

# **Commit Request 4p15\_3: Default of Clip Method to Slow**

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IEEE 802.3 Channel Operating Margin (COM) Open Source Project Ad Hoc

# History

Revision	Date	Comment
0.5	18-Jun-26	<ul style="list-style-type: none"><li>▪ Initial Draft.</li></ul>
1.0	22-Jun-26	<ul style="list-style-type: none"><li>▪ Revised the slides on the results.</li></ul>
1.5	23-Jun-26	<ul style="list-style-type: none"><li>▪ Revised slide 14 for a typing mistake.</li></ul>

# Purpose for Commit Request

- Commit request related to the default of “Clip Method” to “Slow”.
- The default of the “Clip Method” for the ADC quantization noise should be “Slow” in staying aligned with the IEEE 802.3dj standard.
- Branch: default\_clip\_method\_slow.  
[https://opensource.ieee.org/hansel.dsilva/com\\_code/-/branches](https://opensource.ieee.org/hansel.dsilva/com_code/-/branches)
- Git branch file pointer:  
[https://opensource.ieee.org/hansel.dsilva/com\\_code/-/blob/default\\_clip\\_method\\_slow/release/com\\_ieee8023\\_4p15p0\\_default\\_adc\\_clip\\_slow.m?ref\\_type=heads](https://opensource.ieee.org/hansel.dsilva/com_code/-/blob/default_clip_method_slow/release/com_ieee8023_4p15p0_default_adc_clip_slow.m?ref_type=heads)

# Navigate to Hansel\_Dsilva/com\_code

[https://opensource.ieee.org/802-com/com\\_code/-/forks](https://opensource.ieee.org/802-com/com_code/-/forks)

The screenshot shows the IEEE Open Source Project page for the 802-COM / com\_code / Forks. The page displays a list of 11 forks, with the following details:

Forker	Repository	Description	Updated
Baidyanath Dutta	com_code	Merge branch 'KR_PKGB_CONFIG_for_d2p1' into 'main'	Updated 2 months ago
Norman Swenson	com_code	add 4p10p0 beta release	Updated 4 months ago
Mohammad Shakiba	com_code	add configuration file folder and some configuration files	Updated 4 months ago
Adee Ran	com_code	Merge branch 'signal_flow_graph' into 'main'	Updated 3 months ago
Hansel Dsilva	com_code	rename for 4.12.0_beta1 to 4.12.0	Updated 16 minutes ago
Kent Lusted	com_code	rename for 4.12.0_beta1 to 4.12.0	Updated 2 weeks ago
Richard Mellitz	com_code	rename for 4.12.0_beta1 to 4.12.0	Updated 1 day ago
Adam Gregory	com_code	deleting fork version	Updated 1 month ago

A red box highlights the fork by Hansel Dsilva, and a black arrow points to it with the text "Navigate to Hansel\_Dsilva/com\_code".

# Checking changes of a branch to the last release

[https://opensource.ieee.org/hansel.dsilva/com\\_code/-/branches](https://opensource.ieee.org/hansel.dsilva/com_code/-/branches)

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Hansel Dsilva / com\_code / Repository / Branches


Overview Active Stale All

Filter by branch name



View branch rules New branch

Active branches

default\_clip\_method\_slow   
dd86556e · Setting the default of Clip Method to Slow and corrected for a typogra

adaptive\_local\_search   
0b006115 · revised the function call of OptFom\_Adaptive\_Local\_Search in bringin

Use drop down in the 3 dots pulldown for default\_clip\_method\_slow and select compare. Selecting bring up the compare screen

New  

Compare

Delete branch

# Code Updates

- 2 m file changed.
- 0 m files added.
- No additional config csv and xlsx files are included.

Files changed,  
src/get\_PSDs.m  
src/read\_ParamConfigFile.m

# New or changed keywords

None

# New Outputs


None

# Summary of code changes page 1

```
src/read_ParamConfigFile.m
... @@ -245,7 +245,7 @@ param.specBER = xls_parameter(parameter, 'DER_0');
% Target detector error ratio
245 param.DER_CDR = xls_parameter(parameter, 'DER_CDR',true,1e-2); % min
DER required for a CDR
246 param.N_qb = xls_parameter(parameter, 'N_qb',true,0); % adc number of
bits if 0 do not apply quantization
247 param.P_qc= xls_parameter(parameter, 'P_qc',true,2*param.specBER); %
adc clipping probability
248 - param.clip_method = xls_parameter(parameter, 'Clip Method', false,
'Fast'); % "Clip Method" parameter for Quantization Noise ('Fast' or
'Slow')
249 param.P_peak= xls_parameter(parameter, 'P_peak',true,param.specBER);
% SCMR CDFprobability. Default DER_0
250 param.pass_threshold = xls_parameter(parameter, 'COM Pass
threshold',false,0); % the pass fail threshold for COM in dB
251 param.add_rx_noise = xls_parameter(parameter, 'add_rx_noise', true,
param.pass_threshold); % additional receiver noise target in dB
...
... @@ -245,7 +245,7 @@ param.specBER = xls_parameter(parameter, 'DER_0');
% Target detector error ratio
245 param.DER_CDR = xls_parameter(parameter, 'DER_CDR',true,1e-2); % min
DER required for a CDR
246 param.N_qb = xls_parameter(parameter, 'N_qb',true,0); % adc number of
bits if 0 do not apply quantization
247 param.P_qc= xls_parameter(parameter, 'P_qc',true,2*param.specBER); %
adc clipping probability
248 + param.clip_method = xls_parameter(parameter, 'Clip Method', false,
'Slow'); % "Clip Method" parameter for Quantization Noise ('Fast' or
'Slow')
249 param.P_peak= xls_parameter(parameter, 'P_peak',true,param.specBER);
% SCMR CDFprobability. Default DER_0
250 param.pass_threshold = xls_parameter(parameter, 'COM Pass
threshold',false,0); % the pass fail threshold for COM in dB
251 param.add_rx_noise = xls_parameter(parameter, 'add_rx_noise', true,
param.pass_threshold); % additional receiver noise target in dB
...
```

