P802.3ck D1.4
Annex 120G EH/VEC Values

Matt Brown, Huawei, 802.3ck Editor-in-Chief

Introduction

- In Draft 1.4 the measurement method for EH and VEC was modified such that the specified values of EH and VEC need to be revisited.
- This slide package summarizes the values for EH and VEC as proposed by the following comments:
  - 5, 40, 61, 72, 75, 76, 77, 78, 80, 81, 88, 145, 146
- These comments cover all four test points:
  - TP1a (host output), 120G.3.1, Table 120G-1
  - TP1 (module input), 120G.3.4, Table 120G-10
  - TP4 (module output), 120G.3.2, Table 120G-3
  - TP4a (host input), 120G.3.3, Table 120G-7

Presentations

The following presentations were viewed the ad hocs prior to the comment resolution meetings:

- ❖ https://www.ieee802.org/3/ck/public/adhoc/jan06_21/wu_3ck_adhoc_01_010621.pdf
- ❖ https://www.ieee802.org/3/ck/public/adhoc/jan06_21/mellitz_3ck_adhoc_01_010621.pdf
- ❖ https://www.ieee802.org/3/ck/public/adhoc/jan13_21/ghiasi_3ck_adhoc_01_011321.pdf

The following presentations (so far) were submitted for the upcoming comment resolution meetings:

- ❖ https://www.ieee802.org/3/ck/public/21_01/ghiasi_3ck_01_0121.pdf
- ❖ https://www.ieee802.org/3/ck/public/21_01/mellitz_3ck_01_0121.pdf
- ❖ https://www.ieee802.org/3/ck/public/21_01/wu_3ck_01_0121.pdf

Comments, part 1

CI **120G**   *SC* **120G.3.1**   *P* **231**   *L* **17**   # 5

Mellitz, Richard   Samtec

Comment Type   **TR**   *Comment Status* **X**

   EH and VEC need be to computed for the histogram window.

SuggestedRemedy

   Change Eye height, differential (min) to 10 mV
   Change Vertical eye closure (max) to 13 dB
   Presentation available

Proposed Response   *Response Status* **O**

CI **120G**   *SC* **120G.5.2**   *P* **246**   *L* **38**   # 40

Brown, Matt   Huawei

Comment Type   **T**   *Comment Status* **X**

   The editor's note indicates that the specified values for EH/VEC value may need to be
   updated due to measurement method being updated in D1.4.

SuggestedRemedy

   Provide updated values for host output, module output, host input, and module input if
   necessary and remove editor's note.

Proposed Response   *Response Status* **O**

CI **120G**   *SC* **120G.3.1**   *P* **231**   *L* **17**   # 61

Wu, Mau-Lin   MediaTek

Comment Type   **T**   *Comment Status* **X**

   Due to we adopted the new EH & VEC test methods in D1p4, the specifications of EH &
   VEC for "Table 120G-1 - Host output characteristics at TP1a" and "Table 120G-10 -
   Module stressed input parameters" shall be updated to reflect the impact by new method.

SuggestedRemedy

   Propose to change EH from 15 mV to 8 mV in Table 120G-1 & 120G-10.
   Propose to change VEC from 9.0 dB to 12.0 dB in Table 120G-1.
   Propose to change VEC (max) from 9.5 dB to 12.5 dB in Table 120G-10.
   Propose to change VEC (min) from 9.0 dB to 12.0 dB in Table 120G-10.
   Detailed analysis is included in wu_3ck_01_0121.pdf

Proposed Response   *Response Status* **O**

CI **120G**   *SC* **120G.3.1**   *P* **231**   *L* **18**   # 72

Healey, Adam   Broadcom Inc.

Comment Type   **T**   *Comment Status* **X**

   The eye height and vertical eye closure limits were based on (simulated) measurements of
   a vertical slice of the eye at the nominal sampling time. The measurement method for eye
   height and vertical eye closure in 120G.5.2 has been modified to use a vertical slice of the
   eye spanning -50 to +50 mUI around the nominal sampling time. Comparison of
   measurement results implies that the change in the measurement method results in up to
   a 3 dB increase in vertical eye closure and a similar decrease in eye height.

