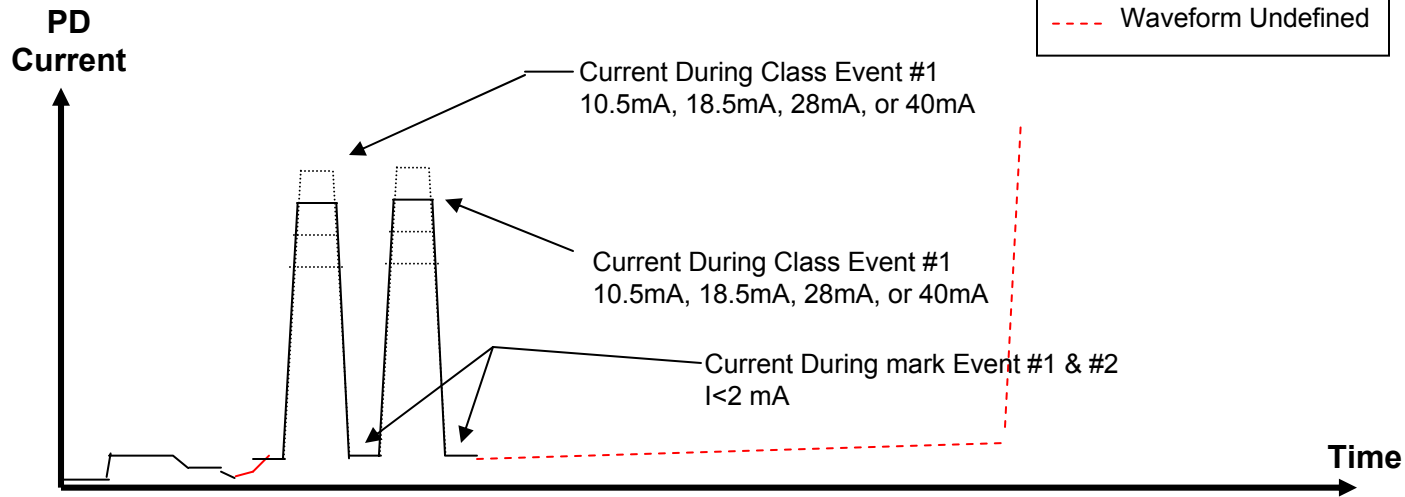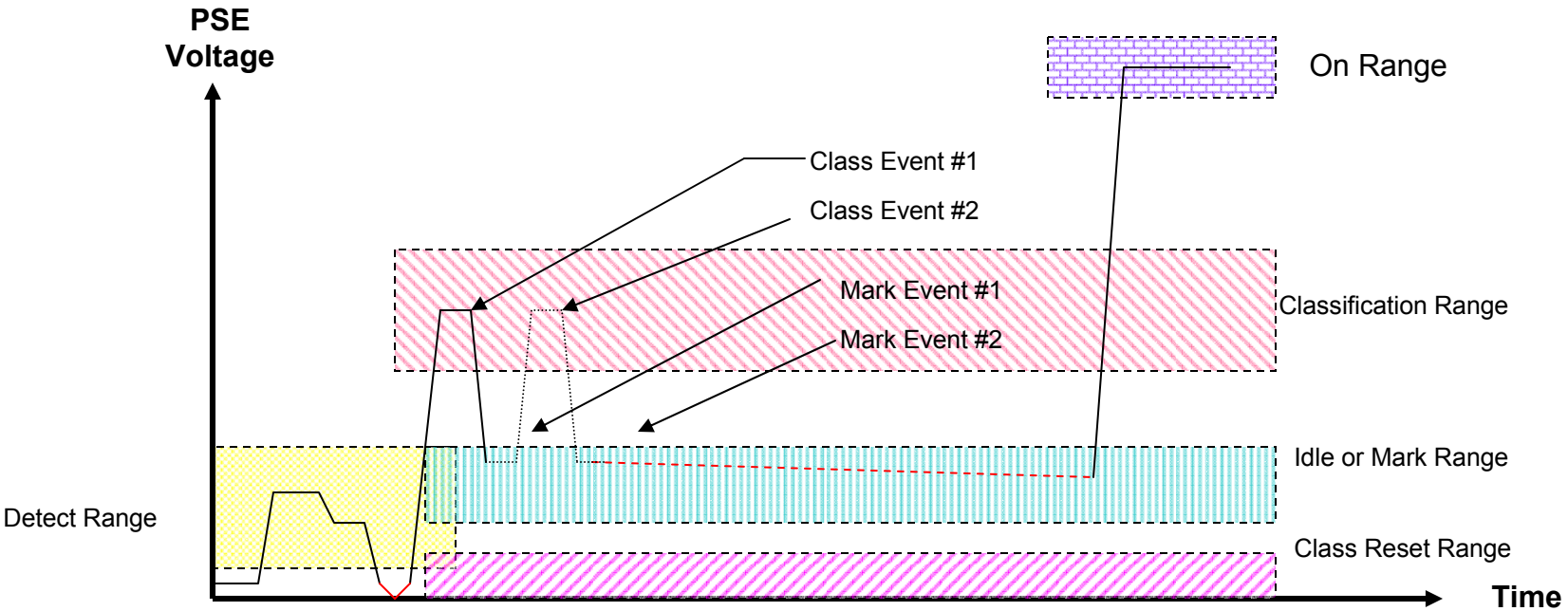# PoE Plus
IEEE 802.3at
Classification Ad Hoc
Extended Classification Using
Two Classification Events
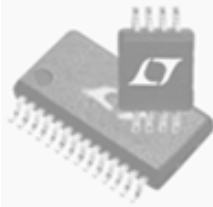
Clay Stanford
Linear Technology

