Measured Interference Tolerance Results

Response to comments #137 and #100

Matt Brown, Quake Technologies, mbrown@quaketech.com

Acknowledgements

- Thanks to Intel for providing the backplane infrastructure, related support, and guidance.
- Thanks for inputs from:
  - Xiao-Ming Gao, Intel
  - Charles Moore, Agilent

Introduction

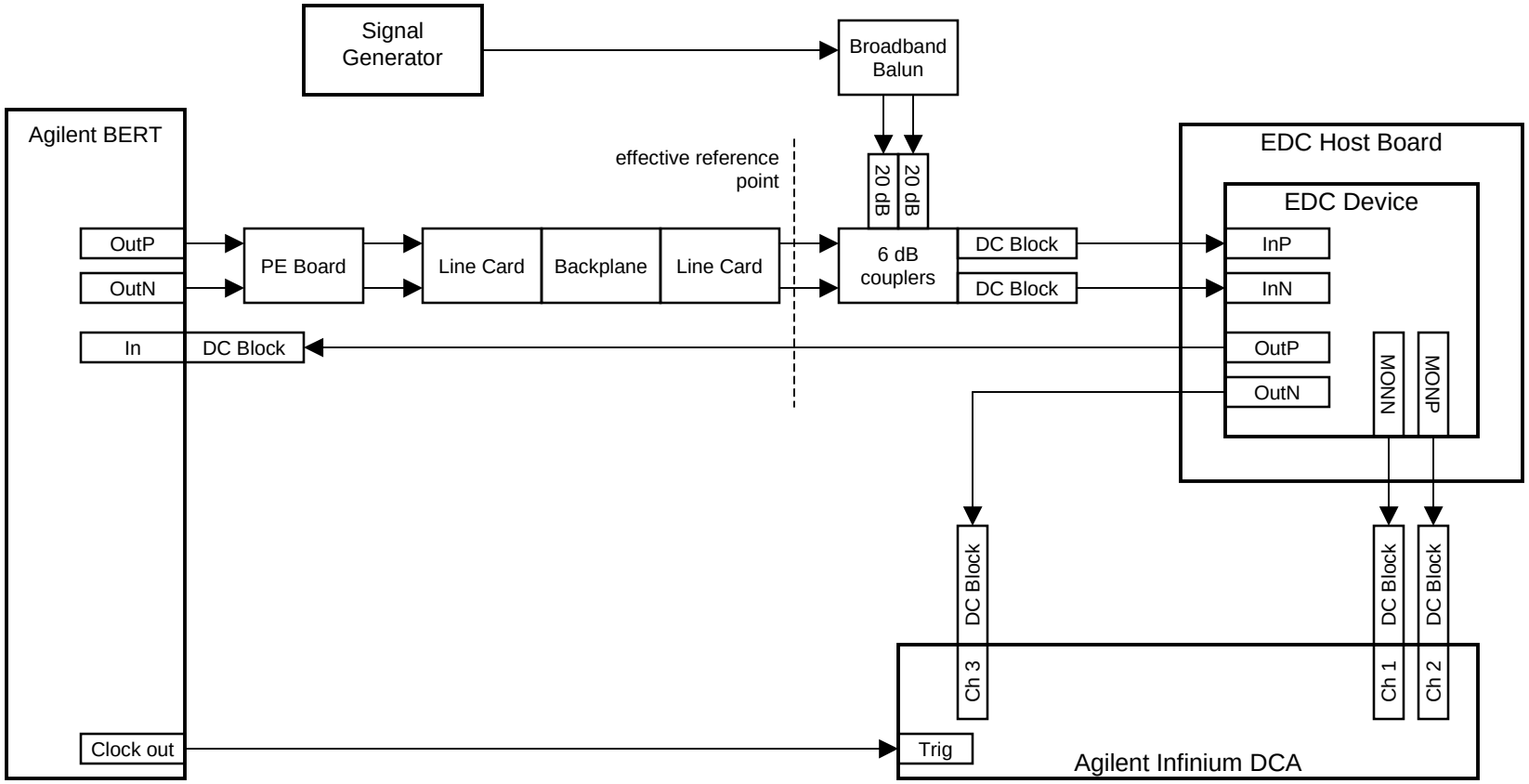
- This slide package summarizes interference tolerance tests using the Quake backplane interface and Intel backplane channels.
- Response to Comments #137 and #100
- Tests
  - sinusoidal interference tolerance
  - PRBS interference tolerance
- Continuation of backplane tests presented in mbrown_01_0705.

