

ERL Comment Update with New Data for Tx Hosts

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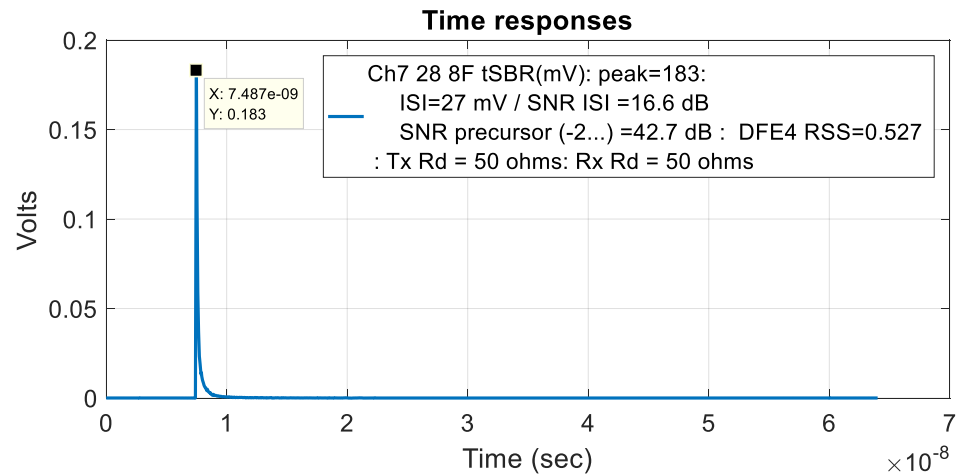
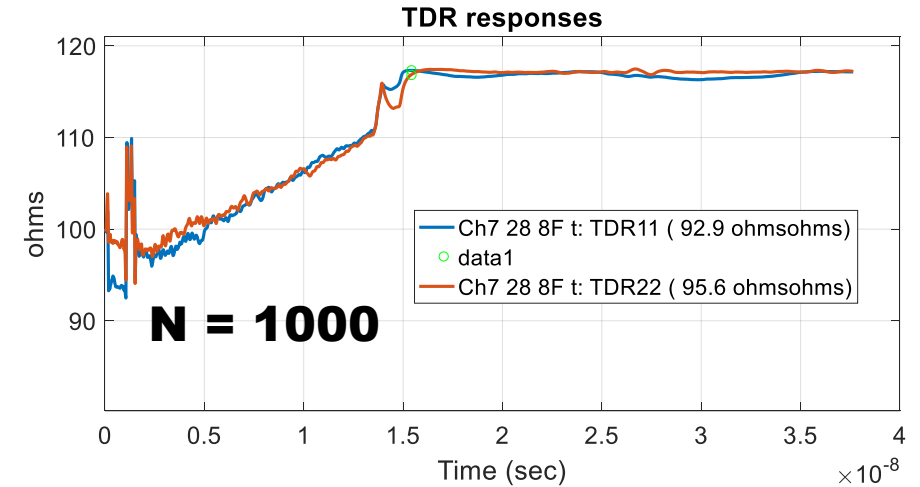
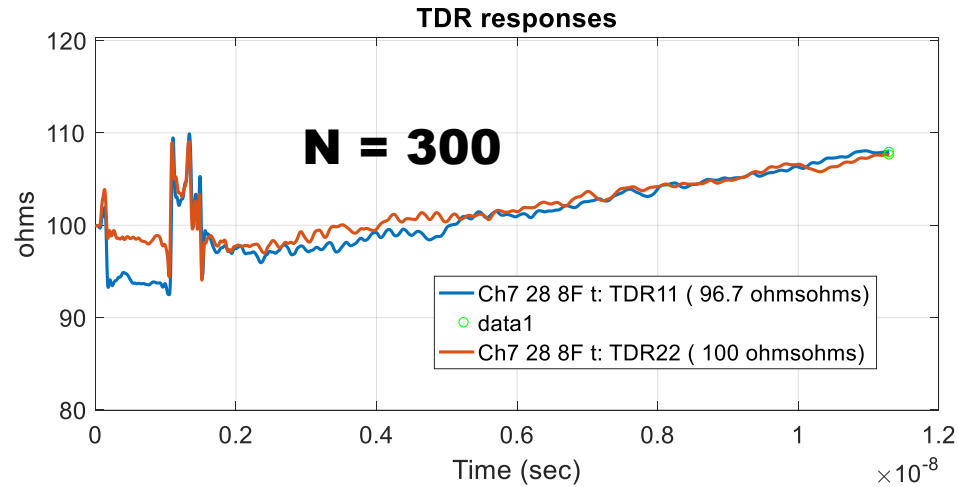
Toc

