100GBASE-SR4: Effects of Instrument Noise Comments i-25, i-26, i-27 & i-28

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Presentation Outline

•After the May 2014 meeting, the assumptions on which link model analyses were based were reviewed. One assumption, the sensitivity of the reference receiver (Ref Rx) based on the input noise of the expected 19.3 GHz optical plug-in, was found to be unrealistically optimistic. An RMS dark input noise of 4.5 μW was assumed; 17 μW is now expected.

•Attributes affected by the Ref Rx sensitivity includes transmitter eye mask coordinates, transmitter vertical eye closure sampling point and limit and stressed receiver eye mask coordinates and calibration.

•Information regarding transmitter eye mask coordinates and transmitter vertical eye closure sampling point and limit is presented.

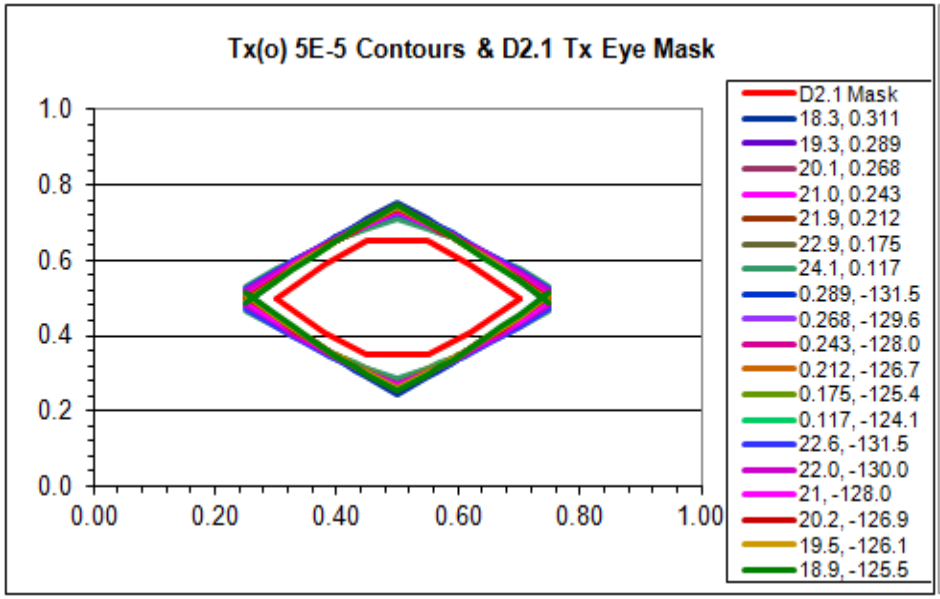
•Comment i-25: see pages 3 & 4

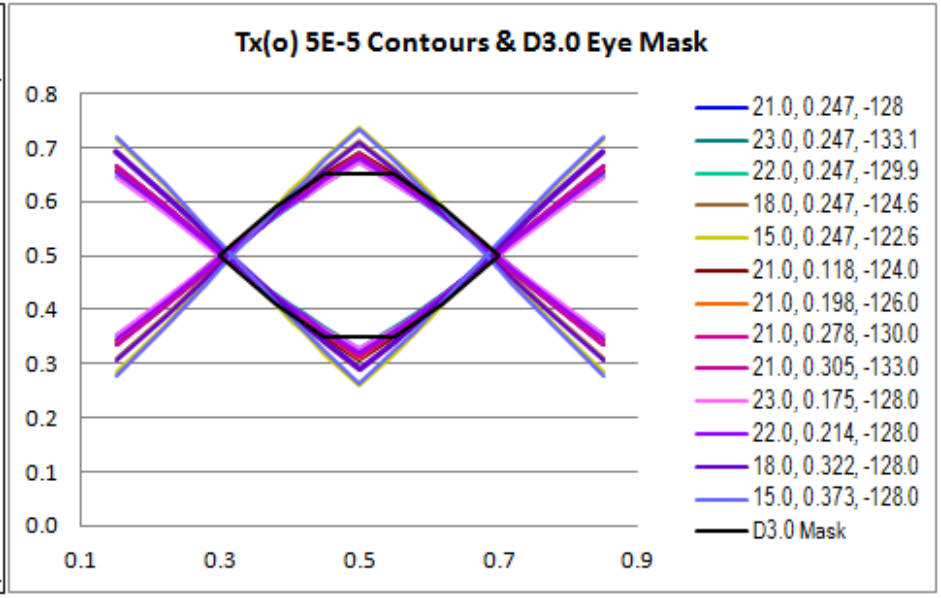
•Comment i-26: see pages 5 & 6

