Alien Crosstalk Noise Level for 1000BASE-T1

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Outline

- Alien Crosstalk noise test 97.5.5.2 is added to 1000BASE-T1 draft D2.1. This document provides an estimate for a test level that corresponds to Alien crosstalk limits established in 97.5.6.3.2 and 97.5.6.3.4.

Alien crosstalk noise test

97.5.5.2 Alien crosstalk noise rejection

This specification is provided to verify the receiver's tolerance to alien crosstalk noise. The test is performed with a noise source consisting of a signal generator with Gaussian distribution, bandwidth of 550 MHz and magnitude of –130 dBm/Hz for devices supporting type A link segments and –145 dBm/Hz for devices supporting type B link segments. The receive DUT is connected to these noise sources through a resistive network, as shown in Figure 97–35, with a link segment as defined in 97.5.6. The noise is added at the MDI of the DUT. The BER shall be less than 10^{-10}, and to satisfy this specification the frame error ratio is less than 10^{-7} for 125 octet packets measured at MAC/PLS service interface.

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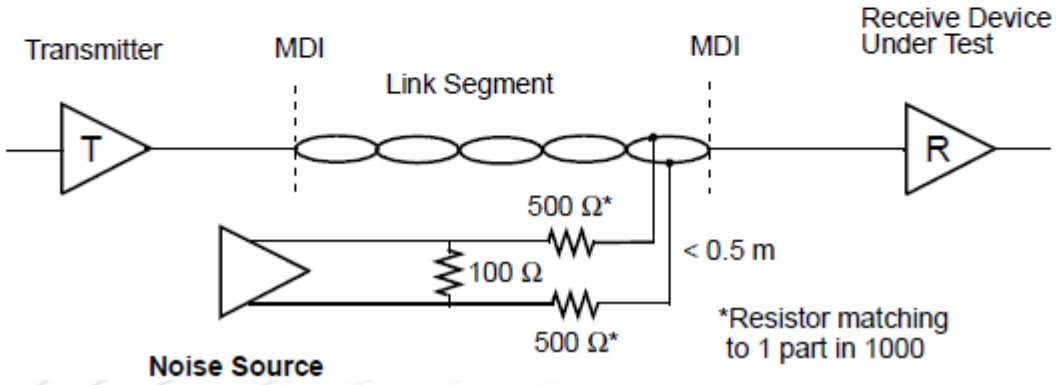
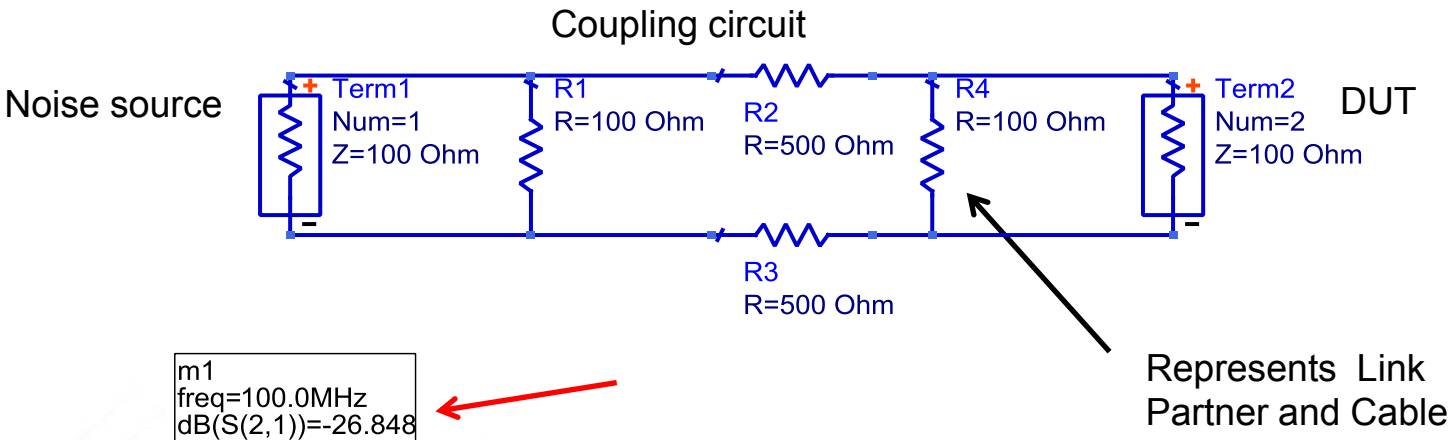
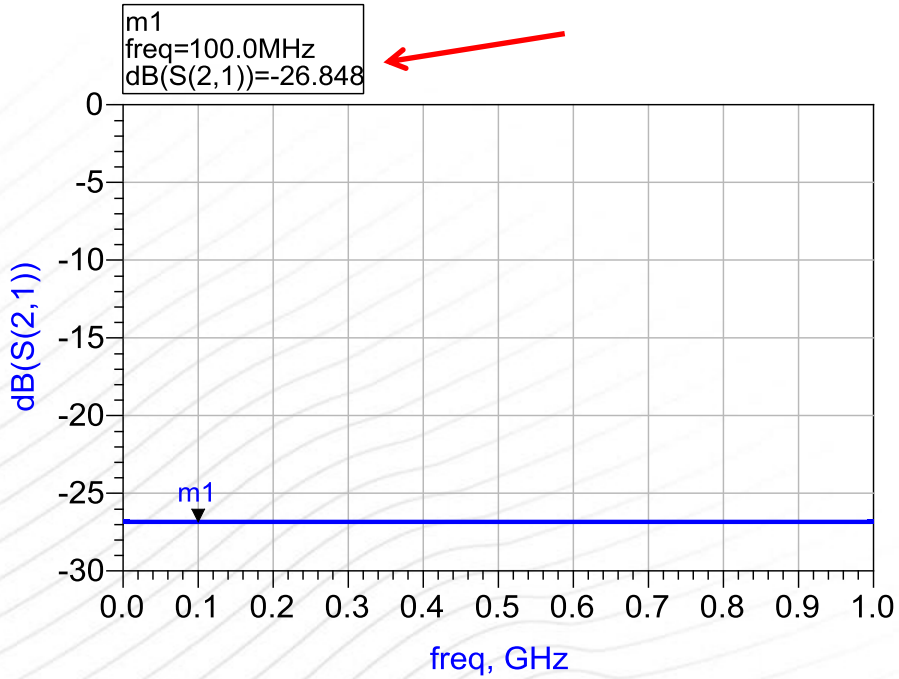


