

EVM_{RMS} Measurements for DP-DQPSK and DP-16QAM Format

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Introduction

- EVM_{RMS} has been adopted in the in-force Recommendation ITU-T G.698.2 as the metric to define the quality of a 100 Gb/s DP-DQPSK transmitter.
- For the future revision of G.698.2, ITU-T Q6/15 has chosen DP-16QAM for 400 Gb/s applications, at least for the 80 km space, and as a candidate format for 200 Gb/s applications.
- Work based on laboratory measurements to investigate the suitability of EVM_{RMS} as the transmitter quality metric also for a DP-16QAM transmitter is ongoing in ITU-T Q6/15.
- The definition of EVM_{RMS} as a suitable metric for a DP-16QAM transmitter in 80 km 400 Gb/s applications in P802.3ct has to be confirmed.

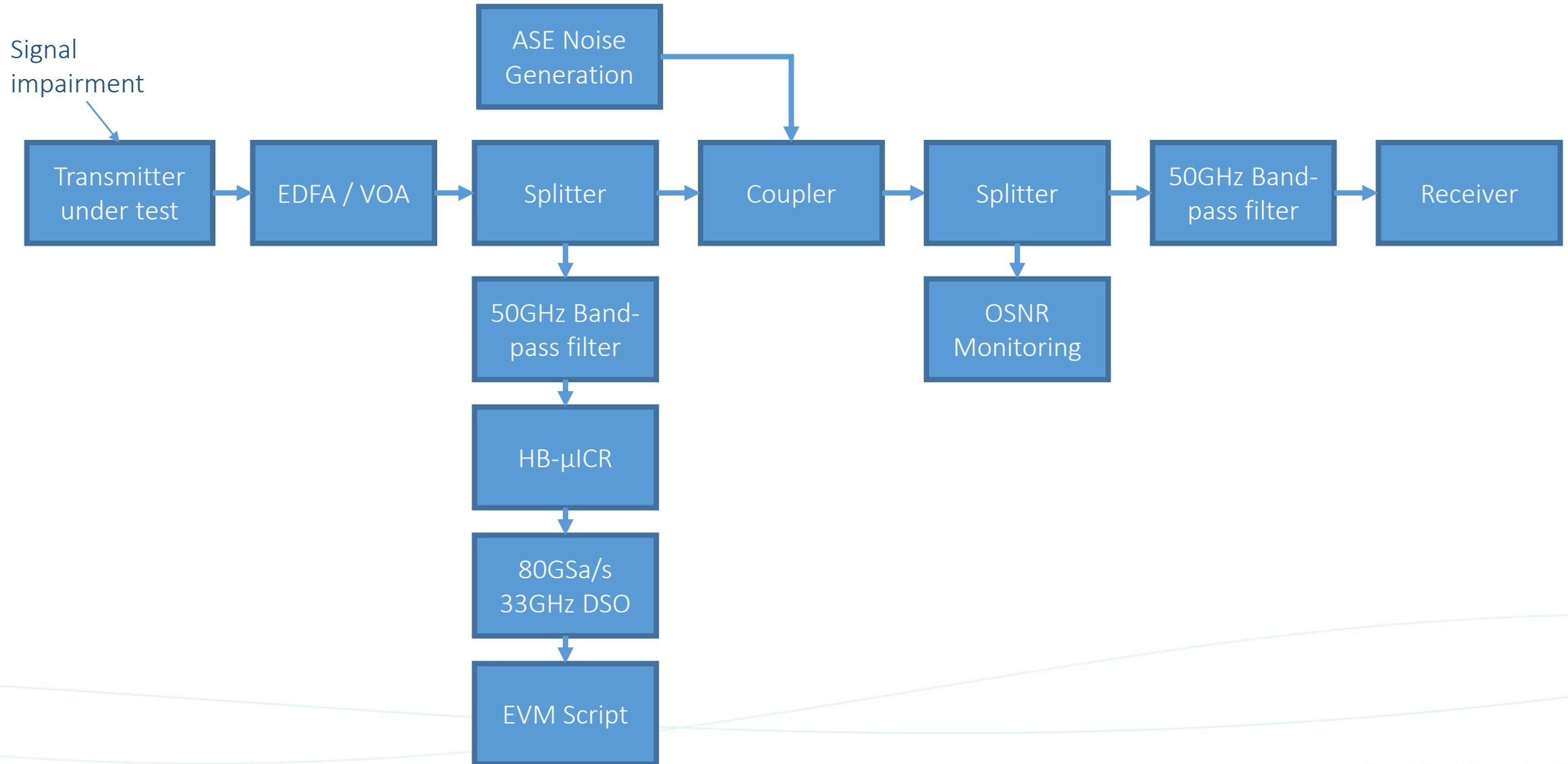
Previous contributions

- The Ad Hoc presentation [anslow_3cn_01_181025](#) and the Vancouver meeting presentation [anslow_3ct_02_0319](#) contained:
 - Measurement results on EVM_{RMS} for DP-DQPSK (considered, together with the ones presented in this contribution, by ITU-T Q6/15 when the EVM_{RMS} limits were defined for 100 Gb/s application codes contained in G.698.2);
 - Measurement results on EVM_{RMS} for DP-16QAM.
- The Ad Hoc presentations [lecheminant_3cn_01_190207](#) and [lecheminant_3ct_01_190509](#) provided an introduction on the processing steps required to calculate the EVM_{RMS} and on the script developed in ITU-T by Q6/15 members for testing purposes.

This contribution

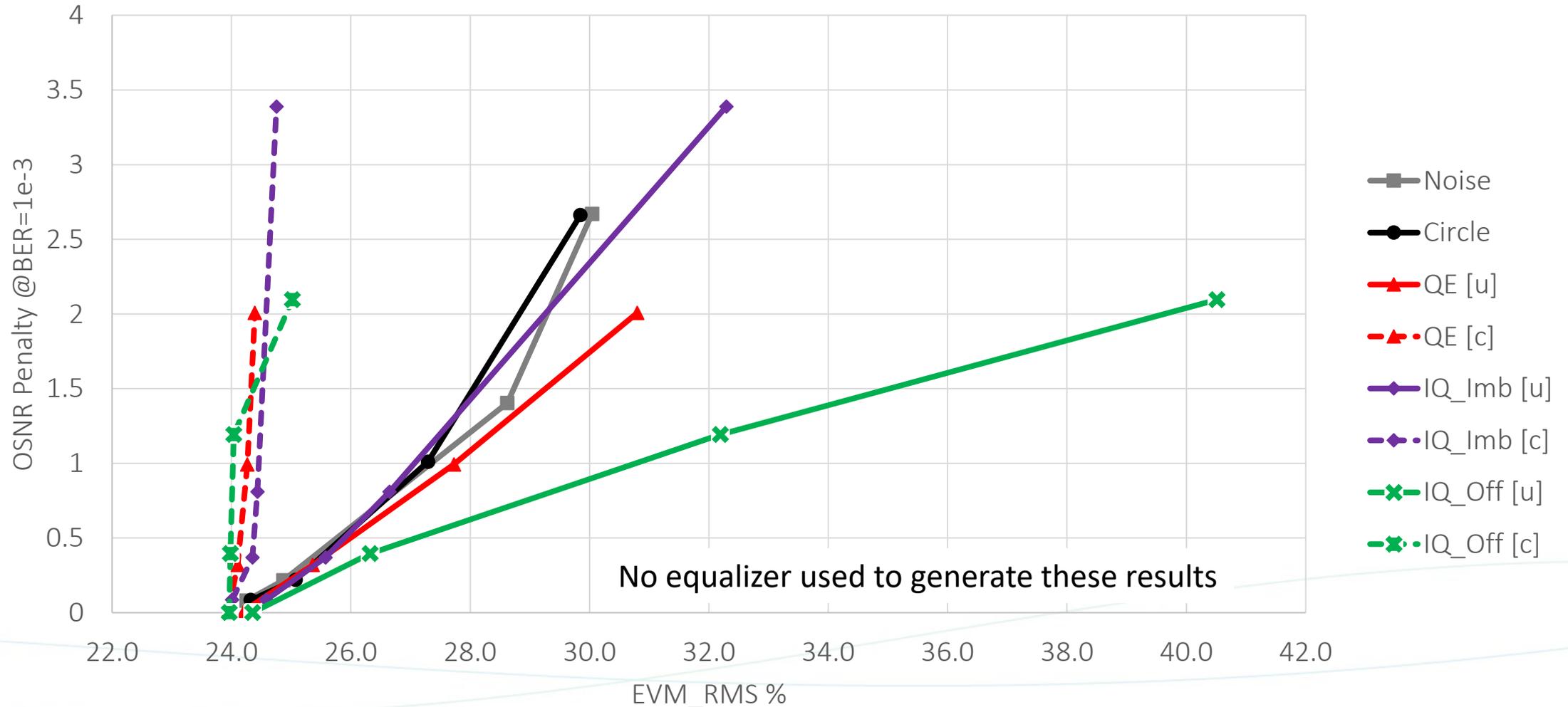
- This contribution reports test results of EVM_{RMS} versus OSNR penalty for DP-DQPSK and DP-16QAM signals impaired by the following transmitter impairments:
 - Additive white Gaussian noise (zero mean noise with Gaussian distributed magnitude and phase);
 - Circle-like noise (zero mean noise with fix magnitude and random phase);
 - Quadrature error (QE);
 - IQ imbalance;
 - IQ offset.

