Cross-Clause Comment Resolution

Matt Brown
Huawei
P802.3ck Editor-In-Chief

IEEE P802.3ck Task Force
May 2021

120F/162/163 RIT Jitter (part 1) Comments 135, 209, 134

The following presentations are relevant to these comments:
https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf
https://www.ieee802.org/3/ck/public/21_05/li_3ck_02a_0521.pdf

Cl 162 *SC* 162.9.4.3.3 *P* 163 *L* 6 # 209

Healey, Adam Broadcom Inc.

Comment Type TR *Comment Status* D *RIT jitter*

For values of J3u/Jrms where the condition stated in NOTE 1 is satisfied, The Q3 value should be derived from 10^(-3) and not 10^(-3)/2. The A_DD and sigma_RJ derived for the given value of Q3 will correspond to a dual-Dirac distribution with a smaller value of J3u than what is measured from the pattern generator. The calibrated interference amplitude (based on COM) will in turn be somewhat higher resulting in a level of overstress. This issue has been pointed out in <https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf>.

SuggestedRemedy

Change the value of Q3 to 3.0902. Change NOTE 1 to begin "Q3 is an approximated solution of Q(Q3) = 10^(-3), where…". Make a similar change to 163.9.3.4 (page 192, line 14). In 120F.3.2.3 (page 224, line 2), note that Q4 (an approximated solution of Q(Q4) = 10^(-4)) is 3.719 as an exception to the use of Equation (120D–10) and Equation (120D–11).

Proposed Response *Response Status* W

PROPOSED ACCEPT IN PRINCIPLE.
Refer to
https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf.
Implement the suggested remedy with editorial license.
[Editor's note: CC: 162, 163, 120F]

120F/162/163 RIT Jitter (part 2)
Comments 135, 209, 134

Cl **120F** *SC* **120F.3.2.3** *P* **224** *L* **2** **#** 135

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **D** *RIT jitter (CC)*

Equation (120D-10) and (120D-11) referred from 120F.3.2.3 step e are not accurate, because the dual-dirac jitter distributuion estimated by these equations does not match well with the original distributuion even if the original distributuion is pure dual-dirac distributuion. For instance, J4u of the estimated dual-dirac jitter distribution is always significantly smaller than the measured J4u. I propose to change these equations.

SuggestedRemedy

Add the following equations after step j, and change references to Equation (120D-10) and (120D-11) in step e with the new equations:

D4d = (Q4d^2 + 1) * (J_RMS^2) - (J4u / 2)^2

If D4d >= 0,
  A_DD = (J4u / 2 + Q4d * sqrt(D4d)) / (Q4d^2 + 1)
  sigma_RJ = (J4u / 2 - A_DD) / Q4d

If D4d < 0,
  Qx = sqrt((J4u / 2 / J_RMS)^2 - 1)
  A_DD = (J4u / 2) / (Qx^2 + 1)
  sigma_RJ = sqrt((J_RMS^2) - (A_DD^2))

where
  Q4d = 3.7190

Add the following Note after the equation:

Note 1 -- Q4d is an approximated solution of Q(Q4d) = 1 x 10^(-4), where the Q function is defined in Equation (95-1).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The following related presentation was reviewed at a previous ad hoc meeting:
https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf
Implement the suggested remedy with editorial license.
For task force discussion.
[Editor's note: CC: 120F, 163]

Cl **163** *SC* **163.9.3.4** *P* **192** *L* **34** **#** 134

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **D** *RIT jitter (CC)*

Equation (163-2) and (163-3) are not accurate, because the dual-dirac jitter distribution estimated by these equations does not match well with the original distribution even if the original distribution is pure dual-dirac distribution as presented at ad hoc meeting (see hidaka_3ck_adhoc_01_041421). For instance, J3u of the estimated dual-dirac jitter distribution is always significantly smaller than the measured J3u. I propose to change these equations.

Since the proposed equations never break, we do not need Note 2.

