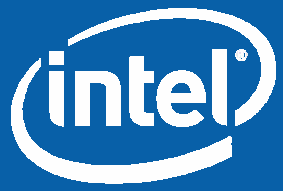


EIT limit for port type KR

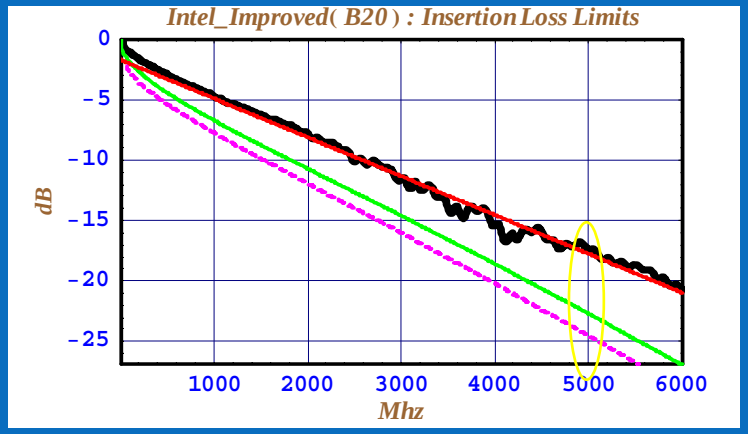
Fulvio Spagna

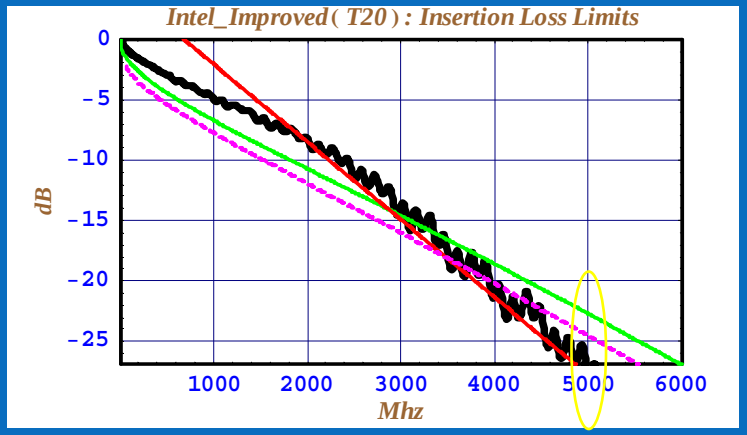
Objectives

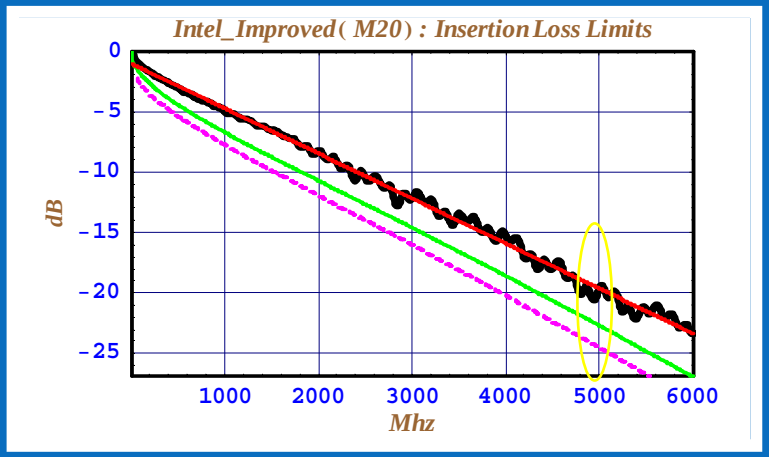
- Determine an appropriate level for the EIT test for the KR port type
  - this means finding an appropriate level for the sinusoidal interference which is representative of the levels of interference experienced in presence of crosstalk
  - because the EIT test methodology defined in Clause 69A is based on a high-loss channel (like the proposed ITTC23), it is important to determine the level of crosstalk experienced by a high loss channel
- Among the channels available in the database, there are several examples of high loss channels. In this presentation I will focus on the Intel channels (peters_m1_0605.zip) as they have been demonstrated to be more representative of a marginal channel.

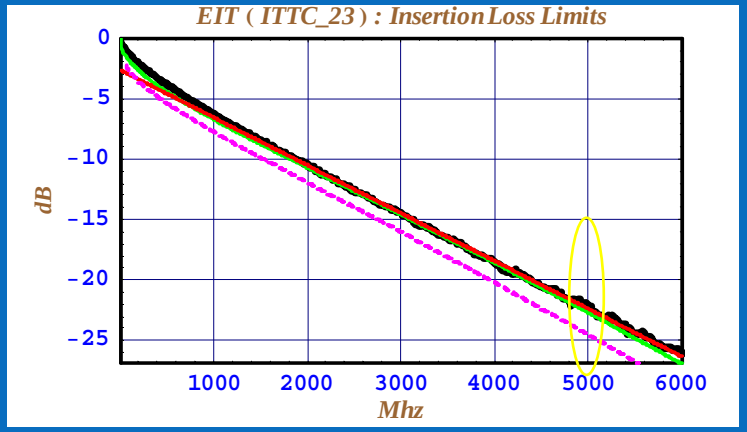
Note: in the following pages, all the channel parameters are referenced to the new Amax(f) defined in goergen_01_0206

Intel channels: long channels characteristics (KR port type)