SuggestedRemedy

   In Table 120G-1, change "Eye height, differential (min)" to 10 mV and "Vertical eye closure
   (max)" to 12 dB.
   In Table 120G-3, change "Near-end eye height, differential (min)" and "Far-end eye height,
   differential (min)" to 17 mV and "Near-end vertical eye closure (max)" and "Far-end vertical
   eye closure (max)" to 10.5 dB.
   In Table 120G-7, change "Near-end eye height" and "Far-end eye height" to 17 mV and
   "Near-end vertical eye closure" and "Far-end vertical eye closure" to 10.5 dB.
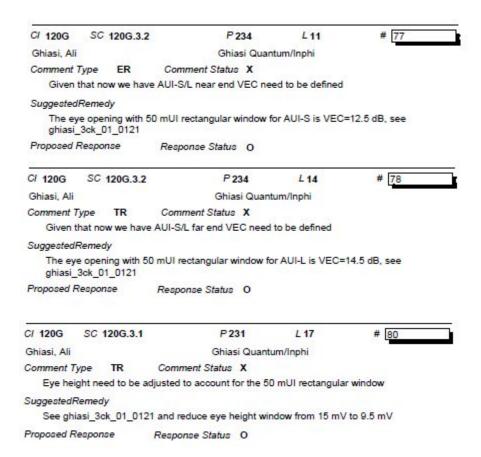   In Table 120G-10, change "Eye height" to 10 mV, "VEC (max)" to 12.5 dB, and "VEC
   (min)" to 12 dB.

Proposed Response   *Response Status* **O**

Comments, part 2

CI **120G**   SC **120G.3.2**   P **234**   L **11**   # 75

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   *Comment Status*   **X**

Given that now we have AUI-S/L near end eye would be AUI-S min eye opening

SuggestedRemedy

The eye opening with 50 mUI rectangular window for AUI-S is VEO=20 mV, see ghiasi_3ck_01_0121

Proposed Response   *Response Status*   **O**

CI **120G**   SC **120G.3.2**   P **234**   L **13**   # 76

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   *Comment Status*   **X**

Given that now we have AUI-S/L far end eye would be AUI-S min eye opening

SuggestedRemedy

The eye opening with 50 mUI rectangular window for AUI-L is VEO=11 mV, see ghiasi_3ck_01_0121

Proposed Response   *Response Status*   **O**

CI **120G**   SC **120G.3.2**   P **234**   L **11**   # 77

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **ER**   *Comment Status*   **X**

Given that now we have AUI-S/L near end VEC need to be defined

SuggestedRemedy

The eye opening with 50 mUI rectangular window for AUI-S is VEC=12.5 dB, see ghiasi_3ck_01_0121

Proposed Response   *Response Status*   **O**

CI **120G**   SC **120G.3.2**   P **234**   L **14**   # 78

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   *Comment Status*   **X**

Given that now we have AUI-S/L far end VEC need to be defined

SuggestedRemedy

The eye opening with 50 mUI rectangular window for AUI-L is VEC=14.5 dB, see ghiasi_3ck_01_0121

Proposed Response   *Response Status*   **O**

CI **120G**   SC **120G.3.1**   P **231**   L **17**   # 80

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   *Comment Status*   **X**

Eye height need to be adjusted to account for the 50 mUI rectangular window

SuggestedRemedy

See ghiasi_3ck_01_0121 and reduce eye height window from 15 mV to 9.5 mV

Proposed Response   *Response Status*   **O**

Comments, part 3

CI **120G**   SC **120G.3.1**   P **231**   L **19**   # 81

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   Comment Status **X**

VEC need to be adjusted to account for the 50 mUI rectangular window

SuggestedRemedy

See ghiasi_3ck_01_0121 and reduce eye height window from 7.5 dB to 14 dB

Proposed Response   Response Status **O**

CI **120G**   SC **120G.3.4.1**   P **240**   L **46**   # 88

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   Comment Status **X**

Table 120G-10 needs to be updated now that measurements are with 50 mUI window

SuggestedRemedy

See ghiasi_3ck_01_0121 and reduce eye height window from 15 mV to 9.5 mV
See ghiasi_3ck_01_0121 and reduce eye height window from 7.5 dB to 14+/- 0.5 dB

Proposed Response   Response Status **O**

CI **120G**   SC **120G.3.2**   P **234**   L **10**   # 145

Dawe, Piers   Nvidia

Comment Type   **TR**   Comment Status **X**

For a reasonably clean module (or test equipment in a host stressed eye test), the driver
swing has to be aggressively reduced to deliver only 24 mV at near end, short setting.
120E has 70 mV.

SuggestedRemedy

Eye height limits should be set sensibly for short and long modes, near and far - not all the
same.
Change the NEEH from 24 mV to 40 mV.

Proposed Response   Response Status **O**

CI **120G**   SC **120G.3.2**   P **234**   L **14**   # 146

Dawe, Piers   Nvidia

Comment Type   **TR**   Comment Status **D**   TP4 EQ settings

As already discussed, the 2-settings method with only two compliance losses doesn't
work. If the module is set to the short setting, and the host receiver isn't that near, the eye
it is offered is smaller than 24 mV because of loss, and out of tune as well. If the module
is set to the long setting and the host isn't that long, the eye is also out of tune. There's no
guarantee that either setting is usable.

SuggestedRemedy

There should be 4 EH-VEC limit pairs: short near and far, and long near and far, in Table
120G. In 120G.3.2.2.1, give the four zp values: for short, 0 (as at present) and 184, for
long, 61 and 244.7 (as at present).

