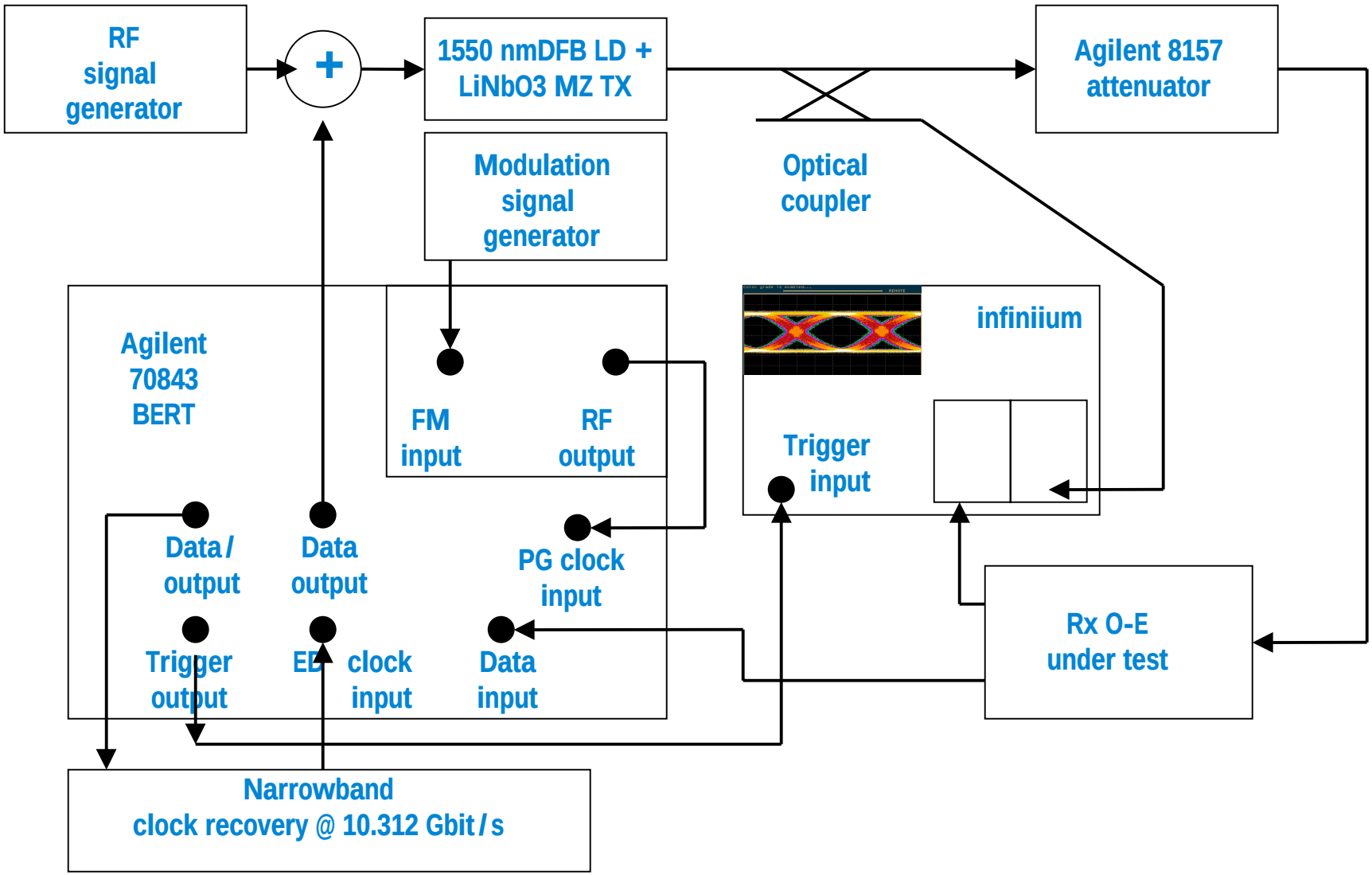
Mario Puleo

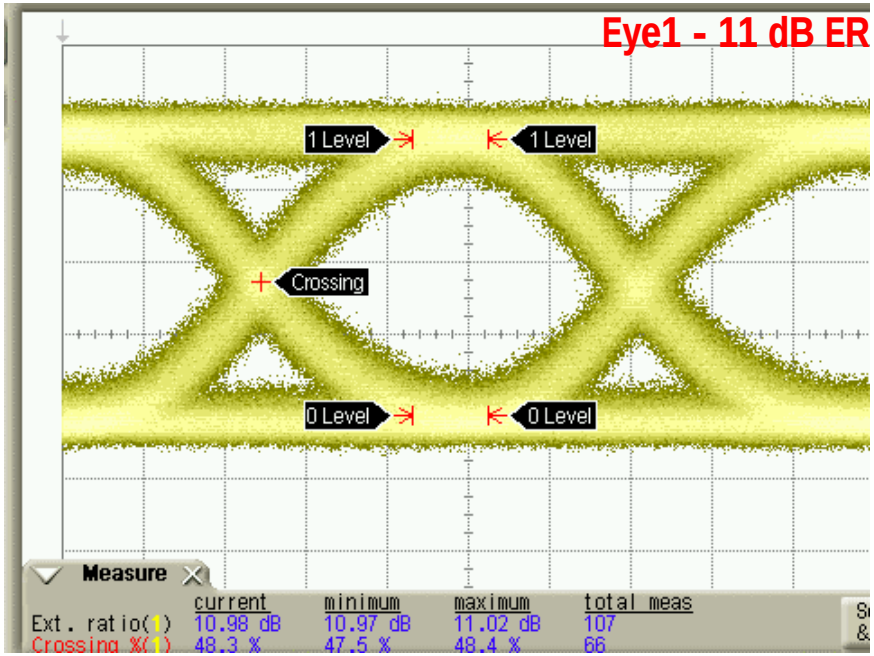
Stressed sensitivity measurements with LiNbO3 MZ and directly modulated sources

