dambrosia_01_0505 Informative Model Methodology Update

John D'Ambrosia
Tyco Electronics

Rich Mellitz
Intel

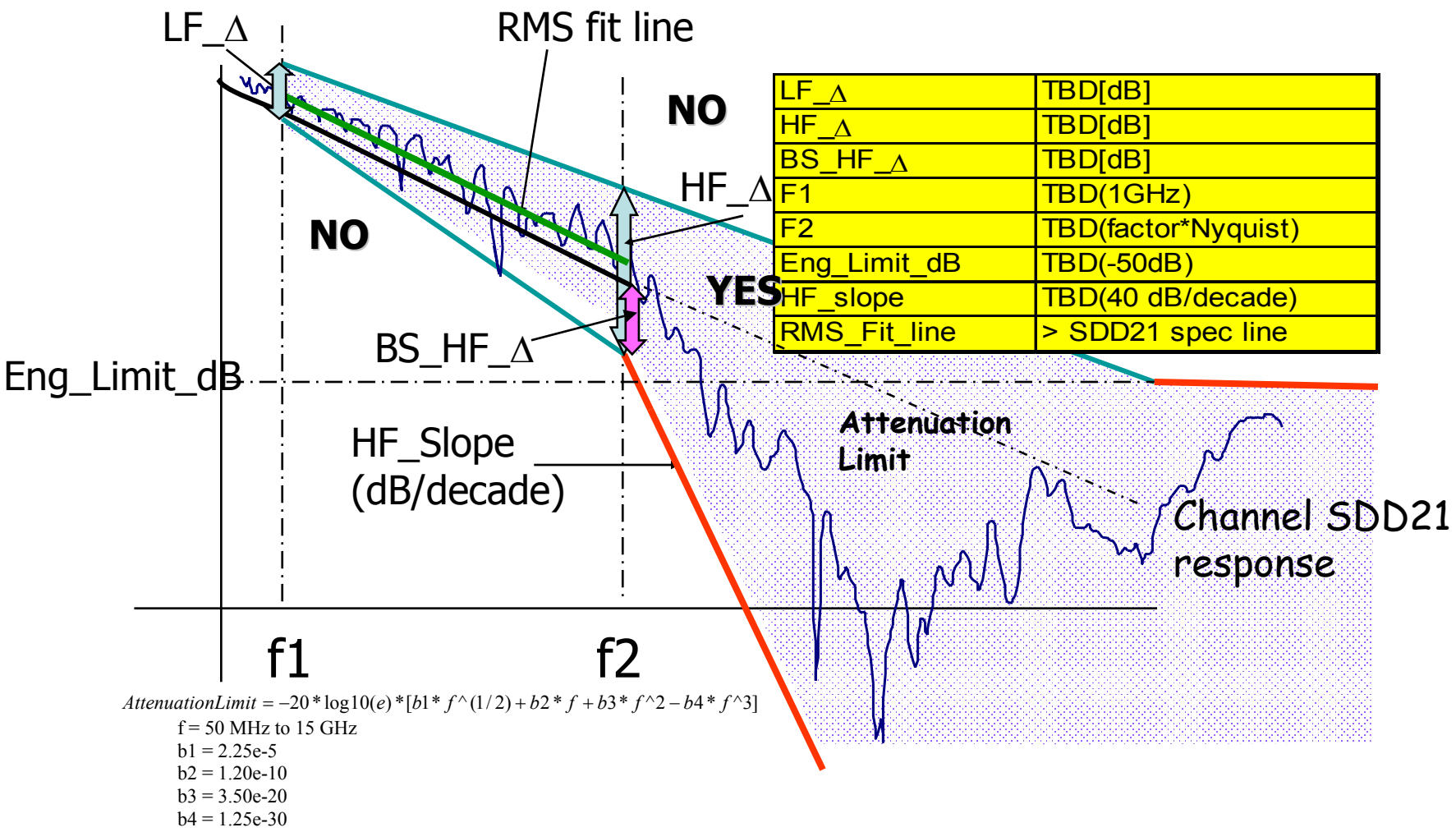
Supporters

- Petre Popescu
- Howard Baumer

Discussion

- Informative Model Methodology (dambrosia_01_0105) approved
- Correlation with Signal Ad Hoc Results underway (melitz_01_0505)
- General comments
  - Good correlation of channel with no xtalk
  - Crosstalk impacts correlation
    - IBM results (abler_01_0305)
    - Need to address crosstalk
    - Re-introduction of ACR (healey_c1_0505)