Limitations

- The test configuration is far from ideal
  - The transmitter is not compliant
    - The equalization is effectively 2 taps, giving pre-emphasis only.
    - The pre-emphasis adjustment resolution is 3 dB.
    - There is substantial distortion of the transmitted signal.
  - The path in not compliant
    - The path is not a well-behaved point to point path, but rather a real backplane channel with significant self-interference
    - There is an extra 6 dB loss due to the interference coupling method.
  - Receiver forced to operate as 3-tap DFE

Test Configuration, Sinusoidal Interference

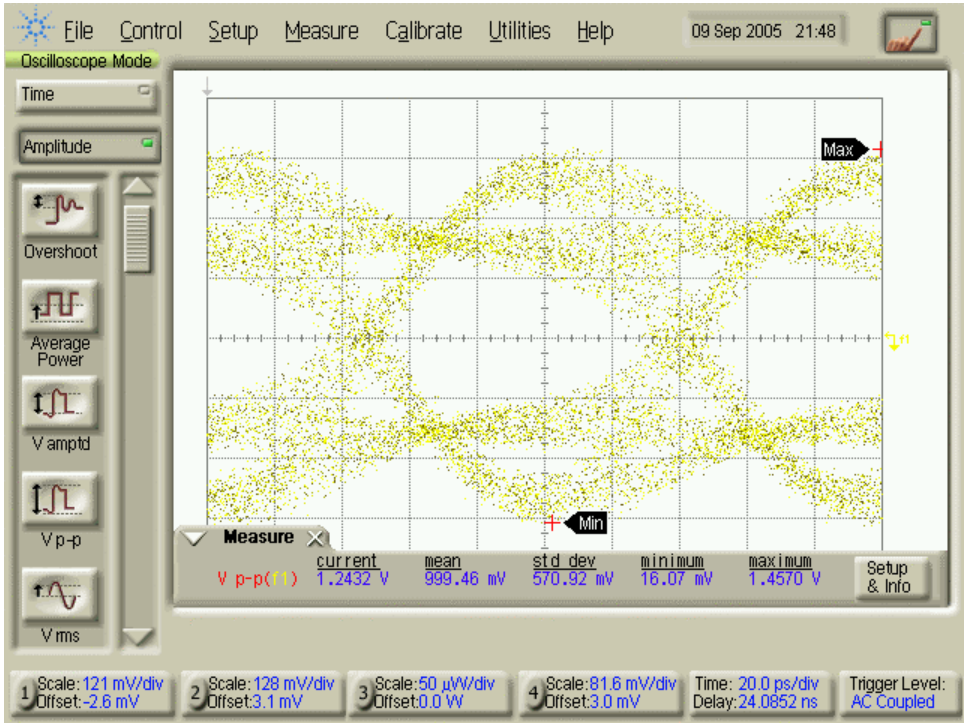
- The block diagram below illustrates the test configuration.



