Revisit TP1a EH and VEC based on New Test Method in IEEE 802.3ck D1p4

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For IEEE 802.3ck



P802.3ck

Supporters



Outlines

- Background
- Channel & Analysis
- Impact from New Test Method in D1p4
- TP1a vs Whole-Link Correlation
- Summary & Proposals



Background

- New test method of C2M TP1a EH/VEC had been adopted in 802.3ck D1p4
 - Proposed in <u>healey_3ck_02_1020</u>
 - EH/VEC specs in D1p4 are not valid any more
- Run COM analysis based on new method in D1p4 to derive new EH/VEC specs
 - Adopt similar analysis as <u>wu_3ck_01a_1119</u>
- Proposals for Table 120G-1
 - VEC = 12 dB for TP1a
 - EH = 8 mV for TP1a
- This is an updated version from wu 3ck adhoc 01 010621
 - To response suggestions from ad-hoc meeting
 - Mark the updated content by pink



Channel and Analysis

- Channel (crosstalk included) and reference receiver
 - Whole-link & TP1a analysis for total <u>nineteen IEEE C2M host-to-module channels</u>
 - Sweep host package trace length, z_p1(TX)
 - z_p1(TX) = [5:0.5:10 11:1:20 22:2:36]
 - Total 19 * 29 = 551 CH+PKG test cases
- COM parameter settings [details in appendix]
 - COM 3.1
 - Whole link: TX Device/PKG + H2M Channels + RX PKG/Device

C_d	[1.2e-4 0.85e-4]	nF	[TX RX]
L_s	[0.12 0.12]	nH	[TX RX]
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]
z_p select	[12]		[test cases to run]
z_p (TX)	[×× ; 1.8 1.8]	mm	[test cases]
z_p (NEXT)	[28;00]	mm	[test cases]
z_p (FEXT)	[×× ;1.81.8]	mm	[test cases]
z_p (RX)	[28;00]	mm	[test cases]
C_p	[0.87e-4 0.65e-4]	nF	[TX RX]

- TP1a: TX Device/PKG + H2M Channels
 - Set 'zero' to related RX PKG & on-die settings



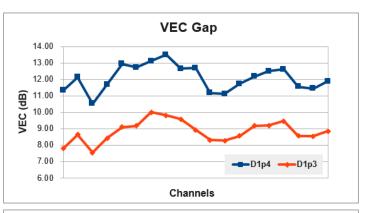
Impacts to COM, EH & VEC from New Test Method Adopted by D1p4 – D1p3 vs. D1p4

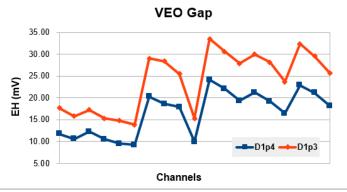
- Considerations of the following parameter changes from D1p3 to D1p4
 - − EH/VEC methodology: T_O = $25 \rightarrow 50$ mUI
- Observations
 - EH & VEC does degrade based on new method



TP1a Analysis – Impact to VEC & VEO (EH)

