XLAUI/CAUI Transmit and Receiver Compliance Testing

xAUI AdHoc Meeting

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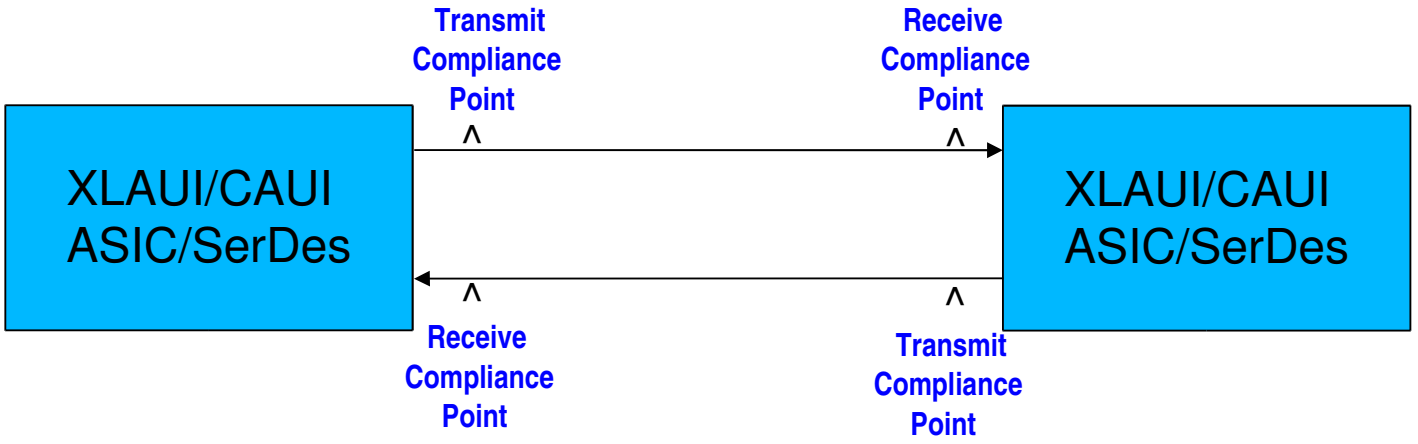
Ali Ghiasi
Broadcom Corporation
aghiasi@broadcom.com

Key Decision

- PMA to TP1 and TP4 to PMA loss
- How to test transmitter for compliance
- What should be the channel definition s-parameters, ..
- How to test receiver for compliance

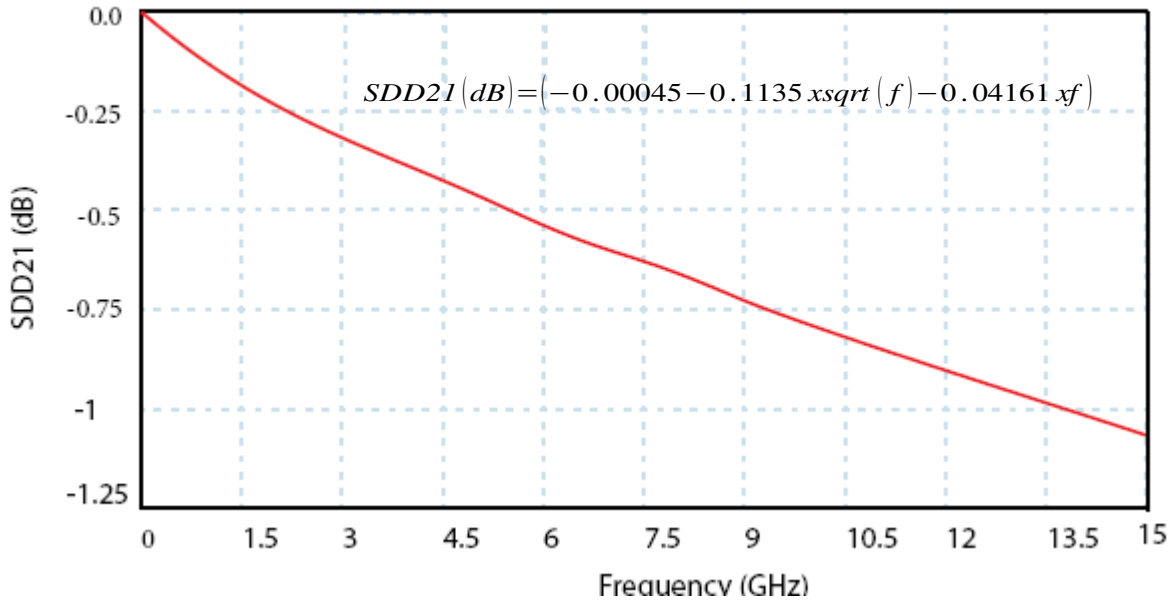
xAUI Compliance Point

- **Chip to chip with 10 dB loss at Nyquist**
  - **May include one connector**
  - **Keep it simple and lets not get wrapped in specific implementations which will change over time!**
- **Where should the transmit and receive compliance point be?**
  - **At the ball?**
  - **With short PCB trace to allow some form of high speed connector?**



