

# Analysis of different filtering schemes for PAM3 Modulation and effective margin to the Mask

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May 2014

# Motivation

- Two TXPSD masks were suggested
- Different Analog, Digital and a combination of the two schemes were analyzed
- Margin to the mask was analyzed for each of the filtering schemes

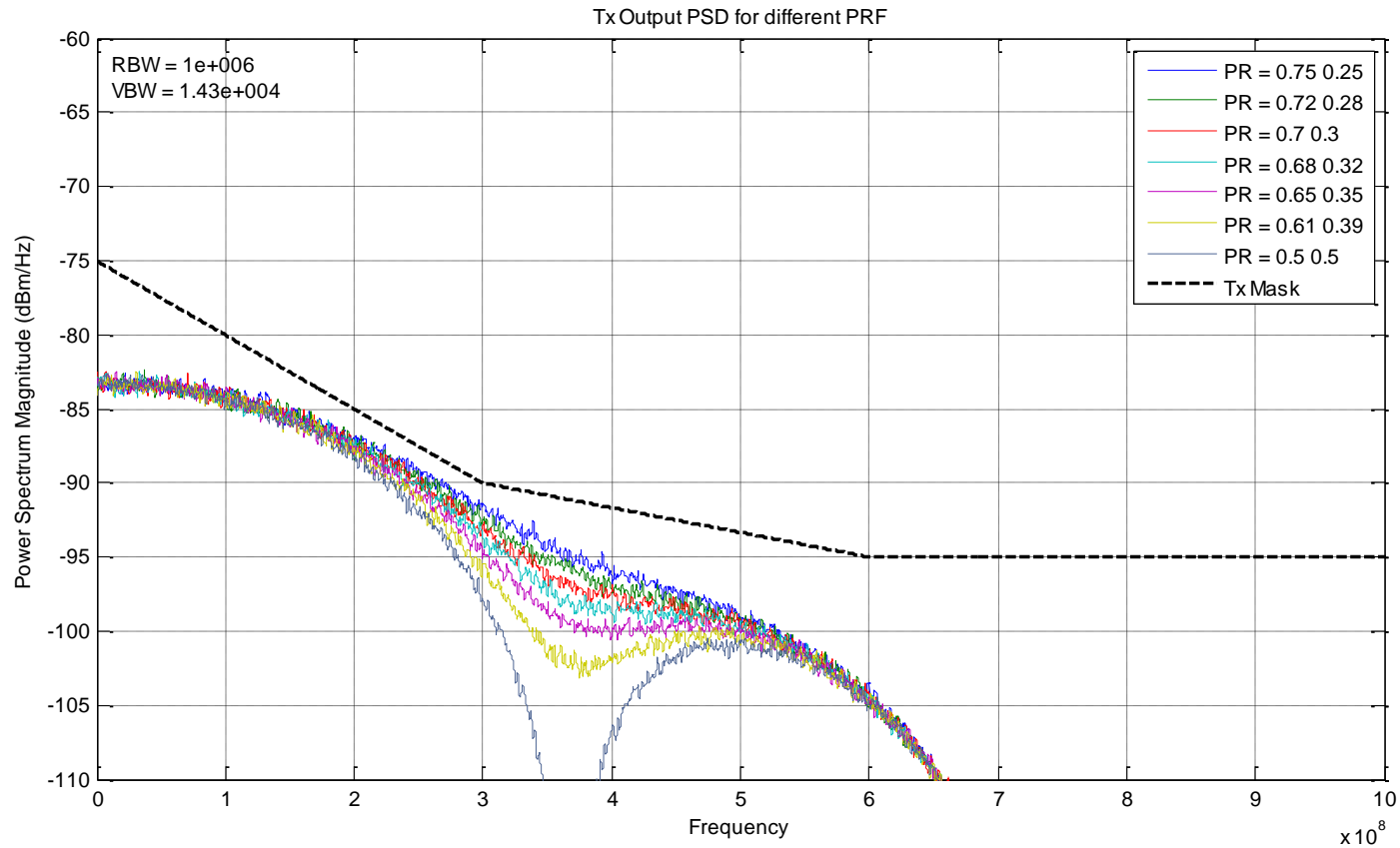
# Assumptions

The following parameters will be used in the following tests (unless specified otherwise):

- Analog filter – Butterworth 2<sup>nd</sup> order @  $3/5 * \text{BaudRate}$
- PAM-3 constellation
- Symbols were generated randomly (no coding)
- Tx swing (in order to match references):
  - PAM3 – 1Vpp

# Partial-Response Co-efficient Sweep

- ~732MHz symbol rate (16% coding overhead)
- Analog filter – Butterworth 2<sup>nd</sup> order @  $3/5 \times \text{BaudRate}$
- $V_{pp} = 1V$



# Result Summary

- The below tables summarize the PSD results for several TX architectures
  - For both PAM2 and PAM3 modulation
  - For the Old Mask and the New Mask proposal (From Ahmad Chini, Broadcom)
  - Analog filter – Butterworth 2<sup>nd</sup> order @  $3/5 \times \text{Baud Rate}$

PAM3 V <sub>pp</sub> = 1V, Baud Rate = 732MBPS	No Filtration	No PRF With Ana Filt	PRF [0.75 0.25] No Ana Filt	PRF [0.75 0.25] With Ana Filt
Old PSD Mask	Margin -4.5dB @ 300M	Margin -3.5dB @ 330M	Margin 0.5dB @ 250M	Margin 1.6dB @ 276M
New PSD Mask	Margin -4dB @ 400M	Margin -2dB @ 400M	Margin -0.2dB @ 950M	Margin 2.85dB @ 200M

# Conclusions

- 2.85 dB of margin from the mask is attained under following conditions
  - 1V pp
  - PAM3 coding
  - [0.75 0.25] PR shaping
  - 2<sup>nd</sup> order Butter-worth at  $3/5 * \text{Baud-rate}$
  - New Mask shape proposed