



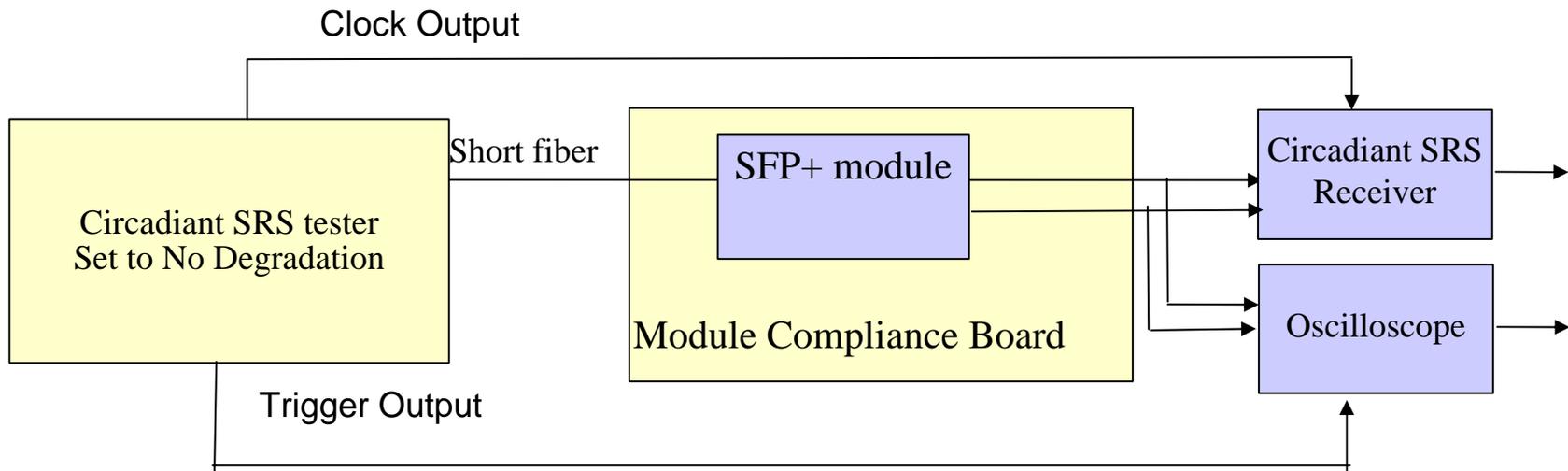
Sensitivity and Random Jitter
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Background

- **For system budgeting it has been suggested that jitter is the key parameter for link closure in high speed limiting links.**
- **The assumption is that the receiver R_j contribution is equal to $1.0UI$ at the intrinsic sensitivity and reduces in proportion to the OMA.**
- **This presentation describes practical test results to evaluate this suggestion.**

Experimental set up

- The Circadiant SRS tester was set to $2^{31}-1$ with no degradation and the BER versus OMA was measured
- The Circadiant SRS tester was changed to a square wave pattern and the Jitter was measured on the Oscilloscope at the same OMA values (but over a wider range).



BER v OMA.

Test Control

IntelliScript

External Instrument Control

Internal Proc. Ctrl.

05:50:00PM Wed 09 Jul 2008

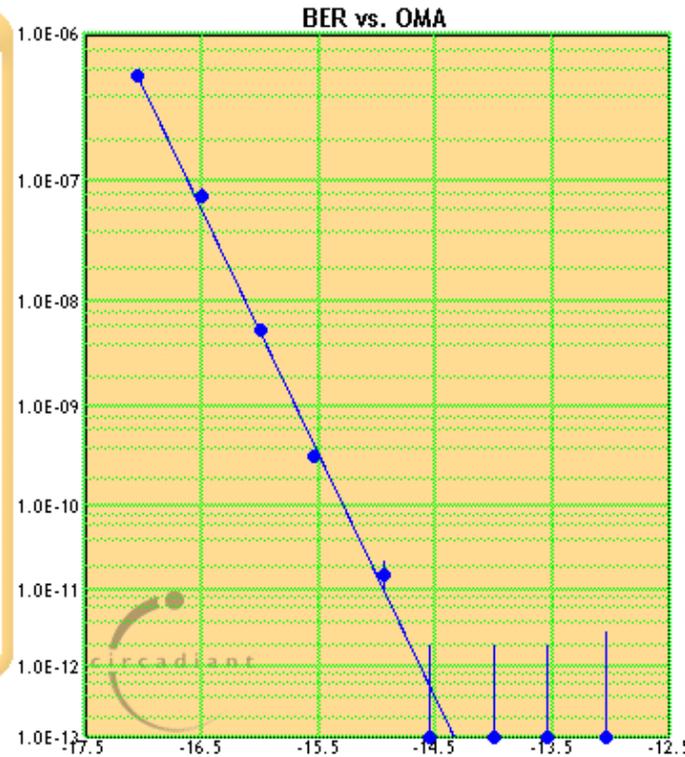
Sensitivity Results

Serial Number: **NULL**
 Code: **NULL**
 Date: **Wed Jul 09 2008**
 Time: **05:42:16 PM**
 Elapsed Time: **440 sec**

