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Link Segment Consideration

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FMP Ethernet Link Segment Consideration

- FMP Ethernet link segments must support both power delivery and data transmission.
- 10BASE-T1L and 100BASE-T1L define two link segment classes:
  - Up to 10 inline connectors with a reach of at least 1 km
  - Up to 5 inline connectors with a reach of at least 500 m
- Determine which link segment class best aligns with power channel requirements.
- Alternatively, define the Ethernet link segment based on the worst-case power channel deployment scenario.

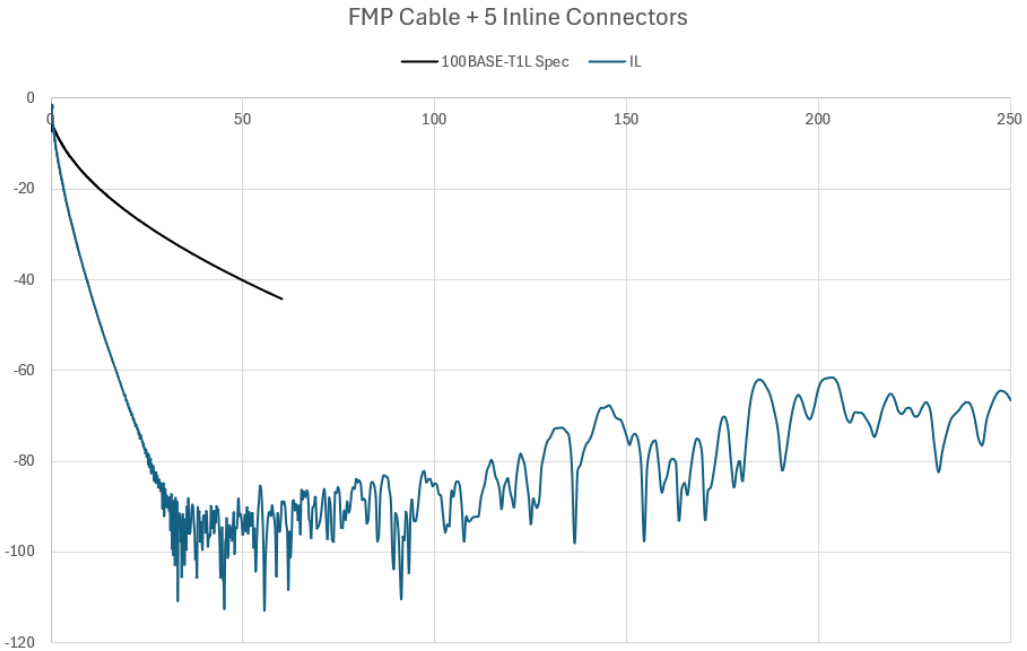
FMP Data Channel Measurements for a 100BASE-T1L Link Segment