- Change the default from 'Fast' to 'Slow'.

# Summary of code changes page 2

```
src/get_PSDs.m Edit View file @ dd86556e  
... @@ -234,7 +234,7 @@ else % find noise for item that set have tx ffe  
for each loop  
234     sampled_pulse_response = sampled_pulse_response(1:num_ui);  
235     end  
236  
237 -   if strcmpi(param.clip_method, 'slow')  
238     sig_aftert_ctle_pdf =  
get_pdf_from_sampled_signal(sampled_pulse_response,param.levels,OP.Bin  
Size);  
239     noise_after_ctle_pdf = sig_aftert_ctle_pdf;  
240     sigma_noise =  
sqrt(result.S_in_rms.^2+result.S_rn_rms^2+result.S_xn_rms^2+result.S_t  
n_rms^2+result.S_rj_rms^2);  
...  
... @@ -234,7 +234,7 @@ else % find noise for item that set have tx ffe  
for each loop  
234     sampled_pulse_response = sampled_pulse_response(1:num_ui);  
235     end  
236  
237 +   if strcmpi(param.clip_method, 'Slow')  
238     sig_aftert_ctle_pdf =  
get_pdf_from_sampled_signal(sampled_pulse_response,param.levels,OP.Bin  
Size);  
239     noise_after_ctle_pdf = sig_aftert_ctle_pdf;  
240     sigma_noise =  
sqrt(result.S_in_rms.^2+result.S_rn_rms^2+result.S_xn_rms^2+result.S_t  
n_rms^2+result.S_rj_rms^2);  
...
```

- Correct for a typographical mistake from 'slow' to 'Slow'.