I propose similar changes to clause 162.9.4.3.3.

SuggestedRemedy

Replace Equation (163-2) and (163-3) with the following set of equations:

D3d = (Q3d^2 + 1) * (J_RMS^2) - (J3u / 2)^2

If D3d >= 0,
  A_DD = (J3u / 2 + Q3d * sqrt(D3d)) / (Q3d^2 + 1)
  sigma_RJ = (J3u / 2 - A_DD) / Q3d

If D3d < 0,
  Qx = sqrt((J3u / 2 / J_RMS)^2 - 1)
  A_DD = (J3u / 2) / (Qx^2 + 1)
  sigma_RJ = sqrt((J_RMS^2) - (A_DD^2))

where
  Q3d = 3.0902

Change Note 1 as follows:

Note 1 -- Q3d is an approximated solution of Q(Q3d) = 1 x 10^(-3), where the Q function is defined in Equation (95-1).

Remove Note 2.

Apply the same changes to Equation (162-7), Equation (162-8), Note 1, and Note 2 in clause 162.9.4.3.3.

Change the references to Equation (162-7) and (162-8) in Note 2 of Table 162-15 in clause 162.9.4.4.2 with the updated equations.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The subject of this comment has been discussed in ad hoc presentation:
https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf

Implement the suggested remedy with editorial license.
[Editor's note: CC: 120F, 163]

120G/162 ERL Tfx (part 1)
Comments 185, 184, 174

Cl **120G** *SC* **120G.3.1.2** *P* **238** *L* **41** # 185

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **D** *TP1 ERL Tfx*

Investigations of the effect of the Time-gated propagation delay on practical HCB's has shown that the input RF connector is affecting the ERL unless the 200 ps is increased to approx 300ps. 300ps is still adequately short to not affect the measurement of the device under test. i.e. The value used for Tfx does not sufficiently mitigate the effects of reflections from the test connector. See dudek_3ck_adhoc_01a_041421

SuggestedRemedy

Change the value from 0.2ns to 0.3ns also on page 242 line 41

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
For task force discussion.
Resolve in conjunction with comment #174.

Cl **162** *SC* **162.9.3.5** *P* **159** *L* **13** # 184

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **D** *ERL Tfx*

Investigations of the effect of the Time-gated propagation delay on practical HCB's has shown that the input RF connector is affecting the ERL unless the 200 ps is increased to approx 300ps. 300ps is still adequately short to not affect the measurement of the device under test. i.e. The value used for Tfx does not sufficiently mitigate the effects of reflections from the test connector. See dudek_3ck_adhoc_01a_041421

SuggestedRemedy

Change the value from 0.2ns to 0.3ns. Also on page 167 line 44.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120G** *SC* **120G.3.1.2** *P* **238** *L* **41** # 174

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **D** *TP1 ERL Tfx*

This fixed time value of time-gated propagation delay Tfx is unworkable because the HCB is defined by its loss not its transit time. While HCBs for connectors with few lanes such as SFP+ may be constructed from PCB, those for connectors with many lanes such as QSFP-DD are challenged by fanout and therefore may use a cabled construction with the same loss and a much greater delay than a PCB. The discontinuity at cable-PCB interface should be windowed out just like the coax connector, but would reasonably be much more than 0.2/2 ns (or ~20 mm?) from the coax connector. The HCB transit time is known well enough, just as its loss is, so we can use that in the windowing. Notice that in 163 and 120F, "The value of Tfx is twice the delay from TP5v to TP5", so it's known there.

SuggestedRemedy

Change 0.2 ns to twice 0.8 times the delay between the test fixture test connector and the near side of the test fixture host-facing connector on the HCB. Make a similar change in 162.9.3.5 (HCB for CR). Although there may be less pressure to use a cabled technique for MCBs, for consistency, make similar changes in 120G.3.2.3 and 162.11.3 (MCB).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
For task force discussion.
Resolve in conjunction with comment #185.