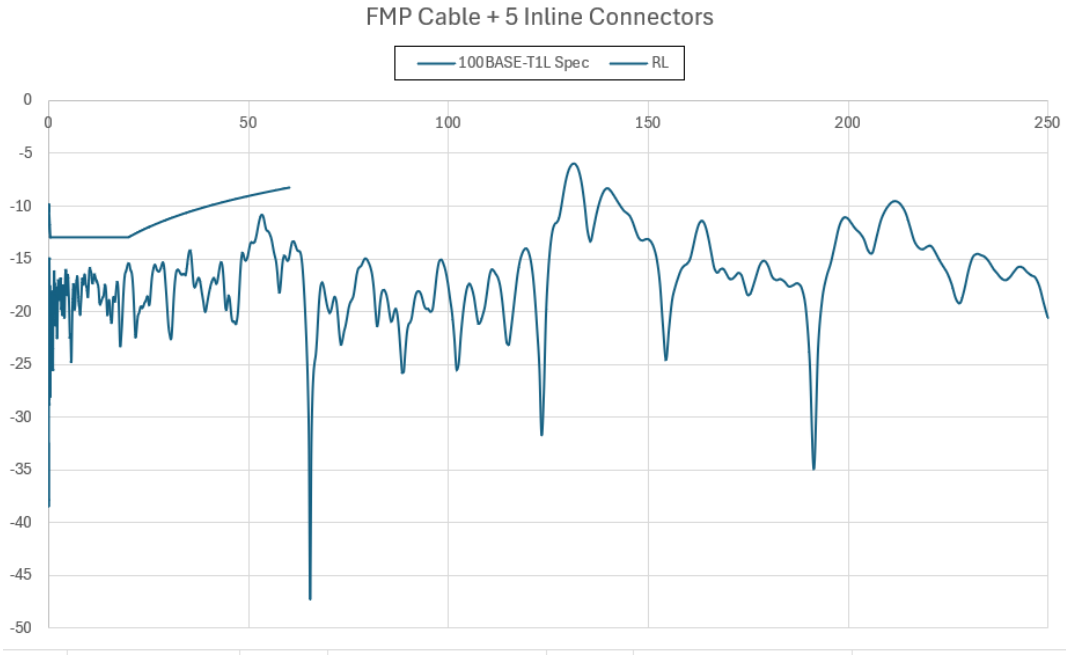
16AWG 4-pair Cable / Commercially Available Terminal Blocks











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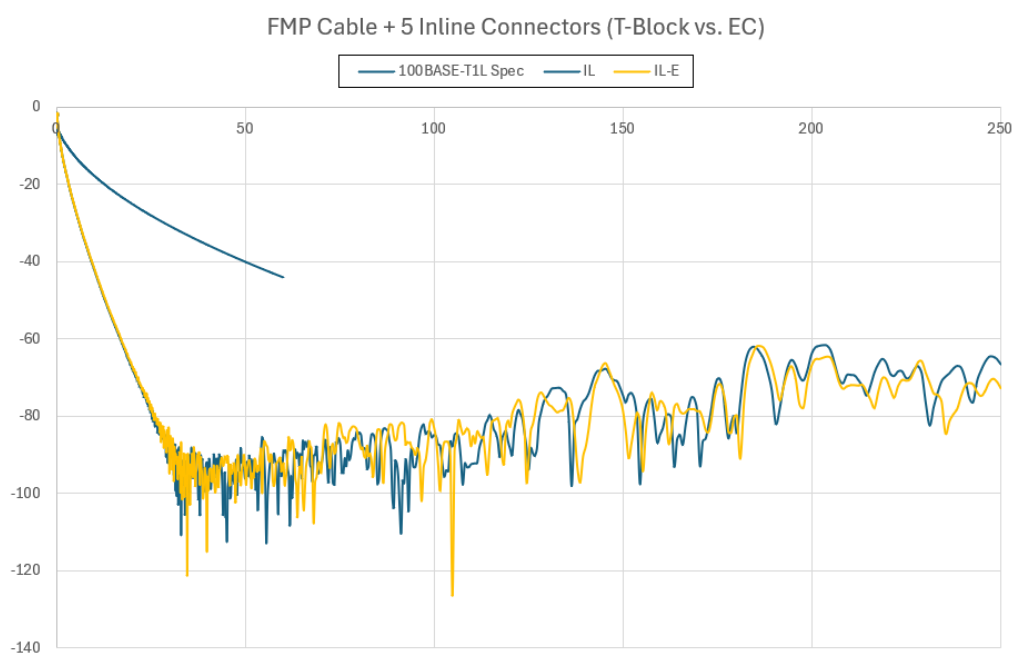
FMP Data Channel Measurements for a 100BASE-T1L Link Segment