# get\_PSDs() and adjust\_Rx\_noise\_for\_quantization()

```
function result = get_PSDs(result,h,cursor_i,txffe,G_DC,G_DC2,param,chdata,OP)
....
if strcmpi(param.clip_method, 'slow')
    sig_after_ctle_pdf = get_pdf_from_sampled_signal(sampled_pulse_response,param.levels,OP.BinSize);
    noise_after_ctle_pdf = sig_after_ctle_pdf;
    sigma_noise =
sqrt(result.S_in_rms.^2+result.S_rn_rms.^2+result.S_xn_rms.^2+result.S_tn_rms.^2+result.S_rj_rms.^2);
    noise_after_ctle_pdf.y = 1/(sqrt(2*pi)*sigma_noise)*exp(-
noise_after_ctle_pdf.x.^2/(2*sigma_noise.^2))*OP.BinSize;
    sig_noise_after_ctle_pdf= conv_fct(sig_after_ctle_pdf,noise_after_ctle_pdf);
    sig_noise_after_ctle_cdf = cumsum(sig_noise_after_ctle_pdf.y);
    ctle_signal_sigma = sqrt(sum((sig_noise_after_ctle_pdf.x.^2).*sig_noise_after_ctle_pdf.y));
    adc_clip=-CDF_inv_ev(param.P_qc, sig_noise_after_ctle_pdf,sig_noise_after_ctle_cdf);
    result.ctle_signal_sigma=ctle_signal_sigma;
else
    adc_clip = sum(abs(sampled_pulse_response));
end
adc_lsb = 2*adc_clip/(2^param.N_qb-1);
sigma_Q = adc_lsb/sqrt(12);
S_qn = sigma_Q^2/f_b*ones(1, num_ui);
result.adc_clip=adc_clip;
result.S_qn = S_qn;
result.S_qn_rms = sqrt(sum(result.S_qn)* delta_f);
```

```
function [chdata,NS,combined_interference_and_noise_pdf] =
adjust_Rx_noise_for_quantization(combined_interference_and_noise_pdf,NS, chdata,fom_result,param,OP)

sig_after_ctle_pdf = get_pdf_from_sampled_signal(chdata(1).pulse_sampled_w_tx_ffe_ctle, param.levels, param.delta_y);
sig_after_ctle_pdf = conv_fct(sig_after_ctle_pdf, combined_interference_and_noise_pdf);
sig_after_ctle_cdf = cumsum(sig_after_ctle_pdf.y);
adc_clip = -CDF_inv_ev(param.P_qc, sig_after_ctle_pdf, sig_after_ctle_cdf);
ctle_signal_sigma = sqrt(sum((sig_after_ctle_pdf.x.^2).*sig_after_ctle_pdf.y));
adc_lsb = 2*adc_clip/(2^param.N_qb-1);
NS.sigma_Q = adc_lsb/sqrt(12);
NS.sigma_before_clip = ctle_signal_sigma;
NS.peak_clip = adc_clip;
NS.p2ptosigma_clip = 2*adc_clip/ctle_signal_sigma;
quantization_noise_in_pdf = combined_interference_and_noise_pdf; % This is to copy the fields of the structure
[~,adc_ind_right] = min(abs(quantization_noise_in_pdf.x-adc_lsb/2));
