## **ON Semiconductor**

### Is Now



To learn more about onsemi<sup>™</sup>, please visit our website at www.onsemi.com

onsemi and ONSEMI. and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. onsemi reserves the right to make changes at any time to any products or information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using onsemi products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by onsemi. "Typical" parameters which may be provided in onsemi data sheets and/ or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. onsemi does not convey any license under any of its intellectual property rights nor the rights of others. onsemi products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use onsemi products for any such unintended or unauthorized application,

# **Automotive Dome Lamp**



### ON Semiconductor®

www.onsemi.com

## APPLICATION NOTE

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.

#### 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.

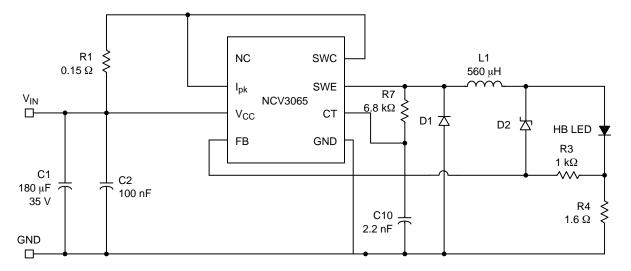


Figure 1. The NCV3066 used as a Buck Regulator

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  $\Omega$  = 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 <u>AND8298/D</u>.

### DN05069/D

ON Semiconductor and iii) are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at <a href="www.onsemi.com/site/pdf/Patent-Marking.pdf">www.onsemi.com/site/pdf/Patent-Marking.pdf</a>. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor, "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor data sheets and/or specification by customer's technical experts. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices or medical co

### **PUBLICATION ORDERING INFORMATION**

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800–282–9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910 Japan Customer Focus Center Phone: 81-3-5817-1050 ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative