Comment: #111 and others (This is part B of darshan_01_0317.pdf)

Ipeak-2P_unb has the flexibility to be adjusted as function of the Vpse, Pclass-PD and Rch. This flexibility has many advantages. Icon-2P_unb can benefit with the same advantages by reusing means that we have already in the spec. KIpeak that was used for Ipeak-2P_unb can be used for Icon-2P_unb as well. This is due to the fact that the system pair to pair unbalance factor that is represented by KIpeak for Ipeak-2P_unb is the same for Icon-2P_unb.

Proposed Remedy:

Make the following changes:

145.2.8.5 Continuous output current capability in the POWER_ON state

IPort-2P and IPort-2P-other are the currents on the pairs with the same polarity of the two pairsets and are defined in Equation (145–5) and in Equation (145–6).

$$I_{\text{Port-2P}} = \left\{ \begin{array}{ll} I_{\text{Port-2P-pri}} & \text{for the Primary Alternative} \\ I_{\text{Port-2P-sec}} & \text{for the Secondary Alternative} \end{array} \right\}_{\text{A}} \quad (145\text{–}5)$$

$$I_{\text{Port-2P-other}} = \left\{ \begin{array}{ll} I_{\text{Port-2P-sec}} & \text{for the Primary Alternative} \\ I_{\text{Port-2P-pri}} & \text{for the Secondary Alternative} \end{array} \right\}_{\text{A}} \quad (145\text{–}6)$$

IPort is the total current on both pairs with the same polarity and is defined in Equation (145–7).

$$I_{\text{Port}} = \{ I_{\text{Port-2P}} + I_{\text{Port-2P-other}} \}_{\text{A}} \quad (145\text{–}7)$$

where

IPort-2P-pri is the output current sourced on the Primary Alternative
IPort-2P-sec is the output current sourced on the Secondary Alternative

PSEs shall be able to source ICon-2P, the current the PSE supports on each powered pairset, as defined in Equation (145–8).

$$I_{\text{Con-2P}} = \left\{ \begin{array}{ll} P_{\text{Class}} / V_{\text{PSE}} & \text{when in 2-pair mode} \\ \min(I_{\text{Con}} - I_{\text{Port-2P-other}}, I_{\text{Con-2P-unb}}) & \text{when 4-pair powering a single-signature PD} \\ P_{\text{Class-2P}} / V_{\text{PSE}} & \text{when 4-pair powering a dual-signature PD} \end{array} \right\}_{\text{A}} \quad (145\text{–}8)$$

where

*P*Class is PClass as defined in Equation (145–2)
*P*Class-2P is PClass-2P as defined in Equation (145–3)
*V*PSE is the voltage at the PSE PI as defined in 145.1.3
*I*Con is the total current a PSE is able to source as defined in Equation (145–9)
*I*Con-2P-unb is the current a PSE is able to source on a pairset due to unbalance as defined in Table 145–16 or in Equation 145-XY
*I*Port-2P-other is the output current on the other pairset as defined in Equation (145–6)

$$ICon-2P\_unb=(1+KIpeak)\times\frac{ICon}{2}$$ (145-XY)

where

*K*IPeak The value of KIPeak, defined in Equation (145–13), is based on a curve fit and is dimensionless

*I*Con is the total current a PSE is able to source as defined in Equation (145–9)

Alternatively an over-margined value of Icon-2P_unb defined in Table 145-16 may be used.

