Updated Emissions Profiles of ACT and TDD PHYs

IEEE 802.3dm

July, 2025

Hiok Tiaq Ng
Aviva Links Inc.

Introduction

- This contribution updates a previous presentation with…
  - Proposed TDD sampling rates and max TX output levels
  - Proposed ACT sampling rates and max TX output levels

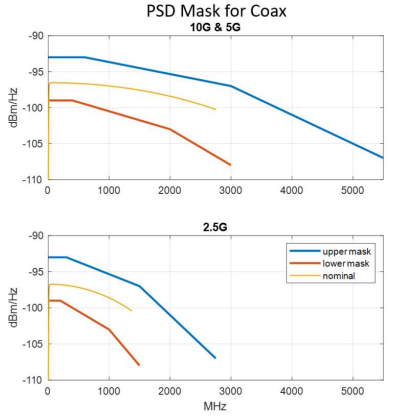
- Revisit the emission profiles of TDD and ACT PHYs.
  - Spectrums are observed for potential emission issues.

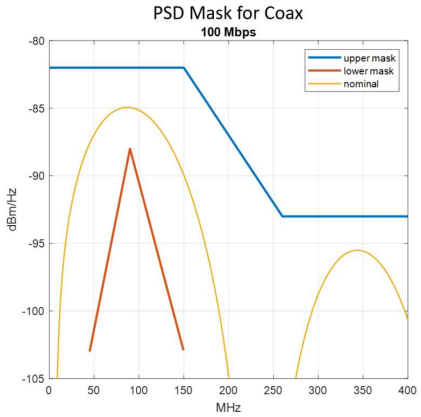
- Following slides show
  - Individual High speed (Downstream) and Low speed (Upstream) spectrums
  - System level spectrums at MDI (single ended)

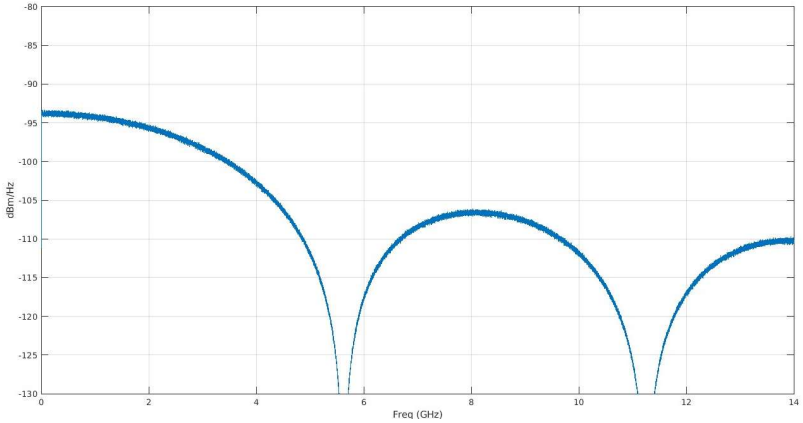
- References
  - https://www.ieee802.org/3/dm/public/0525/Ng_3dm_02_05122025.pdf
  - https://www.ieee802.org/3/dm/public/0125/Chini_3dm_01a_0125.pdf
  - https://www.ieee802.org/3/dm/public/0125/Chini_3dm_03a_0125.pdf
  - https://www.ieee802.org/3/dm/public/0525/sedarat_3dm_202505a.pdf

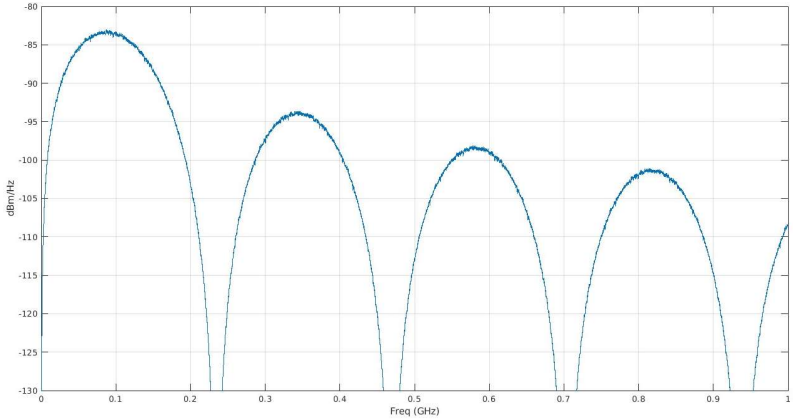
ACT TX Voltage Swing vs PSD (Coax)

