

How Much Frequency Content is Needed to Measure

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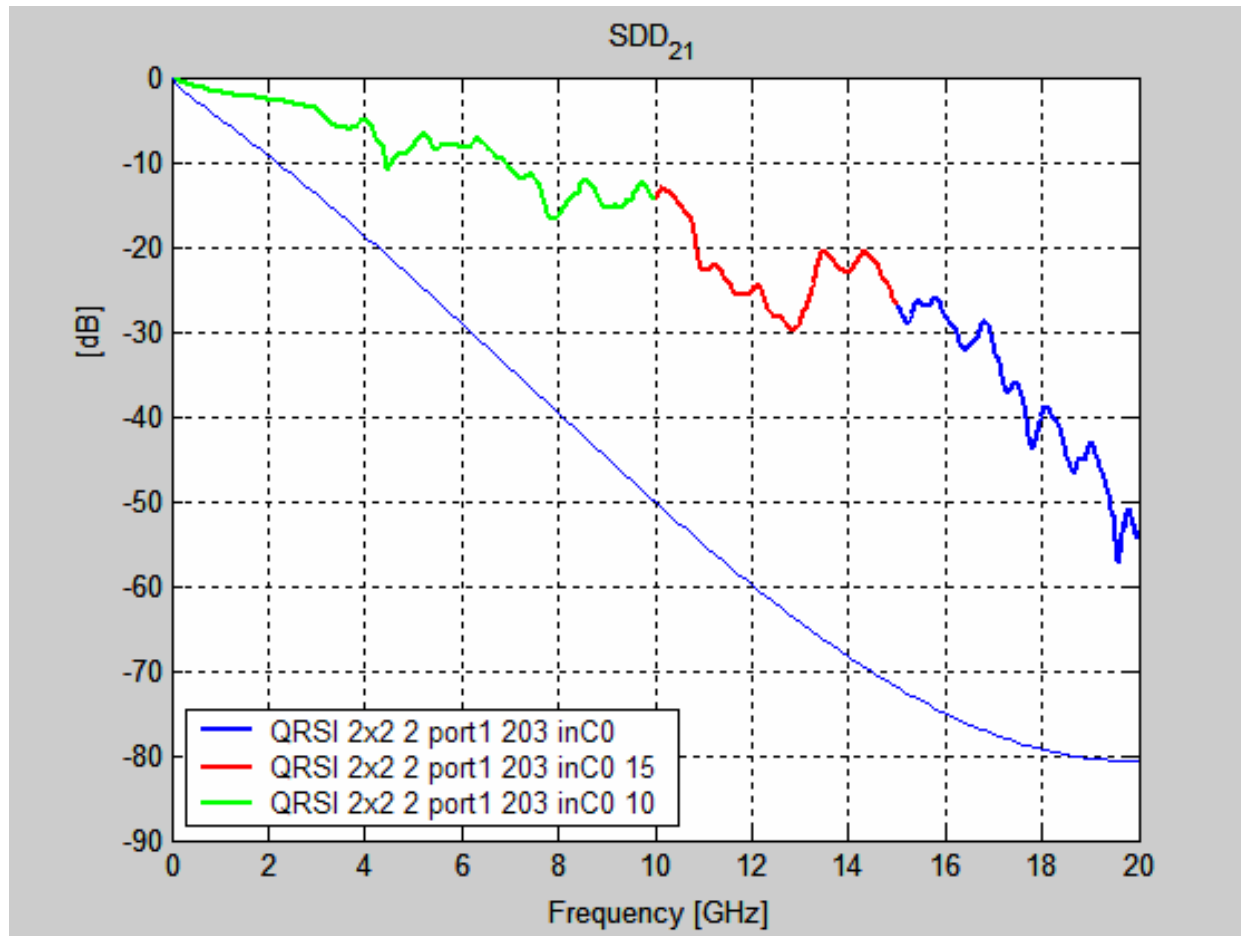
Statement of Problem

