802.3CG CONSISTENT PMA ELECTRICAL PARAMETERS AND LINK SEGMENT DEF

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IIS

802.CG

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PMA Electrical Parameters and Link Segment Definition

- Baseline for short reach link segment (as of motion #14 in Charlotte Sep 2017):

Insertion Loss:	IL <	1+1.6 (f-1)/9 dB	f=0.3…. 10MHz
		2.6 + 2.3 (f-10)/23 dB	f=10 …. 33MHz
		4.9 + 2.3 (f-33)/33 dB	f=33 ……40MHz
Return Loss:	RL >	14 dB	f=0.3…10MHz
		14-10*LOG10(f/10) dB	f=10…40MHz
Mode Conversion:	MC >	30 dB	f=0.3…20MHz
		30-20*LOG10(f/20) dB	f=20…200MHz

- Continuing on http://www.ieee802.org/3/cg/public/Nov2017/Zerna_3cg_01a_1117.pdf
- Taking IL and RL definition as given … checking and adjusting the rest in simulation

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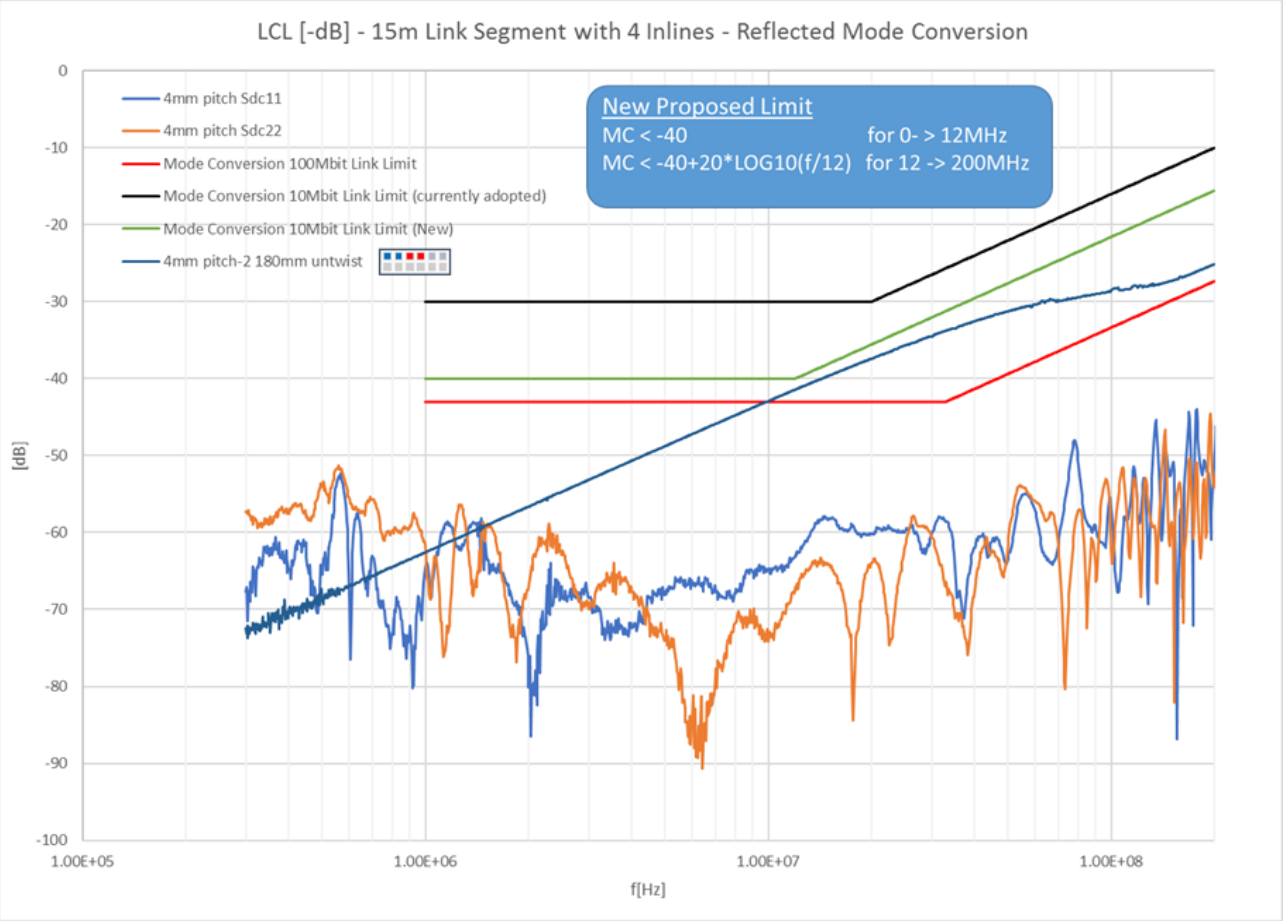
PMA Electrical Parameters and Link Segment Definition

- Proposal Eric DiBasio on Reflector Jan 18th 2018
- MC problem 10MHz upwards
  → new MC limit



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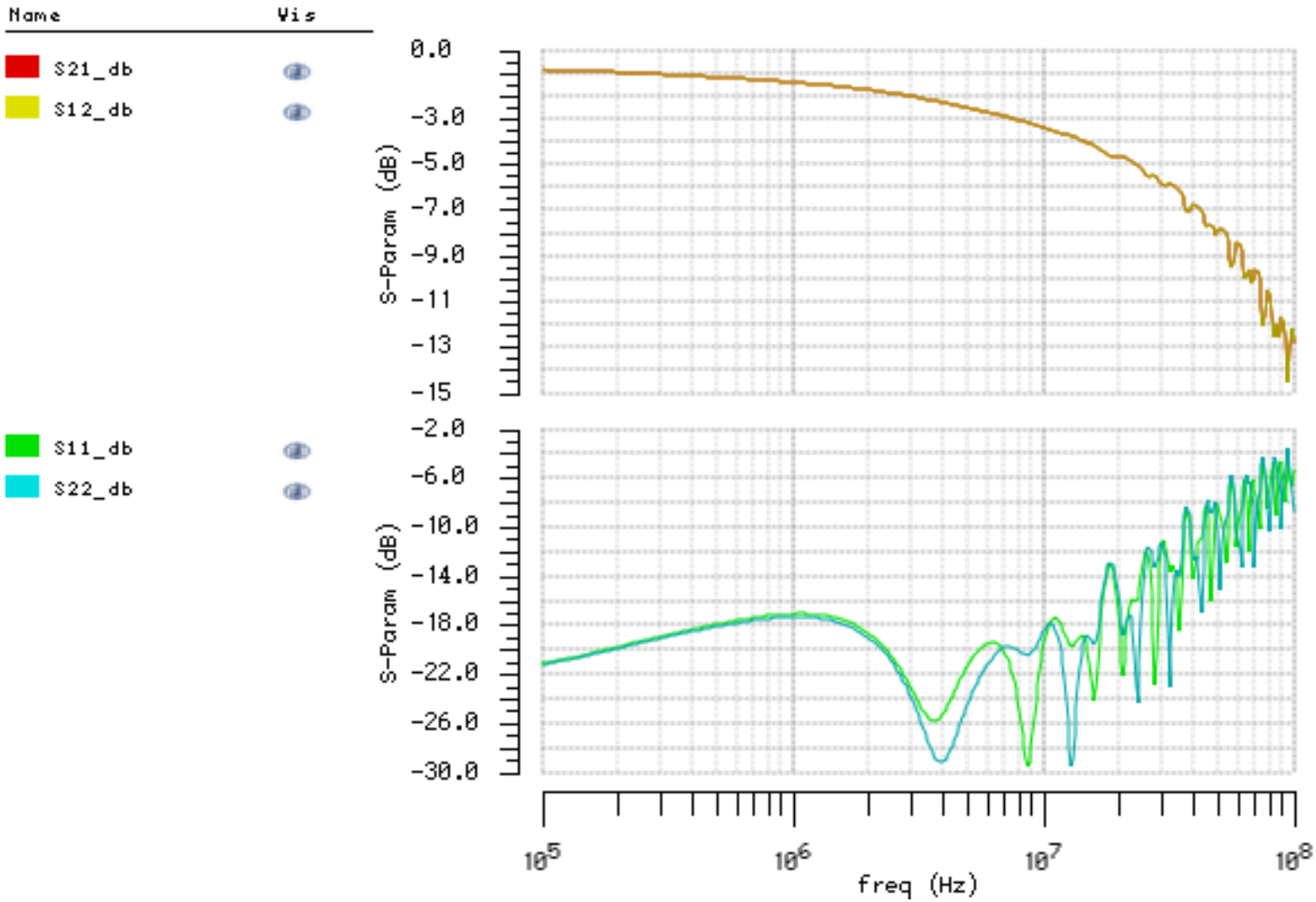
Insertion Loss and Return Loss of used Channel Model



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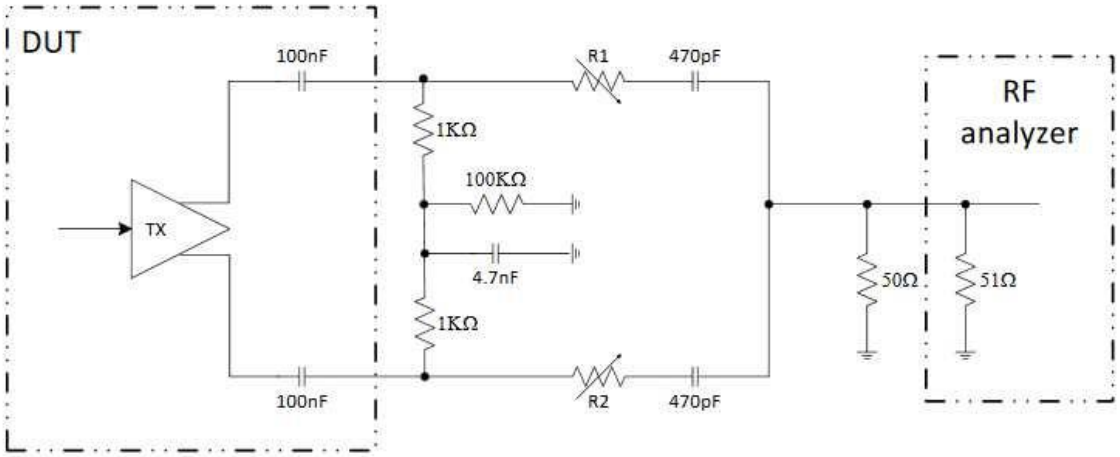
PMA Electrical and Link Segment Definition

- DPI network:
  R1/R2 = 120Ohm

  +-2.5% asymmetry:
  -54.6dB mode conv.