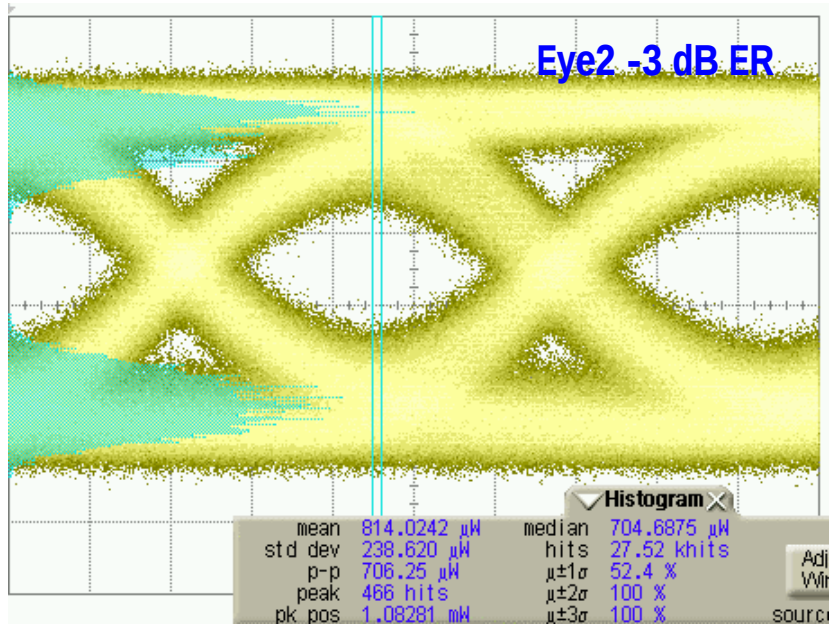
Agilent Technologies

Set-up

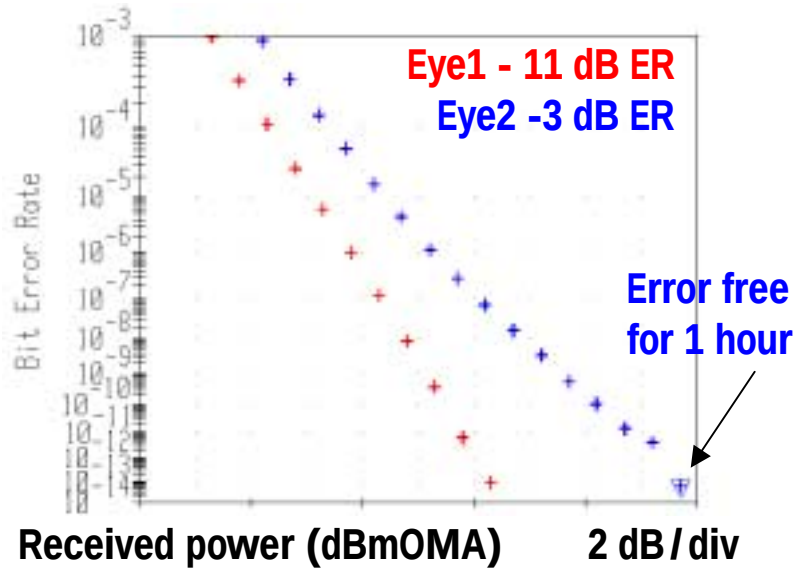

RF
signal
generator
+
1550 nmDFB LD +
LiNbO3 MZ TX
Agilent 8157
attenuator
Modulation
signal
generator
Optical
coupler
Agilent
70843
BERT
FM
input
RF
output
infiniium
Trigger
input
Data /
output
Data
output
PG clock
input
Trigger
output
EB clock
input
Data
input
Rx O-E
under test
Narrowband
clock recovery @ 10.312 Gbit/s

Effect of eye closure and extinction ratio

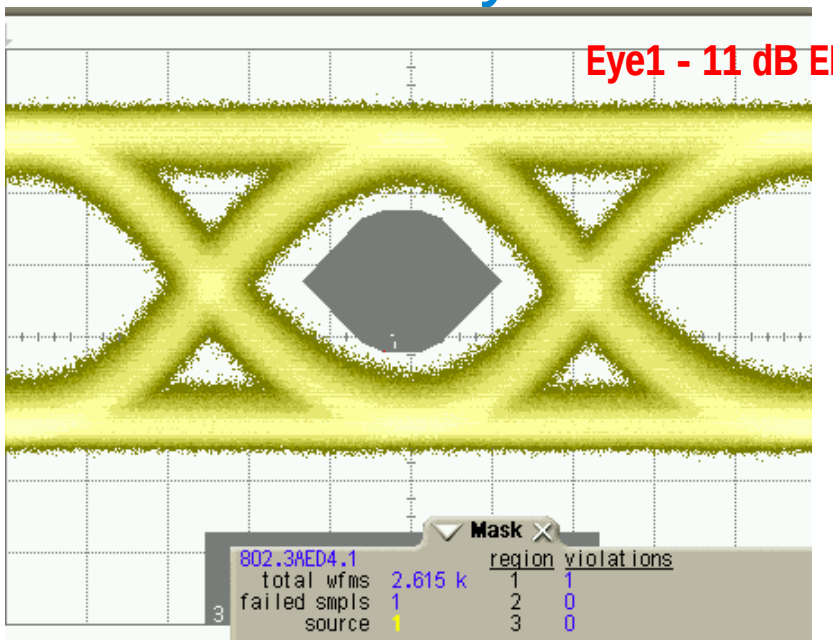


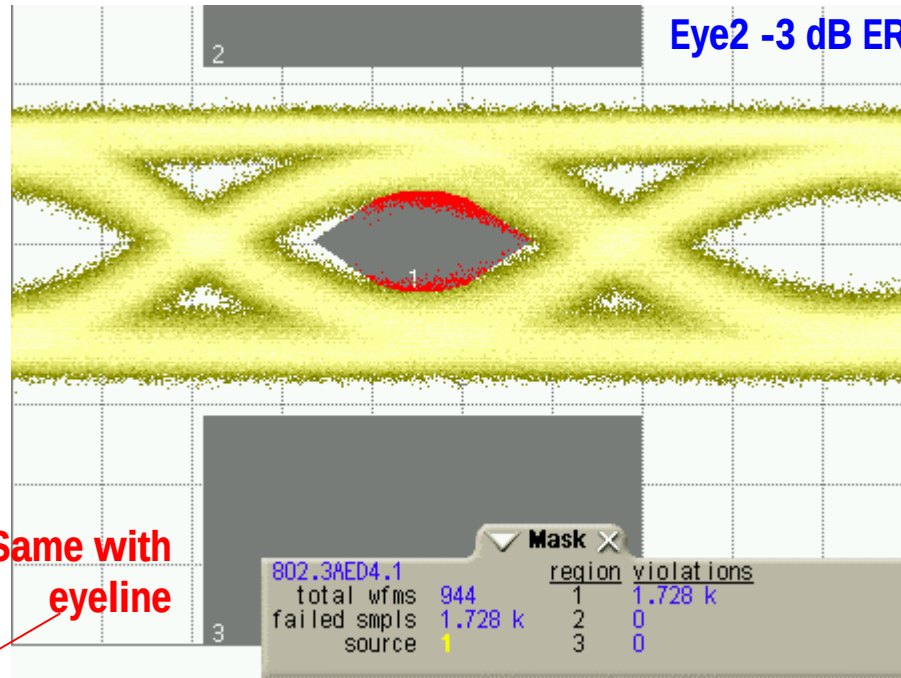


Eye closure obtained by undermodulating the LiNbO3 MZ,
bad extinction ratio obtained by polarization misalignment at MZ input

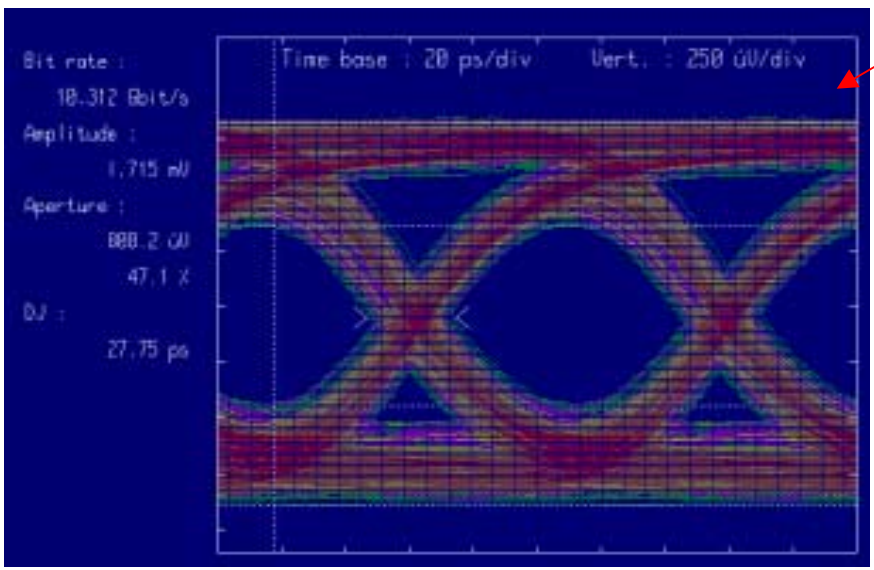


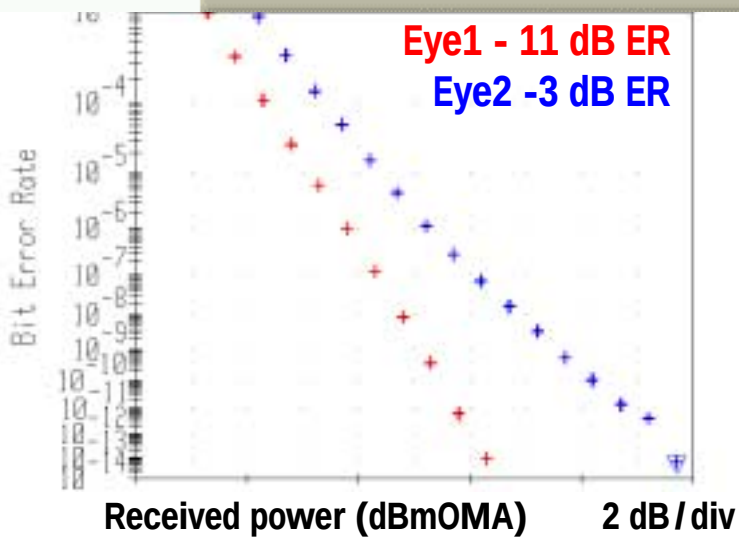
Effect of eye closure and extinction ratio