Informative Model

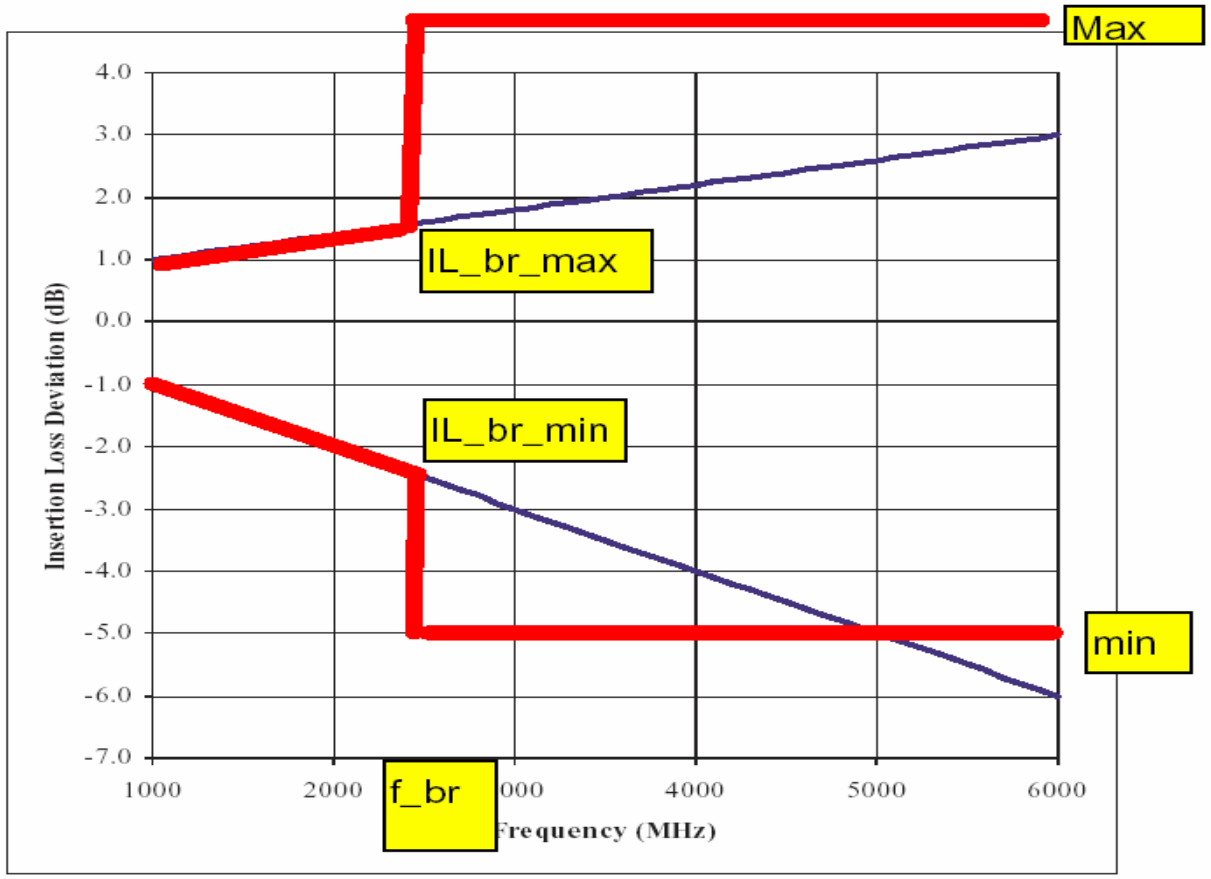


LF_Δ	TBD[dB]
HF_Δ	TBD[dB]
BS_HF_Δ	TBD[dB]
F1	TBD(1GHz)
F2	TBD(factor*Nyquist)
Eng_Limit_dB	TBD(-50dB)
HF_slope	TBD(40 dB/decade)
RMS_Fit_line	> SDD21 spec line

$$AttenuationLimit = -20 * \log10(e) * [b1 * f\text{^}(1/2) + b2 * f + b3 * f\text{^}2 - b4 * f\text{^}3]$$

