

# **ERL Parameter Update with Data for Hosts and Cable Assemblies**

**Richard Mellitz, Samtec**

**04-04-2018 IEEE 802.3 50 Gb/s, 100 Gb/s, and 200 Gb/s Ethernet Task Force Electrical Ad-Hoc**

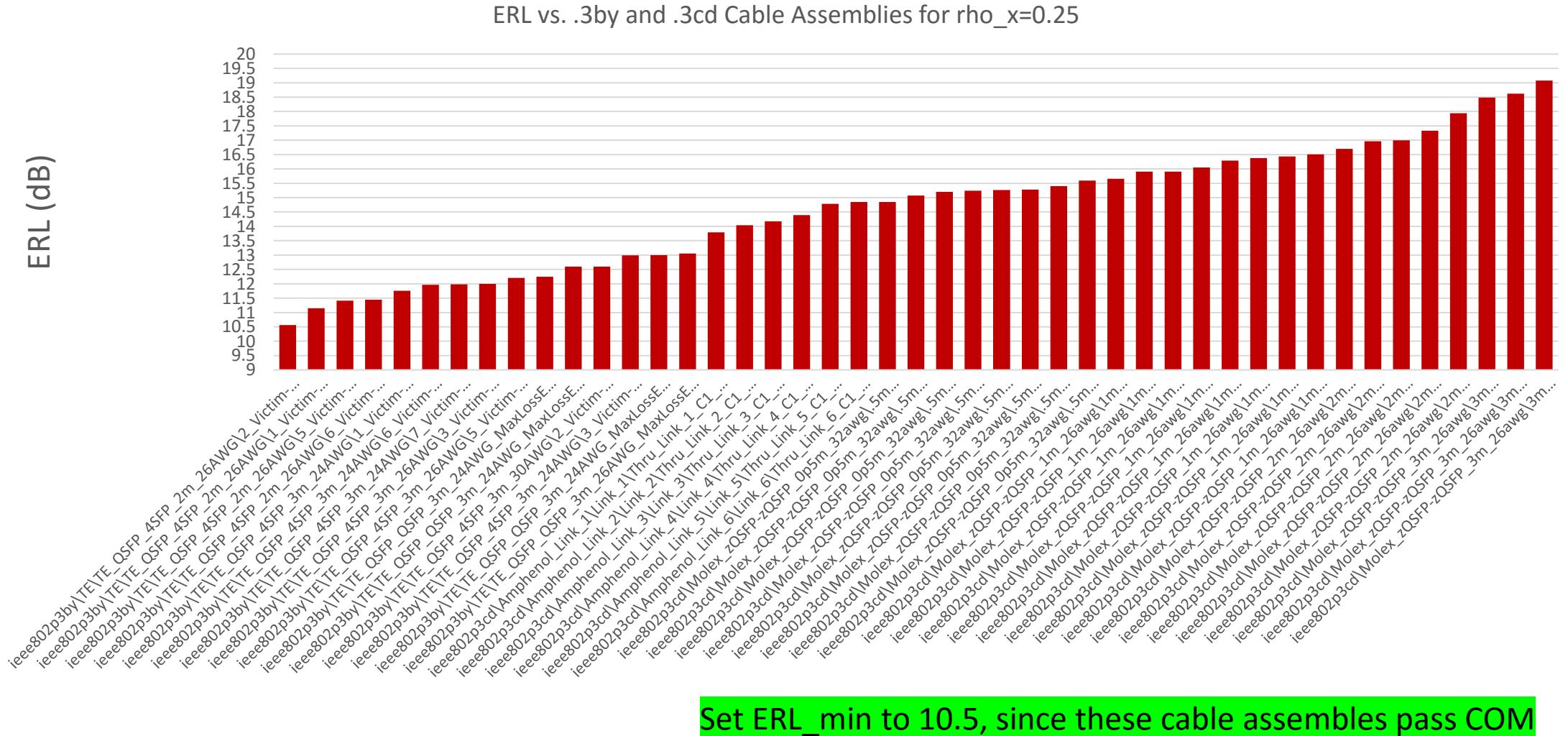
# ToC

- ❑ ERL and Parameter Recommendation
- ❑ ERL Results for Cable Assemblies
- ❑ ERL, COM, and Pmax/Vf Controlled Experiment
- ❑ False Pass/False Fail Results
- ❑ Summary