[~,adc_ind_left] = min(abs(quantization_noise_in_pdf.x+adc_lsb/2));
% adc_ind_right= find ( min(abs(quantization_noise_pdf.x-adc_lsb/2)) == abs(quantization_noise_pdf.x-adc_lsb/2) );
% adc_ind_left= find ( min(abs(quantization_noise_pdf.x+adc_lsb/2)) == abs(quantization_noise_pdf.x+adc_lsb/2) );
quantization_noise_in_pdf.y = zeros(size(quantization_noise_in_pdf.x));
quantization_noise_in_pdf.y(adc_ind_left:adc_ind_right) = 1/(adc_ind_right-adc_ind_left+1);
% initialize quantization noise PDF afeter RxFFE to a Dirac delta PDF
quantization_noise_pdf = combined_interference_and_noise_pdf;
[~,ind_center]= min(abs(quantization_noise_pdf.x));
quantization_noise_pdf.y = zeros(size(quantization_noise_pdf.x));
quantization_noise_pdf.y(ind_center) = 1;
% Calculate quantization noise PDF after RxFFE
h_rxffe = fom_result.RxFFE(find(fom_result.RxFFE ~= 0));
for irxffe = 1:length(h_rxffe)
    if irxffe ~= param.ffe_pre_tap_len
        quantization_noise_in_pdf_scale = scalePDF(quantization_noise_in_pdf, abs(h_rxffe(irxffe)));
        quantization_noise_pdf = conv_fct(quantization_noise_pdf, quantization_noise_in_pdf_scale);
    end
end
combined_interference_and_noise_pdf = conv_fct(combined_interference_and_noise_pdf, quantization_noise_pdf);
NS.quantization_noise_pdf = quantization_noise_pdf ;
```

- Choosing Clip Method of “Fast” creates a disconnect between get\_PSDs() and adjust\_Rx\_noise\_for\_quantization().

# List of CR and KR Channels on 802.3dj Public Area

- Below are the 200 Gb/s CR and KR channel data (TP0 to TP5)- with crosstalk.

1. akinwale\_3dj\_01\_2311: x4
2. weaver\_3dj\_02\_2311: x12
3. akinwale\_3dj\_01\_2310: x7
4. lim\_3dj\_07\_2309: x1
5. lim\_3dj\_04\_230629: x1
6. lim\_3dj\_03\_230629: x1
7. weaver\_3dj\_elec\_01\_230622: x8
8. shanbhag\_3dj\_01\_2305: x6
9. shanbhag\_3dj\_02\_2305: x4
10. kocsis\_3dj\_02\_2305: x5
11. weaver\_3dj\_02\_2305: x36
12. mellitz\_3dj\_02\_elec\_230504: x27
13. weaver\_3dj\_02\_2303: x5
14. mellitz\_3dj\_02\_2303: x54

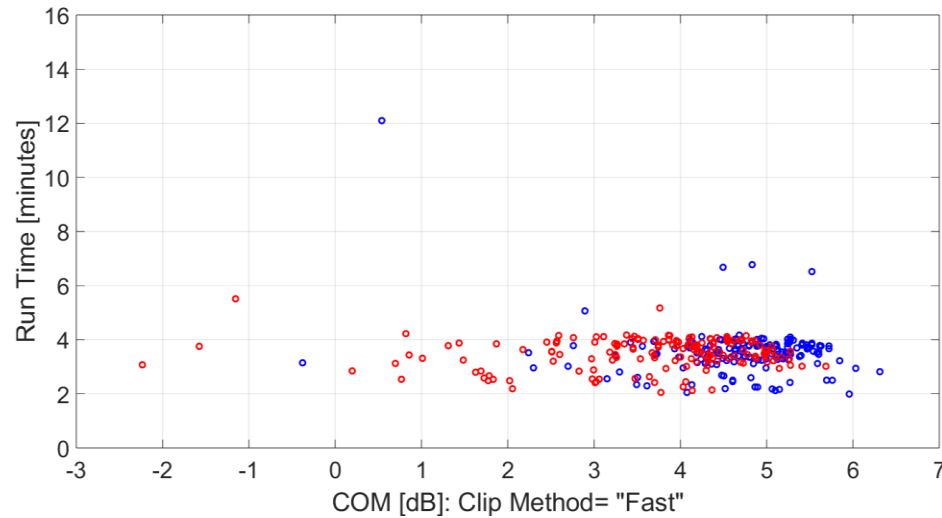
Table 178–14—Device termination and package model parameters