  +-5% asymmetry:
  -48.38dB mode conv.



  both have lower 3dB-cutoff around 3.85MHz

- Stripline emission limits AV: up to 30MHz several bands 21dBµV in 10kHz
  - coupling transfer function cable to stripline: 10dB
  - limit for common mode on cable: 31dBµV in 10kHz

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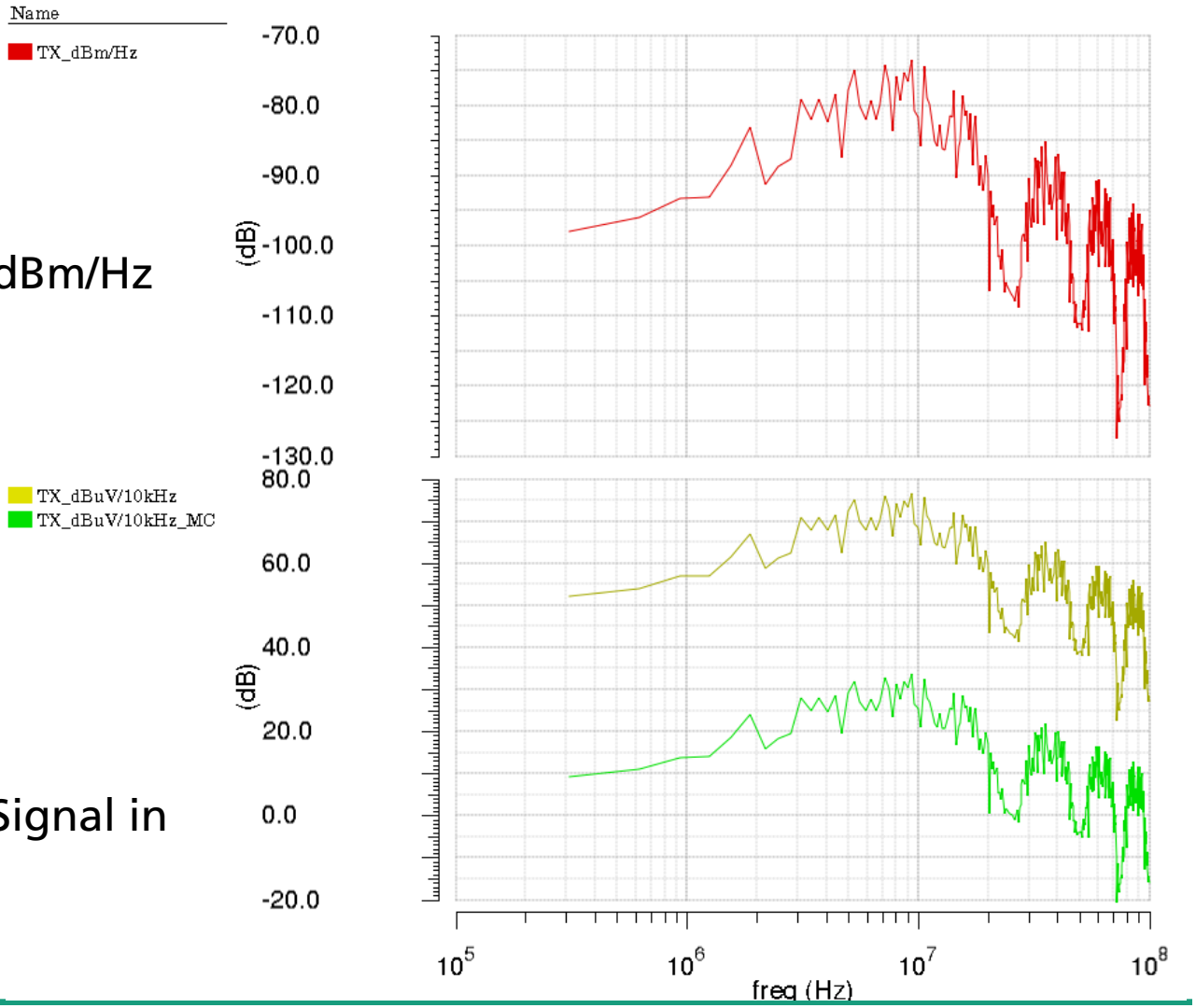
TX PSD & Emissions – Case A (MC=43dB,20MHz; A_{TX}=400mVpp)