- ❑ Comment overview table
- ❑ Experiment with 3 dB COM Cable Assembly (CA)
- ❑ Review results from D3.2 ERL
- ❑ Explore ERL false pass/fail
- ❑ Adjusting ERL as in D3.2
- ❑ Options and Recommendations

Overview of ERL Comments

Clause	ERL Min (dB) D3.2	ρ_x D3.2	β_x D3.2	N D3.2	ERL Min (dB) D3.2 comment	ρ_x D3.2 comment	B_x D3.2 comment	N D3.2 comment
136 Tx Host	$8 - 40 \log_{10} \left(\frac{P_{max}}{V_f} \right)$	0.44	10.7	300	7 $- 20 \log_{10} \left(\frac{P_{max}}{V_f} \right)$ <i>or</i> 12?	.3	1.7	300
136 Rx Host	14.5	0.44	10.7	300	12	.3	1.7	300
136 Cable Assembly	11	0.44	10.7	1000	10.5	.25	1.7	1000
137 Tx Device	16.1	0.44	10.7	100	15	.32	1.7	100
137 Rx Device	16.1	0.44	10.7	100	15	0.32	1.7	100
137 Channel	10	0.44	10.7	300	10	0.18	1.7	1000

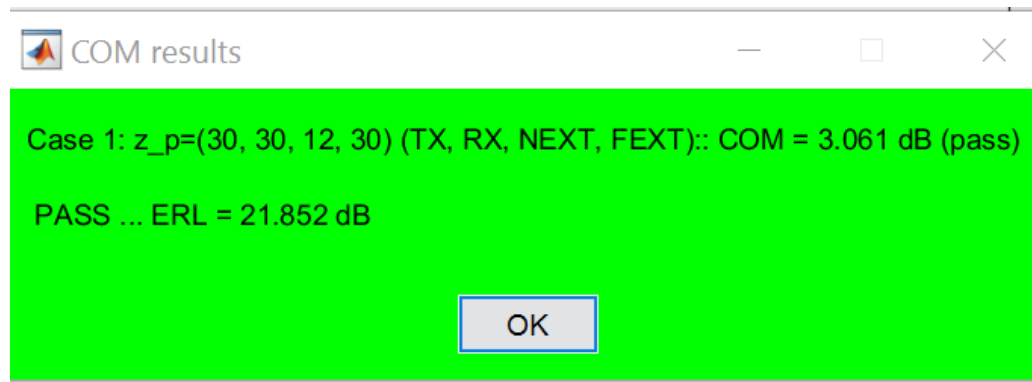
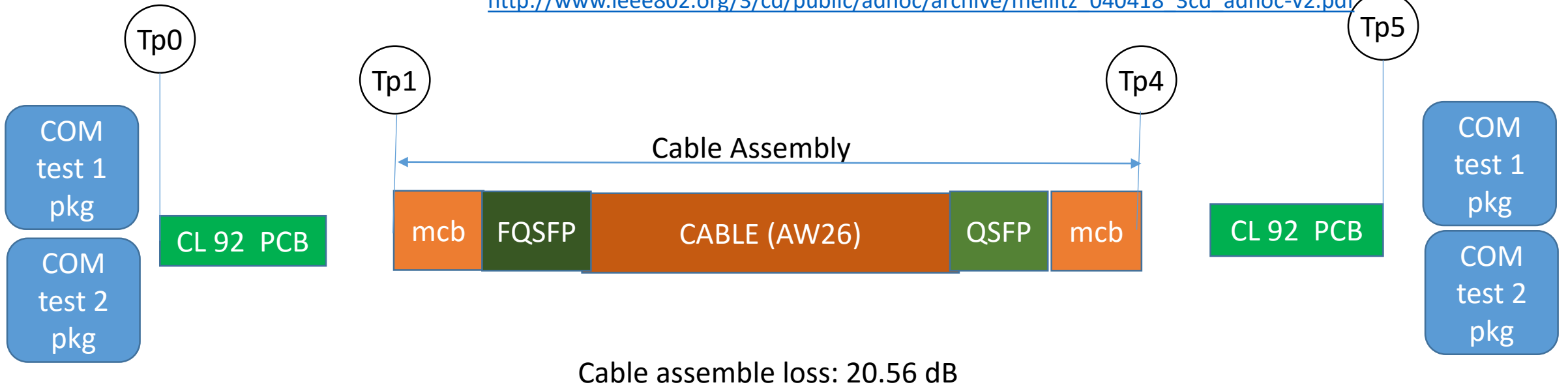
N = 300 for channels is not sufficient, recommend 1000



