# SECQ versus threshold adjustment (some eye compression cases).

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Background

- 802.3cd draft included optimization of threshold by up to ±1% of OMAouter as part of TDECQ measurement method.

- In this work we analyse the SECQ variation due to optimum threshold adjustment at ±1% and ±2% of OMA outer over some of the compression cases illustrated into king_3cd_01_0118.
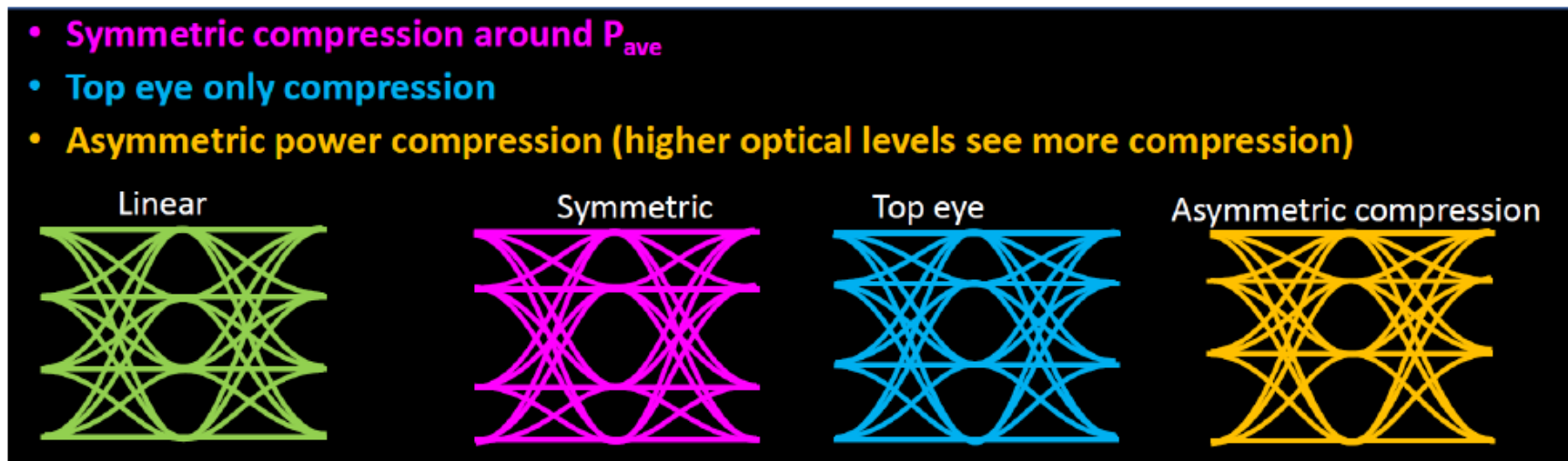

- Experimental results reinforce the fact that TDECQ/SECQ variation is heavy function of signal distortion.

Tester set-up part list (in progress)

We recently purchased and assembled key parts to develop SECQ tester as per IEEE 'Stressed receiver conformance test block diagram'.

Hardest work of calibration process should include the ability to switch between different compression cases in a (dynamic) repetitive way.