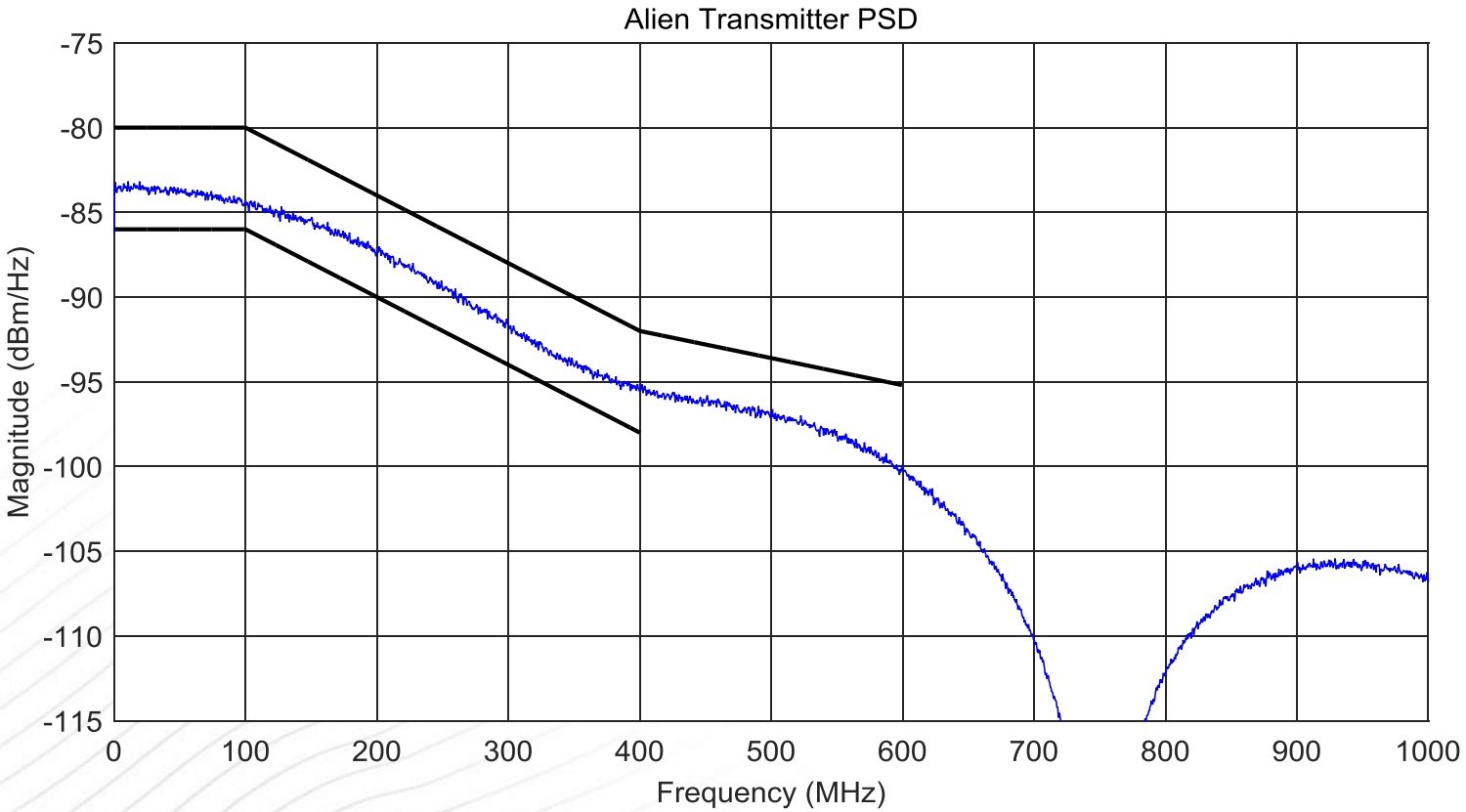
- Suggested Alien crosstalk noise test as per P8023bp-D2.1.pdf