From: http://www.ieee802.org/3/cd/public/channel/Cisco_Backplane_channel_data.zip

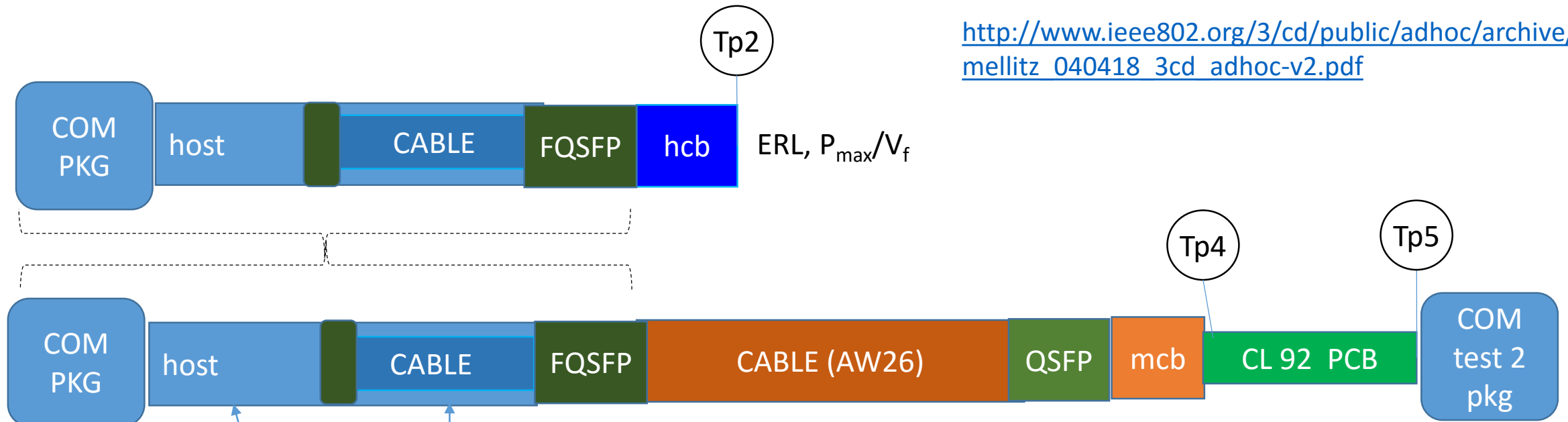
Cable Passes 3 dB COM w/ no crosstalk

http://www.ieee802.org/3/cd/public/adhoc/archive/mellitz_040418_3cd_adhoc-v2.pdf



End to End Cable Channels are Synthesized from Host Channels and Physical Variables