Parameter	Symbol	Value	Units
Device termination model			
Single-ended device capacitance for stage 1	$C_d^{(1)}$	$40 \times 10^{-6}$	nF
Single-ended device capacitance for stage 2	$C_d^{(2)}$	$90 \times 10^{-6}$	nF
Single-ended device capacitance for stage 3	$C_d^{(3)}$	$110 \times 10^{-6}$	nF
Single-ended device series inductance for stage 1	$L_s^{(1)}$	0.13	nH
Single-ended device series inductance for stage 2	$L_s^{(2)}$	0.15	nH
Single-ended device series inductance for stage 3	$L_s^{(3)}$	0.14	nH
Single-ended bump capacitance	$C_b$	$30 \times 10^{-6}$	nF
Device package model, class A			
Transmission line parameter $\gamma_0$	$\gamma_0$	$5 \times 10^{-4}$	1/mm
Transmission line parameter $a_1$	$a_1$	$8.9 \times 10^{-4}$	ns <sup>1/2</sup> /mm
Transmission line parameter $a_2$	$a_2$	$2 \times 10^{-4}$	ns/mm
Transmission line parameter $r$	$r$	$6.141 \times 10^{-3}$	ns/mm
Transmission line 1 length, Test 1	$z_p^{(1)}$	33	mm
Transmission line 1 length, Test 2	$z_p^{(1)}$	12	mm
Transmission line 1 characteristic impedance	$Z_c^{(1)}$	87.5	$\Omega$
Transmission line 2 length	$z_p^{(2)}$	1.8	mm
Transmission line 2 characteristic impedance	$Z_c^{(2)}$	92.5	$\Omega$
Device package model, class B			
Transmission line parameter $\gamma_0$	$\gamma_0$	$5 \times 10^{-4}$	1/mm
Transmission line parameter $a_1$	$a_1$	$6.5 \times 10^{-4}$	ns <sup>1/2</sup> /mm
Transmission line parameter $a_2$	$a_2$	$2.93 \times 10^{-4}$	ns/mm
Transmission line parameter $r$	$r$	$6.141 \times 10^{-3}$	ns/mm
Transmission line 1 length, Test 1, Tx / Rx	$z_p^{(1)}$	45 / 44	mm
Transmission line 1 length, Test 2, Tx / Rx	$z_p^{(1)}$	30 / 29	mm
Transmission line 1 characteristic impedance	$Z_c^{(1)}$	87.5	$\Omega$
Transmission line 2 length	$z_p^{(2)}$	2	mm
Transmission line 2 characteristic impedance	$Z_c^{(2)}$	95	$\Omega$
Transmission line 3 length	$z_p^{(3)}$	1.3	mm
Transmission line 3 characteristic impedance	$Z_c^{(3)}$	100	$\Omega$
Transmission line 4 length	$z_p^{(4)}$	1.5	mm
Transmission line 4 characteristic impedance	$Z_c^{(4)}$	78	$\Omega$

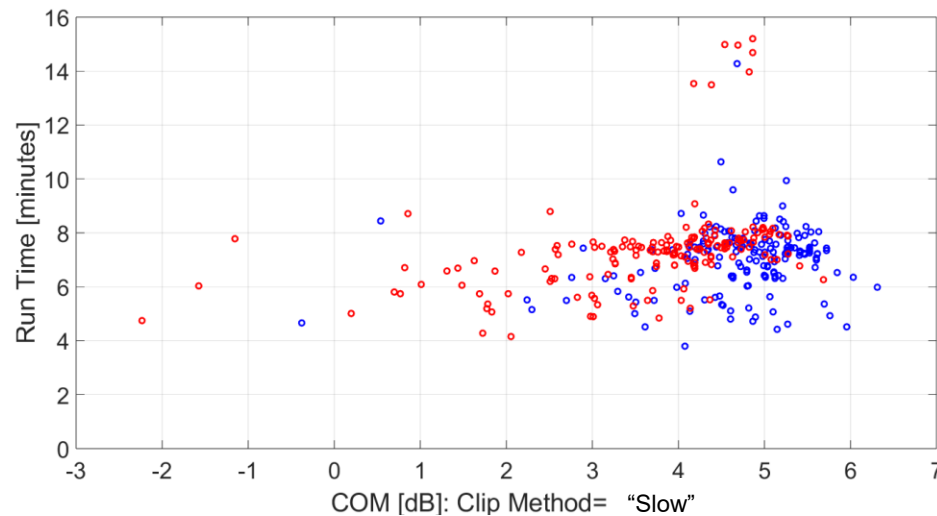
- Total of 171 channels from the IEEE 802.3dj Public Area are evaluated against the class A and class B package models.
  - Total cases= 171x4= 684 cases.