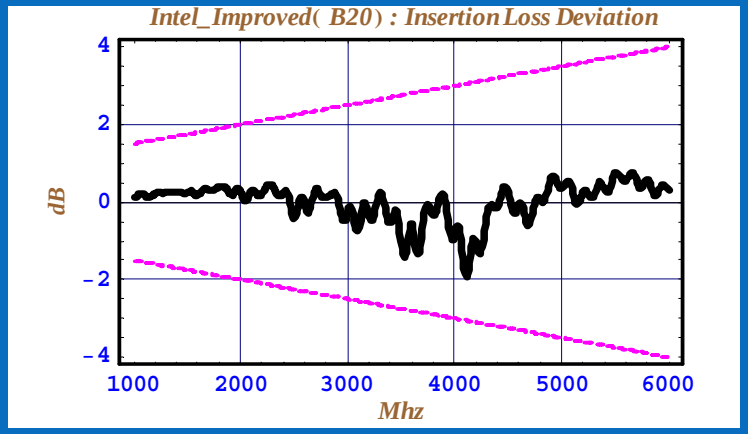


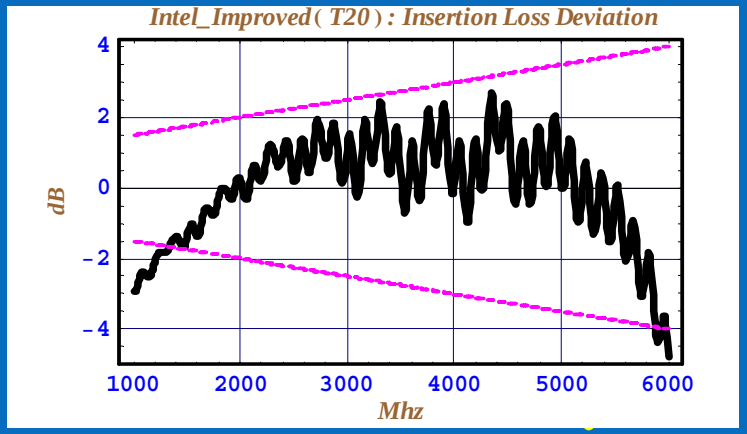


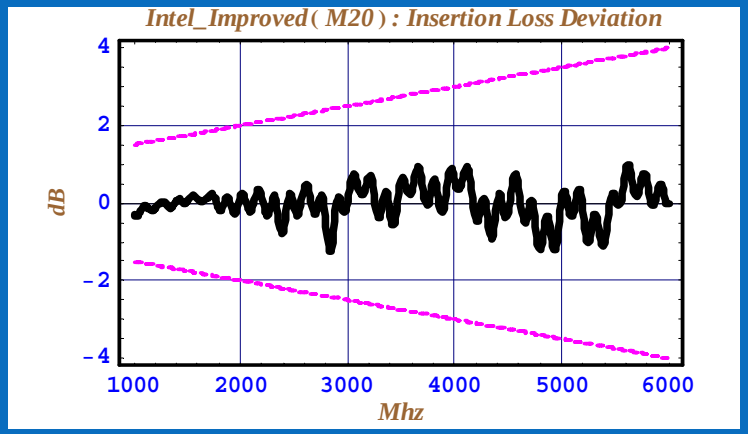


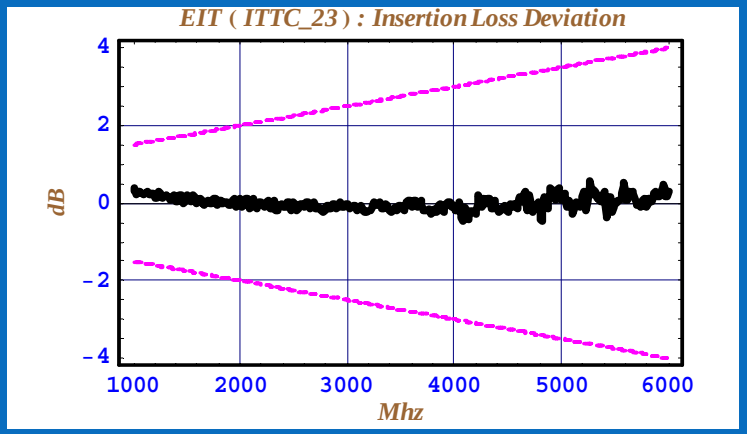


Intel channels: long channels characteristics (KR port type)

