A Few Common Mode Measurements

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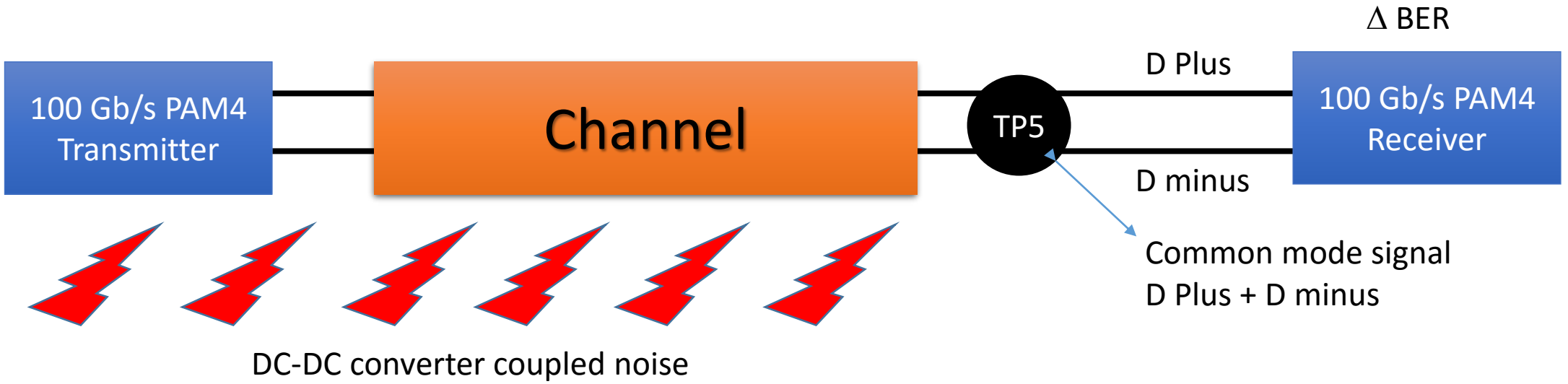
CM measurement data

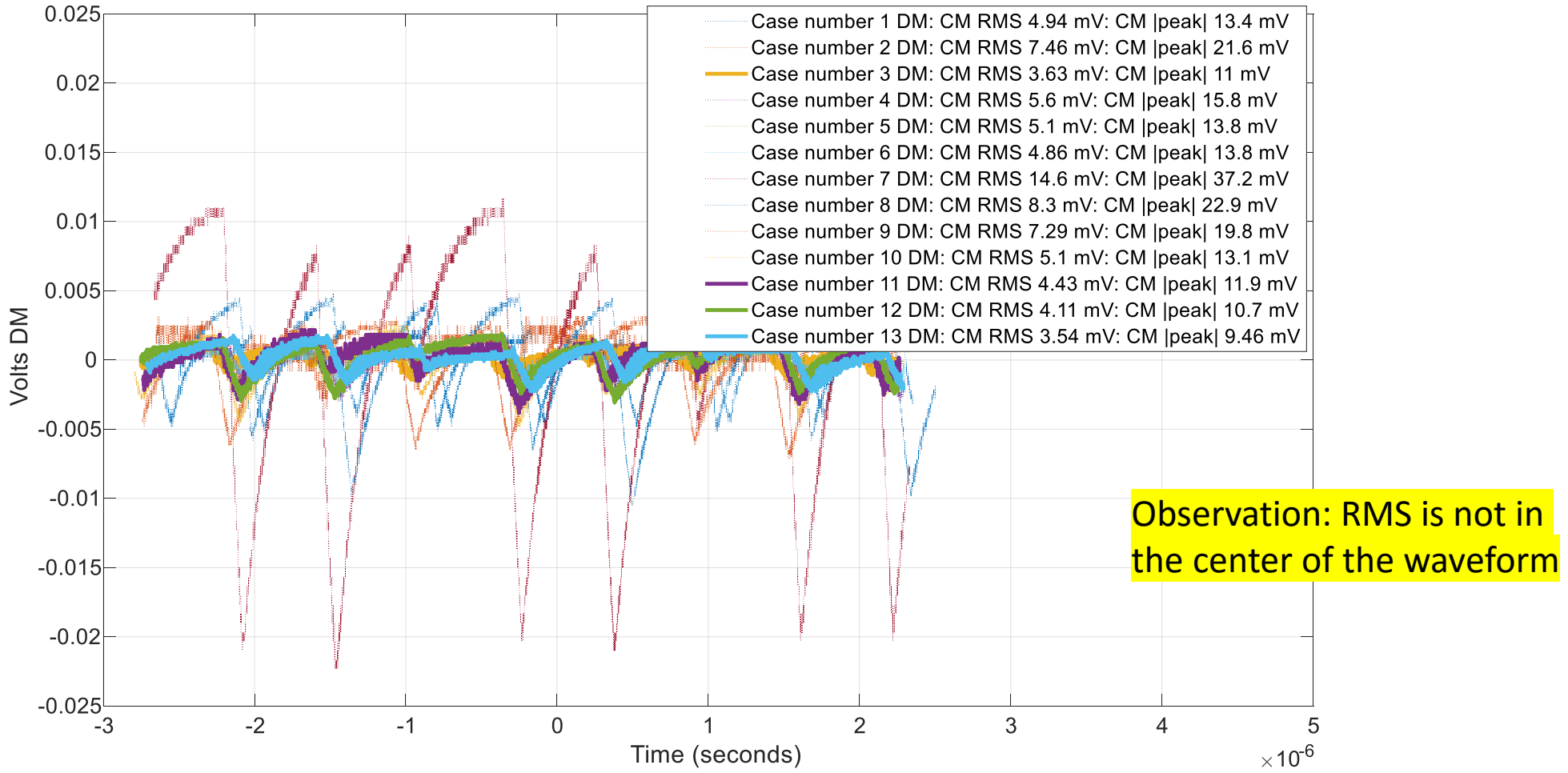
- Limited scope of measurements
- Targeting DC-DC CM impacting 100G SERDES lines
- Goal: Illustrate nature of at least 1 type of CM noise
- Not covering impact of “in-band” CM either coherent of not.