- Transmit PSD in dBm/Hz
- Differential and Common Mode Signal in dBµV/10kHz



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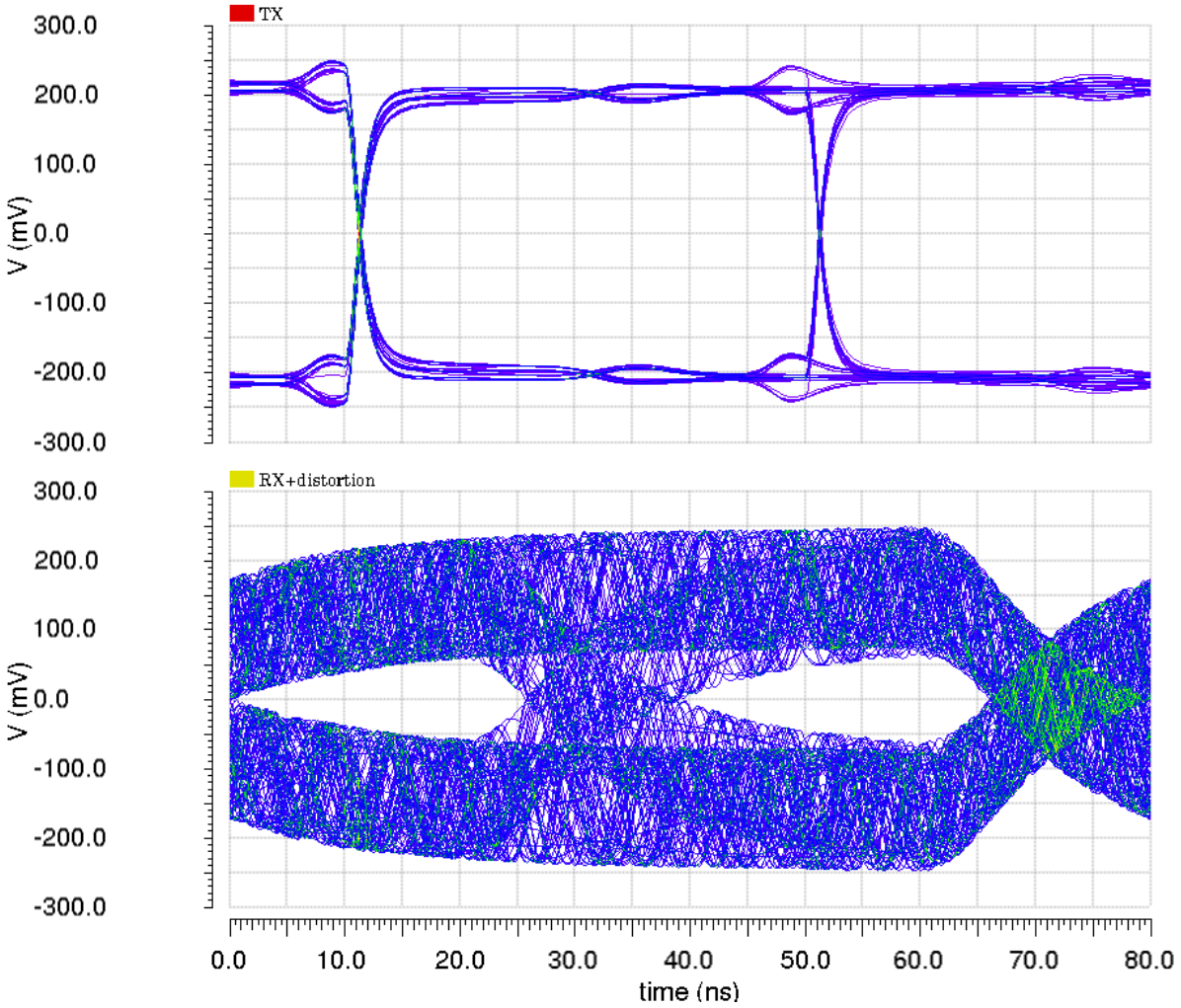
Eye Diagrams – Case A (MC=43dB,20MHz; A_{TX}=400mVpp)

- Transmit eye diagram
- Receive eye diagram => BCI severity IV (3-200MHz) attenuated by mode conversion added
- LowPass 1st order -3dB@25MHz in RX



