38	9.20	9.82
17	10.78	11.89	12.40	9.83	10.73	11.29	8.62	9.53	10.13	8.52	9.29	9.87
18	10.77	11.89	12.43	9.82	10.70	11.31	8.59	9.54	10.16	8.50	9.33	9.89
19	10.57	11.72	12.34	9.63	10.55	11.14	8.55	9.37	9.93	8.39	9.15	9.74
20	10.56	11.80	12.40	9.61	10.56	11.16	8.51	9.33	9.90	8.28	9.09	9.70
21	10.66	11.66	12.22	9.72	10.56	11.09	8.55	9.41	9.92	8.44	9.23	9.83
22	9.16	10.74	11.59	8.57	9.54	10.25	7.73	8.51	9.00	7.56	8.25	8.77

### 3.7.6. Group Delay Ripple (ps) at 1550 nm (6GHz)



Overtemp	-40C	-40C	-40C	25C	25C	25C	85C	85C	85C	95C	95C	95C
Vcc	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	3.63V	2.97V	3.3V	2.97V
Mean	33.86	33.48	32.78	33.72	33.37	32.72	32.35	32.35	32.16	32.10	32.05	32.23
Median	34.20	33.74	33.11	33.87	33.61	32.82	32.31	32.21	31.81	32.24	32.04	32.26
Std. Dev.	1.18	1.30	1.39	1.02	0.90	1.07	1.07	1.26	1.03	0.83	1.00	1.00
Max.	35.33	35.35	34.37	35.32	34.53	34.87	34.32	34.12	34.51	33.39	34.37	33.92
Min.	31.12	30.19	29.28	31.47	31.01	30.71	30.33	29.61	30.38	29.87	29.97	29.27
Range	4.21	5.17	5.09	3.85	3.52	4.16	4.00	4.51	4.13	3.52	4.40	4.65
1	34.60	33.81	32.85	33.43	33.88	33.38	33.12	34.12	33.03	31.80	32.86	32.28
2	34.94	34.56	33.98	34.15	33.90	33.44	33.19	33.87	33.48	32.05	32.75	32.17
3	33.30	33.07	31.08	31.52	33.88	32.15	32.42	32.20	31.67	31.80	31.79	31.89
4	35.03	34.59	32.99	34.19	33.05	32.43	33.21	33.85	32.25	32.63	31.97	32.23
5	35.33	35.08	34.37	34.36	34.10	32.77	31.94	31.94	32.49	33.21	32.51	33.44
6	35.12	34.36	33.64	35.16	34.18	33.73	33.85	32.83	32.89	32.63	33.20	32.42
7	32.53	31.37	32.08	32.96	33.58	32.39	32.42	32.08	31.51	32.57	32.10	31.81
8	34.65	34.82	33.54	35.32	33.28	34.34	32.09	31.87	31.77	31.32	31.65	31.46
9	34.37	34.34	33.96	34.04	34.53	34.87	33.34	33.69	32.61	33.39	32.46	33.79
10	34.77	32.19	32.80	33.58	33.36	31.83	31.83	31.86	31.14	31.93	29.97	32.82
11	34.29	33.90	34.13	33.95	34.16	33.76	33.03	34.07	34.51	33.01	33.44	33.92
12	31.12	30.19	29.28	31.47	31.01	30.84	30.60	29.69	31.83	29.87	30.04	29.27
13	34.99	33.54	33.24	33.41	33.63	33.57	32.20	32.49	33.62	32.53	32.25	32.28
14	31.95	32.27	31.39	32.69	32.23	31.38	30.47	29.61	31.03	30.99	32.11	31.56
15	34.20	35.35	33.60	35.12	33.89	32.47	34.32	33.51	31.79	32.67	34.37	32.61
16	32.13	32.48	30.77	32.96	33.21	30.71	30.33	31.15	31.22	30.79	31.75	32.12
17	33.87	34.64	34.26	34.63	32.65	33.23	31.80	31.84	31.65	32.71	32.19	32.28
18	34.18	33.39	34.21	33.46	33.88	32.87	31.40	32.21	33.48	32.20	31.77	31.73
19	34.19	33.94	32.93	34.54	33.14	32.96	33.48	31.09	31.08	32.27	31.99	32.81
20	33.86	33.67	33.37	33.90	34.19	31.44	32.75	32.57	32.56	31.90	31.88	33.43
21	32.67	32.50	32.07	33.83	33.00	32.98	31.66	33.12	31.49	32.32	31.35	31.24
22	32.75	32.49	30.66	33.23	31.39	32.21	32.19	32.09	30.38	31.71	30.77	31.43



