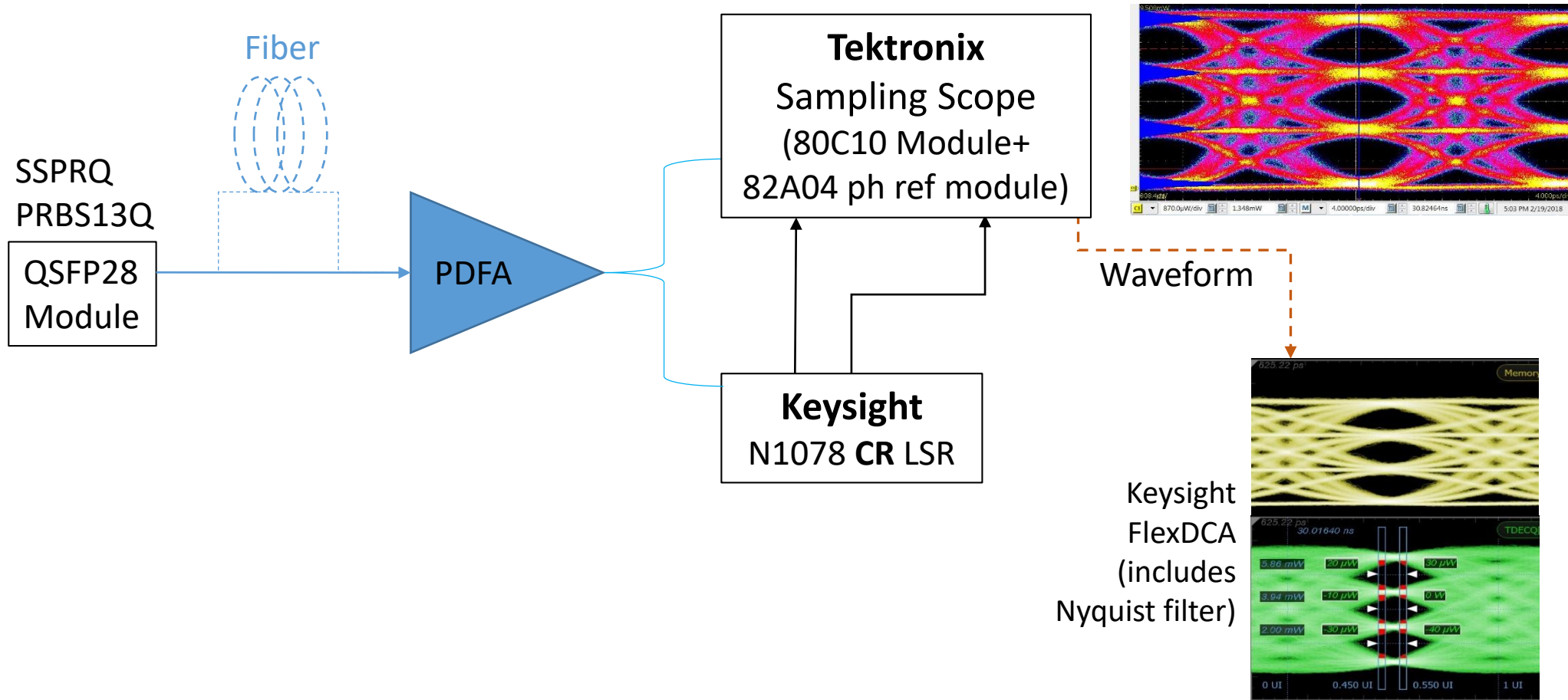# 100GBASE-DR: 'GoldenEye'

- Marco Mazzini -

Background

- So far 802.3bs and 802.3cd requested TX waveforms across different technologies and rates (more recently, 100G Lambda MSA decided that it would be beneficial to gather some representative TDECQ data from a variety of transmitters).

- Different IEEE contributions (schube_011718_3cd_adhoc, dawe_032118_3cd_adhoc) highlighted that probably some more work has to be done to refine SECQ methodology and limit the 'practical' TDECQ region to ensure no interoperability troubles.

- Based on these requests, we are publishing 53.125 GBaud optical eyes and the acquired waveforms (PRBS13Q and SSPRQ), from a 100GBASE-DR QSFP28 module tested in Cisco Italy.