Next slides showing SSPRQ waveforms acquired during preliminary calibration process (values *around* 3dB SECQ) and then post processed with FlexDCA beta FW.
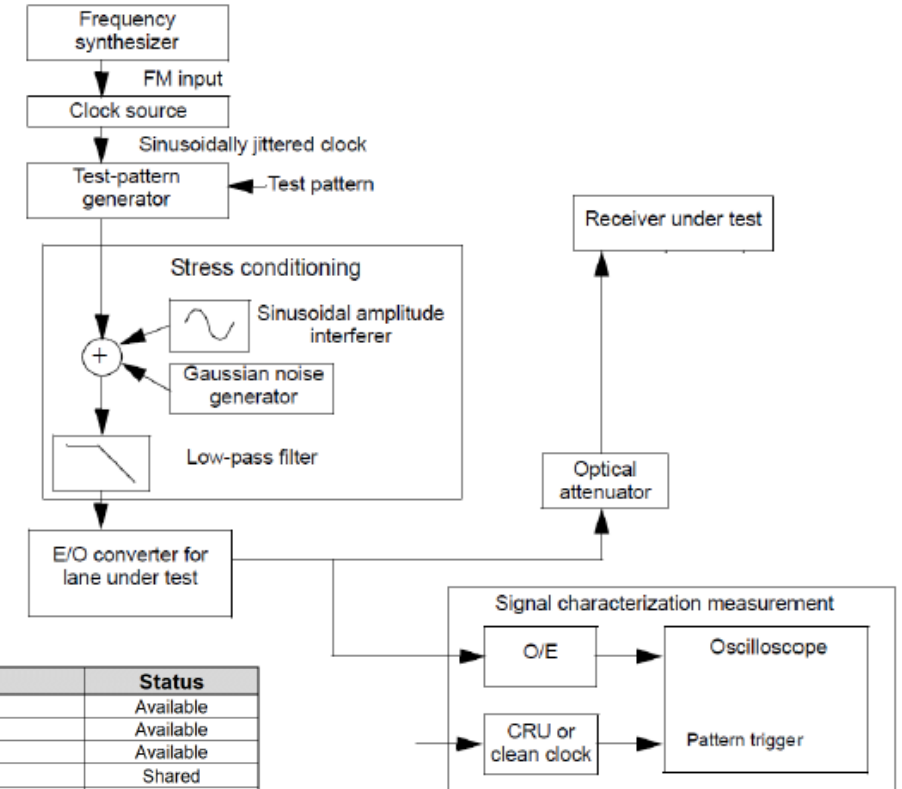

