Measurement of nPPI in Support of Unretimed LR4

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Overview

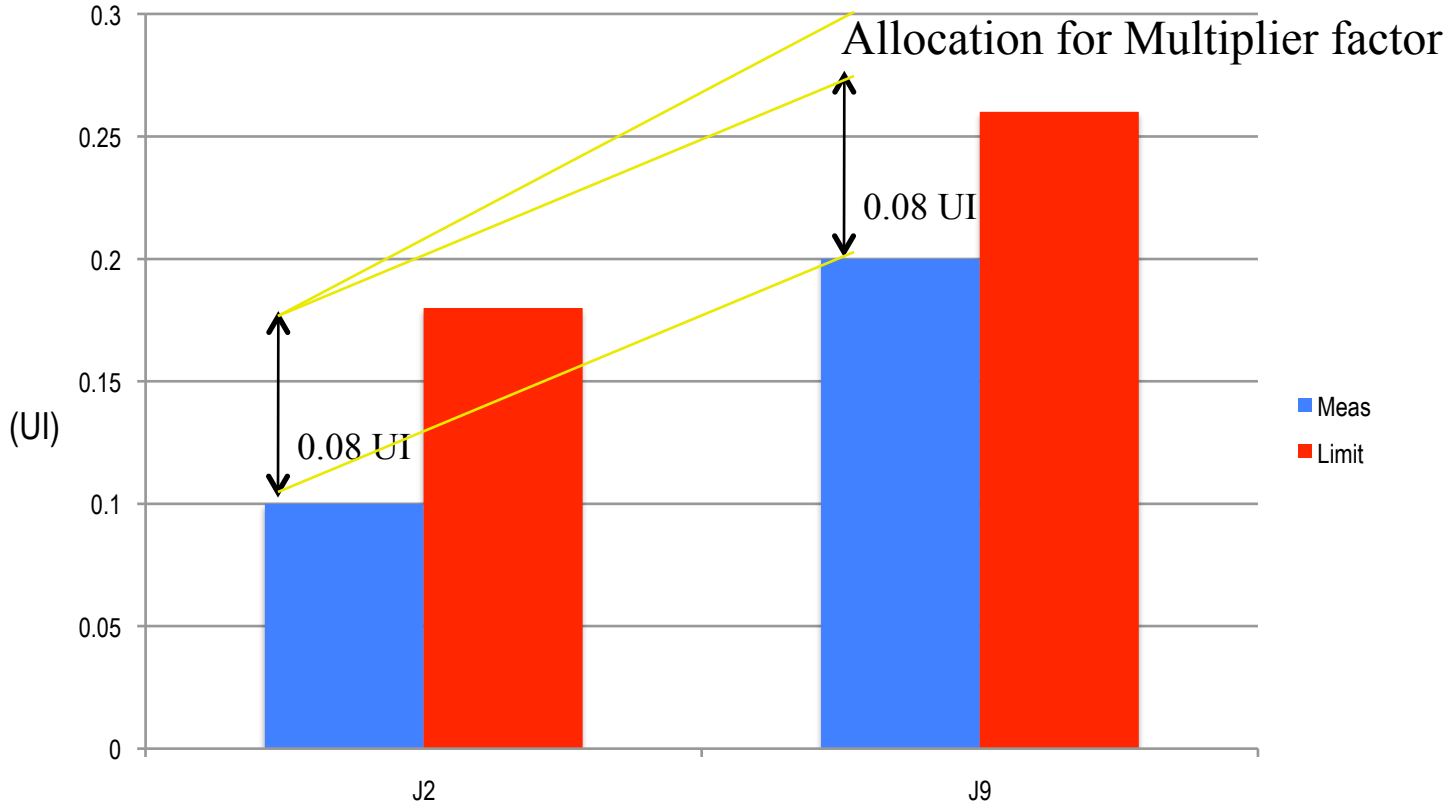
- This presentation will show that J2 limit at TP1a can be reduced from current limit of 0.18 UI without any material impact, since DDPWS and J9 are the constraining parameters
  - Our study also shows J9 at TP1a should be relaxed
- QSFP crosstalk analysis show sufficient margin nPPI implementations including un-retimed LR4

Test Setup

- Multi-port SFP+ device driving an SFP+ channel with 6.5 dB loss at Nyquist
- The host channel had two short stubs <15 mils to emulate practical host implementation
- Test equipment was Agilent DCA-J with option 201 and 401
- DDPWS measured with PN9
- J2 and J9 measured with PN31
- Measured J2 and J9 value were scaled up by (0.07 – Measured DDPWS)

