NXP Multi-Channel LED Drivers ASLx50y & ASLx41y Series

Automotive Exterior Lighting Gets A New Level of Flexibility, Scalability

Boost converters and buck drivers developed as a cost-effective solution for multi-channel LED driver modules. They are designed to address the increasing demand for a single flexible, scalable platform architecture, supporting a full range of newly arising and existing LED lighting features with a high degree of re-use and shorter development times.

KEY FEATURES

▶ Highly integrated ASLx50y multi-phase boost converter
  - Regulated output voltage programmable from 10 – 80 V
  - Wide operating input voltage (+5.5 to +40 V)
  - 5 V SPI for control, diagnostics with external MCU
  - 1-, 2-, or 4-phase operation for higher power and limp home functionality supported by ASLx507 1-, 2-phase
  - Space-saving, pin-compatible HVQFN32 package
▶ Highly integrated ASLx41y multi-channel buck driver
  - Constant current to LEDs independent of input voltage
  - 5 V SPI for control, diagnostics with external MCU
  - External MOSFET for higher flexibility, better thermal design with limp home functionality supported by ASLx417 2-, 3-channel
  - 2 or 3 channels in pin-compatible HVQFN32 package

KEY BENEFITS

▶ One compact, cost-effective architecture for all LED string configurations
▶ Pin-to-Pin compatibility enabling scalable PCB designs
▶ High architecture re-use, allows shorter development time
▶ Easy, extensive programming via SPI
▶ Robust, highly reliable, and efficient performance

APPLICATIONS

▶ Automotive LED lighting control units
▶ High and low beams, advanced dynamic beams
▶ Matrix/pixel exterior lighting
▶ Daytime running lights (DRLs), position lights, fog lights
▶ Rear tail and stop lights, turn indicators

The NXP ASLx50y multi-phase boost converter and ASLx41y multi-channel buck driver are designed to support maximum styling and design flexibility with minimum hardware and software changes, helping develop cost-effective differentiation for car manufacturers.

These highly integrated devices combine our deep understanding of LED performance with our world-class automotive A-BCD mixed-signal HV technology, so they operate very efficiently while supporting a highly flexible, very scalable system architecture.

HIGH FLEXIBILITY

The hysteretic DC/DC buck topology, which support input voltages to 80 V, allows maximum flexibility on output voltages for each channel, enabling applications with up to 20 LEDs. The drivers supports high-current (>1.5 A) LEDs, so manufacturers can follow the trend of replacing traditional lights with LEDs, while delivering robust performance, high reliability, and efficiency.

Both families of devices are equipped with a 5 V SPI interface, for extensive configurability, control, and diagnostic communication with an external microcontroller. The SPI interface makes it easy to program key parameters, including output LED current, output boost voltage, booster DC/DC frequency.

HIGH SCALABILITY

The ASLx50y and ASLx41y support a common architecture, with few external components, that can be used to drive any configuration of LED strings (high/low current, matrix or segment switching). Also, pin-to-pin compatibility within the ASLx41y driver series means a common PCB design can be used to drive multi-channel applications with an output power from 30 to 140 W. The result is lower development costs with extensive options for design re-use and shorter development times compared to other solutions.

ASLX50Y FEATURES

The ASL250y/450y are multi-phase boost converters that can have two independent output voltages, each programmable, via the SPI interface, with an accuracy of 3%. The SPI interface can also be used to adjust the DC/DC converter frequency from 125 to 700 kHz.

The ASLx50y supports monitoring of the input and output voltages. The design can also be optimized by adjusting the output phases to lower ripple on the battery line, lower system cost, improve efficiency, electromagnetic compatibility (EMC) performance. Due to the pin-compatibility, the system architecture can easily be scaled to drive a higher number of channels, with a common PCB layout.

ASLX41Y FEATURES

The ASLx41y multi-channel buck driver provides constant current to the LEDs, independent of input voltage. The output current can be programmed, using the SPI interface, to 1.5 A with an accuracy of 5%. To achieve an output current above 1.5 A, the two output channels can be connected, or the external components can be changed.

PWM dimming is possible, from 0 or 1.5 to 100%, with a resolution of 0.1%. The wide output voltage range (2.5 to 70 V) can be used to drive up to 20 LEDs.
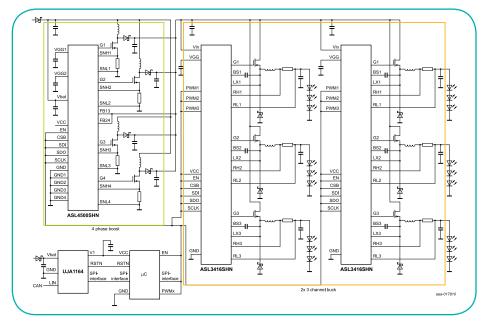
The monitoring of the output LED voltage enables fault detection for LED open and short-to-ground. The 2-channel ASL241y and the 3-channel ASL341y are both housed in an HVQFN32 package, for complete pin-for-pin compatibility, enabling common PCB layout to be used for a scalable number for channels.

The ASLx417 Buck Converters also come with a limp-home functionality in case of communication breakdown and are pin to pin compatible with the ASLx416.

Similarly, the booster ICs also offer limp-home functionality for 1 and 2 phases with ASL1507 and ASL2507 and are pin to pin compatible with the non-limp home variants.

Part number	Description	Package
ASL1500SHN	1-phase boost converter	HVQFN32
ASL2500SHN	2-phase boost converter	HVQFN32
ASL4500SHN	4-phase boost converter	HVQFN32
ASL4501SHN	4-phase boost converter with enhanced phase mismatch	HVQFN32
ASL2416SHN	2-channel LED buck driver	HVQFN32
ASL3416SHN	3-channel LED buck driver	HVQFN32
ASL1507SHN	1-phase boost converter with limp home mode	HVQFN32
ASL2507SHN	2-phase boost converter with limp home mode	HVQFN32
ASL2417SHN	2-channel buck driver with limp home mode	HVQFN32
ASL3417SHN	3 channel buck driver with limp home mode	HVQFN32

SIX-CHANNEL REFERENCE ARCHITECTURE