

Channel Insertion Loss

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IL Channel Equation

- ▶ IL equations for PCB, Link Segment (Cable, In-lines) , MDI Connector
- ▶ IL Channel Loss w/Isola FR408 PCB material
- ▶ IL Channel Loss w/Isola 370HR PCB material
- ▶ IL Channel Loss plot comparison

IL Equations

$$IL_{PCBFR408} = 0.18\sqrt{f(GHz)} + 0.0559f(GHz) \text{ dB/in}$$

$$IL_{PCB370HR} = 0.18\sqrt{f(GHz)} + 0.1138f(GHz) \text{ dB/in}$$

$$IL_{MDI} = 0.1\sqrt{f(GHz)} \text{ dB}$$

$$IL_{Inline} = 0.25\sqrt{f(GHz)} \text{ dB}$$

$$IL_{Cable} = 2.92 * 10^{-5}\sqrt{f(Hz)} + 9.8 * 10^{-11}f(Hz) \text{ dB/m}$$

$$IL_{LinkSegment} = 0.002f(MHz) + 0.68f^{0.45}(MHz)$$

IL Channel loss w/FR408 PCB material

PHY	Baud (M)	Bandwidth (MHz)	PCB Loss (dB)	IEEE Link Segment Loss (dB)	MDI header Loss (dB)	Total Loss (dB)
2.5GBASE-T1	1406.25	703.125	-0.8561	-14.3982	-0.0839	-16.2780
5GBASE-T1	2812.5	1406.25	-1.3143	-20.5600	-0.1186	-23.4257
10GBASE-T1	5625	2812.5	-2.0659	-29.8688	-0.1677	-34.3360

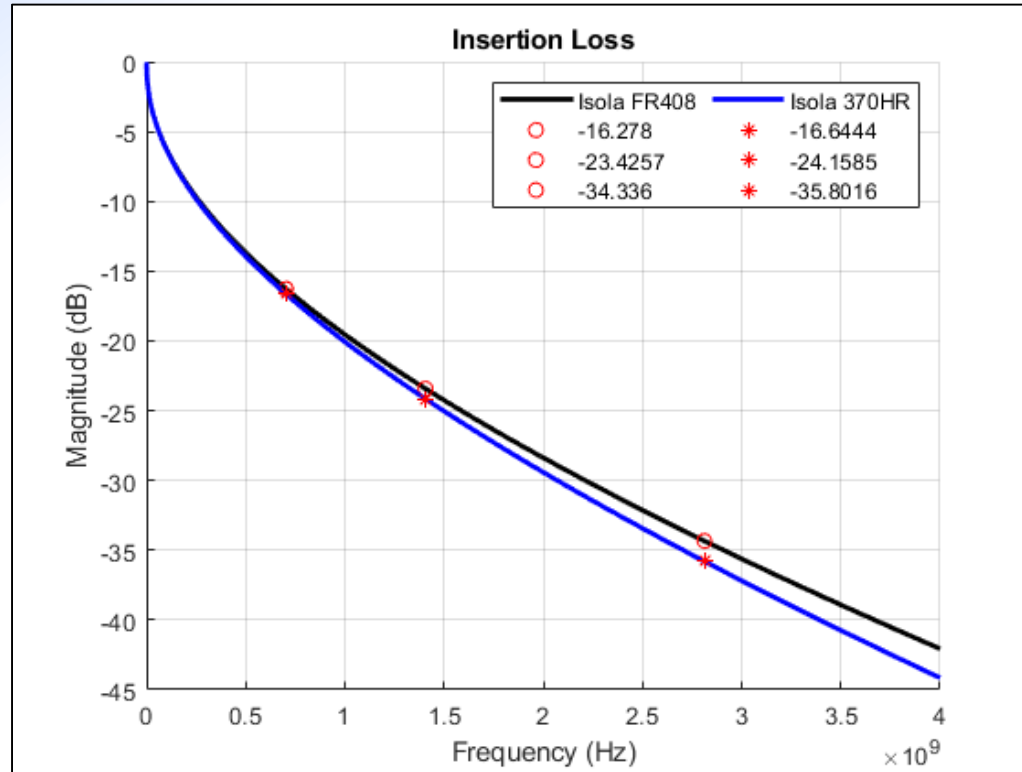
- ▶ Link Segment= 15m + 4 Inlines
- ▶ PCB Trace Length = 4.5in
- ▶ PCB Material = Isola FR408

IL Channel loss w/370HR PCB material

PHY	Baud (M)	Bandwidth (MHz)	PCB Loss (dB)	IEEE Link Segment Loss (dB)	MDI header Loss (dB)	Total Loss (dB)
2.5GBASE-T1	1406.25	703.125	-1.0393	-14.3982	-0.0839	-16.6444
5GBASE-T1	2812.5	1406.25	-1.6807	-20.5600	-0.1186	-24.1585
10GBASE-T1	5625	2812.5	-2.7987	-29.8688	-0.1677	-35.8016

- ▶ Link Segment= 15m + 4 Inlines
- ▶ PCB Trace Length = 4.5in
- ▶ PCB Material = Isola 370HR

IL Channel Loss Plot



Questions / Discussion

