
802.3cy link segment insertion loss

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Status summary

- Summary of results and thoughts in [DiBiaso et al 3cy adhoc 01a 04 20 21.pdf](#) including a suggesting for the link segment IL up to 7 GHz as follows:

$$IL \leq 1.325 \times \left(\frac{6.5}{15}\right) \times (0.002f + 0.68f^{0.45})dB, \quad f \text{ in MHz}$$

- Formula presented by Chris Diminico shows some anomalies at very low frequencies due to the roll-of term included.
- Suggest to improve the formula's slope to better represent the IL variation over temperature, which is currently covered by a constant factor $1.325 \times \left(\frac{6.5}{15}\right)$, while temperature mainly affects resistive loss and add a term for roll-off that follows the proposed slope.

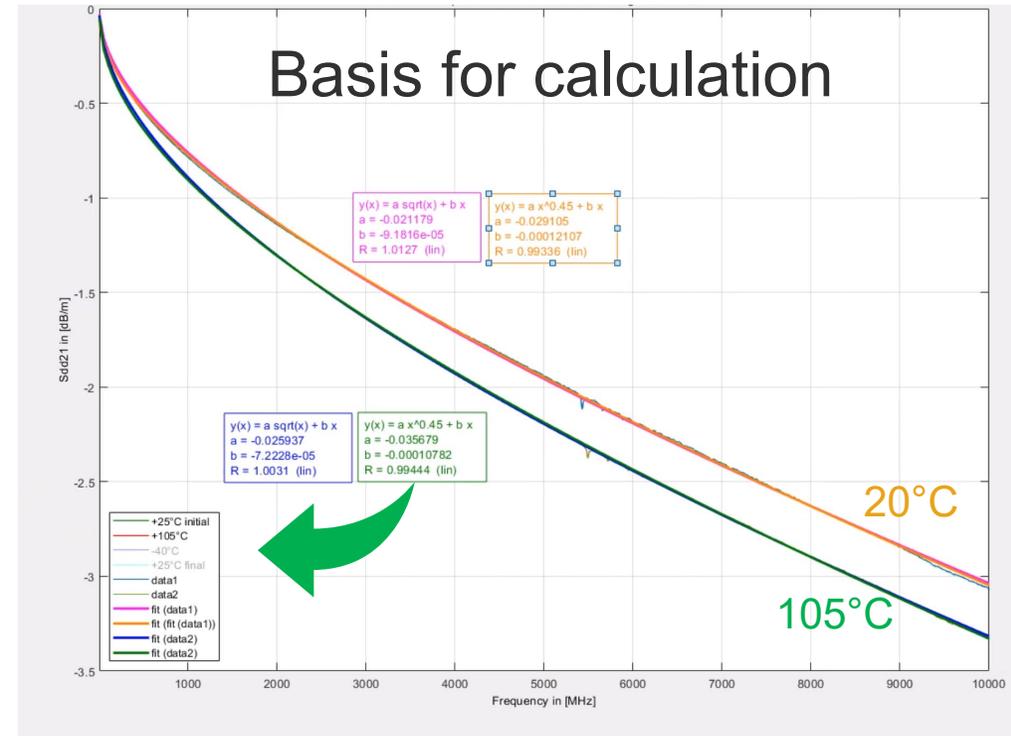
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Measured data and formula explanation

- IL in dB/m for a representative SPP cable AWG26 at room temperature and 105°C
- Fit of the IL curve by formula with $f^{0.45}$

$$IL \leq 11 * 1.15 \times \left(0.00010782f + 0.035679 \times \sqrt{\left(\frac{0.14}{0.22}\right)} \times f^{0.45} \right) + \frac{0.5 \times f^6}{7500^6} \text{ dB}$$

11 m length ageing & connectors gauge difference roll-off



Simplified formula

$$Insertion\ loss(f) \leq 0.001364f + 0.36 \times f^{0.45} + 0.5 \left(\frac{f}{7500} \right)^6 \text{ (dB)}$$

where f is the frequency in MHz; $10 \leq f \leq 9000$

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802.3cy link segment insertion loss proposal

- Scaling to 29 dB as proposed by Chris Diminico.

$$\text{Insertion loss}(f) \leq 0.00135f + 0.3564 \times f^{0.45} + 0.495 \left(\frac{f}{7500} \right)^6 \text{ (dB)}$$

where f is the frequency in MHz; $10 \leq f \leq 9000$



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Summary

- Suggest to consider the link segment insertion loss as follows:

$$\text{Insertion loss}(f) \leq 0.00135f + 0.3564 \times f^{0.45} + 0.495 \left(\frac{f}{7500} \right)^6 \text{ (dB)}$$

where f is the frequency in MHz; $10 \leq f \leq 9000$

- Representative for an 11 m link segment with 2 inline connectors based on AWG 24, where around 5 m are exposed to high temperature with some margin for ageing over lifetime.
- Roll-off above 7 GHz follows the suggestion of Chris Diminico.