# Fast vs. Slow Clip Method: Results on Run Time

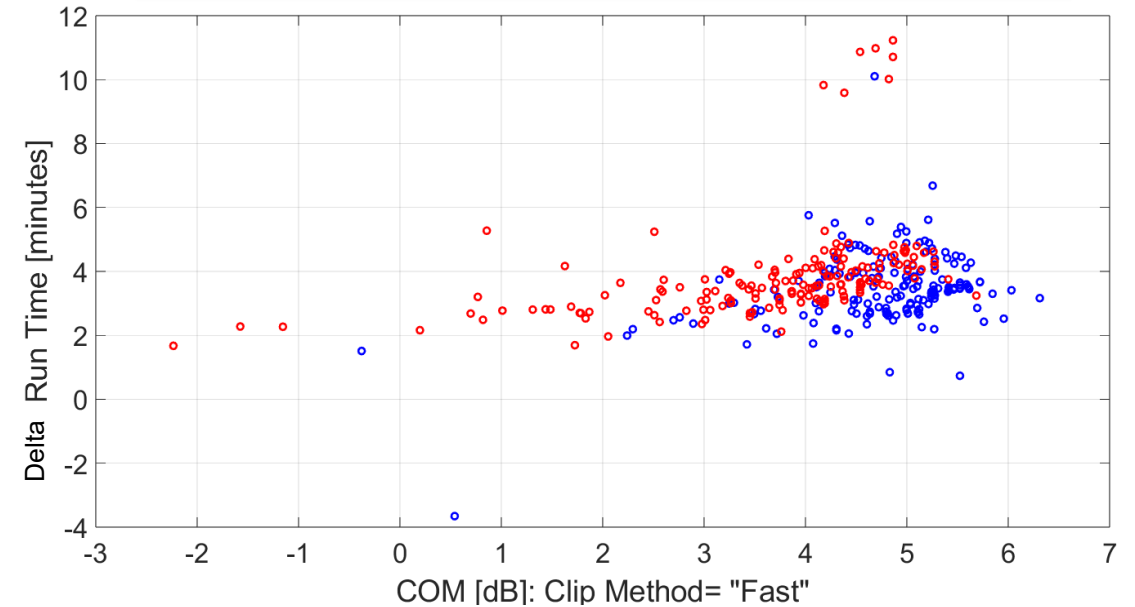
1] Clip Method  
= "Fast"



2] Clip Method  
= "Slow"



3] Delta= Clip Method= "Slow" - Clip Method= "Fast"

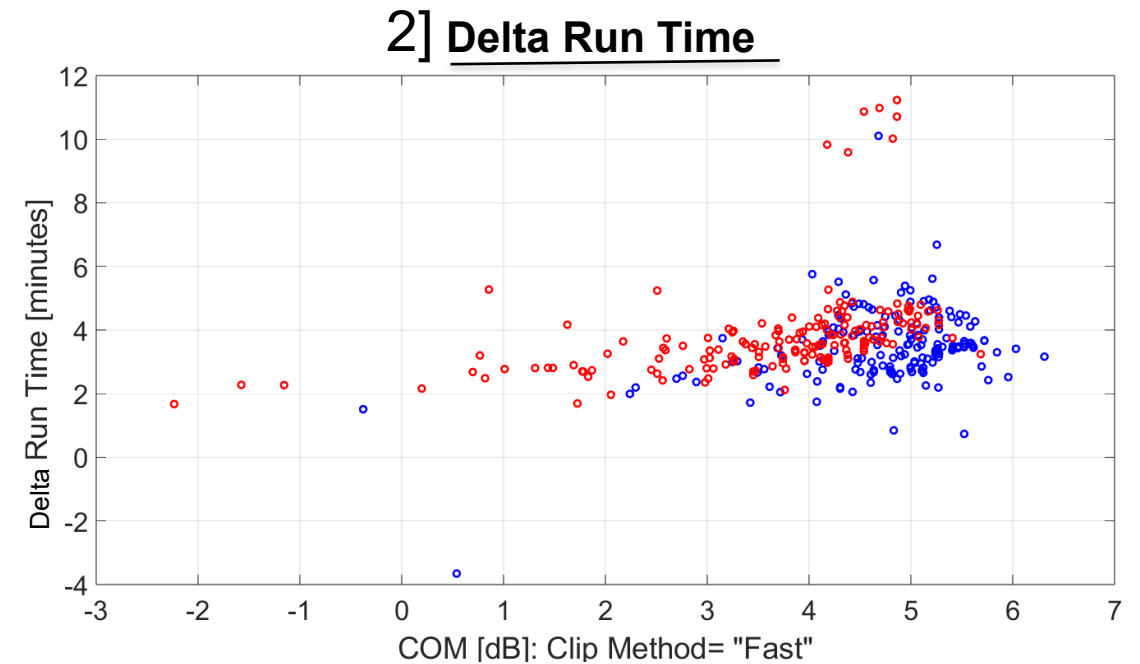
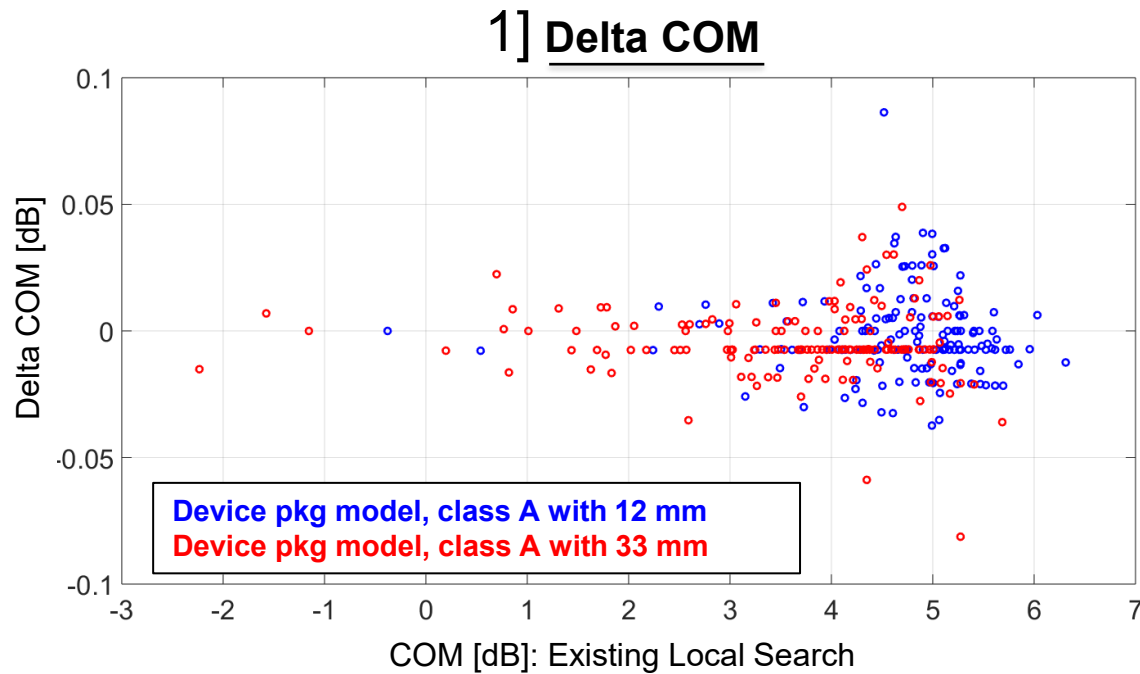