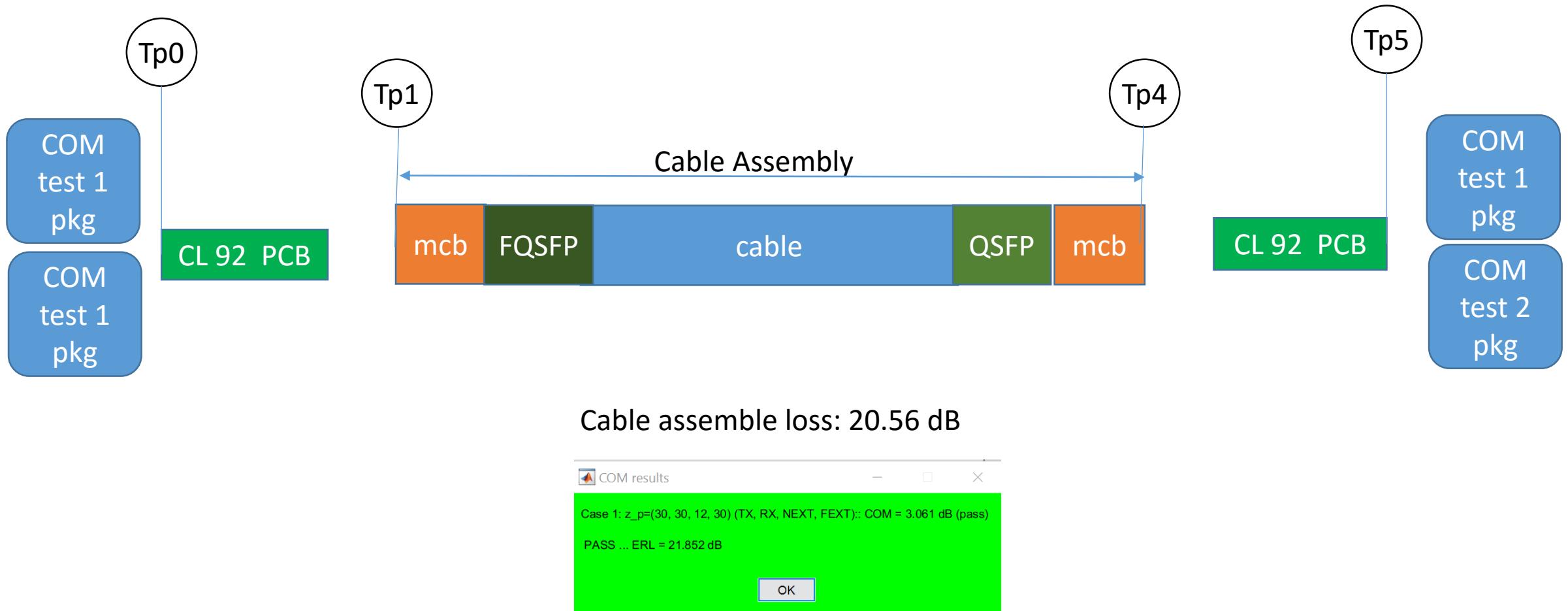
# Overview of ERL Comments

Clause	ERL Min (dB) D3.2	$\rho_x$ D3.2	$\beta_x$ D3.2	N D3.2	ERL Min (dB) D3.2 comment	$\rho_x$ D3.2 comment	$B_x$ D3.2 comment	N D3.2 comment
136 Tx Host	$8 - 40 \log_{10} \left( \frac{P_{max}}{V_f} \right)$	.44	10.7	300	12	.3	1.7	300
136 Rx Host	14.5	.44	10.7	300	12	.3	1.7	300
136 Cable Assembly	11	.44	10.7	1000	10.5	.25	1.7	1000
137 Tx Device	16.1	.44	10.7	100	15	$e^{\frac{-ERL_{min\_channel}}{20}} = 0.32$	1.7	100
137 Rx Device	16.1	.44	10.7	100	15	$e^{\frac{-ERL_{min\_channel}}{20}} = 0.32$	1.7	100
137 Channel	10	0.44	10.7	300?	10	$e^{\frac{-ERL_{min\_devoce}}{20}} = 0.18$	1.7	1000