Pass Criteria
 Sensitivity: **-7.50 dBm**
 Uncertainty: **N/A**
 BER Definition: **1.00e-12**

Comments:
NULL

Legend (Click for details)	Serial Number	Save	Sensitivity (dBm) Uncertainty (dB)	Slope	Fit	Status	Signal Configuration/ Traffic Type/ Error Source	Hide Plot
●	NULL	X	-14.62 0.04	-0.662	17.68	ABRT	current.cfg Unframed Bit Errors	hide



- Start
- Save
- Save to USB
- Compare
- Save PNG
- Print
- Exit
- Go Back

Instantaneous **BER** Setup

PRBS Sync BER: 0.0001065

Click to Reset 10^{-10} >math>10^{-4}</math>

Time Gate Type

Actual Time

Progress:

Accum Totals Inst Rates Gate Control

Start

Val

Dec

TxBits RxBits RxBitErr

A3318 OUT to DUT

-16.17 dBm Avg. Power

0.00 dB Cal. Factor

850 nm λ

Unframed Traffic

No Degradation

Optical Degrad

Int 10.3 Gb/s Clock

A3318 IN from DUT

Good Signal Detect

Lock

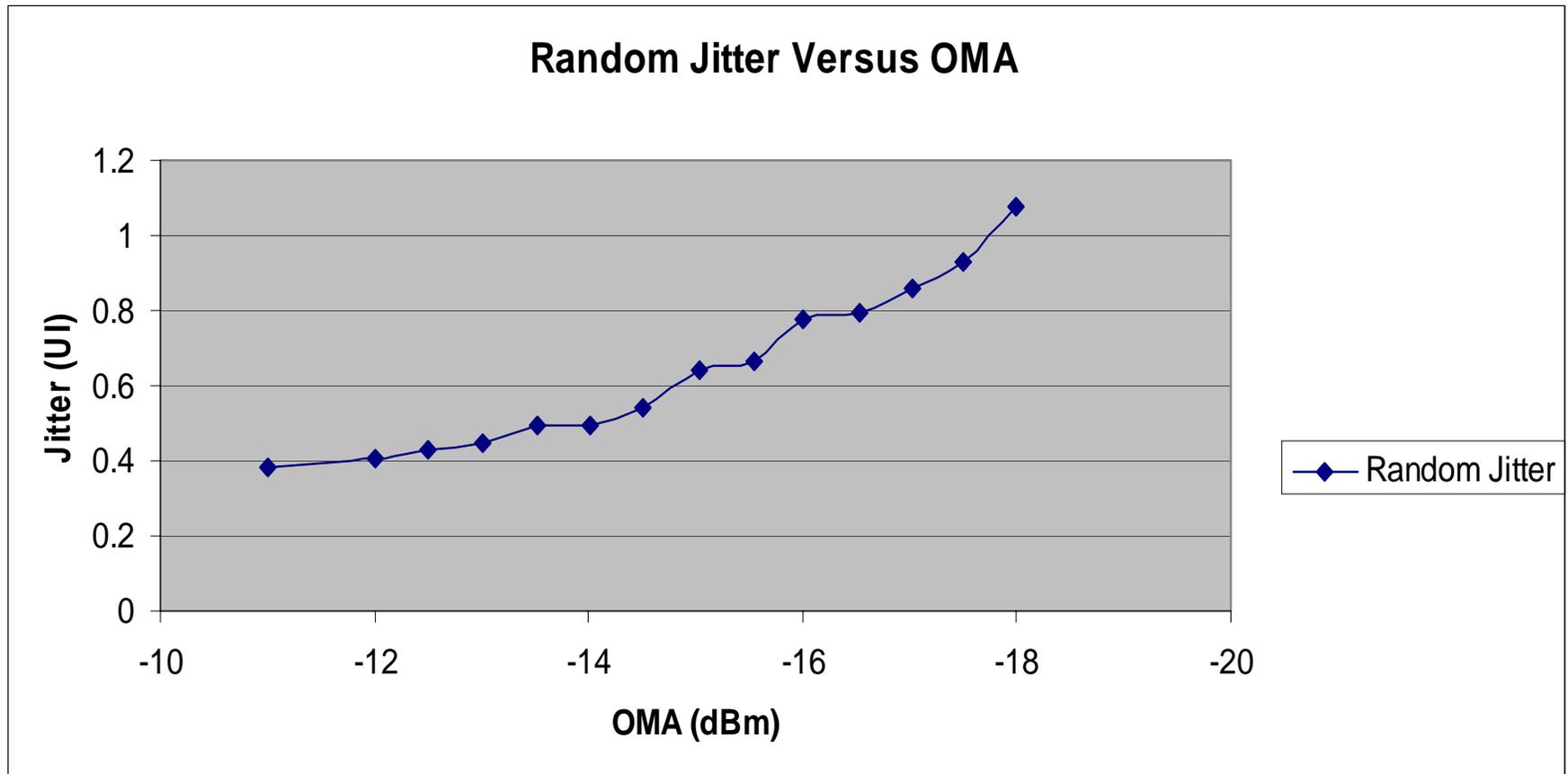
Help Admin a8a68308-a9a69426

TX 850nm MultiMode

RX Digital Electrical Mode

Status

Jitter versus OMA



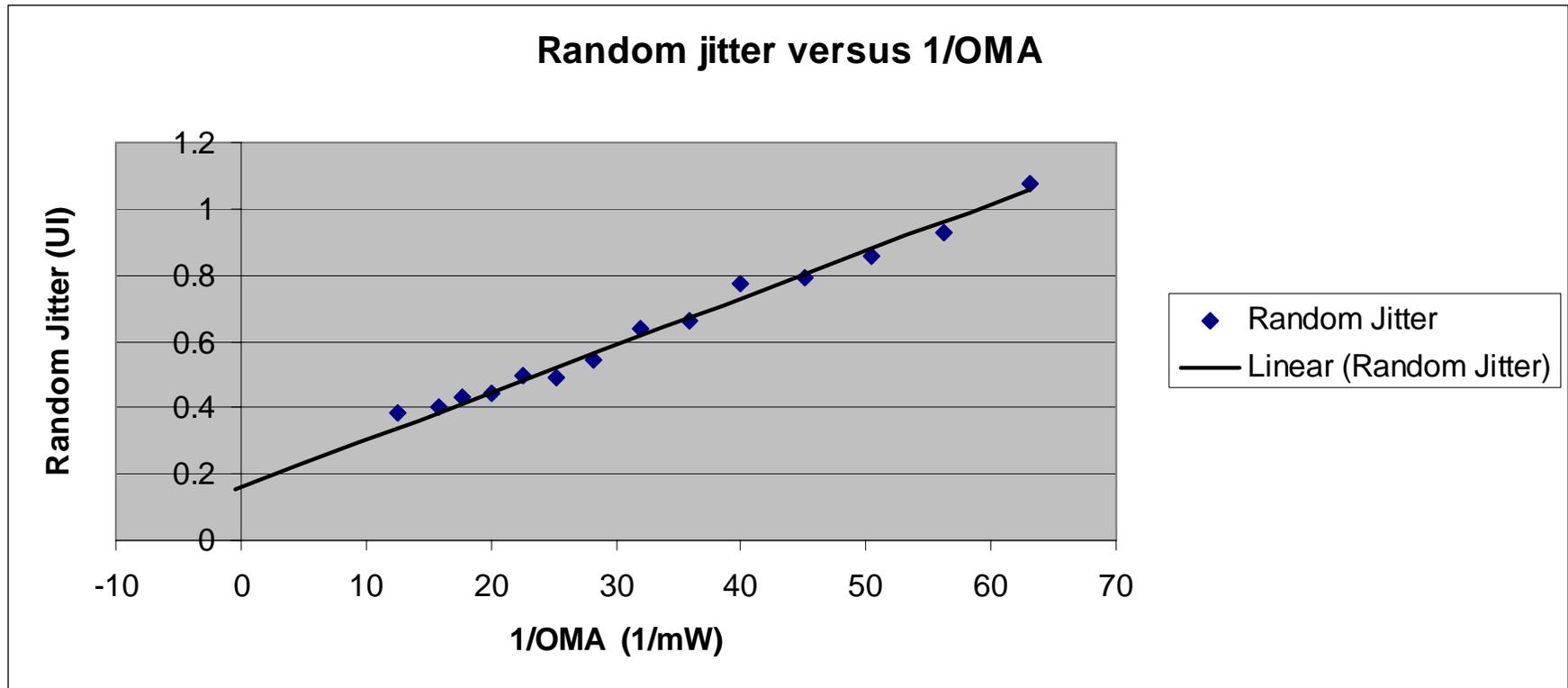
The Random Jitter at the Sensitivity point is less than 0.6UI !!!!!

Conclusions.

- **The Random Jitter at the measured sensitivity threshold is below 0.6UI**
- **The Jitter not equaling 1.0UI at the sensitivity point shows that this is not a true “intrinsic sensitivity test”. Likely degradations are due to set up/hold times in the Circulant error detector, and vertical eye closure and RIN in the Tx. (ie “No degradation” is really “no intentional additional degradation”)**
- **The 40/100G spec does not need 2.3dB of additional power budget above typical measured sensitivity for random jitter allocation.**
- **An SFP+ only has approx 0.6UI of jitter at an OMA of -15dBm.**

Jitter versus OMA linearized.

- In order to investigate this further the graph was linearized by changing the horizontal axis to $1/\text{OMA}$ with OMA in mW



Additional Conclusions.

- **The Random Jitter does follow an approximately linear curve versus $1/\text{OMA}$**
- **The Jitter at the intercept that is equivalent to infinite OMA implies that there is a jitter source that is not related to the intrinsic sensitivity. A combination of the scope timebase jitter and the Circadian Tx jitter are the likely sources.**

Further linearization.

- This “none sensitivity related jitter” was RSS'd out of the jitter to determine how well the sensitivity related jitter follows theory. (see below graph). The resulting graph is a very good fit to the linear curve indicating that the theory is sound.