Device pkg model, class A with 12 mm  
Device pkg model, class A with 33 mm

- Clip Method of "Slow" presents a much as 4x increase in the run time compared to Clip Method of "Fast".

# Fast vs. Slow Clip Method: Results on COM and Run Time

$\Delta = \text{Clip Method} = \text{"Slow"} - \text{Clip Method} = \text{"Fast"}$



- Clip Method of "Slow" presents a negligible change in the value of COM when compared to Clip Method of "Fast".
- The observed delta COM of  $\pm 0.1$  dB was observed in [https://www.ieee802.org/3/ad\\_hoc/COM/public/telecon/250617/shakiba\\_COM\\_01a\\_250617.pdf](https://www.ieee802.org/3/ad_hoc/COM/public/telecon/250617/shakiba_COM_01a_250617.pdf)

# Thank You

# COM Spreadsheet for Package Class A

data rate, die load, ref impedance				I/O control			Operational				SAVE_CONFIG2MAT	0	
Parameter	Setting	Units	Information	DIAGNOSTICS	1	logical	ERL Pass threshold	11	dB			Receiver testing	
f_b	106.25	Gbd		DISPLAY_WINDOW	1	logical	COM Pass threshold	3	db			0	
f_min	0.05	GHz		CSV_REPORT	0	logical	DER_0	2.00E-04				logical	
Delta f	0.01	GHz		RESULT_DIR	.\results\CAKR {date}\		T_r	0.00400	ns			5.00E-03	V
C_d	[0.4e-4 0.9e-4 1.1e-4; 0.4e-4 0.9e-4 1.1e-4]	nF	[TX RX]	SAVE_FIGURES	0	logical	FORCE_TR	1	logical	for legacy but required		ICN parameters	
L_s	[0.13 0.15 0.14; 0.13 0.15 0.14]	nH	[TX RX]	Port Order	[ 1 3 2 4 ]		PMD_type	C2C	for MMSE use C2C only		T_t	6.000	ps
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]	RUNTAG	KR_pkgA		EW	1			f_v	0.371	39.42
R_0	46.25	Ohm		COM_CONTRIBUTION	0	logical	MLSE	1	logical		T_ft	4.250	ps
PKG_NAME	PKG_LowR_CLASSA PKG_LowR_CLASSA		TX RX				ts_anchor	1			T_nt	4.250	ps
z_p select	[ 1 2 ]			TDR and ERL options			sample_adjustment	[-24 24]			f_f	0.524	55.65
L	4			TDR	1	logical	Local Search	2			f_n	0.524	55.65
M	32			ERL	1	logical	flim	6.70E+10	Hz		f_1	0.010	GHz
filter and Eq				ERL_ONLY	0	ns	zero_pad	1	logical		f_2	67.000	GHz
f_r	0.55	*fb		TR_TDR	0.005		Filter: Rx FFE				A_ft	0.600	V
c(0)	0.55		min	N	7000	logical	ffe_pre_tap_len	6	UI		A_nt	0.600	V
c(-1)	0		[-0.34:02:0] [min:step:max]	TDR_Butterworth	1		ffe_post_tap_len	8	UI		Parameter		Setting
c(-2)	0		[0.14:02:0] [min:step:max]	beta_x	0		w_max(d_w) and -w_min(d_w)				board_tl_gamma0_a1_a2	[05.95e-4 2.6e-05]	1.4 db/in @ 53.125G
c(-3)	0		[min:step:max]	rho_x	0.618		ffe_post_tap1_max	0.7	(normalized)	w_max(d_w+2) and -w_min(d_w+2)	board_tl_tau	5.790E-03	ns/mm
c(-4)	0		[min:step:max]	TDR_W_TXPKG	0	UI	ffe_tapn_max	0.7	(normalized)	all other fixed w_max and w_min	board_Z_c	92.5	Ohm
c(1)	0		[-0.2:02:0] [min:step:max]	N_bx	16	??	num_ui_RXFF_noise	4096			z_bp (TX)	9	mm
N_b	1	UI		fixture delay time	[ 00 ]		Floating Tap Control				z_bp (NEXT)	9	mm
b_max(1)	0.85		As/dffe1	Tukey_Window	1		N_bg	2	0 1 2 or 3 groups	N_wg	z_bp (FEXT)	9	mm
b_max(2..N_b)	0		not used	Z_t	46.25		N_bf	4	taps per group	N_wf	z_bp (RX)	9	mm
b_min(1)	0		As/dffe1	Noise, jitter			N_f	80	UI span for floating taps	Nmax-d_w-1	C_0	[ 00 ]	nF
b_min(2..N_b)	0		not used	sigma_RJ	0.01	UI	bmaxg	0.05	max FFE value for floating taps	all floating w_max and w_min	C_1	[ 00 ]	nF
g_DC	[-20:1:0]	dB	[min:step:max]	A_DD	0.02	V^2/GHz	N_tail_start	9	(UI) start of tail taps limit	not supposed to be used but untested	Include PCB	0	logical
f_z	42.50	GHz		eta_0	7.50E-09	dB	TS_SRCH_MODE	full-sweep					
f_p1	42.50	GHz		SNR_TX	33.5		Clip Method	Slow					
f_p2	106.25	GHz		R_LIM	0.95								
g_DC_HP	[-6:1:0]		[min:step:max]	N_qb	6								
f_HP_PZ	1.328125	GHz		P_qc	1.00E-07								

## Note.

Toggle Clip Method to "Slow" or "Fast"  
 Set TS\_SRCH\_MODE to "full-sweep"  
 Set sample\_adjustment to "[-24 24]"

Parameter	Setting	Units	Information
package_tl_gamma0_a1_a2	[ 0.0005 0.00089 0.0002 ]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[87.5 87.5; 95 95; 100 100; 100 100]	Ohm	
R_d	[ 46.25 46.25 ]	Ohm	[TX RX]
z_p (TX)	[ 12 33 33 33 ; 1.8 1.8 1.8 1.8 ; 0 0 0 0 ; 0 0 0 0 ]	mm	[test cases]
z_p (NEXT)	[ 12 33 33 33 ; 1.8 1.8 1.8 1.8 ; 0 0 0 0 ; 0 0 0 0 ]	mm	[test cases]
z_p (FEXT)	[ 12 33 33 33 ; 1.8 1.8 1.8 1.8 ; 0 0 0 0 ; 0 0 0 0 ]	mm	[test cases]
z_p (RX)	[ 12 33 33 33 ; 1.8 1.8 1.8 1.8 ; 0 0 0 0 ; 0 0 0 0 ]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
A_v	0.385	V	Vf=0.400
A_fe	0.385	V	Vf=0.399
A_ne	0.481	V	Vf=0.400
.END			