f = 50 MHz to 15 GHz
b1 = 2.25e-5
b2 = 1.20e-10
b3 = 3.50e-20
b4 = 1.25e-30

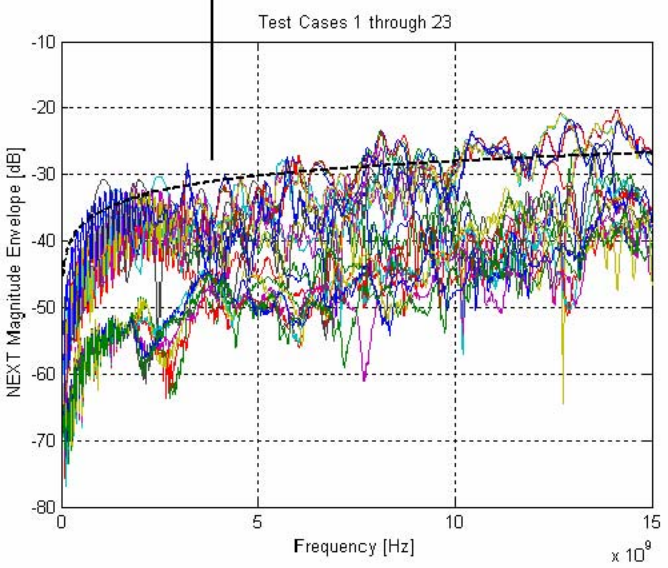
Refinement of “Ripple” Boundary (melitz_01_0505)



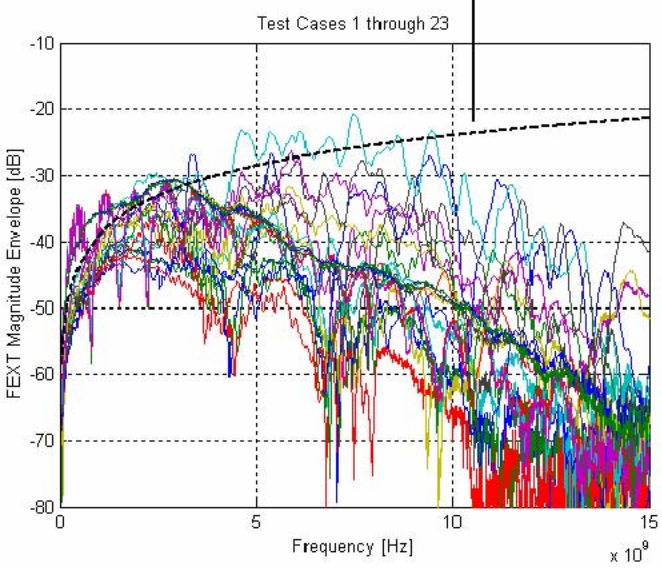
Crosstalk Bounds (healey_c1_0505)

Single-Aggressor Crosstalk Limits (Example)

$$NEXT_n(f) \le -28 + 7.5\log_{10}\left(\frac{f}{10^{10}}\right)$$



$$FEXT_n(f) \le -24 + 7.5\log_{10}\left(\frac{f}{10^{10}}\right)$$



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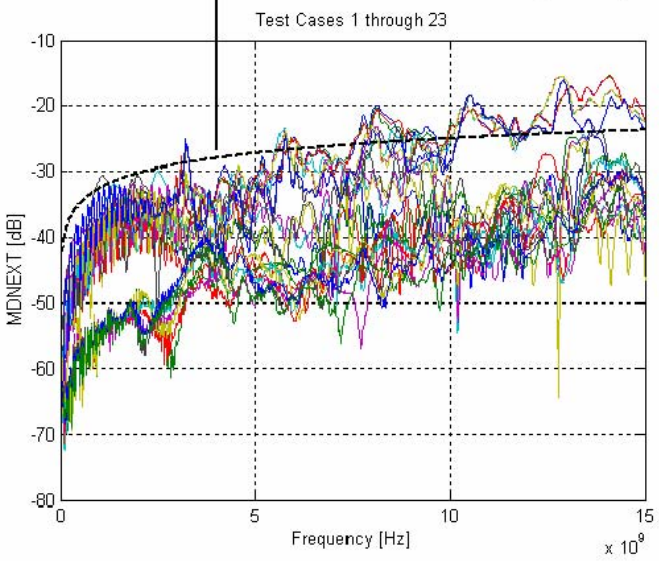
Crosstalk Bounds (healey_c1_0505)

Power-Sum Crosstalk Limits (Example)