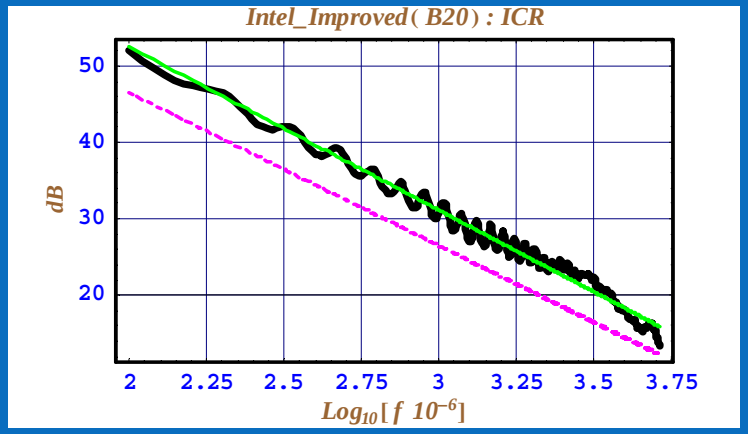


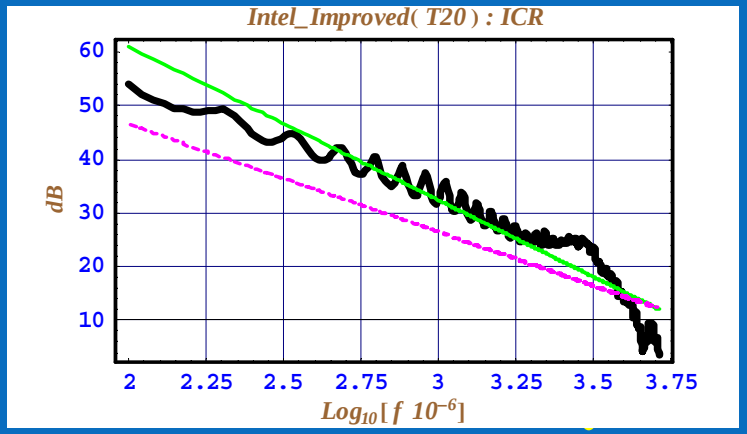


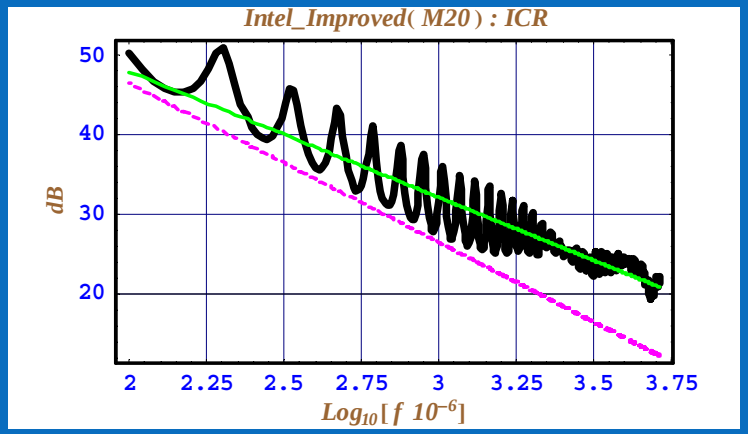


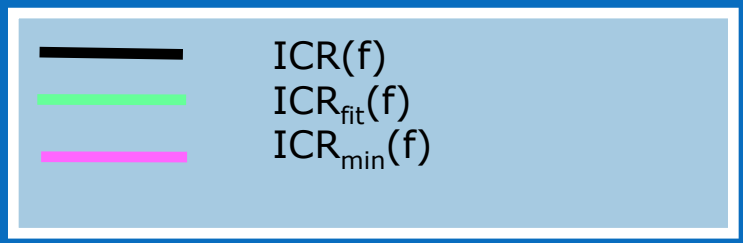


Intel channels: long channels characteristics (KR port type)