Noise coupling circuit loss



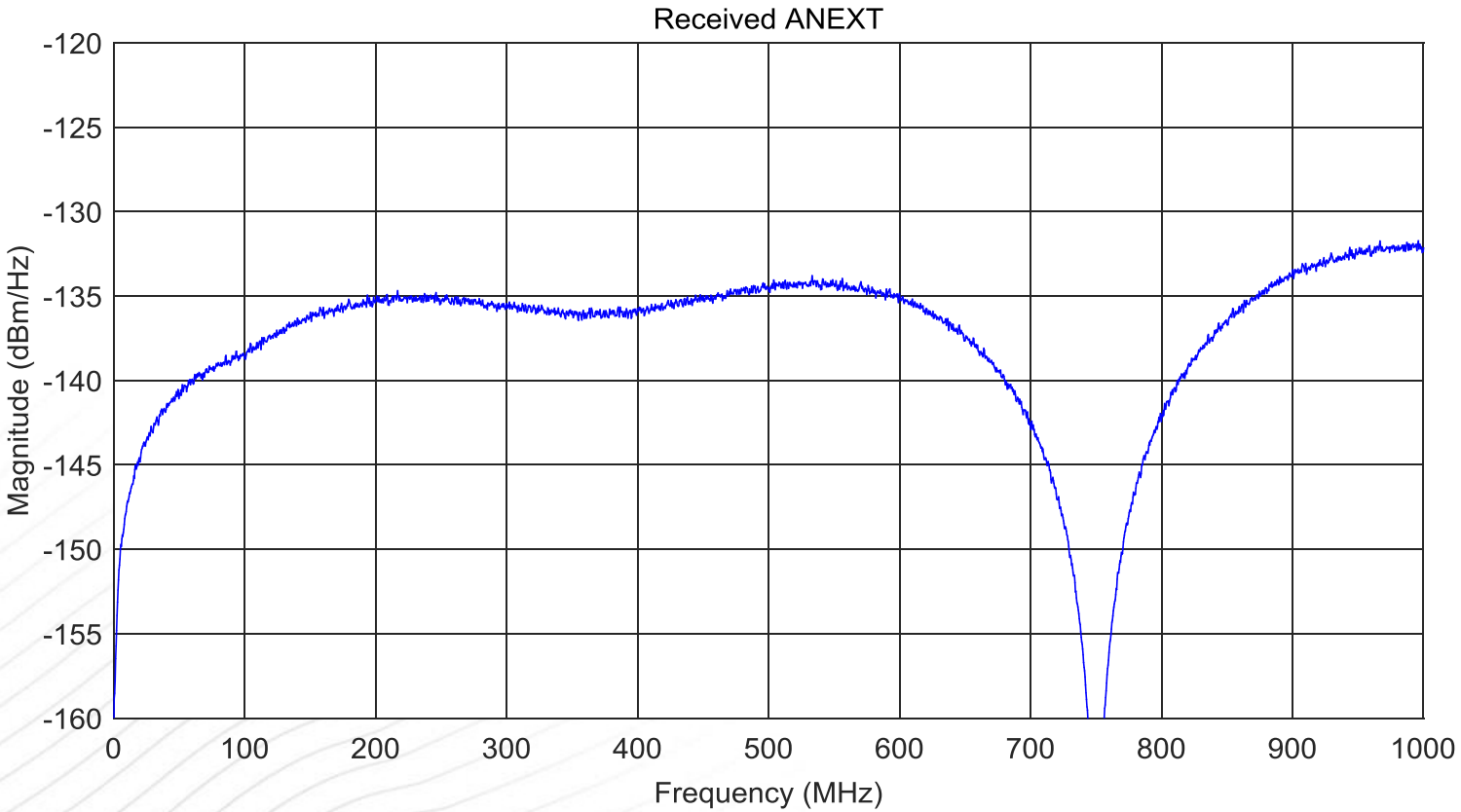


Assumed Alien Transmitter PSD