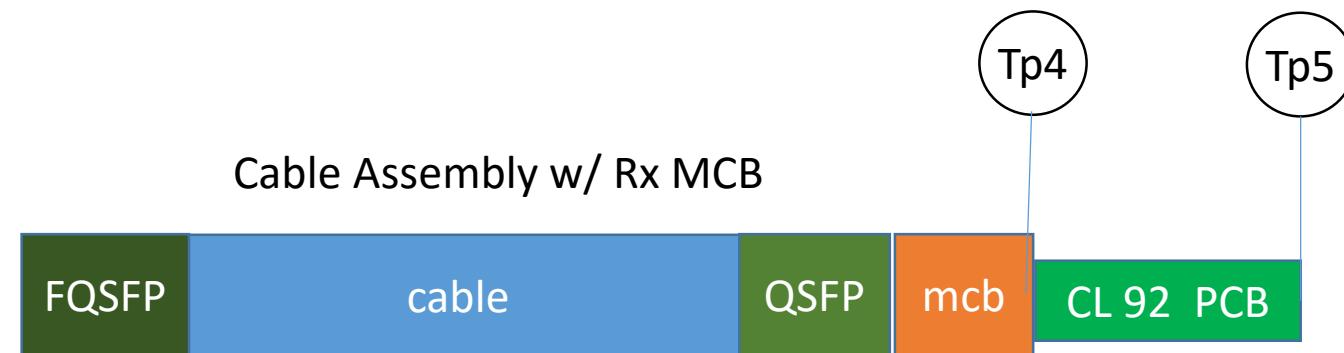
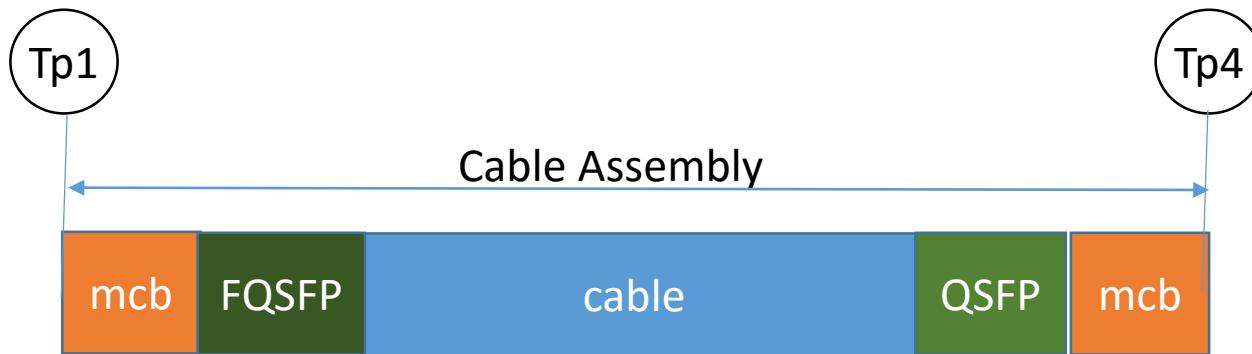
# ERL vs. .3by and .3cd Cable Assemblies for rho\_x=0.25



