

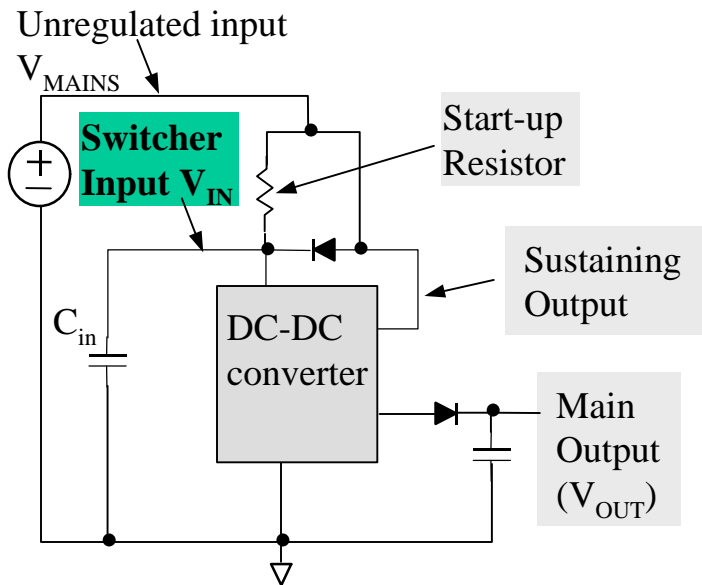
Backgrounder and Proposal For Specifying PD Input Current

- Presentation Goal:
 - suggest perspective for looking at PD surge/ripple current
 - suggest language for PD current spec

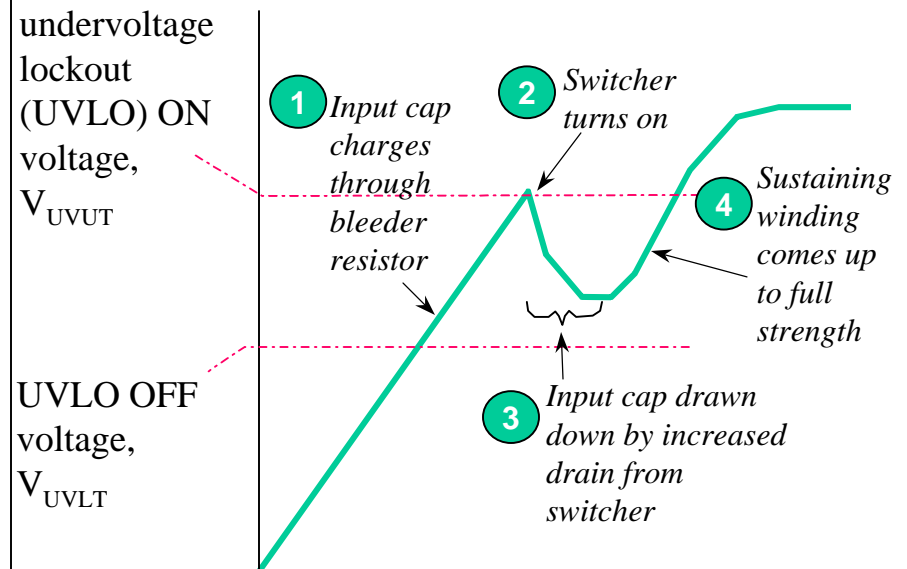
- Presentation Roadmap:
 - show current & voltage waveforms of typical switcher **without** detection or classification
 - describe waveforms **with** detection and classification
 - how input capacitor of PD impacts PSE current
 - numerical example
 - summarize & discuss proposal for specifying PD current
 - proposed language for PD current spec