Experiment: Power supply common model noise on 100 Gb/s PAM4 signal



- Only one particularly setup used for the purpose of getting an indication of the nature on 1 type of common mode voltage
- Evaluate
  - CM Signal waveform
  - Power spectral density of CM signal
  - CM probability density function (PDF)
  - CM cumulative distribution function (CDF)

Common Mode (CM) Measured Signals

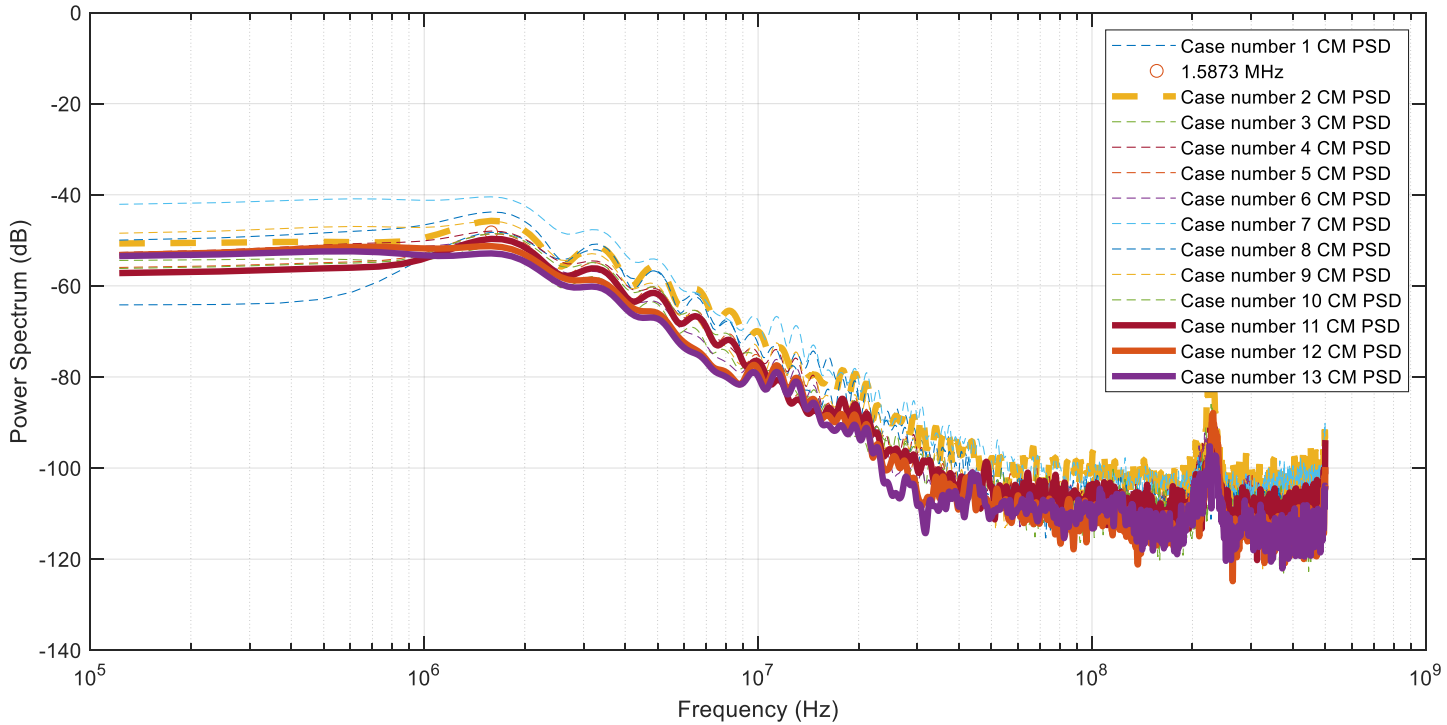


Observation: RMS is not in the center of the waveform