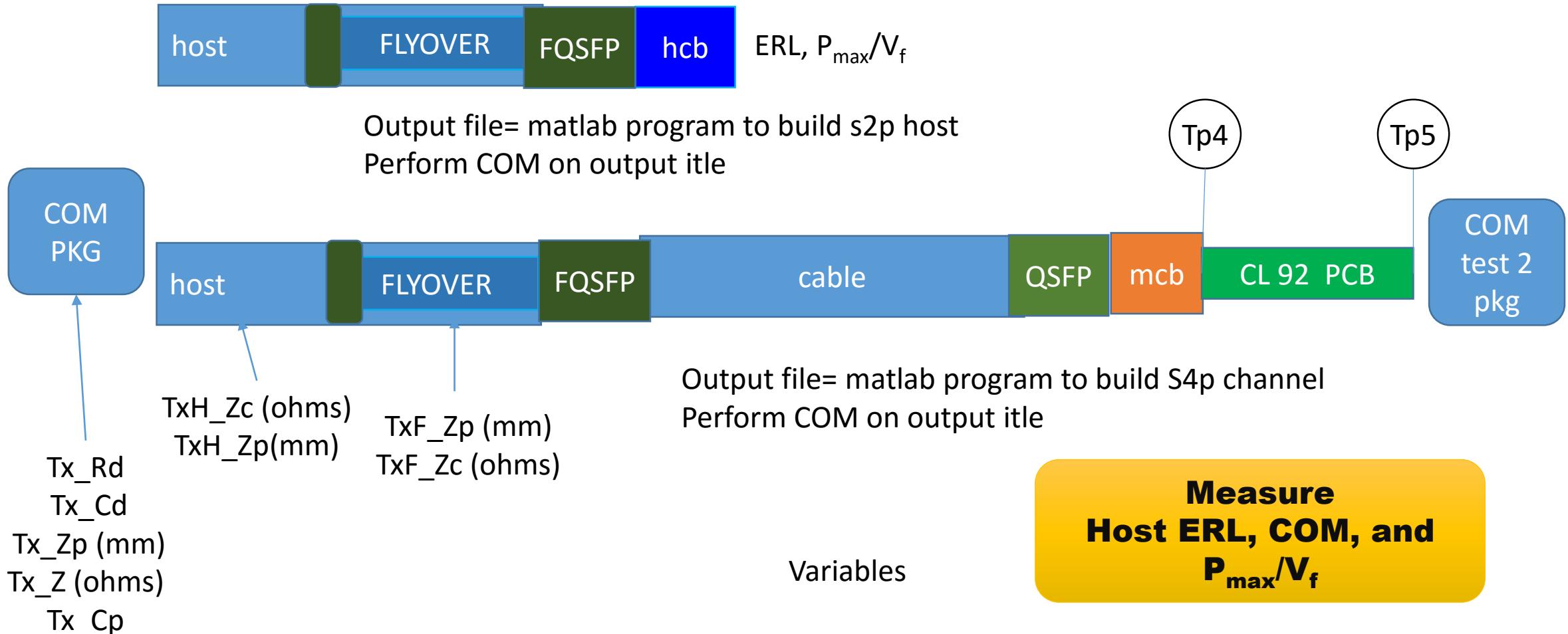
# Create Cable with 3 dB of COM w/ no crosstalk