http://www.ieee802.org/3/cd/public/adhoc/archive/mellitz_040418_3cd_adhoc-v2.pdf



ERL, P_{max}/V_f

Tp2

Tp4

Tp5

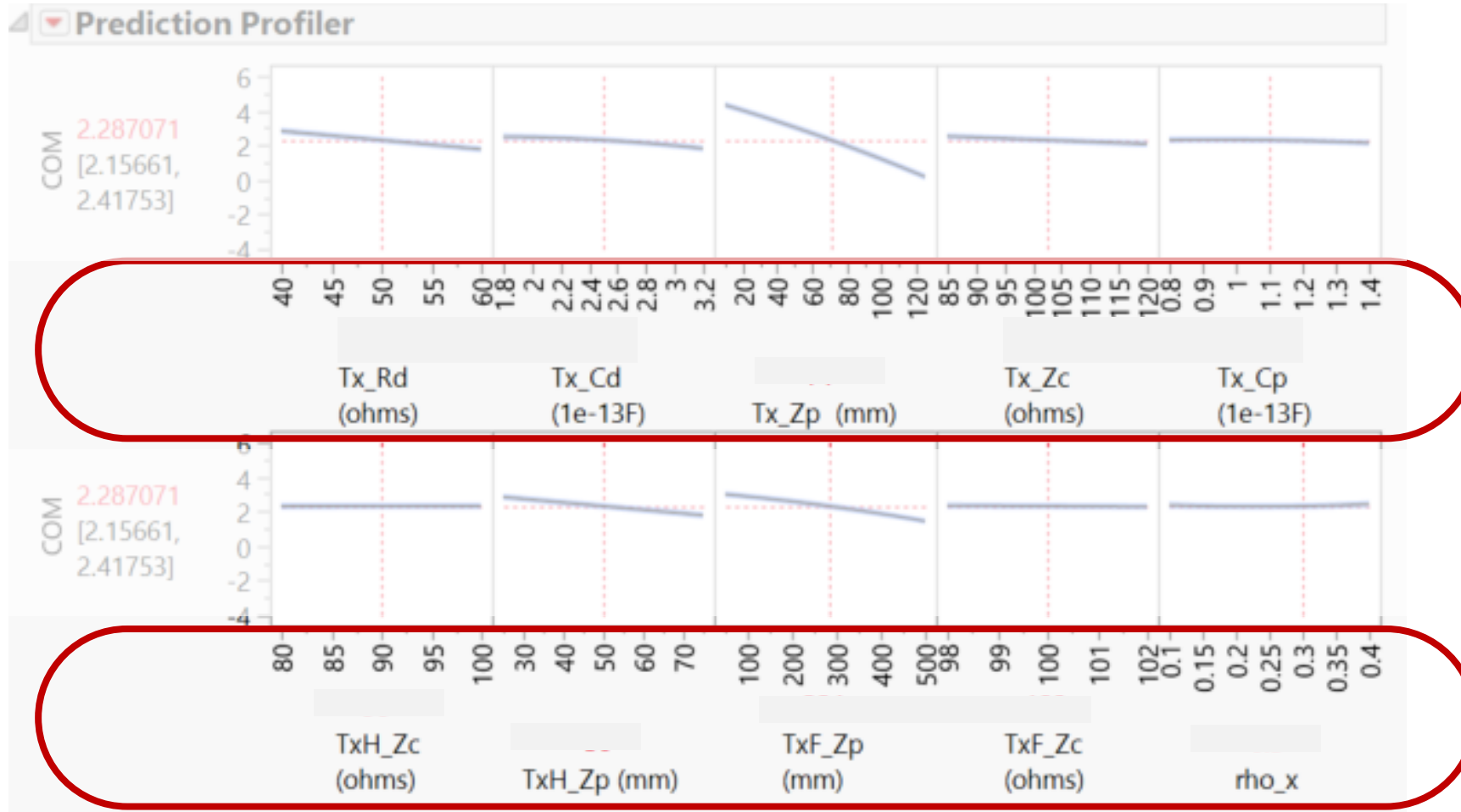
- Tx_Rd
- Tx_Cd
- Tx_Zp (mm)
- Tx_Z (ohms)
- Tx_Cp
- TxH_Zc (ohms)
- TxH_Zp(mm)
- TxF_Zp (mm)
- TxF_Zc (ohms)

