

# COM V1.65 for Package and C2M Exploration

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***November 23, 2016***

# COM V1.65

- ❑ For development of 50Gb/s per lane PAM-4
- ❑ Not fully vetted against old versions.
  - So far seems, to yield the same answers
  - Volunteers, feedback, and debug suggestions welcome
- ❑ Added capability to adapt transmitter and package base on impedance channel.
- ❑ Added TDR reporting for diagnosis
- ❑ Added feature to aid C2M standards development.
  - CTLE for eq. 120D-2
  - Voltage eye height reporting
  - Mate test fixture testing

# Choosing package as function of driving point impedance

❑ Suggested in:

- [http://www.ieee802.org/3/cd/public/Nov16/mellitz\\_3cd\\_01\\_1116.pdf](http://www.ieee802.org/3/cd/public/Nov16/mellitz_3cd_01_1116.pdf)

❑ COM V1.65 implements this

❑ Zc is chosen based on drive point impedance

❑ Specified in the COM configuration file with:

New 'cd exploratory		
TDR	1	logical
WC_PORTZ	1	logical

Table 93A–3 parameters		
Parameter	Setting	Units
package_tl_gamma0_a1_a2	[0 1.734e-3 1.455e-4]	
package_tl_tau	6.141E-03	ns/mm
package_Z_c	[90 110]	Ohm

❑ Termination resistance Rd, A\_v, A\_f, A\_n, and SNR\_TX are also selected along with Zc

R_d	[55 55]	Ohm	[TX RX] or selected
A_v	[0.45 42]	V	tdr selected
A_fe	[0.45 42]	V	tdr selected
A_ne	[.64 .64]	V	tdr selected
SNR_TX	[32.5 32.51]	dB	tdr selected

# Additions for C2M standards development

$$H(f) = \frac{GP_1P_2P_{LF}}{Z_1Z_{LF}} \times \frac{j2\pi f + Z_1}{(j2\pi f + P_1)(j2\pi f + P_2)} \times \frac{j2\pi f + Z_{LF}}{j2\pi f + P_{LF}}$$

(120E-2)

[presented in mellitz 3bs 02a 1116.pdf](#)

## ❑ Suggested configuration file to test mated test fixtures

g_DC	[-1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8 8.5 9]	dB	[min:step:max]
f_z	[8.359 8.159 7.995 7.604 6.713 6.421 6.155 5.733 5.353 5.007 4.691 4.399 4.13 3.88 3.647 3.43 3.228]	GHz	
f_p1	[18.6 18.6 18.6 18.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6]	GHz	
f_p2	[14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1 14.1]	GHz	
PHY_type	C2M		
EH_min	32	Value	EH limit EH limit
EH_max	34	Value	
f_HP_P	[1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2]	GHz	
f_HP_Z	[1.2 1.15 1.1 1.075 1.05 1.025 1 1 1 1 1 1 1 1 1 1]	GHz	

Table 120E-2—Reference CTLE coefficients

Peaking (dB)	G	$\frac{P_1}{2\pi}$	$\frac{P_2}{2\pi}$	$\frac{Z_1}{2\pi}$	$\frac{P_{LF}}{2\pi}$	$\frac{Z_{LF}}{2\pi}$
1	0.89125	18.6	14.1	8.359	1.2	1.2
1.5	0.8414	18.6	14.1	8.159	1.2	1.15
2	0.79433	18.6	14.1	7.995	1.2	1.1
2.5	0.74989	18.6	14.1	7.604	1.2	1.075
3	0.70795	15.6	14.1	6.713	1.2	1.05
3.5	0.66834	15.6	14.1	6.421	1.2	1.025
4	0.63096	15.6	14.1	6.155	1.2	1

Table 120E-2—Reference CTLE coefficients (continued)