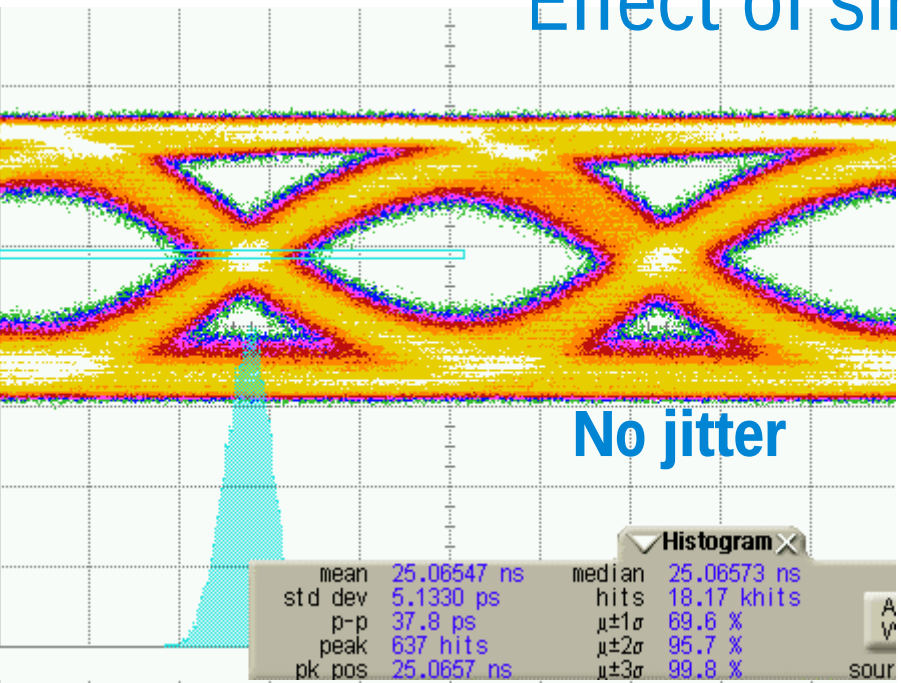


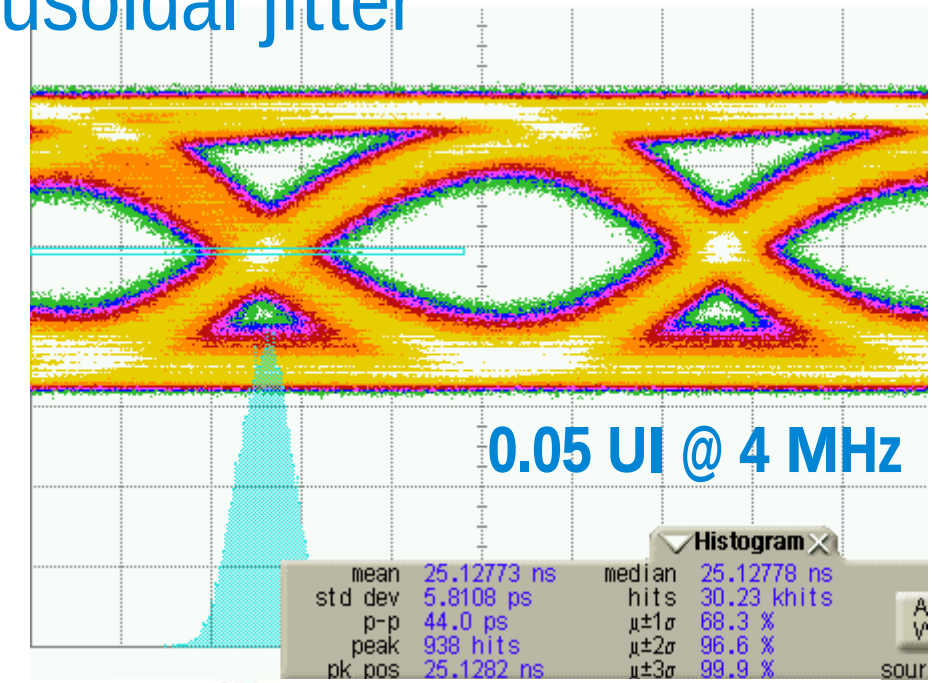
Same with eyeline

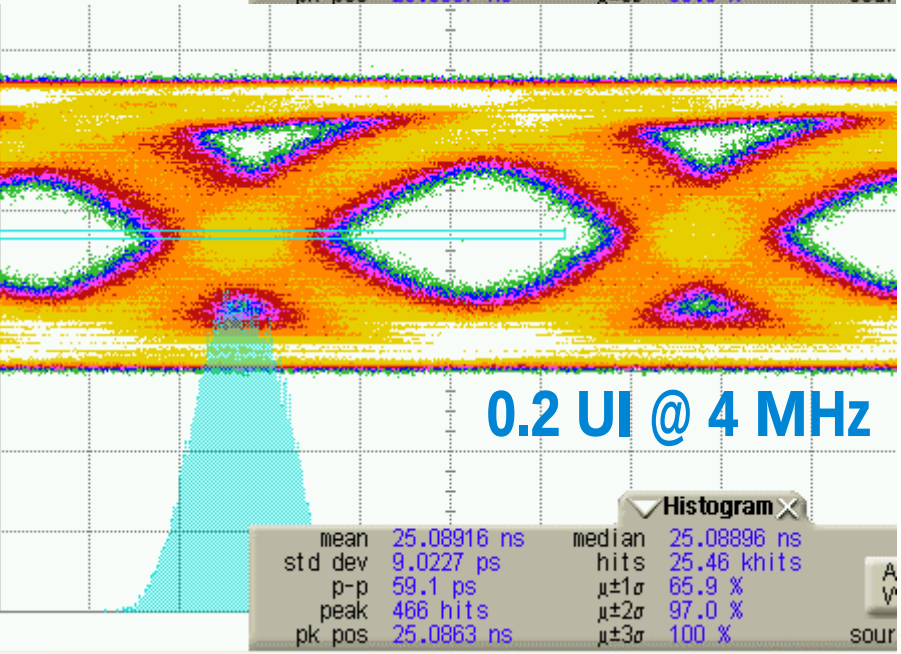


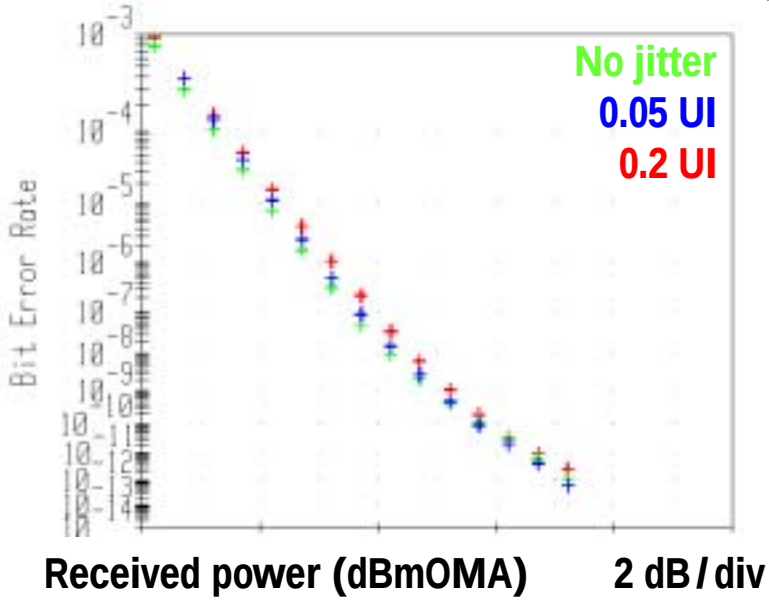


Effect of sinusoidal jitter