Physical Design Variables

Measure Host ERL, COM, and P_{max}/V_f

Red Circles Illustrate Parameter Ranges Used

http://www.ieee802.org/3/cd/public/adhoc/archive/mellitz_040418_3cd_adhoc-v2.pdf

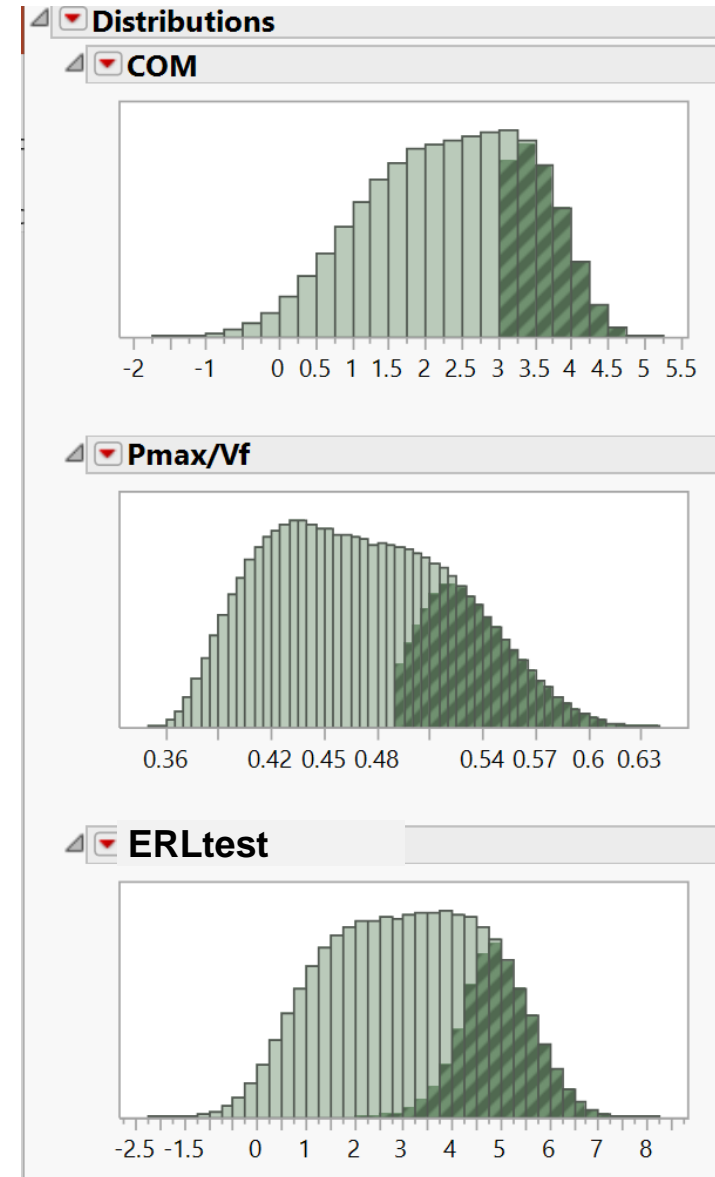


Re-Formulate and Create a Variable ERLtest from D3.2 Spec

- ❑ $ERL > 8 - 40 * \log_{10}(P_{\max}/V_f)$
- ❑ $ERL + 40 * \log_{10}(P_{\max}/V_f) > 8$
 - Let $ERL_{\min} = ERL + 40 * \log_{10}(P_{\max}/V_f)$
- ❑ ERLtest is greater than 8 here
- ❑ From D3.2 also $\rho_x=0.44$ and $\beta_x=10.7$ are used