- Based on the low noise and low ISI characteristics, we think it can be used as *'GoldenEye'* for 53GBaud optical simulations (e.g. filtering, noise, distortion can be added).

Eye acquisition (TDECQ test) – TX set-up

SSPRQ
PRBS13Q

Fiber

QSFP28
Module

PDFA

Tektronix
Sampling Scope
(80C10 Module+
82A04 ph ref module)

Keysight
N1078 **CR** LSR

Waveform

Keysight
FlexDCA
(includes
Nyquist filter)

Transmitter waveforms are acquired with above set-up and already published.
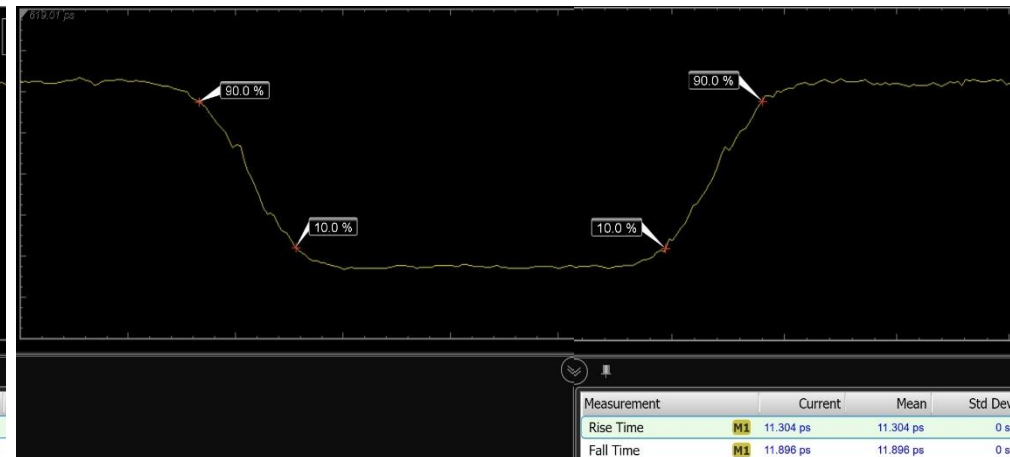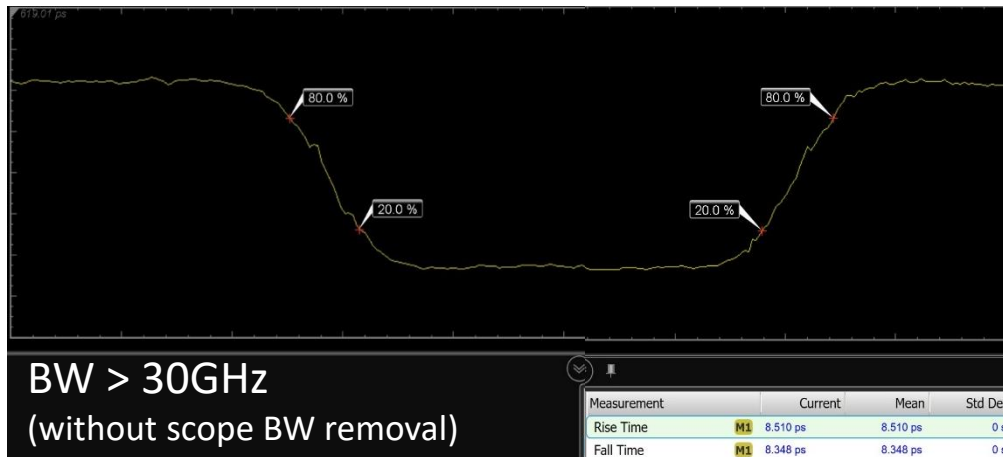