•Comment i-27: see pages 3 & 4

•Comment i-28: see pages 5 & 6

Ref Rx Sensitivity & Observed Tx 5E-5 Contours





Comments i-25 & i-27

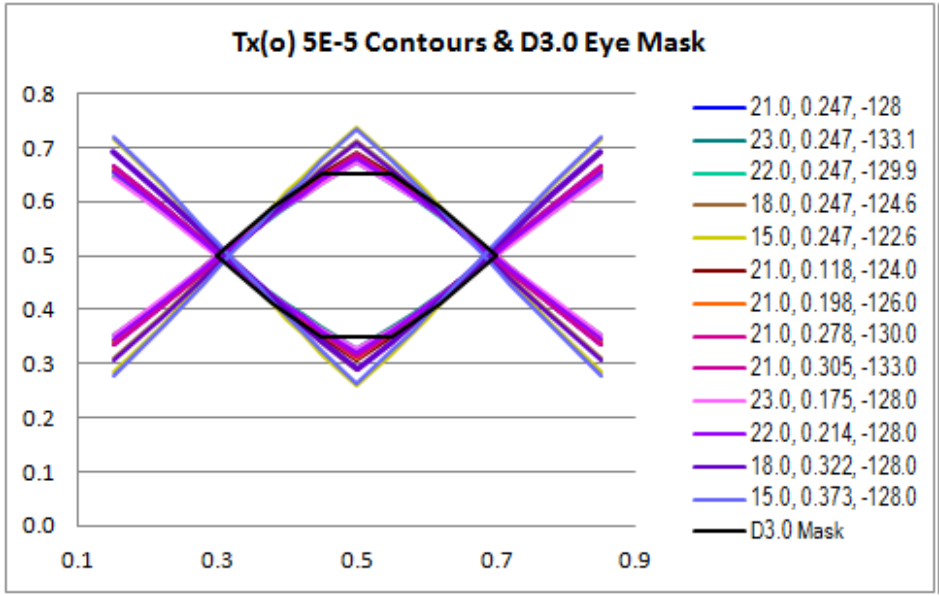
•The chart on the left shows the expected observed Tx TP2 5E-5 contours for a set of worst case transmitters at the time of the March 2014 meeting with the inner eye mask that is defined in Draft 3.0 These contours were based on an expected oscilloscope dark RMS input noise of 4.5 µW for a 19.3 GHz optical plug-in. Since then the expectation for dark RMS input noise has changed to 17 µW. This results in shift from an expected RJ of ~0.24 UI in the mask test to an expected RJ of ~0.36 UI.

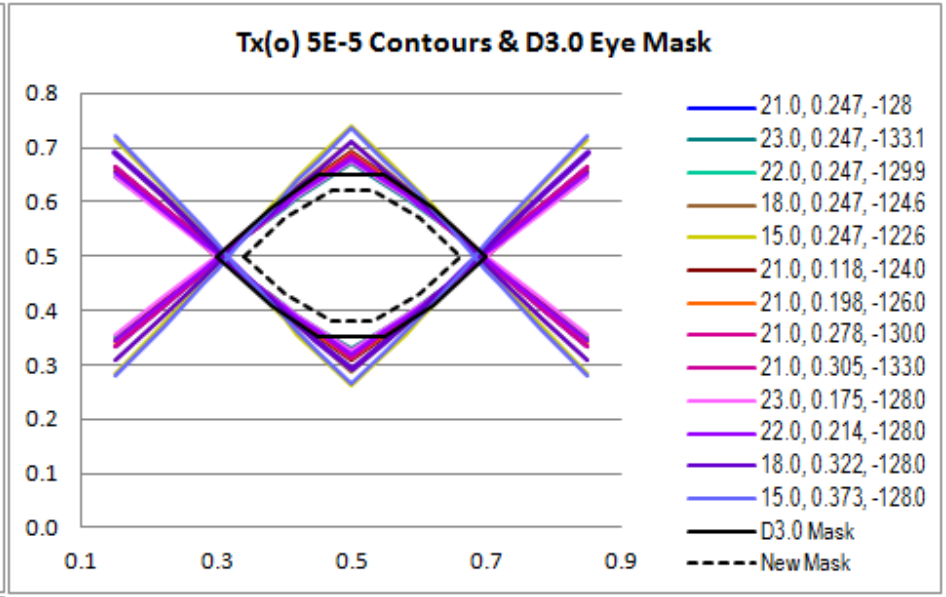
•The chart on the right shows expected observed Tx TP2 5E-5 contours for a set of worst case transmitters based on a scope with an expected dark RMS input noise of 17 µW for a 19.3 GHz optical plug-in. None of the worst case contours will pass the currently defined eye mask.

