NXP AC/DC converter for LED luminaires

A bright idea for dimmable LED luminaires

Our latest AC/DC converter reference design shows how next-generation LED luminaires can be combined seamlessly with existing electrical infrastructures including wall-mounted dimmers. Based on the NXP STARplug family, it uses robust components and proven technologies to simplify the design of solid-state lighting (SSL) applications.

Key features

- High energy efficiency at approx. 15 W: 85% at 120 V AC, 82% at 230 V AC
- Power factor of 0.77
- 80 - 270 V AC input
- Output voltage follows V_F of the LEDs
- Output current 1000 mA (± 5%)
- Meets safety / isolations regulations (UL 1598 Class 2 and IEC60950)
- Wide range of built-in protection circuits

Key benefits

- Supports the development of next-generation LED luminaires
- Compatible with existing wall-mounted dimmers
- Long lifetime solution
- High energy efficiency
- Enables fast evaluation and creation of lighting solutions

Key applications

- Retro-fit LED lamps
- LED ballasts
- Signage
- Contour lighting
- Commercial lighting e.g. cabinet or freezer lights
- Other lighting applications

Solid-state lighting has the potential to offer huge energy savings over conventional lighting solutions. To make the next big step forward in SSL implementation requires efficient driver solutions that optimize LED lumen output, fit standard luminaire form factors and are fully compatible with existing electrical infrastructures including wall-mounted dimmer switches.

NXP Semiconductors' AC/DC converter reference design for LED luminaires lets you easily design these solutions and optimize lumen output, system lifetime and cost. With just a minimum of additional components, it offers a driver solution that is fully compatible with transistor or even thyristor (triac) based wall-mounted dimmers.

NXP founded by Philips

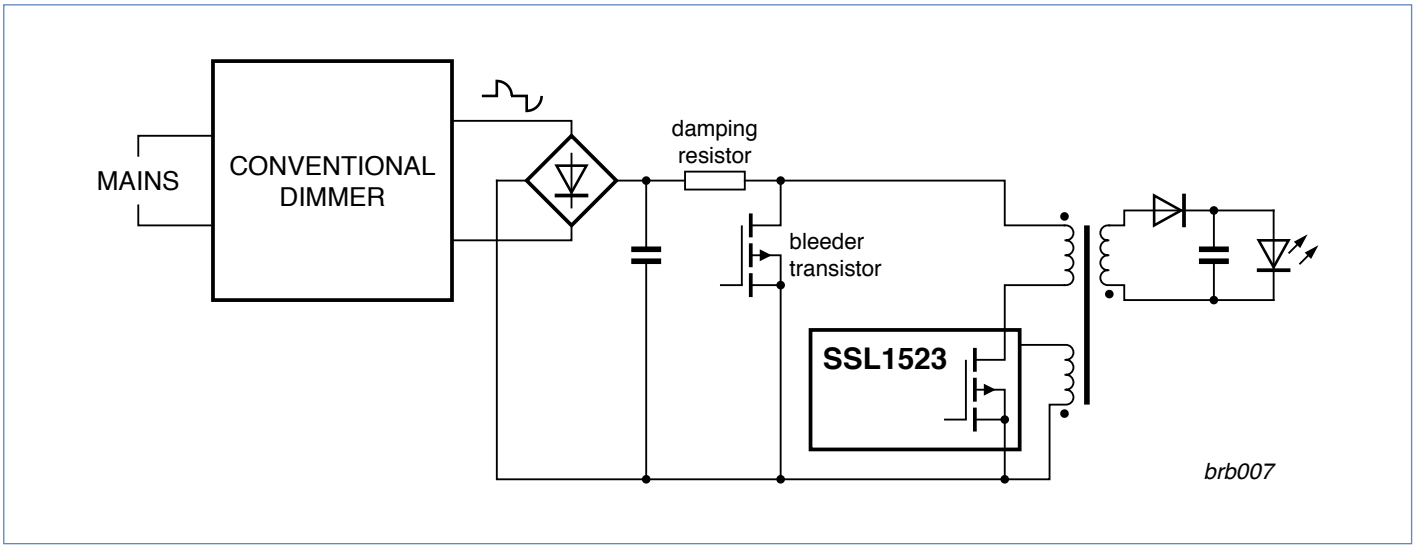
Central to this reference design is the Switched Mode Power Supply (SMPS) controller IC SSL1523. This compact flyback converter from our STARplug+ family guarantees energy efficiency through valley switching, an adaptive switching frequency and low-resistance internal transistors.
Such high efficiency allows the use of lower-specification passive components and smaller heat sinks, translating into lower system costs.

A full suite of built-in protection features include, cycle by cycle adjustable, over-current protection (OCP), under voltage lock-out (UVLO), over voltage protection (OVP), over temperature protection (OTP), short winding protection (SWP) and demagnetization protection. The design also enables easier thermal management and hence better lumen consistency and longer LED lifetimes, with system lifetime further enhanced through limited electrolytic capacitor requirements.

The reference design can be used in a wide variety of applications. Tailored for a single state-of the-art, 3 W LED, other LEDs or LED combinations can be implemented easily.

NXP STARplug+ SMPS control IC SSL1523 for low-power systems

- Integrated 650 V MOSFET ($R_{DS(on)}$ = 6.5 Ω)
- Highly efficient power conversion
  - Low $R_{DS(on)}$ reduces switching losses
  - Adaptive switching frequency
  - Valley switching



www.nxp.com

founded by PHILIPS

Date of release: January 2008
Document order number: 9397 750 16259
Printed in the Netherlands