July, 2006

802.3at Classification Using Two Classification Events

PSE Voltage

On Range

Class Event #1

Class Event #2

Mark Event #1

Classification Range

Mark Event #2

Idle or Mark Range

Detect Range

Class Reset Range

Time

PD Current

Current During Class Event #1
10.5mA, 18.5mA, 28mA, or 40mA

Waveform Undefined

Current During Class Event #1
10.5mA, 18.5mA, 28mA, or 40mA

Current During mark Event #1 & #2
I<2 mA

Time

PoEP: IEEE 802.3at
2 Event Rules

.atPD Rules:

- PD is behind diode bridge so fall time is controlled by internal PD circuits and not PSE port voltage. Therefore an .atPD is required to pull the internal supply down using the classification event current until the PD detects the Mark event. Once the PD has detected the Mark, the PD can stop pulling down on the port. Note that in this scenario, the port voltage may not discharge all the way down to the Mark range and this is not a problem.

- If the port voltage goes to reset range, PD clocking is reset and the PD will start with Class Event #1.

- During Mark event, .atPD R≠25Kohm, to avoid .af PSE classing again.

.at System Rules:

- .atPSE is the master, generating port voltage. .atPD is slaved to .atPSE, responding with port current.

- System is designed so that .atPD spends a limited amount of time in the Mark range in case .atPD is using dynamic memory which requires power to maintain state.

- .atPSE transitions from 2nd Mark event to Power On without going down into Reset range.
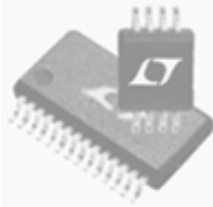
PoEP: IEEE 802.3at
2 Event .at/.af Interaction

.atPSE with .afPD:

- If .atPSE sees 0-0, 1-1, 2-2, 3-3, or 4-4, it assumes .afPD and powers per .af spec, i.e. 15.4W, 4W, 7W, 15.4W, or 15.4W respectively

.atPSE with .atPD:

- If .atPSE sees 1-2, 1-3, etc, (none of which are 0), it knows PD is an .atPD.

.afPSE with .atPD:

- If .afPSE sees .atPD, it will use first class. Therefore, new 2W .atPD should use class 1-x, so that .afPSE allocates 4W. Similarly, new 11W .atPD should use 3-x so that .afPSE allocates 15.4W.

Comments

- .afPD may not pull internal PD supply down quickly between pulses but it doesn't matter. With the Mark event in the Signature range, .afPD might "float" at some voltage 10-15.5V, but will return to class range when PSE drives port back to class voltage.
- Class 0 is not used by .atPD because Class 0 can be 0mA and would not pull port low. Port needs to be pulled low by .atPD so that .atPD can see that .atPSE has driven classification voltage to the Mark event.