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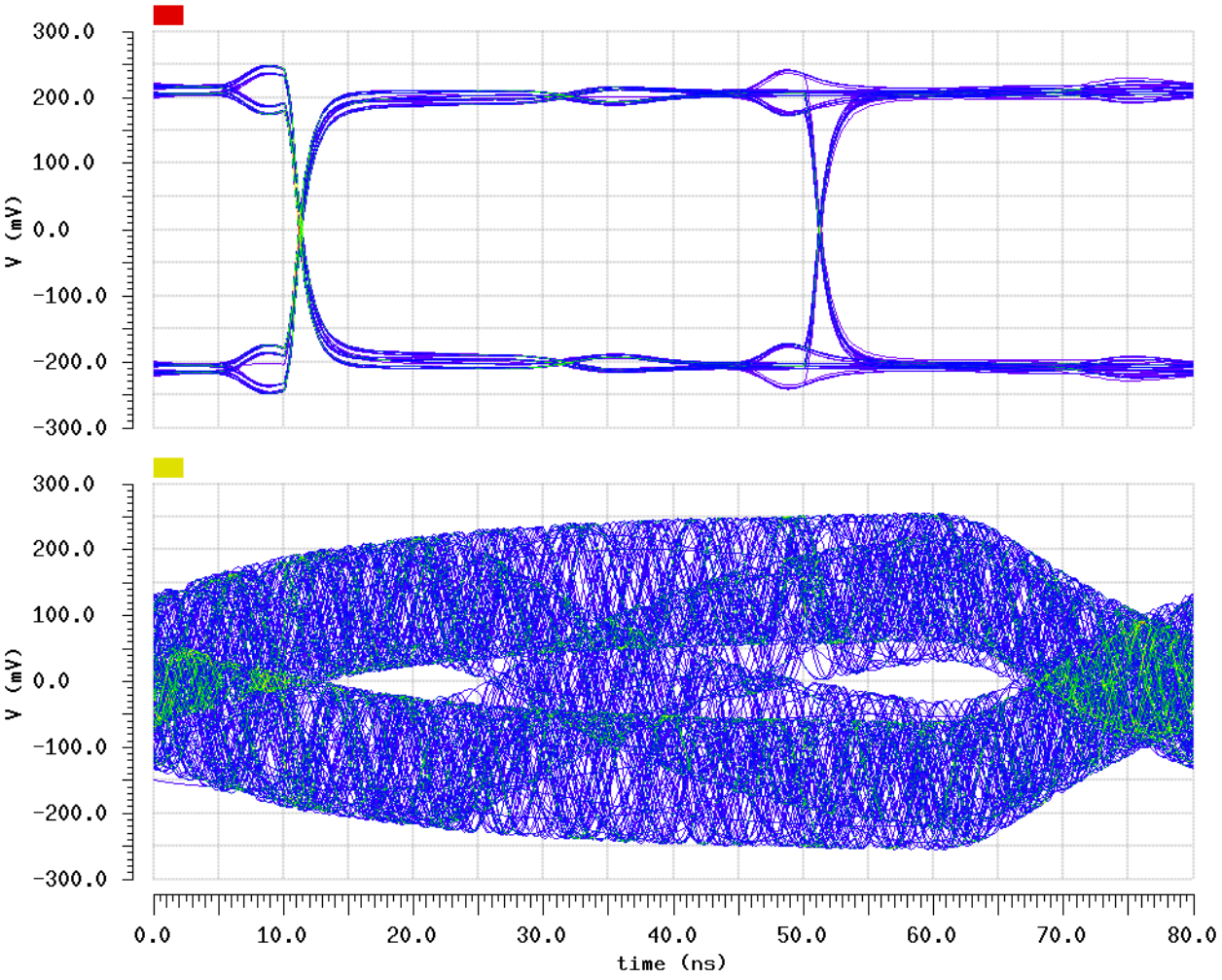
Eye Diagrams – Case A' (MC=43dB,9MHz; A_{TX}=400mVpp)

- Transmit eye diagram
- Receive eye diagram => BCI severity IV (3-200MHz) attenuated by mode conversion added
- **LowPass 1st order -3dB@12.5MHz in RX**



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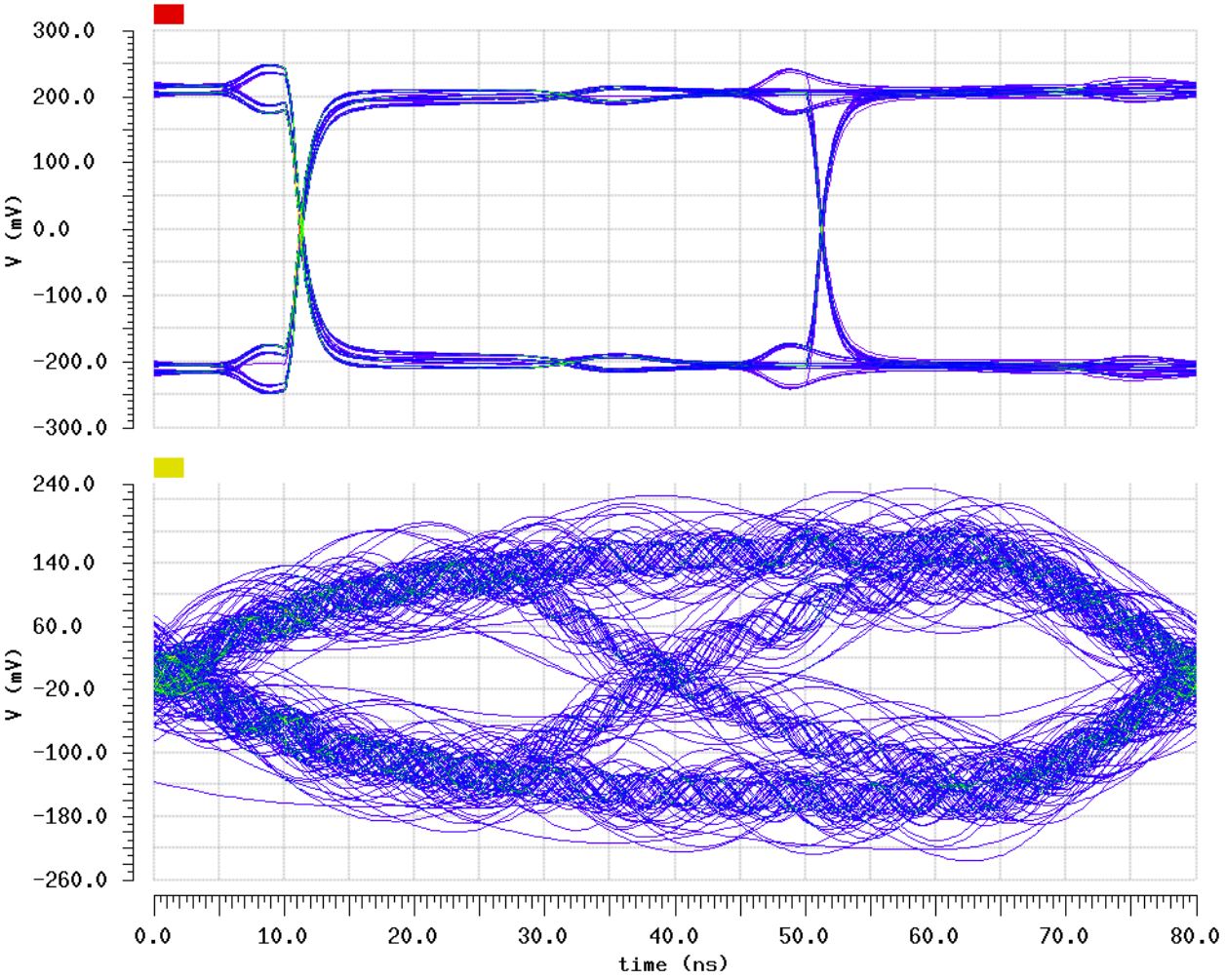
Eye Diagrams – Case A' (MC=43dB,9MHz; A_{TX}=400mVpp)