Test Parameters, Sinusoidal Interference Source

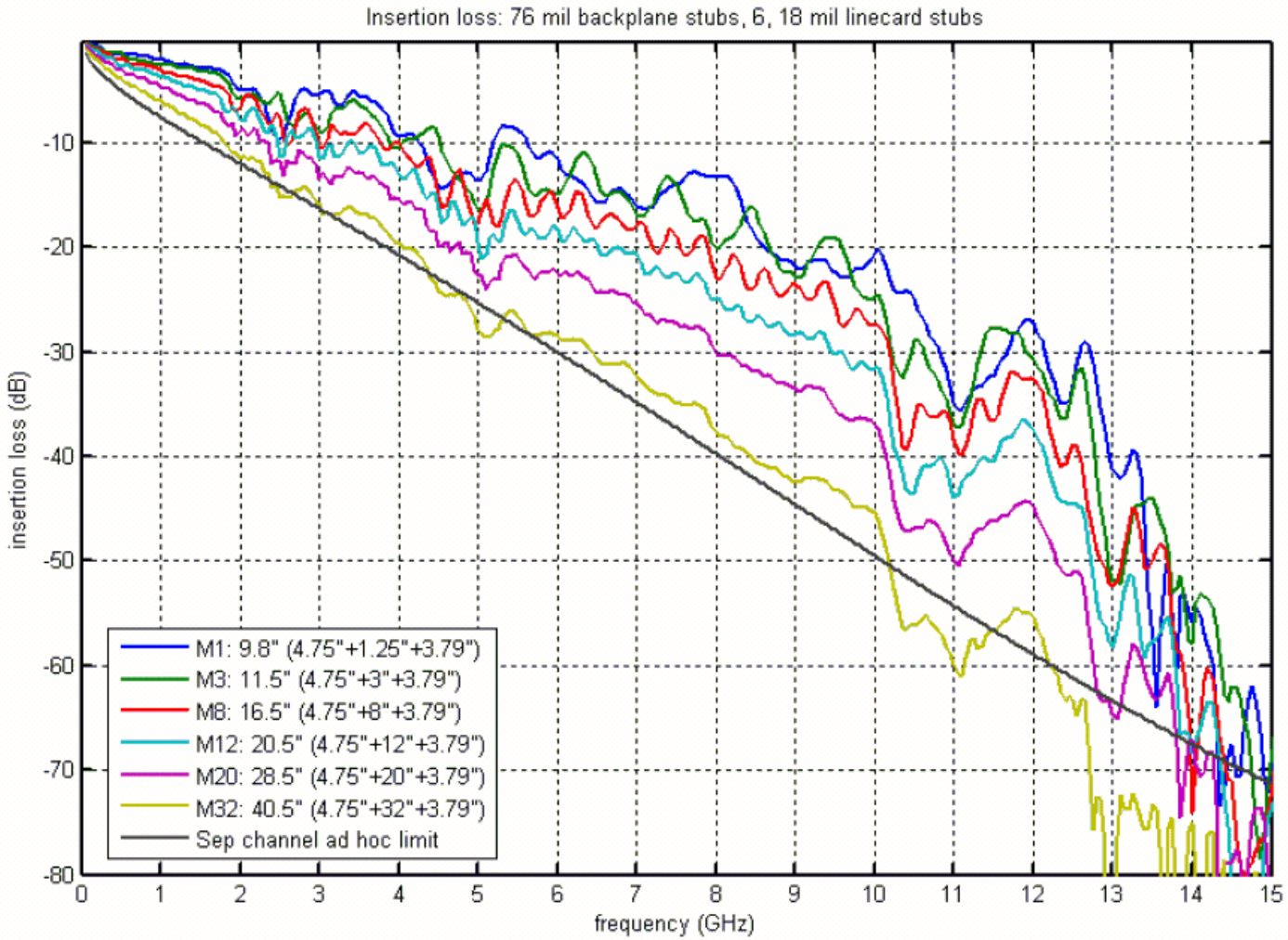
- Data source:
  - Pattern: PRBS15, PRBS31
  - Data rate: 10.3125 GHz
  - Pre-emphasis: 6 dB
- Interference source
  - Format: sinusoidal
  - Rate: 1GHz to 10GHz
- Channels:
  - Intel B12, M12, M20