- 0.65Vppse and 0.32Vppse for ACT model (PAM4 5.625GSps↓ 234MSps↑)
- PSD masks below (left) assume continuous transmission



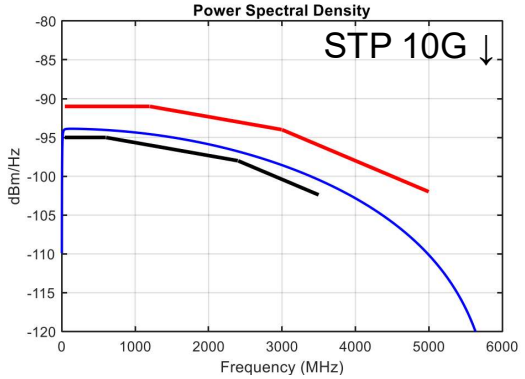


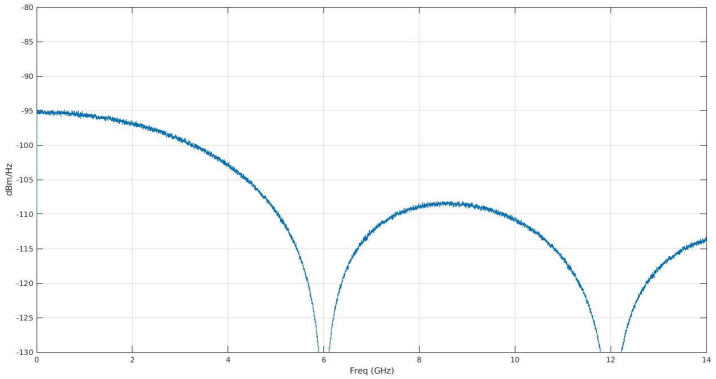


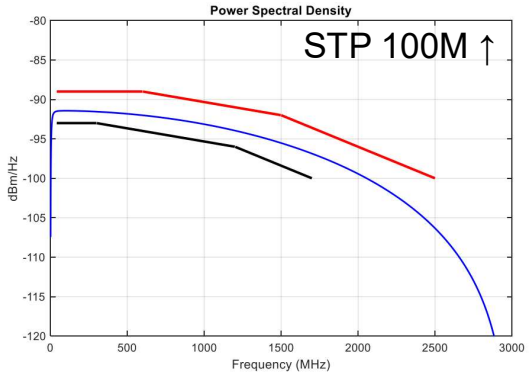


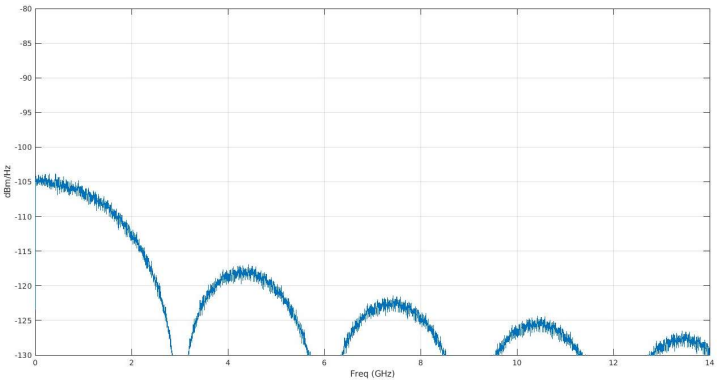
TDD TX Voltage Swing vs PSD (Coax)

- 0.6Vppse and 0.35Vppse for TDD model (PAM4 6GSps↓ 3GSps↑)
- PSD masks below (left) assume continuous transmission
- Simulated results on right use TX data with Inter-Burst Gap (IBG)