120G/162 ERL Tfx (part 2)
Comments 185, 184, 174

162.9.3.5 Transmitter effective return loss (ERL)

ERL of the transmitter at TP2 is computed using the procedure in 93A.5 with the values in Table 162–12. Parameters that do not appear in Table 162–12 take values from Table 162–18.

NOTE—The specified T_{fx} value represents a propagation delay which sufficiently mitigates the effects of reflections from the test connector and test fixture transmission line.

Transmitter ERL at TP2 shall meet the requirement in Table 162–10.

Table 162–12—Transmitter and receiver ERL parameter values

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.01	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	800	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Time-gated propagation delay	T_{fx}	0.2	ns
Tukey window flag	*tw*	1	—

120G.3.1.2 Host output effective return loss (ERL)

ERL of the host output at TP1a is computed using the procedure in 93A.5 with the values in Table 120G–2.

Host output ERL at TP1a shall be greater than or equal to ERL (min) specified in Table 120G–1.

Table 120G–2—Host output and input ERL parameter values

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.01	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	800	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Time-gated propagation delay	T_{fx}	0.2	ns
Tukey window flag	*tw*	1	—

NOTE—The specified T_{fx} value represents a propagation delay which sufficiently mitigates the effect of reflections from the test connector and test fixture transmission line.

120F/120G/162B return loss variable names (part 1)
Comments 61, 62, 63, 65, 66

Cl **120F** *SC* **120F.3.2.2** *P* **223** *L* **2** # 61

Brown, Matt Huawei

Comment Type **E** *Comment Status* **D** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 120F-1 and in the variable list that follows, change variable name RL_dcm to Return_Loss.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120G** *SC* **120G.3.1.1** *P* **237** *L* **36** # 62

Brown, Matt Huawei

Comment Type **E** *Comment Status* **D** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 120G-1 and in the variable list that follows, change variable name RLDC to Return_Loss.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120G** *SC* **120G.3.3.1** *P* **243** *L* **34** # 63

Brown, Matt Huawei

Comment Type **E** *Comment Status* **D** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 120G-2 and in the variable list that follows, change variable name RLCD to Return_Loss.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **162B** *SC* **162B.1.3.4** *P* **271** *L* **30** # 65

Brown, Matt Huawei

Comment Type **E** *Comment Status* **D** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 162B-7 and in the variable list that follows, change variable name CMRL to Return_Loss.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **162B** *SC* **162B.1.3.5** *P* **272** *L* **31** # 66

Brown, Matt Huawei

Comment Type **E** *Comment Status* **D** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 162B-8 and in the variable list that follows, change variable name CMDRL to Return_Loss.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

120F/120G/162B return loss variable names (part 2)
Comments 61, 62, 63, 65, 66

Below excerpts show the variable forms pointed out by the comments.

$$RL_{dcm}(f) \geq \begin{cases} 25 - 0.72f & 0.05 \leq f \leq 13.9 \\ 15 & 13.9 < f \leq 38 \end{cases} \qquad (120F\text{–}1)$$

where

RL_{dcm}	is the differential to common-mode return loss in dB
f	is the frequency in GHz

$$RLDC(f) \leq \begin{cases} 22 - 20(f/53.125) & 0.01 \leq f \leq 26.56 \\ 15 - 6(f/53.125) & 26.56 < f \leq 53.125 \end{cases} \qquad (120G\text{–}1)$$

where

RLDC	is the common-mode to differential return loss in dB
f	is the frequency in GHz

$$RLCD(f) \leq \begin{cases} 22 - 20(f/53.125) & 0.01 \leq f \leq 26.56 \\ 15 - 6(f/53.125) & 26.56 < f \leq 53.125 \end{cases} \qquad (120G\text{–}2)$$

where

RLCD	is the differential to common-mode return loss in dB
f	is the frequency in GHz