Pre-emphasized signals at line card input

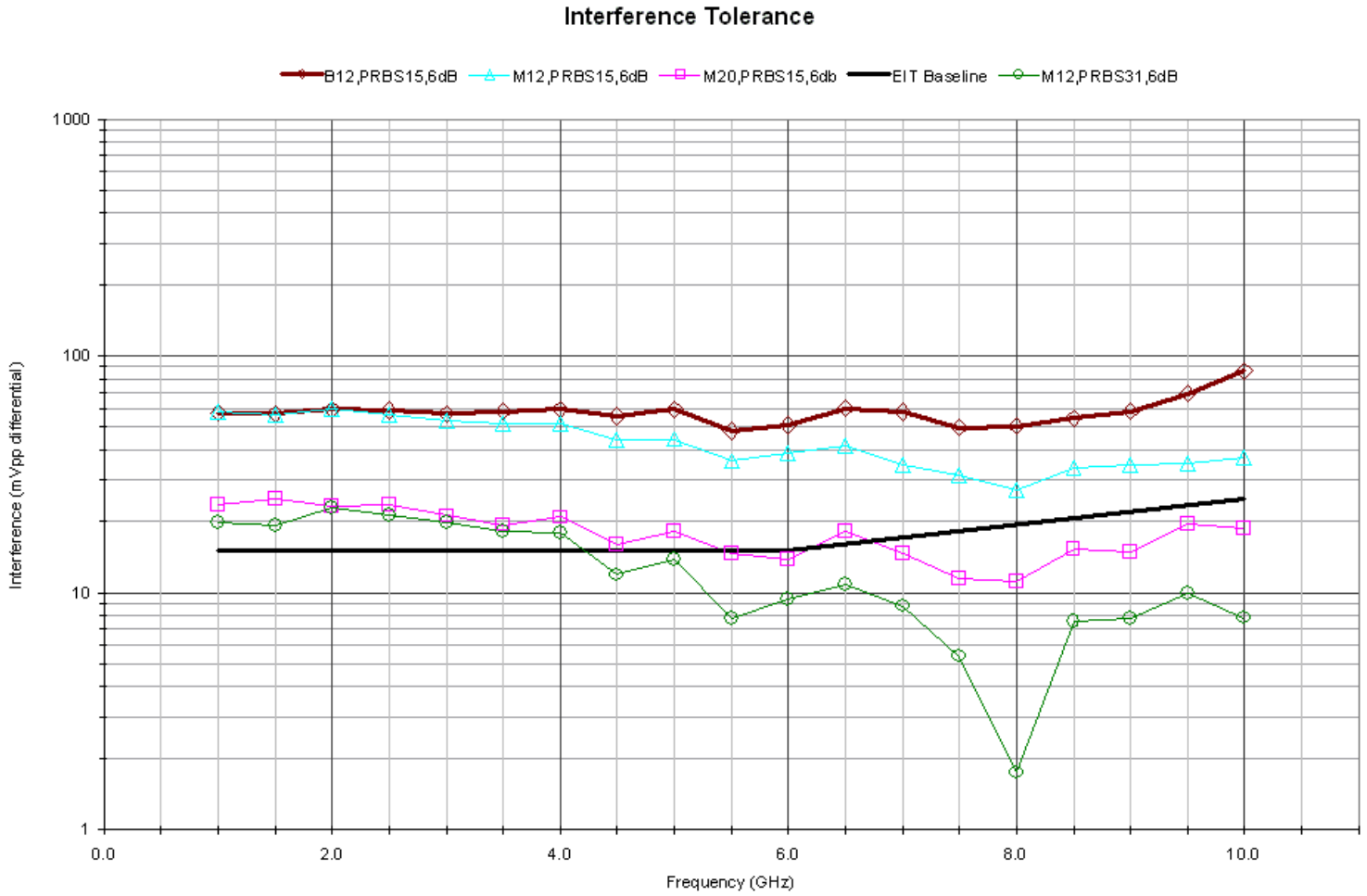


PE=6dB
PRBS15
10.3125 Gbps

Intel 0904 Middle Layer Channel SDD21 (from peters_01_0904)

