

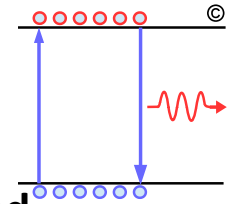
Clause 137 Channel Insertion Loss

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IEEE 802.3bs Task Force Meeting

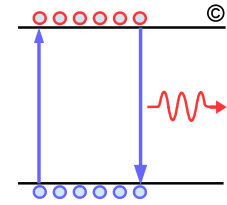
Nov 7th, 2016

Overview

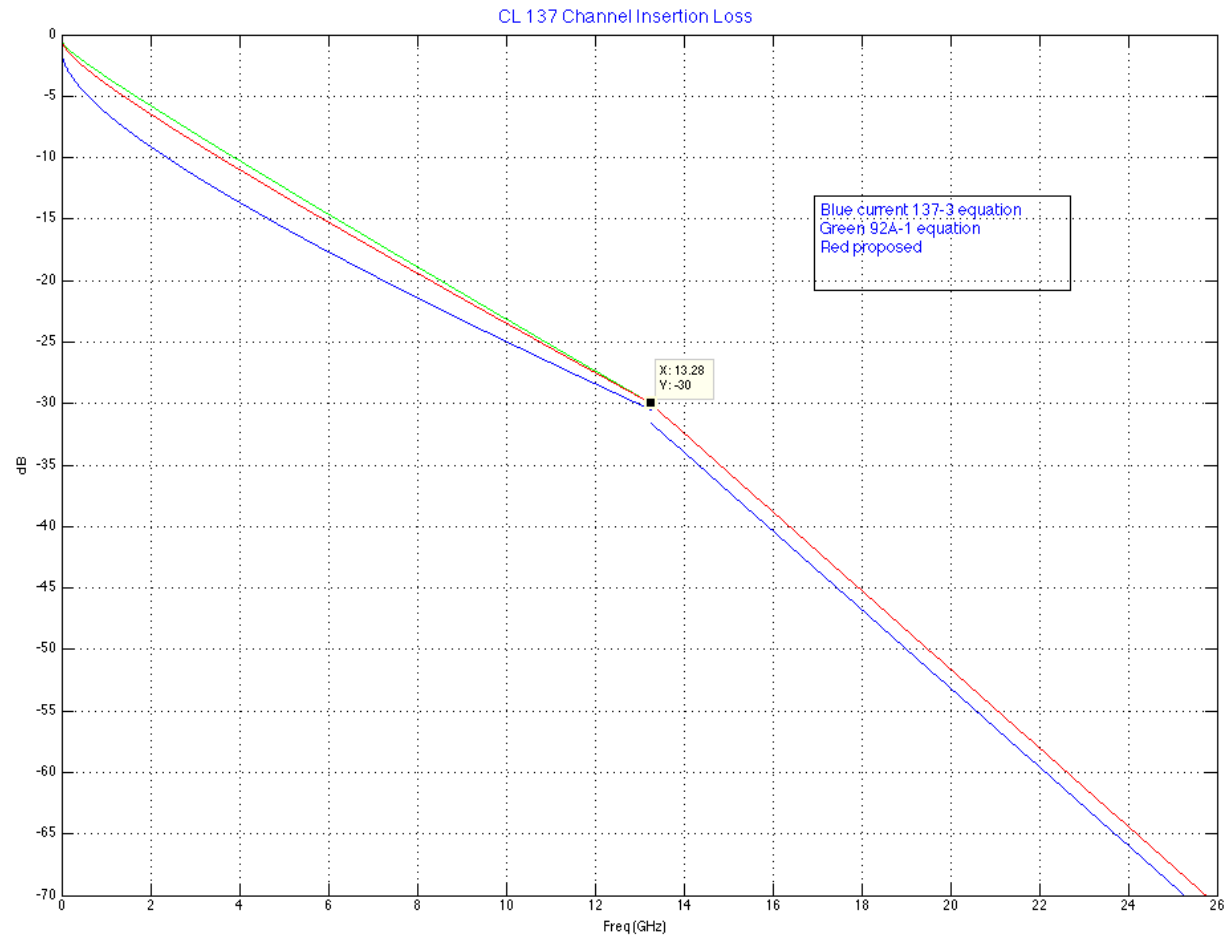


- ❑ **Current clause 137 PMD sublayer for type 50GBASE-KR, 100GBASE-KR2, and 200GBASE-KR4 has very strong \sqrt{f} response**
 - The recommended channel response has 750% stronger \sqrt{f} than clause 92A
- ❑ **To better fit material lower loss than Megtron 6 should increase \sqrt{f} coefficient of clause 92 A but there is no reason to increase the coefficient by 7.5x**
- ❑ **In support of comment 122 which proposes to increase the \sqrt{f} coefficient by ~2.2x compare to CL92A.**

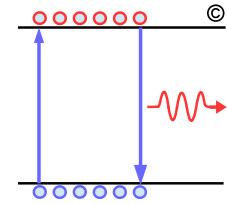
Clause 137 Channel Response



□ In comparisons to clause 92A and proposed response



Different Channel Responses



- **Clause 92A, equation 92A-1 dominated by linear f loss**

$$IL_{PCB} \leq 0.5 \left(0.0694 + 0.4248 \times \sqrt{f} + 0.9322 \times f \right) \text{ (dB) for } 0.01 \leq f \leq 19 \text{ GHz}$$

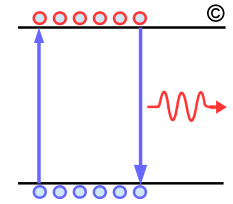
- **Clause 137, equation 137-1 is strongly dominated by \sqrt{f}**

$$IL_{PCB} \leq \begin{cases} 1.3 + 3.9\sqrt{f} + 1.13 \times f & \text{for } 0.01 \leq f \leq fb \\ -10.89 + 3.2 \times f & \text{for } fb \leq f \leq fb \end{cases} \text{ (dB)}$$

- **Proposed channel response has more f domination than equation 92A-1 to better fit lower loss dielectric material**

$$IL_{PCB} \leq \begin{cases} 0.4842 + 1.744\sqrt{f} + 1.744 \times f & \text{for } 0.01 \leq f \leq fb \\ -12.44 + 3.2 \times f & \text{for } fb \leq f \leq fb \end{cases} \text{ (dB)}$$

Summary



- ❑ **Equation 137-1 does not represent any common implementation of low loss PCB**
 - Response similar to equation 137-1 can be constructed naked microstrip on Rogers material or from cable
 - Equation 137-1 \sqrt{f} response is increased by 7.5x from equation 92A-1
- ❑ **The suggested modification increases equation 137-1 \sqrt{f} response by 2.2x in comparison to equation 92A-1 to better fit lower loss PCB material.**