				VEC	(dB)	EH (mv)
				D1p4	D1p3	D1p4	D1p3
lim 3ck 01a 031		Tx7_L10	112G_16dB_(QSFPDD+module card)_TX7_L10	11.32	7.79	11.76	17.65
		Tx7_L23	112G_16dB_(QSFPDD+module card)_TX7_L23	12.13	8.64	10.56	15.78
	lim 3ck 01 0319 c	Tx3_L10	112G_16dB_(QSFPDD+module card)_TX3_L10	10.51	7.54	12.24	17.23
)	2m.zip	Tx3_L23	112G_16dB_(QSFPDD+module card)_TX3_L23	11.69	8.42	10.49	15.30
		Tx7_Asic	112G_16dB_(QSFPDD+module card)_TX7_Asic	12.93	9.10	9.51	14.78
		Tx3_Asic	112G_16dB_(QSFPDD+module card)_TX3_Asic	12.73	9.18	9.20	13.85
lim_3ck_adhoc_0	073119 lim_3ck_adhoc_02 073119.zin	Ch5a_2"	Channel5a_Smaller_Pad_2inch_trace	13.12	10.00	20.30	29.06
		Ch5b_3"	Channel5b_Smaller_Pad_3inch_trace	13.48	9.81	18.60	28.40
L		Ch5c_4"	Channel5c_Smaller_Pad_4inch_trace	12.64	9.58	17.91	25.47
		Ch5d_9"	Channel5d_Smaller_Pad_9inch_trace	12.69	8.92	9.93	15.32
	akinwale_3ck_C2M _channels_TP0a_10 0ohms_08222019.z	2''100Oh m	C2M_2p0in_100Ohm_thru1.s4p	11.17	8.31	24.09	33.49
			C2M_3p0in_100Ohm_thru1.s4p	11.12	8.27	22.07	30.62
kinwale_3ck_ad		4''100Oh m	C2M_4p0in_1000hm_thru1.s4p	11.73	8.57	19.35	27.86
			C2M_2p0in_85Ohm_thru1.s4p			21.21	
.9		3''850hm	C2M_3p0in_85Ohm_thru1.s4p	12.50	9.19	19.22	28.14
	ohms_08222019.zi p		C2M_4p0in_85Ohm_thru1.s4p			16.48	
	akinwale_3ck_C2M		C2M_2p0in_950hm_thru1.s4p	11.55	8.56	22.91	32.33
	_channels_TP0a_95		C2M_3p0in_950hm_thru1.s4p			21.14	
	Ohms_08222019.zip	4"950hm	C2M_4p0in_950hm_thru1.s4p	_		18.15	
			Diff (D1p3 as basis)	3.24		-7.32	
				۲ð	502. 3	DCK	





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Summary of Impacts from New Test Method

Difference of VEC, & EH
 (D1p4 – D1p3)

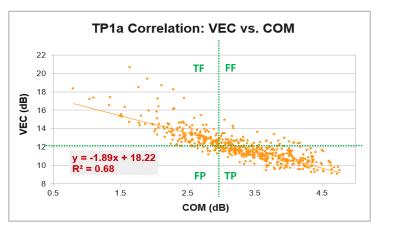
Item	Difference
VEC	3.24 dB
EH	-7.32 mV

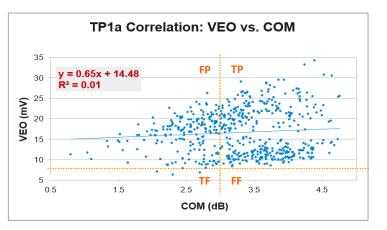


EH/VEC vs. COM Correlation – Check Correlation

- T_O = 0 mUI for COM
 - Take COM >= 3 dB as pass indicator
- Correlation of COM and VEC/VEO
 - VEC (dB) is kind of correlated to COM in whole link analysis, while EH (mV) doesn't
 - VEC: R² = 0.68
 - VEO (EH): R² = 0.01

- Which is better indicators? VEC vs. EH
 - VEC is a very good indicator for DUT performance
 - EH is NOT strongly correlated to COM, especially for short channels
- Too high of EH threshold risks over-kill good DUT



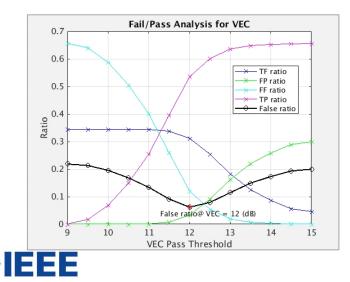




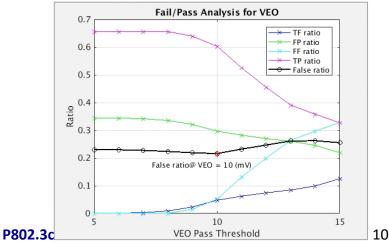
Pass/Fail Analysis – Weighted False Ratio as Criterion

• Definitions of True/False-Pass/Fail

	VEC <= pass threshold (VEO >= pass threshold)	VEC > pass threshold (VEO < pass threshold)
COM >= 3 dB	True-Pass (TP)	False-Fail (FF)
COM < 3 dB	False-Pass (FP)	True-Fail (TF)