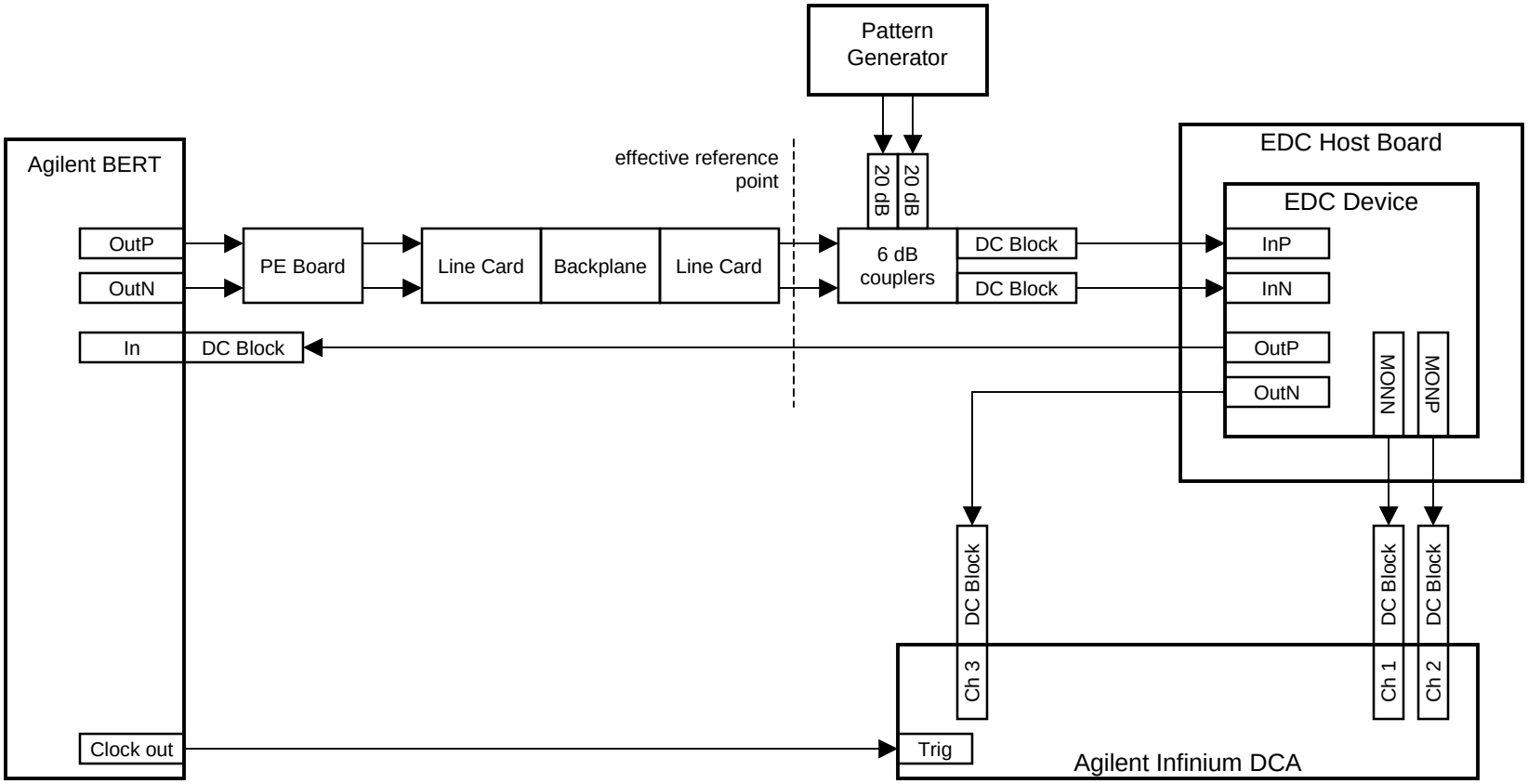


Measured EIT Curves



Test Configuration, PRBS Interference

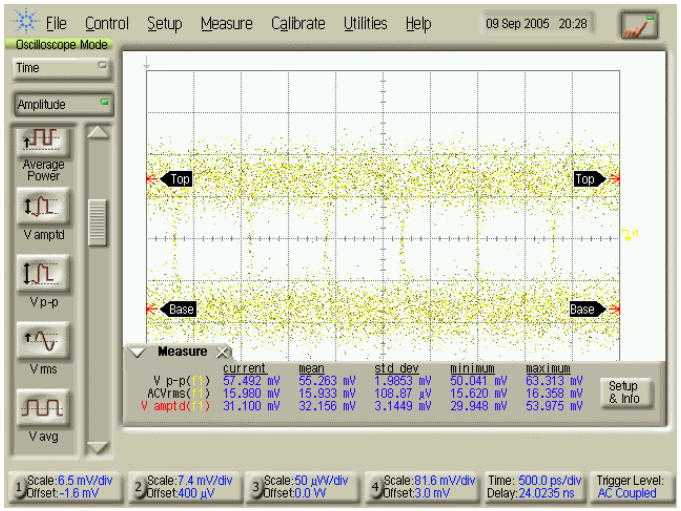
- The block diagram below illustrates the test configuration.



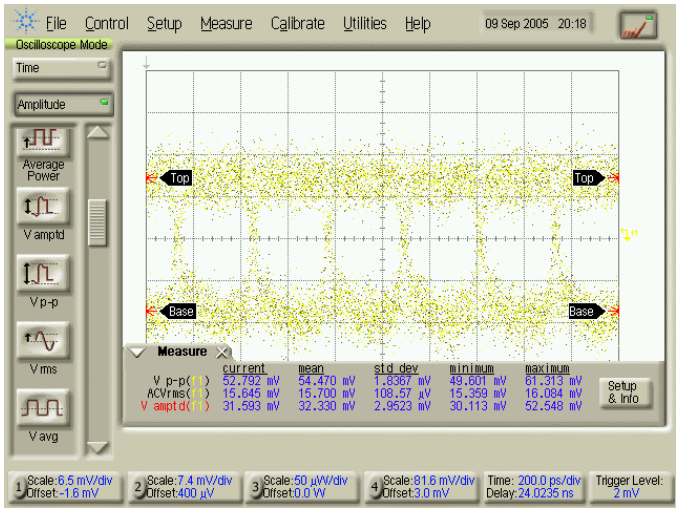
Test Parameters, PRBS Interference Source