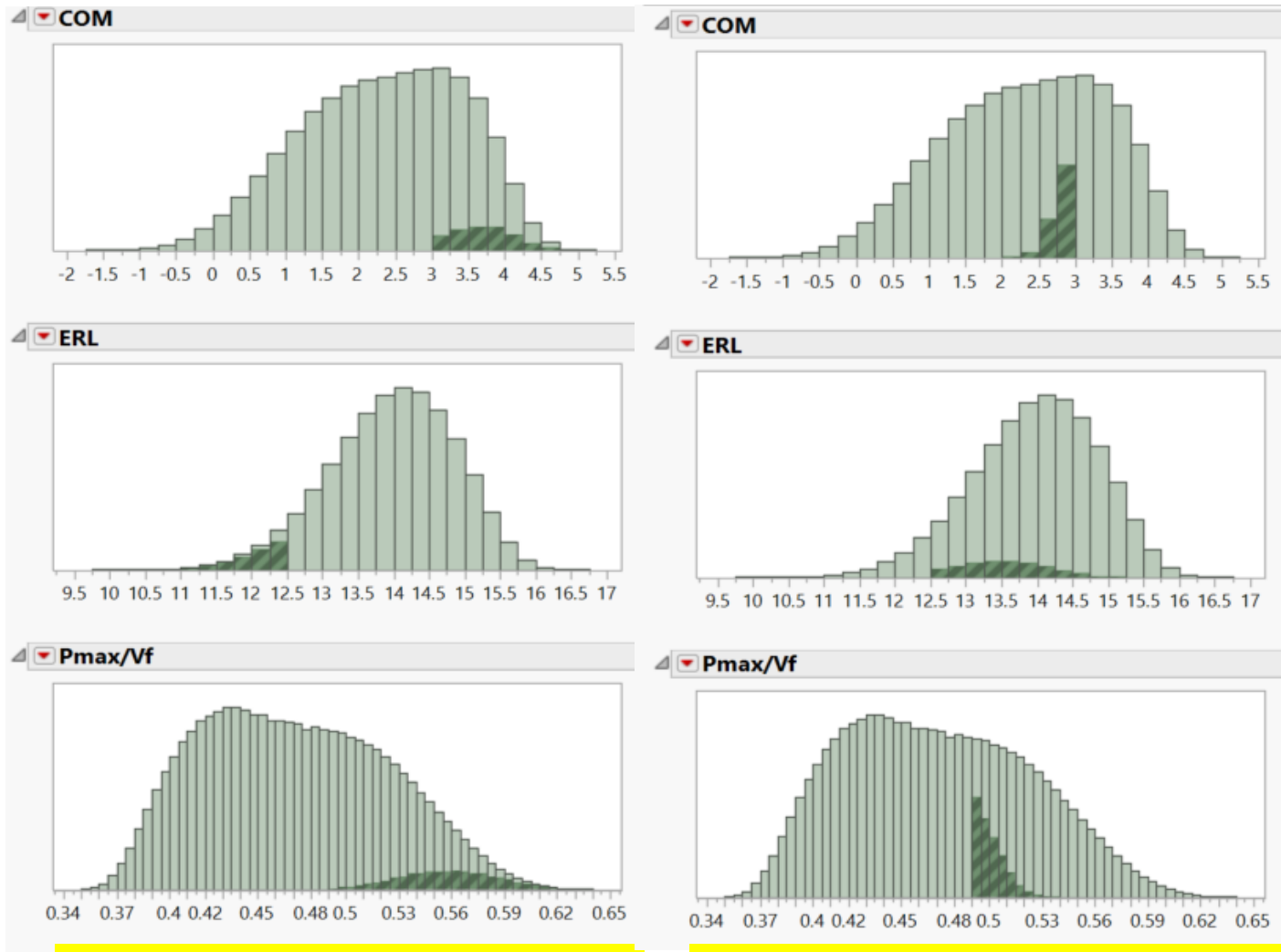
D3.2 ERL Does Not Pass Tested Host Channels