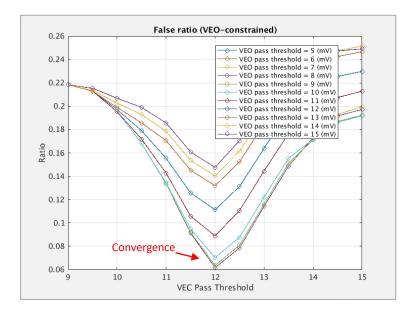


- T_O = 0 mUI for COM
 - Take COM >= 3 dB as pass indicator
- Find VEC & EH thresholds to minimize Weighted
 False ratio = (2*FP + FF)/3 ratios
 - VEC = 12 dB with 6.17% Weighted False ratio
 - EH = 8 mV with 21.60% Weighted False ratio →
 quite high, not a good indicator for performance
 - Next: Combine two of them



Joint Correlation of VEC/VEO

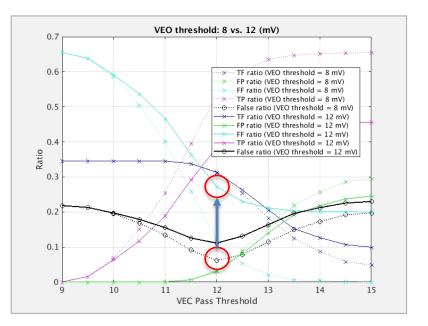
- VEO-constrained VEC is adopted to conjunctively combine separate pass/fail decisions
 - The procedure adopted in D1p4
 - Filtering samples that didn't meet VEO requirement → [5:15] mV
- Optimal false ratio converges at (with False ratio = 15.25%)
 - VEC pass threshold = 12 dB
 - VEO pass threshold = 8 mV
- Q: is EH (min) = 8 mV too small the value?





Increasing EH (min) doesn't Help, but Hurt

- T_O = 0 mUI for COM
 - Take COM >= 3 dB as pass indicator
- Increasing EH (min) from 8 mV to 12 mV, for example
 - Actually over-kill good DUT (~15% False-Fail ratio increase)
 - No benefits to drop false-passed bad DUT (nearly the same False-Pass ratio)
- The major indicator shall be VEC (max) & keep EH (min) low enough to avoid over-kill good Host DUT





Summary & Proposals

- New TP1a test method impacts VEC & EH & we need new thresholds in D1p5 to reflect that
 - Impact to VEC & EH = +3.24 dB & -7.32 mV
- Based on COM vs. VEC/EH correlation to derive the following new thresholds for D1p5

Spec	D1p4	D1p5
VEC	9 dB	12 dB
EH	15 mV	8 mV



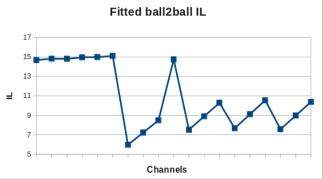
Thank You



C2M Host-to-Module Channels for Analysis

Short Channel Long Channel

Contribution	Zip files	Channel	SxP Files	Fitted ball2b
		Tx7_L10	112G_16dB_(QSFPDD+module card)_TX7_L10	17
		Tx7_L23	112G_16dB_(QSFPDD+module card)_TX7_L23	1/
	lim Jak 01 0210 s2m -in	Tx3_L10	112G_16dB_(QSFPDD+module card)_TX3_L10	
im_3ck_01a_0319	lim_3ck_01_0319_c2m.zip	Tx3_L23	112G_16dB_(QSFPDD+module card)_TX3_L23	13
		Tx7_Asic	112G_16dB_(QSFPDD+module card)_TX7_Asic	
		Tx3_Asic	112G_16dB_(QSFPDD+module card)_TX3_Asic	
		Ch5a_2"	Channel5a_Smaller_Pad_2inch_trace	
im_3ck_adhoc_01_	073119	Ch5b_3"	Channel5b_Smaller_Pad_3inch_trace	7
	lim_3ck_adhoc_02_073119.zip	Ch5c_4"	Channel5c_Smaller_Pad_4inch_trace	5
		Ch5d_9"	Channel5d_Smaller_Pad_9inch_trace	Chan
	akinwala 2ck C2M channels TD	2''1000hm	C2M_2p0in_100Ohm_thru1.s4p	
	akinwale_3ck_C2M_channels_TP 0a 1000hms 08222019.zip	3''1000hm	C2M_3p0in_100Ohm_thru1.s4p	
	0a_10001113_00222013.21p	4''1000hm	C2M_4p0in_100Ohm_thru1.s4p	
kinwale 3ck adhoc	akinwale_3ck_C2M_channels_TP 0a_85ohms_08222019.zip	2''850hm	C2M_2p0in_85Ohm_thru1.s4p	
		3''850hm	C2M_3p0in_85Ohm_thru1.s4p	
	04_03011113_00222013.21p	4''850hm	C2M_4p0in_85Ohm_thru1.s4p	
	akinwale_3ck_C2M_channels_TP	2''930hm	C2M_2p0in_93Ohm_thru1.s4p	
	0a_930hms_08222019.zip	3''930hm	C2M_3p0in_93Ohm_thru1.s4p	
	34_33353_332222013.2ip	4"930hm	C2M_4p0in_93Ohm_thru1.s4p	b