#### 4. Notes and Conclusions

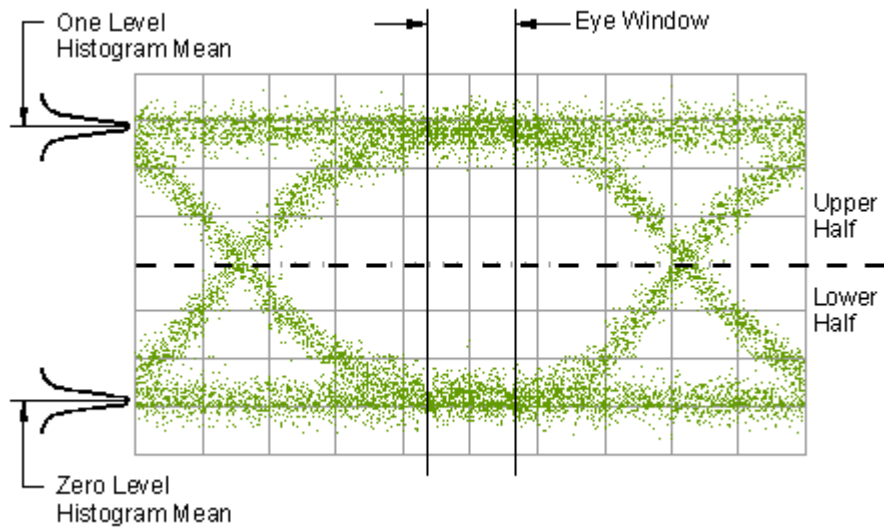
GN3268 ROSA using GCS PD shows comparable performance to GN3268 ROSA using Albis PD.

All results satisfy the datasheet.

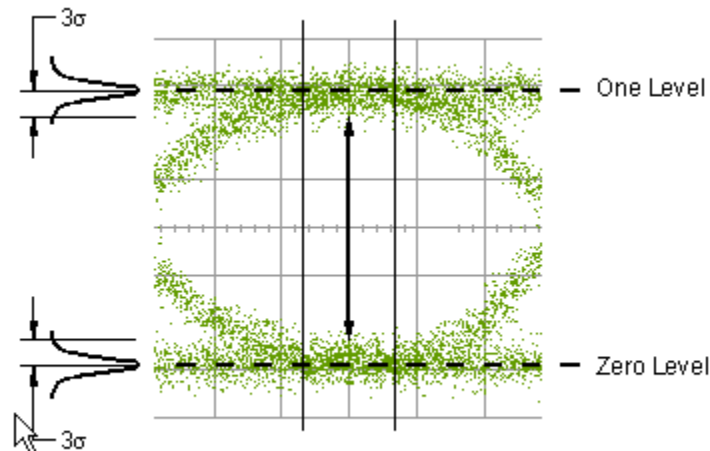
5. Appendix 1: Eye Diagram Measurement Definitions

a. Eye Heights

Eye height is a measure of the vertical opening of an eye diagram. Histograms are constructed to characterize both the one and zero levels *and* their noise levels within the eye window boundaries. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.



The one and zero levels are the relative means of the histograms. The noise is measured through the histograms as three standard deviations from both the one level and zero level into the eye opening.





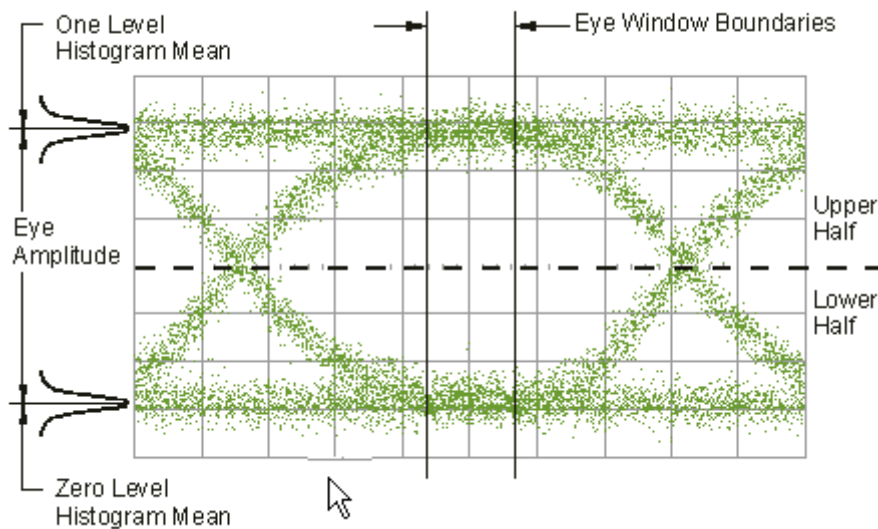
The eye height is determined as follows, eye height = (one level -  $3\sigma$ ) - (zero level +  $3\sigma$ )