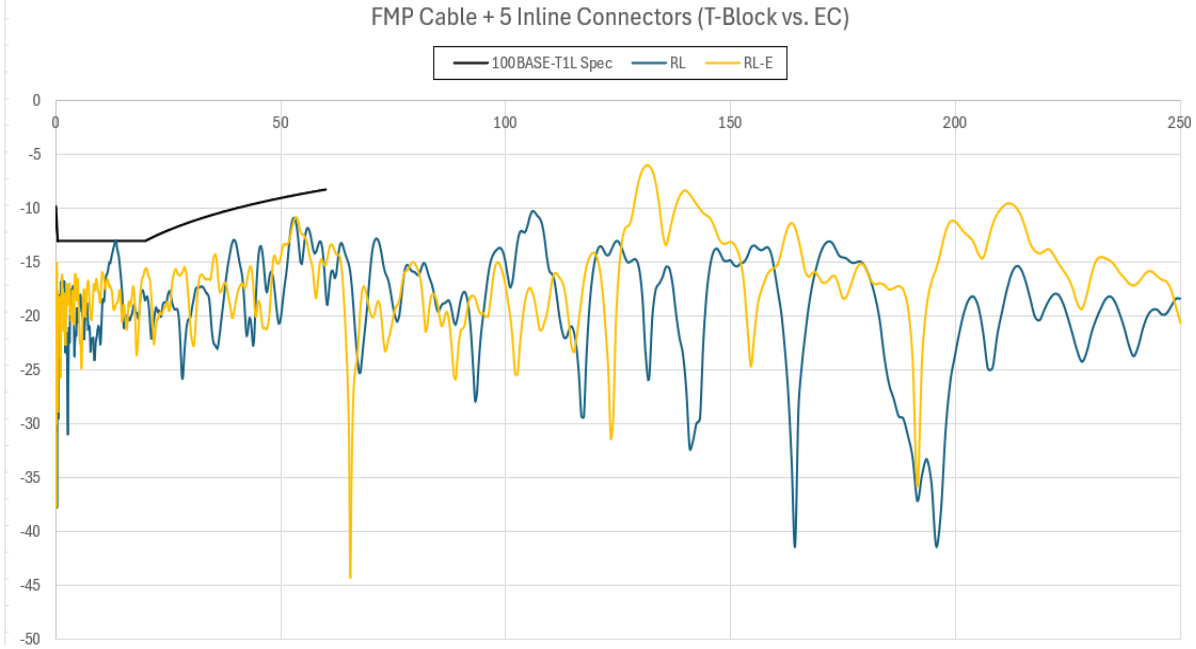
16AWG 4-pair Cable / Enhanced Connectors