SECQ tester - available part list

Equipment	Manufacturer	Part Number	Comment	Status
Mainframe	Anritsu	MP1800A		Available
PPG (2x32G)	Anritsu	MU1830020A		Available
Clock Synthezizer / Jitter	Anritsu	MU181000A	Only SJ injection	Available
	Anritsu	MU181500B	RMS Jitter and Noise, SJ injection	Shared
53G DAC	Anritsu	PAM4 DAC G0374A		Available
LiNbO3 Modulator	Fujitsu	FTM7937EZ	D-D modulator	Available
PM Laser	Santec	Tunable Laser TSL-550		Available
PDFA amplifier	FiberLabs Inc.	AMP-FL8611-OB-13		Available
Linear amplifier	SHF	SHF M827 A	Optional 67Ghz, 11dB Amplifier for S-D modulator	Optional
Low Pass Filter(s)	Tektronix	PSPL5935 25-28GHz		Optional
Mainframe	Tektronix	DSA8300		Available
Scope transmitter SW	Keysight	P.05.80.12	PAM4 analysis software (thr. adj. aligned to IEEE)	Available
CDR	Keysight	N1078A CR LSR		
Optical Head	Tektronix	80C10C	70GHz with different filters	Available
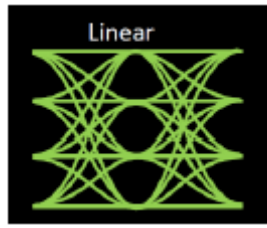
Linear case
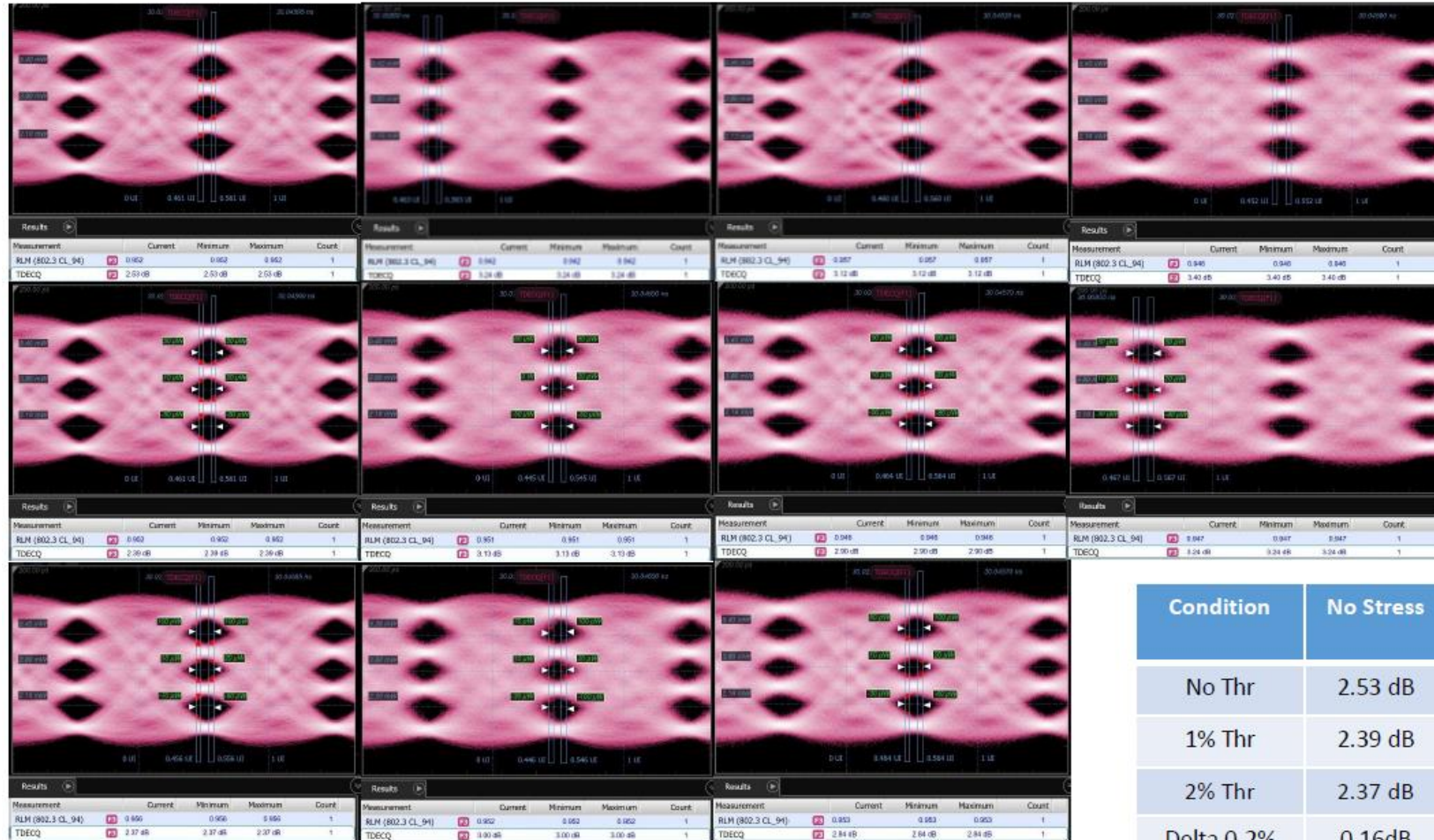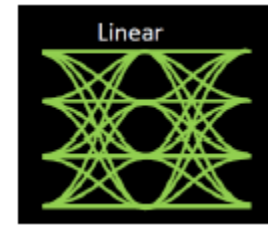
Clause 94	Parameter
6356	L3
4618	L2
2994	L1
1274	L0
0.959	**RLM**
OIF 230	
1738	EH 2-3
1624	EH 1-2
1720	EH 0-1
0.93	**Eye Linearity**

