Digitally controlled LED driver board for automotive lighting applications

Features

- Two embedded L99LD21 high power LED drivers able to supply four independent channels
- Output current up to 1.69 A each channel
- Input operating voltage range from 5.5 V to 24 V
- Programmable via SPI, allowing accurate LED current setting
- Protections and diagnostics for output short-circuit and open-load, overtemperature, and battery undervoltage.
- Automotive Limp-Home Mode support
- Board size: 81 x 100 mm. Maximum components height: 11 mm
- WEEE and RoHS compliant
- All ST components are qualified Automotive grade
- Board designed according to the AutoDevKit initiative

Description

The AEK-LED-21DISM1 LED driver board is designed for high brightness automotive LED front lighting applications according to the AutoDevKit initiative. It can control four LED strings through two embedded L99LD21 flexible LED drivers with high efficiency boost controller and two embedded buck converters. The boost controller section in each L99LD21 LED driver integrates a high current gate driver for an external N-channel MOSFET and delivers a constant output voltage to two integrated buck converters. The boost controller of two devices can be stacked to allow dual phase operation for high power applications, with an interleaving pattern for improved input current ripple and current load sharing. The buck converter integrates an N-channel MOSFET driven by a bootstrap circuit.

The board uses SPI communication with an external microcontroller via a 12-pin male connector, and a special Limp Home Mode implemented in the L99LD21 driver ensures that active communication with the MCU is regularly monitored. You can use the AutoDevKit library extension for the SPC5-Studio development environment to install board firmware drivers that are immediately compatible with SPC5-family MCUs.

The overall package is designed to address automotive lighting applications, including high beams and low beams, daytime running lights, turn indicators, position lights, side markers and fog lights.

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<td>AutoDevKit digitally controlled LED driver board</td>
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The AEK-LED-21DISM1 evaluation board is designed to replicate a typical automotive front lighting solution. Boost gate switching and buck converter current control is managed by the digital logic and control section of the L99LD21 LED driver, which also provides other safety and protection mechanisms, including standby management through a dedicated state machine and a special Limp Home safety mode to help preserve fail safe operation for safety critical operations like low beams and turn indicators.

The behavior of the board is monitored and controlled through the control, status and customer trimming registers in the L99LD21 LED drivers, which can be read or set by an external microcontroller through the fast SPI interface.

RELATED LINKS

AutoDevKit: Adaptive Front Lighting demonstration kit video on YouTube
Figure 2. AEK-LED-21DISM1 schematic - LED section
Figure 3. AEK-LED-21DISM1 schematic connectors

**SPI & SIGNAL CONNECTOR**

**BLUETOOTH CONNECTORS**

**DISCOVERY CONNECTORS**
## Revision history

**Table 1. Document revision history**

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<tr>
<td>26-Jul-2019</td>
<td>1</td>
<td>Initial release.</td>
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