Introduction to simulation model - Infineon Designer

LITIX™ Power TLD5045EJ

About this document

Scope and purpose

This document outlines LITIX™ Power **TLD5045EJ** main features by means of its digital twin, referred as simulation model, in typical application setups aiming to be an easy, time efficient and cost reduction solution for exploring device capabilities and integration in complex applications.

Information covered in this document does not substitute datasheet content and shall be regarded as complementary to it. For a more precise description of the device and its features, please consult the datasheet [1].

Intended audience

This application note along with the simulation model itself offers an interactive solution targeted for anybody who aims to explore the functionality and “what if” scenarios for **TLD5045EJ** device.

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The LITIX™ Power **TLD5045EJ** is a highly integrated smart LED buck controller with built in protection functions. The main function of this device is to drive single or multiple series connected LEDs efficiently from a voltage source (V_{REC}) higher than the LED forward voltage by regulating a constant LED current (I_{LED}).

The available online circuits are listed below:

- 12 V Automotive LED driver with LITIX™ Power TLD5045EJ step-down converter (dimming) [2]

Click here to open the circuits

2 Simulation model features

- Perform transient simulations: observe and analyze transient device response to different stimuli. The number of stimuli and probes is unlimited.
- Measure the device electrical parameters in typical conditions with increased precision at small resolution (e.g. 100 ns/1 µV/1 µA).
- Integrate the simulation model in complex application and explore new possibilities.
- Explore main features of the real device (for more details consult the datasheet): shortest time to obtain results, zero error cost (no harm to physical components), can be done by anyone (engineers, students, etc.):
    - Regulation loop
    - Digital dimming via embedded PWM generator
    - Open load diagnosis via ST pin
- Simulation model does not cover all features of the real device in order to keep the usability and simulation speed in a reasonable range:
    - Thermal network and self-heating not available, no overtemperature detection and protection
    - Current consumption of the IC not considered (no realistic power efficiency calculation possible)
    - No ESD, EMC, AC, DC and Monte Carlo analysis simulation capability
    - Possible convergence issues for using DC sources, steep ramps or high frequency sources within the setup.

3 Model performance

3.1 Dimming – transient

The test bench shows the behavior of TLD5045EJ while powering a high-power LED in PWM mode. The dimming is generated by the internal PWM engine using external RC network. The PWM engine can be disabled via J1 jumper (one-click on symbol to toggle position).

The output current is set to a peak value of 580 mA via R_{SET} external resistor. Switching frequency can also be adjusted via external RC network.