COM Settings – Whole Link (for COM Value)

Setting								Table 93A–3 paramet		Floating Tap Control			
	Units	Information		DIAGNOSTICS	1	logical	Parameter	Setting	Units	N_bg	0	012 or 3 group	5
53.125	GBd			DISPLAY_WINDOW	0	logical	package_tl_gamma0_a1_a2	[0 0.0009909 0.0002772]		N_bf	3	taps per group	
0.05	GHz			CSV_REPORT	0	logical	package_tl_tau	6.141E-03	nsimm	N_F	40	span for floating	taps
0.01	GHz			RESULT_DIR	Aresults\100GEL_0	2M_host_ida	te package_Z_c	[87.5 87.5 ; 92.5 92.5]	Ohm	bmaxg	0.2	FE value for floa	ting taps
[1.2e-4 0.85e-4]	nF	[TX BX]		SAVE_FIGURES	0	logical		ICN & FOM_ILD parameter	ers				
[0.12 0.12]	nH	[TX BX]		Port Order	[1324]		f_y	0.594	*Fb	for TP4>	[1.2e-4 0]	nF	[TX BX]
[0.3e-4 0.3e-4]	nF	[TX BX]		RUNTAG	C2M_eval_		EF	0.594	GHz f_r specified in first column		[0.12 0]	nH	[TX BX]
[12]		[test cases to run]		COM_CONTRIBUTIO	0	logical	£n	0.594	GHz		[0.3e-4 0]	nF	[TX BX]
[12 16 ; 1.8 1.8]	mm	[test cases]		Local Search	2		F_2	40	GHz		[123]		[test cases to run]
[28;00]	mm	[test cases]		0	perational		A_ft	0.600	v		[278]	mm	[test cases]
[12 16 ; 1.8 1.8]	mm	[test cases]		VEC Pass threshold	9	db	A_nt	0.600	v		[000]	mm	[test cases]
[28;00]	mm	[test cases]		EH_min	15	m٧					[278]	mm	[test cases]
[0.87e-4 0.65e-4]	nF	[TX BX]		ERL Pass threshold	7.3	dB					[000]	mm	[test cases]
50	Ohm			DER_0	0.00001						[0 0.87e-4]	nF	[TX BX]
[50 50]	Ohm	[TX BX]		T_r	0.0075	ns							
0.415	V	vp/vf=.694		FORCE_TR	1	5				Ta	able 92–12 parameters		
0.415	V	vp/vf=.694		PMD_type	C2M					Parameter	Setting		
0.608	V			BREAD CRUMBS	0	logical				board ti gamma0 a1 a2	[0 3.8206e-04 9.5909e-05	1	
4				SAVE CONFIG2MAT	1	logical				board ti tau	0.00579	ns/mm	
32	Samp/UI			PLOT CM	0	logical				board Z c	100	Ohm	
100	Samp/UI			TDR a	nd ERL options						407	mm	
50	mÜl			TDR	1	logical					407	mm	
0	V	[test cases]	[0.0235 0.0256]	ERL	1	logical					407	mm	-
filter and Eq				ERL ONLY	0	logical					407	mm	-
	*fb				0.01	ns					0	nF	
0.54		min		N	800		new			C_1	0	nF	
[-0.2:0.02:0]		[min:step:max]		beta x	0		upodated for D1.4			Include PCB	0	logical	
					0.618								-
				fixture de lav time	[0.0.2e-91	[port1 port2]							
				TDR V TXPKG	1								
4	UI			N bx	0	UI							
0.4		As/dffe1		Tukey Window	1								
[0.15 0.10 0.1]		As/dfe2N b			eiver testing								