Measured J2/J9 at TP1a

- Current J2 specifications is too lax but J9 is too tight, options are:
  - J2=0.16/0.17 UI and J9=0.28 UI
  - J2=0.18 UI and J9=0.3 UI

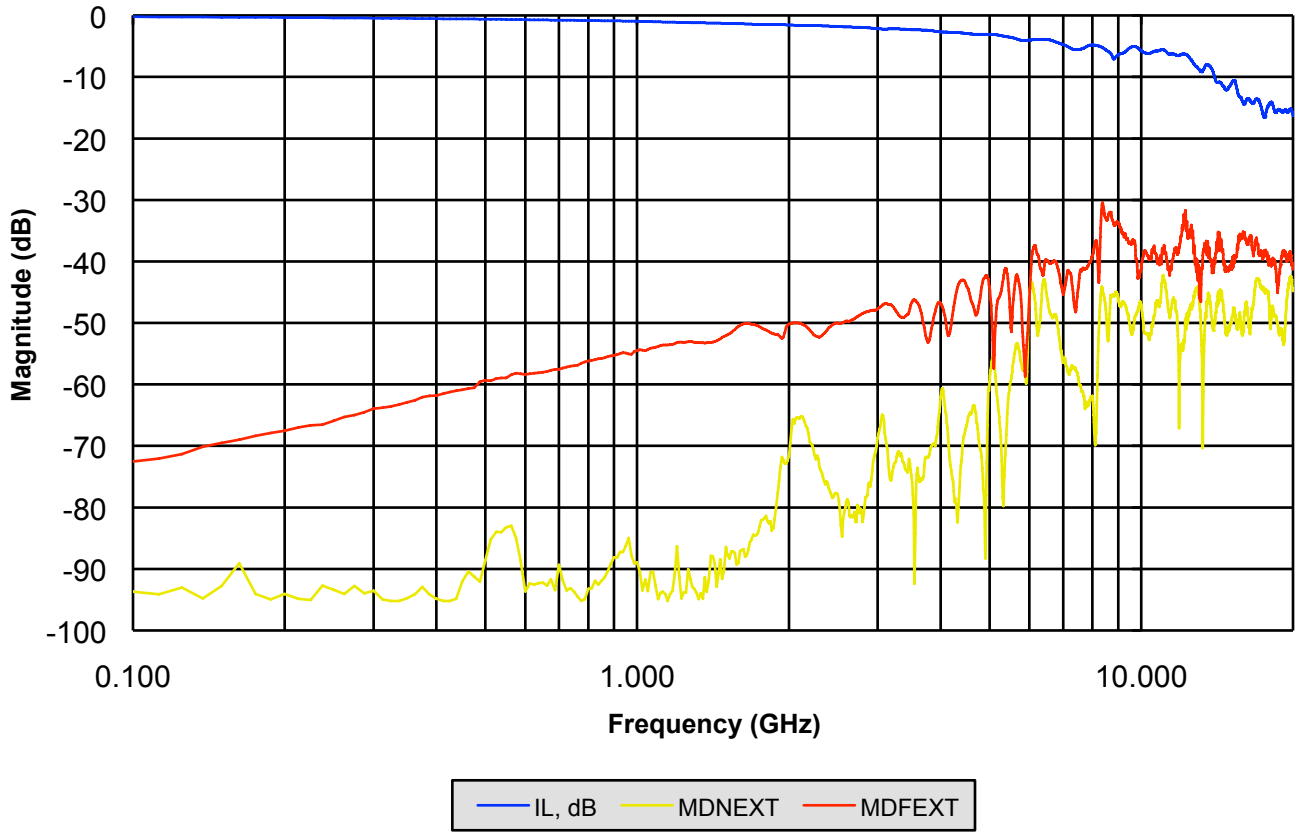


QSFP Crosstalk Baseline Analysis

- Broadcom QSFP MCB-HCB was used for baseline crosstalk analysis http://www.ieee802.org/3/ba/public/sep09/ghiasi_01_0909.pdf
  - MCB-HCB were designed to meet the loss and return loss requirements
  - MCB uses stripline with two short stubs
  - HCB is based on Microstrip
- Table 85-11 MDFEXT and MDNEXT is based on the following assumptions:
  - Use the worst case aggressor FEXT and NEXT and assume -6 dB for other 3 NEXTs and 2 FEXT in the MDFEXT and MDNEXT analysis
  - Pad MDFEXT and MDNEXT further for other implementations