b. Eye Amplitudes

Eye amplitude is the difference between the logic 1 level and the logic 0 level histogram mean values of an eye diagram. This measurement is made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

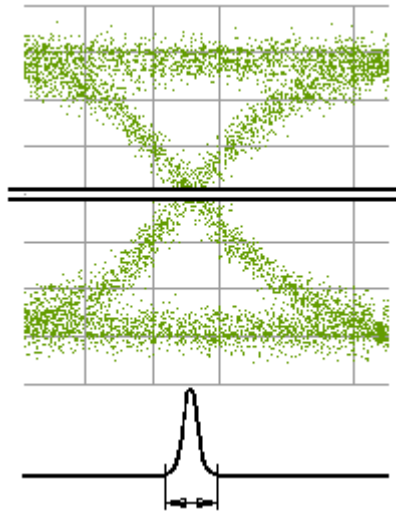
A histogram is constructed using the sampled portion of the eye diagram within the eye window. This histogram is comprised of data points from the upper and lower halves of the eye diagram and is used to determine the mean values of the logic 1 and logic 0 levels. The eye amplitude is determined as follows:



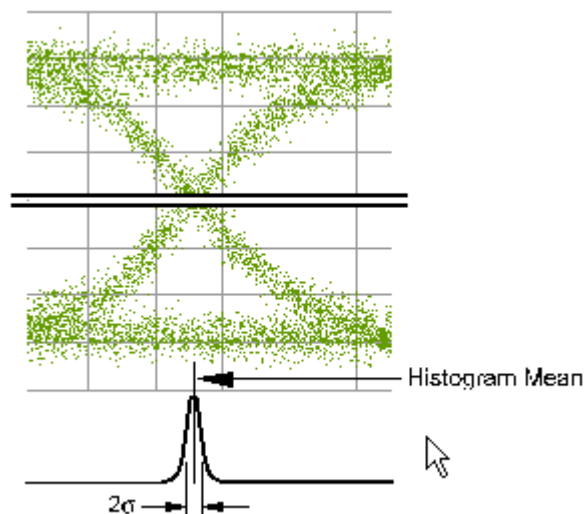
c. Jitter RMS and pk-pk

Eye Jitter is the measure of the time variances of the rising and falling edges of an eye diagram, as these edges affect the crossing point of the eye. To compute jitter, the level of the crossing point of the eye is first determined. Then a vertically thin measurement window is placed horizontally through the crossing point, and a time histogram is generated.

Jitter pk-pk is equal to the full width of the histogram at the eye crossing point.



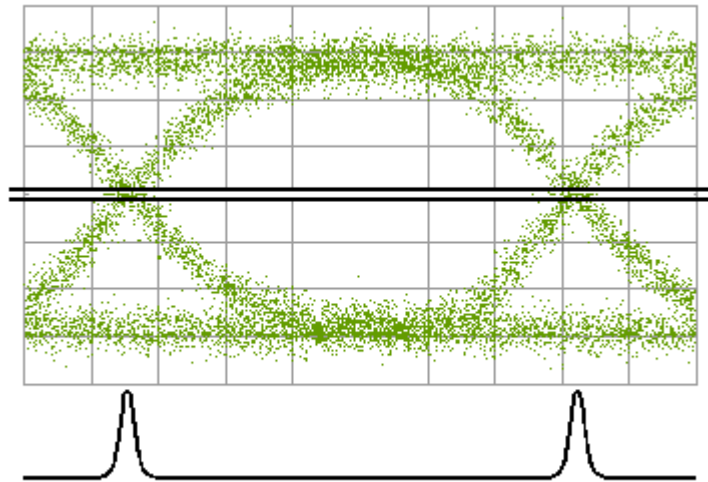
Jitter RMS is defined as  $1 \sigma$  (standard deviation) of the crossing point histogram



