6G SAS Self-Consistency of Reference TX, Channel & RX

Mike Jenkins

LSI Corp

RX Eye Height:
Purpose & Typical values

- Ensuring positive RX input eye height provides *margin* for RX imperfections (noise, offsets, etc.)
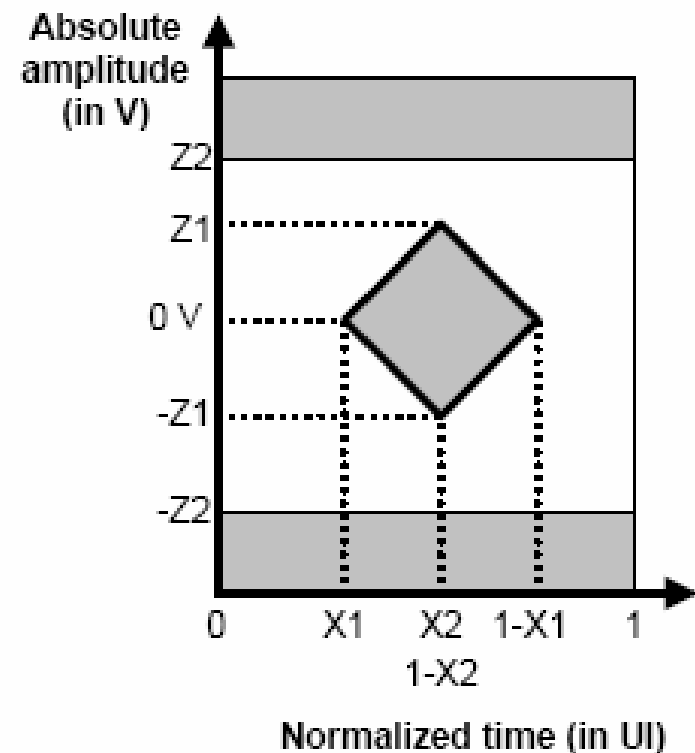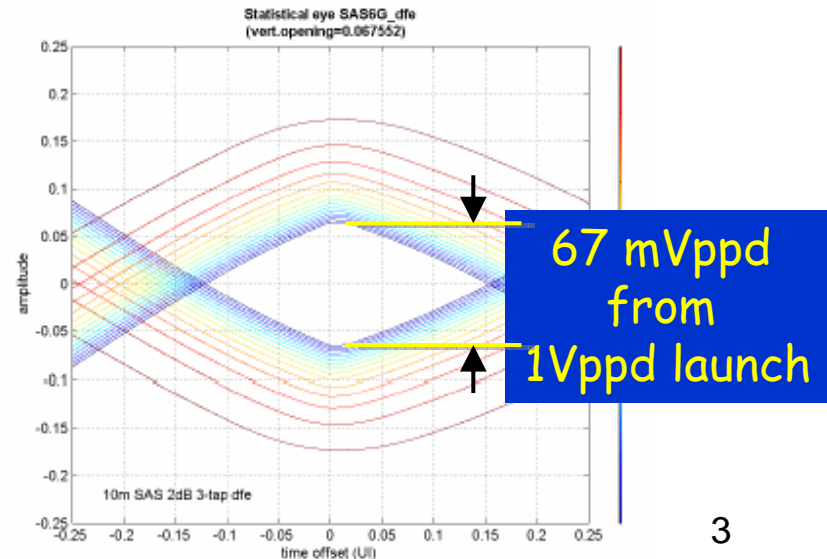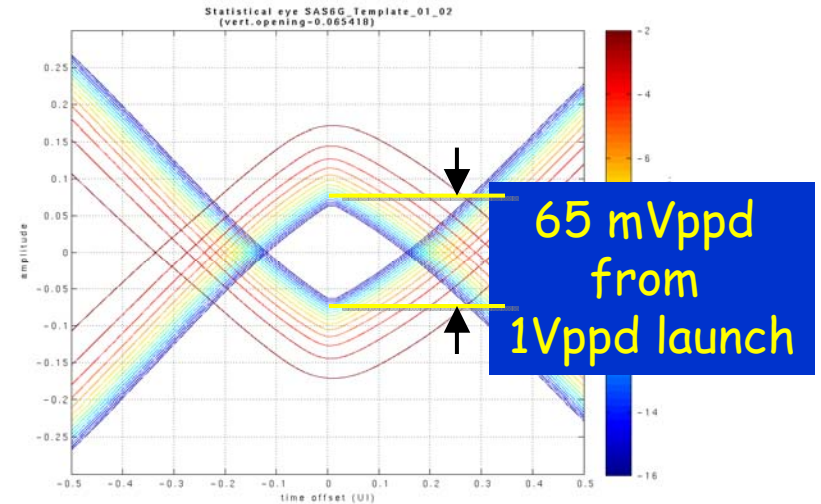- 275 to 375 mVppd for 3G SAS
- 150 mVppd proposed in 07-253r1 (Witt)
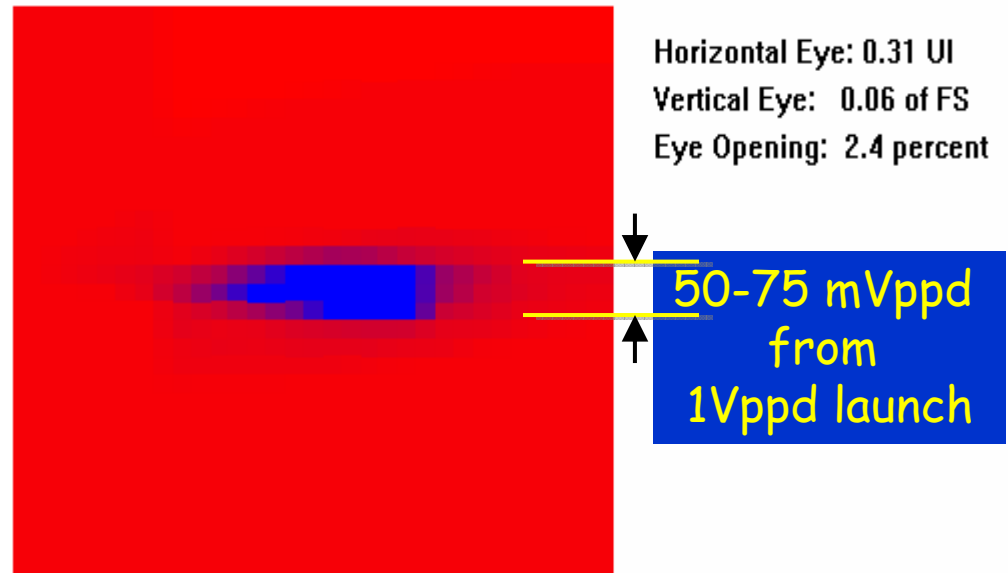
Figure 115 — Receiver device eye mask