Measurement Setup



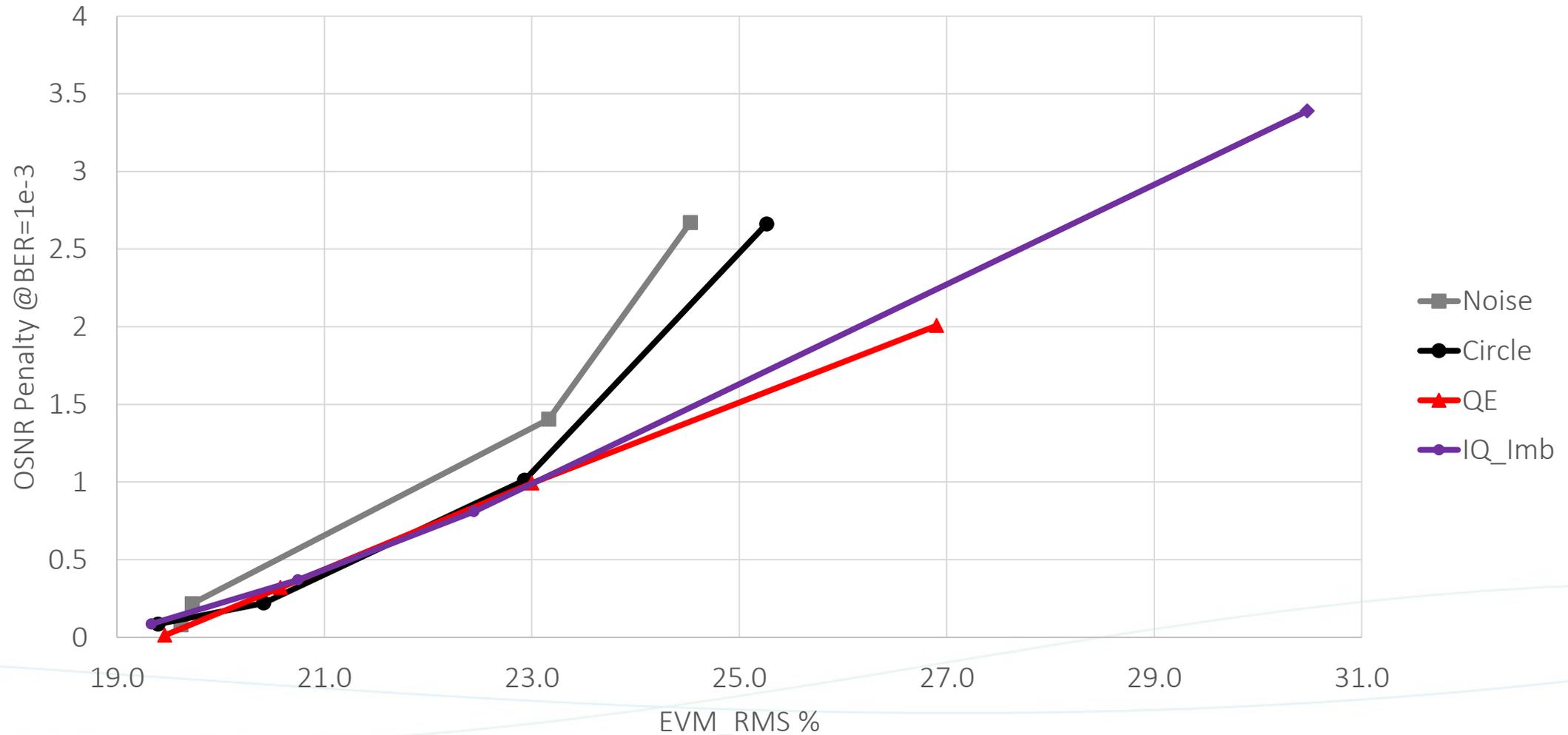
100 Gb/s DP-DQPSK Measurements Results

- Results used to investigate the EVM_{RMS} as transmitter quality metric for 100 Gb/s DP-DQPSK.



