Proposal for Mated Test Fixture Performance

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Related to comments #459, #460, #461, #462, #463, #464, and #465

Motivation

- Get rid of TBDs in D1P3, Annex 179B

Comment #459 (and #212)

- Propose to replace the TBD with “0.15”

The FOM_{ILD} is calculated according to 93A.4 with f_b = 106.25 GHz, T_t = 6 ps, and f_r = 0.55 × f_b. The fitted insertion loss and insertion loss deviation are computed over the range f_{min} = 0.05 GHz to f_{max} = 67 GHz. FOM_{ILD} shall be less than or equal to TBD dB.

Comment #460 (and #214, #49)

- Propose to replace the TBD with “Table 179-18”
  - Aligned with the format of previous projects
- *Alternatively, “Table 93A-4”*
  - *Per Comment #49*

179B.4.2 Mated test fixtures effective return loss (ERL)

The values of the mated test fixtures ERL are computed using the procedure in 93A.5 with the parameter values in Table 179B–1. Parameters that do not appear in Table 179B–1 take values from Table TBD.

The reference differential impedance for the mated test fixtures ERL computation shall be 92.5 Ω. The mated test fixtures ERL shall be greater than or equal to 10.3 dB.

Table 179B–1—Mated test fixtures ERL parameter values

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.005	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	1600	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Time-gated propagation delay	T_{fx}	0	ns
Tukey window flag	tw	1	—
Target detector error ratio	DER_0	2×10^{-5}	—
NOTE—The mated test fixtures test connector and transmission line are not time-gated (by setting T_{fx} to 0) in order to include the entire test fixture.			

Comment #463

- To compute ERL with a reference differential impedance of 92.5 Ω, the parameter “Z_t” must be set to “46.25”

179B.4.2 Mated test fixtures effective return loss (ERL)

The values of the mated test fixtures ERL are computed using the procedure in 93A.5 with the parameter values in Table 179B–1. Parameters that do not appear in Table 179B–1 take values from Table TBD.

The reference differential impedance for the mated test fixtures ERL computation shall be 92.5 Ω. The mated test fixtures ERL shall be greater than or equal to 10.3 dB.

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Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	1600	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Time-gated propagation delay	T_{gx}	0	ns
Tukey window flag	tw	1	—
Target detector error ratio	DER_0	2×10^{-5}	—
NOTE—The mated test fixtures test connector and transmission line are not time-gated (by setting T_{gx} to 0) in order to include the entire test fixture.			

Comment #463 – Z_t

```
8879    % added default to support multiple packages
8880 -  param.C_v = xls_parameter(parameter, 'C_v', true,0)*1e-9; % C_v in nF (via cap)  (single sided)
8881 -  param.R_diepad = xls_parameter(parameter, 'R_d', true, [50,50]); % Die source termination resistance  (single sided)
8882 -  param.Z_t = xls_parameter(parameter, 'Z_t', true,50); %  single sided source termination reference resistance for TDR and ERL
8883 -  param.TR_TDR = xls_parameter(parameter, 'TR_TDR', true , 8e-3); %  Gaussian shaped transition time for TDR source in ns
```

Comment #465 (and #454, #217, #52)

- Adjust the aggressor rise/fall time in Table179B-2 to match the aggressor rise/fall time in Table 179B-4
  - "4.25ps"
- *Alternatively, "4"*
  - *Per Comment #52*
- *Alternatively, "6"*
  - *Per Comment #217*

Table 179B–2—SFP224 mated test fixtures integrated near-end crosstalk noise parameters

Description	Symbol	Value	Units
Symbol rate	f_b	106.25	GBd
3 dB reference receiver bandwidth	f_r	58. 4375	GHz
Near-end disturber peak differential output amplitude	A_{nt}	600	mV
Near-end disturber 20% to 80% rise and fall times	T_{nt}	6	ps

Table 179B–4—Multi-lane mated test fixtures integrated crosstalk noise parameters

Description	Symbol	Value	Units
Symbol rate	f_b	106.25	GBd
3 dB reference receiver bandwidth	f_r	58.4375	GHz
Near-end disturber peak differential output amplitude	A_{nt}	600	mV
Far-end disturber peak differential output amplitude	A_{ft}	600	mV
Near-end disturber 20% to 80% rise and fall times	T_{nt}	4.25	ps
Far-end disturber 20% to 80% rise and fall times	T_{ft}	4.25	ps