- Data source
  - Pattern: PRBS15
  - Bit rate: 10.3125 Gbps
- Pre-emphasis: 6 dB
- Interference source
  - Format: PRBS31
  - Rate: 1.25 Gbps, 3.125 Gbps, and 10.3125 Gbps
- Channels:
  - Intel 0904 M12

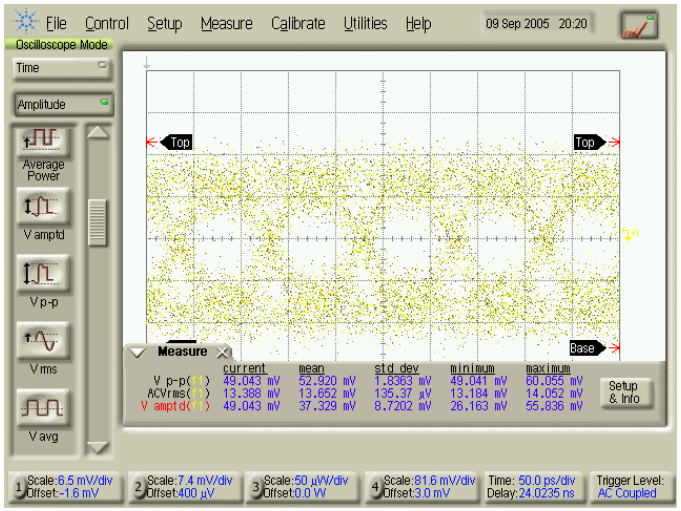
PRBS interference signals, measured at Rx input