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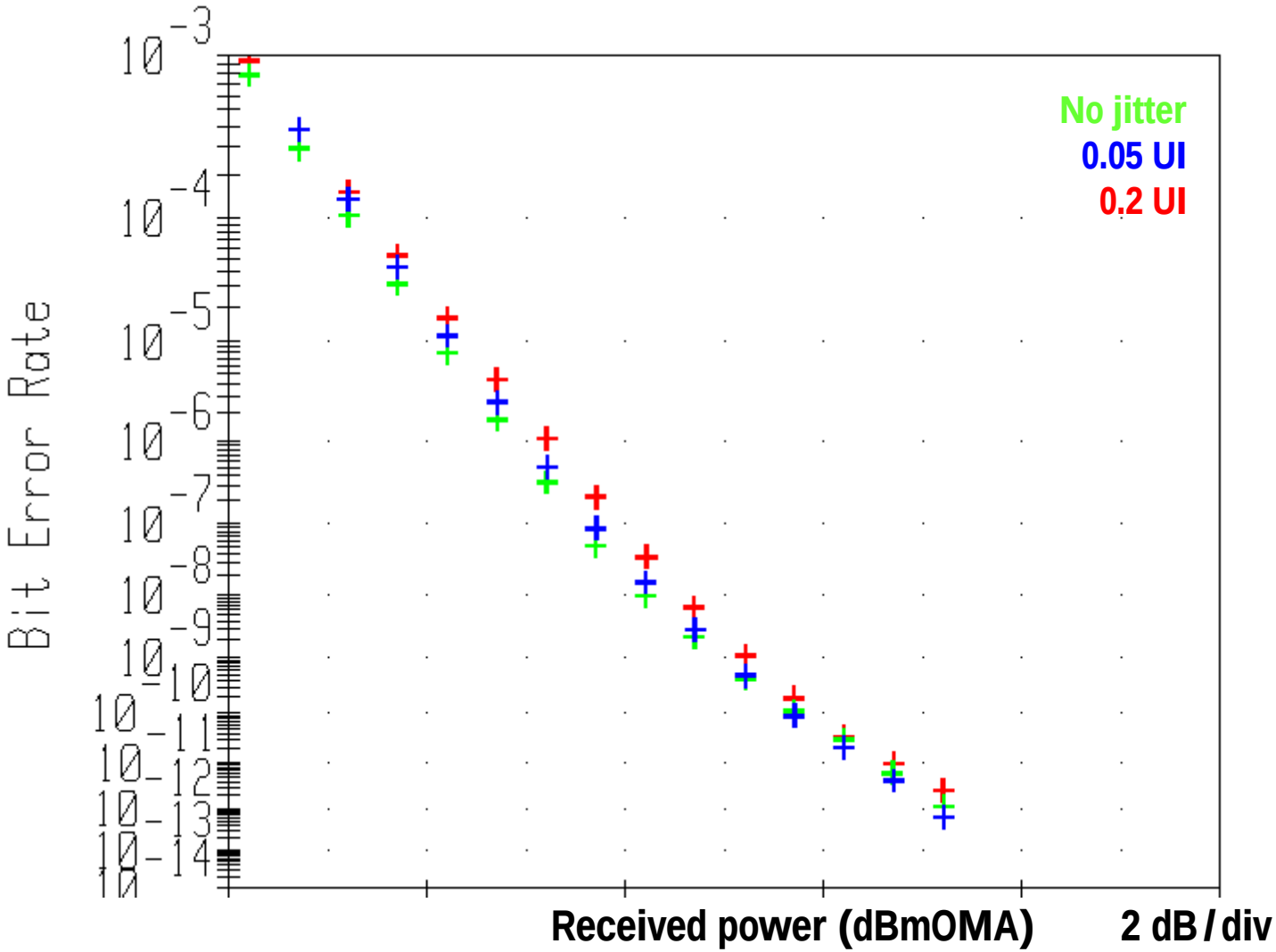
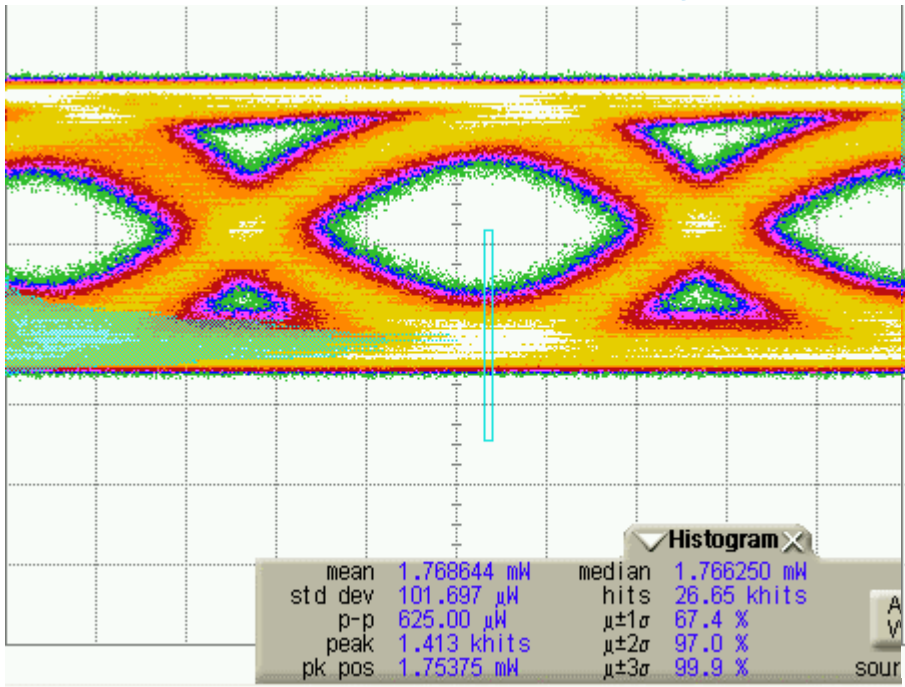
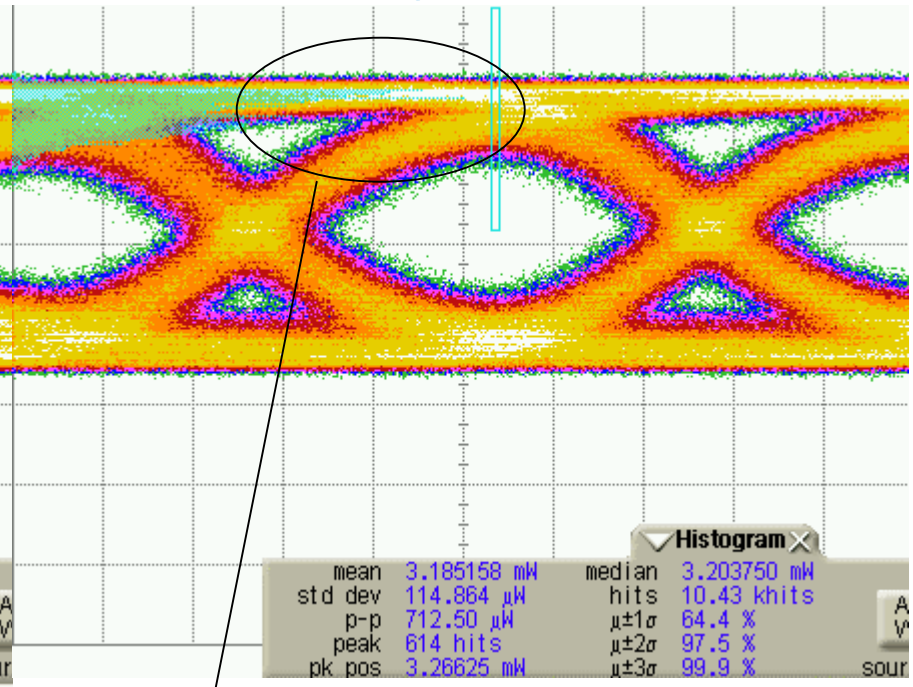
Same expanded