# Build 3dB COM Cable with 3 dB w/o Tx MCB

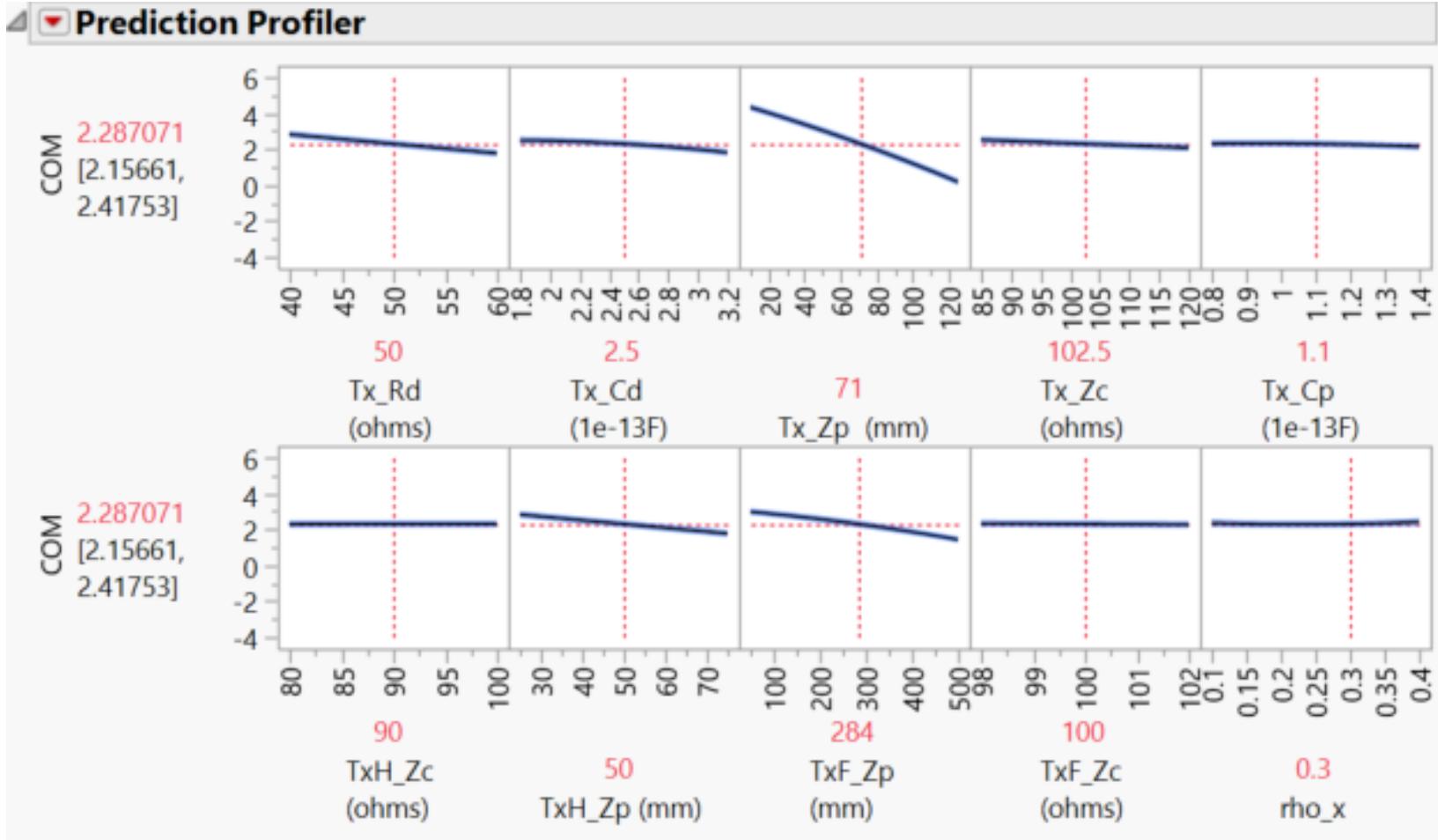


# Build host channels and corresponding end to end cable channels

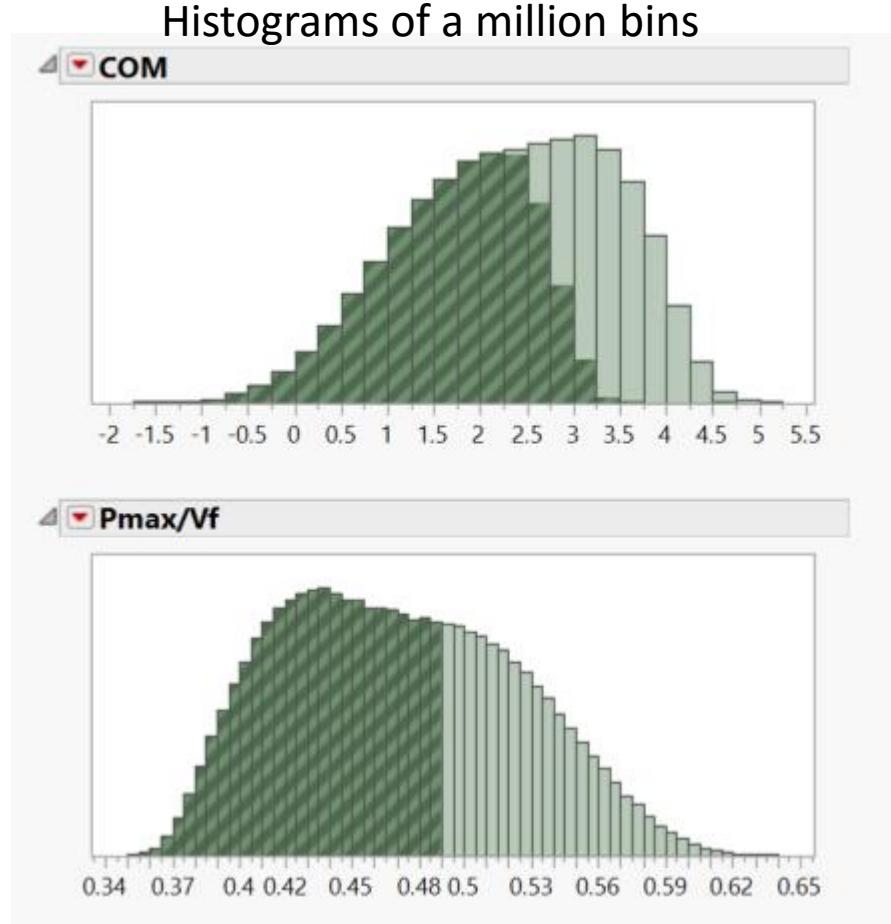


# Design of Experiments to Predict COM, ERL, and Pmax/Vf

*Example of host design parameter ranges*