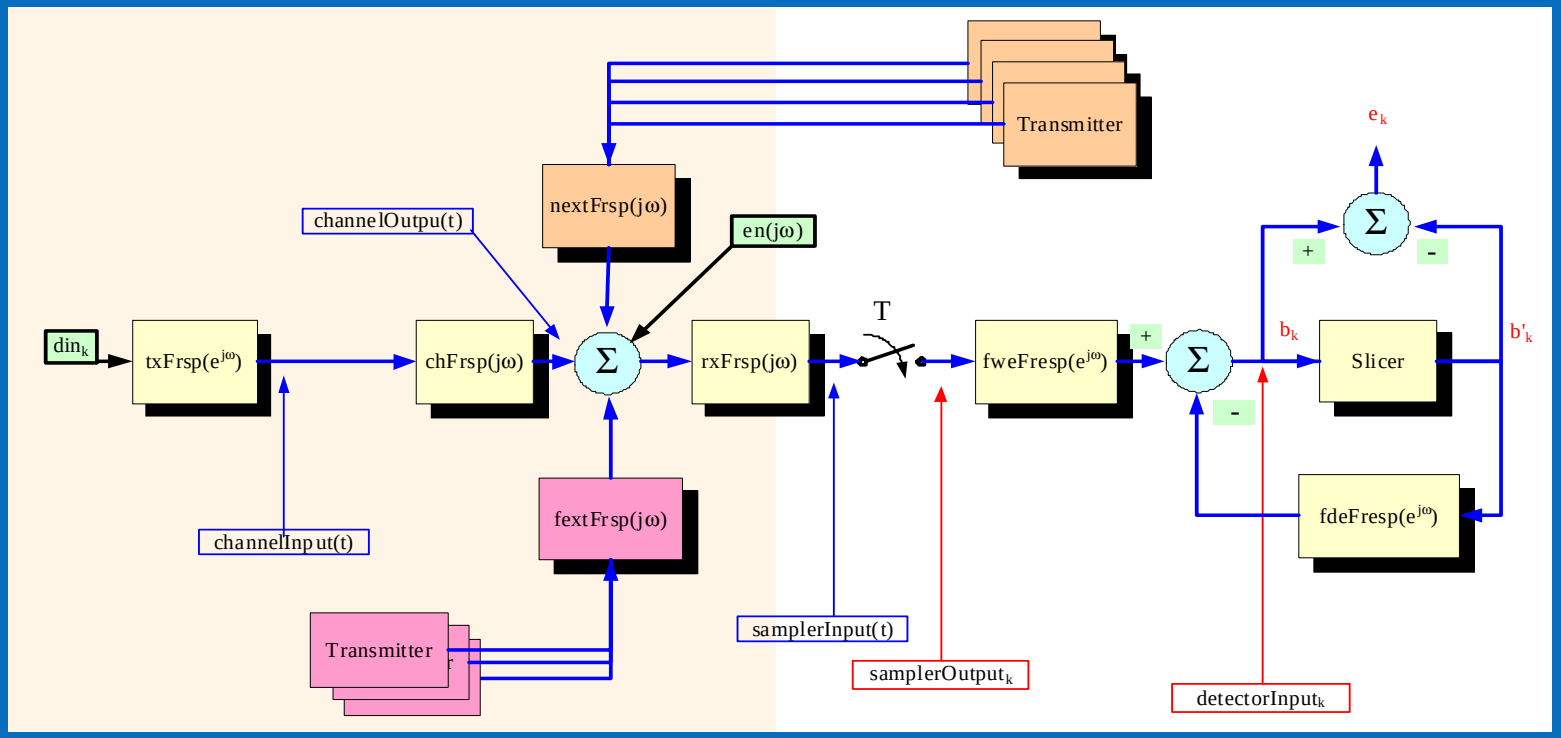






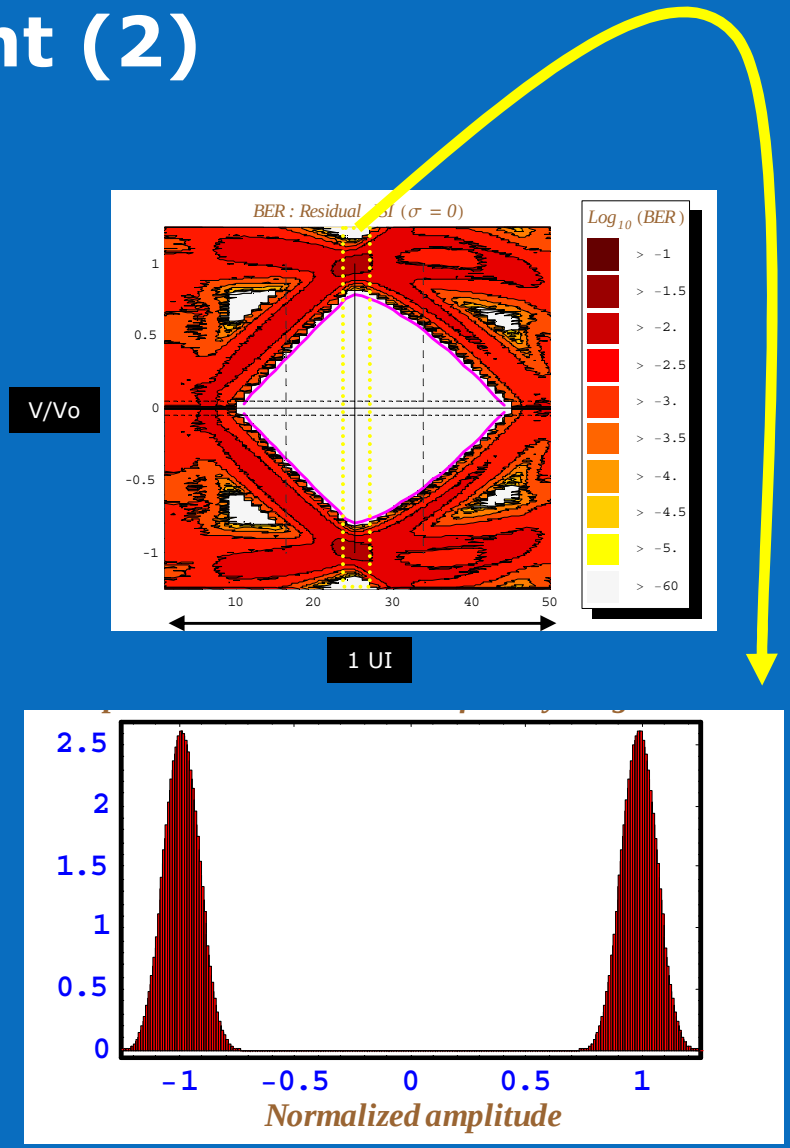


Simulation Environment (1)

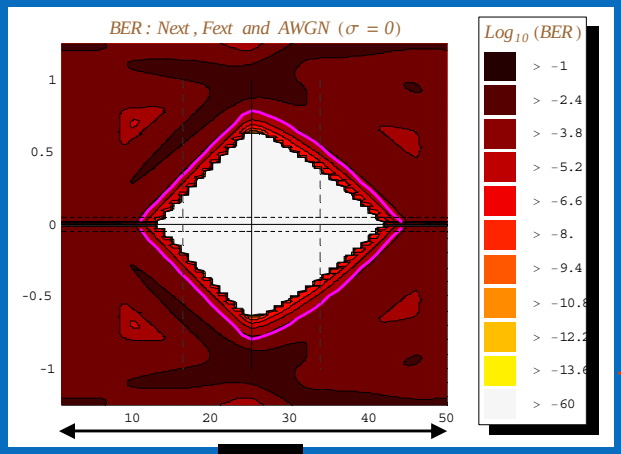


Simulation Environment (2)

- Simulation conditions:
  - PRBS15 pattern
  - No timing jitter on either transmitter or receiver
  - 3 taps FFE, 5 taps DFE.
    - FFE boost subject to 802.3ap constraints
  - Cross-talk signal is subject to the same equalization conditions as main signal
    - Cross-talk and forward signal have same launch amplitude
  - Transmitter has finite rise/fall time
    - $t_r = t_f = 24$ pS
  - Receiver input amplifier modeled as a two pole low pass filter with poles at 0.7 f_s and 1.0 f_s

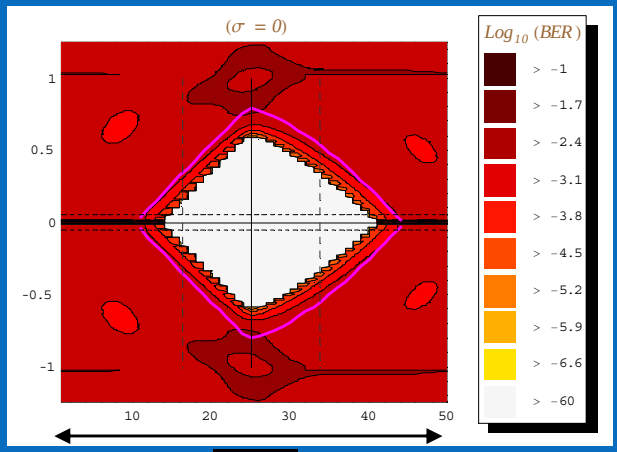


Simulation Environment (3)



