

10GBASE-T Transmitter PSD

Sandeep Gupta (Teranetics), Ramin Shirani (Aquantia)

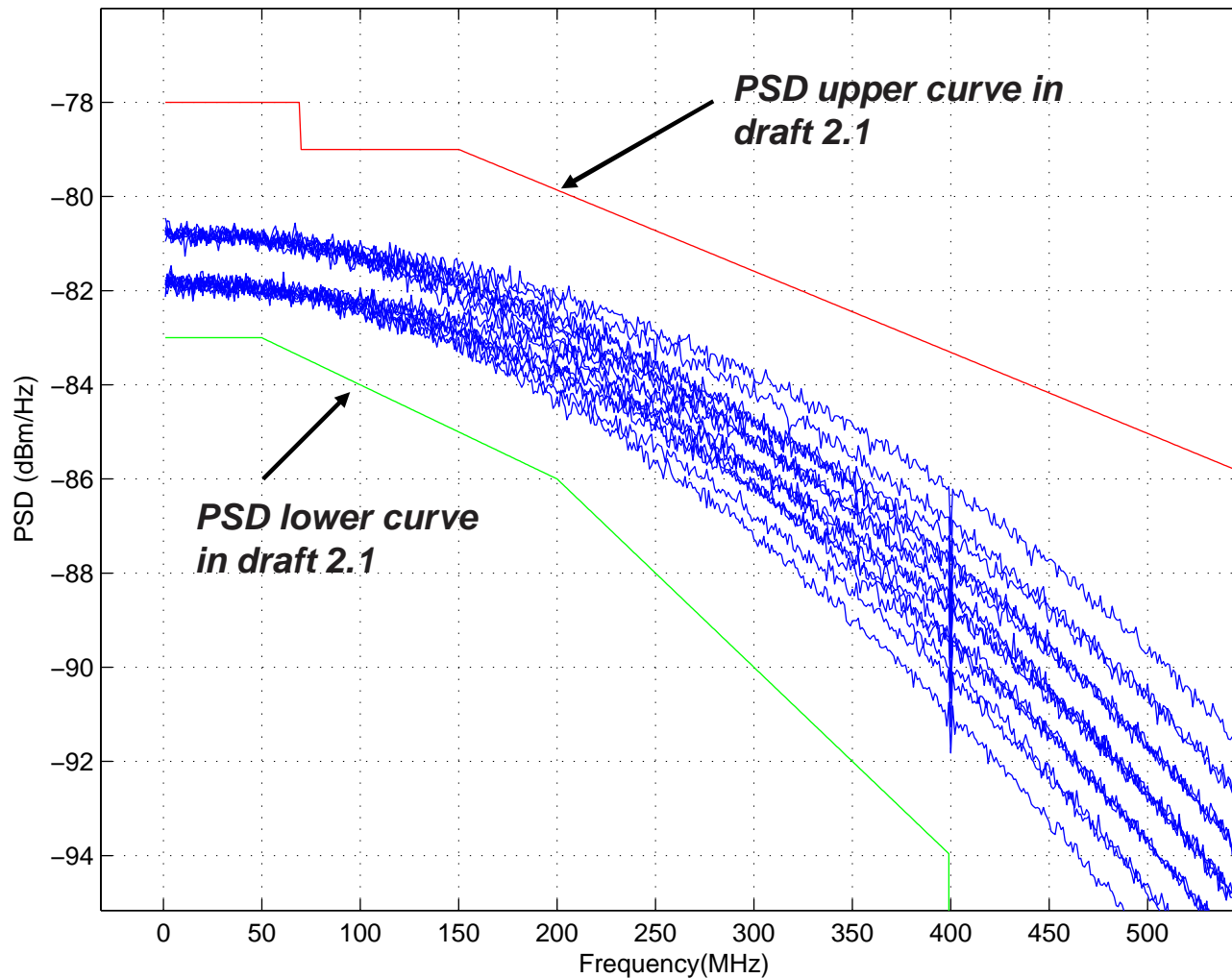
***Supported by:
Ariel Yagil, TI
Pedro Reviriego, Agere***

Transmit PSD mask

- PSD mask assumptions
 - Transformer 1st pole at ~100kHz
 - Transformer pole f1 with substantial tolerance of 750MHz +/-33%
 - Transmitter pole f2, “simple filter pole” contributed by the total capacitance at transmitter and 50ohms. This is modeled as 750MHz +/-33% tolerance
 - Transmitter and board “parasitic” pole f3 with substantial tolerance for different implementations, 1200MHz +/- 33%.
 - Sinc roll-off, contributing majority of the band limitation.
- Assume that the voltage on the line side of the transformer, after going in through the transformer Insertion loss (in addition to its bandwidth loss) is 2V +/-6%.
- 2V +/-6% peak to peak differential at the MDI
 - meets the power spec
 - 2V +/-6% spec is better for transmit and echo cancellation linearity. Linearity limits SNR margin. Detailed analysis is in slide 10 of the following file:

http://www.ieee802.org/3/an/public/jan05/gupta_1_0105.pdf

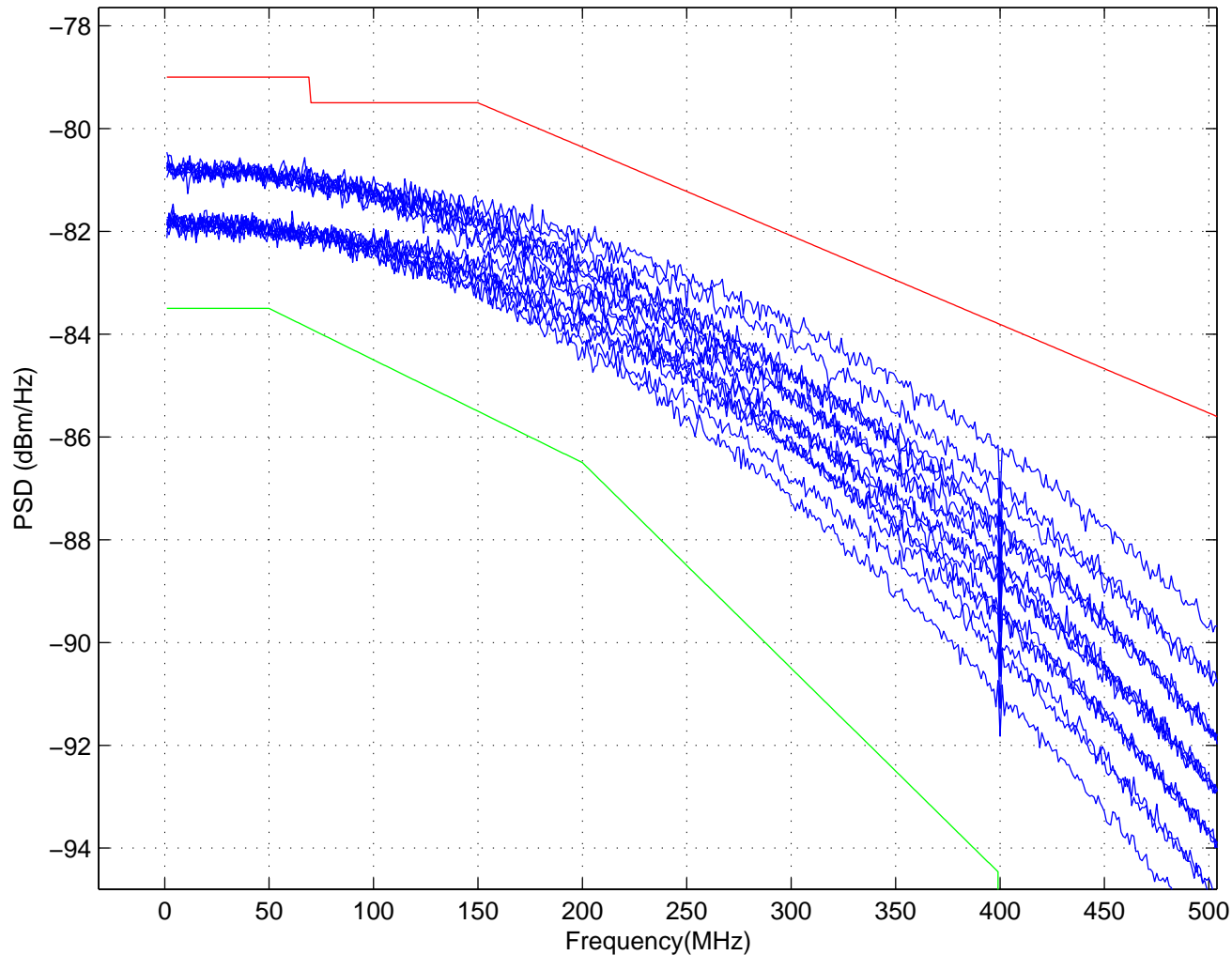
PSD curves with assumptions as stated



Note:

- With 2V +/- 6% at the transformer output, the lower PSD curve has smaller margin at lower end.
- 2V +/- 6% with the filter tolerances as specified meets the power spec
- Upper PSD has a larger margin, especially the lower 0-70MHz range.

Proposal for PSD



Recommendation:

Reduce the upper PSD by 1dB in 0-70MHz.

0.5dB reduction on upper and lower curves everywhere else w.r.t. draft 2.1, would make it better centered.

PSD upper curve:

- 79 dBm/Hz, $0 < f \leq 70$**
- 79.5 dBm/Hz, $70 < f \leq 150$**
- $-79.5 - (f - 150)/58$ dBm/Hz, $150 < f \leq 730$**
- $-79.5 - (f - 330)/40$ dBm/Hz, $730 < f \leq 1810$**
- 116 dBm/Hz, $1810 < f < 3000$**

PSD lower curve:

- 83.5 dBm/Hz, $5 < f \leq 50$**
- $-83.5 - (f - 50)/50$ dBm/Hz, $50 < f \leq 200$**
- $-86.5 - (f - 200)/25$ dBm/Hz, $200 < f \leq 400$**

Where f and the ranges are in MHz