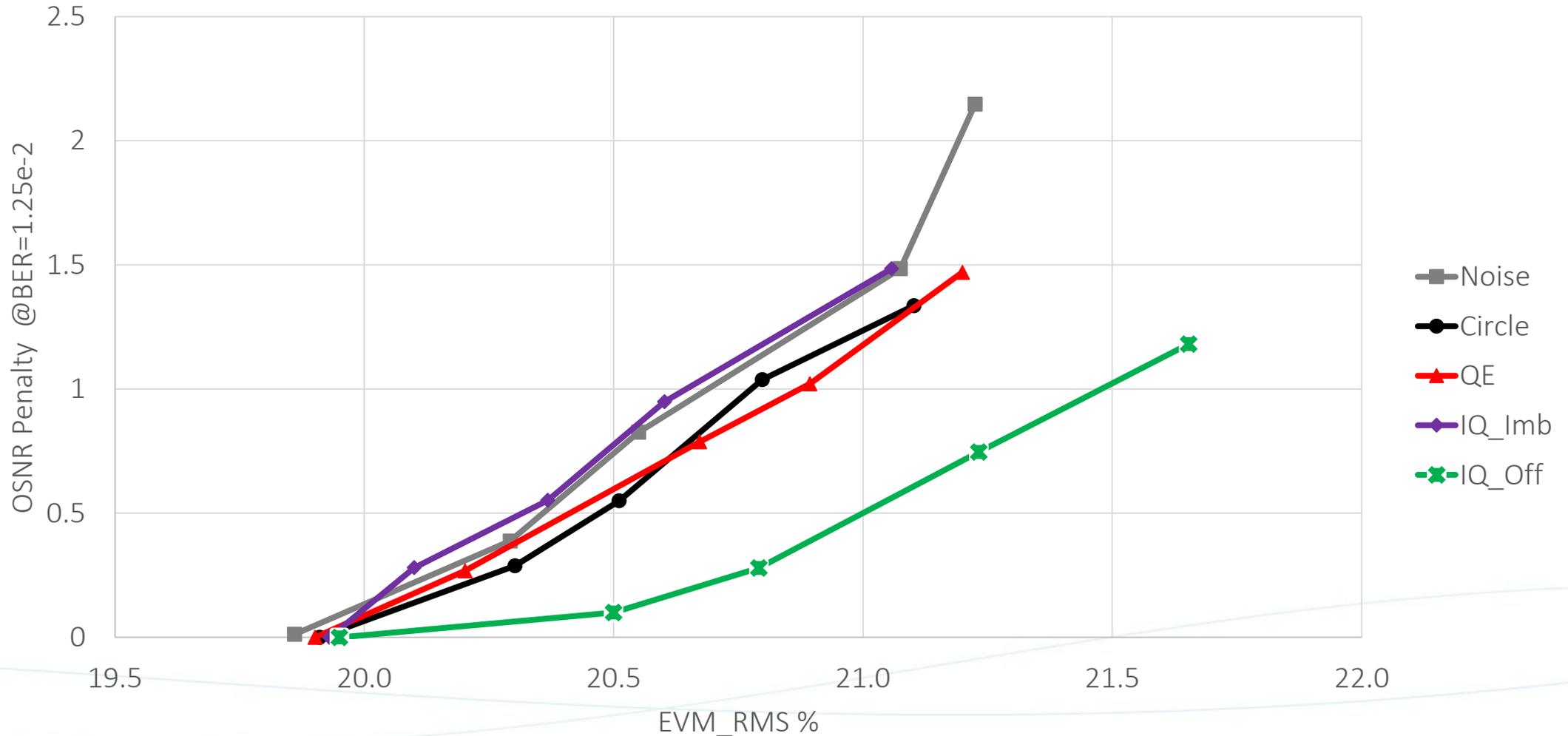
100 Gb/s DP-DQPSK Measurements Results

- Results used to set the EVM_{RMS} limit for 100 Gb/s DP-DQPSK 80 km application codes in G.698.2.



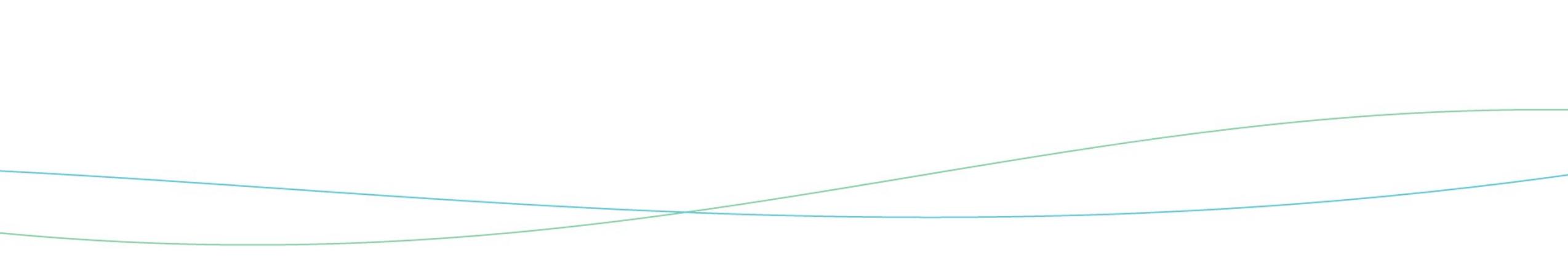
200 Gb/s DP-16QAM Measurements Results

- Results used to investigate the EVM_{RMS} as transmitter quality metric for DP-16QAM format.



Observations

- The shown measurement results confirm that the transmitter quality metric used for DP-DQPSK in the in-force Recommendation ITU-T G.698.2 is suitable also for DP-16QAM.
 - An EVM_{RMS} limit and a maximum allowable IQ offset still needs to be identified.
- The obtained curves are much steeper than those measured for DP-DQPSK.
- In the results reported [anslow_3cn_01_181025](#) and [anslow_3ct_02_0319](#), the EVM_{RMS} for 1 dB OSNR penalty was about 0.5%, starting EVM_{RMS} at about 21.5%, while in the results reported in this contribution this is about 0.8% and the starting EVM_{RMS} is at about 20%.
 - Further study is required to identify the reason for this discrepancy.



Thank You!