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LEDFRONTHBLB_REF NEW

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Overview

Reference design for high beam and low beam combination using TLD5099EP

This Infineon Reference Design Guide describes a detailed implementation of an automotive front light high beam / low beam combination using the flexible multitopoly DC-DC controller **TLD5099EP (/cms/en/product/power/lighting-ics/litix-automotive-led-driver-ic/litix-power/tld5099ep/)** of the **LITIX™ Power family (/cms/en/product/power/lighting-ics/litix-automotive-led-driver-ic/litix-power/)** in current controlled buck-boost SEPIC configuration. One single DC-DC channel is used to drive the high beam and low beam. The high beam can be activated in conjunction with the low beam or the low beam can be activated standalone. This represents a cost saving approach especially suitable for entry level LED headlamps. A PWM dimming feature enables furthermore control of brightness and enables derating in extreme operating conditions. State of the art diagnosis is provided as well as transient robustness. Compliant EMC performance is verified according to the CISPR25 standard. Thermal performance information is given and discussed.

Key components:

- **TLD5099EP (/cms/en/product/power/lighting-ics/litix-automotive-led-driver-ic/litix-power/tld5099ep/)**
  Multitopology DC-DC controller from the LITIX™ Power family
- **IPD60N10S4L (/cms/en/product/power/mosfet/20v-800v-automotive-mosfet/75v-100v-n-channel-automotive-mosfet/ipd60n10s4l-12/)**
  OptiMOS™ - T2 as power stage switching MOSFET
- **IPD50P04P4L-11 (/cms/en/product/power/mosfet/20v-800v-automotive-mosfet/20v-150v-p-channel-automotive-mosfet/ipd50p04p4l-11/)**
  OptiMOS™ - P2 as reverse battery protection MOSFET

Useful links:

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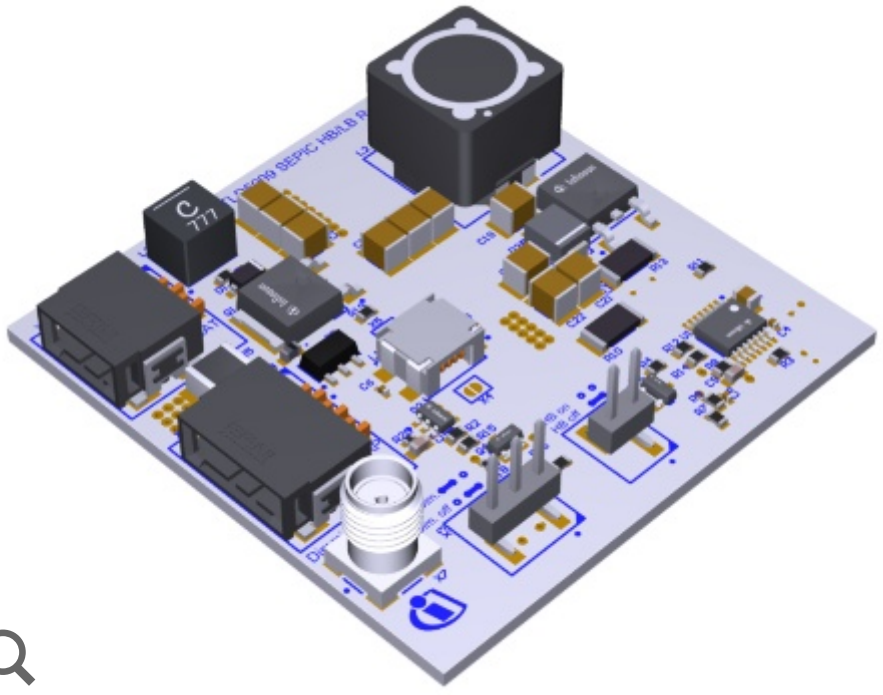
- **Click here to view the Reference Design 3D Model. (/cms/media/atv-3dmodels/REF_LEDFRONTHBLB/)**

Benefits

- Transient Pulse tested
- EMC compliance
- Thermal tests
- Focus on cost optimized design

Potential Applications

- **Automotive LED front light (/cms/en/applications/automotive/body-electronics-and-lighting/led-front-lighting/)**
  :
  High beam, low beam
  Daytime running light, turn indicator
- Motorcycle headlamp



