1.1 Fitted insertion loss

The fitted insertion loss IL_{fitted} as a function of frequency f is defined in Equation (1).

$$IL_{fitted}(f) = a_1\sqrt{f} + a_2 f + a_4 f^2 \text{ dB} \tag{1}$$

Given the cable assembly insertion loss IL measured between TP1 and TP4 over N frequencies f_n spanning 50 MHz to 7500 MHz, the coefficients of the fitted insertion loss shall be calculated as follows.

Define the frequency matrix F as shown in Equation (2).

$$F = \begin{bmatrix} \sqrt{f_1} & f_1 & f_1^2 \\ \sqrt{f_2} & f_2 & f_2^2 \\ \vdots & \vdots & \vdots \\ \sqrt{f_N} & f_N & f_N^2 \end{bmatrix} \tag{2}$$

The polynomial coefficients a_1, a_2, and a_4 shall be calculated as shown in Equation (3).

$$\begin{bmatrix} a_1 \\ a_2 \\ a_4 \end{bmatrix} = (F^T F)^{-1} F^T IL \tag{3}$$

In Equation (3), "T" denotes the matrix transpose operator and IL is a column vector of the measured insertion loss values, IL_n at each frequency f_n.

The cable assembly insertion loss shall satisfy the requirements defined in Table 1. The fitted insertion loss corresponding to the maximum insertion loss at 5.15625 GHz and the maximum allowed values of a_1 , a_2, and a_4 is illustrated in Figure 1.

Table 1 - Cable assembly insertion loss characteristics

Parameter	Condition	Units	Value
Insertion loss at 5.15625 GHz	Max.	dB	17.04
Fitted insertion loss, a_1	Max.	dB/root-GHz	6.0
Fitted insertion loss, a_2	Max.	dB/GHz	1.0
Fitted insertion loss, a_4	Max.	dB/GHz^2	0.08
Note – The limit on the insertion loss at 5.15625 GHz prevents the coefficients a_1, a_2, and a_4 from having the maximum allowed values simultaneously.			

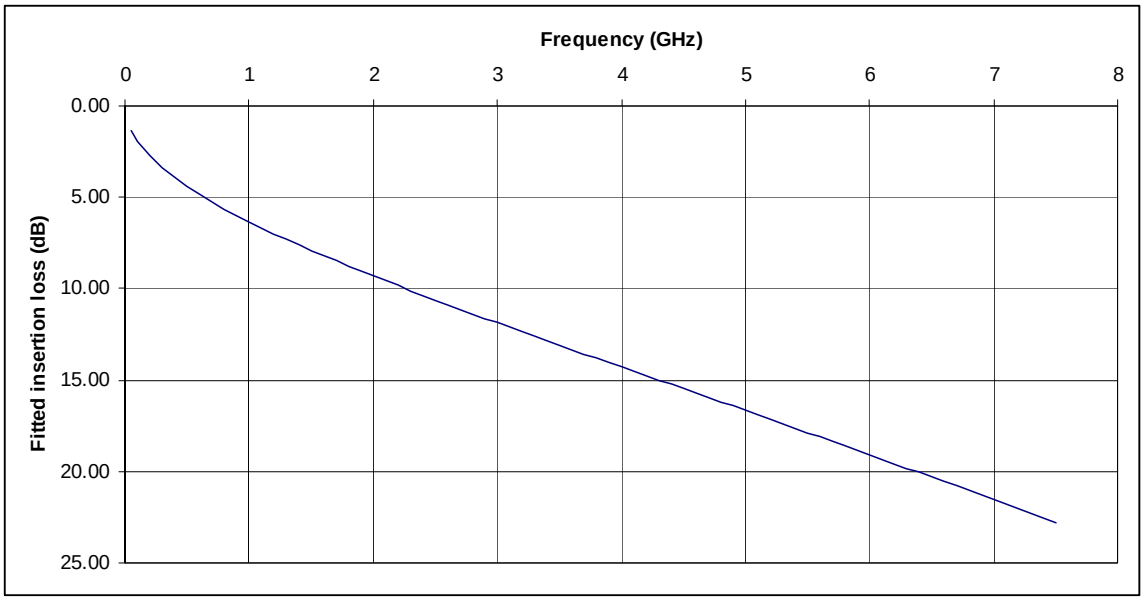

Figure 1 - Illustration of fitted insertion loss

1.2 Insertion loss deviation

The insertion loss deviation *ILD* is the difference between the measured insertion *IL* and the fitted insertion loss IL_{fitted} as defined in Equation (4).

$$ILD(f) = IL(f) - IL_{fitted}(f) \tag{4}$$

The *ILD* shall be within the region defined by Equation (5) and Equation (6) for all frequencies from 50 MHz to 7500 MHz.

$$ILD(f) \geq ILD_{\min}(f) = -0.7 - 0.0002\,f \text{ dB} \tag{5}$$

$$ILD(f) \leq ILD_{\max}(f) = 0.7 + 0.0002\,f \text{ dB} \tag{6}$$

1.3 Justification for proposed requirements (NOT FOR INCLUSION IN THE DRAFT)