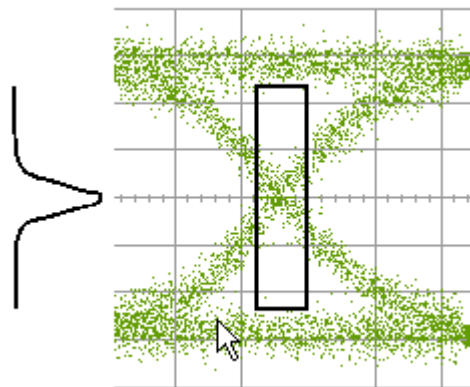
d. Crossing percentage

Crossing percentage is a measure of the amplitude of the crossing points relative to the one level and zero level. The one and zero level measurements are made in a section of the eye referred to as the eye window boundaries. The eye window boundary is the central 20% of the bit period.

A vertically thin measurement window is placed horizontally through the crossing points, and a horizontal histogram is used to determine the mean location (in time) of the crossing point.



A narrow vertical histogram is used to determine the amplitude of crossing points.

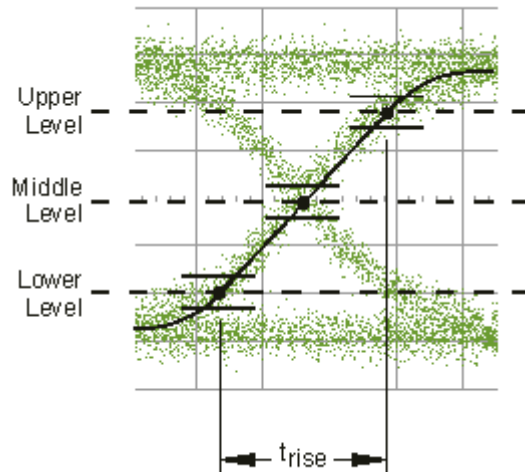


The mean derived from the horizontal and vertical histogram results in  $V_{\text{cross}}$ . Crossing percentage is then determined by the following:

$$\text{Crossing percent} = 100 (V_{\text{cross}} - V_{\text{zero level}}) / (V_{\text{one level}} - V_{\text{zero level}})$$

e. Rise Time and Fall Time

Rise time is a measure of the mean transition time of the data on the upward slope of an eye diagram. The data crosses through the following three thresholds: the lower, middle, and upper thresholds, as well as through the eye crossing point. The settings for the threshold levels are the 20% to 80% points on the transition.



Rise time= time at the upper threshold crossing – time at the lower threshold crossing

Fall times are similarly calculated except on the downward slope of an eye diagram.



### GCS Material Composition Form

<b>Manufacturer Name:</b> Global Communication Semiconductors, LLC	
<b>Date:</b> 2/1/16	<b>Department:</b> Quality
<b>Manufacturer Representative:</b> Jim Fraser, Sr. Dir of Quality	
<b>Telephone:</b> 310-530-7274 X121	<b>E-mail:</b> jfraser@gcsincorp.com
<b>Fax:</b> 310-530-7279	

#### Substances in Product

Description	Device	Homogeneous Material Name	Substance Name	CAS No.	Substance Mass (mg)	Content Rate (%) per Homogeneous Material	Exemption Remark		
Material Composition (Part Wt. 0.062mg)	Do262	PD Chip	In	7440-74-6	0.04780000	0.7698			
			P (white phosphorus)	12185-10-3	0.01290000	0.2074			
			Ga	7440-55-3	0.00001090	0.0002			
			As	7440-38-2	0.00002480	0.0004			
			Au	7440-57-5	0.00127000	0.0205			
			Ti	7440-32-6	0.00000547	0.0001			
			Pt	7440-06-4	0.00003590	0.0006			
			Si	7440-21-3	0.00002720	0.0004			
			N	7440-02-0	0.00001820	0.0003			
			C	7440-44-0	0.00001640	0.0003			
			H	1333-74-0	0.00000137	0			
			Zn	7440-66-6	5.73E-10	0			

GCS will inform the customer should the content of the homogeneous substance change.