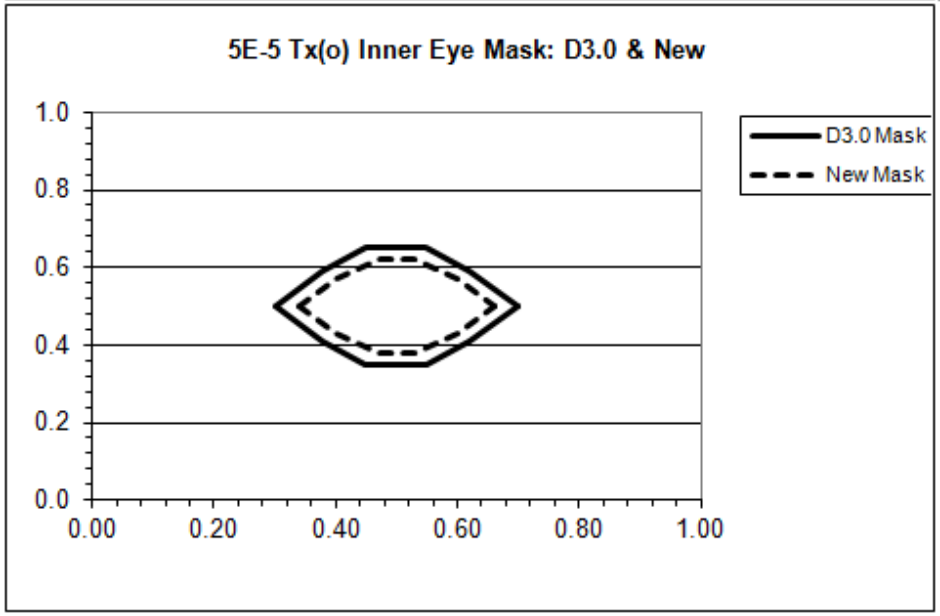
•It may be possible to keep the same mask coordinates by reducing the hit ratio from 5E-5 to 1.5E-3 (reduces RJ from 0.36 UI at 5E-5 to 0.24 UI at 1.5E-3.

•A new 5E-5 hit ratio mask is proposed on the following page.