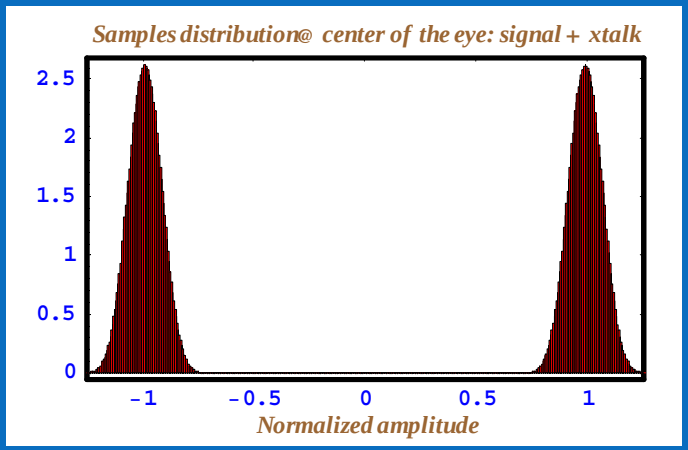
V/Vo

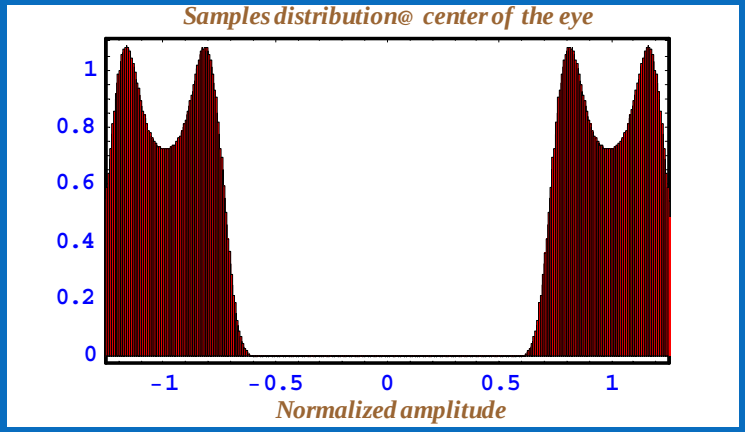
1 UI



V/Vo

1 UI



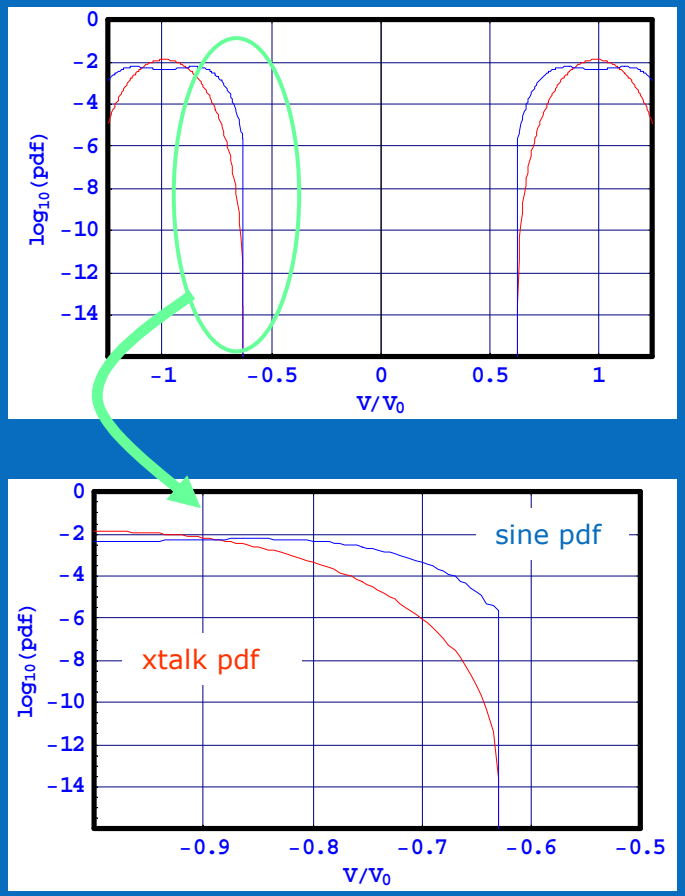


PRBS 15 aggressor:
vertical opening : 0.251 mV_{pp}
horizontal opening : 0.440 UI_{pp}

