



10 Mb/s Single Twisted Pair Ethernet 10BASE-T1L PSD Mask Changes (Comment #192)

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Suggested Changes to PSD Mask

- Clause 146.5.4.4 specifies the transmitter power spectral density (PSD) and power level.
- The power level is specified to be **8.8 ± 1.0 dBm** for the 2.4 V_{pp} operating mode and **1.2 ± 1.0 dBm** for the 1.0 V_{pp} operating mode.
 - Suggestion is to change the wording (in bold blue) of text in the following way:

In test mode 3 (reflecting normal operation **in Idle mode**), the transmit power shall be **8.6 ± 1.2 dBm** for the 2.4 V_{pp} operating mode and **1.0 ± 1.2 dBm** for the 1.0 V_{pp} operating mode.

- Equations 146-6 to 146-9 specify the upper and lower PSD limits, Figure 146-19 shows the PSD limits graphically.
 - The **difference between upper and lower PSD limits is currently only 5 dB**, which is small compared to the PSD masks of other Ethernet standards.
 - The measured PSD of the FPGA based evaluation board, which has been trimmed to exactly output 2.4 V_{pp} is about 1 dB nearer at the upper limit than at the lower limit.
 - Therefore the suggestion is to **increase the upper PSD mask limit by 1 dB** in the frequency range between 0 and 2.5 MHz.
 - **Resulting is a difference between upper and lower PSD limits of 6 dB**, which is similar to other Ethernet standards.
 - **All other values are kept the same.**

New PSD Limit Equations

- PSD mask limits for a transmit signal amplitude of $2.4 V_{pp}$:

$$\text{Upper PSD Limit } (f) = \begin{cases} -54 \frac{\text{dBm}}{\text{Hz}} & 0 \leq f \leq 2.5 \text{ MHz} \\ -54 - 1.6 \cdot (f - 2.5 \text{ MHz}) \frac{\text{dBm}}{\text{Hz}} & 2.5 \text{ MHz} < f < 12.5 \text{ MHz} \\ -70 \frac{\text{dBm}}{\text{Hz}} & 12.5 \text{ MHz} \leq f \leq 20 \text{ MHz} \end{cases}$$

$$\text{Lower PSD Limit } (f) = \begin{cases} -60 \frac{\text{dBm}}{\text{Hz}} & 0.625 \text{ MHz} \leq f \leq 2.5 \text{ MHz} \\ -60 - 4 \cdot (f - 2.5 \text{ MHz}) \frac{\text{dBm}}{\text{Hz}} & 2.5 \text{ MHz} < f \leq 5 \text{ MHz} \end{cases}$$

