



IEEE802.3 4P Study Group

# PD Behavior in Undefined 20.5V~30V Area

November 2014, San Antonio

Gaoling Zou, MAXIM Integrated Products

[gaoling.zou@maximintegrated.com](mailto:gaoling.zou@maximintegrated.com)

# Goal of this Presentation

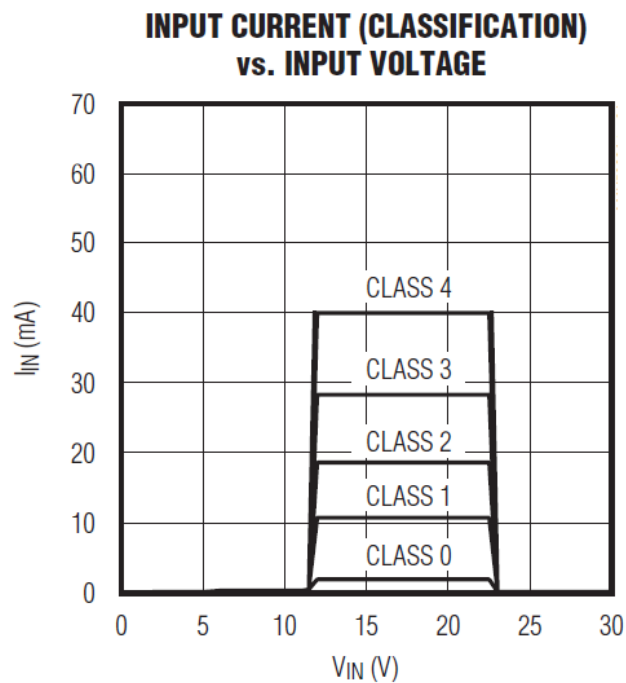
- Describe the behavior of Type1 and Type2 PD in undefined area
- Address the concerns
  - > 2-Level Classification (Kanata, September 2014)

# Main Concerns/Issues

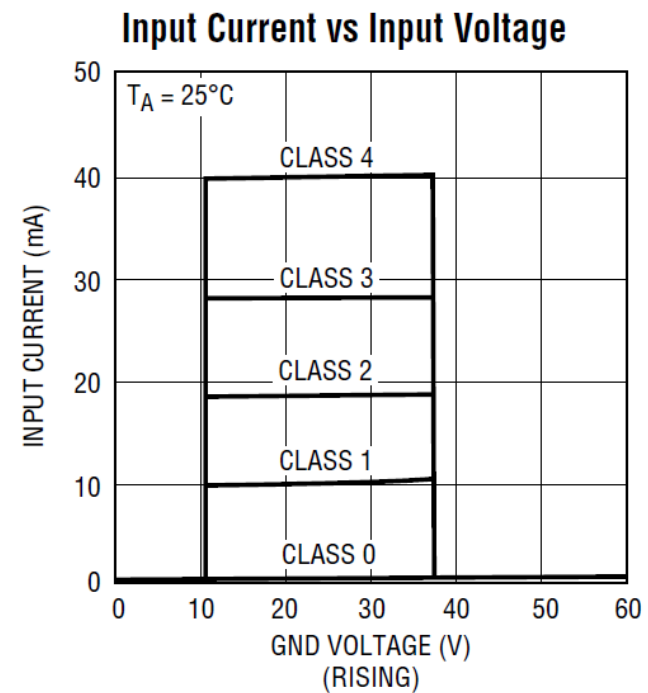
- “Known Issue” of Classification
  - > PD shall NOT respond with different current provided with the same classification voltage
    - 4P PoE systems use cases and proposed requirements, Yair Darshan, Jan 2014
    - Class 5, 3-Event Classification, Gaoling Zou, Mar 2014
    - Classification Current Width Modulation, Gaoling Zou, May 2014
    - Classification Current Width Modulation, Gaoling Zou, Jul 2014
    - IEEE P802.3bt Mutual Identification, David Abramson, Sep 2014
    - Classification Using Hysteresis, David Dwelley, Sep 2014
- Voltage from 20.5V up to the PD UVLO turn ON, is undefined area in 3af/3at Standard.
  - > Second Level Classification voltage is in this area and may have backward compatible issue
    - 2-Level Classification, Gaoling Zou, Sep 2014

# Type1/Type2 PD Behaviors

## Case1



## Case2



The PD responds with either no/low (couple of mA) current or class current when operated in the undefined region.

# Summary

- When detecting Class0-3 in the 1<sup>st</sup> finger, Type3 PSE will power up the Type1 PD by skipping the 2<sup>nd</sup> and 3<sup>rd</sup> finger;
- If it is Class4 in the 3<sup>rd</sup> finger, then type3 PSE limits the power within 30W;

# Annex-

## Factors to Select 2<sup>nd</sup> Level Classification Voltage

### PSE Side

- The lower limit of 26.5V
  - > Classification Disable Threshold \* at PD controller side
  - > 2xVF of the input diode bridge.
- The upper limit of 29.5V
  - > PD power supply turn off voltage Voff (30V in 3at standard)

### PD Side

- The lower limit of 25.5V
  - > The min of PSE VCLE
  - > 2xVF at the input diode bridge
- The upper limit of 29.5V
  - > The max of PSE VCLE
  - > Very minimum of VF at active bridge

\*The Classification current will be turned OFF when PD input voltage is greater than the threshold (refer to the picture in CASE1 at page4).

## Annex- 3-Event w/ 2-Level Classification

- Type3 PD needs to provide 40mA in first 2-Event classification as 3at.
- Type3 PSE probes 2<sup>nd</sup> Level Classification Voltage between 26.5~29.5V
- Type3 PSE uses the same Classification Event Timing and Mark Event Timing as in 2-Event