- Transmit eye diagram
- Receive eye diagram => BCI severity IV (3-200MHz) attenuated by mode conversion added
- **LowPass 2nd order -3dB@12.8MHz in RX**



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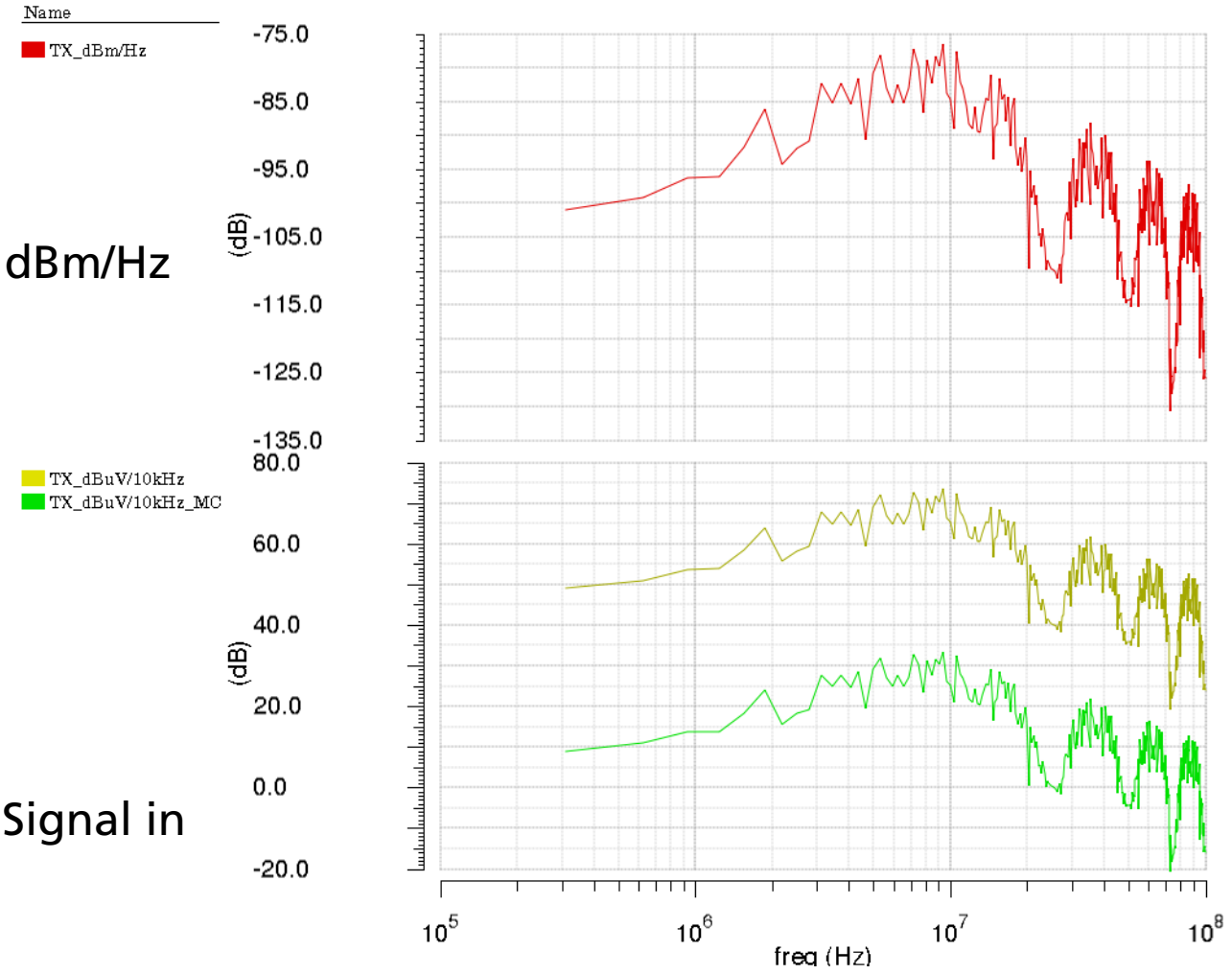
TX PSD & Emissions Case B (MC=40dB,12MHz; A_{TX}=280mVpp)