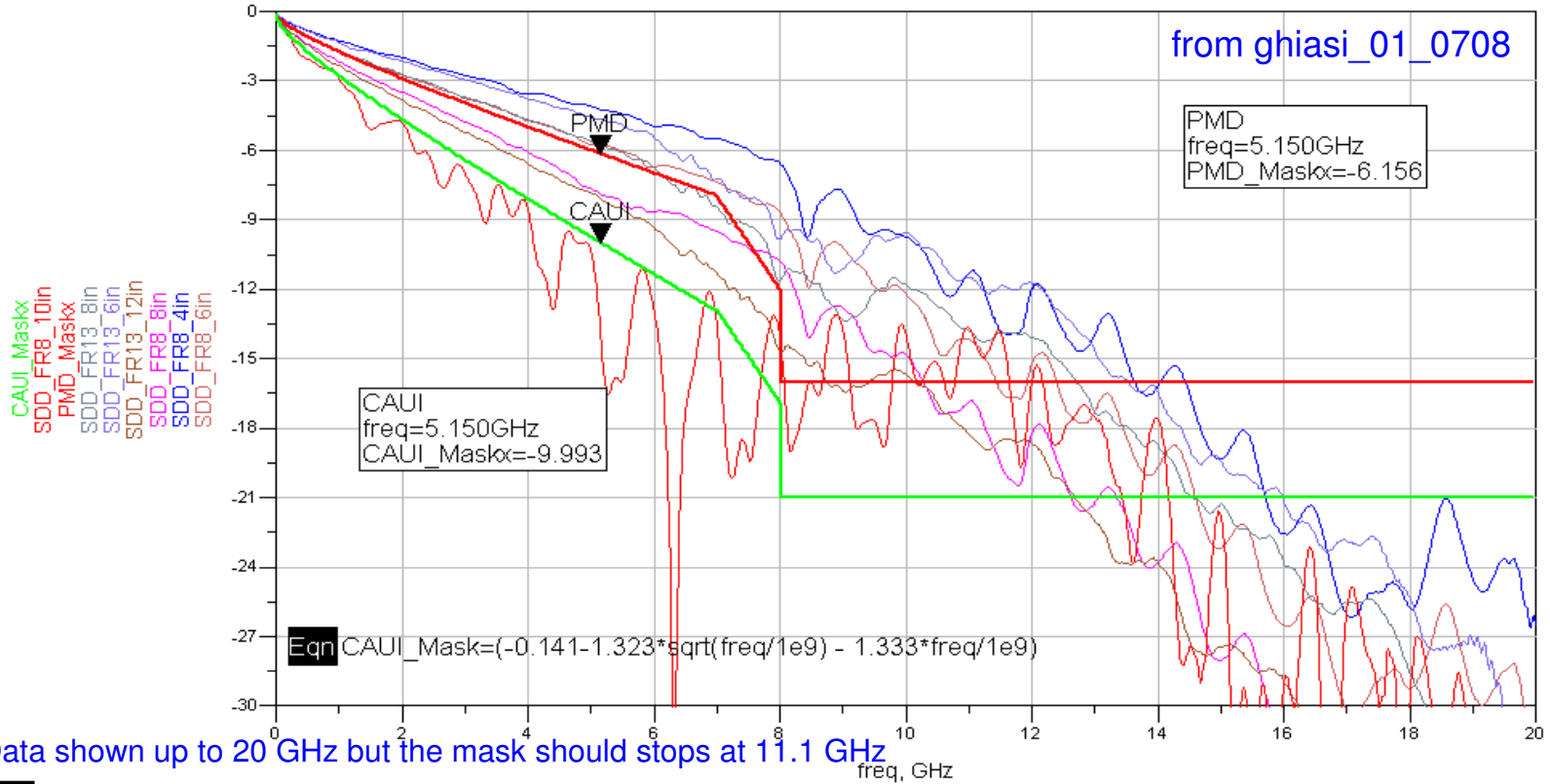
Acceptable Loss for xAUI PMA Chip to TP1

- It has been suggested 3” of PCB traces acceptable between chip ball and the compliance point!
  - Even on Rogers material a 3” long PCB will result ~1.5 dB loss and masking return loss by 3 dB, just not acceptable!
  - A xAUI DUT board with 1.5 dB loss mean you can not test <3 dB channel loss.
- xAUI PMA chip to TP1 loss<0.7 dB and possible with high density RF connector
- Below SFP+ SerDes DUT board loss which is 0.5 dB@5.5 GHz.