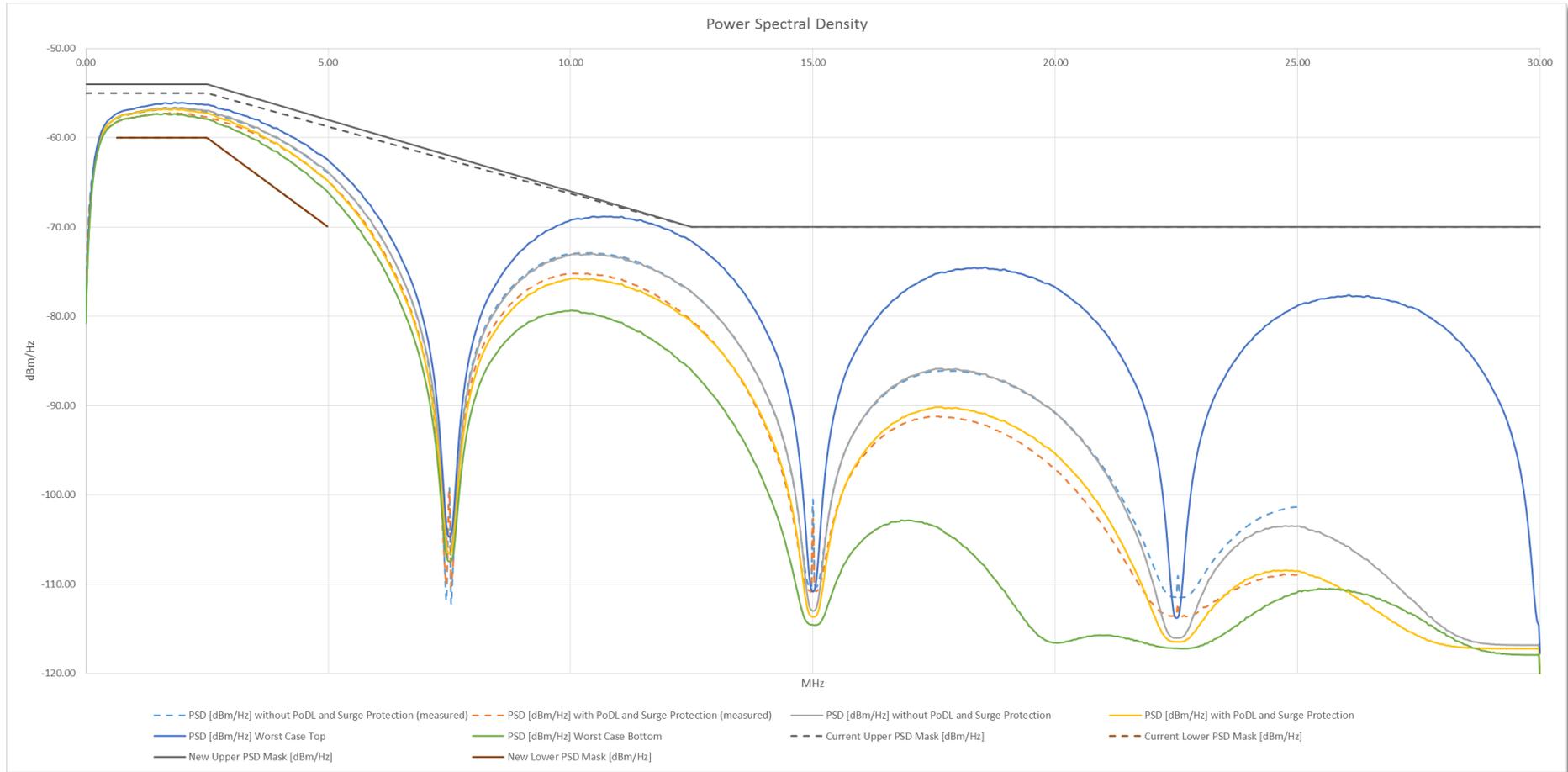
- PSD mask limits for a transmit signal amplitude of $1.0 V_{pp}$:

$$\text{Upper PSD Limit } (f) = \begin{cases} -61.6 \frac{\text{dBm}}{\text{Hz}} & 0 \leq f \leq 2.5 \text{ MHz} \\ -61.6 - 1.6 \cdot (f - 2.5 \text{ MHz}) \frac{\text{dBm}}{\text{Hz}} & 2.5 \text{ MHz} < f < 12.5 \text{ MHz} \\ -77.6 \frac{\text{dBm}}{\text{Hz}} & 12.5 \text{ MHz} \leq f \leq 20 \text{ MHz} \end{cases}$$

$$\text{Lower PSD Limit } (f) = \begin{cases} -67.6 \frac{\text{dBm}}{\text{Hz}} & 0.625 \text{ MHz} \leq f \leq 2.5 \text{ MHz} \\ -67.6 - 4 \cdot (f - 2.5 \text{ MHz}) \frac{\text{dBm}}{\text{Hz}} & 2.5 \text{ MHz} < f \leq 5 \text{ MHz} \end{cases}$$