		As/dffe1		BX CALIBRATION	0	logical							
[-0.15 - 0.05 - 0.05]		As/dfe2N b		Sigma BBN step	5.00E-03	V							
	dB	[min-sten-max]		N	oise jitter								
		[minacepinian]				111							
		[min-sten-max]											
	GH2	[mmaxepinian]											
		ranges			0.00								
[0-1-2-3]	dB	ranges											
	0.01 [12e+4.0.86+4] [0.12.0.12] [0.3e+4.0.3e+4] [12] [12] [12] [12] [12] [12] [12] [12] [12]	0.01 GiHz [12#4.0.85#4] nF [0.12.0.12] nH [0.3e+0.3e+4] nF [12] nF [13] nm [12] nF 50 Ohrm 0.415 V 0.608 V filter and Eq 0.75 0.75 Yb 0.54 0.54 [0.402.01] [0.402.01] [0.415.010 0.1 0.41 0.4 0.41 0.4 [0.50.02.01] [0.1.1	0.01 GHz [12e4.0.85e4] nF [TXFRX] [0.3e4.0.3e4] nF [TXFRX] [0.3e4.0.3e4] nF [TXFRX] [12] [test cases] [TXFRX] [12] [test cases] [TXFRX] [12] [test cases] [test cases] [28]:0.0] mm [test cases] [28]:0.0] mm [test cases] [28:0.0] mm [test cases] [0.7e+4.0.85e+1] nF [TXFRX] 0.455 V ophris.834 0.415 V ophris.834 0.415 V ophris.834 0.608 V 4 32 SampUl 100 50 mU 0 0 V [test cases] filter and Eq 0.75 Yb 0.75 Yb min (0.02.01] [min:step:mat] (0.10.02.0] [min:step:mat] (0.15<0.00	0.01 GHz [12e4.0.85e4] nF [TXFRX] [03e4.0.3e4] nF [TXFRX] [12] [TXFRX] [TXFRX] [12] [Est cases] [TXFRX] [2] [13] mm [test cases] [2] [13] [test cases] [TXFRX] [0.45] Ohm [TXFRX] [TXFRX] [0.415] V uplvfs.834 [0.415] [0.415] V uplvfs.834 [0.0235.0.0266] filter and Eq [0.020] [min:tep:mat] [0.0235.0.0266] filter and Eq min [min:tep:mat] [0.02.02.0] [0.010_0.01] [min:tep:mat] [0.015_	0.01 GHz RESULT_DIR [12e+0.85e-4] nF [TX RX] SAVE_FIGURES [012.02] nH [TX RX] Fort Order [02e+0.86-4] nF [TX RX] Fort Order [12] [test cases to run COM_CONTRIBUTIO [12] [test cases] COM_CONTRIBUTIO [12] [test cases] VEC Pass threshold [12] [test cases] VEC Pass threshold [12] [test cases] VEC Pass threshold [12] [test cases] ERL Pass threshold [28] 0.0hm DEF_0 [007e+0.65e-4] nF [TX RX] [007e+0.65e-4] nF [TX RX] [007e+0.65e-4] nF [TX RX] [0086] V up/vir.634 [00.608] V up/vir.634 [00.608] V up/vir.634 [00.600] NI [TR RX] [010] [minstepmas] [TOR_UCLFCMITES] [02.00.01] [minstepmas] [TOR_UCLFCMITES]	0.01 GHz FESULT_DR tresultst00GEL_1 [12e+0.85e-4] nF [TX FX] SAVE_FIGURES 0 [02:02] nH [TX FX] SAVE_FIGURES 0 [12] [Itst cases to run COM_CONTRIBUTIO 0 [28]:18.18] mm [test cases] Com_CoNTRIBUTIO 0 [28]:18.18] mm [test cases] Com_CoNTRIBUTIO 0 [28]:00] mm [test cases] Com_CoNTRIBUTIO 0 [28]:01] mm [test cases] Com_CoNTRIBUTIO 0 [28]:00] mm [test cases] Com_CoNTRIBUTIO 0 [28]:00] mm [test cases] EFL pass threshold 9 [28:00] mm [test cases] EFL pass threshold 9 [0.415 V uptris.694 FDRCE_TR 1 0.415 V uptris.694 PMD_type C2M 0.606 mU GNE_CONFIG2MAT 1 1 32 SampU [00	0.01 GHz RESULT_DIR Mesukst00GEL_C2M_host_data [12e+0.85e+1] nF [TX RX] SAVE_FIGURES 0 logical [03e+0.3e+1] nF [TX RX] Fort Order [1324] logical [12] Itest cases torun COM_CONTRIBUTIO 0 logical [12] Itest cases] VEC Pass threshold 9 db [12] Itest cases] ERL Pass threshold 7.3 dB [12] Itest cases] ERE_0_CRUMBS 0 logical [12] Itest cases] T_r 0.00001 Displand [12] Itest cases] EREA_CRUMBS 0 logical [12] Vylvir.834 PMD_type C2M logical [13] Vylvir.834 PMD_type C2M	0.01 GHz FESULT_DIR Nesultst00GEL_C2M_host_Idation package_2_c [124-0.858-4] nF [TX FR] SAVE_FIGURES 0 logical [012.02] nH [TX FR] SAVE_FIGURES 0 logical [12] [12] [12] [12] Figure Cases COM_CONTRIBUTIO 0 logical f,f [12]	0.01 GH2 PESULT_DR tresults/100GEL_C2M_hot_late package_Z_o [875975:32525] [1244.086+1] nF [TXR0] SAVE_FIGURES 0 logical ict # row	0.01 GHz PESULT_DIR veruits/00EL_CAM_lost_jate paklag_Z_0 [075975] 32592] Oim [12a-01564] rF [TTKPK] Port Didr [12] Dim Dim [12] r r TTKPK] Port Didr [12] Dim Dim [12] r Restarson COM_LONTRIBUTIO 0 logical i.r 0.854 Pht [12] Test cases to run COM_CONTRIBUTIO 0 logical i.r 0.854 OH4 [28, 10.0] rmm fest cases to run COM_CONTRIBUTIO 0 logical i.r 0.854 OH4 [28, 10.0] rmm fest cases to run COM_CONTRIBUTIO 0 logical i.r 0.854 OH4 OH4 [28, 10.0] rmm fest cases to run COM_CONTRIBUTIO 0 logical A_R 0.0000 A_R OH4 POFCE_TR	0.01 0H2 0H3 0H3 <th< td=""><td>0.010.040.040PESULT_DPVerentrostance_LCPALoge_Loc000000000000000000000000000000000</td><td>0.010.010.010.010.02PESULT_CINVereeNNUCC_CAN_Lock_Letwpackage2, c(27.877): (25.92.1)0.0m0.0m0.010.02PEUNOS0.010.02PEUNOS0.010.02PEUNOS0.010.020.010.020.010.020.01<th< td=""></th<></td></th<>	0.010.040.040PESULT_DPVerentrostance_LCPALoge_Loc000000000000000000000000000000000	0.010.010.010.010.02PESULT_CINVereeNNUCC_CAN_Lock_Letwpackage2, c(27.877): (25.92.1)0.0m0.0m0.010.02PEUNOS0.010.02PEUNOS0.010.02PEUNOS0.010.020.010.020.010.020.01 <th< td=""></th<>



