
802.3CG CONSISTENT PMA ELECTRICAL PARAMETERS AND LINK SEGMENT DEF

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802.CG



802.3cg Short-Reach PHY

PMA Electrical Parameters and Link Segment Definition

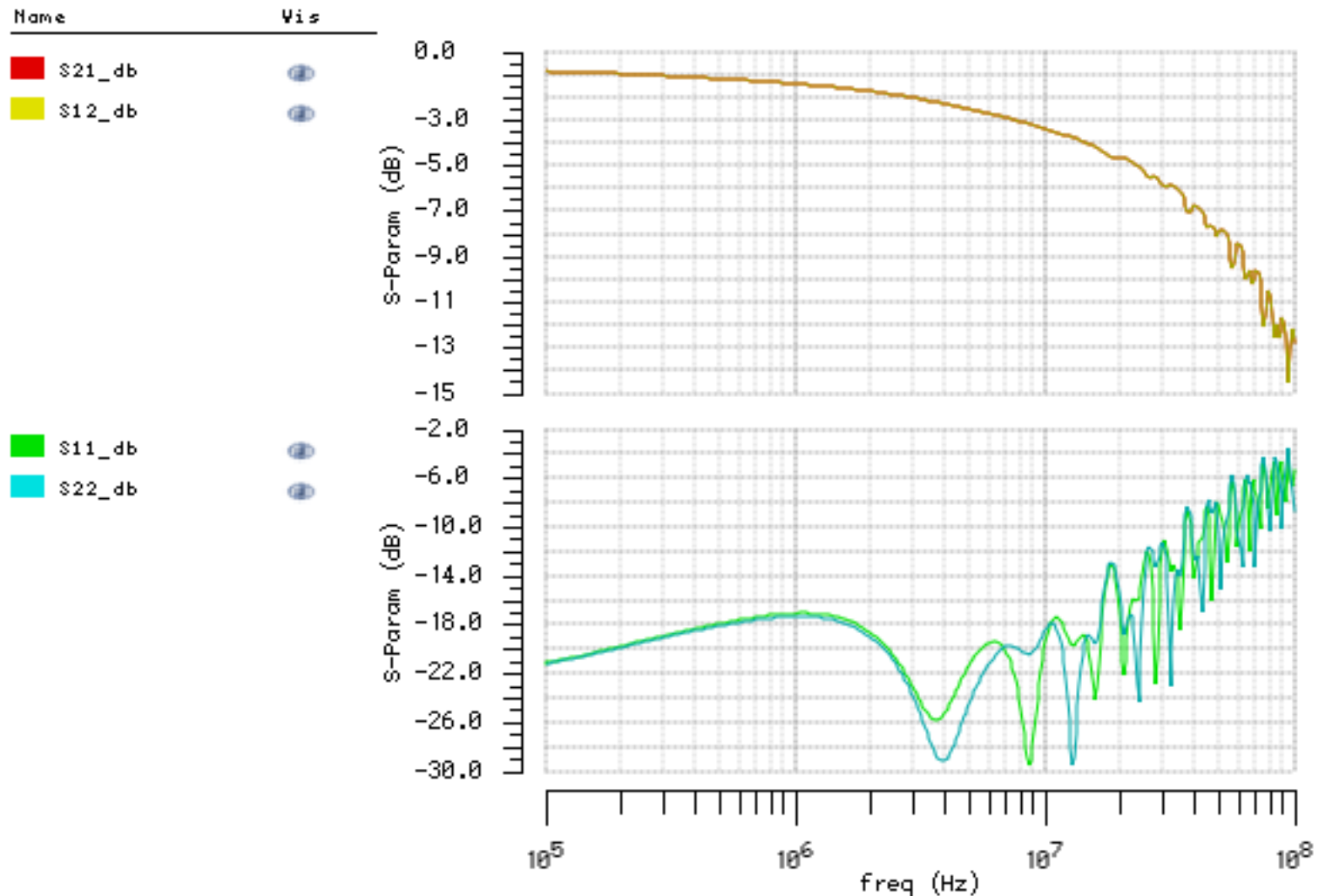
- Baseline for short reach link segment (as of motion #14 in Charlotte Sep 2017):