Proposed Response   Response Status **W**

Values in Draft 1.4

Table 120G–1—Host output characteristics at TP1a

Parameter	Reference	Value	Units
Signaling rate, each lane (range)		53.125 ± 50 ppm[a]	GBd
DC common-mode output voltage (max)	120G.5.1	2.8	V
DC common-mode output voltage (min)	120G.5.1	−0.3	V
Single-ended output voltage (max)	120G.5.1	3.3	V
Single-ended output voltage (min)	120G.5.1	−0.4	V
AC common-mode RMS output voltage (max)	120G.5.1	17.5	mV
Differential peak-to-peak output voltage (max) Transmitter disabled Transmitter enabled	120G.5.1	35 870	mV
Eye height, differential (min)	120G.3.1.5	15	mV
Vertical eye closure (max)	120G.3.1.5	9	dB

Table 120G–3—Module output characteristics (at TP4)

Parameter	Reference	Value	Units
Signaling rate, each lane (nominal)		53.125[a]	GBd
AC common-mode output voltage (max, RMS)	120G.5.1	17.5	mV
Differential peak-to-peak output voltage (max)	120G.5.1	900	mV
Near-end eye height, differential (min)	120G.3.1.5	24	mV
Near-end vertical eye closure (max)	120G.3.1.5	7.5	dB
Far-end eye height, differential (min)	120G.3.1.5	24	mV
Far-end vertical eye closure (max)	120G.3.1.5	7.5	dB
Common-mode to differential return loss (min)	120G.3.1.2	Equation (120G–1)	dB
Effective return loss, ERL, (min)	120G.3.2.3	TBD	dB

Table 120G–10—Module stressed input parameters

Parameter	Value
Applied pk-pk sinusoidal jitter	Table 120G–8
Eye height	15 mV
VEC (max)	9.5 dB
VEC (min)	9.0 dB

Table 120G–7—Host stressed input parameters

Parameter	Value
Applied peak-to-peak sinusoidal jitter	Table 120G–8
Near-end eye height	24 mV
Near-end vertical eye closure	7.5 dB
Far-end eye height	24 mV
Far-end vertical eye closure	7.5 dB

EH value comments

Comment #	TP1a	TP1	TP4 NE/FE	TP4a NE/FE
5 (Rich Mellitz)	10	—	—	—
61 (Mau-Lin Wu)	8	8	—	—
72 (Adam Healey)	10	10	17	17
75 (Ali Ghiasi)	—	—	NE=20	—
76 (Ali Ghiasi)	—	—	FE=11	—
77 (Ali Ghiasi)	—	—	—	—
78 (Ali Ghiasi)	—	—	—	—
80 (Ali Ghiasi)	9.5	—	—	—
81 (Ali Ghiasi)	—	—	—	—
88 (Ali Ghiasi)	—	9.5	—	—
145 (Piers Dawe)	—	—	NE=40	—

VEC value comments

Comment #	TP1a	TP1 min	TP1 max	TP4 NE/FE	TP4a NE/FE
5 (Rich Mellitz)	12.6^1	—	—	—	—
61 (Mau-Lin Wu)	12	12	12.5	—	—
72 (Adam Healey)	12	12	12.5	10.5	10.5
75 (Ali Ghiasi)	—	—	—	—	—
76 (Ali Ghiasi)	—	—	—	—	—
77 (Ali Ghiasi)	—	—	—	NE=12.5	—
78 (Ali Ghiasi)	—	—	—	FE=14.5	—
80 (Ali Ghiasi)	—	—	—	—	—
81 (Ali Ghiasi)	14	—	—	—	—
88 (Ali Ghiasi)	—	13.5	14.5	—	—
145 (Piers Dawe)	—	—	—	—	—
Note 1: From mellitz_01.					

Summarized values

Parameter	D1.4	Proposals	Consensus
EH @ TP1a (host output)	15	8, 9.5, 10	10 mV
EH @ TP1 (module stressed input)	15	same as TP1a	10 mV
EH NE/FE @ TP4 (module output)	24/24	17/17, 20/11, 40/24	25/15 mV[1]
EH NE/FE @ TP4a (host stressed input)	24/24	same as TP4	?
VEC @ TP1a (host output)	9	12, 12.6, 14	12 dB
VEC min/max @ TP1 (module stressed input)	9/9.5	12/12.5, 13.5/14.5	12 dB min 12.5 dB max
VEC NE/FE @ TP4	7.5/7.5	10.5/10.5, 12.5/14.5	?
VEC NE/FE @ TP4a	7.5/7.5	same as TP4	?
Note 1: Pending discussion of comment #146.			

Summary

- Amongst the proposals, there is no clear consensus on any of the values, however the proposed values are similar to each other for each parameter.
- We need to agree upon a new value for each of the parameters.