Ref Rx Sensitivity & Tx Eye Mask Coordinates







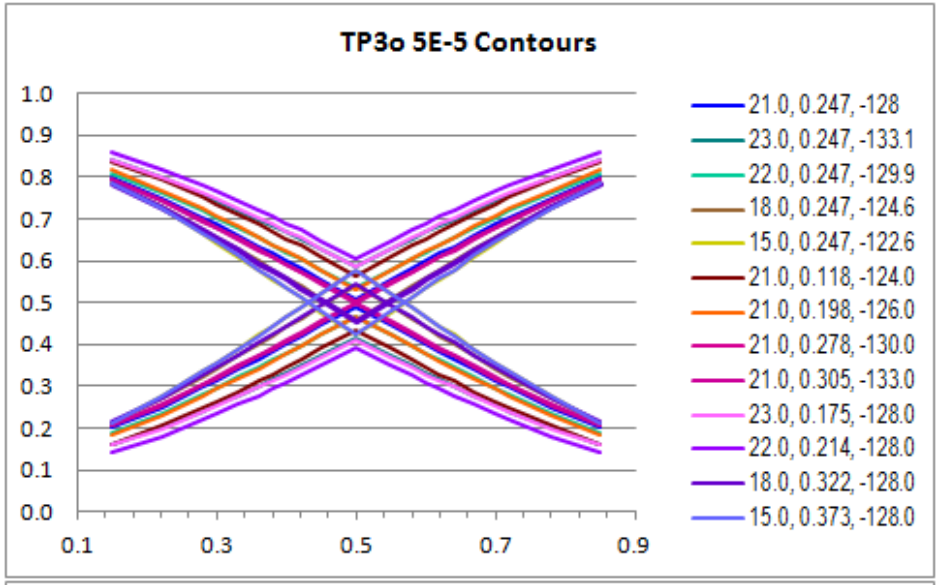
Comments i-25 & i-27

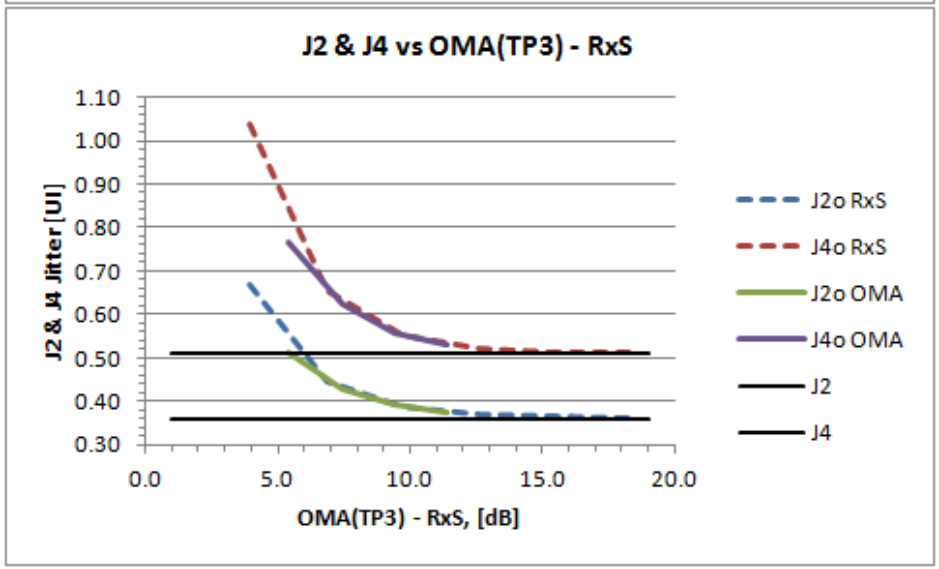
- The chart on the upper left repeats a chart from the prior page.
- The charts on the upper right and lower left show a newly proposed Tx eye mask that accounts for the currently expected oscilloscope input noise.
- Eye mask coordinates X1, X2, X3, Y1, Y2, Y3
  Draft 3.0: 0.30, 0.38, 0.45, 0.35, 0.41, 0.5
  New: 0.34, 0.40, 0.47, 0.38, 0.43, 0.5

Update to comment i-25

- Change X1 (from 0.3 to 0.34), X2 (from 0.38 to 0.4), X3 (from 0.45 to 0.47), Y1 from 0.35 to 0.38), Y2 (from 0.41 to 0.43), Y3 (0.5 no change).

Ref Rx Sensitivity & BW & Stressed Rx Sensitivity Conditions





Comments i-26 & i-28

•The upper-left chart shows expected observed 5E-5 contours from a set of worst case transmitters based on a scope with an expected dark RMS input noise of 17 µW for a 19.3 GHz optical plug-in. Here OMA at TP3 is min Tx OMA at max TxVEC (or TDP) of -3.0 dBm less insertion loss of 1.86 dB and RxS is -8.79 dBm (= 10Log(2Q x 0.017mW) yielding a signal 3.9 dB above sensitivity. There is very little to no eye openning.