Insertion Loss:	IL <	$1 + 1.6 (f - 1) / 9 \text{ dB}$	$f = 0.3 \dots 10 \text{ MHz}$
		$2.6 + 2.3 (f - 10) / 23 \text{ dB}$	$f = 10 \dots 33 \text{ MHz}$
		$4.9 + 2.3 (f - 33) / 33 \text{ dB}$	$f = 33 \dots 40 \text{ MHz}$
Return Loss:	RL >	14 dB	$f = 0.3 \dots 10 \text{ MHz}$
		$14 - 10 \cdot \log_{10}(f / 10) \text{ dB}$	$f = 10 \dots 40 \text{ MHz}$
Mode Conversion:	MC >	30 dB	$f = 0.3 \dots 20 \text{ MHz}$
		$30 - 20 \cdot \log_{10}(f / 20) \text{ dB}$	$f = 20 \dots 200 \text{ MHz}$

- 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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Insertion Loss and Return Loss of used Channel Model



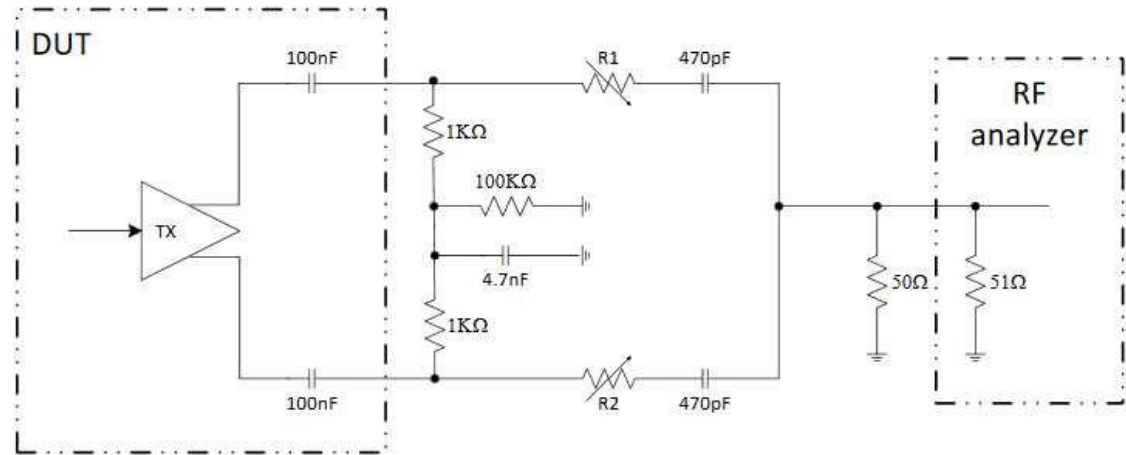
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PMA Electrical and Link Segment Definition