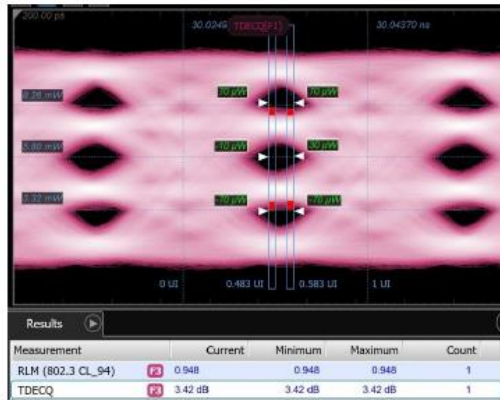| Condition	No Stress	Adding SJ	Adding Noise	Adding SJ and Noise
No Thr	2.53 dB	3.24 dB	3.12 dB	3.4 dB
1% Thr	2.39 dB	3.13 dB	2.90 dB	3.24 dB
2% Thr	2.37 dB	3.00 dB	2.84 dB	3.22 dB
Delta 0-2%	0.16dB	0.24dB	0.28dB	0.18dB
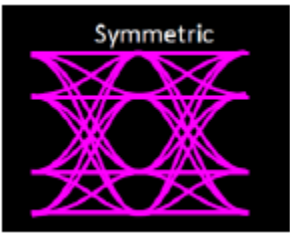
Symmetric compression around Pave
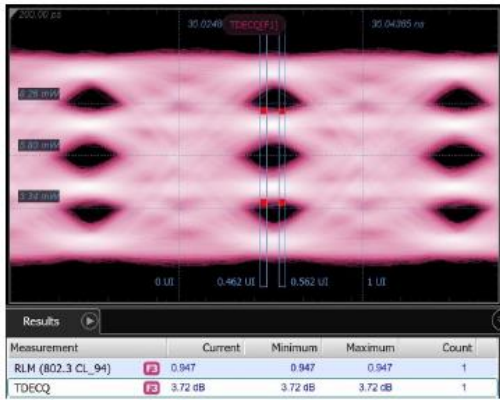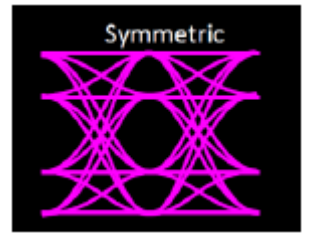
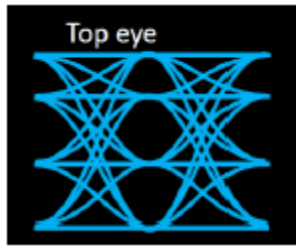(No thr.) SECQ = 3.72dB   (1% thr.) SECQ = 3.42dB   (2% thr.) SECQ = 2.95dB
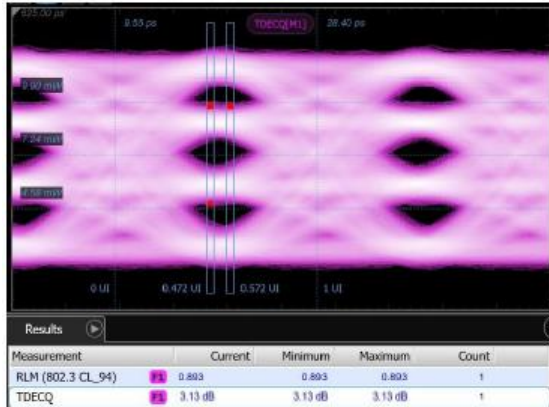
Clause 94	Parameter
9698	L3
7232	L2
4370	L1
1880	L0
0.946	**RLM**
OIF 230	
2466	EH 2-3
2862	EH 1-2
2490	EH 0-1
0.86	**Eye Linearity**

Condition	Symmetric	Delta
No Thr	3.72 dB	-
1% Thr	3.42 dB	0.3dB
2% Thr	2.95 dB	0.77dB

Stronger SECQ improvement due to threshold adjustment with respect linear case.

802.3cd: SECQ versus threshold adjustment

Top-eye compression
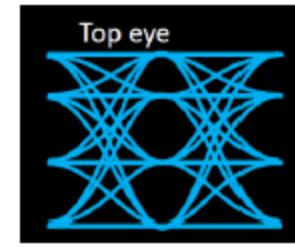
(No thr.) SECQ = 3.13dB

(1% thr.) SECQ = 2.95dB

(2% thr.) SECQ = 2.53dB

Condition	Symmetric	Delta
No Thr	3.13 dB	-
1% Thr	2.95 dB	0.18dB
2% Thr	2.53 dB	0.60dB

Clause 94	Parameter
11422	L3
8856	L2
5824	L1
2804	L0
0.893	RLM
OIF 230	
2566	EH 2-3
3032	EH 1-2
3020	EH 0-1
0.85	Eye Linearity

Stronger SECQ improvement due to threshold adjustment with respect linear case.

802.3cd: SECQ versus threshold adjustment

Comments

- 802.3cd draft included optimization of threshold by up to ±1% of OMAouter as part of TDECQ measurement method.

- By exploring some eye compression cases (as per king_3cd_01_0118), we measured 0.3dB SECQ delta at 1% of OMAouter optimization threshold versus average threshold case.
  - As expected, difference is higher with respect 'linear' tester case.

- An SRS tester should be built to explore some of these compression cases to properly stress RX DUT.
  - As per today, pretty low RLM values are allowed by current SECQ limits.

- According to these experiments, 0.4dB of SECQ reduction due to ± 1% threshold adjustment seems a reasonable number, in case task force will agree to change stressor values.
  - More contributions confirming these findings are welcome.