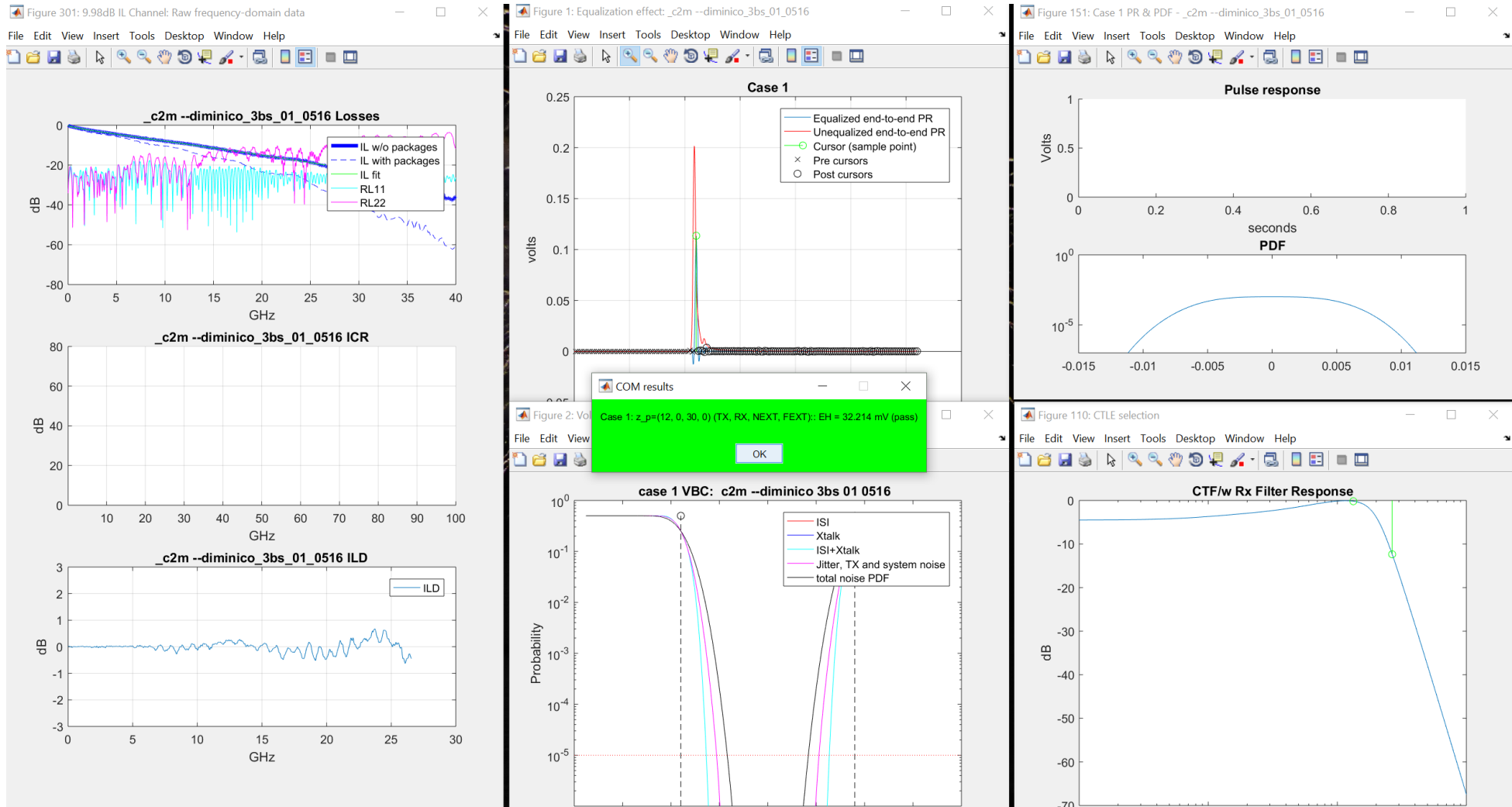
Peaking (dB)	G	$\frac{P_1}{2\pi}$	$\frac{P_2}{2\pi}$	$\frac{Z_1}{2\pi}$	$\frac{P_{LF}}{2\pi}$	$\frac{Z_{LF}}{2\pi}$
4.5	0.59566	15.6	14.1	5.733	1.2	1
5	0.56234	15.6	14.1	5.353	1.2	1
5.5	0.53088	15.6	14.1	5.007	1.2	1
6	0.50119	15.6	14.1	4.691	1.2	1
6.5	0.47315	15.6	14.1	4.399	1.2	1
7	0.44668	15.6	14.1	4.13	1.2	1
7.5	0.4217	15.6	14.1	3.88	1.2	1
8	0.39811	15.6	14.1	3.647	1.2	1
8.5	0.37584	15.6	14.1	3.43	1.2	1
9	0.35481	15.6	14.1	3.228	1.2	1

# Files included:

- ❑ com\_ieee8023\_93a\_165.m
- ❑ config\_com\_ieee8023\_93a=200GAUI-4\_and\_400GAUI-8\_C2M\_120e\_MTF.xls
- ❑ config\_com\_ieee8023\_93a=50GBASE-KR\_postd1p0\_exp.xls

# Example: Mated Test Fixture evaluation

```
com_ieee8023_93a_165('config_com_ieee8023_93a=200GAUI-4_and_400GAUI-8_C2M_120e_MTF.xls', 0, 0, 'diminico_3bs_01_0516.s4p')
```



## Additional Information

Keyword description

V1.65

# Summary of new keywords for TDR

	Value	actions	Comments
TDR	0 or 1	1 = perform TDR	If missing or 0, ignore and perform like V1.63
WC_PORTZ	0 or 1	1 – find worse case port parameters based on TDR for Tx and Rx ports. Must have TDR=1 to be active	If missing or 0, ignore and perform like V1.63
A_v	[ val1 val2] or val1	Used of TDR and WC_PORTZ is = 1 use port impedance to determine which value to use else just used val1	
A_fe			
A_ne			
SNR_TX			
package_Z_c			
R_d			Only used for through channel to compute gammas.



# Summary of CLTE keywords

Keyword	Value	actions
PHY_type	C2M, C2C	Changes pass fail report from COM to Vertical Eye Height if C2M. If C2C missing COM is used
EH_min	Millivolts	Minimum EH threshold when C2M is set
EH_max	Millivolts	Maximum EH threshold when C2M is set
g_DC_HP	gain values or missing	If 1. Use CTLE from P802.3bs Annex 93A if missing and f_HP_P and f_HP_Z is missing use original CL93 CTLE
f_HP_PZ	Pole/Zero in GHz or list corresponding g_DC_HP values	f_HP_P and f_HP_Z must not be used with this
f_HP_P	Pole/Zero in GHz or list corresponding g_DC values	When g_DC_HP is missing but these are defined use equation 120E-2
f_HP_Z		
g_DC	gain values	
f_z	Pole/Zero in GHz or list corresponding g_DC values	When g_DC_HP is missing but f_HP_P and f_HP_Z are defined, CTLE uses equation 120E-2
f_p1		
f_p2		