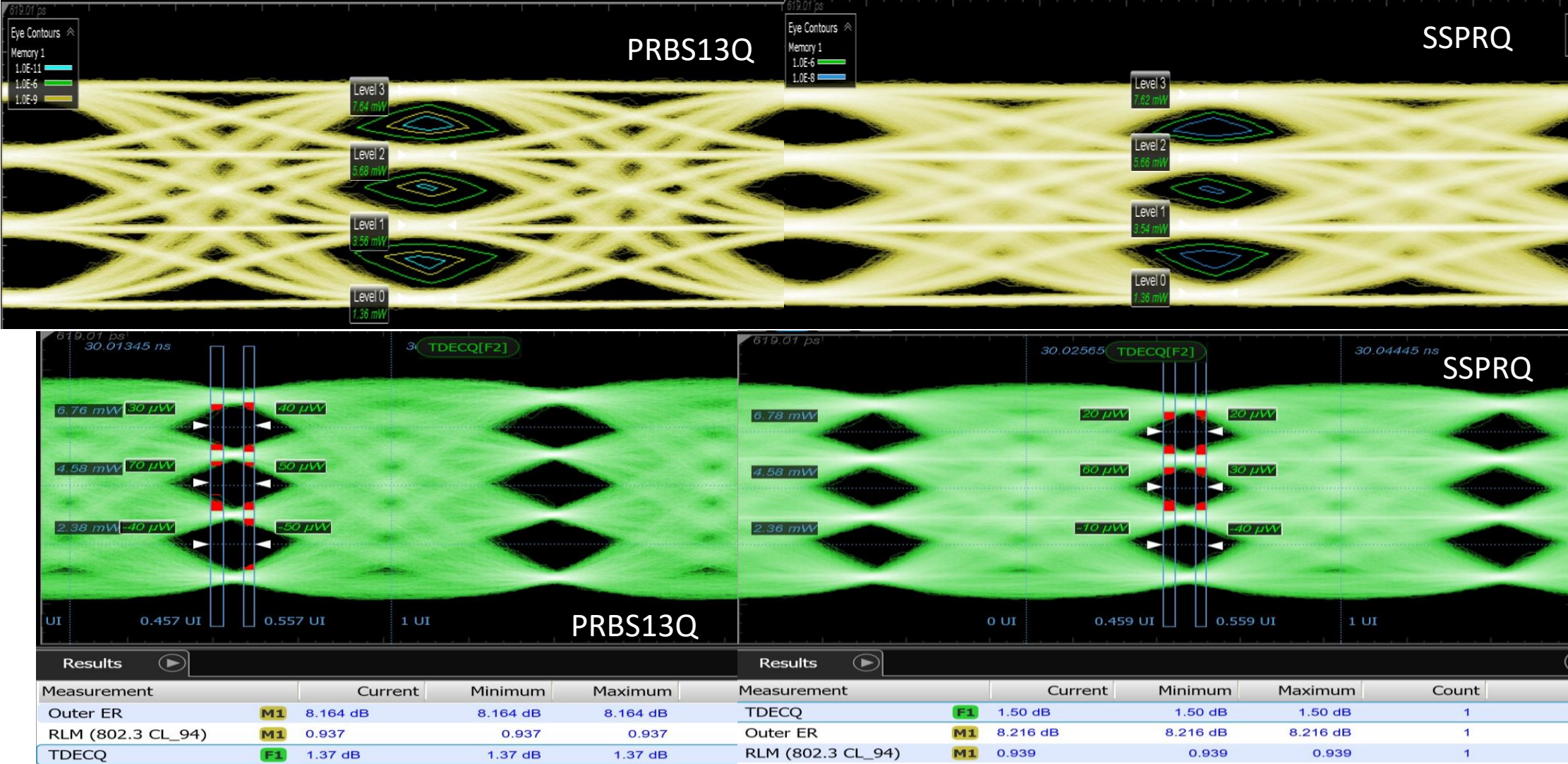
TX characteristics: eye diagram, ER, RLM, rise/fall.
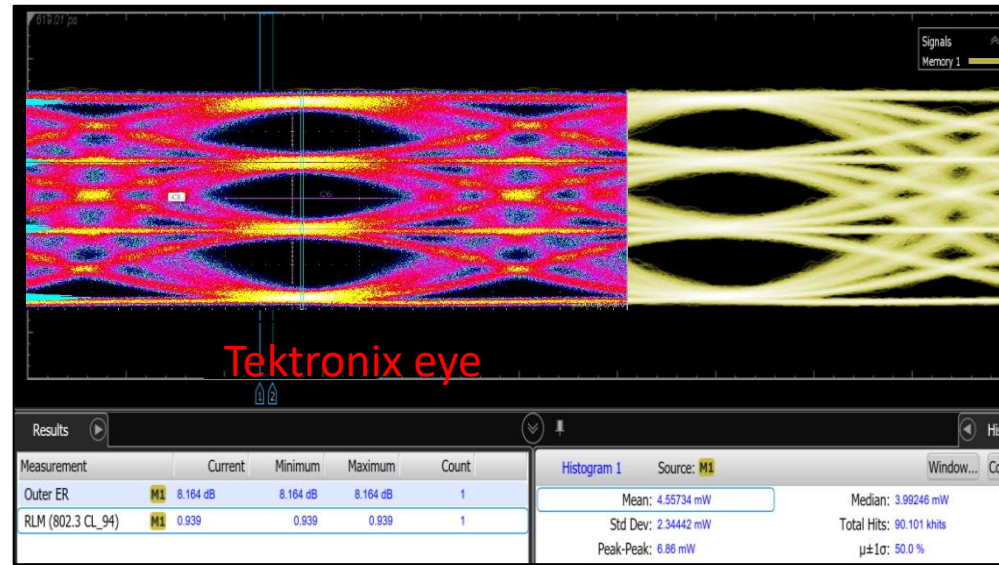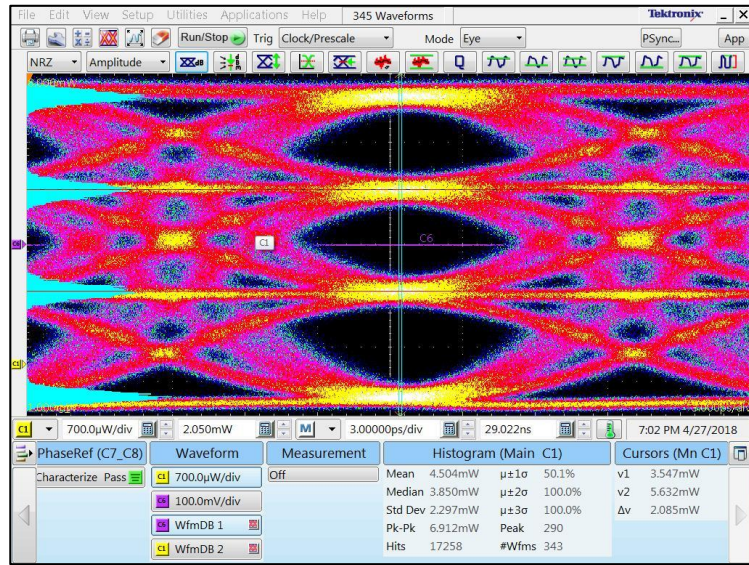
Raw waveform (no equ)
Calc VECP01 = 2.12 dB
Calc VECP12 = 2.68 dB
Calc VECP23 = 2.25 dB

