Comment discussion: KR Test Fixtures

Howard Heck

IEEE P802.3ck Task Force

June 30,2020

Comments (Full Text)

CommentID	CommenterName	CommenterCo	Clause	Subclause	Page	Line	CommentType	Comment	SuggestedRemedy
31	Wu, Mau-Lin	Mediatek	163	163.9.1.2	178	52	T	The insertion loss of TP0a test fixture is still keep as between 1.2 dB and 1.6 dB at 26.56 GHz. It may be critial for the state-of-art PCB technology to achieve this small IL value.	Propose to change '1.2 dB and 1.6 dB at 26.56 GHz' to '2.4 dB and 3.2 dB at 26.56 GHz'.
33	Ben Artsi, Liav	Marvell Technology	163	163.9.1	177	26	T	TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.	Measurement to be done at a newly defined TP0v which may vary according to implementation. A presentation will be provided with details, parameters values and method.
34	Ben Artsi, Liav	Marvell Technology	163	163.9.1.2	178	47	T	A reference TP0 - TP0a test fixture is specified while its loss values are not practical.	Specify a more feasible reference TP0 to TP0a specification alongside informative parameters for reference in TP0a. Specify an additional test fixture range of TP0 - TP0v Loss at ~26.56GHz = 5dB ; ILD = 0.2dB ; ERL. A presentation is to be provided with the actual suggestion
35	Ben Artsi, Liav	Marvell Technology	163	163.9.2.2	179	27	T	The Rx test fixture definition is extremely hard to achieve, if even possible and anyhow embedded as part of the interconnect when used for the interference tolerance test. Thus, should allow a higher max loss for Rx test fixture.	Recommend increasing loss limits to a minimum of 3 and max of 4dB at 26.56GHz with ILD=0.2dB
153	Ran, Adee	Intel	163	163.9.1.2	178	52	T	(Cross-clause) The test feature normative insertion loss requirements are not realistic for real devices, especially with multiple lanes. Also, as presented in http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf, the variations allowed within the recommendations create significant variations in results of compliance parameters. This is obvisouly not a viable methodology anymore. It is suggested to replace the test fixture requirements with an explicit equation describing s-parameters of a transmission line with 4 dB IL (using equation 93A–14 with appropriate parameters) such that TP0a is well-defined, and create informative specifications at this TP0a. Alternatively, informative specifications can be given at TP0. Normaitve requirements should use a new methodology based on measued or extracted test fixture s-parameters. Also applies to Annex 120F.	Reference: http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf A presentation with more details will be provided.
154	Ran, Adee	Intel	163	163.9.1.2	179	48	T	The reference return loss requirements have questionable value or justification, the RL specifications have been replaced by ERL. The ERL calculation practically excludes the test fixture effect.	Delete the content from "The differential return loss of the test fixture" to the end of 163.9.1.2.

Comment Summary

| C#	Summary	Notes
31	Increase the TP0-TP0a IL to 2.4 – 3.2 dB @ 26.56 GHz	Current: 1.2-2.4 dB
33	Define new measurement point TP0v, which may vary with implementation.	
34	Specify TP0-TP0v: IL=5 dB @ 26.56 GHz w/ ILD=0.2 dB & specify informative parameters @ TP0a.	http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf
153	Replace test fixture normative requirements with equation-based S-parameters for a 4 dB fixture transmission line & create informative specs @ TP0a. Use new methodology to specify normative requirements.	
154	Eliminate test fixture return loss requirement	
35	Increase loss for Rx test fixture to 3 – 4 dB @ 26.56 GHz with ILD = 0.2 dB.	

Test Points

- Spec
  - TP0 @ Package ball; TP0a: text fixture
  - 163.9.1.2 specifies range 1.2 – 1.6 dB
  - Effects of differences between test fixture IL & ref IL are to be accounted for in measurement

- Proposals
  - C#31: Change IL range to 2.4 – 3.2 dB @ 26.56 GHz
  - C#33 & #34: Specify TP0v with IL = 5 dB @ 26.56 GHz and ILD = 0.2dB. Keep informative TP0a specifications.
    http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf
  - C#153: Specify S-parameters for 4dB fixture transmission line, along the lines of Equation 93a-14.

$$IL_{ref}(f) - 0.0037 + 0.1052\sqrt{f} + 0.0337f, \qquad 0.05 \le f \le 53.125$$