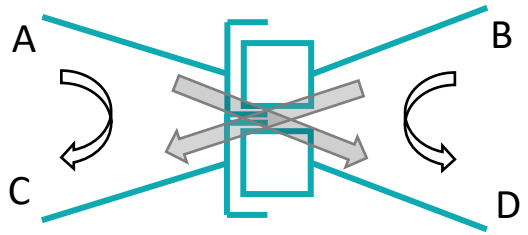




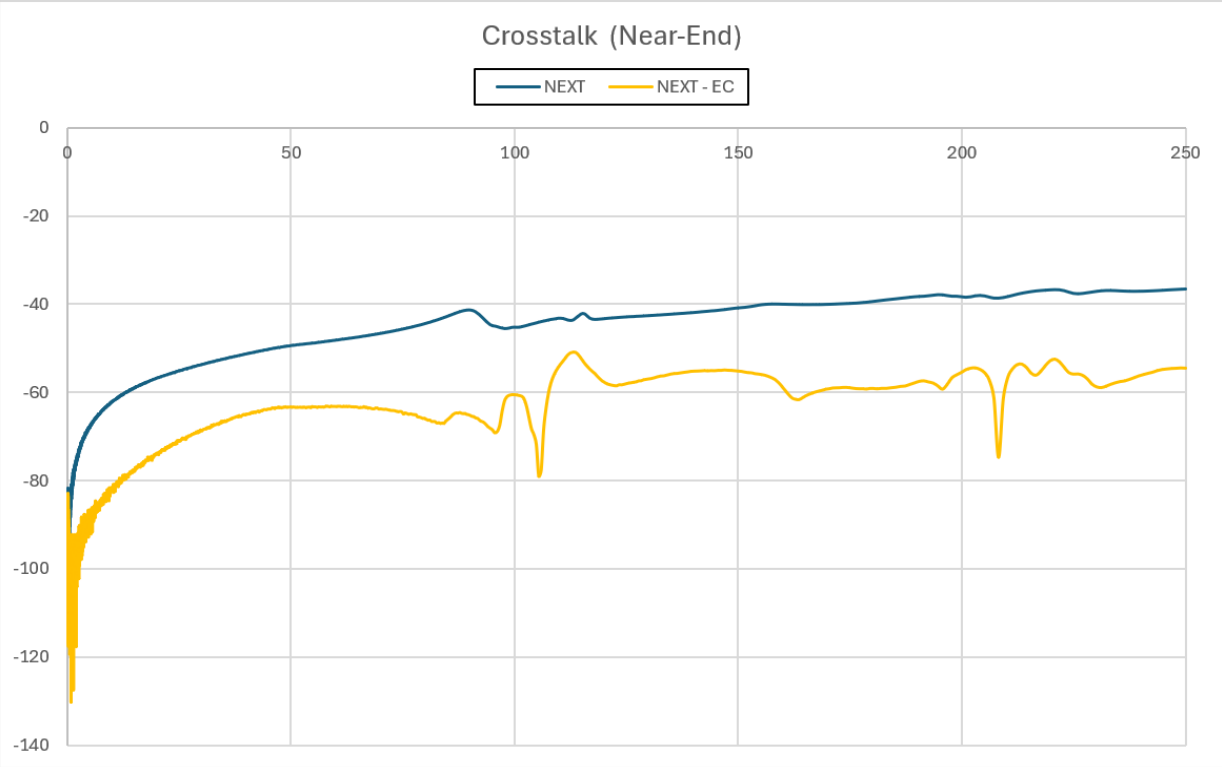


