DN05069/D

Automotive Dome Lamp

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APPLICATION NOTE

Description

LEDs are becoming more and more popular in automobile design and styling. One of the applications where they are being used is dome lamps, reading lamps, and for trunk illumination. This application note goes over a simple, yet cost-effective solution to drive a High Brightness LED in these applications using the NCV3065 or NCV3066.

The NCV3065 (no enable) and NCV3066 (with enable) are monolithic switching regulators from ON Semiconductor designed specifically to drive High Brightness LEDs (HB LEDs). They feature an on-board power switch and a low feedback voltage of only 235 mV which is used to regulate the average current in the LED. Together these make an incredibly cost effective solution for driving these LED applications.

An inductor in a buck regulator makes for a great constant current source, since the current in an inductor cannot change instantly. The circuit in Figure 1 below shows the HB LED in series with the inductor. In a typical buck regulator application one would also have an output capacitor to ground to create a constant voltage source, but since we are interested in current and not the output voltage, these capacitors can be removed, which saves on the overall bill of material.

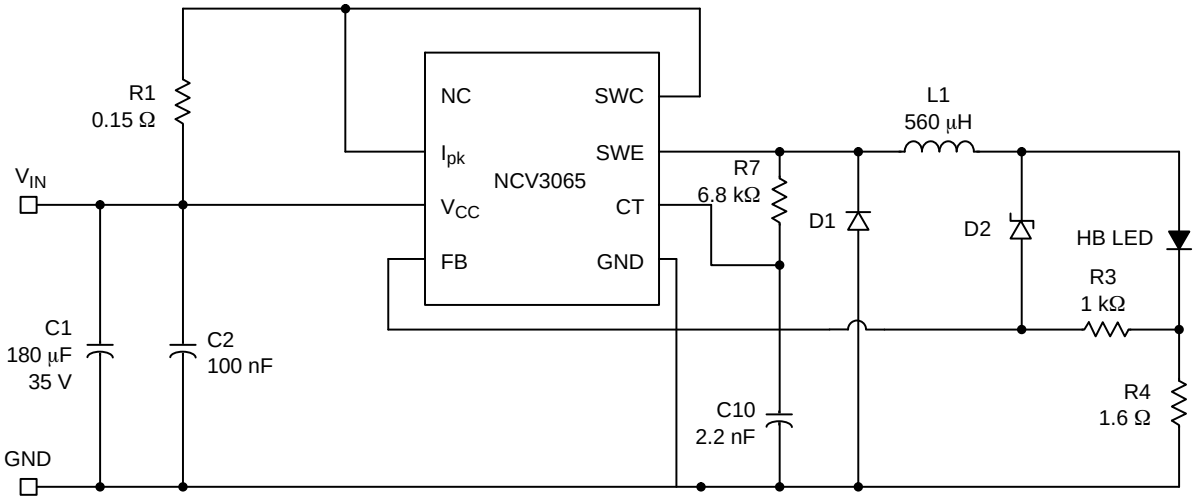

Figure 1. The NCV3066 used as a Buck Regulator

With a feedback voltage of 235 mV, the above circuit is setup for roughly 150 mA of current through the HB LED (235 mV/1.6 Ω = 147 mA). R1 is used to protect the device for output short circuits by limiting the peak switch current. R7 is used to modify the max duty cycle which helps eliminate pulse skipping which can sometimes occur, while C10 sets up the switching frequency (more information on this feed-forward design technique can be found in our application note AND8284/D). D1 is a Schottky diode which provides a current path for the inductor when the main power switch is off. And R3 and zener diode D2 provide protection to the circuit in case the LED becomes open circuited.

More information on how to design using the NCV3065/66 can be found on our website, where there is a design tool and a number of other design notes available. For more information on eliminating the output capacitors, see application note AND8298/D.

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