# COM Spreadsheet for Package Class B

data rate, die load, ref impedance				I/O control				Operational				SAVE_CONFIG2MAT			
Parameter	Setting	Units	Information	DIAGNOSTICS	1	logical	ERL Pass threshold	11	dB			Receiver testing	0		
f_b	106.25	GBd		DISPLAY_WINDOW	1	logical	COM Pass threshold	3	db			RX_CALIBRATION	0	logical	
f_min	0.05	GHz		CSV_REPORT	1	logical	DER_0	2.00E-04				Sigma BBN step	5.00E-03	V	
Delta_f	0.01	GHz		RESULT_DIR	.\results\CAKR_{date}\		T_r	0.00400	ns			ICN parameters			
C_d	[0.4e-4 0.9e-4 1.1e-4; 0.4e-4 0.9e-4 1.1e-4]	nF	[TX RX]	SAVE_FIGURES	1	logical	FORCE_TR	1	logical			T_t	6.000	ps	
L_s	[0.13 0.15 0.14; 0.13 0.15 0.14]	nH	[TX RX]	Port Order	[1 3 2 4]		PMD_type	C2C				f_v	0.371	39.42	
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]	RUNTAG	KR_pkgB		EW	1				T_ft	4.250	ps	
R_0	46.25	Ohm		COM_CONTRIBUTION	0	logical	MLSE	1	logical			T_nt	4.250	ps	
PKG_NAME	PKG_HIR_CLASSB PKG_HIR_CLASSB		TX RX				ts_anchor	1				f_f	0.524	55.65	
z_p select	[ 3 4 ]			TDR and ERL options				sample_adjustment	[-24 24]			f_n	0.524	55.65	
L	4			TDR	1	logical	Local Search	2				f_1	0.010	GHz	
M	32			ERL	1	logical	flim	6.70E+10	Hz			f_2	67.000	GHz	
filter and Eq				ERL_ONLY	0	ns	zero_pad	1	logical			A_ft	0.600	V	
f_r	0.55	*fb		TR_TDR	0.005		Filter: Rx FFE					A_nt	0.600	V	
c(0)	0.55		min	N	7000	logical	ffe_pre_tap_len	6	UI						
c(-1)	0	[-0.34; 0.2:0]	[min:step:max]	TDR_Butterworth	1		ffe_post_tap_len	8	UI			Parameter	Setting		
c(-2)	0	[0.14; 0.2:0]	[min:step:max]	beta_x	0		w_max(d_w) and -w_min(d_w)					board_tl_gamma0_a1_a2	[0.595e-4 2.6e-05]	1.4 db/in @ 53.125G	
c(-3)	0		[min:step:max]	rho_x	0.618		ffe_pre_tap1_max	0.7	(normalized)			board_tl_tau	5.790E-03	ns/mm	
c(-4)	0		[min:step:max]	TDR_W_TXPKG	0	UI	ffe_post_tap1_max	0.7	(normalized)			board_Z_c	92.5	Ohm	
c(1)	0	[-0.2; 0.2:0]	[min:step:max]	N_bx	15	??	ffe_tapn_max	0.7	(normalized)			z_bp (TX)	60	mm	
N_b	1	UI		fixture delay time	[ 0 0 ]		num_ui_RXFF_noise	4096				z_bp (NEXT)	60	mm	
b_max(1)	0.85		As/dffe1	Tukey_Window	1		Floating Tap Control					z_bp (FEXT)	60	mm	
b_max(2..N_b)	0		not used	Z_t	46.25		N_bg	2	0 1 2 or 3 groups			z_bp (RX)	60	mm	
b_min(1)	0		As/dffe1	Noise, jitter				N_bf	4	taps per group		C_0	[ 0 0 ]	nF	
b_min(2..N_b)	0		not used	sigma_RJ	0.01	UI	N_f	80	UI span for floating taps			C_1	[ 0 0 ]	nF	
g_DC	[-20; 1:0]	dB	[min:step:max]	A_DD	0.02	V^2/GHz	bmaxg	0.05	max FFE value for floating taps			Include PCB	0	logical	
f_z	42.50	GHz		eta_0	7.50E-09	dB	N_tail_start	9	(UI) start of tail taps limit						
f_p1	42.50	GHz		SNR_TX	33.5		TS_SRCH_MODE	full-sweep							
f_p2	106.25	GHz		R_LM	0.95		Clip Method	Slow							
g_DC_HP	[-6; 1:0]		[min:step:max]	N_gb	6										
f_HP_PZ	1.328125	GHz		P_gc	1.00E-07										

## Note.

Toggle Clip Method to "Slow" or "Fast"  
 Set TS\_SRCH\_MODE to "full-sweep"  
 Set sample\_adjustment to "[-24 24]"

..START	PKG_HIR_CLASSB		
Parameter	Setting	Units	Information
package_tl_gamma0_a1_a2	[ 0.0005 0.00065 0.000293 ]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[ 87.5 87.5; 95 95; 100 100; 78 78 ]	Ohm	
R_d	[ 46.25 46.25 ]	Ohm	[TX RX]
z_p (TX)	[ 8 24 30 45; 2 2 2 2; 1.3 1.3 1.3 1.3; 1.5 1.5 1.5 1.5 ]	mm	[test cases]
z_p (NEXT)	[ 8 24 29 44; 2 2 2 2; 1.3 1.3 1.3 1.3; 1.5 1.5 1.5 1.5 ]	mm	[test cases]
z_p (FEXT)	[ 8 24 30 45; 2 2 2 2; 1.3 1.3 1.3 1.3; 1.5 1.5 1.5 1.5 ]	mm	[test cases]
z_p (RX)	[ 8 24 29 44; 2 2 2 2; 1.3 1.3 1.3 1.3; 1.5 1.5 1.5 1.5 ]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
A_v	0.385	V	Vf=0.400
A_fe	0.385	V	Vf=0.399
A_ne	0.481	V	Vf=0.400
..END			