Diagrams

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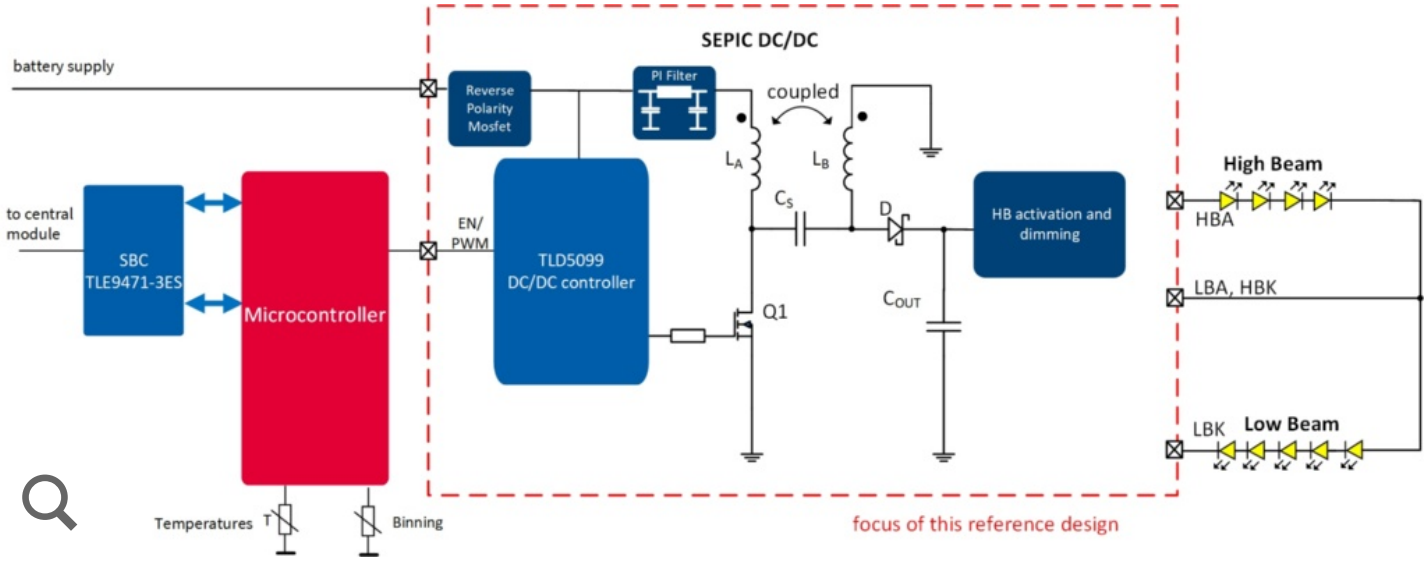

Parametrics

Parametrics	**LEDFRONTHBLB_REF**
Family	LED Driver
Input Type	DC
Output Voltage min max	14.0 V 27.0 V
P_{out} min max	13.0 W 25.0 W
Product Description	This Infineon Reference Design Guide describes a detailed implementation of an automotive front light high beam / low beam combination using the flexible multitopoly DC-DC controller TLD5099EP of the LITIX™ Power family in current controlled buck-boost SEPIC configuration.
Qualification	Automotive
Supply Voltage min max	8.0 V 27.0 V

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Parametrics	LEDFRONTHBLB_REF
Target	Automotive, Lighting
Application	
Topology	Buck-Boost
Type	Reference Design

Order

Sales Product Name	**LEDFRONTHBLB_REF**
OPN	LEDFRONTHBLBREFTOBO1
Product Status	active and preferred
Package name	
Order online	
Completely lead free	
Halogen free	
RoHS compliant	no
Packing Size	1
Packing Type	CONTAINER
Moisture Level	
Moisture Packing	NON DRY

Boards

+ Reference Design

Automotive front light LED reference design with SEPIC topology NEW (/dgdl/Infineon-78F68834278-TLD5099EP-Front_light-SEPIC-ReferenceDesign-v01_00-EN.pdf?

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› EN (/dgdl/Infineon-Z8F68834278-TLD5099EP-Front_light-SEPIC-ReferenceDesign-v01_00-EN.pdf?fileId=5546d46272aa54c00172b850df584e15)
01_00 | 2020-06-15 | pdf | 6.6 MB

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LITIX™: How to avoid current spikes when the load changes

Current spikes, which are created when the load of a current controlled LED driver changes, can be avoided by adding some external components. Take a look at this simulation model **https://www.infineon.com/dgdl/Infineon-atv_12v_LED_lighting_full-bridge_controller_TLD5190_V3-SimulationTool-v01_03-EN.htm?fileId=5546d46271bf4f9201724cbdc8d27fef (https://www.infineon.com/dgdl/Infineon-**…

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Use of LITIX™ POWER LED drivers when applying PWM via switched power lines

LITIX™ Power products can be used when the power lines are being switched. Please consider that the enable pin EN / PWMI receives the correct PWM signal - and not a distorted signal after the input filter. See **https://www.infineon.com/dgdl/Infineon-Z8F67392382_Multitopology_controllers_with_PWM_dimming_through-ApplicationNotes-v01_00-EN.pdf?fileId=5546d4626eab8fbf016ed600cc1839db**…

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Maximum number of LITIX™ BASIC+ LED used for one function to meet <10 mA fault mode current

In total you can use up to 11 LITIX™ BASIC+ LED driver devices for one function on the same ERRN bus.
Rationale: Referring to the ECs (Electrical Characteristics) "internal supply and EN pin" two parameters are of interest:

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1.) IS(fault,ERRN): Current consumption during fault condition triggered from another device shari…

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Litix BASIC+ explanation of output structure of ERRN pin

The ERRN pin is implemented as an open drain output with an internal current limitation.
A pull up resistor has to be placed externally to ensure the desired functionality. To ensure functionality at least 10kOhm are recommended. A typically used value for RERRN is 22kOhm, as used in our EMC test report.
Have a look in the Basic+ Appnote "Diagnosis and fault management" available on the Infineon…

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How to disable the status pin (ST pin) functionality on a LITIX Basic device

The solution to pull down the ST line with a NPN-Transistor during STOP mode is ok, because the transistor is directly controlled by the STOP supply.
In case of a fault condition the device will source a small current (<220µA) to increase the ST line. When the NPN is turned ON, this small current will be sourced into ground and the ST net will not rise sufficiently to disable the other LED drivers connected to the same ST net. Only the device whi…

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Implementation of a custom thermal derating feature with LITIX™ Basic+

An external temperature derating can be achieved by placing a PTC type resistor at the IN_SET pin. A short trace length (few cm) to place the PTC resistor closer to the LEDs is uncritical. For extended trace length PCB, ground shifts and potential disturbance may impact the current regulation accuracy.
As the voltage in the IN_SET pin is kept constant at 1.22V, the change of the resistance directly…

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