Startup Waveforms of Typical Switcher Without Detection or Classification

Block Schematic of Step-down Switcher

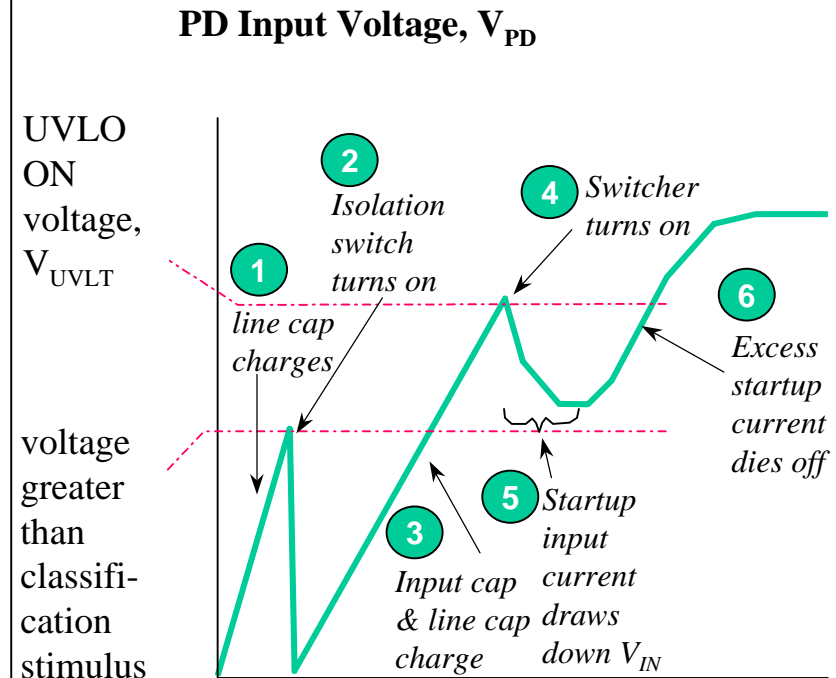
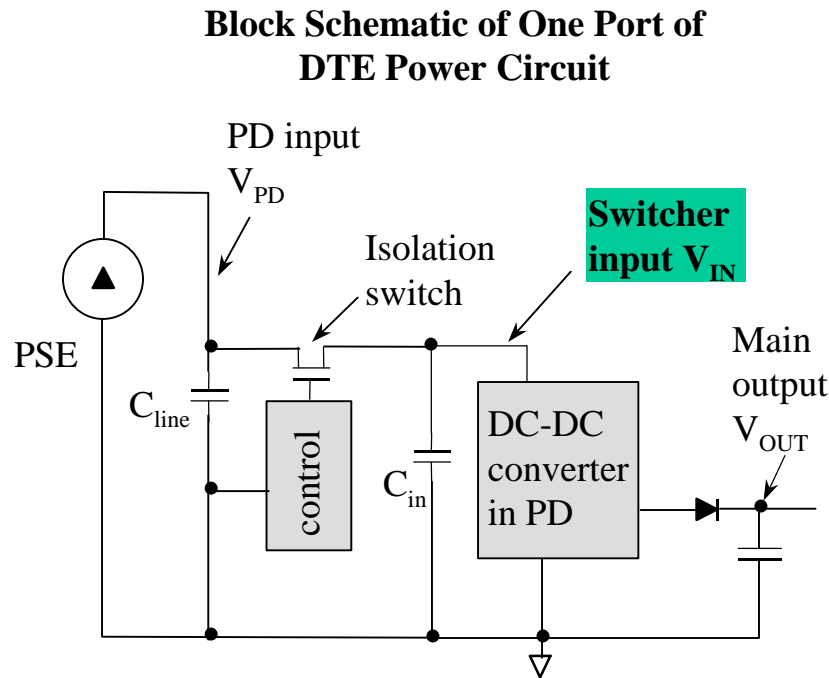


Switcher Input Voltage V_{IN} vs. Time



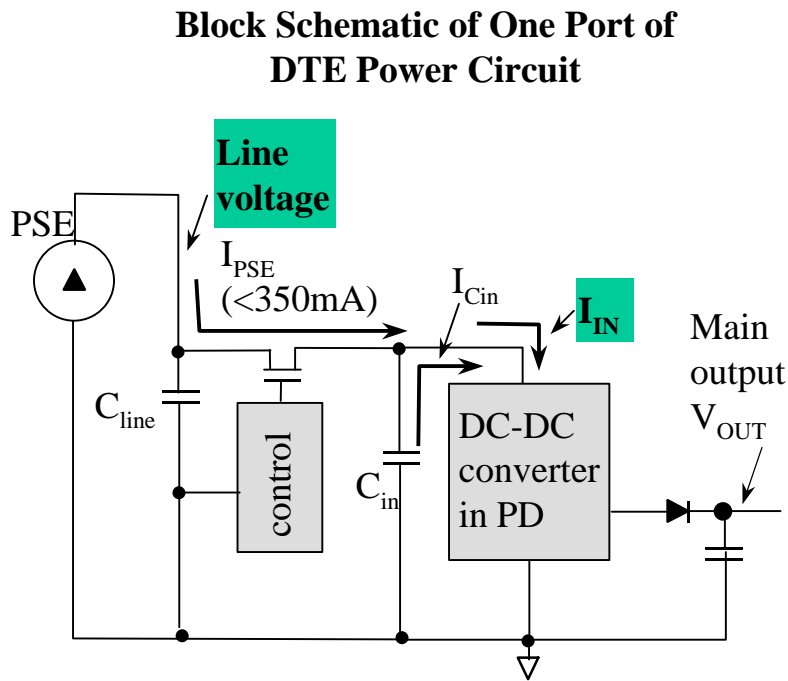
Main point: input surge current sourced by input cap