XLAUI/CAUI Channel SDD21 (Informative)

- **XLAUI/CAUI supports about 250 mm of FR4-8 or about 375 mm of 5.5 mils FR4-13 striplines**
  - **The 10 dB channel was created by cascading 2nd PCB with 2 dB loss at Nyquist with the 8" Fr4-8 channel which is adding some ripple.**



Data shown up to 20 GHz but the mask should stops at 11.1 GHz

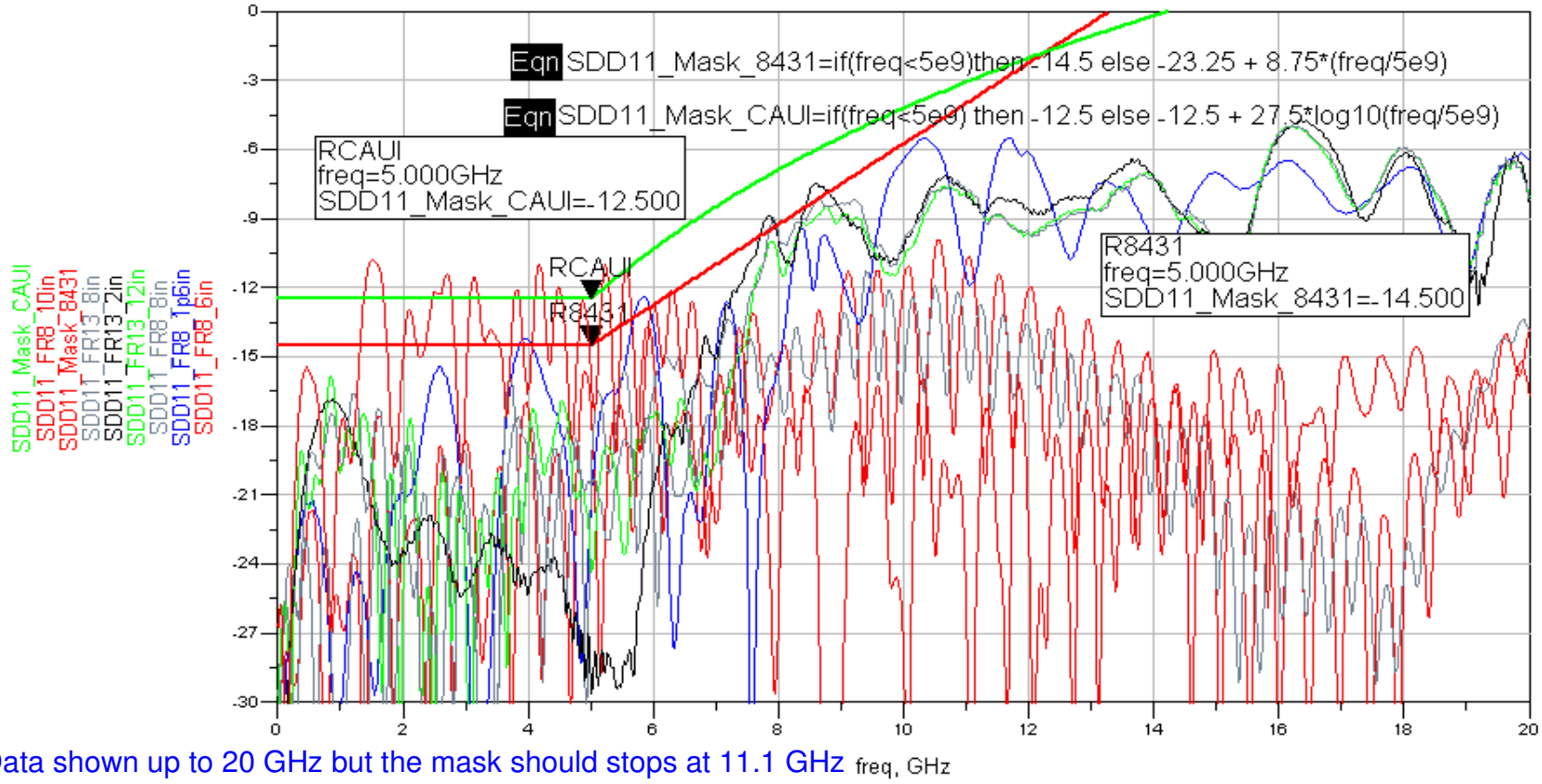
Eqn CAUI_Maskx=if(freq<7e9) then (-0.141-1.323*sqrt(freq/1e9) - 1.33*freq/1e9) elseif (freq<=8e9) then 15.1-4.*freq/1e9 else -21 endif