1.44 dB @ 25.56 GHz
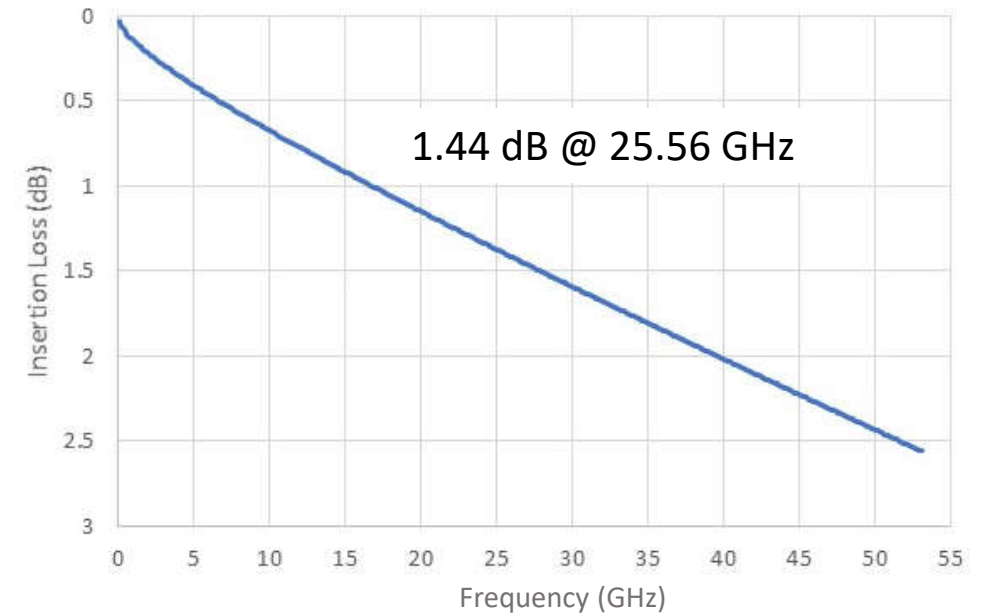
TP0v Methodology Proposal

Problem statement

❑ As presented in mellitz_3ck_01a_0120
  ("Practical Device Test Fixtures for 100G KR ... or Not and the Impact on ERL and P max /V f")
  • Test fixtures introduce offset and variability
  • Accounting for practical test fixture variability test dwarfs the limit we would want set
  • Recommend: Specify transmitter at a TP0 and receiver at TP5

Enabling implementation-dependent test fixture
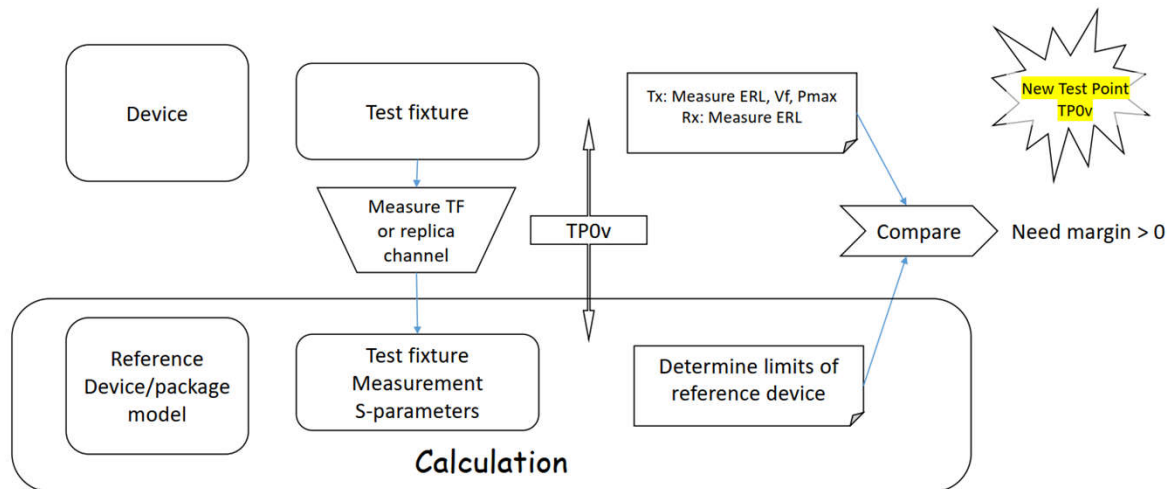
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf

Proposed new Methodology

❑ Measure TP0-TP0v channel (or replica) for the device/lane under test

❑ Concatenate Tr filter, Tx reference device and package model, and B-T measurement filter (same equations used in COM)

❑ Using the concatenated channel, calculate an output pulse response (with minimum A_v) and TDR at TP0v, with ideal termination

❑ Calculate Vf, Vpeak/Vf, and ERL
  • The results are the expected parameters of the reference Tx at this TP0v
  • This is the bar that the DUT should be compared to!

❑ Now measure Vf, Vpeak, and ERL of the DUT at TP0v using existing method

❑ Margin from the calculated reference values ➜ pass/fail