



10 Mb/s Single Twisted Pair Ethernet

10BASE-T1L PSD Mask Changes

Steffen Graber
Pepperl+Fuchs

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Suggested Changes

- 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, **but without specifying the relevant frequency range**.

- 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**), **within a frequency range of 0.1 MHz to 20 MHz** the transmit power shall be **8.8 ± 2.0 dBm** for the 2.4 V_{pp} operating mode and **1.2 ± 2.0 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.
 - To cover measurement tolerances it seems to be reasonable to increase the difference between upper and lower PSD limits.
 - Nevertheless the transmit amplitude itself is specified by a voltage level in Clause 146.5.4.1.
- Suggestion is to **increase the upper PSD mask limit by 2 dB** in the frequency range between 0 and 2.5 MHz.
- Suggestion is to **decrease the lower PSD mask limit by 1 dB** in the frequency range between 0.625 MHz and 2.5 MHz.
- **All other values are kept the same.**

New PSD Limit Equations

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

$$Upper\ PSD\ Limit\ (f) = \begin{cases} -53 \frac{dBm}{Hz} & 0 \leq f \leq 2.5\ MHz \\ -53 - 1.7 \cdot (f - 2.5\ MHz) \frac{dBm}{Hz} & 2.5\ MHz < f < 12.5\ MHz \\ -70 \frac{dBm}{Hz} & 12.5\ MHz \leq f \leq 20\ MHz \end{cases}$$

$$Lower\ PSD\ Limit\ (f) = \begin{cases} -61 \frac{dBm}{Hz} & 0.625\ MHz \leq f \leq 2.5\ MHz \\ -61 - 3.6 \cdot (f - 2.5\ MHz) \frac{dBm}{Hz} & 2.5\ MHz < f \leq 5\ MHz \end{cases}$$

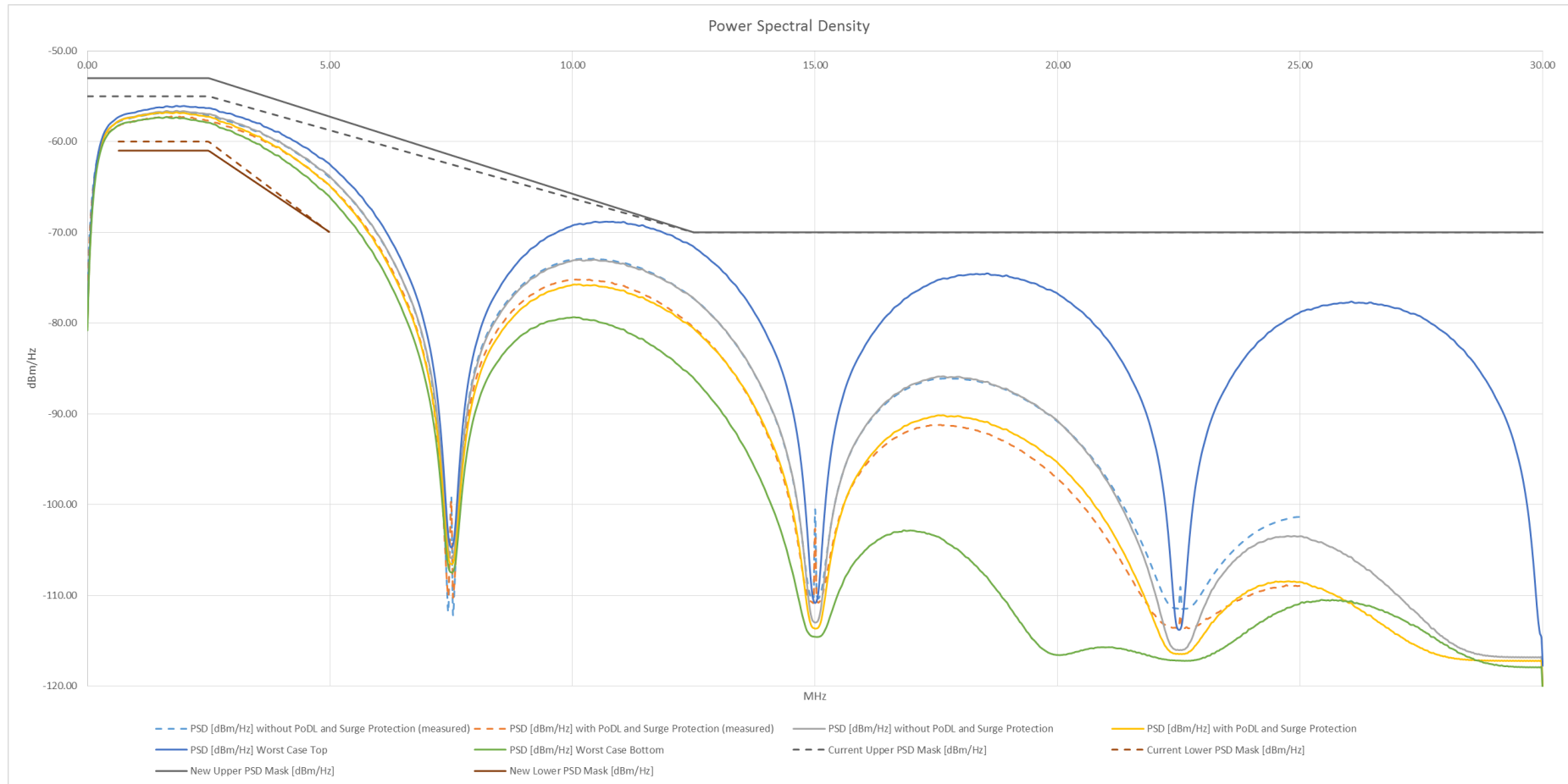
- PSD mask limits for a transmit signal amplitude of $1.0 V_{pp}$:

$$Upper\ PSD\ Limit\ (f) = \begin{cases} -60.6 \frac{dBm}{Hz} & 0 \leq f \leq 2.5\ MHz \\ -60.6 - 1.7 \cdot (f - 2.5\ MHz) \frac{dBm}{Hz} & 2.5\ MHz < f < 12.5\ MHz \\ -77.6 \frac{dBm}{Hz} & 12.5\ MHz \leq f \leq 20\ MHz \end{cases}$$

$$Lower\ PSD\ Limit\ (f) = \begin{cases} -68.6 \frac{dBm}{Hz} & 0.625\ MHz \leq f \leq 2.5\ MHz \\ -68.6 - 3.6 \cdot (f - 2.5\ MHz) \frac{dBm}{Hz} & 2.5\ MHz < f \leq 5\ MHz \end{cases}$$

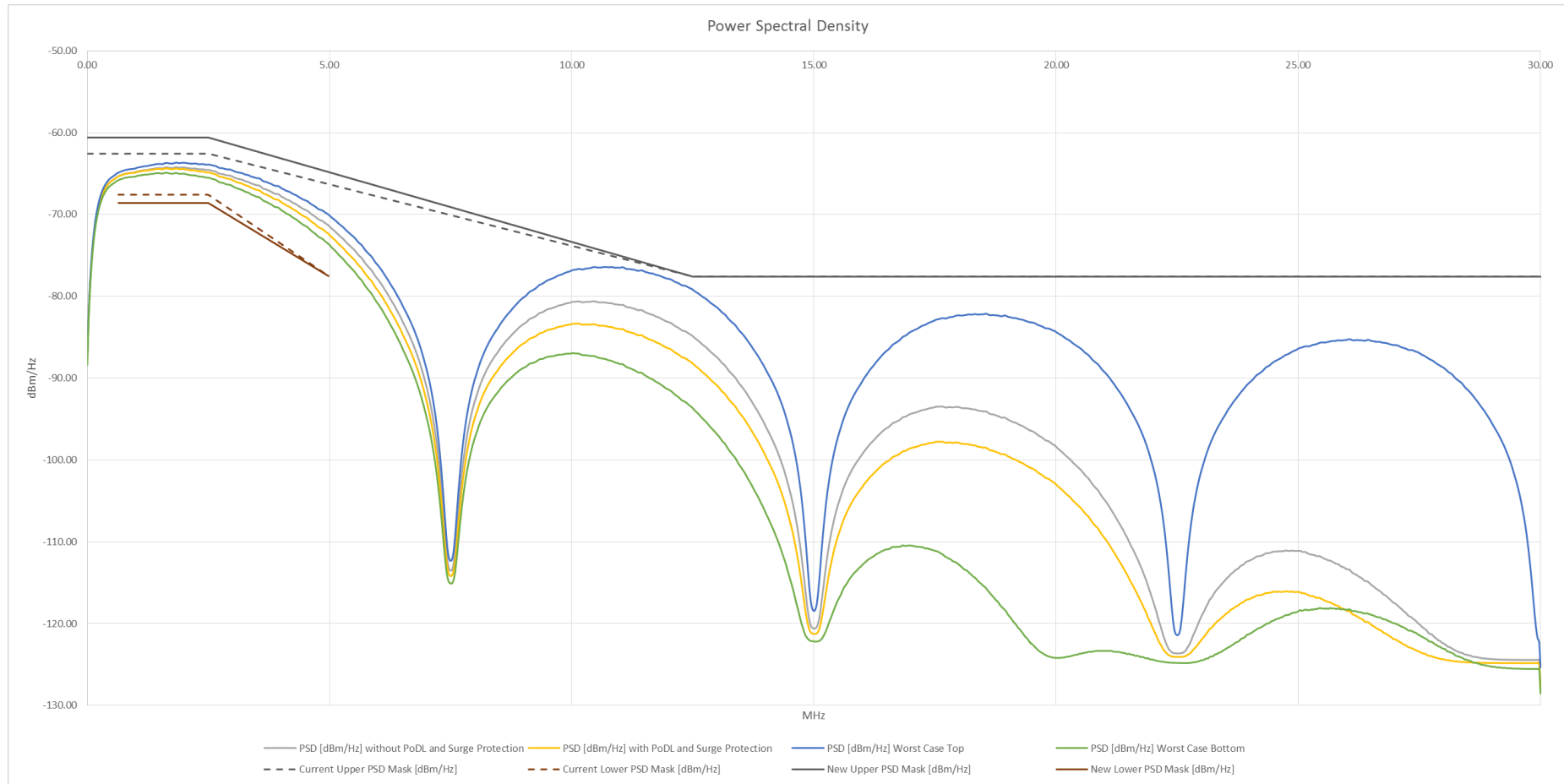
Backup Slides

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