VECP calculated as 10*Log of ratio between relative level spacing and 1E-5 Eye Height.

Calculated SNR > 32dB.

Tektronix eye

BW > 30GHz
(without scope BW removal)
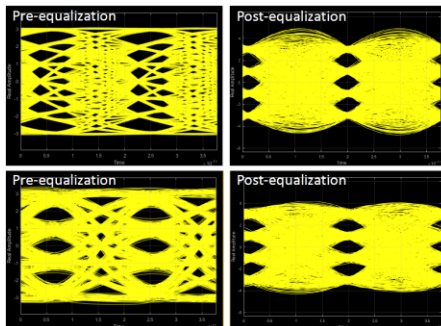
PRBS13Q and SSPRQ: eye countour, TDECQ.

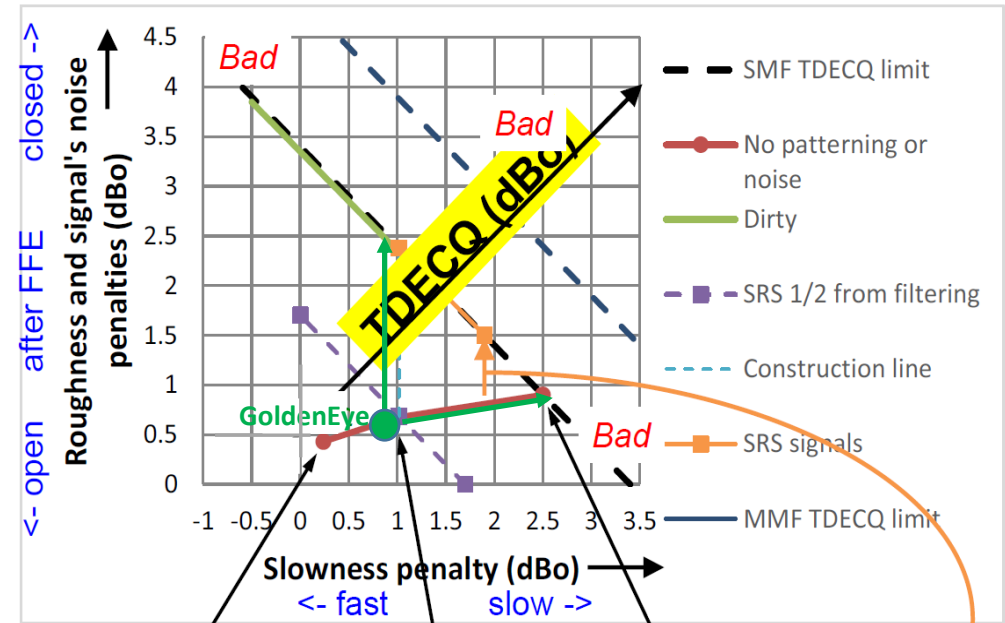TDECQ as per latest IEEE 802.3cd draft (1% OMA outer threshold optimization).

Comments

We think that Cisco's GoldenEye can be then useful to model towards Case A and B SRS behaviors as per
schube_011718_3cd_adhoc (left), or sit close to the ideal waveform in the dawe_032118_3cd_adhoc chart (right).

SECQ limit

Case A | Case B | GoldenEye | +Filter | +Noise
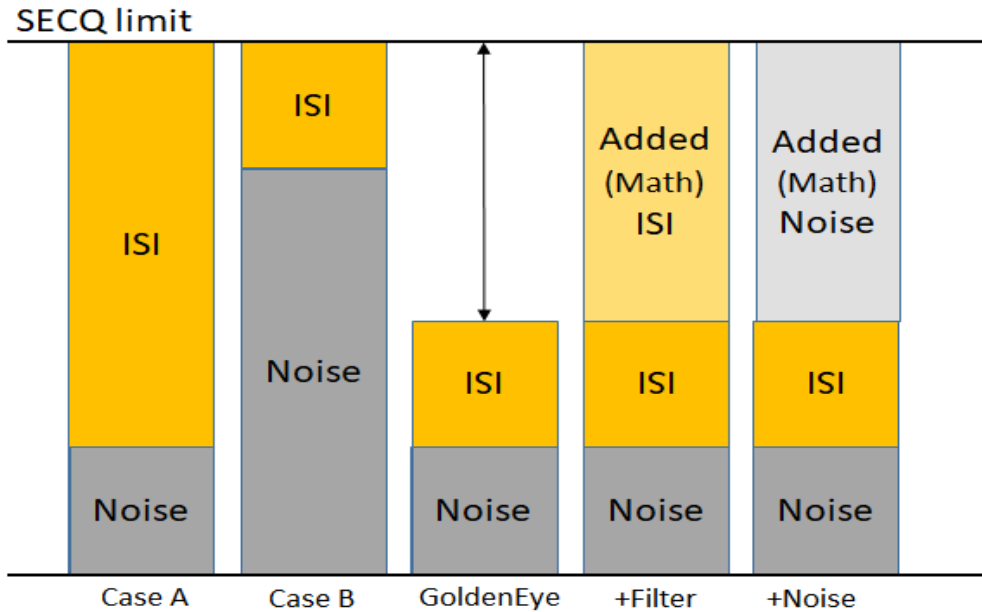
Case A SRS conformance signal
@ 1.7 dB SECQ
35 dB SNR, ~22 GHz Tx BW

Case B SRS conformance signal
@ 1.7 dB SECQ
23.5 dB SNR, ~35 GHz Tx BW

Pre-equalization | Post-equalization
Pre-equalization | Post-equalization

Legend:
- SMF TDECQ limit
- No patterning or noise
- Dirty
- SRS 1/2 from filtering
- Construction line
- SRS signals
- MMF TDECQ limit

Ideal waveform | Half the SECQ from filtering | Slowest, as dawe_3cd_01a_0318 slides 2 to 5

Slowness penalty (dBo)	0.92
Residual ISI, noise penalties (dBo)	0.58

THANK YOU