Startup Waveforms With Detection and Classification

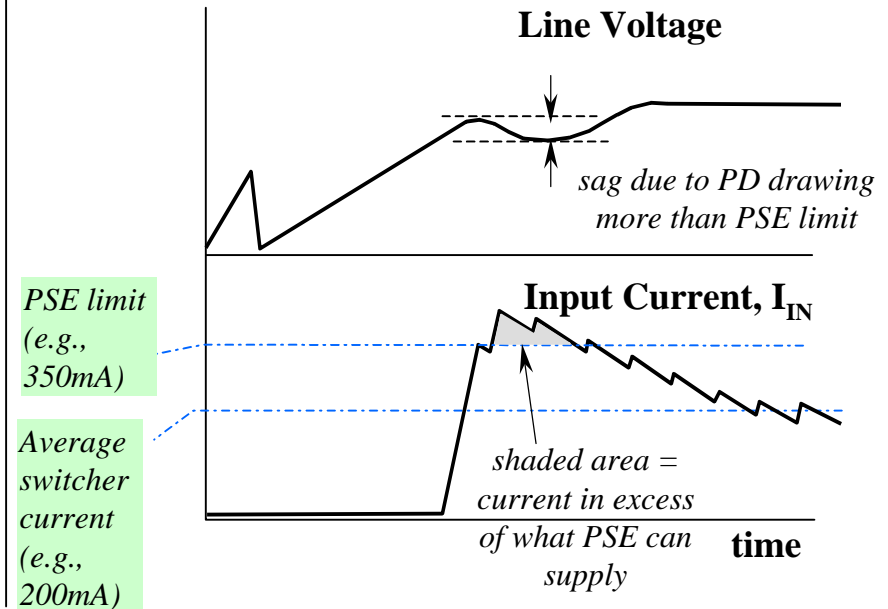


Main point: input cap C_{IN} acts as a reservoir of current that reduces sag in PD voltage upon switcher startup

Benefits of PD Input Capacitor – Startup & Steady State



Switcher Input Voltage & Current Vs. Time

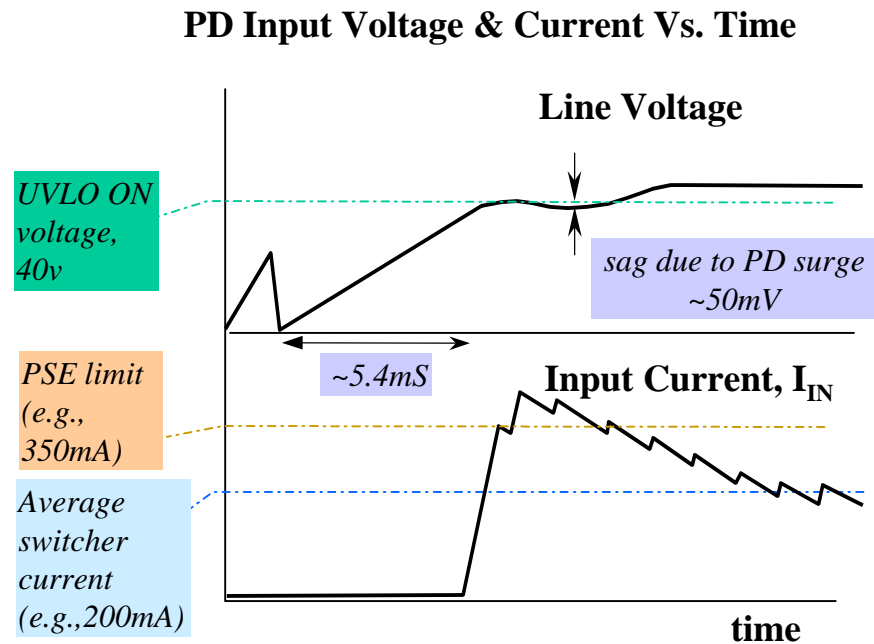


- Main benefits of input capacitor:
 - Allows PSE current limit to be set lower than peak PD draw;
 - Bypasses impedance due to cable length
 - Reduces radiated high-frequency energy, aka EMI

Simple numerical example of waveforms

- Assume:
 - PSE limit of 350mA
 - Switcher max input current of 500mA, duration of surge 100uS
 - Input cap of 47uF, ESR of 0.2ohm
 - UVLO ON 40v

- Then:
 - switching starts ~5.4mS after detection & classification.
 - sag due to 500mA surge is ~50mV



Special PD Load Management

If a PD load requires peak currents in excess of 350mA, such circuit techniques as deemed appropriate by the PD Designer shall be used to satisfy the PD's requirements without affecting the PSE, such as:

- Additional Input Capacitance
- Boost-Buck Converter to make use of $J = 1/2CV^2$
- Local battery systems for very high pulse currents

Proposed Language for PD Current Spec

“The PD designer shall choose component values that perform satisfactorily given:

- 350mA maximum peak operating current draw by PD
- PSE current foldback during PD startup to limit FET dissipation
- The input ripple current spec of the switcher being used”