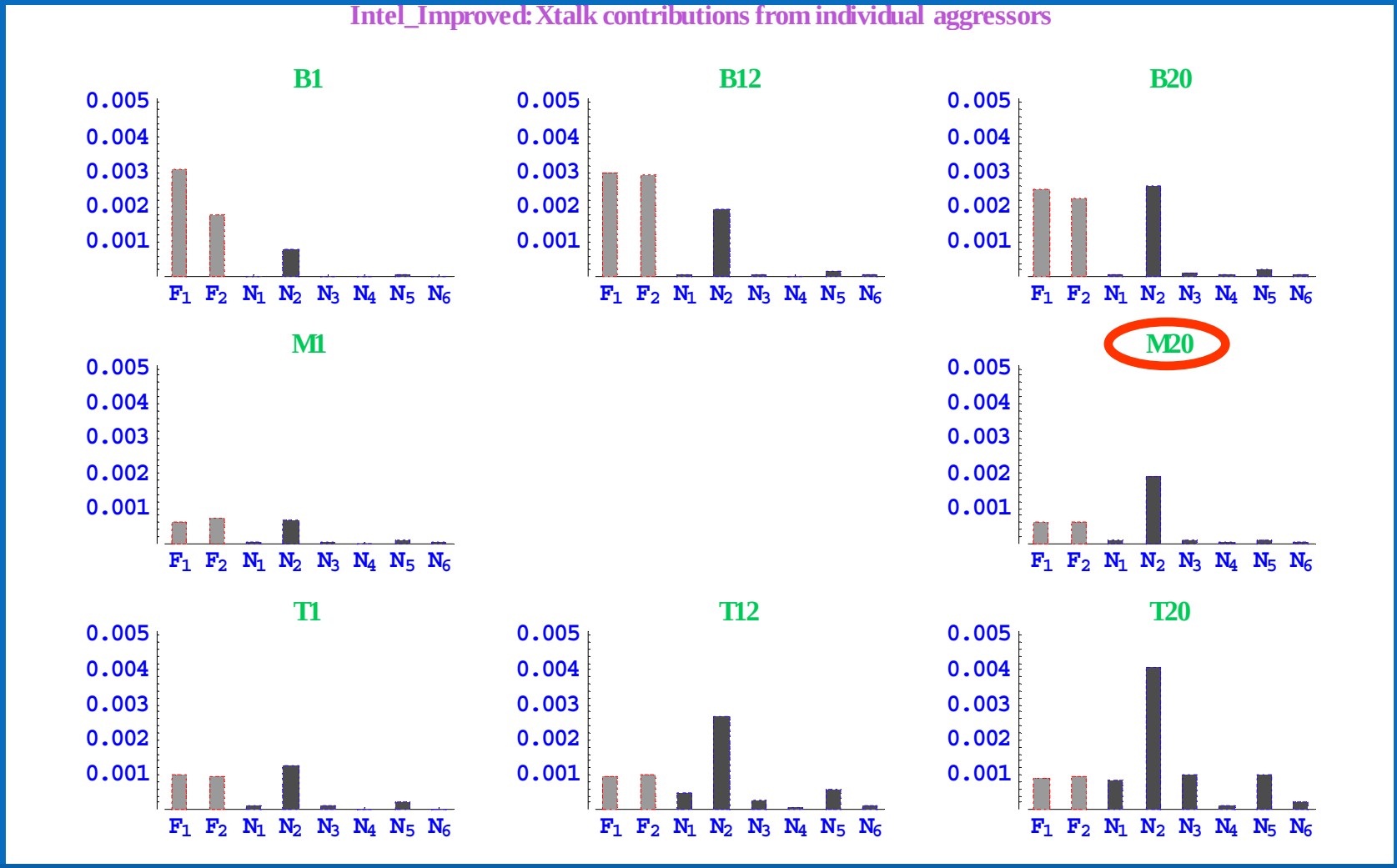
Equivalent sinusoidal aggressor:
vertical opening : 0.251 mV_{pp}
horizontal opening : 0.440 UI_{pp}

Simulation Environment (4)

- Same launch voltage for forward and cross -talk signal does not represent a worst case scenario
  - Consistent with Abler_01_0106 and Abler_01_0206
  - It does not appear that handling of multiple sources of interferers is documented. Is this something that should be taken care of in Clause 69A?
- Use of PRBS15 instead of PRBS23 should still provide a reasonable approximation to the worst case eye at the slicer
  - No particular reason for this choice except simulation time
- Sinusoidal interference changes samples probability distribution at slicer input

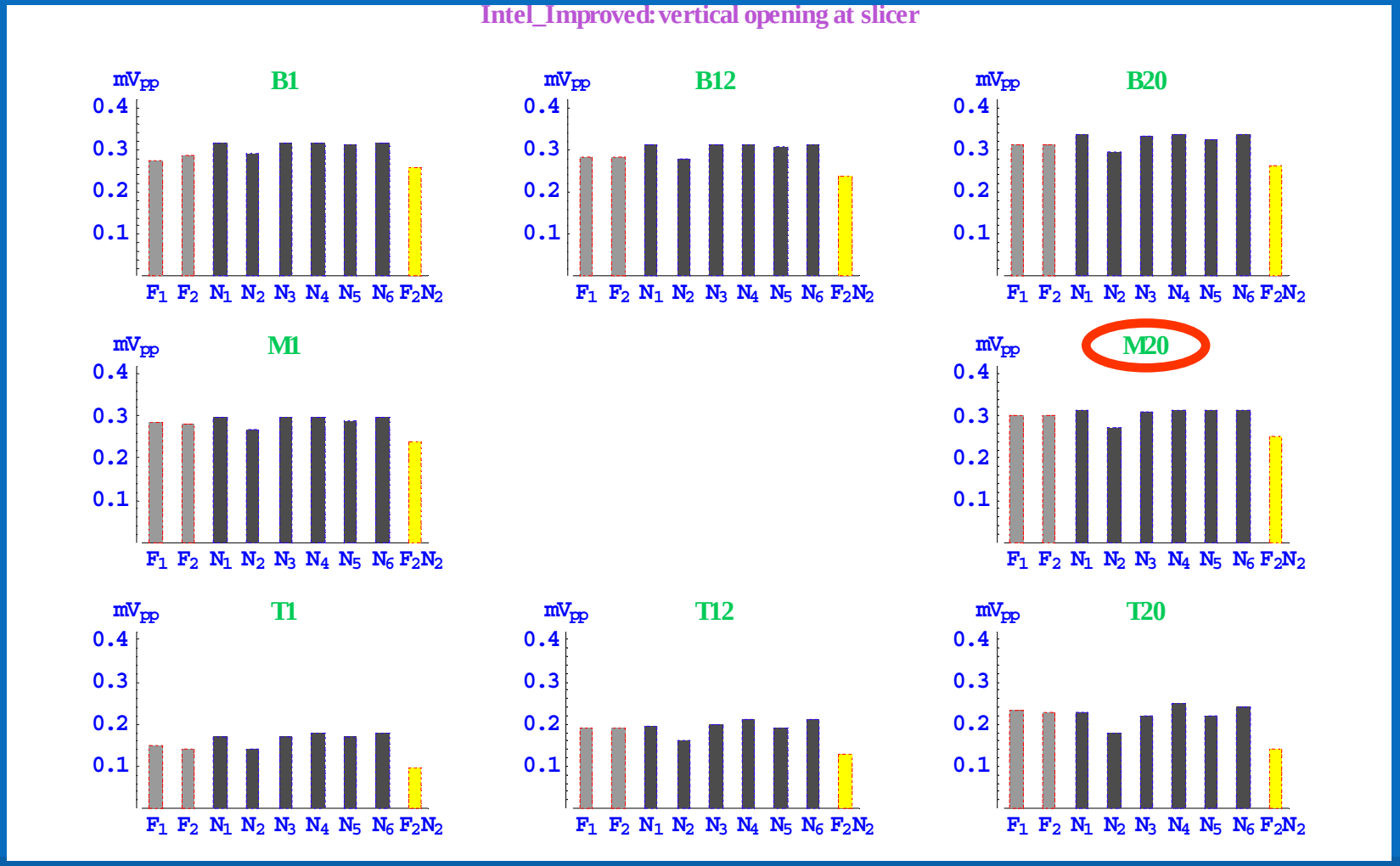


Intel channels (1)