- ❑ Plot ERLtest for D3.2 (bottom distribution)
- ❑ Nothing in the population passes D3.2 ERL
 - Primarily due to the Grr equation
- ❑ Many designs pass COM for the cable assembly
- ❑ A change for Grr, β_x , ρ_x was suggested in
 - [mellitz_3cd_01a_032118_elect_adhoc](#)



http://www.ieee802.org/3/cd/public/adhoc/archive/mellitz_3cd_032118_adhoc-v2.pdf

Tx Host Test Results for ERLmin (limit): False Pass and False Fail



http://www.ieee802.org/3/cd/public/adhoc/archive/mellitz_040418_3cd_adhoc-v2.pdf

ERL min (dB)	False fail	False pass
16	30%	0%
14.5	28%	0.20%
13.5	16.30%	2.90%
13	9.50%	4.70%
12.5	4.40%	5.80%
12	1.50%	6.20%
11.5	0.40%	6.40%
11	0.06%	6.40%
0	0%	6.40%

ERL false fail example **ERL false pass example**

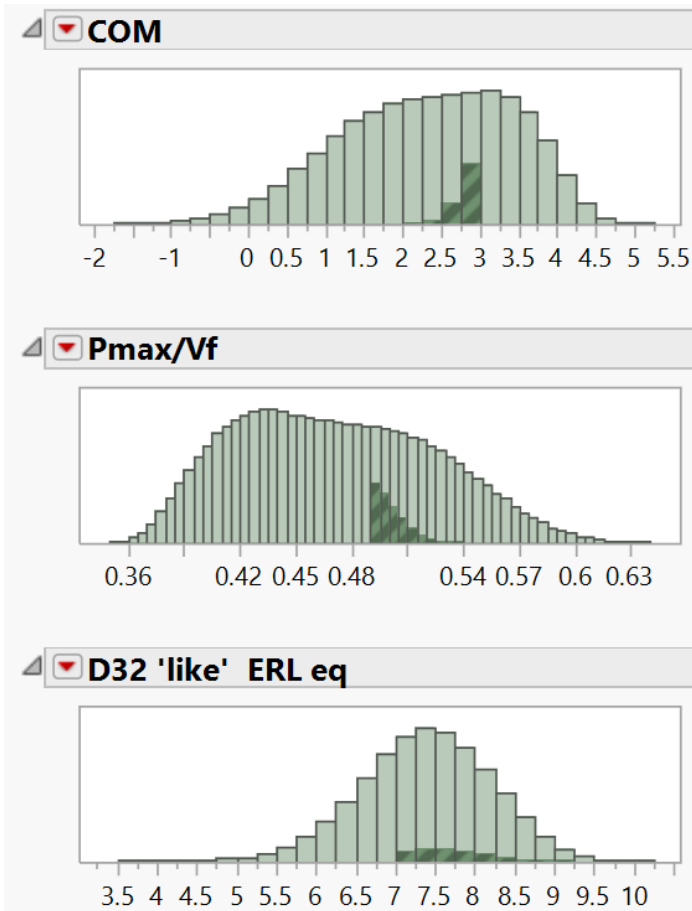
See background slides for explanation of light dark area and ERL false pass/fail

Another Thought:

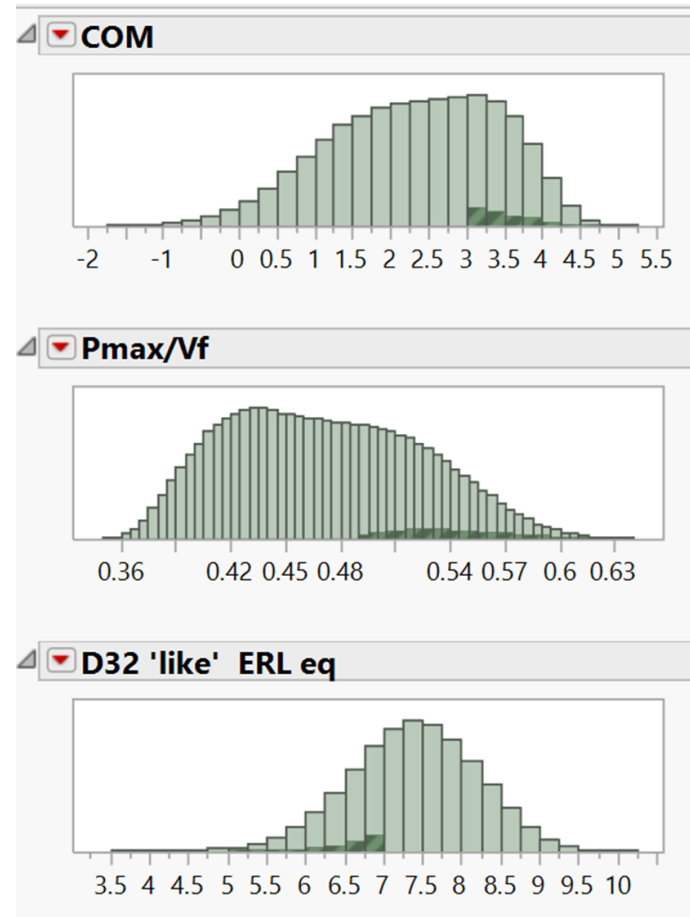
Adjust the D3.2 “ $\log_{10}(P_{max}/V_f)$ ” ERL Term
(and G_{rr} , β_x , ρ_x)

