# Sensitivity and Random Jitter

Mike Dudek

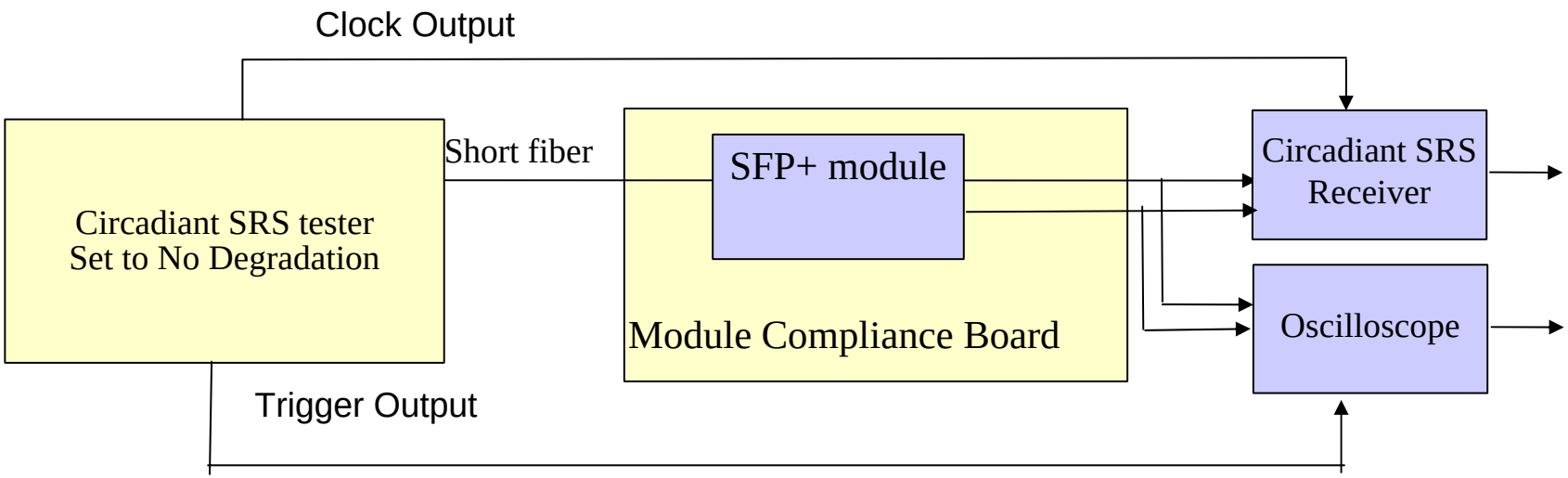
August 10 2008

# Background

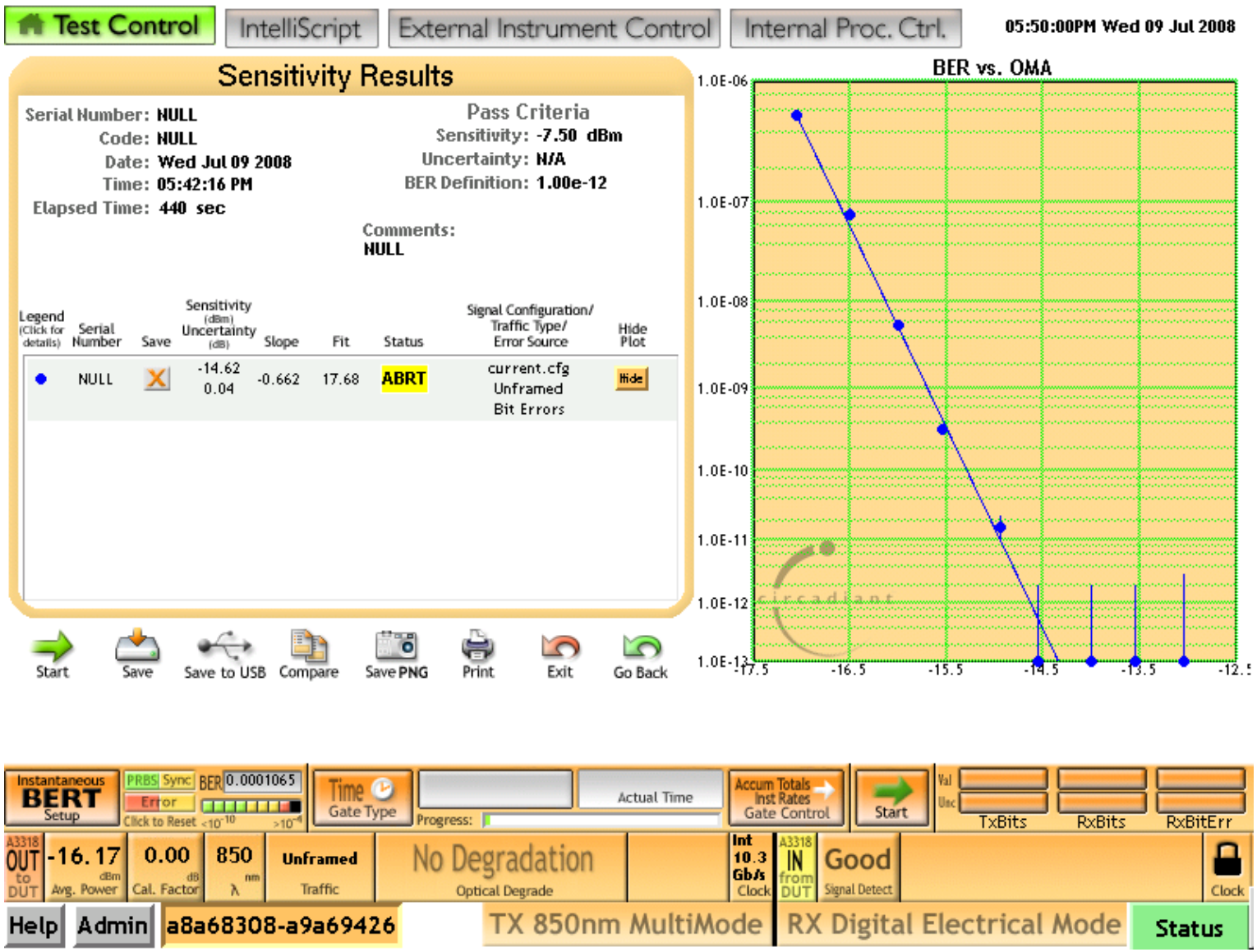
- **For system budgeting it has been suggested that jitter is the key parameter for link closure in high speed limiting links.**
- **The assumption is that the receiver Rj contribution is equal to 1.0UI at the intrinsic sensitivity and reduces in proportion to the OMA.**
- **This presentation describes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