- VNA Measurement – Fmin to Fmax
- Time measurement resolution without extrapolation $1 / (2 * F_{max})$
 - $F_{max} = 20 \text{ GHz}$
 - Time Resolution $1 / 40 \text{ GHz} = 25 \text{ ps}$
 - For 10 GBaud (100 ps UI), 4 samples per baud
- From channel measurement accuracy, it has been observed that deep nulls and signals in the noise cause VNA to have measurement issues which are being investigated

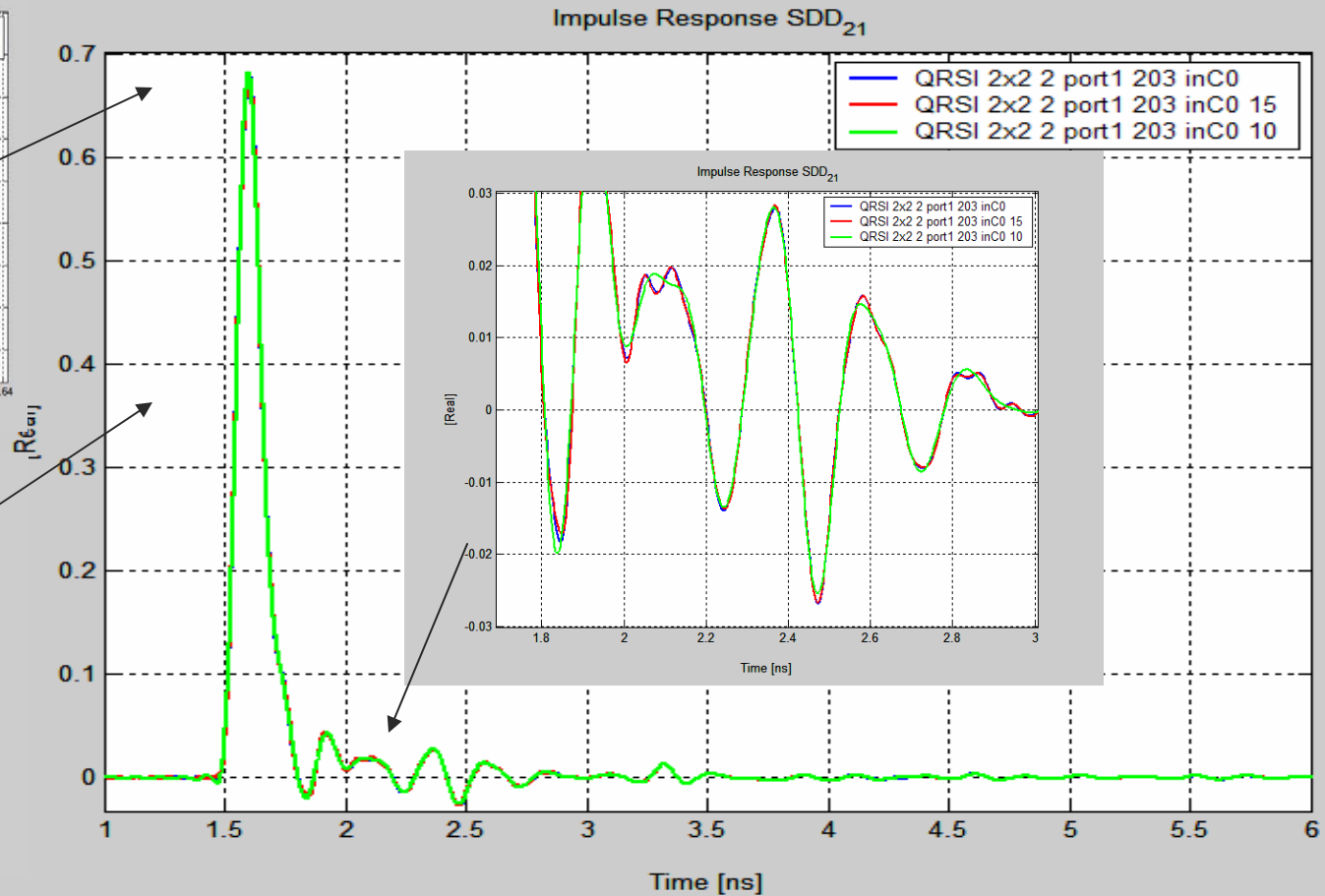
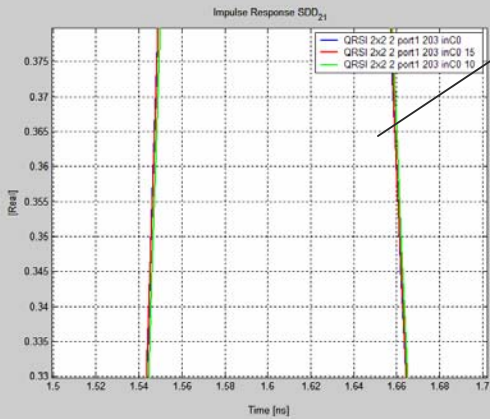
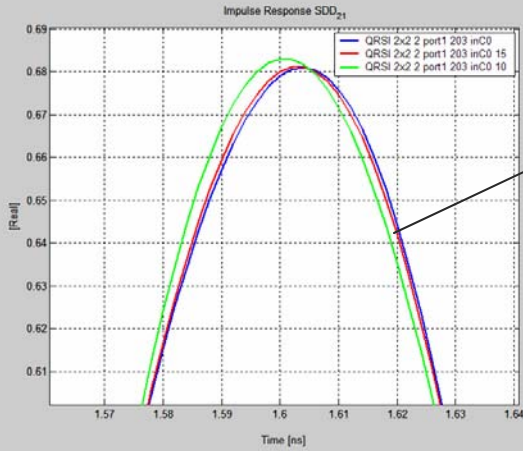
[Analysis Plan]