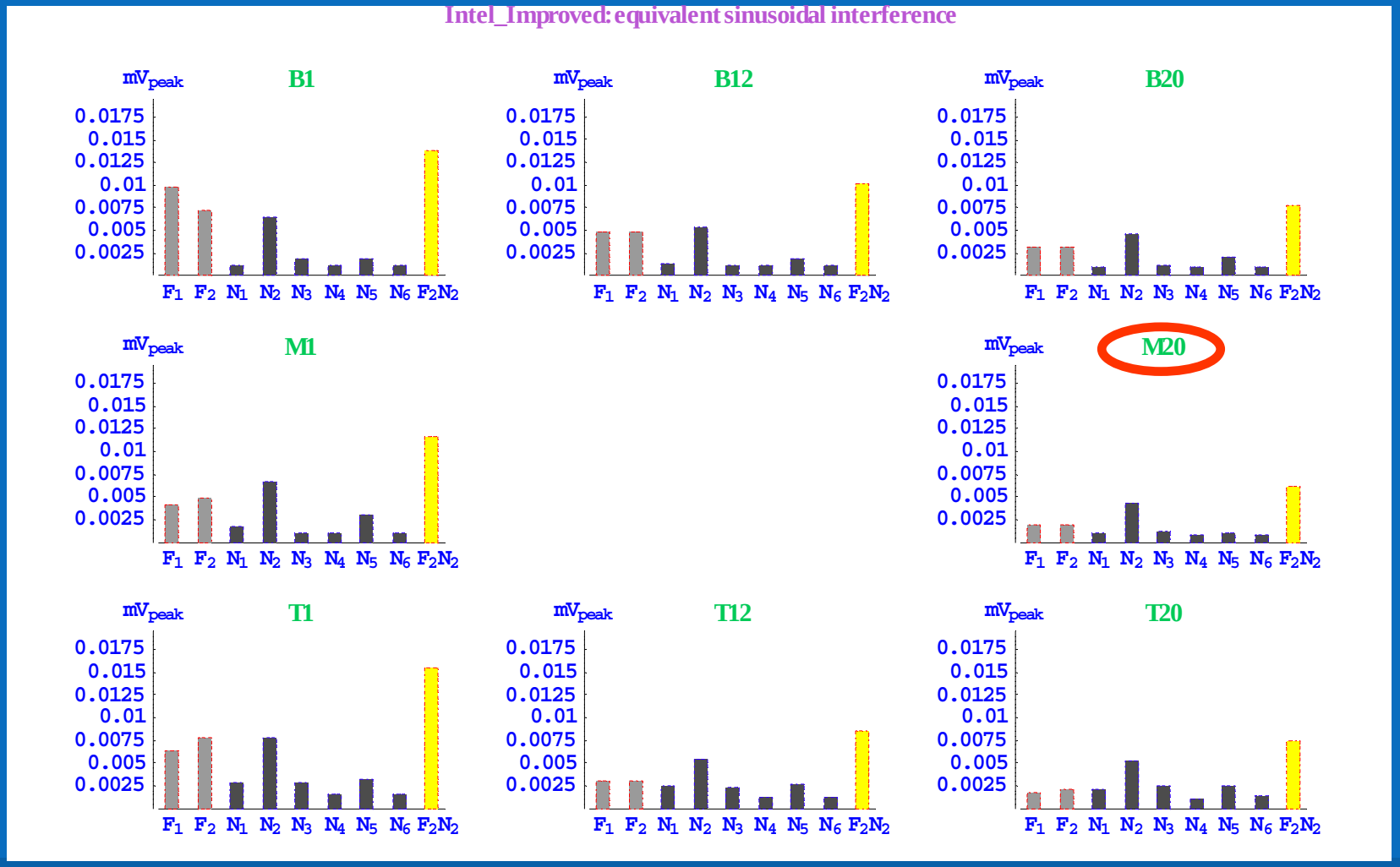


Intel channels (2)