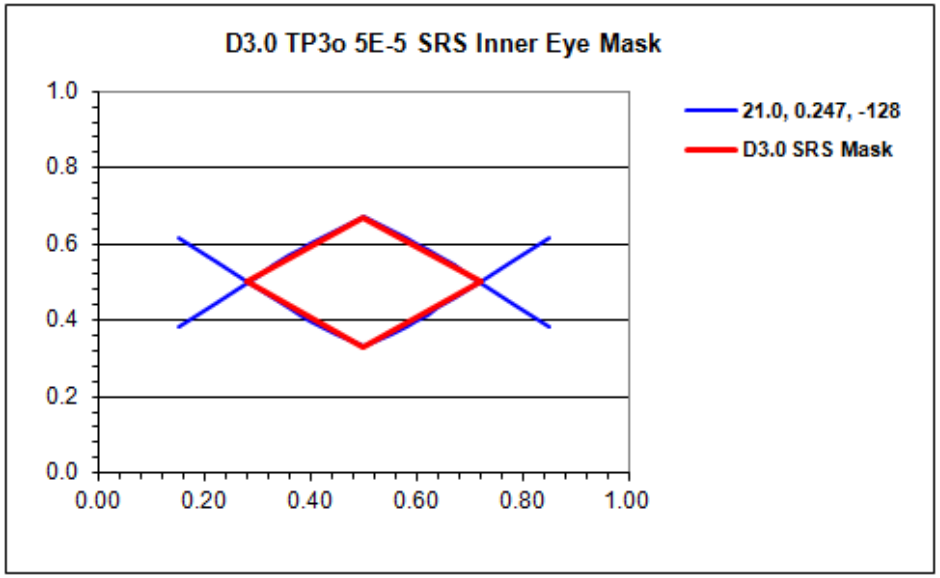
•The lower-left chart shows expected observed J2o and J4o jitter for the worst case Tx labeled (21.0, 0.247, -128) over a range of signal levels above sensitivity. The graphs labeled Jn RxS were created by changing Rx sensitivity & the charts labeled Jn OMA were created by changing Tx OMA after deleting the 1.5 dB connector loss. The graphs labeled J2 & J4 do not include observation impairments.

•A signal level 10 dB above test equipment sensitivity may be reasonable to provide when calibrating the stressed receiver input signal for J2 and J4, producing only minor impairments that can be included in the stressed receiver sensitivity (SRS) J2 and J4 conditions. Here the expected observed values are:

J2 = 0.39 UI

J4 = 0.55 UI

Ref Rx Sensitivity & BW & Stressed Rx Sensitivity Conditions



Comments i-26 & i-28

•The chart shows expected observed 5E-5 contours for the worst case Tx labeled (21.0, 0.247, -128) based on a scope with an expected dark RMS input noise of 17 µW for a 19.3 GHz optical plug-in and a signal ~ 10 dB above the scope sensitivity. The resultant eye appears suitable for calibration of stressed receiver sensitivity conditions.

•The SRS eye mask defined in D3.0 is included. No adjustment appears needed for the stressed receiver eye mask coordinates or VECP.

Update to comment i-26

•Change J2 from 0.41 UI to 0.39 UI.

No changes are needed for J4 (0.55 UI), VECP (4.2 dB) and eye mask coordinates, X1 (0.28 UI), X2 (0.5 UI), X3 (0.5 UI), Y1 (0.33 UI), Y2 (0.33 UI), Y3 (0.4 UI).

Update to comment i-28

•Change the first sentence in the first paragraph of 95.8.8.4 from "The stressed receiver conformance test signal can be verified using an optical reference receiver with an ideal fourth-order Bessel-Thomson response with a reference frequency fr of 19.34 GHz." to "The stressed receiver conformance test signal can be verified using an optical reference receiver with an RMS input noise of 17 microwatts and ideal fourth-order Bessel-Thomson response with a reference frequency, fr, of 19.34 GHz."

•Insert after the first sentence of the last paragraph of 95.8.8.4 the following, "The signal amplitude at the reference receiver input shown in Figure 95-3 while calibrating the stressed receiver conditions shown in Table 95-7 should be 10dB above the sensitivity of the reference receiver."