# Pmax/Vf is a pretty good performance indicator



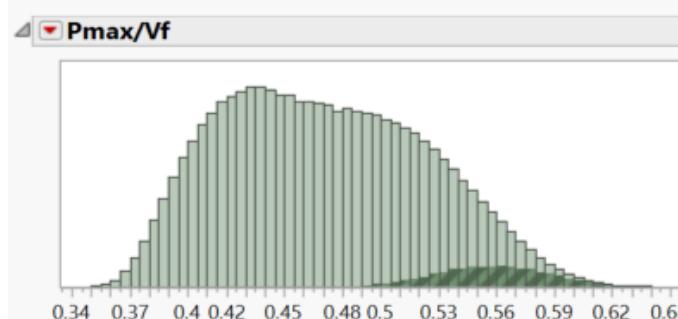
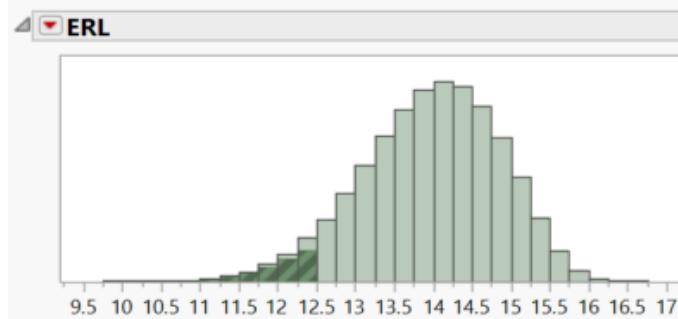
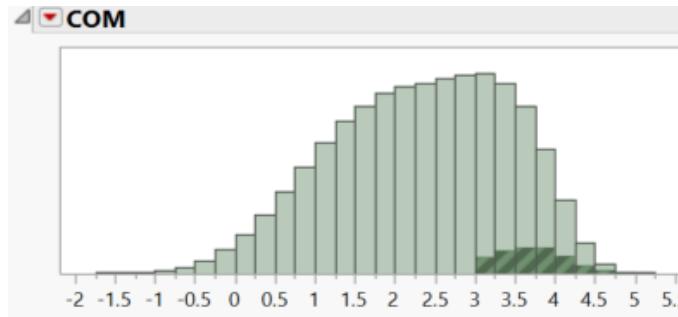
6.4% ERL false pass  
30% ERL false fail

ERL false pass – means ERL passes but system fails COM  
ERL false fail – means ERL fails but system passes COM