PRBS31
1.25 Gbps

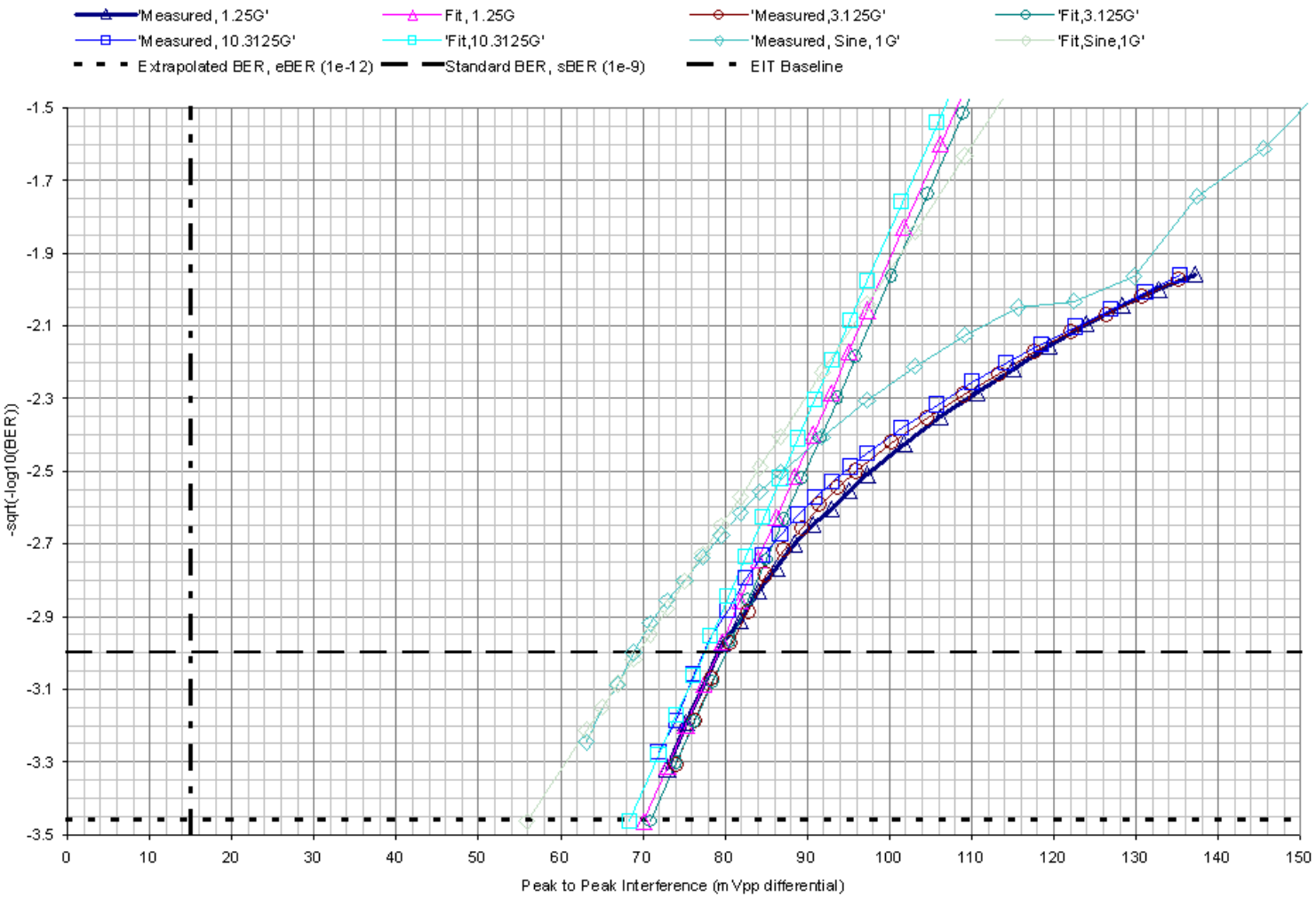


PRBS31
3.125 Gbps



PRBS31
10.3125 Gbps

Comparison of BER curves for Sinusoidal and PRBS sources Channel M12, PRBS15



Test Results Summary

- Using a channel similar to Annex 69A (M20) interference tolerance is borderline, despite limitations of test configuration, interfaces, and self-interference on channel.
- There is significant sensitivity to pattern length, comparing results with PRBS15 and PRBS31.
- Use of PRBS instead of sinusoid for interference source yields a similar BER curve.

Conclusions

- The specification is likely achievable by a receiver.
- Given the observed sensitivity to pattern length, simulations using PRBS15 may be optimistic.
- The channel used for compliance testing must be well-behaved.