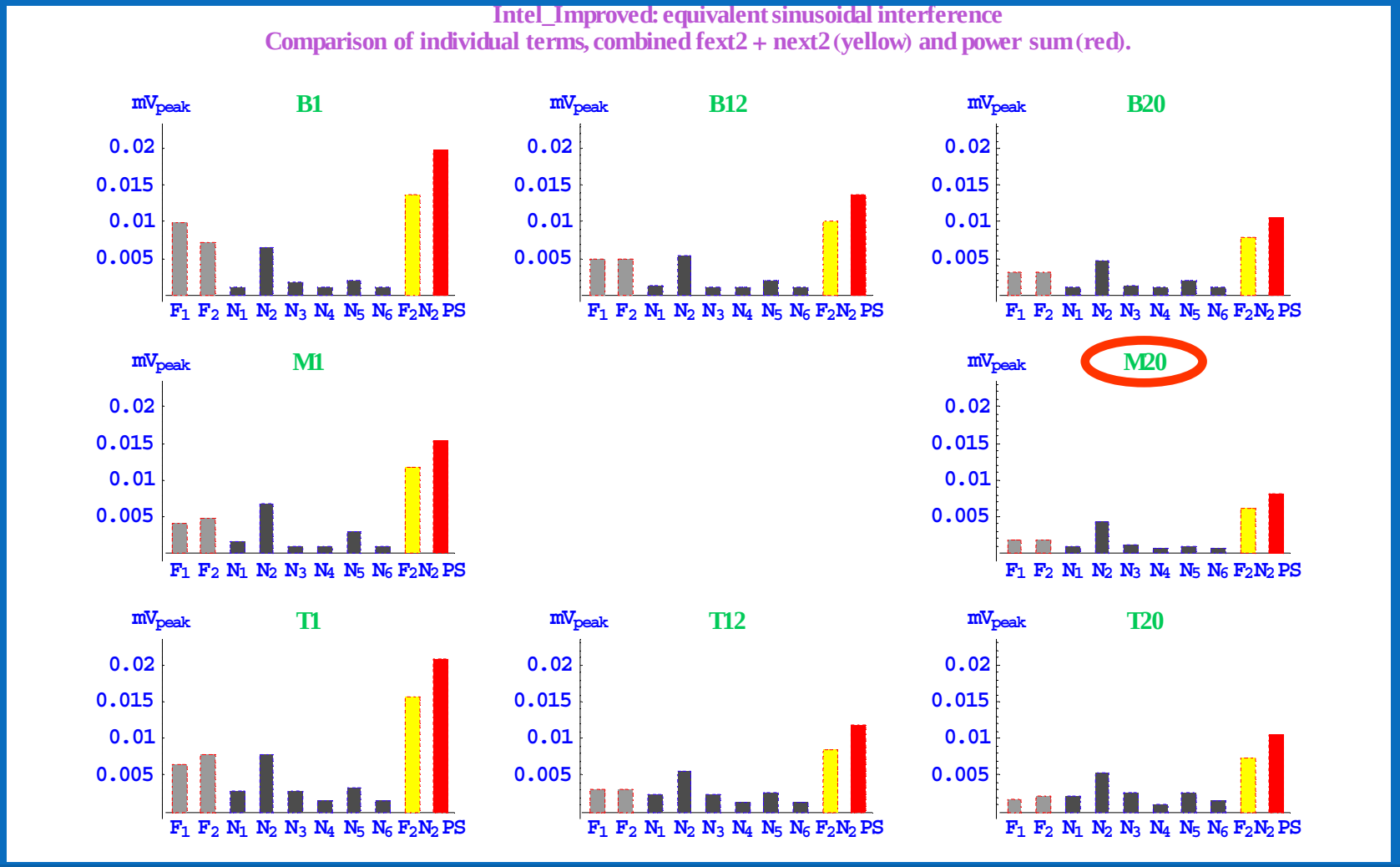
Intel channels (3)



Intel channels (4)

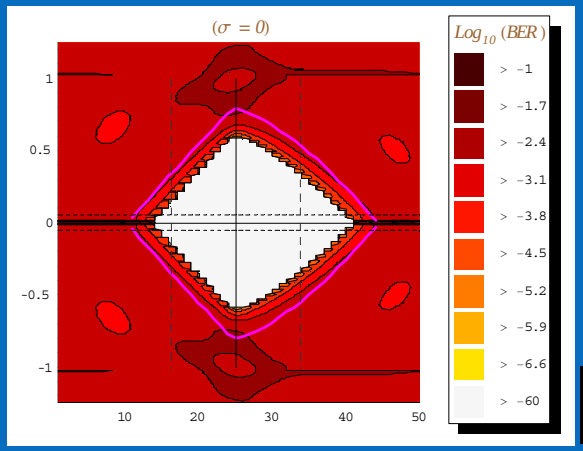


Intel channels (5)

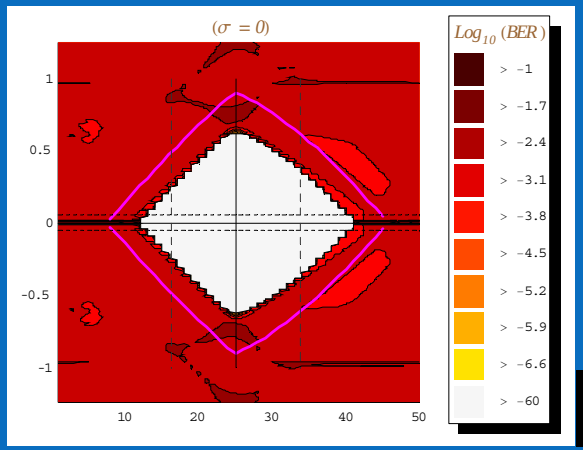


M20 vs. ITTC23

- M20
  - Vertical opening: 0.235 mVpp
  - Horizontal opening: 0.4 UIpp
- ITTC23
  - Vertical opening: 0.246 mVpp
  - Horizontal opening: 0.48 UIpp
- Comparison of ITTC23 and M20 indicates a reasonable match in vertical opening.
- Horizontal opening in M20 is reduced with respect to ITTC23, most likely because of self-noise.
  - Comparison of the inserion loss deviation curves for the ITTC23 and M20 channels indicate that the latter Sdd21 curve has more ripple .



M20



ITTC23

Conclusions

- The amount of interference tolerable by a channel increases as the insertion loss decreases
- For a high loss channel like ITTC23 it is important to establish realistic levels of crosstalk
- The Intel M20 channel represents a reasonable approximation to the EIT channel.
  - The insertion loss curve is within a few dB from the Amax(f) curve
  - One dominant NEXT aggressor and two significant FEXT aggressors
- The levels of crosstalk observed in the M20 are consistent, in a a power sum fashion, with the existing EIT specification of 15 mV_{pp}.
- It is recommended that the EIT spec for a KR port type is maintained at 15 mV_{pp}.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