- DPI network:
 $R1/R2 = 120\Omega$

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

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



both have lower 3dB-cutoff around 3.85MHz

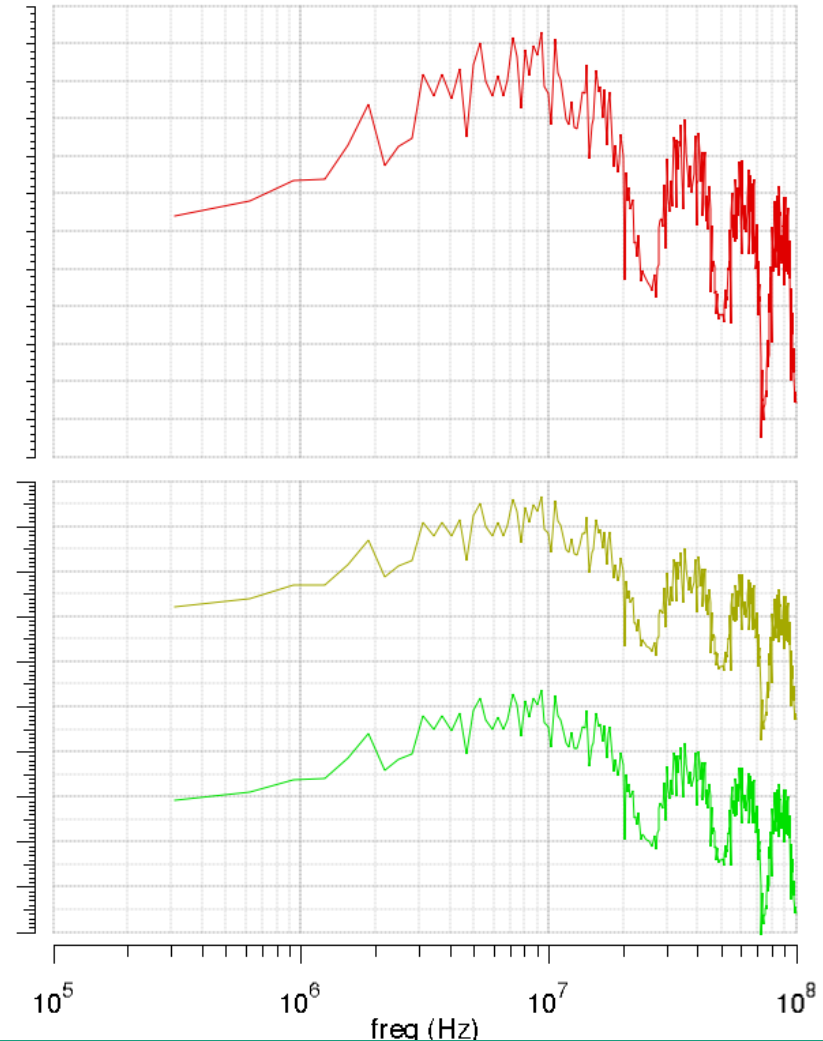
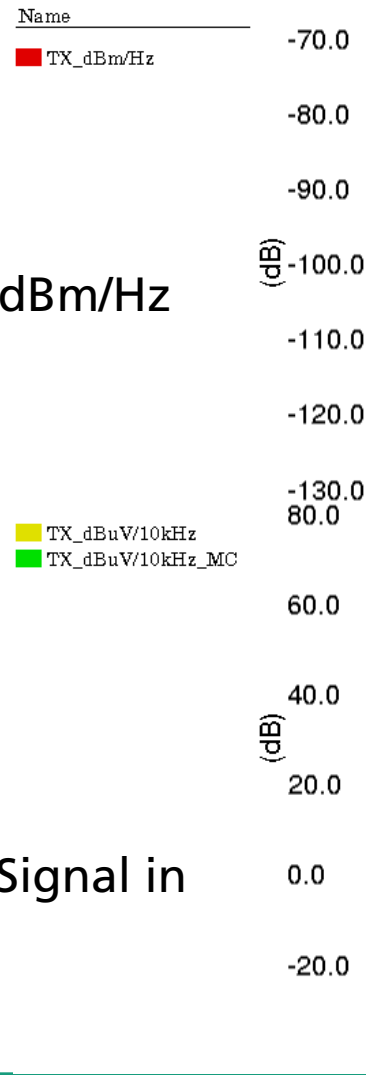
- Stripline emission limits AV: up to 30MHz several bands 21dBμV in 10kHz
 - coupling transfer function cable to stripline: 10dB
 - limit for common mode on cable: 31dBμV in 10kHz