- Measure to 20 GHz
 - a channel like the proposed AP SDD21 model
 - a channel much better
 - Try to include line card length variation
- Delete frequency content above
 - 15 GHz
 - 10 GHz
- Pulse response based on 10, 15, and 20 GHz for 10 Gb/s
 - Conditions
 - FFT Interpolation (padding with 0's)
 - Vp-p – 1V
 - Edge Rate – 25 ps
 - No Tx / Rx Models
 - Look @ SDD21

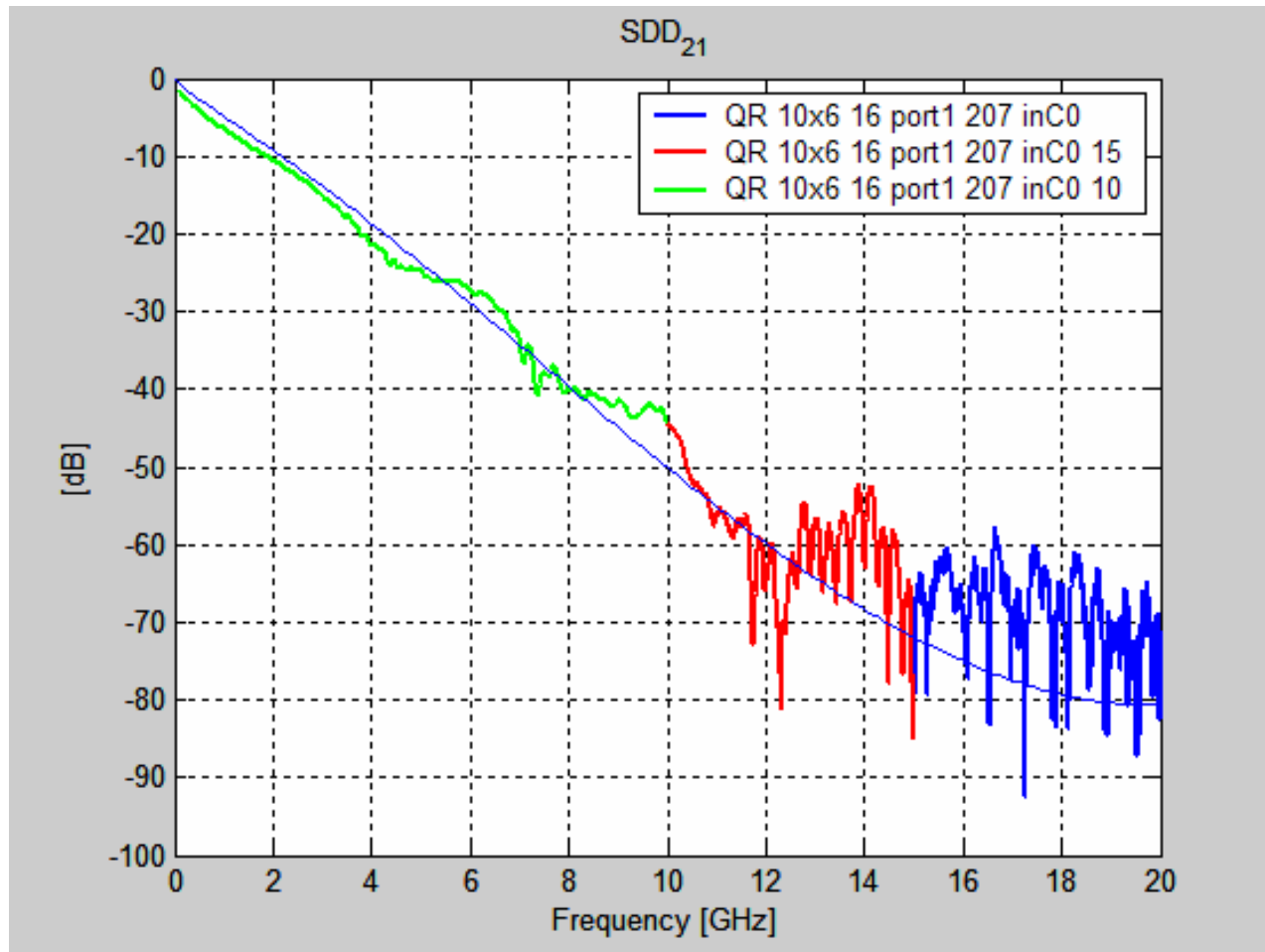
[Channel 1]