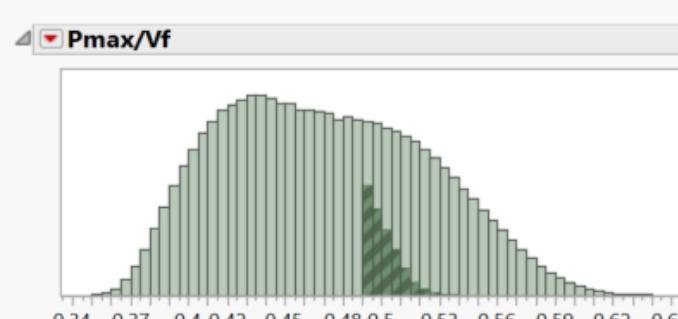
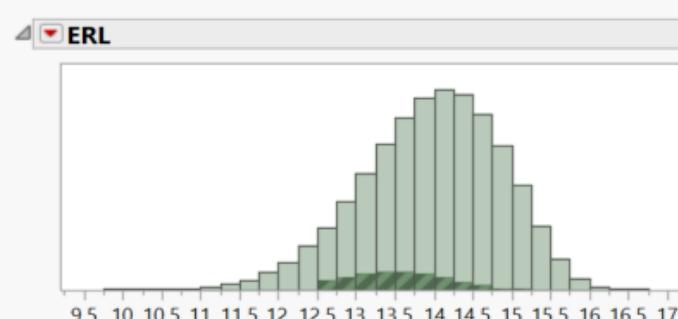
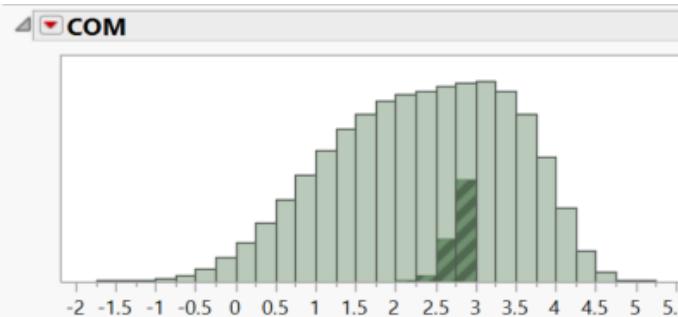
X is values of annotated title and Y is bin density  
Darker bins represent the same channel design (parameters)

# Use ERL to limit false pass and false fail

Recommended ERL min



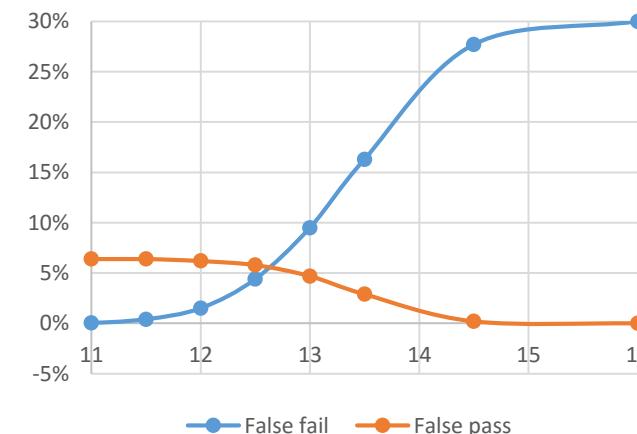
ERL false fail example



ERL false pass example

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 PASS/FAIL %



# Recommendation

- ❑ Refer to mellitz\_3cd\_01a\_032118\_elect\_adhoc
  - $\rho_x$  should only act on the range for re-reflections of the DFE taps
    - Resolves missing channel tie in to make sense of  $\rho_x$
  - Revisit  $\beta_x$  tied into pulse loss of a package
  - Set value after the DFE range to in eq. 93A-61
- ❑ Remove the Pmax/Vf factor from ERL for host recommended in comment resolution.
- ❑ Use table on slide 3 for ERL limit and parameters
- ❑ No update of COM Matlab required
  - Set Grr\_limit to 1 in configuration spreadsheets