Indications are that solid traces have the least effect on BER

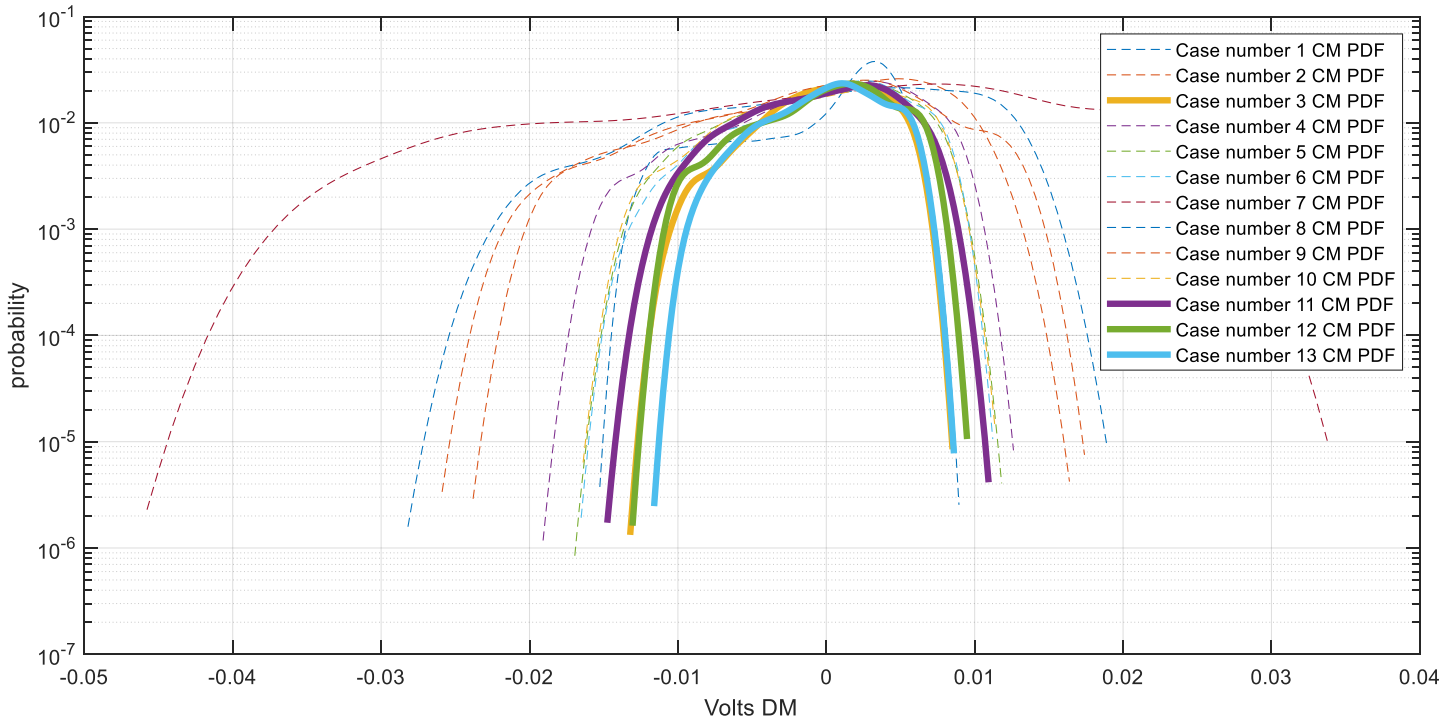
Common Mode (CM) Power Spectral Density

A few MHz bandwidth

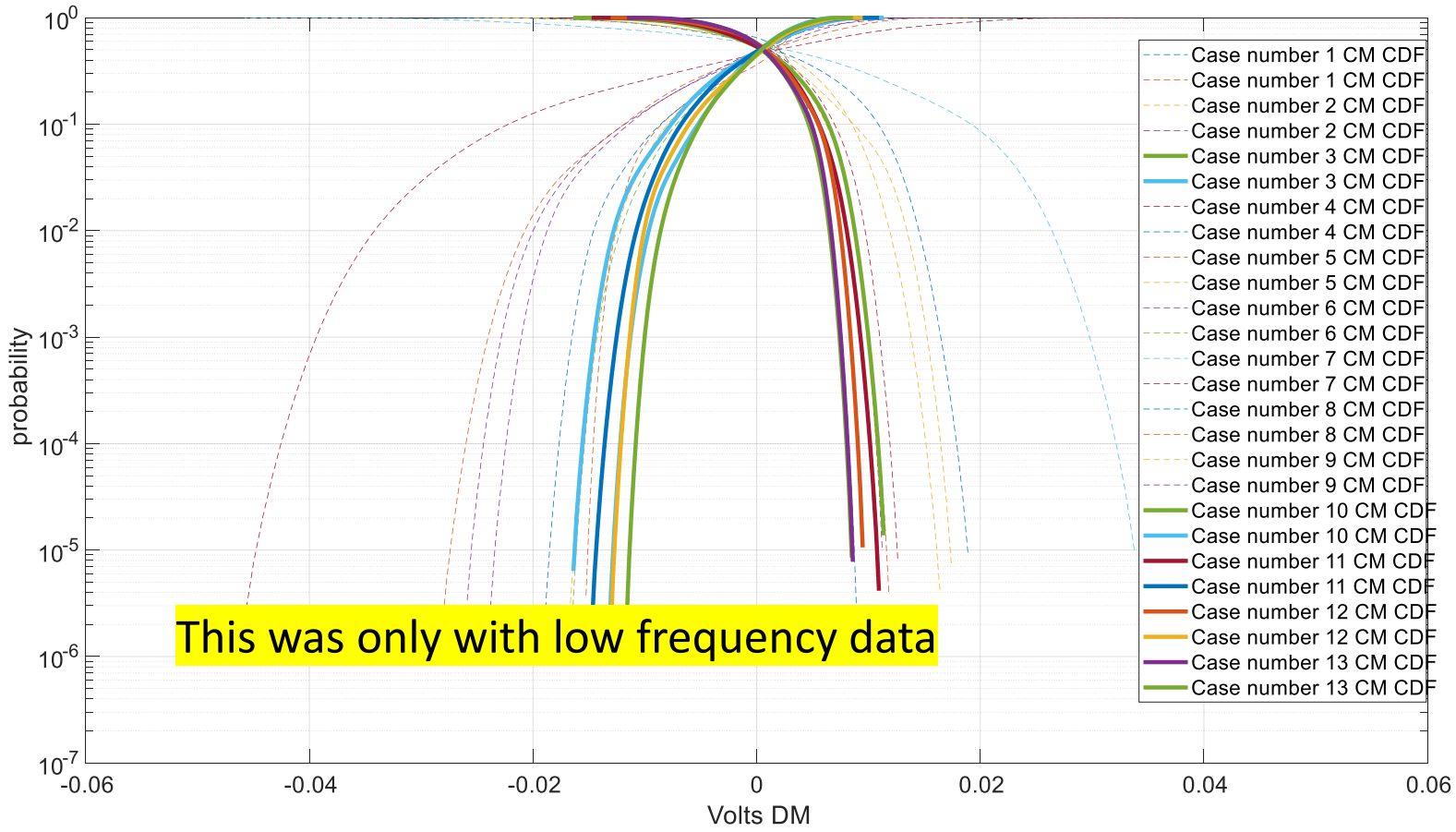


Common Mode (CM) Probably Density Function (PDF)

Not Gaussian … a parabola would be Gaussian



Common Mode (CM) Cumulative Distribution Function (CDF)



Observations and discussions

- DC-DC converter Nosie is limited to a few MHz
- Consider 2 specs for CM at TP0v
  - 2 spec for TP0v.
  - Lower frequency would have little dependence on fixture loss
    - Signal to AC common-mode noise ratio, SCMR (min) is seems applicable
  - Higher frequency noise would be dependent on fixture loss
    - Signal to AC common-mode noise ratio, SCMR (min) is seem applicable
- Sinusoidal vs Gaussian noise
  - Issue is for low and high frequency
  - Sinusoidal
    - Peak = sqrt(2) * rms = crest factor * rms
  - Gaussian
    - Peak= qfunctinv(DER0)*rms
  - Potential solution adjust for crest factor (Peak/rms)
  - Other option are possible