T10/07-120r0 SAS-2 Transmitter De-Emphasis Measurement
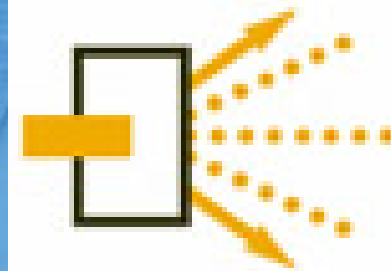
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This presentation documents laboratory experience of transmitter equalization measurements using various patterns.

- Patterns Used
    - D30.3
    - K28.7
    - K28.5
    - SASCJT

The following formula shall be used to calculate the equalization value:

$$DE_{dB} = 20 Log_{10} \left(\frac{V_{pk-pk}}{V_{vma}} \right)$$

- Ref – T10/07-063r2 SAS-2 6Gbps PHY Specification

- Method discussion
  - Used two histogram
    - Top half
    - Bottom half
  - Peak-to-peak value used
  - Vvma – mode value used
  - Clarify sample size – 1000/2000 or 10000
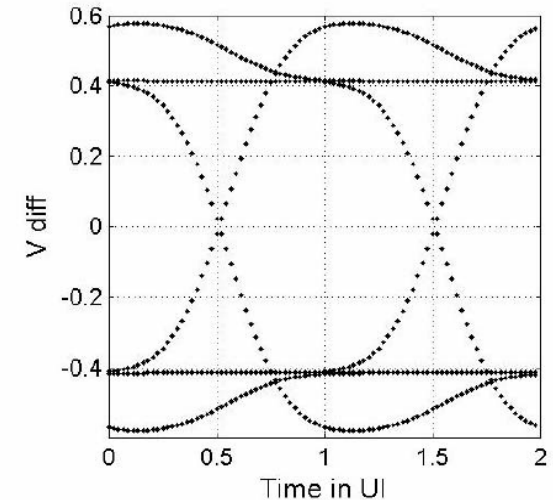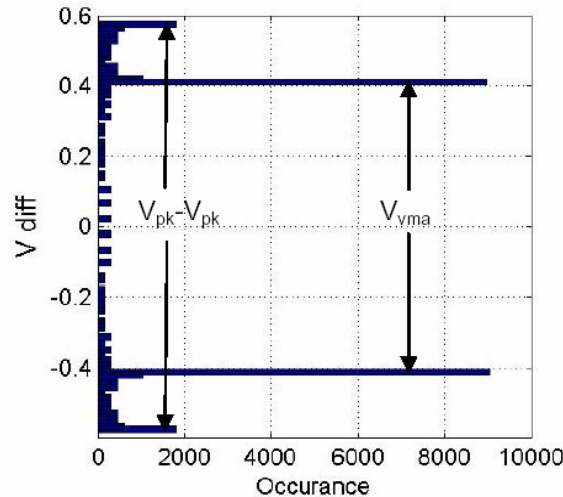
The Vpk-Vpk and Vvma mode values shall be measured using the following or an equivalent procedure:

1. An equivalent time sampling scope with a histogram function shall be used.
2. The sampling scope shall be calibrated for measurement of a 3GHz signal.
3. The V_{pk}-V_{pk} mode value shall be determined as illustrated in Figure xxx. A sample size of 1000 minimum, 2000 maximum histogram hits shall be used to determine the values. (The histogram on the left of the test pattern signal displayed on the right.)
4. The V_{vma} mode value shall be determined as done for V_{pk}-V_{pk} in step 3.

Results/Discussion

| Pattern	pk-pk top(mV)	mode top(mV)	pk-pk bottom(mV)	mode bottom(mV)	dB
K28.7	437	296	420	-313	2.97
K28.5	484	321	454	-326	3.23
D30.3	446	296	433	-289	3.54
SASCJT	497	296	463	-281	4.42

Top Histogram

Bottom Histogram

- Measured values of De-Emphasis is pattern dependent
  - We need to understand that the applied De-Emphasis is the same

- Receiver tolerance test calls for SASCJT pattern (Ref sas2r08 Annex A)
  - Potential for confusion if a reference transmitter is used for the receiver tolerance test

Summary
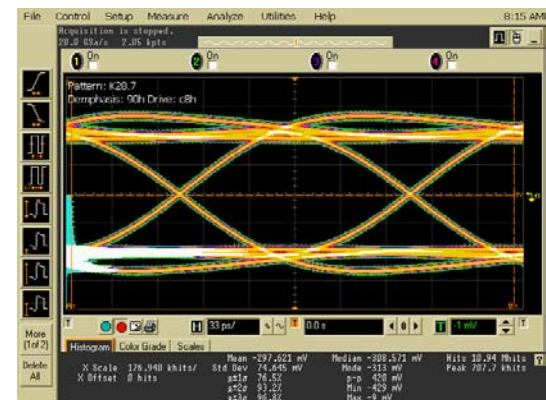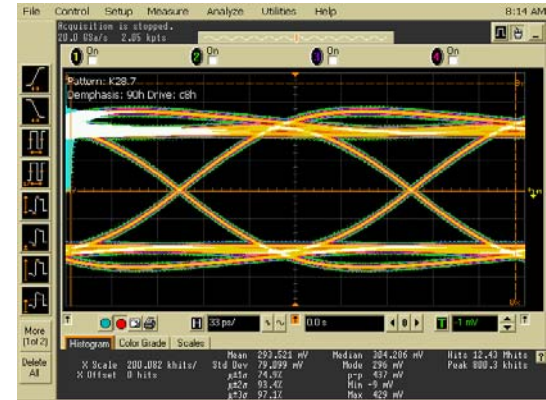
- Same De-Emphasis setting can show different measured value for different patterns due to their content and cause for confusion