

Adopted Link Segment Specifications

George Zimmerman / CME Consulting, Inc.

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Insertion Loss (March 2023)

Insertion loss limit on slide 4 of graber_3dg_02_03152023.pdf

$$IL(f) = \left(5.42 \times \sqrt{f} + 0.044 \times f + \frac{1.76}{\sqrt{f}} \right) + 5 \times 0.02 \times \sqrt{f} \text{ with } 0.1 \text{ MHz} \leq f \leq 60 \text{ MHz}$$

Return loss limit on slide 13 of graber_3dg_01_03152023.pdf

$$RL[dB] = \begin{cases} 9 + 8 \cdot f & \text{for } 0.1 \text{ MHz} \leq f < 0.5 \text{ MHz} \\ 13 & \text{for } 0.5 \text{ MHz} \leq f < 20 \text{ MHz} \\ 13 - 10 \cdot \log_{10} \left(\frac{f}{20} \right) & \text{for } 20 \text{ MHz} \leq f \leq 60 \text{ MHz} \end{cases}$$

PSANEXT & PSAACR-F (July 2023)

PSANEXT:	$50 + 5 \times N$	$0.1 \leq f < 10 \text{ MHz}$
	$50 + 5 \times N - 15 \times \log_{10}(f/10)$	$10 \leq f \leq 60 \text{ MHz}$

PSAACRF:	$50 + 5 \times N$	$0.1 \leq f < 2 \text{ MHz}$
	$36 + 5 \times N - 20 \times \log_{10}(f/10)$	$2 \leq f \leq 60 \text{ MHz}$

With N =	0	for $IL_{20} < 16 \text{ dB}$
	$0.5 \times (IL_{20} - 16)$	for $16 \leq IL_{20} < 18 \text{ dB}$
	1	for $18 \leq IL_{20} < 21 \text{ dB}$
	$1 + 0.5 \times (IL_{20} - 21)$	for $21 \leq IL_{20} < 23 \text{ dB}$
	2	for $23 \leq IL_{20} \text{ (dB)}$

(f is in MHz)

Delay (May 2023)

The dg link segment delay requirement shall be 3500 ns
(note – this allows a 14 AWG cable with maximum IL to be used).

(note 10BASE-T1L used 8834ns at 1589m, so this is 630m same conditions)

TCL (July 2023)

TCL limit for link segments using shielded cabling (note – this does not apply to link segments using unshielded cabling):

$\text{TCL} = 30 \text{ dB}$ for $0.1 \text{ MHz} \leq f < 5 \text{ MHz}$

$\text{TCL} = 30 - 10 * \log_{10}(f / 5)$ for $5 \text{ MHz} \leq f \leq 60 \text{ MHz}$

(f is in MHz)