Eye Heights Reported in Other Presentations:

- 2dB TX, 3-tap DFE 07-227r0, Newman & Sanders

- 2dB TX, 3-tap DFE 07-253r1, Witt

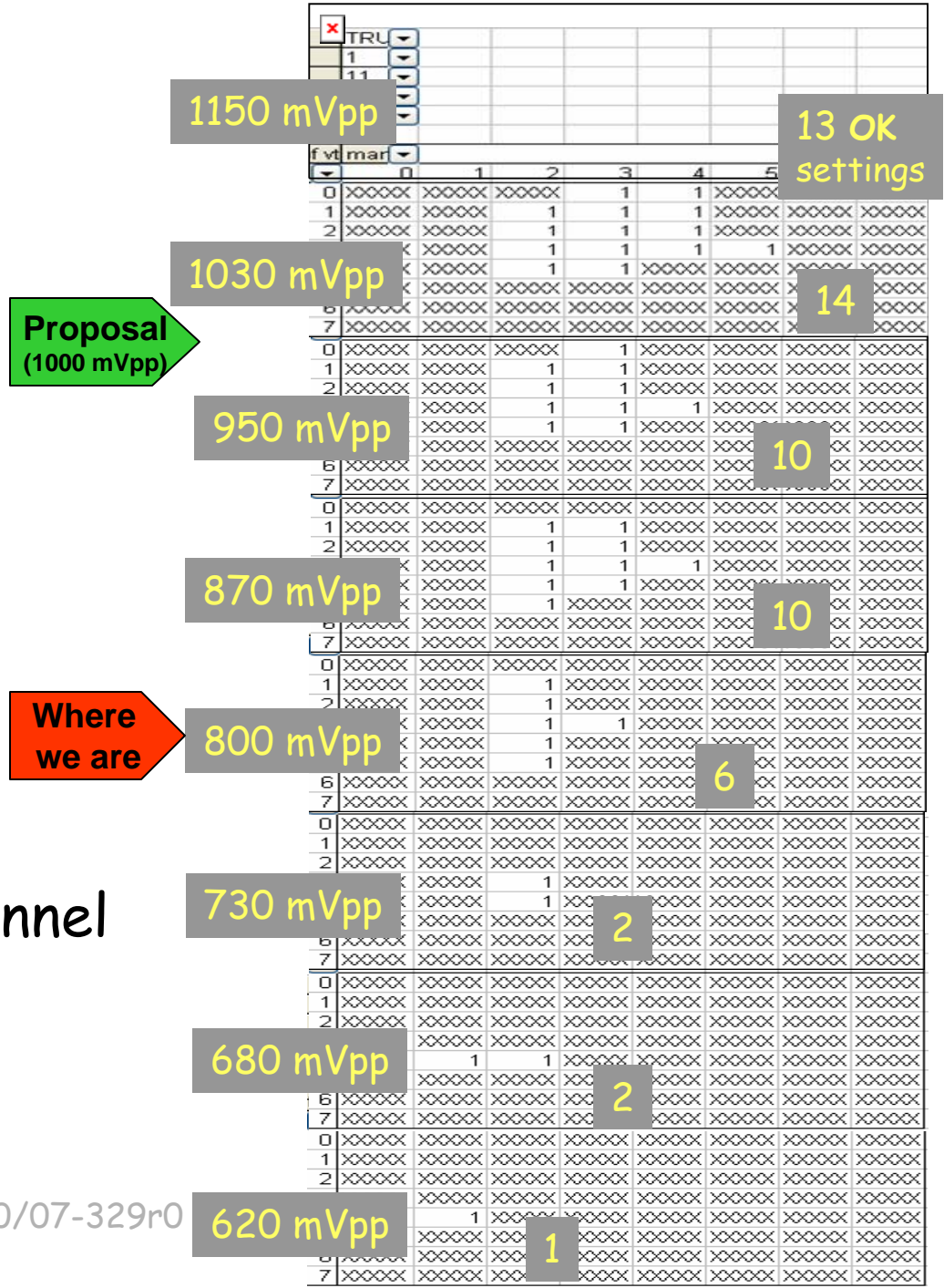65 mVppd from 1Vppd launch

67 mVppd from 1Vppd launch

Measured Eye Height

- ~2dB TX

- ~1Vppd launch

- 8.5 Gb/s

- 19dB channel loss @ 4.25G

Horizontal Eye: 0.31 UI
Vertical Eye: 0.06 of FS
Eye Opening: 2.4 percent

50-75 mVppd from 1Vppd launch

RX 'Sweet Spot' vs. TX Amplitude

- Number of settings yielding BER < 10^{-12} drops quickly below ~800-1000 mVpp

- Conditions:
  - 8.5Gb/s & -19dB channel
  - Nominal PVT
  - No impairments
  - ~2dB de-emphasis

1150 mVpp

13 OK settings

1030 mVpp

14

Proposal (1000 mVpp)

950 mVpp

10

870 mVpp

10

Where we are

800 mVpp

6

730 mVpp

2

680 mVpp

2

620 mVpp

1

Summary & Proposal

- Ref TX+Ref Channel+Ref RX *amplitude* limited. 800mVppd Ref TX launch provides only 1/3rd of proposed 150mVppd eye height

- Data confirms performance deteriorates below ~1000 mV TX peak amplitude

- Proposal:
  - Increase Ref RX to **3-tap** DFE, and
  - Increase REF TX amplitude to **1000** mVppd & **800** mVppd VMA (2dB de-emphasis)