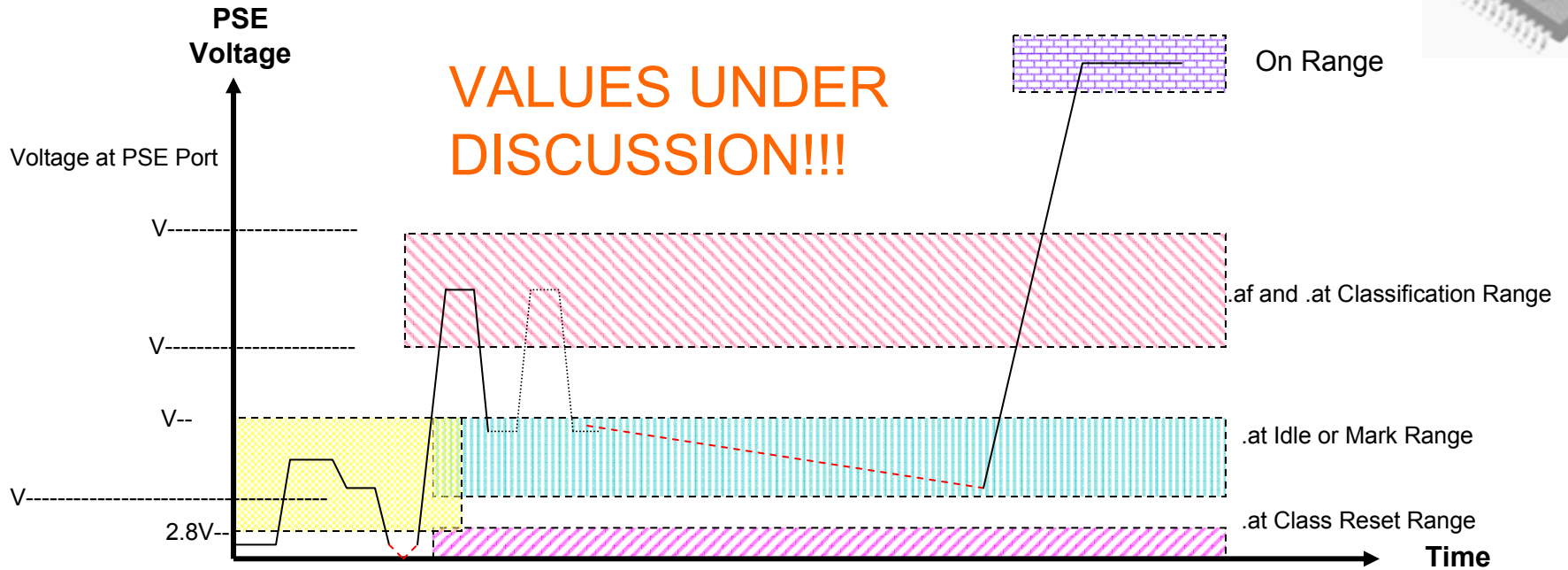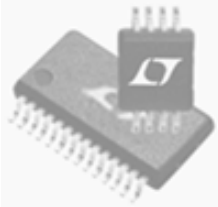# Voltage Ranges and Timing Specification **Per Clay**
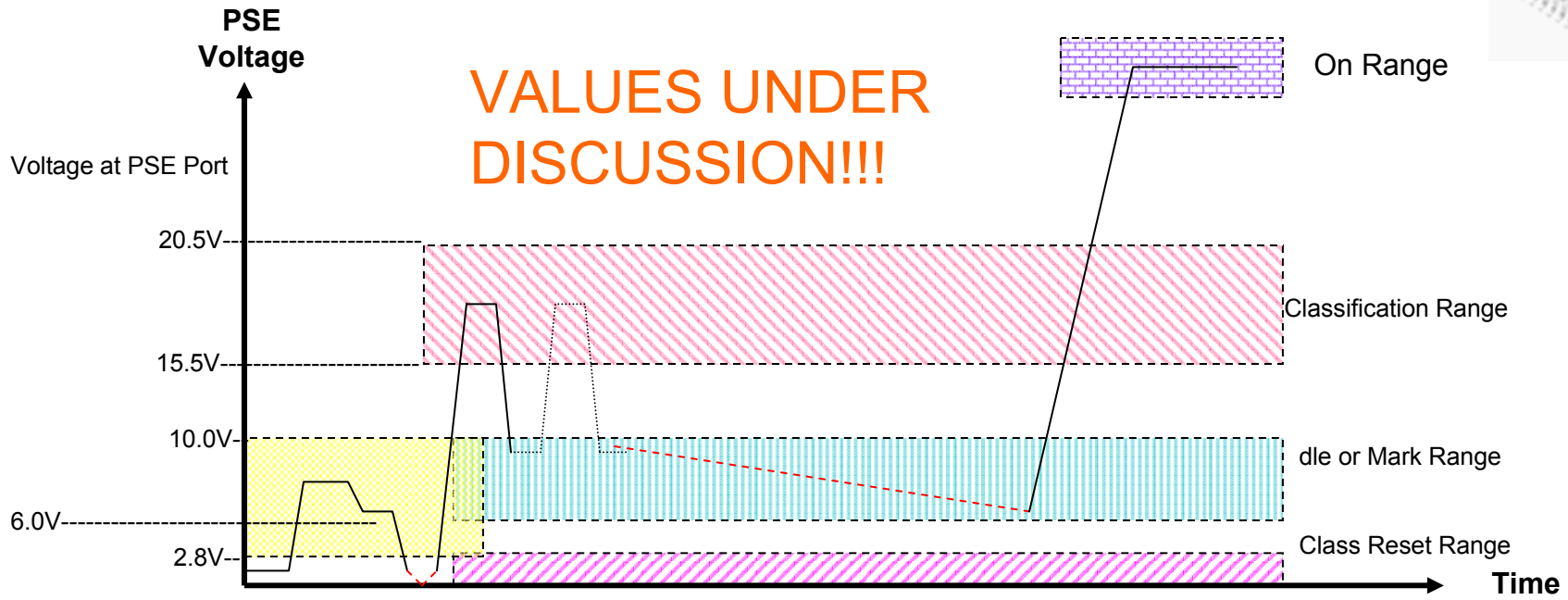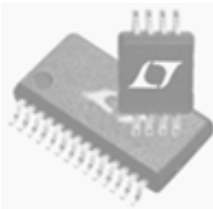
VOLTAGE SPECIFICATIONS		
FUNCTION	MIN (V)	MAX (V)
Classification (at PSE)	15.5	20.5
Mark (at PSE)	7.0	10
Reset Low	0	2.8
Reset High	50	57