Comment #461 and #462(and #454)

- With the assumptions in Table 179B-4, propose replace the TBDs as shown “below“

Table 179B–4—Multi-lane mated test fixtures integrated crosstalk noise parameters

Description	Symbol	Value	Units
Symbol rate	f_b	106.25	GBd
3 dB reference receiver bandwidth	f_r	58.4375	GHz
Near-end disturber peak differential output amplitude	A_{nt}	600	mV
Far-end disturber peak differential output amplitude	A_{ft}	600	mV
Near-end disturber 20% to 80% rise and fall times	T_{nt}	4.25	ps
Far-end disturber 20% to 80% rise and fall times	T_{ft}	4.25	ps

Table 179B–3—SFP224 mated test fixtures integrated near-end crosstalk noise voltage

“1.6”

Parameter	Value	Units
Integrated near-end crosstalk noise voltage	Less than TBD	mV

Table 179B–5—Multi-lane mated test fixtures integrated crosstalk noise

“4.2”

“1.5”

“4.4”

Parameters	Value	Units
MDFEXT integrated crosstalk noise voltage	less than TBD	mV
MDNEXT integrated crosstalk noise voltage	less than TBD	mV
Total integrated crosstalk noise voltage	less than TBD	mV

Comment #464 (and #529)

- Fix the broken equation

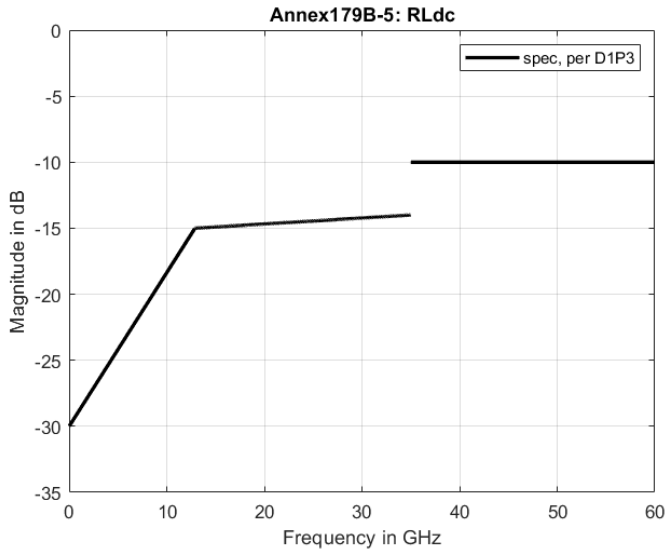
$$RLdc(f) \geq \begin{cases} 30 - 15\frac{f}{12.89} & 0.01 \leq f < 12.89 \\ 15 - 5\frac{f - 12.89}{35 - 12.89} & 12.89 \leq f < 35 \\ 10 & 35 \leq f \leq 60 \end{cases}$$

$$RLdc(f) \geq \begin{cases} 30 - 15\frac{f}{12.89} & 0.01 \leq f < 12.89 \\ 15 - \frac{f - 12.89}{35 - 12.89} & 12.89 \leq f < 35 \\ 10 & 35 \leq f \leq 60 \end{cases} \quad (179B\text{–}8)$$

where

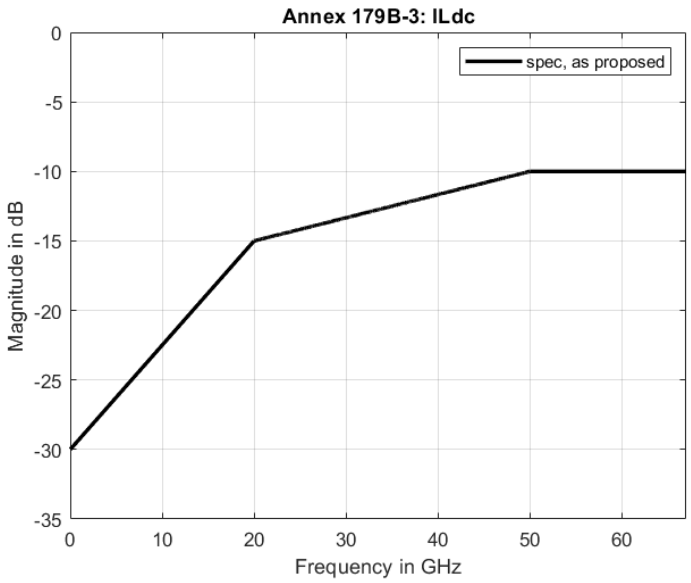
$RLdc(f)$ is the common-mode to differential-mode return loss in dB at frequency f