When powering a single-signature PD over 4-pairs, a PSE supports:
— A total current of ICon, defined in Equation (145–9), over both pairs with the same polarity;
— A minimum current of ICon-2P-unb over one of the pairs of the same polarity under maximum unbalance condition (see 145.2.8.5.1) in the POWER_ON state.

$$I_{Con}=\left\{\frac{P_{Class}}{V_{PSE}}\right\}_A \qquad (145\text{–}9)$$

where

*P*Class is PClass as defined in Equation (145–2)
*V*PSE is the voltage at the PSE PI as defined in 145.1.3

The PSE shall support the AC current waveform parameter IPeak-2P, defined in Equation (145.2.8.5.1), on each powered pairset, while within the operating voltage range of VPort_PSE-2P, for a minimum of TCUT-2P and a duty cycle of at least 5%.

$$I_{Peak\text{-}2P}=\left\{\begin{array}{ll} I_{Peak} & \text{when in 2-pair mode} \\ \min(I_{Peak}-I_{Port\text{-}2P\text{-}other},\ I_{Peak\text{-}2P\_unb}) & \text{when 4-pair powering a single-signature PD} \\ \dfrac{V_{PSE}-\sqrt{V_{PSE}^2-4\times R_{Chan\text{-}2P}\times P_{Peak\_PD\text{-}2P}}}{2\times R_{Chan\text{-}2P}} & \text{when 4-pair powering a dual-signature PD} \end{array}\right\}_A \qquad (145\text{–}10)$$

where

*I*Peak is the total peak current a PSE supports per Equation (145–14)
*I*Port-2P-other is the output current on the other pairset as defined in Equation (145–6).
*I*Peak-2P-unb is the minimum current due to unbalance effects a PSE must support on a pairset as defined in Equation (145–12)
*V*PSE is the voltage at the PSE PI as defined in 145.1.3 *R*Chan-2P is the pairset loop resistance; this parameter has a worst-case value of RCh defined in 145.1.3. RCh is defined in Table 145–1.
*P*Peak_PD-2P is the peak power a dual-signature PD may draw per its assigned Class on a pair-set; see Table 145–28

IPeak, defined in Equation (145–11), is the total current of the powered pairs with the same polarity that a PSE supports, when powering a PD over 2-pairs or powering a single-signature PD over 4-pairs.

$$I_{Peak} = \left\{ \frac{V_{PSE} - \sqrt{V_{PSE}^2 - 4 \times R_{Chan} \times P_{Peak\_PD}}}{2 \times R_{Chan}} \right\}_A \quad (145–11)$$

where

*V*PSE is the voltage at the PSE PI as defined in 145.1.3
*R*Chan is the channel loop resistance as defined in 145.1.3
*P*Peak_PD is the total peak power a PD may draw for its Class; see Table 145–28

IPeak-2P-unb, defined in Equation (145–12), is the minimum current due to unbalance effects that a PSE supports on a pairset when powering a single-signature PD over 4-pairs.

$$I_{Peak\text{-}2P\_unb} = \left\{ (1 + K_{IPeak}) \times \frac{I_{Peak}}{2} \right\}_A \quad (145–12)$$

where

*K*IPeak The value of KIPeak, defined in Equation (145–13), is based on a curve fit and is dimensionless
*I*Peak is the total peak current a PSE supports per Equation (145–11)

$$K_{Ipeak} = \begin{cases} 1 & \text{for Class 0 to 4} \\ \min(0.214 \times (R_{chan\text{-}2P})^{-0.363}, 0.331) & \text{for Class 5} \\ \min(0.199 \times (R_{chan\text{-}2P})^{-0.35}, 0.304) & \text{for Class 6} \\ \min(0.18 \times (R_{chan\text{-}2P})^{-0.335}, 0.27) & \text{for Class 7} \\ \min(0.176 \times (R_{chan\text{-}2P})^{-0.347}, 0.26) & \text{for Class 8} \end{cases} \quad (145–13)$$

where

*R*Chan-2P is the channel DC loop resistance per pairset, as defined in 145.1.3. RChan-2P has a minimum value of 0.2 Ω when used in Equation (145–13).

Alternatively, an over-margined value of IPeak-2P-unb, IPeak-2P-unb_max, defined in Equation (145–14) may be used

$$I_{Peak\text{-}2P\_unb\_max} = \{ I_{LIM\text{-}2P} - 0.002 \}_A \quad (145–14)$$

where

*I*LIM-2P is the ILIM-2P min value per pairset for the PSE, as defined in Table 145–16

End of Baseline