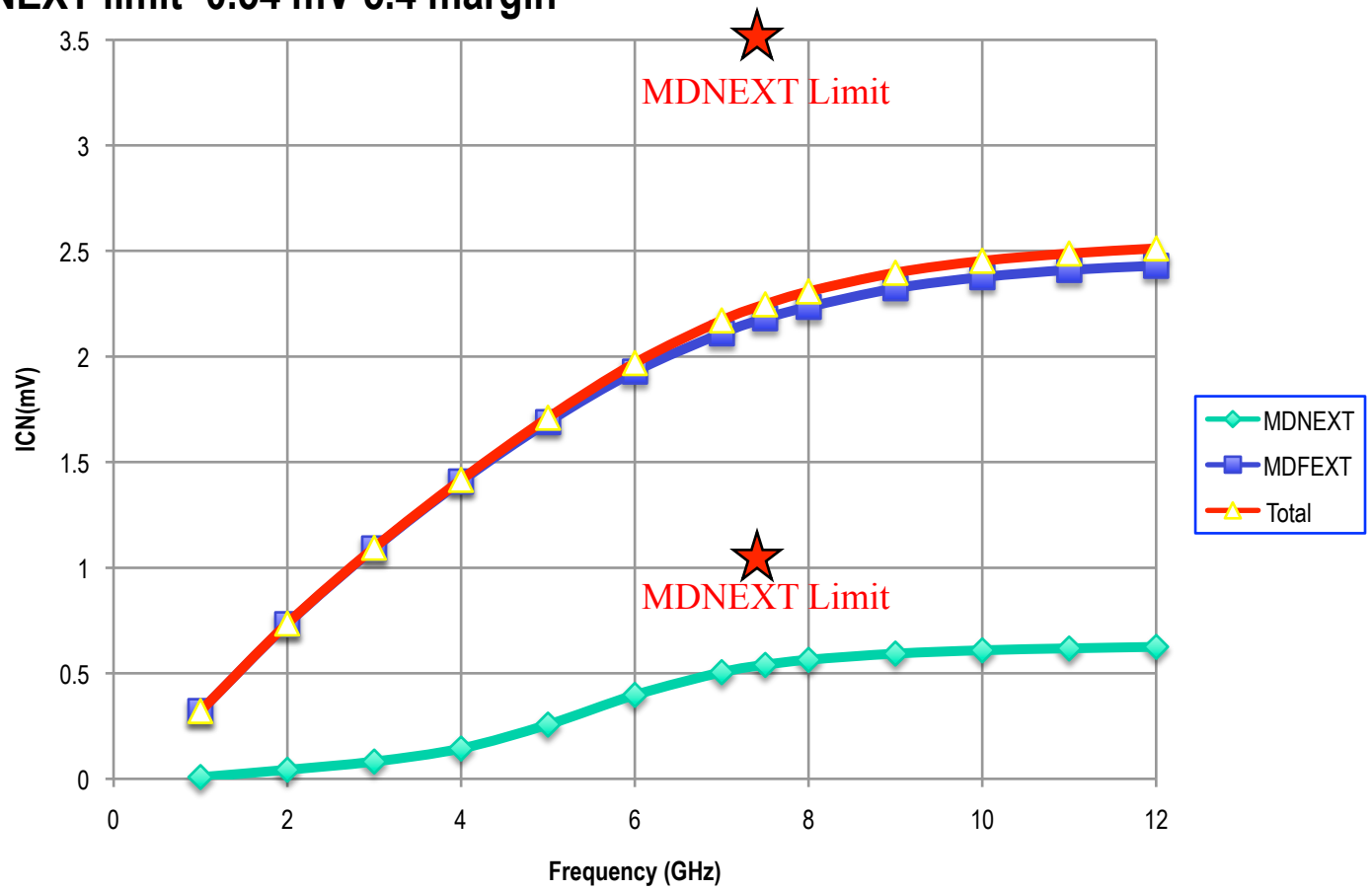
MDFEXT/MDNEXT QSFP

- Integrating BW=7.5 GHz



ICN as Function of Receiver BW

- ICN is calculated with 7.5 GHz receiver BW in CL85
  - MDFEXT limit=3.5 mV 4.1 dB margin
  - MDNEXT limit=0.54 mV 5.4 margin



Summary

- nPPI/CR4/CR10 ICN is base on QSFP Measured result of SFP+ PHY driving worst case nPPI channel indicates nPPI J2 is too relax but on other hand J9 too tight with DDPWS set the limit of 0.07 UI
- Setting J2 at TP1a to 0.16 or 0.17 simplify supporting un-retimed LR4 without a burden to the host
- J9 at TP1a should be relaxed to 0.28 UI regardless what we do with LR4
- ICN values in table 85-11 were base on QSFP connector but sufficient margin are allocated for other implementations.