- ❑ Determine $ERL_{Tx_test} = ERL + 20 * \log_{10}(P_{max}/V_f)$
 - i.e. $ERL > ERL_{Tx_test} - 20 * \log_{10}(P_{max}/V_f)$
- ❑ Let's use the term
 - ERL_{Tx_test} similar to D3.2 ($ERL > 8 - 40 * \log_{10}(P_{max}/V_f)$)

Us false pass and false fail to determine “ ERL_{Tx_min} for D3.2 like eq”



ERL false fail example



ERL false pass example

ERL_{Tx_test} for D3.2 like eq	False fail	False Pass
9.5	30%	0%
9	28.8%	0%
8.5	24.2%	.1%
8	15.9%	0.97%
7.5	7.9%	2.8%
7	2.8%	4.9%
6.5	0.7%	5.8%
6	.1%	6.2%
5.5	0%	6.3%

P_{\max}/V_f helps Tx ERL correlation a little

- ❑ Recommend changes for and G_{rr} , β_x , ρ_x and N in slide 3 but consider the following options:
- ❑ Option 1:
 - $ERL_{Tx} > 7 - 20 \cdot \log_{10}(P_{\max}/V_f)$ dB
 - Requires fit measurements to determine pass/fail
 - Fit measurement alone have been shown to be a good indicator
 - $ERL_{Rx} > 12$ dB
- ❑ Option 2: Keep ERL for Tx and Rx the same
 - $ERL > 12$ dB
- ❑ No changes to COM and ERL computation required
- ❑ Configuration spreadsheets can be posted after meeting decision

Background

Explanation of Dark and Light Areas in Distribution Diagrams

- ❑ Let N be the number sets of parameters (design parameters) where $n=1$ to N
- ❑ $x(n)$ is a single design point or end to end channel design resulting outcome $y(n)$
 - $x(n) = \{ Tx_Rd(n) \ Tx_Cd(n) \ Tx_Zp(n) \ Tx_Z(n)Tx_Cp(n) \ TxH_Zc(n) \ TxH_Zp(n) \ TxF_Zp(n) \ TxF_Zc(n) \}$
 - There are three dependent $y(n)$ vectors where $n=1$ to N as above, $COM(n)$, $ERL(n)$, and $P_{max}/V_f(n)$
- ❑ There is a correspondence between $COM(n)$, $ERL(n)$ $P_{max}/V_f(n)$, and $x(n)$
- ❑ Define a set (ND) of all values of n where COM is greater than say 3 dB.
 - $ND = \{ nx1, nx2, nx3, \dots nx_large_number \}$
 - This is a the design set where COM is greater than 3 dB
- ❑ Color all $COM(ND)$ dark
- ❑ The respective $ERL(ND)$, and $P_{max}/v_f(ND)$ will be colored dark in their respective distributions.
- ❑ Subsequent population reductions can be achieved with similar constraints on ERL and P_{max}/V_f
 - These constraints suggest the values for a specification

Example of False ERL Pass/Fail and False Pass/Fail

