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10GBASE-T Transmitter PSD

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Supported by:
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Transmit PSD mask

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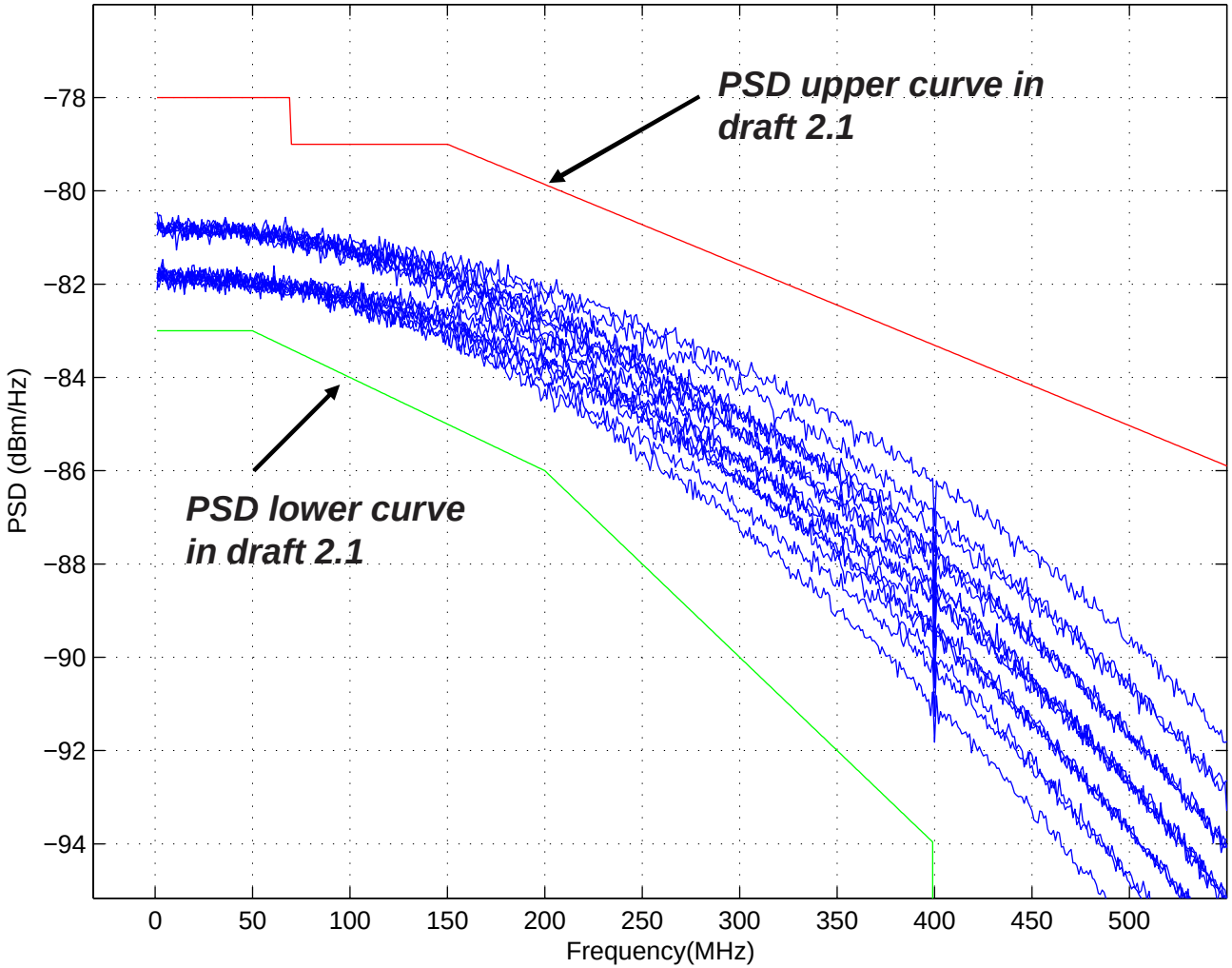
- PSD mask assumptions
  - **Transformer 1st pole at ~100kHz**
  - **Transformer pole f1 with substantial tolerance of 750MHz +/-33%**
  - **Transmitter pole f2, "simple filter pole" contributed by the total capacitance at transmitter and 50ohms. This is modeled as 750MHz +/-33% tolerance**
  - **Transmitter 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