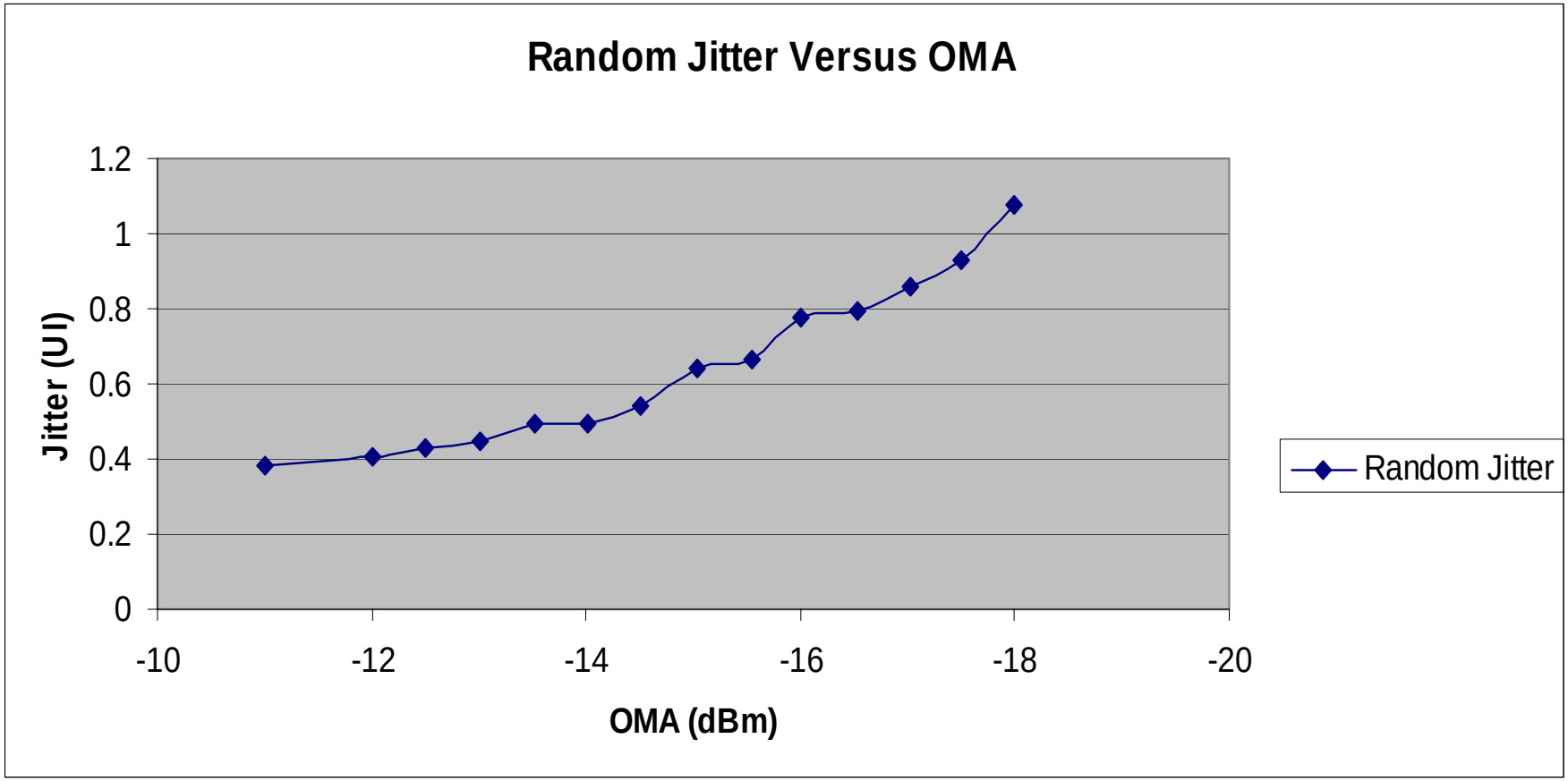
# BER v OMA.