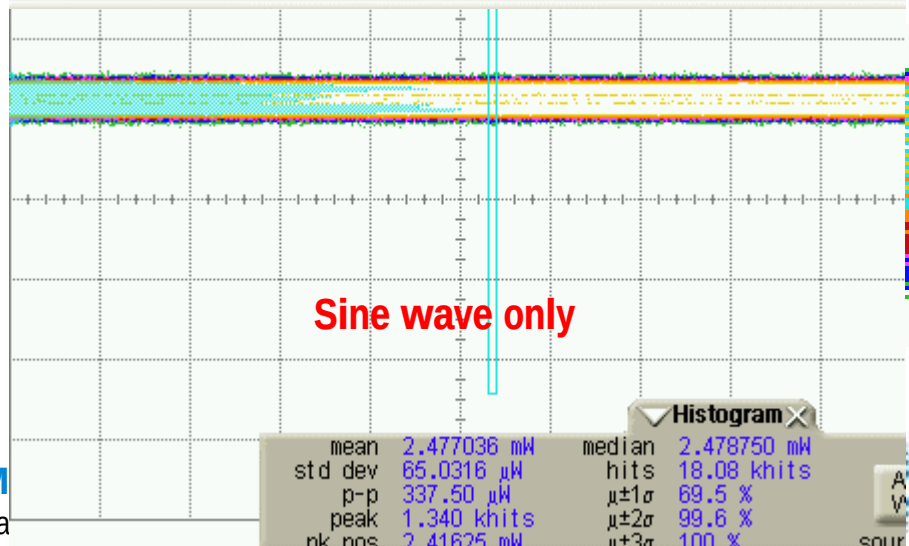


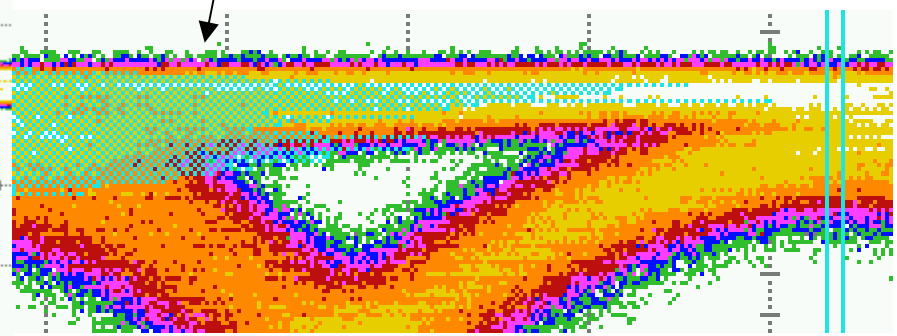
Effect of sine wave + sinusoidal jitter

0.10 UI @ 4 MHz + sine -6 dBm @ 1 GHz

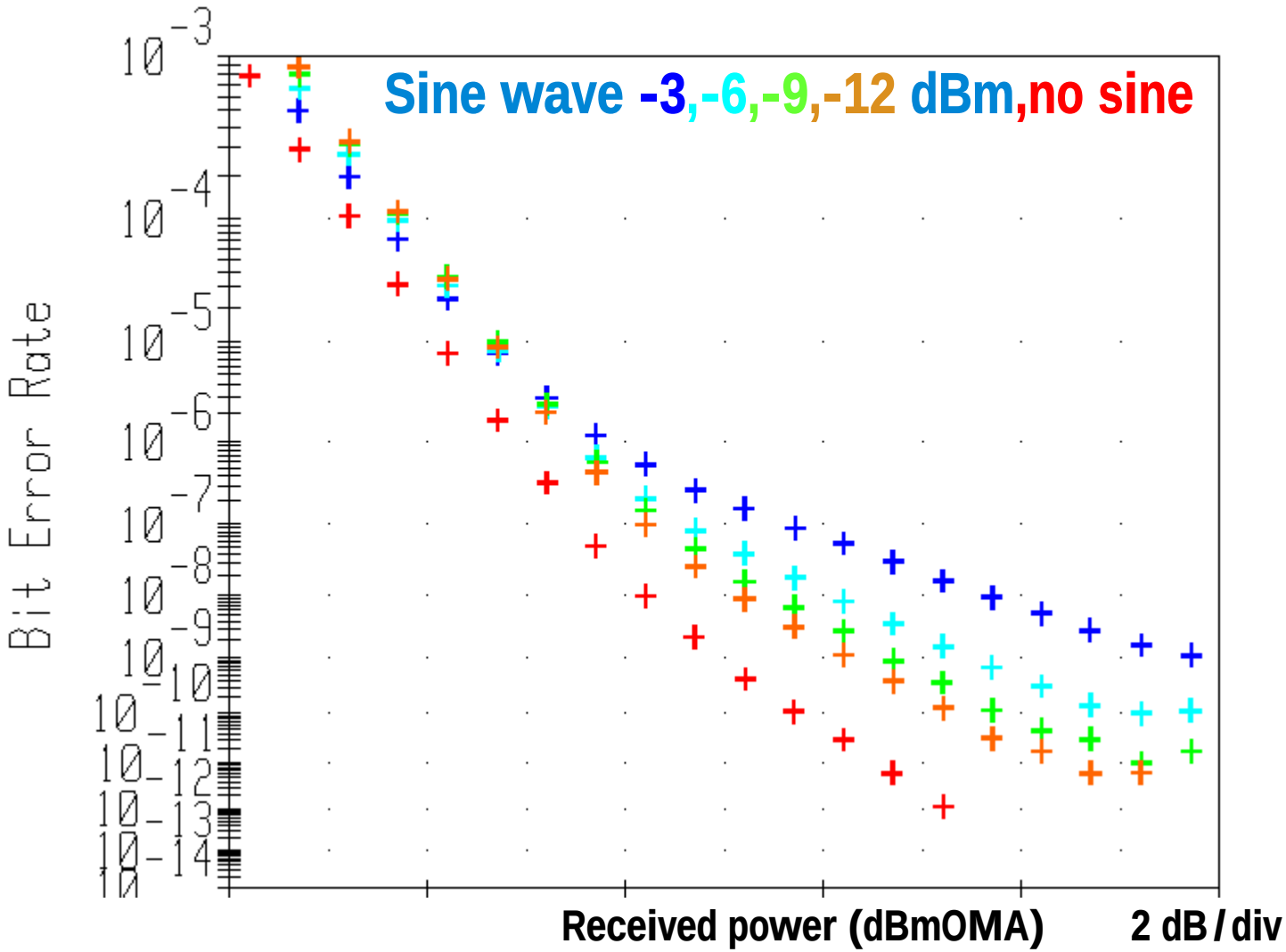




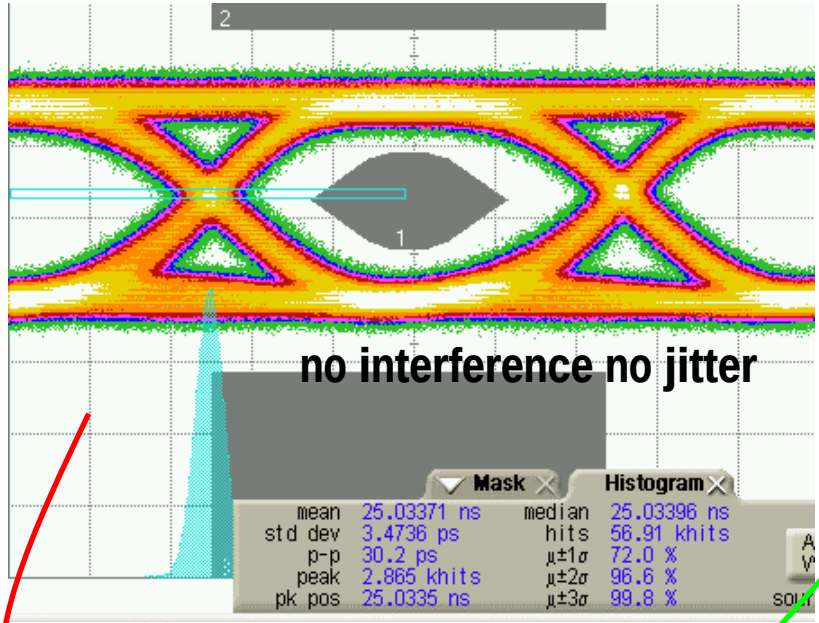


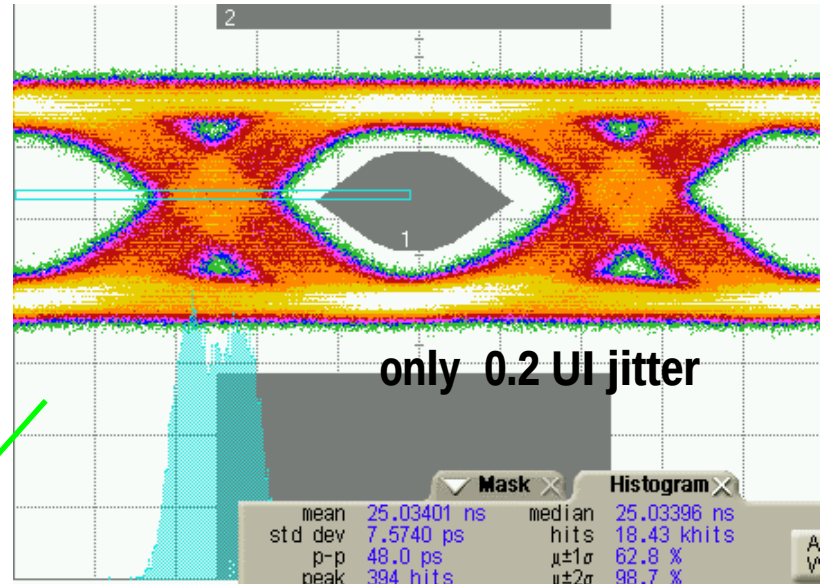


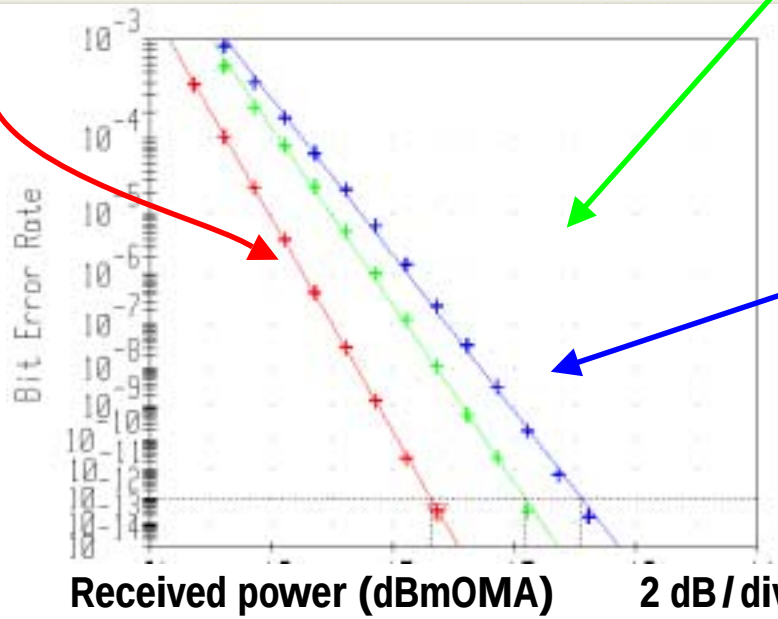
Effect of sine wave + sinusoidal jitter