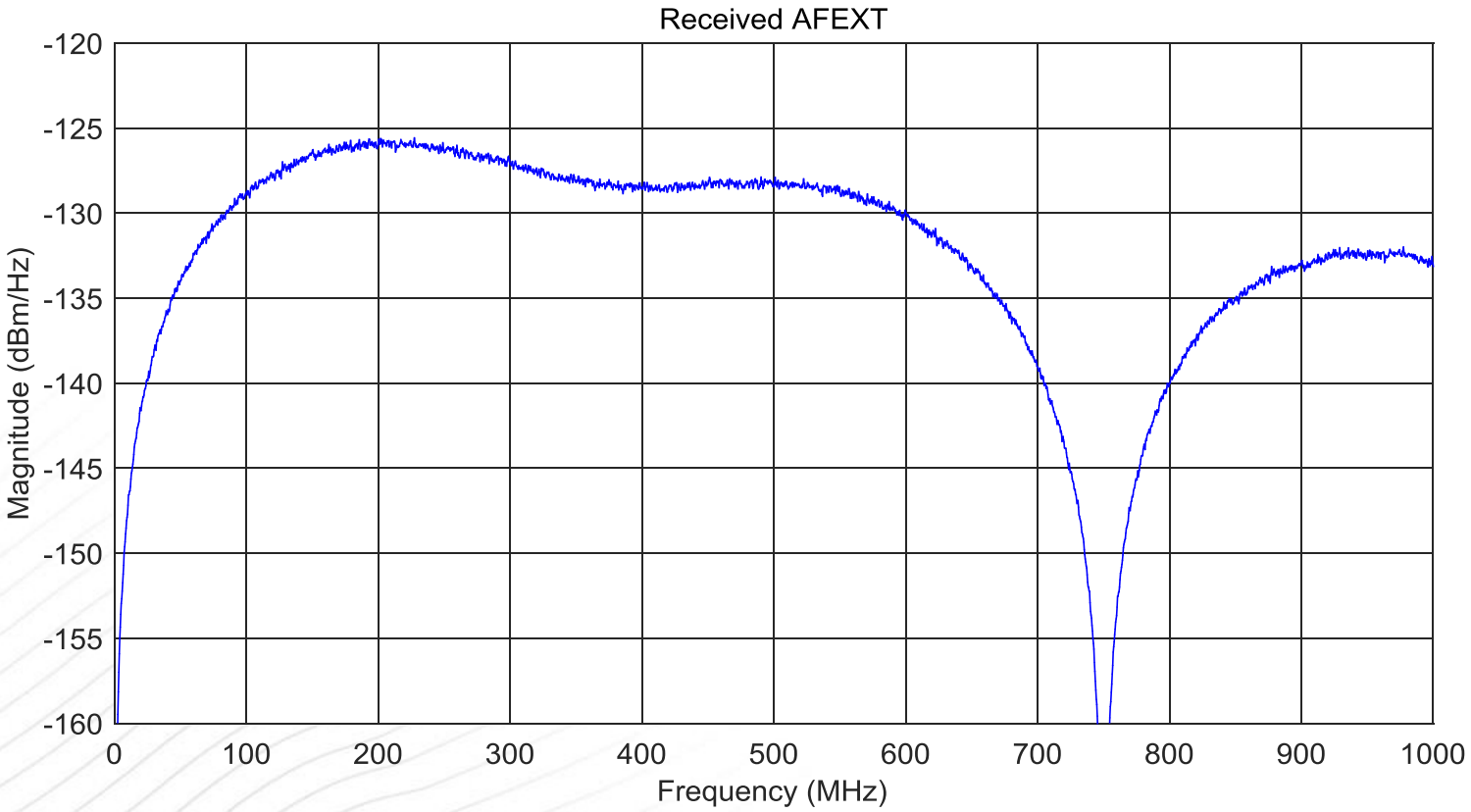
- Assumed Alien Transmitters compliant with 1000BASE-T1 PSD limit

