

# Current Limiter with Active Damping for Dimmable Lighting Systems

## ■ Description

- ▶ Lighting systems, such as an LED driver, can utilize a current limiter for surge protection and active damping
- ▶ Current limiter includes a switchable resistor whose impedance can be varied by either a surge control or a damper control circuit
- ▶ Surge control circuit can increase the impedance of the switchable resistor when the rectified voltage  $V_{RECT}$  is greater than a surge threshold
- ▶ Damper control circuit can increase the impedance of the switchable resistor after the dimmer circuit switches on to dampen input current  $I_{IN}$ .
- ▶ Damper control circuit can reduce the impedance when  $V_{RECT}$  reaches a damper threshold to stop damping

## ■ Benefits

- ▶ Allows a lighting system to withstand high energy surges while simultaneously providing active damping for dimmer circuits
- ▶ Improves overall efficiency
- ▶ Could be used with: LED drivers, LinkSwitch-PH, LinkSwitch-PL

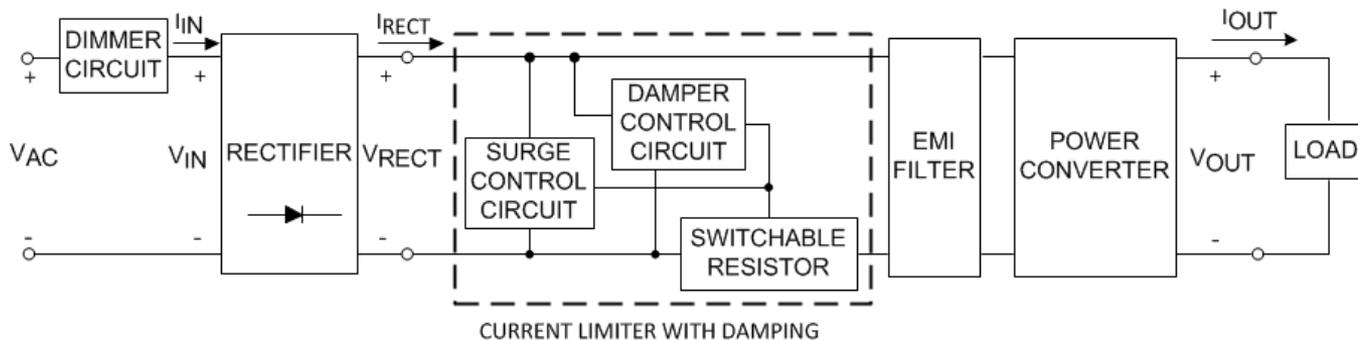


Figure 1. Lighting system with a current limiter which includes a switchable resistor, surge control, and damper control

# Example Current Limiter with Active Damping

- **Low side coupled switchable resistor, includes R9, VR2 and Q3**
  - ▶ Q3 varies impedance of the current limiter by turning ON or OFF; impedance equal to R9 when Q3 is OFF, R9 shorted when Q3 is ON
- **Surge control circuit includes R3, R4, R5, VR1 and Q2**
  - ▶ Adjusts voltage at the control input of Q3 in response to voltage across R5
  - ▶ Q3 is turned off when the voltage across R5 is greater than or equal to the sum of the breakdown voltage of VR1 and the turn on voltage of Q2
- **Damper control circuit includes R6, R7, R8, D1, Q1 and C1**
  - ▶ When dimmer circuit is first turned ON, Q3 is turned OFF
  - ▶ Q3 turns ON when the voltage across C1 reaches a damper threshold
  - ▶ Q1 is turned ON to discharge C1 when voltage on C1 exceeds the voltage across R8 by the turn-on voltage of Q1

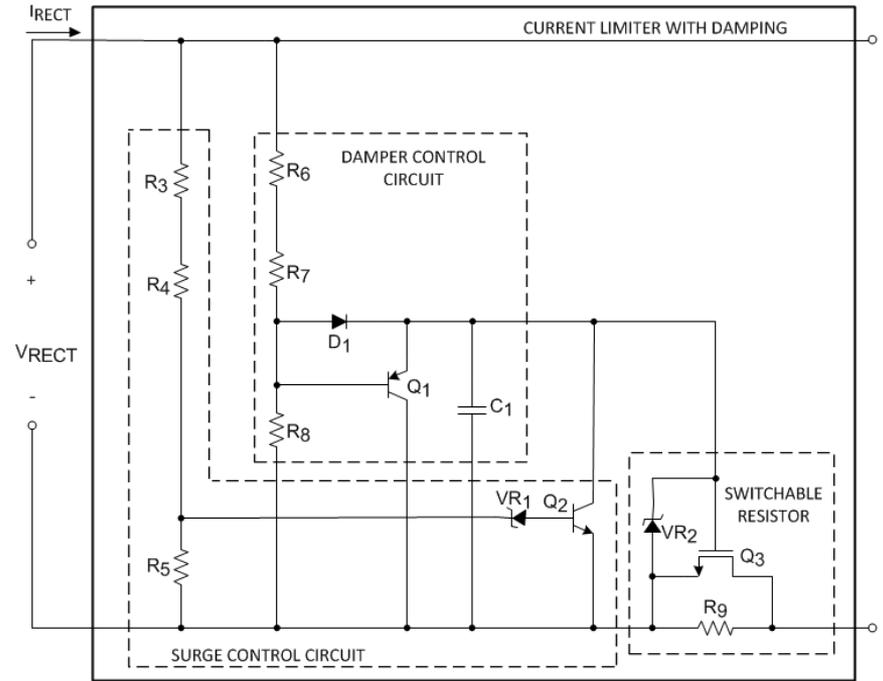


Figure 2. Example current limiter with low side coupled switchable resistor