Inrush with 360uF

Dave Dwelley

Linear Technology

360µF

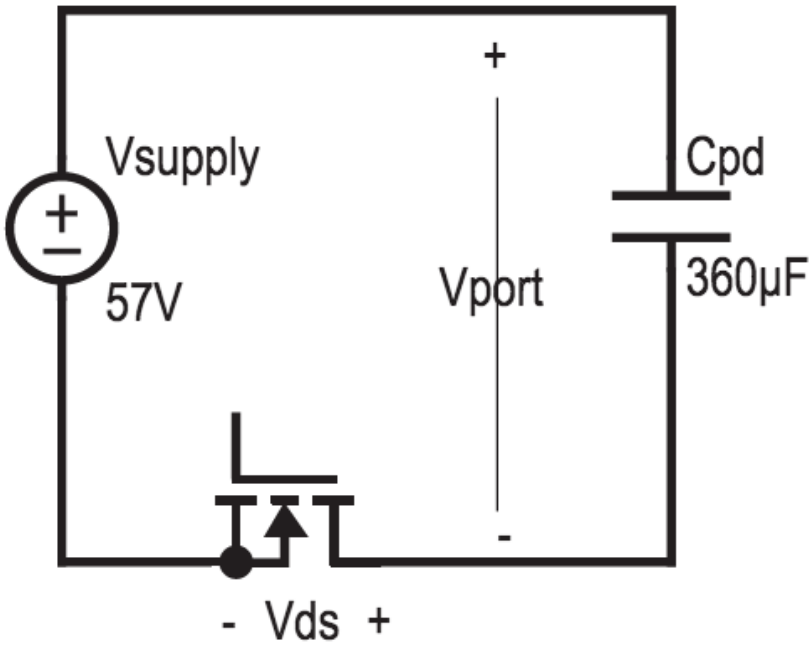
- New .bt text:
  - Input inrush current at startup is limited by the PSE if CPort **per pair-set** < 180 µF, as specified in Table 33–11.
- 180µF/pairset = 360µF total

PSE Gets Hotter

- Tpon doesn't change, so MOSFET inrush power increases by 2x over AT inrush
- SOA is a function of P^2T, so MOSFET peak SOA requirements increase by 4x
- Peak power occurs at the start of inrush and reduces as inrush proceeds
  - This is why foldback works

Foldback

- In current-limited inrush, peak MOSFET power happens with maximum Vds (minimum port voltage)
  - P = Iport*Vds = Iport*(Vsupply-Vport)
- Foldback reduces the current with large Vds and then increases it as Vds shrinks (Vport increases)
- **Foldback is currently out-of-scope for Ilim but forbidden during Iinrush (by Iinrush_2p (min))**



Example Inrush Foldback Curve

- Ilim curve from LTC4266 Datasheet
- This would cover total PSE port current, or pair current with Y-axis scaled /2
- **This provides a 4x P^2T improvement for all PSEs: 1ch, 2ch, internal, external**

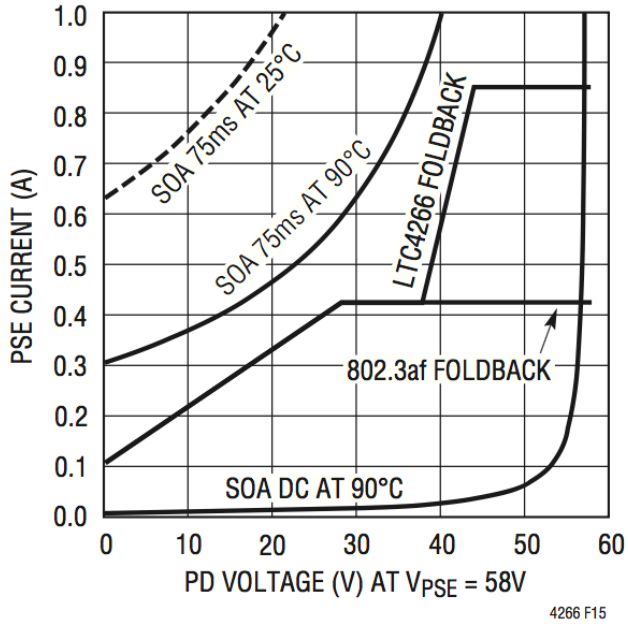


Figure 15. LTC4266 Foldback vs FET Safe Operating Area at 90°C Ambient

Solutions

- Lower Iinrush_2P (min) for Type 3/4 to ~200mA (from 400mA now) with a note that says PSE must charge <360µF to Vport_PSE by Tinrush_max
- Change PD spec back to 180µF total
- Buy a bigger MOSFET

Straw Poll (Pick One Only)

- I prefer:

  ___ Lowering Iinrush_2P (min) for Types 3/4 and requiring 360uF to be charged within Tinrush (max)

  ___ Change PD to 180µF max

  ___ No changes to the text