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

■ Transmit PSD in dBm/Hz

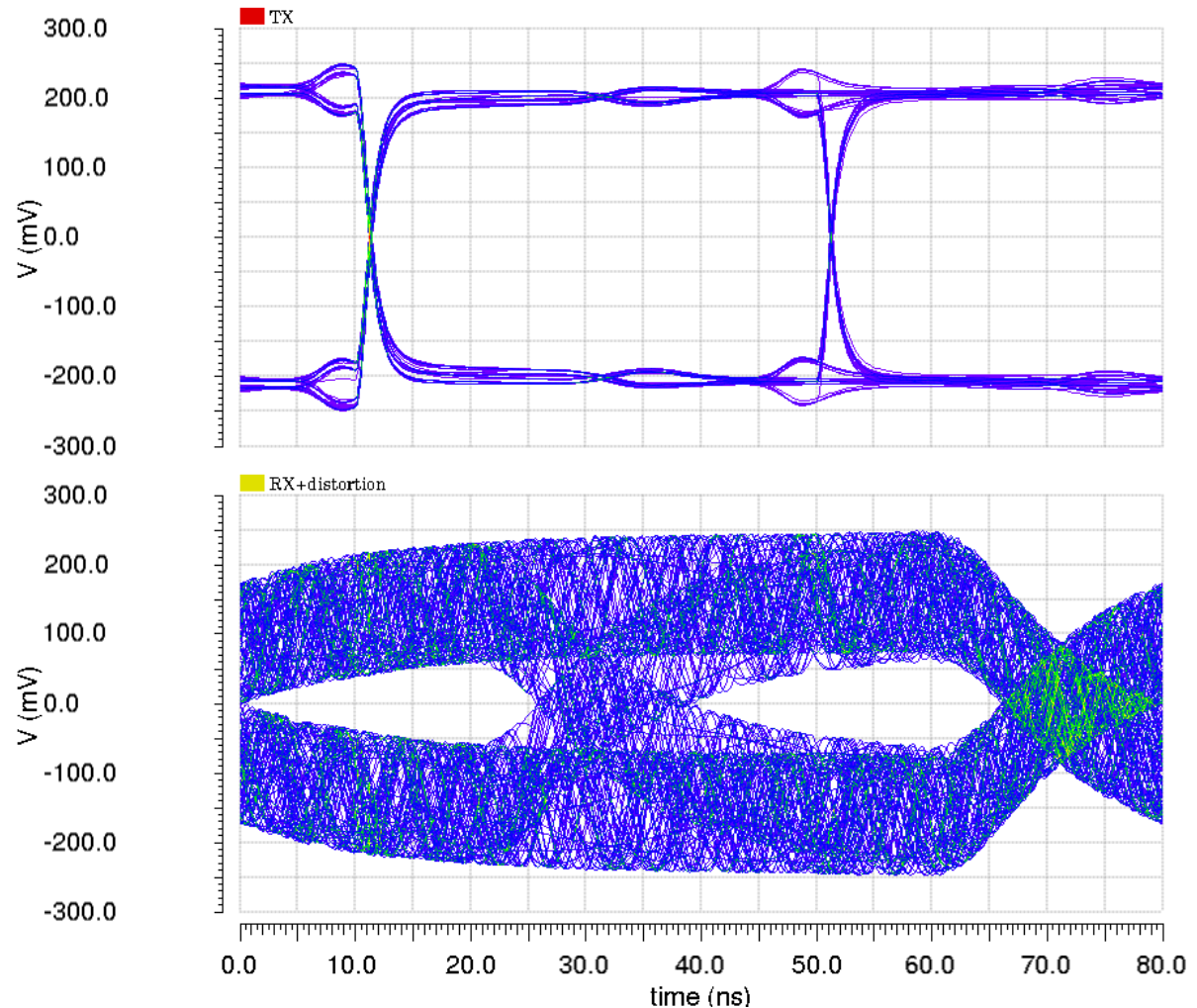
■ Differential and Common Mode Signal in dB μ V/10kHz