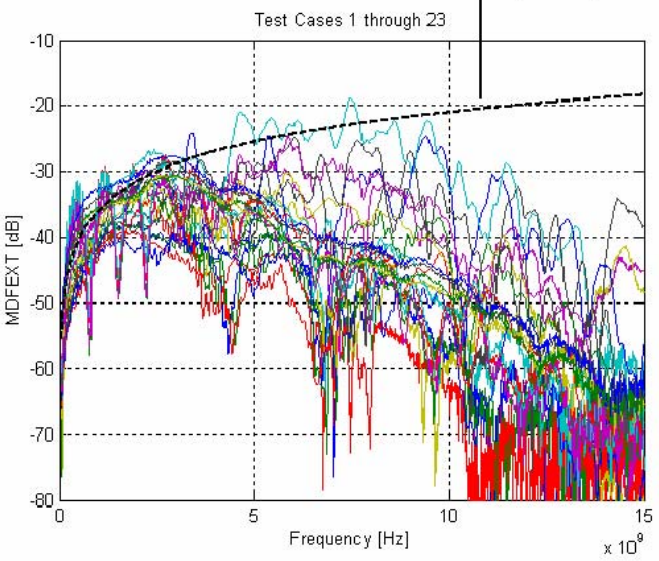
$$MDNEXT(f) = 10\log_{10}\left(\sum_n \left|NEXT_n(f)\right|^2\right)$$

$$MDNEXT(f) \le -25 + 7.5\log_{10}\left(\frac{f}{10^{10}}\right)$$



$$MDFEXT(f) = 10\log_{10}\left(\sum_n \left|FEXT_n(f)\right|^2\right)$$

$$MDFEXT(f) \le -21 + 15\log_{10}\left(\frac{f}{10^{10}}\right)$$

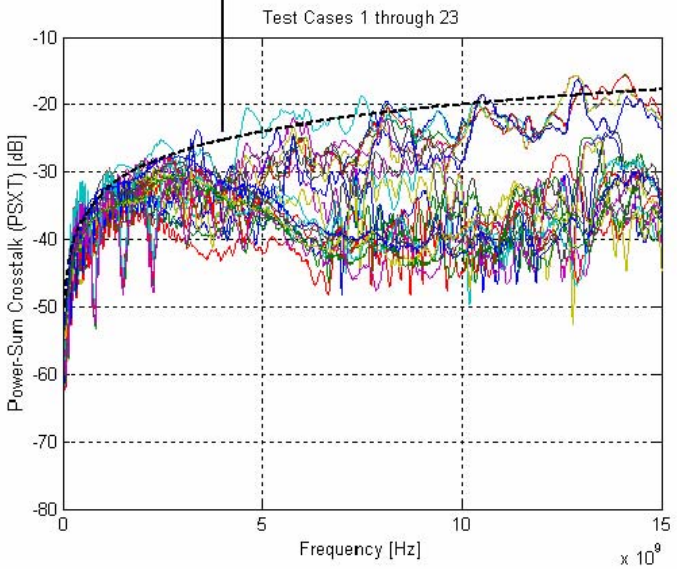


Crosstalk Bounds (healey_c1_0505)

Total Crosstalk (example)

$$PSXT(f) = 10\log_{10}\left(10^{\frac{MDNEXT(f)}{10}} + 10^{\frac{MDFEXT(f)}{10}}\right)$$

$$PSXT(f) \le -20 + 13\log_{10}\left(\frac{f}{10^{10}}\right)$$



Note that:

$$S_o(f) \le S_{lp}(f)10^{\frac{PSXT(f)}{10}}$$

$$R_o(0) \le \int_{-\infty}^{\infty} S_{lp}(f)10^{\frac{PSXT(f)}{10}}\,df$$

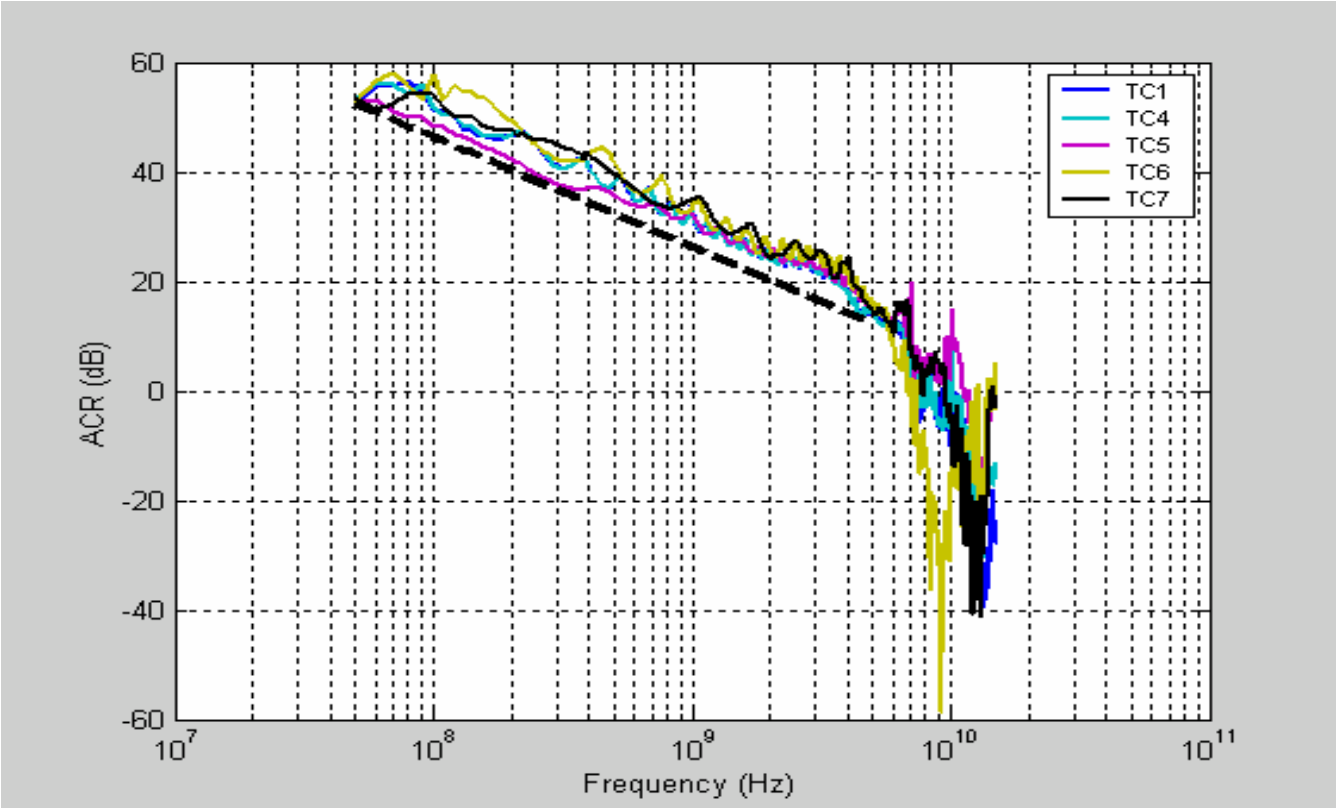
Using $S_{lp}(f)$ from slide 7 and this example PSXT(f), $R_o(0) \le 17$ mV_{rms}.

This aligns well with the computed values shown on slide 8.

ACR Proposal (dambrosia_03_0904)

$$Total\_Crosstalk(dB) = 10\log_{10}\left(10^{(MDNEXT(dB)/10)} + 10^{(MDFEXT(dB)/10)}\right)$$

$$ACR(dB) = SDD21(dB) - Total\_Crosstalk(dB)$$



Example - $ACR(dB) \geq 12.5 - 20\log_{10}\left(\frac{f}{5GHz}\right), f = 0.1...5GHz$

Complete Model Picture

1. Must be above Insertion Loss Limit
2. LMS fit of channel data (F1- F2) must be above attenuation limit
3. Ripple on channel data (F1 – F2) must meet deviation constraints
4. Consider crosstalk
    1. Individual aggressors
    2. NEXT Sum, FEXT Sum
    3. Total Sum
5. Must meet ACR
    1. If crosstalk too high, then SDD21 must be improved

Summary of Complete Model Picture

- Items 1-3 – Methodology approved, Signal Ad Hoc Results / Correlation Analysis underway to complete table
- Items 4-5 – Concepts presented

Recommendations

- Approve Crosstalk Limit Concepts
  - Individual NEXT aggressor
  - Individual FEXT aggressor
  - NEXT Sum
  - FEXT Sum
  - Total Sum
- Approve ACR concept
- Determine equations for all xtalk limit concepts