JDSU

# Jitter versus OMA



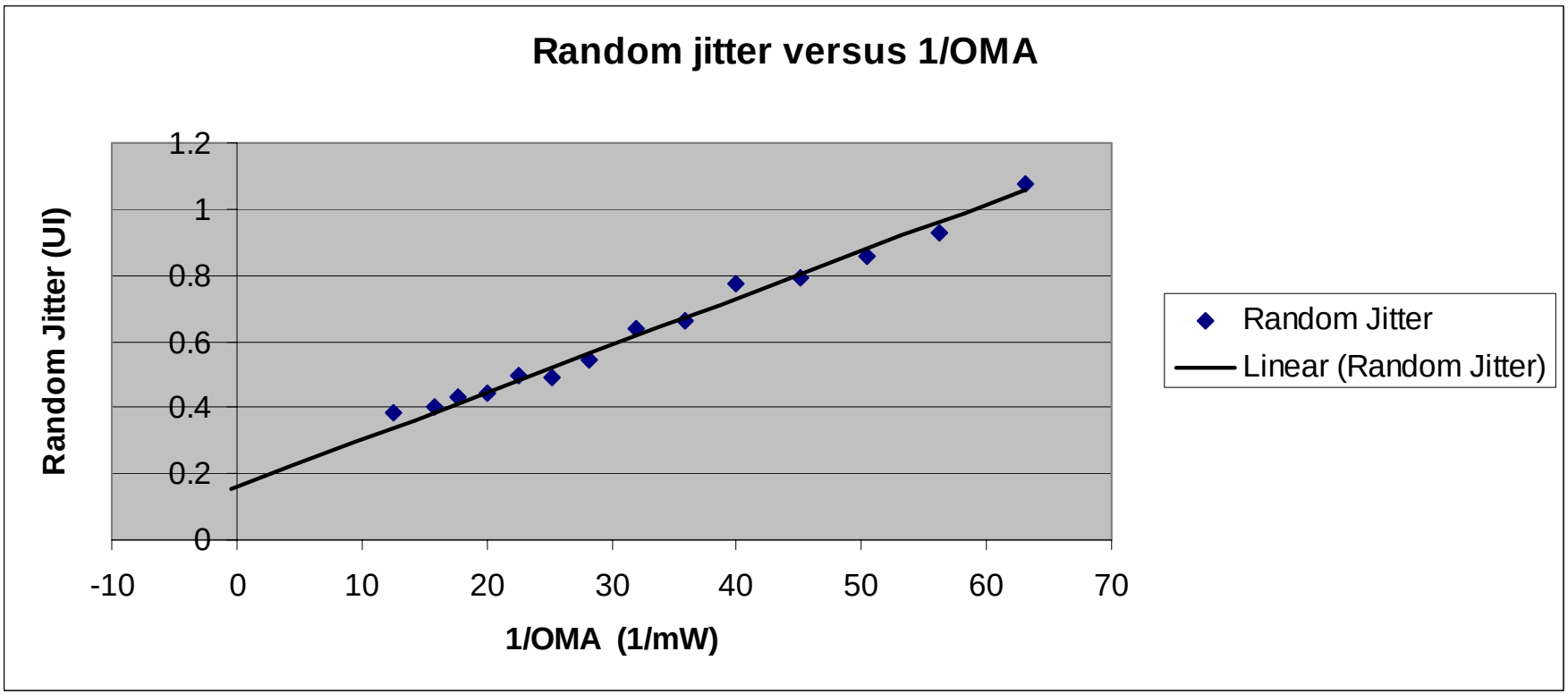

**The Random Jitter at the Sensitivity point is less than 0.6UI !!!!!!**

# 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 Circadiant 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/OMA with OMA in mW**



# Additional Conclusions.

- **The Random Jitter does follow an approximatelty linear curve versus 1/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 Circadiant 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.**