- Transmit PSD in dBm/Hz
- Differential and Common Mode Signal in dBµV/10kHz



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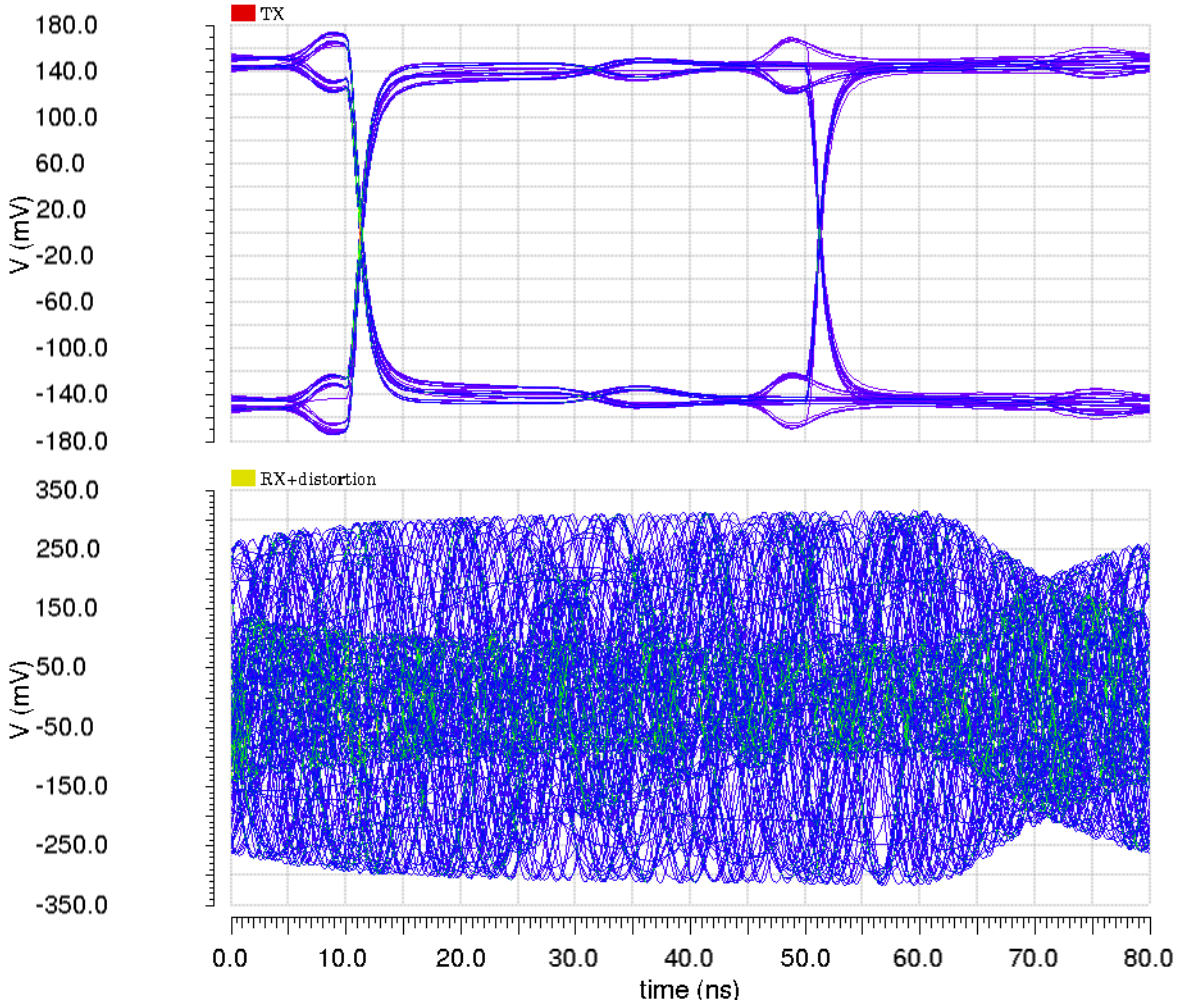
Eye Diagrams – Case B (MC=40dB,12MHz; A_{TX}=280mVpp)

- Transmit eye diagram
- Receive eye diagram => BCI severity IV (3-200MHz) attenuated by mode conversion added
- LowPass 1st order -3dB@25MHz in RX