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

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

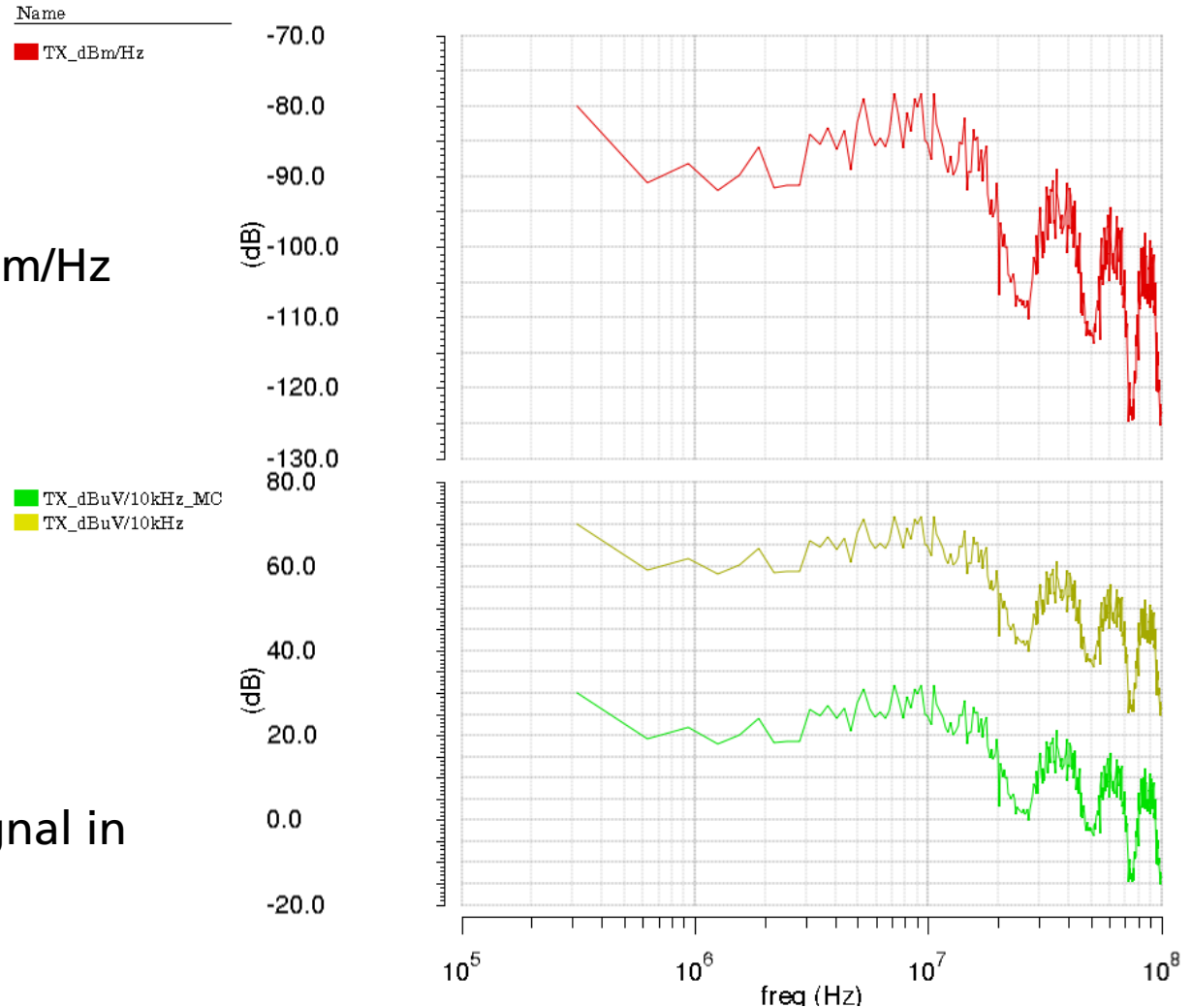


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TX PSD & Emissions Case B (MC=40dB,12MHz; $A_{TX}=280\text{mVpp}$)