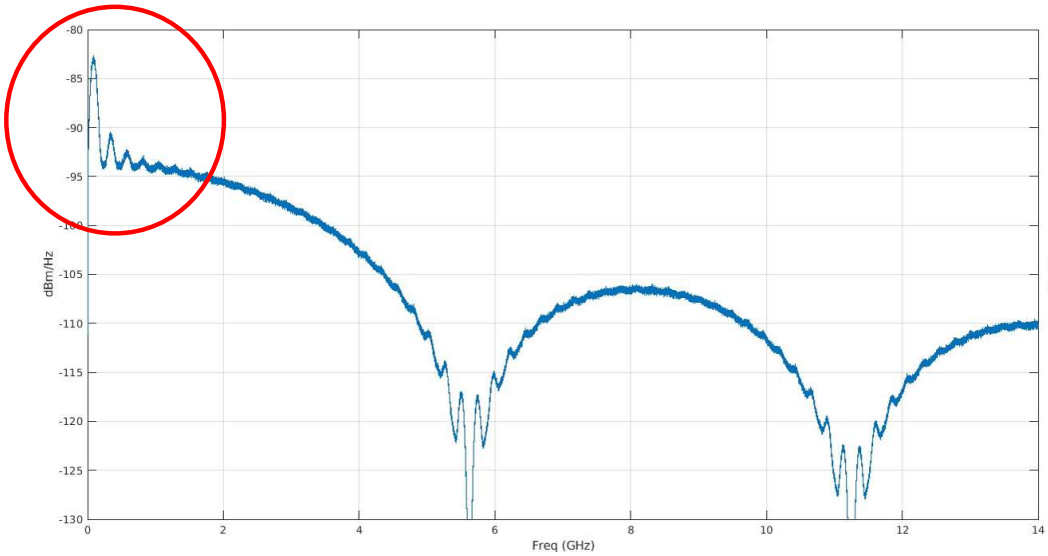




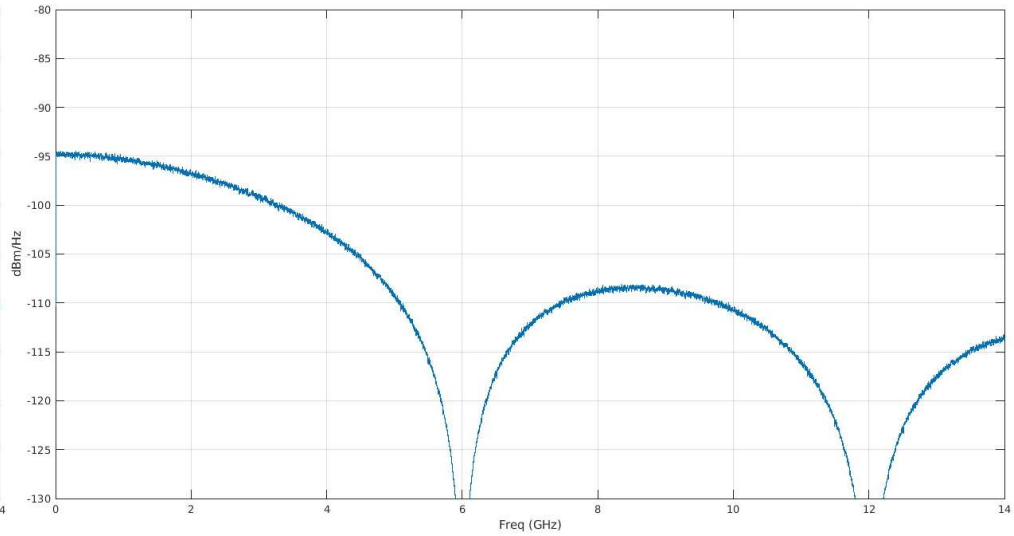
Combined System Spectrum on MDI

- Ideal channel

ACT

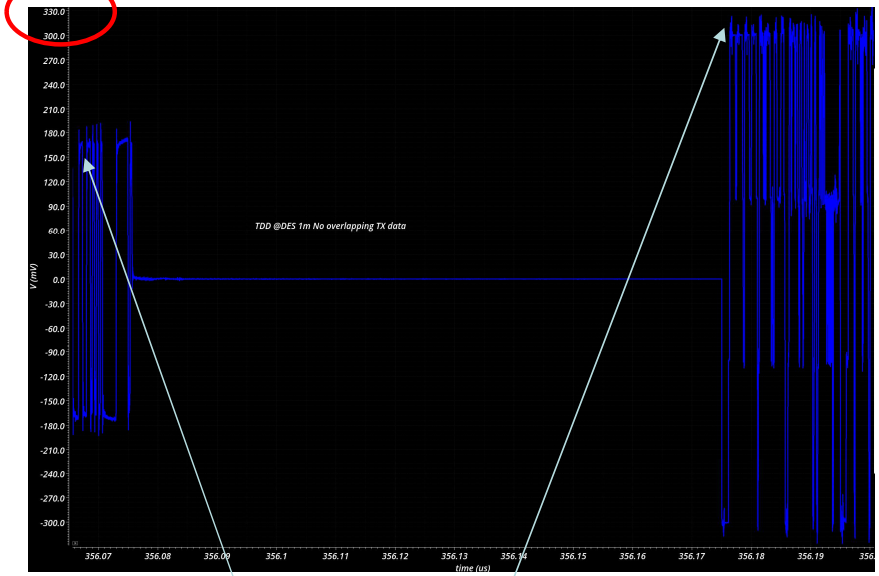


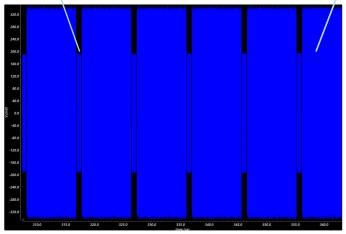
TDD



Sample Transient Waveforms with updated Voltages

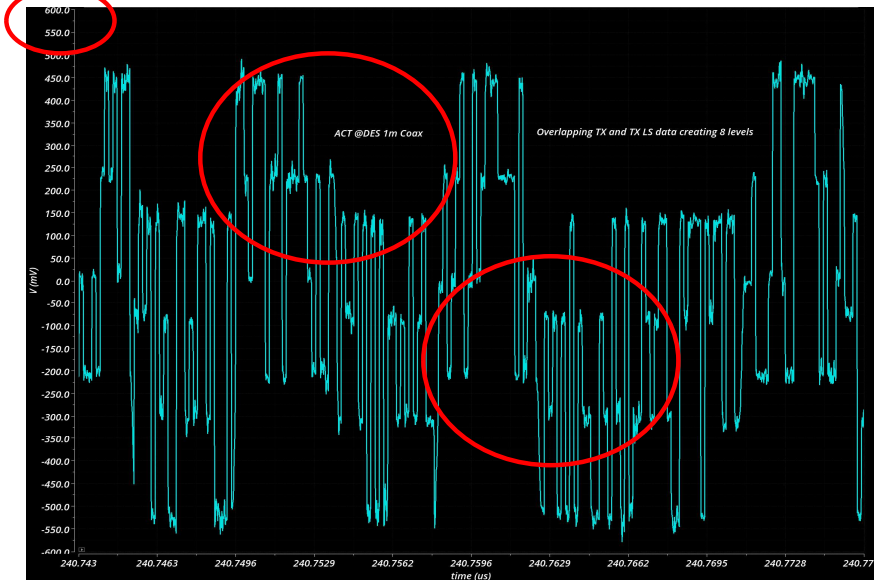
- At TDD Deserializer I/O
  - Max 600mVpp





TDD signal on wire

- At ACT Deserializer I/O
  - Max 970mVpp



ACT signal on wire

Summary

- TX voltage levels updated to match proposed PSD levels
- Time domain results -
  - TDD 600mV remains same
  - ACT results in 970mV signal on the wire even though the DS amplitude is 650mV
- ACT low frequency lobe peak is ~13dBm/Hz higher than TDD spectrum
  - Overlaps FM band
- **This ACT low frequency lobe may contribute to RF Emissions issues**

Thank You!