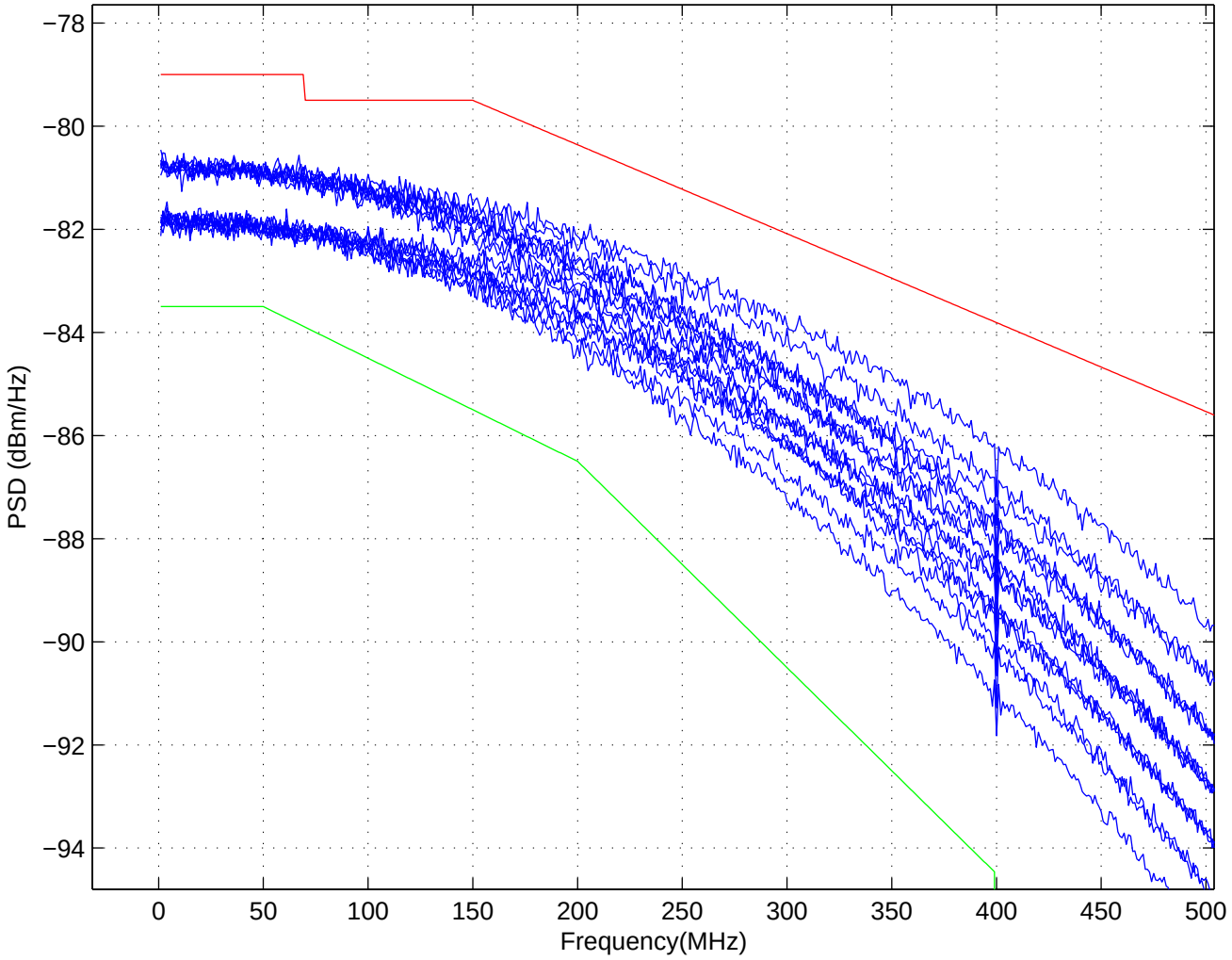
PSD curves with assumptions as stated



***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<=70
-79.5 dBm/Hz, 70<f<=150
-79.5-(f-150)/58 dBm/Hz, 150<f<=730
-79.5-(f-330)/40 dBm/Hz, 730<f<=1810
-116 dBm/Hz, 1810<f<3000

PSD lower curve:

-83.5 dBm/Hz, 5<f<=50
-83.5-(f-50)/50 dBm/Hz, 50<f<=200
-86.5 -(f-200)/25 dBm/Hz, 200<f<=400

Where f and the ranges are in MHz