Eqn PMD_Maskx=if(freq<7e9) then (-0.108-0.845*sqrt(freq/1e9) - 0.802*freq/1e9) elseif (freq<=8e9) then 20-4*freq/1e9 else -16 endif

XLAUI/CAUI Channel SDD11(Informative)

- **The CAUI informative channel SDD11/SDD22 is ~ 2 dB more relaxed than SFF-8431.**
  - **The cascaded channel with 10 dB loss at Nyquist its SDD11 is degrades about 3 dB.**

from ghiasi_01_0708



Data shown up to 20 GHz but the mask should stops at 11.1 GHz

How to Test xAUI Transmitter for far end Compliance

- XAUI had simple channel with just loss – too simplistic
- xAUI transmitter need to be tested with channel shown in ghaisi_01_0708 and pass far end mask with single pre-emphasis setting, How to test transmitter for far end compliance
  - Provide a set of complex SDD21/SDD11/SCC11 function fitted to each channel <2in and 10in, either test with channel meeting these requirements or convolve transmitter waveform with channel data.
  - Instead of actual SDD21/SDD11/SCC11 complex function can be provided, since these channel has connector this method would be accurate enough.
  - Use transmitter waveform compliance similar to KR.
- Crosstalk can be accounted either allocating test margin or can be added like an interference source at the receiver
- In actual application pre-emphasis may be adjusted based on the trace length.

KR TX Mask

- **A Monte-Carlo analysis is required to determine what are the acceptable near end mask which produces far end mask**

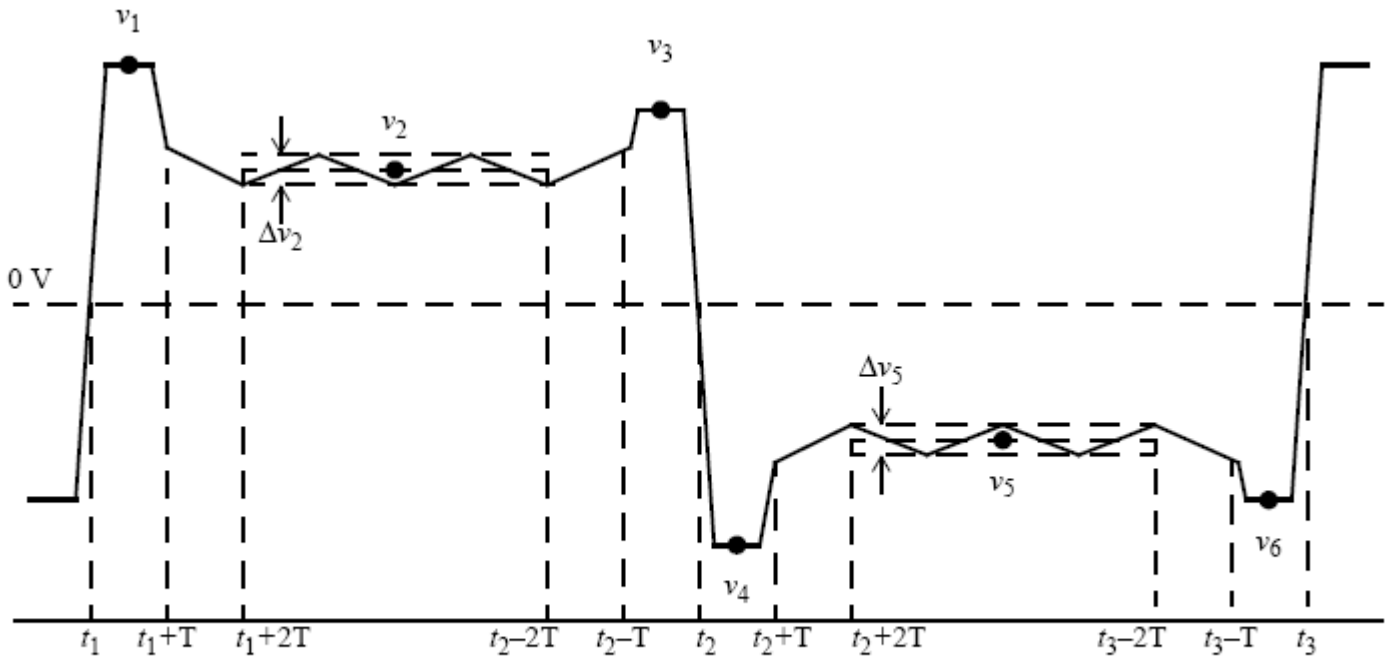


Figure 72–12—Transmitter output waveform

XLAUI/CAUI Receiver Testing

- **Leverage KR interference model with XLAUI/CAUI shortest and longest channel.**
- **When TP4 is at limit for high frequency jitter with interference generator off then interference generator level is increased until TJ limit at TP4 is met.**