■ Transmit PSD in dBm/Hz

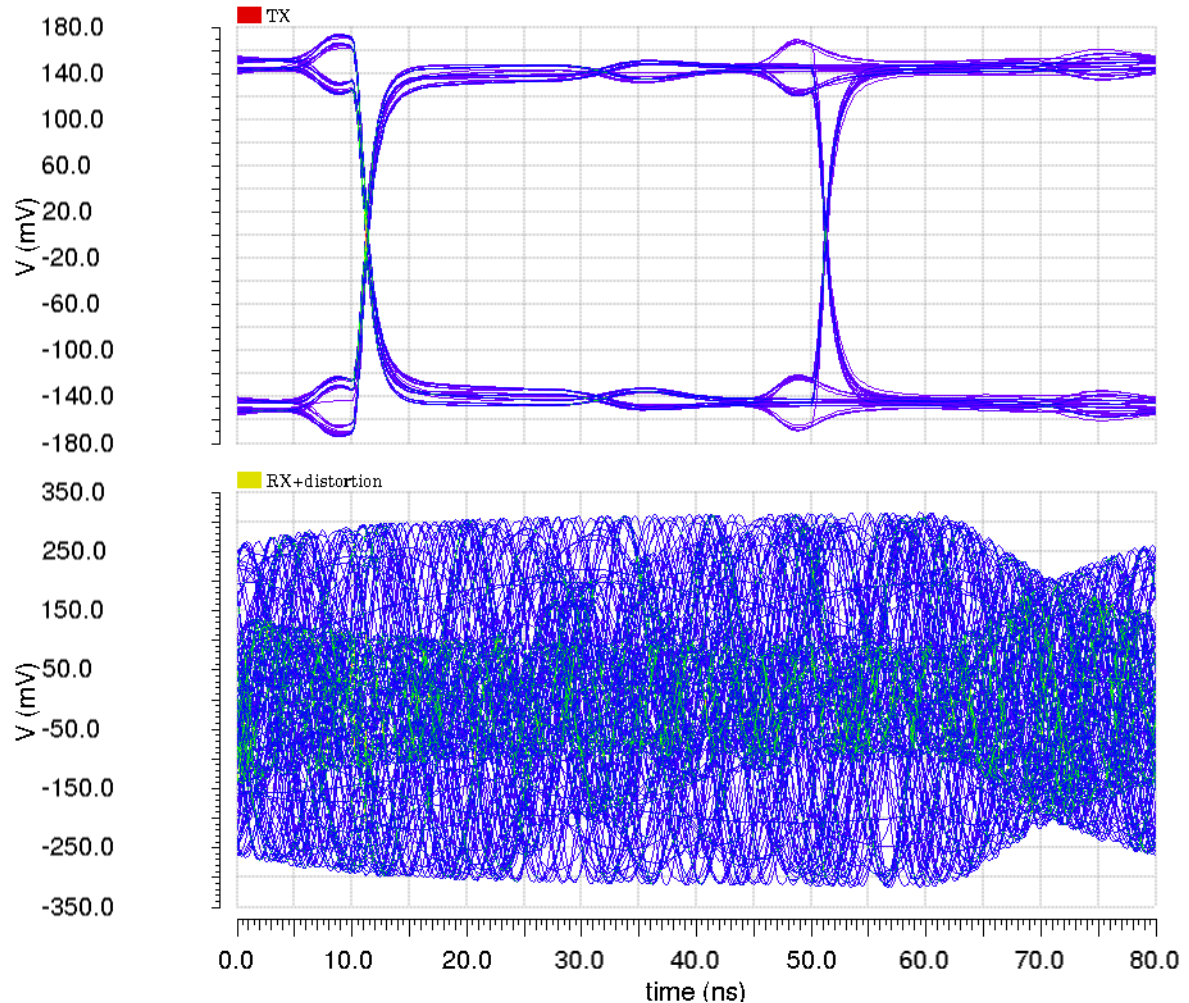
■ Differential and Common Mode Signal in dB μ V/10kHz



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

- 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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PMA Electrical Parameters and Link Segment Definition

Conclusion

- 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 a margin
- With mode conversion equal to 40dB up to 12MHz, there is no margin

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

→ Replace in Draft 1.0: p2p link segment MC definition

$MC < -43$	0.3..20MHz
$< -43 + 20 \cdot \text{LOG}_{10}(f/20)$	20..200MHz

PRELIMINARY VERSION – WILL BE UPDATED UNTIL SUNDAY Jan 21st