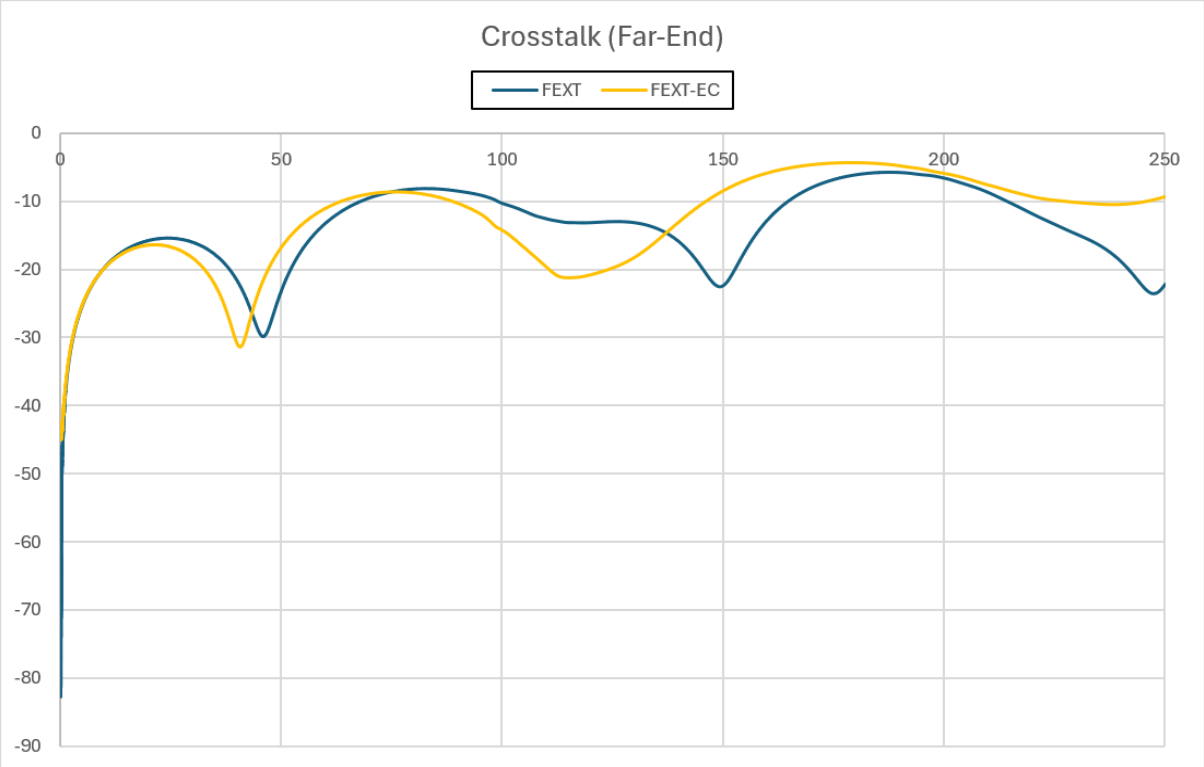
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Inline Connector Crosstalk