$$CMRL(f) \geq \begin{cases} 12 - 9f & 0.01 \leq f < 1 \\ 3 & 1 \leq f \leq 50 \end{cases} \qquad (162B\text{–}7)$$

where

$CMRL(f)$	is the common-mode return loss in dB at frequency f
f	is the frequency in GHz

$$CMDRL(f) \geq \begin{cases} 30 - (30/25.78)f & 0.01 \leq f < 12.89 \\ 17.85 - 0.225f & 12.89 \leq f < 35 \\ 10 & 35 \leq f \leq 50 \end{cases} \qquad (162B\text{–}8)$$

where

$CMDRL(f)$	is the common-mode to differential mode return loss in dB at frequency f
f	is the frequency in GHz

120F/120G/162B return loss variable names (part 3)
Comments 61, 62, 63, 65, 66

Below are the majority of situations where “return_loss” form is used.

$$Return\_loss(f) \geq \begin{cases} 22 - 10(f/26.56) & 0.05 \leq f < 26.56 \\ 15 - 3(f/26.56) & 26.56 \leq f \leq 40 \end{cases} \quad (162\text{–}5)$$

where

Return_Loss(f) is the transmitter common-mode to differential return loss at frequency *f* in dB

f is the frequency in GHz

$$Return\_loss(f) \geq \begin{cases} 22 - 10(f/26.56) & 0.05 \leq f < 26.56 \\ 15 - 3(f/26.56) & 26.56 \leq f \leq 40 \end{cases} \quad (162\text{–}9)$$

where

Return_Loss(f) is the receiver differential to common-mode return loss at frequency *f* in dB

f is the frequency in GHz

$$Return\_loss(f) \geq \begin{cases} 22 - 10(f/26.56) & 0.05 \leq f < 26.56 \\ 15 - 3(f/26.56) & 26.56 \leq f \leq 40 \end{cases} \quad (162\text{–}11)$$

where

Return_Loss(f) is the cable assembly differential to common-mode return loss at frequency *f* in dB

f is the frequency in GHz

$$Return\_loss(f) \geq 1.8 \quad (162\text{–}13)$$

for $0.05 \leq f \leq 40$ GHz

where

Return_loss(f) is the common-mode to common-mode return loss at frequency *f* in dB

f is the frequency in GHz

$$Return\_Loss(f) \geq \begin{cases} 25 - 20(f/53.125) & 0.05 \leq f \leq 26.5625 \\ 15 & 26.5625 < f \leq 53.125 \end{cases} \quad (163\text{–}1)$$

where

Return_Loss(f) is the differential to common-mode return loss at frequency *f* in dB

f is the frequency in GHz

$$Return\_loss(f) \geq \begin{cases} 22 - 10(f/26.56) & 0.05 \leq f < 26.56 \\ 15 - 3(f/26.56) & 26.56 \leq f \leq 40 \end{cases} \quad (163\text{–}5)$$

where

Return_Loss(f) is the TP0 to TP5 channel differential to common-mode return loss at frequency *f* in dB

f is the frequency in GHz

120F/120G/162B return loss variable names (part 4)
Comments 61, 62, 63, 65, 66

	Candidate variable names		
Parameter	**Option 1 (per comments)**	**Option 2 (type is lower case)**	**Option 3 (all upper case)**
differential RL	return_loss	RLdd	RLDD
common-mode to common-mode RL	return_loss	RLcc	RLCC
common-mode to differential RL	return_loss	RLdc	RLDC
differential to common-mode RL	return_loss	RLcd	RLCD

120F/120G/162B return loss variable names (part 5)
Comments 61, 62, 63, 65, 66

Suggested straw poll...

For all return loss variable names I support:
A: Option 1 per slide 9 of brown_3ck_01a_0521
B: Option 2 per slide 9 of brown_3ck_01a_0521
C: Option 3 per slide 9 of brown_3ck_01a_0521
D: No changes to return loss variable names
E: What is return loss?