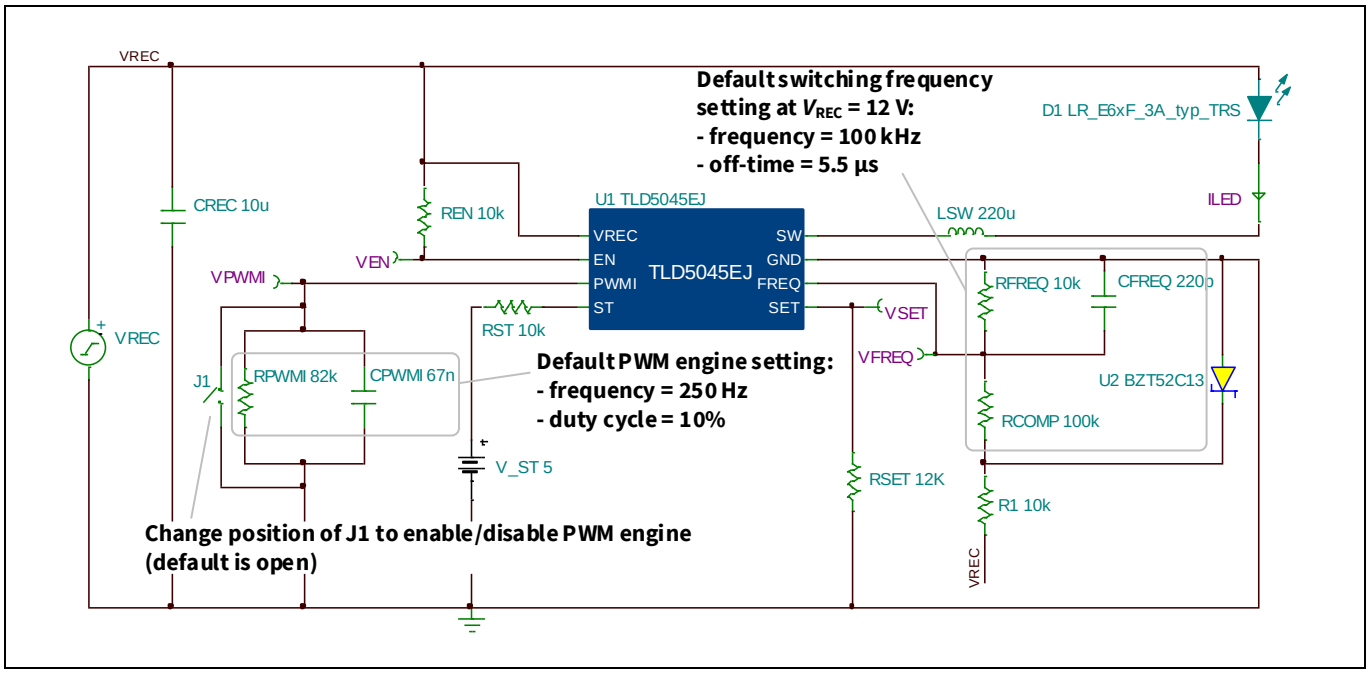

Figure 1 Test setup for dimming [2] click to open

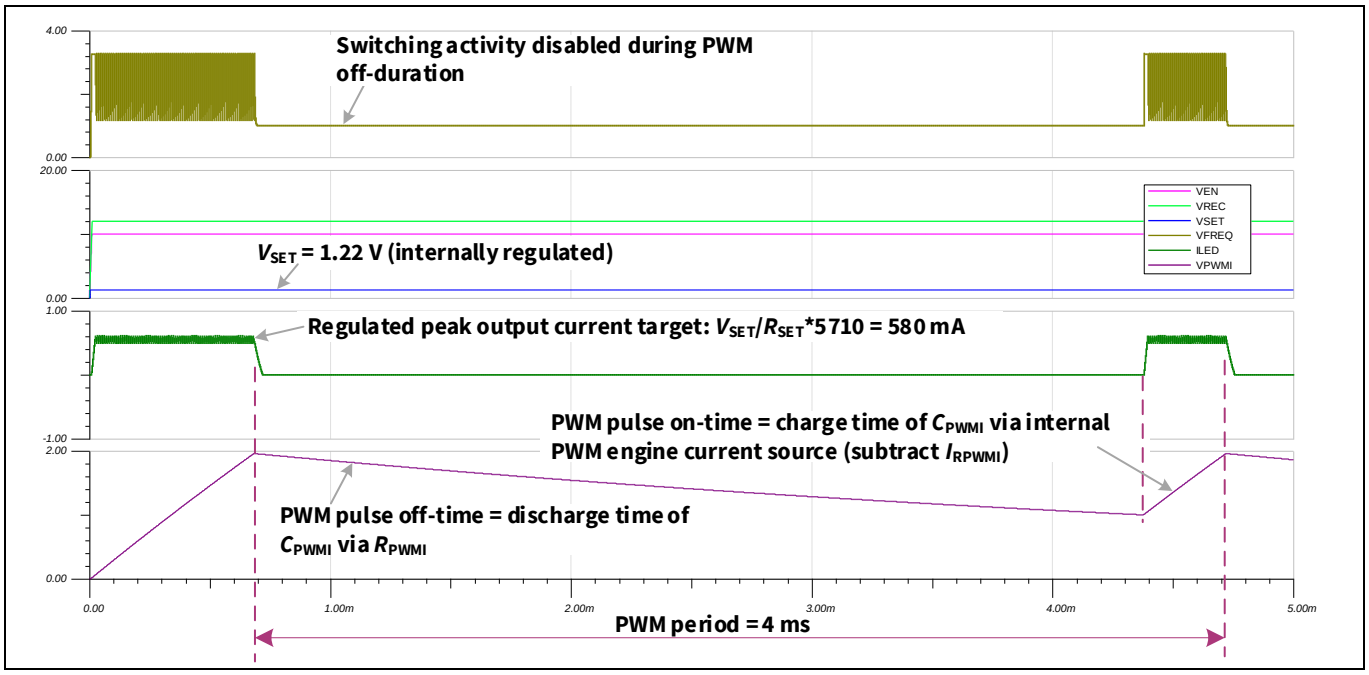

Figure 2 Simulation results dimming

4 List of references

[1] Infineon-TLD5045EJ-DS-v01_20-EN

[2] Infineon designer
https://www.infineon.com/cms/en/tools/landing/ifxdesigner.html?search=true&keyword=TLD5045EJ

5 Revision history

Document version	Date of release	Description of changes
Rev.1.00	07.02.2022	Initial version created

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