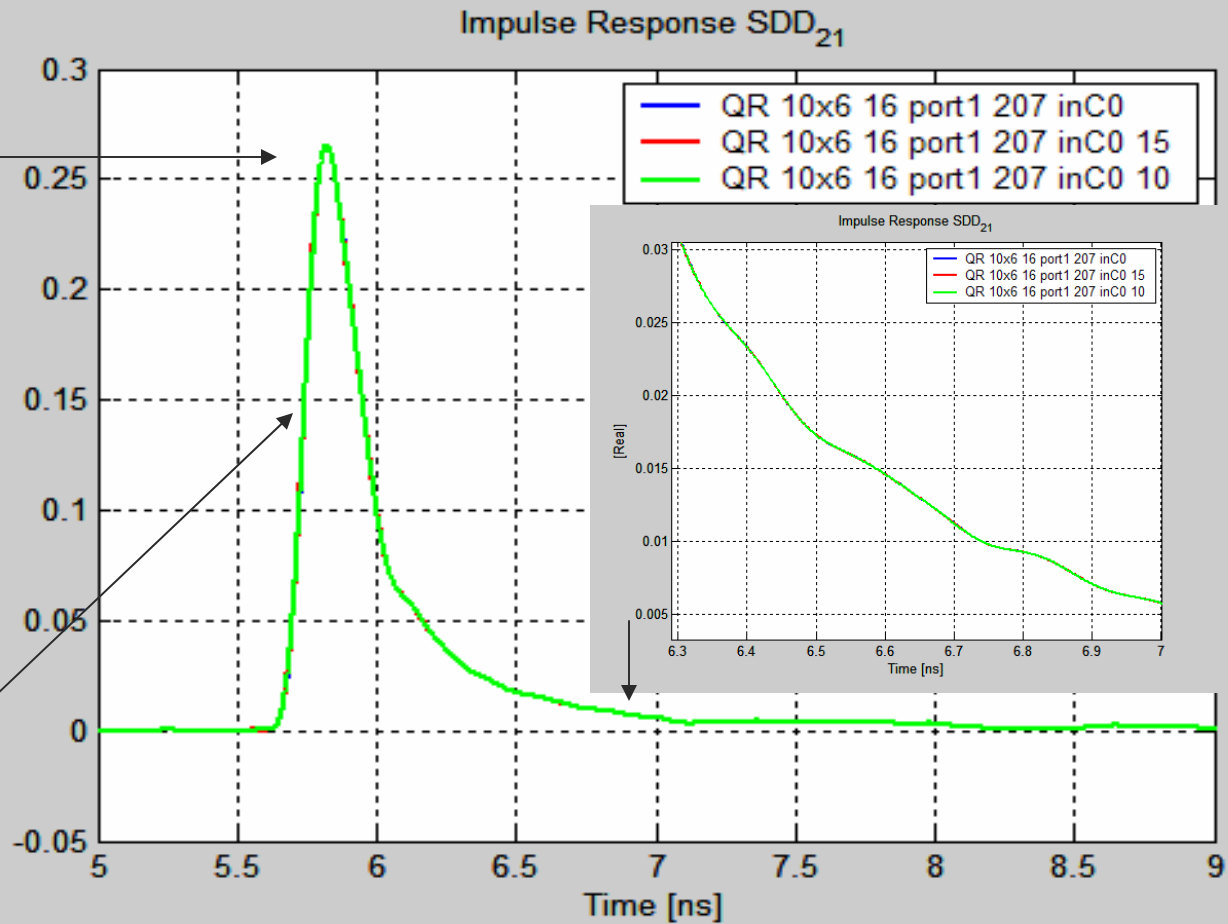
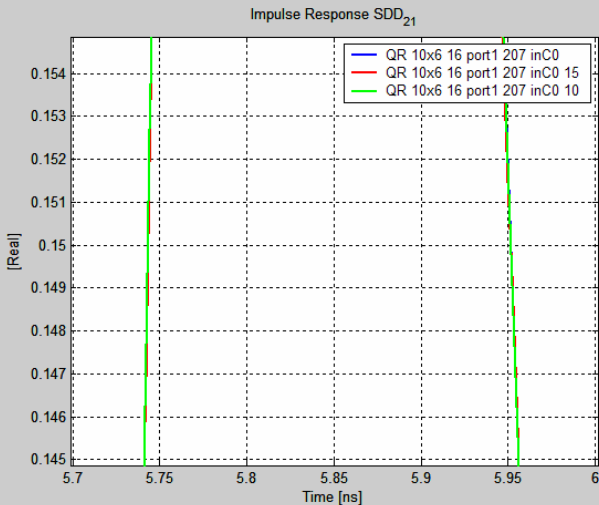
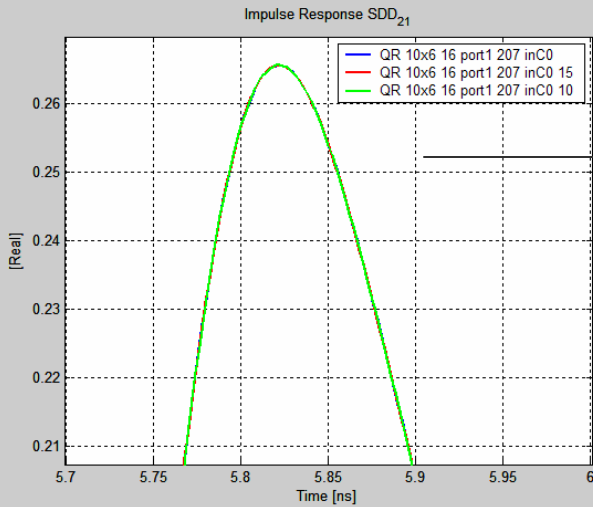
Channel 1 – 10 Gb/s @ 25 ps



[Channel 2]



Channel 2 @ 10 Gb/s, 25ps



[Observations]

- For really good channel
 - No difference between 15 and 20
 - Minimal difference going to 10
- For channel model
 - No difference from 10 to 15 to 20
 - Looks like going into noise around 60 dB @ approximately 12 GHz
- Need to examine with device models