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L7980: switching regulator for LED driving



STMicroelectronics

LED-MR-16 lamp solution using L7980 monolithic buck converter

The L7980/A is a step-down switching regulator with 2.5 A (minimum) current limited embedded power MOSFET, so it is able to deliver up to 2 A current to the load depending on the application conditions. The input voltage can range from 4.5 to 28 V.

Requiring only a minimum set of external components, the device includes an internal 250 kHz switching frequency oscillator that can be externally adjusted up to 1 MHz.

The QFN packages with exposed pad allow a reduced thermal resistance down to 60° C/W.

L7980 key features

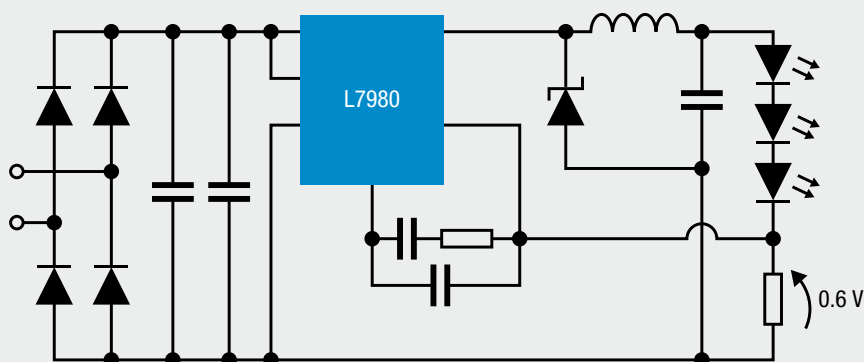
- 4.5 to 28 V input voltage range
- 2 A DC output current capability
- Output voltage adjustable from 0.6 V
- 250 kHz switching frequency, programmable up to 1 MHz
- Internal soft start and enable
- Low drop-out operation: 100% duty-cycle
- Voltage feed-forward
- VFQFPN3x3-8L package

Target applications

- MR-16 lamp retrofit



Application circuit - example



Device description

The L7980 is a new compact step-down monolithic switching regulator capable of delivering up to 2 A of continuous output current. The input voltage can range from 4.5 to 28 V, and is compatible with the commonest voltage buses, including 12 V_{AC}, used in MR-16 applications.

The output voltage can be adjusted from 0.6 V up to the input voltage.

Requiring only a minimum set of external components, the device

includes an internal 250 kHz switching frequency oscillator that can be externally adjusted up to 1 MHz by an external resistor.

The integrated P-channel MOSFET, used for the high-side, requires no external bootstrap capacitor and allows a 100 % duty cycle.

The low $R_{DS(on)}$ of the embedded power element (170 mΩ typ.) provides very low conduction losses.

The L7980 is also suitable for MLCCs

(multi-layer ceramic capacitors) as output filters.

Additional monitoring and protection functions, such as overcurrent, UVLO, thermal shutdown and internal digital soft start, combined with the thermally-efficient QFN8L (3 x 3 mm) package, which has a thermal resistance of 60 °C/W, allow the design of robust and compact applications with a minimum number of external components.

Efficiency achieved in an MR-16 lamp with the L7980

Parameter	Conditions	Value
Vin (AC)	50-60 Hz sinewave	12 Vrms ±10%
Vin (DC)		12 to 24 V
Vout	3x HB WLEDs	8.6 to 11 V
Fsw		400 kHz
I _{LED} nominal	12.5 Vrms, 50 Hz sinewave	350 mA
I _{LED} ripple		<50 mA _{pp}
I _{LED} accuracy		±5%
Efficiency	Vin = 14 V _{DC} Vout = 10 V, Pout = 3 W	88%
Efficiency (rectifying bridge bypassed)		92%



Note:
Application example, not orderable