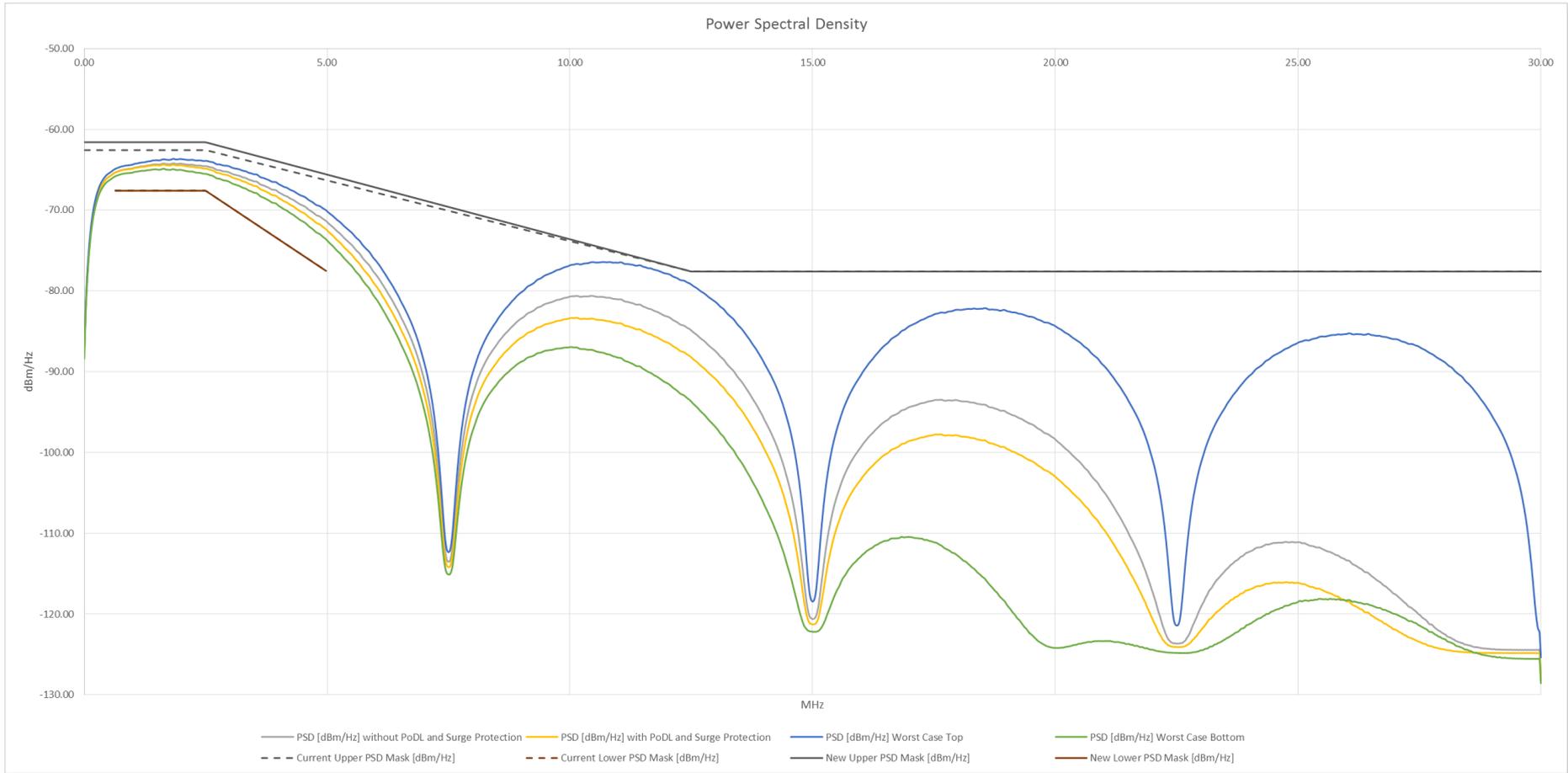
Backup Slides

New PSD Mask (2.4 Vpp Amplitude)



- The dashed limit curves show the current PSD mask limits, the solid limit curves show the new suggested PSD mask limits.

New PSD Mask (1.0 Vpp Amplitude)



- The dashed limit curves show the current PSD mask limits, the solid limit curves show the new suggested PSD mask limits.

Thank You