Will be defined by Voltage Ad Hoc

TIMING SPECIFICATIONS		
EVENT	MIN (ms)	MAX (ms)
1st Class	20	30
1st Mark	2	4
2nd Class	10	18
2nd Mark	2	400XXX
TOTAL	34	56

Voltage Ranges and Timing Specification Per **Yair**

PSE Voltage

VALUES UNDER DISCUSSION!!!

On Range

Voltage at PSE Port

V----------------------

.af and .at Classification Range

V----------------------

.at Idle or Mark Range

V--

V----------------------

.at Class Reset Range

2.8V--

Time

VOLTAGE SPECIFICATIONS		
FUNCTION	MIN (V)	MAX (V)
Classification (at PSE)	15.5	20.5
Mark (at PSE)	7.0	10
Reset Low	0	2.8
Reset High	50	57

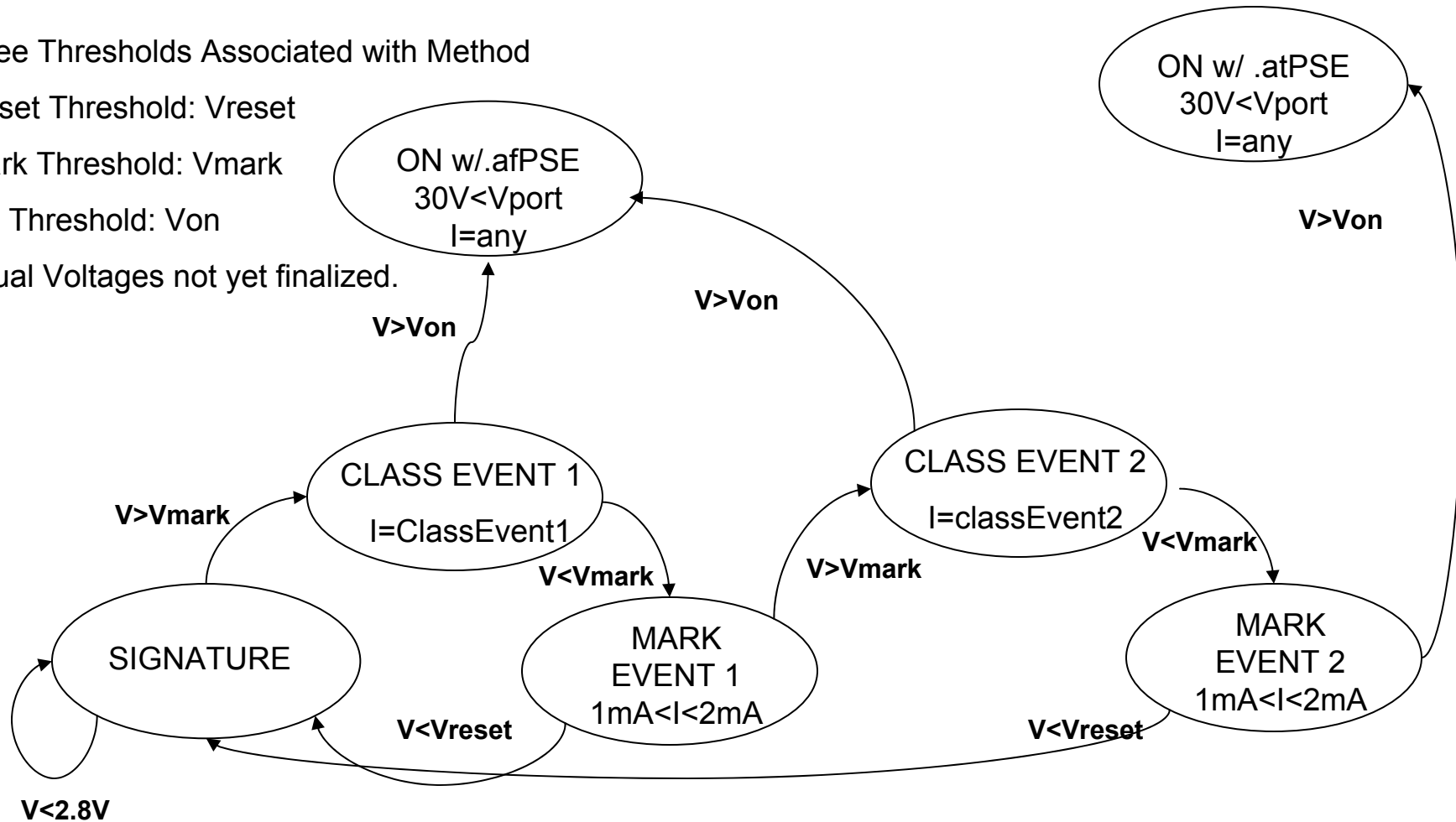| TIMING SPECIFICATIONS		
EVENT	MIN (ms)	MAX (ms)
1st Class	10	30
1st Mark	1.1	2.2
2nd Class	10	30
2nd Mark	1.1	2.2
TOTAL	22.2	64.4

LINEAR TECHNOLOGY

2-Event Classification State Engine in PD
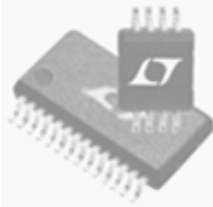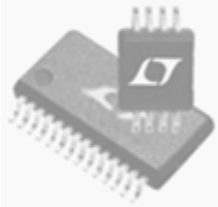
Three Thresholds Associated with Method

•Reset Threshold: Vreset

•Mark Threshold: Vmark

•On Threshold: Von

Actual Voltages not yet finalized.

ON w/ .atPSE
30V<Vport
I=any

ON w/.afPSE
30V<Vport
I=any

V>Von

V>Von

V>Von

CLASS EVENT 1
I=ClassEvent1

CLASS EVENT 2
I=classEvent2

V>Vmark

V<Vmark

V>Vmark

V<Vmark

SIGNATURE

MARK
EVENT 1
1mA<I<2mA

MARK
EVENT 2
1mA<I<2mA

V<Vreset

V<Vreset

V<2.8V

QUESTIONS:

•Does .atPSE need to know there is an .atPD using 15.4W (for example)