Computed Received Alien NEXT



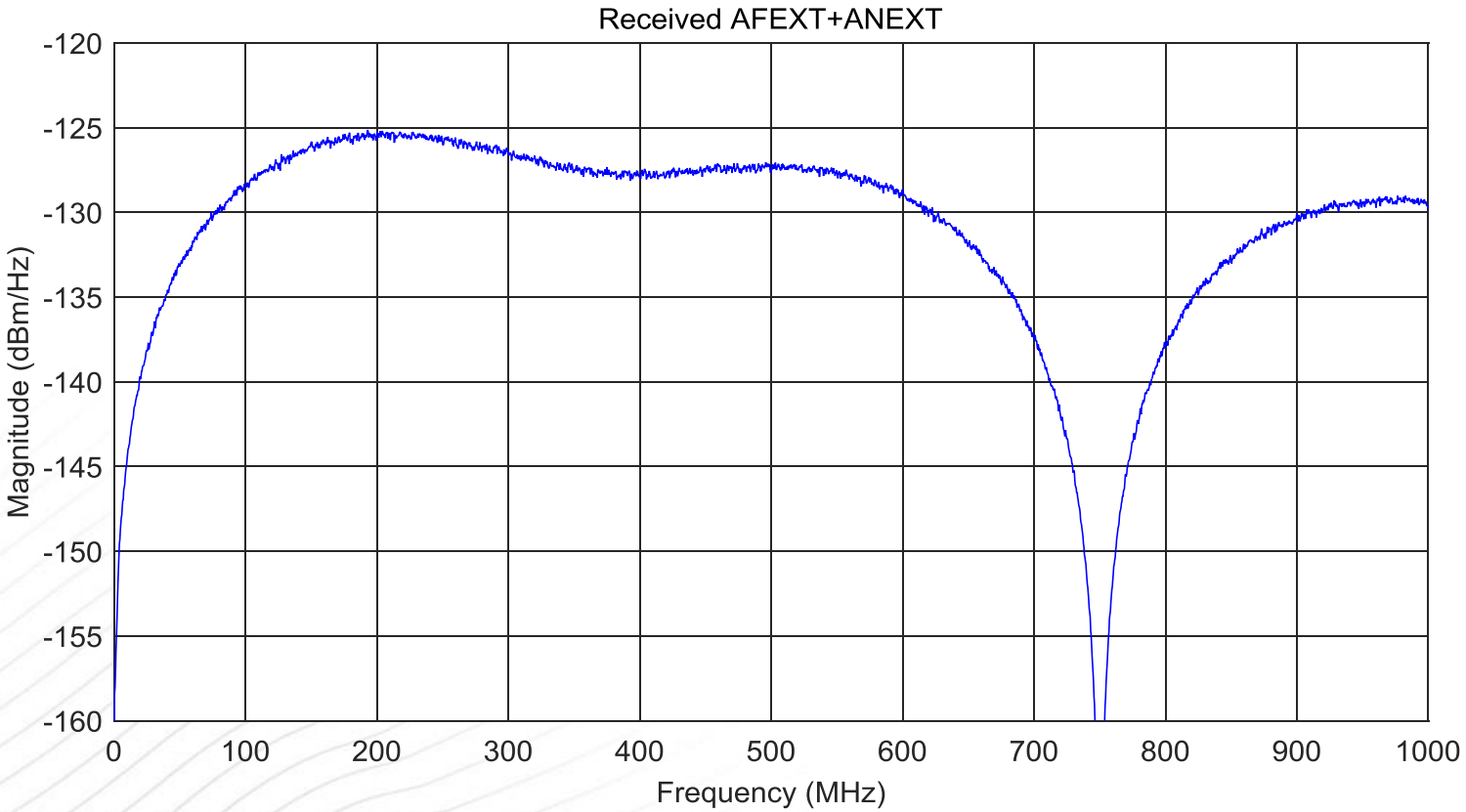
- Computed based on Alien Transmitters PSD and ANEXT limit as per 97.5.6.3.2 in P8023bp-D2.1.pdf. The ANEXT limit line is extrapolated beyond 600 MHz using same equation for this plot.

Computed Received Alien FEXT



- Computed based on Alien Transmitters PSD and AFEXT limit as per 97.5.6.3.4 in P8023bp-D2.1.pdf and assuming a worst case scenario with Alien disturbers having 2 m link segments. The AFEXT limit line is extrapolated beyond 600 MHz using same equation for this plot.

Computed Received Alien FEXT+NEXT



- Computed based on Alien Transmitters PSD and ANEXT and AFEXT limits as per 97.5.6.3.2 and 97.5.6.3.4 in P8023bp-D2.1.pdf

Conclusion

- 1000BASE-T1 alien crosstalk may be approximated with a band pass noise having PSD of about -100 dBm/Hz for type A link segment. This assumes alien noise sources being of the same type as 1000BASE-T1 and a coupling network with -26.8 dB attenuation and crosstalk limits as per 97.5.6.3.2 and 97.5.6.3.4 in P8023bp-D2.1.pdf. It also assumes, higher frequency crosstalk is rejected by anti-aliasing receiver filtering.
- For type B link segments, a test level 10dB lower may be appropriate given longer range expectation of up to 40 meters.