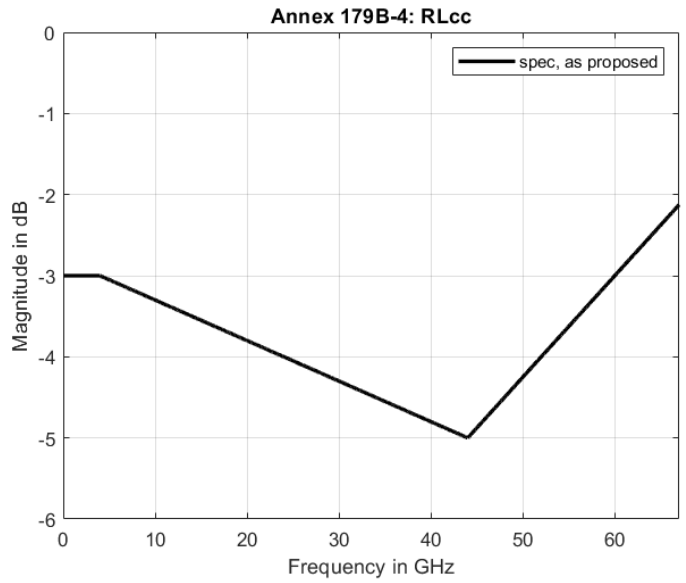
f is the frequency in GHz

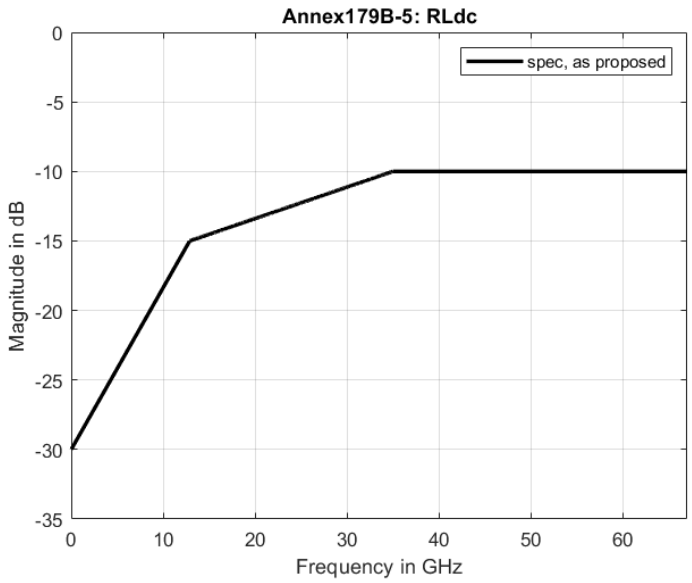


Comment #464 (and #529)

- With other parameters in Annex179B requiring 67GHz bandwidth, extended equations 179B-6,7,8 to 67GHz is reasonable







Comment #464 (and #529)

$$ILdc(f) \geq \begin{cases} 30 - 15\frac{f}{20} & 0.01 \leq f < 20 \\ 15 - 5\frac{f-20}{30} & 20 \leq f < 50 \\ 10 & 50 \leq f \leq 67 \end{cases}$$

$$RLcc(f) \geq \begin{cases} 3 & 0.05 \leq f < 4 \\ 3 + \frac{2}{40}(f-4) & 4 \leq f < 44 \\ 5 + \frac{2}{16}(44-f) & 44 \leq f \leq 67 \end{cases}$$

$$RLdc(f) \geq \begin{cases} 30 - 15\frac{f}{12.89} & 0.01 \leq f < 12.89 \\ 15 - 5\frac{f-12.89}{35-12.89} & 12.89 \leq f < 35 \\ 10 & 35 \leq f \leq 67 \end{cases}$$