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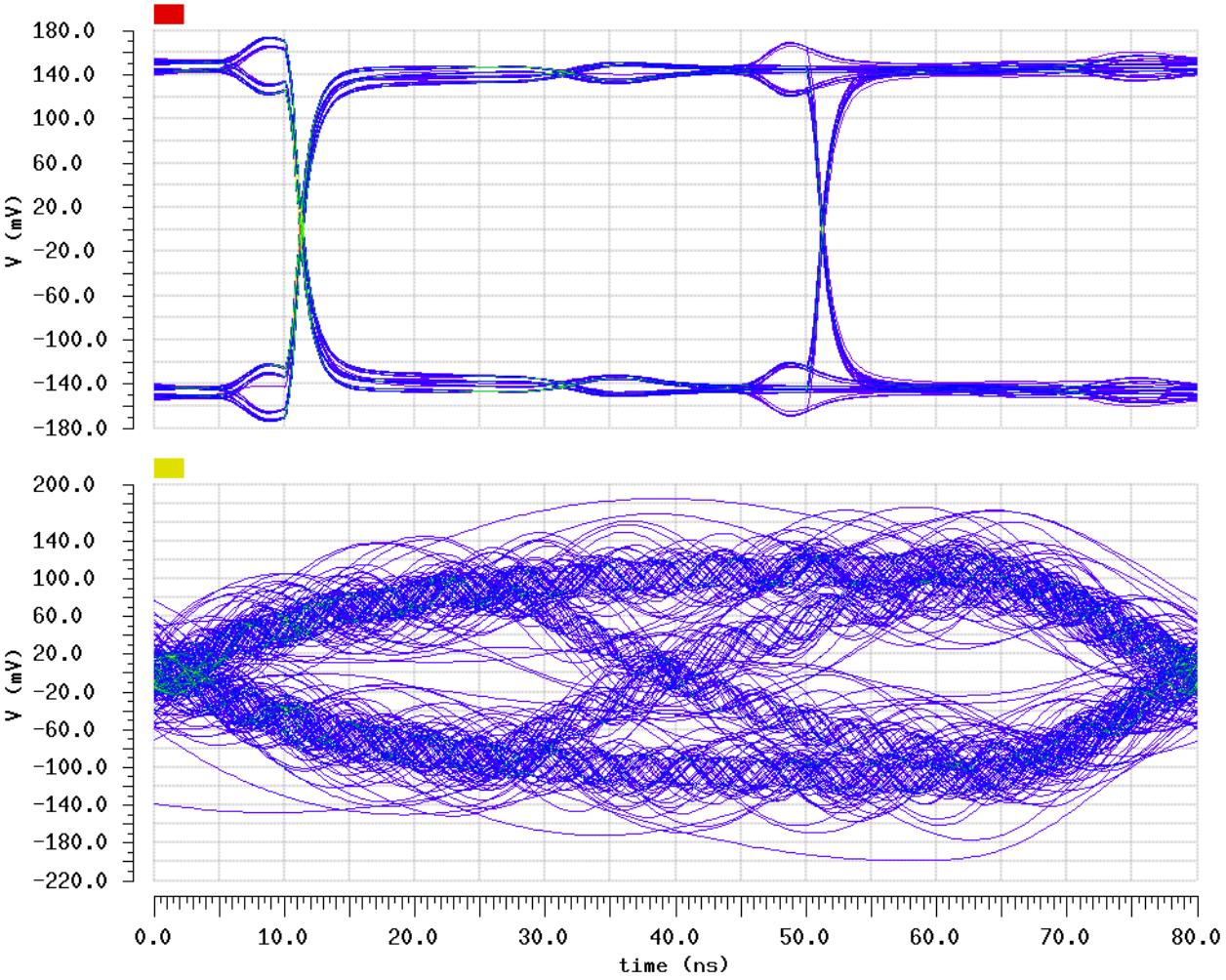
Eye Diagrams – Case B' (MC=40dB,15MHz; A_{TX}=280mVpp)

- Transmit eye diagram
- Receive eye diagram => BCI severity IV (3-200MHz) attenuated by mode conversion added
- **LowPass 2nd order -3dB@12.8MHz in RX**



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Conclusions

- Emissions are stronger than previously assumed
  - even with good mode conversion, transmit amplitude needs to be reduced
- With mode conversion equal to 43dB up to 20MHz, there is good margin
  - trying to meet TE measurments: MC 43dB up to 9MHz combined with more agressive RX filtering → smaller, but positive margin
- With mode conversion equal to 40dB up to 12MHz, there is no margin
  - increasing MC corner frequency to 15MHz combined with more agressive RX filtering → positive, but tiny margin

→ With agressive RX filtering, MC measurements from TE can be taken as baseline, but there is almost no more margin for implementations

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PMA Electrical Parameters and Link Segment Definition

→ Proposal 1: Replace in Draft 1.0: $V_{TX,nom}$ = 400mV

→ Proposal 2: Replace in Draft 1.0: p2p link segment MC definition

MC	< -43	0.3..9MHz
	< -43+20*LOG10(f/9)	9..200MHz