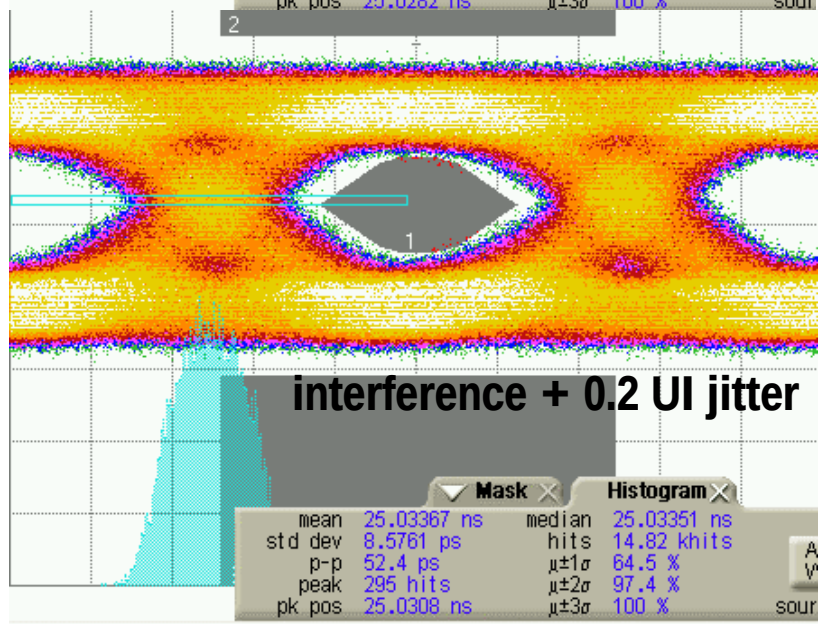


Directly modulated 1300 nm source

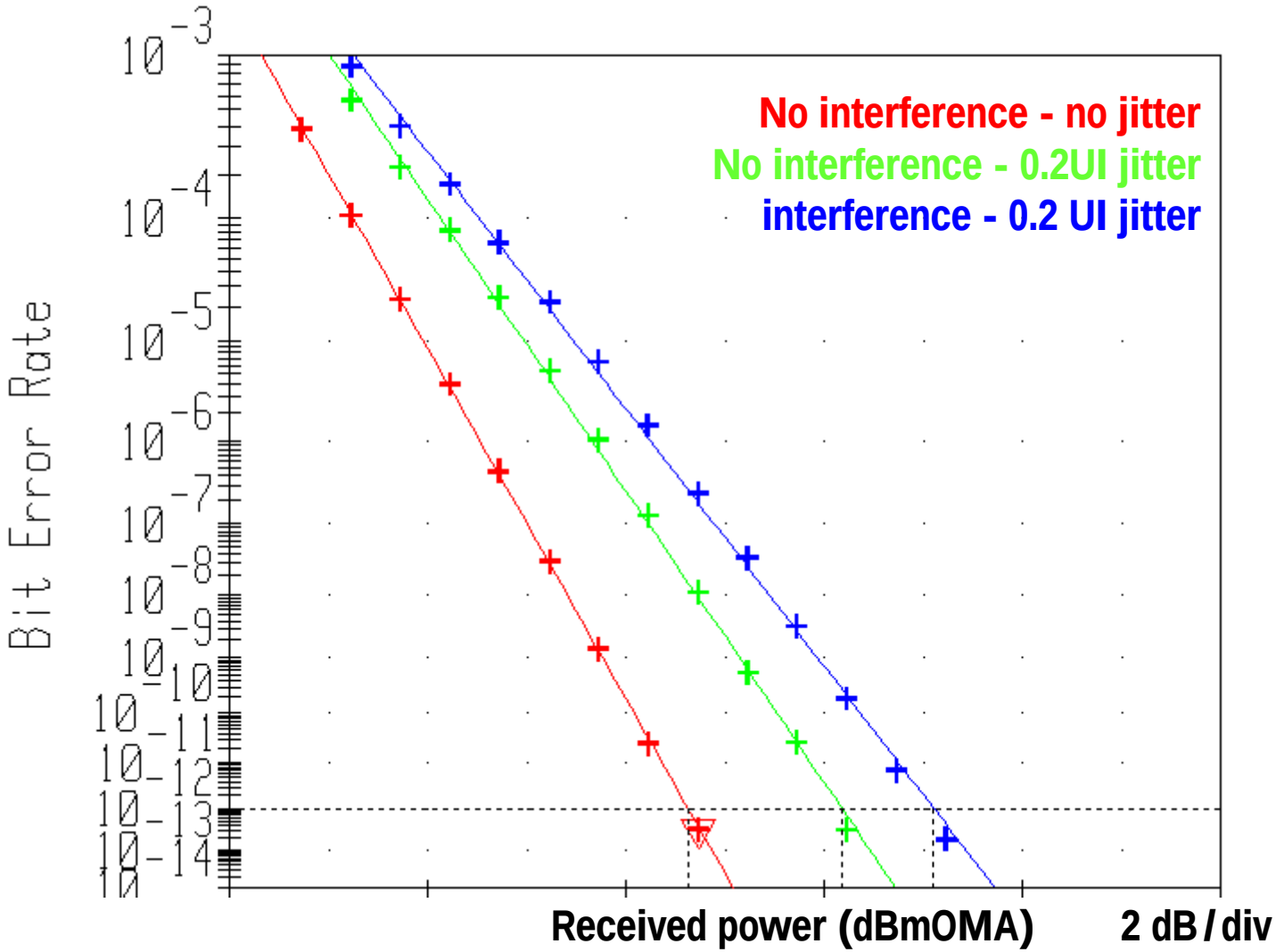






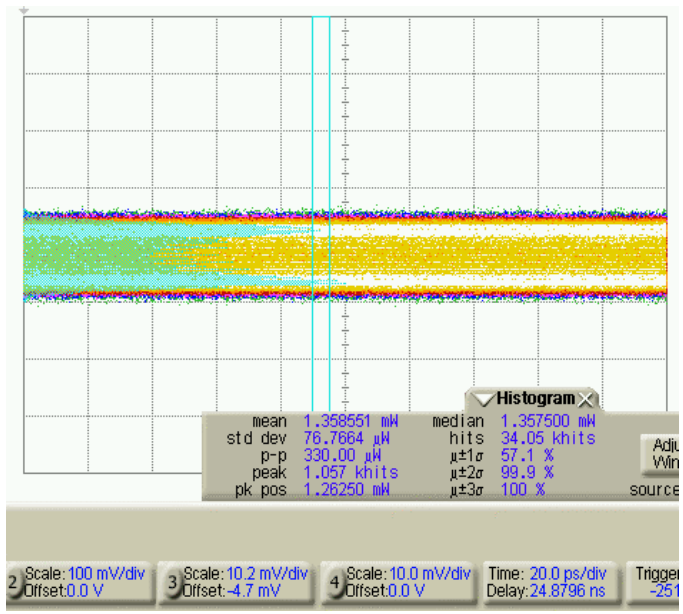


Same expanded

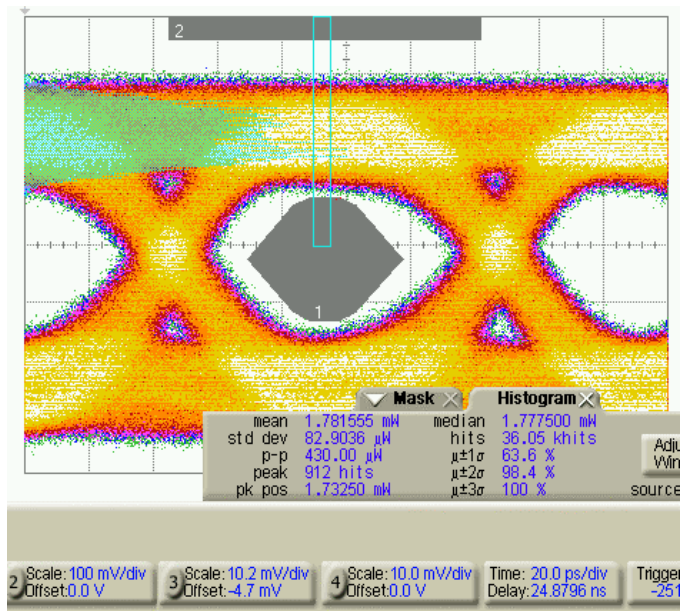


Directly modulated source

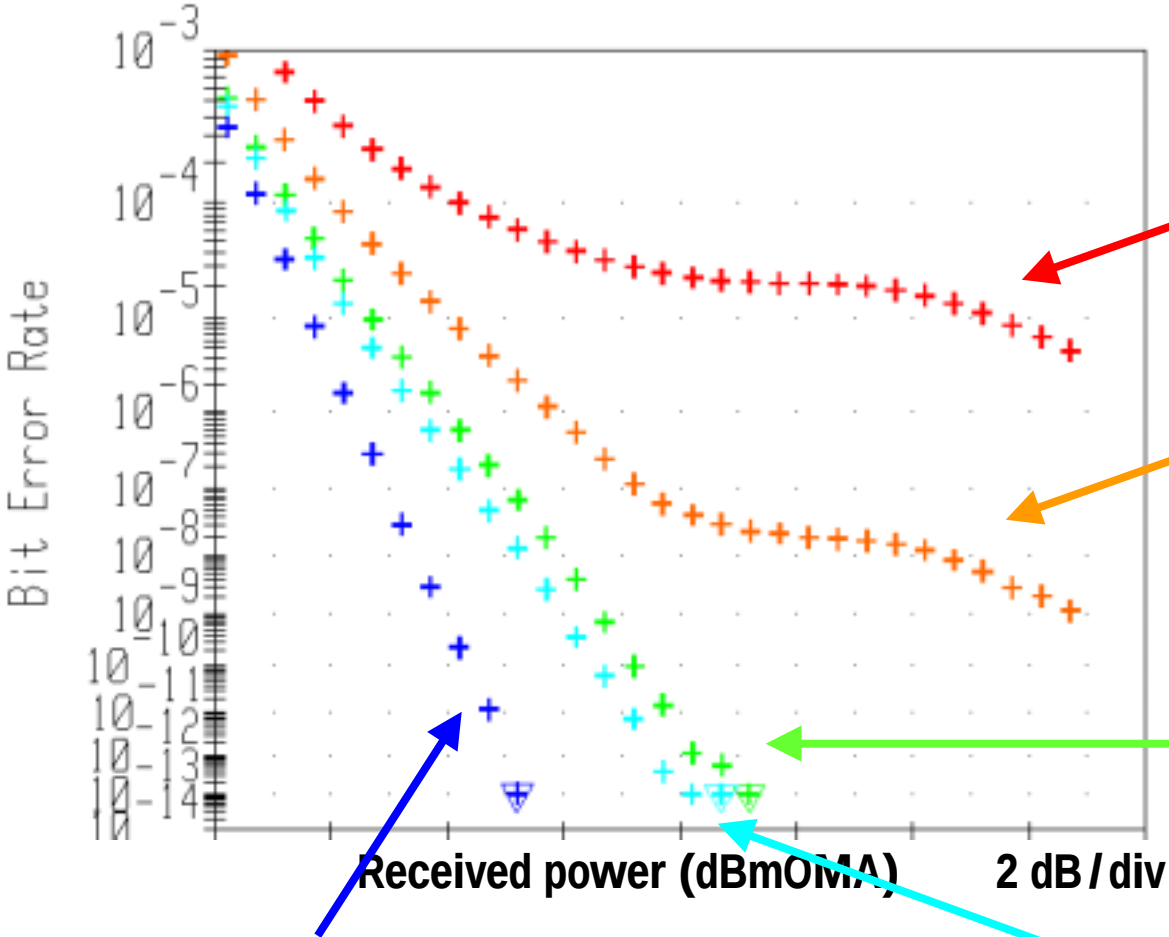
no data, no jitter, sine wave only

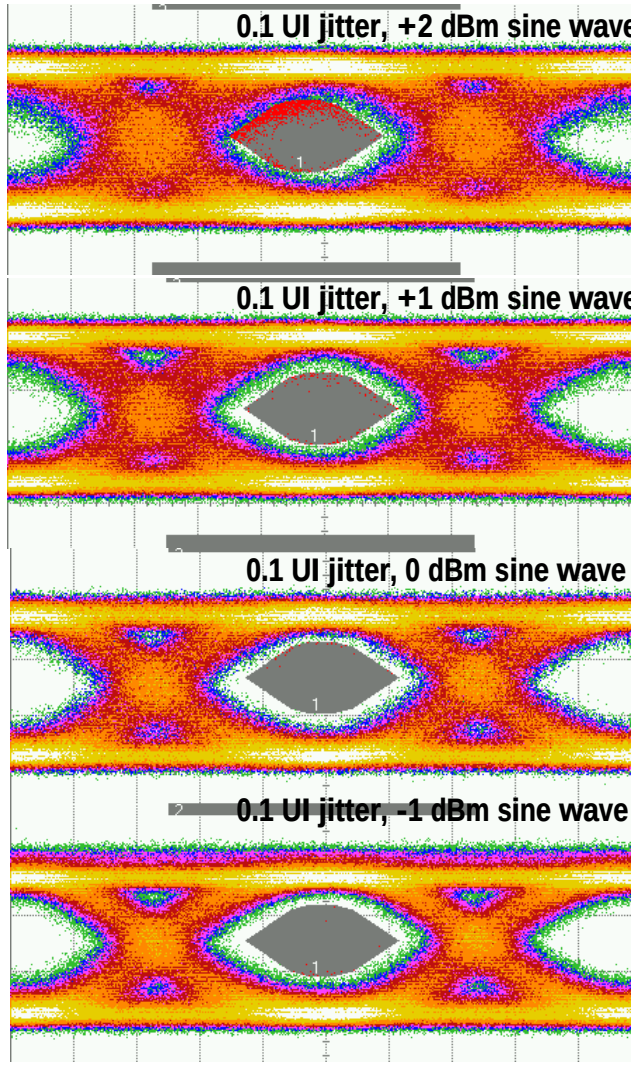


