

Annex XXX

(informative)

TX Function to RX function channel characteristics

XXX.1 Overview

Annex XXX provides information on insertion loss and return loss parameters of the channel defined between TX function and RX function illustrated in Figure xxx.

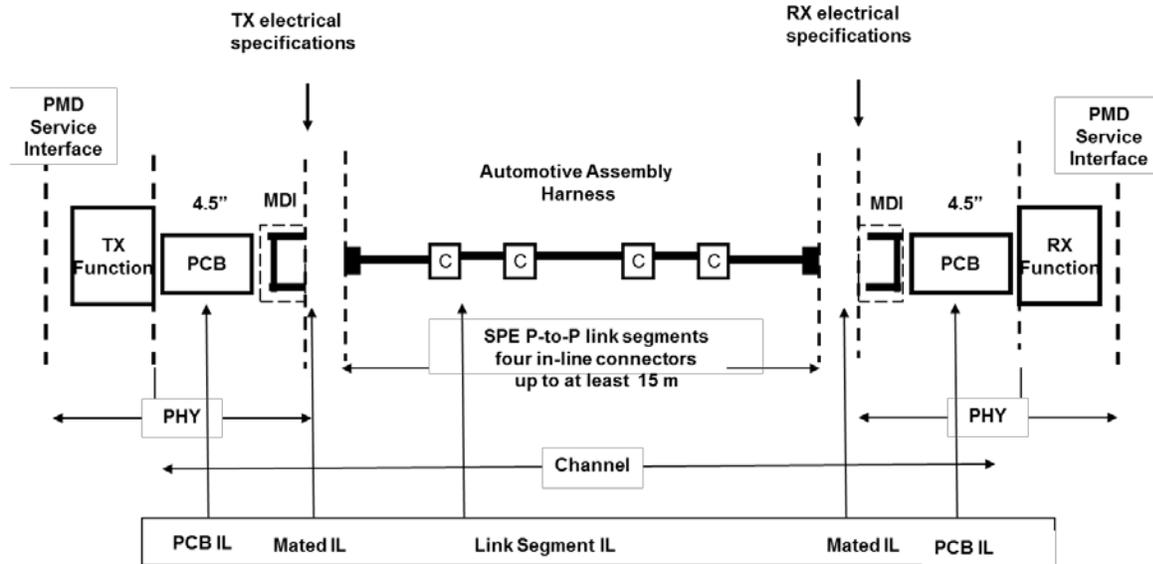


Figure 1– Channel TX function to RX function

XXX.1 Differential printed circuit board trace loss

The recommended maximum and minimum printed circuit board trace insertion losses are specified in Equation (1) and Equation (2), respectively.

$$PCBIL_{dB/4.5in} = (0.18\sqrt{f/10^3} + 0.1138\sqrt{f/10^3}) \cdot 4.5 \quad (1)$$

$$PCBIL_{dB/1in} = (0.18\sqrt{f/10^3} + 0.1138\sqrt{f/10^3}) \cdot 1 \quad (2)$$

Where f is the frequency in MHz $1 \leq f \leq F_{max}$

$$F_{max} = 4000 \cdot S$$

See Table 149–1 for definition of S.

XXX.2 Channel insertion loss

This subclause provides information on channel insertion losses for the maximum-loss channel topology. The maximum channel insertion loss is determined using Equation (3).

$$IL_{channelMax} = (2 * PCBIL_{dB/4.5in} + 2 * IL_{MDI} + IL_{LinkSegment}) \quad (3)$$

where

$$IL_{MDI} = (0.1\sqrt{f/10^3}) \quad (4)$$

$$IL_{LinkSegment} = (0.002 * f + 0.68 * f^{0.45}) \quad (5)$$

f is the frequency in MHz $1 \leq f \leq F_{max}$

$F_{max} = 4000 * S$

See Table 149–1 for definition of S.

The 2.5GBASE-T1, 5GBASE-T1, and 10GBASE-T1 PHYs utilize four level Pulse Amplitude Modulation (PAM4) transmitted at 1406.25 MBd, 2812.5 MBd, and 5625 MBd rates, respectively. The channel insertion loss values are given in Table at .5*MBd for each PHY type.

PHY	MBd	Bandwidth (MHz)	PCB Loss (dB)	IEEE Link Segment Loss (dB)	MDI Loss (dB)	Channel 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

Table 2– Channel insertion loss for each PHY type