COM Settings – TP1a

	Table 93A-1 parameter	rs				/O control	Concernance.		Table 93A-3 paramet	ers	F	loating Tap Control		
Parameter	Setting	Units	Information		DIAGNOSTICS	1	logical	Parameter	Setting	Units	N_bg	0	012 or 3 groups	
F.b.	53.125	GBd			DISPLAY_WINDOW	0	logical	package_tl_gamma0_a1_a2	[0 0.0009909 0.0002772]		N_bf	3	taps per group	
f_min	0.05	GHz			CSV_REPORT	0	logical	package_tl_tau	6.141E-03	ns/mm	N_F	40	span for floating t	aps
Delta_f	0.01	GHz			RESULT_DIR	Aresults\100GEL	C2M_host_lda	ate package_Z_c	[87.5 87.5 ; 92.5 92.5]	Ohm	bmaxg	0.2	FE value for float	ing taps
C_d	[1.2e-4 0]	nF	[TX BX]		SAVE_FIGURES	0	logical		ICN & FOM ILD paramete	ers				
Ls	[0.12 0]	nH	[TX BX]		Port Order	[1324]		fv	0.594	*Fb	for TP4>	[1.2e-4 0]	nF	[TX BX]
C_b	[0.3e-4 0]	nF	[TX BX]		RUNTAG	C2M_eval_		ĒF	0.594	GHz f_r specified in first column		[0.12 0]	nH	[TX BX]
z_p select	[12]		[test cases to run		COM_CONTRIBUTION	0	logical	É.n.	0.594	GHz		[0.3e-4 0]	nF	[TX BX]
z_p(TX)	[12 16; 1.8 1.8]	mm	[test cases]		Local Search	2		F_2	40	GHz		[123]		[test cases to run]
z_p (NEXT)	[00;00]	mm	[test cases]		0	perational		A_ft	0.600	v		[278]	mm	[test cases]
z_p (FEXT)	[12 16; 1.8 1.8]	mm	[test cases]		VEC Pass threshold	9	db	A_nt	0.600	v		[000]	mm	[test cases]
z_p (RX)	[00;00]	mm	[test cases]		EH_min	15	mV					[278]	mm	[test cases]
C_P	[0.87e-4 0]	nF	[TX BX]		ERL Pass threshold	7.3	dB					[000]	mm	[test cases]
R_0	50	Ohm			DER_0	0.00001						[0 0.87e-4]	nF	[TX BX]
R_d	[50 50]	Ohm	[TX BX]		T_r	0.0075	ns							
A_V	0.415	V	vp/vf=.694		FORCE_TR	1	5				т	able 92–12 parameters		
A_fe	0.415	V	vp/vf=.694		PMD_type	C2M					Parameter	Setting		
A_ne	0.608	V			BREAD_CRUMBS	0	logical				board_tl_gamma0_a1_a2	[0 3.8206e-04 9.5909e-05	5]	
L	4				SAVE_CONFIG2MAT	1	logical				board_ti_tau	0.00579	nsimm	
м	32	Samp/U	1		PLOT_CM	0	logical				board_Z_c	100	Ohm	
samples_for_C2M	100	Samp/U	1		TDR a	nd ERL options	5				z_bp (TX)	407	mm	
T_0	50	mUl			TDR	1	logical				z_bp (NEXT)	407	mm	
AC_CM_RMS	0	V	[test cases]	[0.0235 0.0256]	ERL	1	logical				z_bp (FEXT)	407	mm	
	filter and Eq				ERL_ONLY	0	logical				z_bp (RX)	407	mm	
÷.	0.75	۴b			TR_TDR	0.01	ns				C_0	0	nF	
c(0)	0.54		min		N	800		new			C_1	0	nF	
c(-1)	[-0.2:0.02:0]		[min:step:max]		beta_x	0		upodated for D1.4			Include PCB	0	logical	
o(-2)	[0:0.02:0.1]		[min:step:max]		rho_s	0.618								
o(-3)	[0]		[min:step:max]		ficture de lay time	[0 0.2e-9]	[port1 port2]							
c(1)	[-0.1:0.02:0]		[min:step:max]		TDR_V_TXPKG	1								
N_b	4	U			N_bx	0	UI							
b_max(1)	0.4		As/dffe1		Tukey_Window	1								
b_max(2N_b)	[0.15 0.10 0.1]		As/dfe2N_b			eiver testing								
b_min(1)	0.1		As/dffe1		BX_CALIBRATION	0	logical							
b_min(2N_b)	[-0.15 - 0.05 - 0.05]		As/dfe2N_b		Sigma BBN step	5.00E-03	¥							
_DC	[-13:1:-0]	dB	[min:step:max]		N	loise, jitter	ė – – – – – – – – – – – – – – – – – – –							
f_z	12.58	GHz			sigma_RJ	0.01	UI							
E_p1	20	GHz			A_DD	0.02	UI							
f_p2	28	GHz			eta_0	4.10E-08	V^2/GHz							
g_DC_HP	[-3:0.5:0]		[min:step:max]		SNR_TX	32.5	dB							
F_HP_PZ	1.328125	GHz			R_LM	0.95								
G_Qual	[-2-9 ;-2-12; -4-12;-6-13]	dB	ranges											
G2 Qual	[0-1-2-3]	dB	ranges											