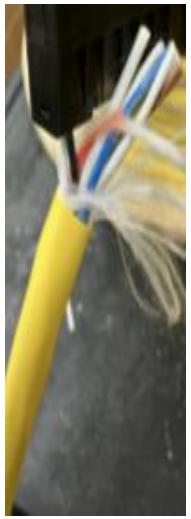


- The NEXT chart shows the worst-case result between $NEXT_{AC}$ and $NEXT_{BD}$ for each connector type.
- The FEXT chart shows the worst-case result between $FEXT_{AD}$ and $FEXT_{BC}$ for each connector type.

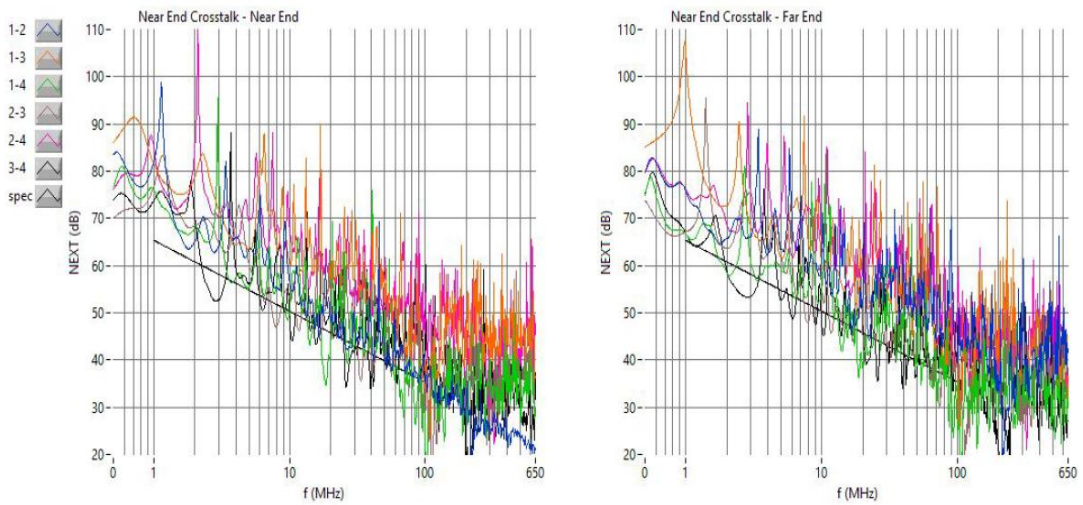




100-meter FMP 4-Pair Unshielded Cable (AWG16) Crosstalk



Near End Cross Talk



ACRF

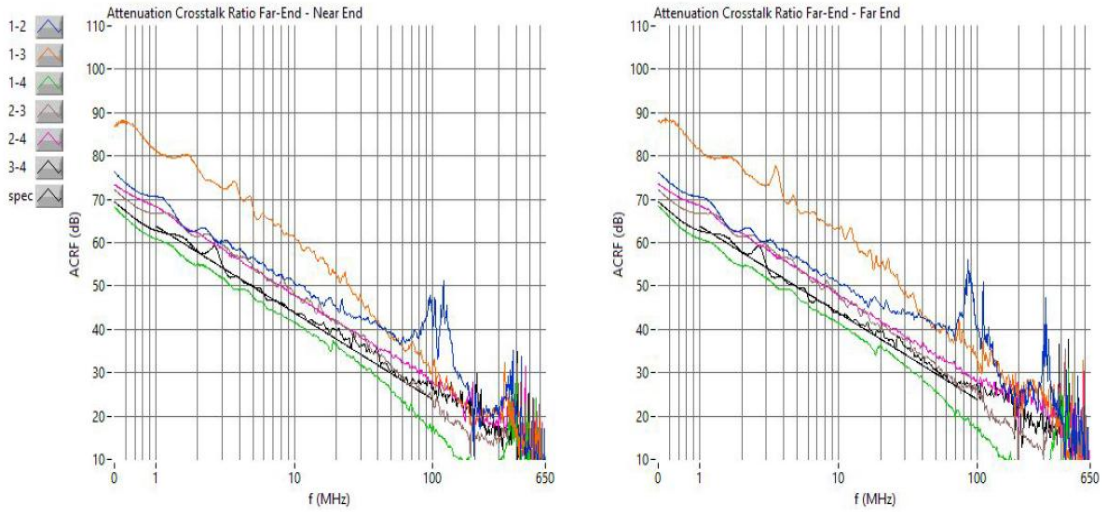


Table 6 - Near End Crosstalk Minimum Margins

NEXT min margin	pair 1 to 2 (dB / MHz)	pair 1 to 3	pair 1 to 4	pair 2 to 3	pair 2 to 4	pair 3 to 4
@Near End	-2.50 / 16.48	-1.29 / 98.97	-14.90 / 100.00	-7.64 / 95.48	3.15 / 82.73	-9.72 / 26.03
@Far End	-1.15 / 16.63	-1.76 / 100.00	-12.10 / 92.95	-7.07 / 73.63	2.29 / 96.34	-8.74 / 25.80

The NEXT requirement is 35.3-15log(f/100) dB from 1 MHz to 100 MHz.

Table 7 - ACRF Minimum Margins

ACRF min margin	pair 1 to 2 (dB / MHz)	pair 1 to 3	pair 1 to 4	pair 2 to 3	pair 2 to 4	pair 3 to 4
@Near End	3.60 / 1.68	5.75 / 97.21	-7.52 / 92.12	-0.34 / 69.77	3.09 / 40.39	-1.12 / 3.40
@Far End	3.71 / 1.71	9.18 / 98.97	-7.34 / 69.15	-1.04 / 75.64	3.62 / 90.49	-1.50 / 6.37

If *FEXT* loss is greater than 90 dB, *ACRF* loss may not be calculated.
The 90dB exclusion criteria was NOT MET for this sample.

The ACRF requirement is 23.8-20log(f/100) dB from 1 MHz to 100 MHz.

Crosstalk performance may become a limiting factor for 100BASE-T1L operation.

Consensus Needed

- Testing indicates that some unshielded FMP cable implementations may be capable of delivering power but do not provide adequate performance to reliably support SPE data transmission.

- Is support for both 10BASE-T1L and 100BASE-T1L required?
  - Supporting both speeds may drive more stringent channel performance requirements.
  - Supporting only 10BASE-T1L could provide greater implementation flexibility.

- Should link segment modeling begin with the worst-case power channel deployment scenario?