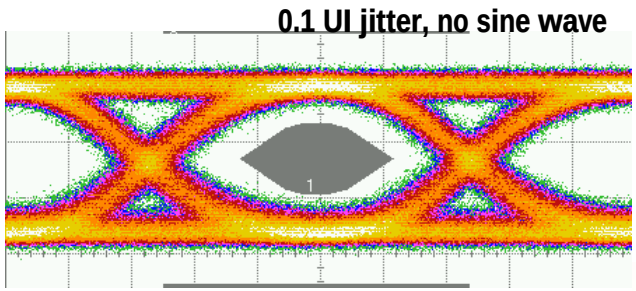
all



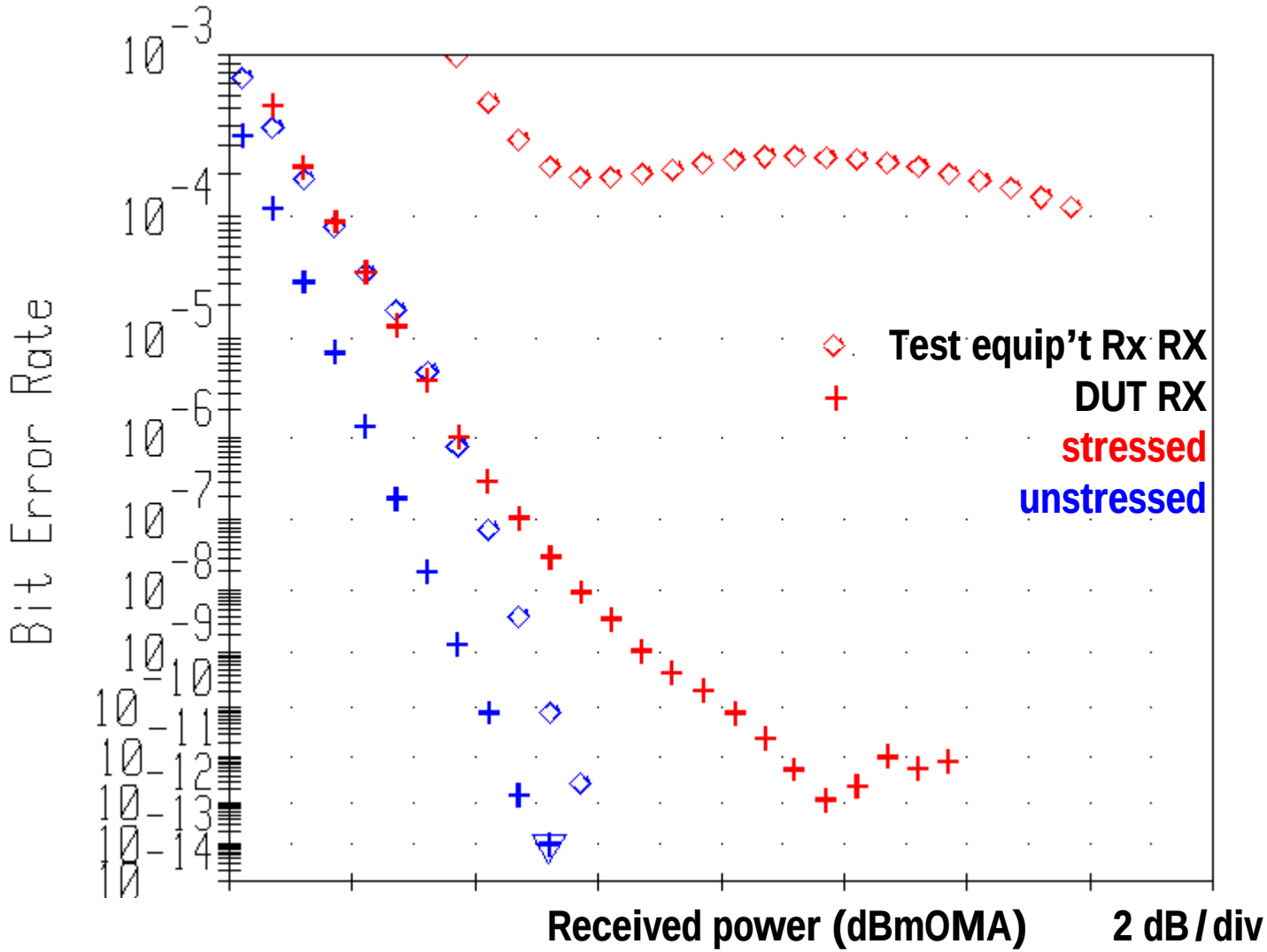
MZ driven over full dynamic range + sine wave + jitter







Other receivers are more affected by stressed eye



Conclusions:

Bad extinction ratio, DJ and ISI don't seem to give error floor problems, only penalty

Same for sinusoidal time jitter

Interfering sine wave very critical

With MZ TX used in linear region (small signal):
gives error floor even when it's nearly invisible in the eye.

With MZ TX used in limiting region (larger signal):
small differences in interferer pass from error free to error floor at 10^-8

With directly modulated laser :
gives penalty without floor even with ugly eye.

From test fest, receivers with higher tolerance have lower sensitivity