

NUD4001 LED Driver Demonstration Boards

Prepared by: Alex Lara
ON Semiconductor



ON Semiconductor®

<http://onsemi.com>

APPLICATION NOTE

General Description

The NUD4001 demo boards are simple circuits which bias the NUD4001 device so that its functionality can easily be observed. Because the NUD4001 device can be used in different ways and applications, two different demo board versions have been developed to cover most of the application cases.

Demo Board A

The purpose of this demo board is to demonstrate the operation of the NUD4001 device for applications where the voltage difference between the input voltage and the LED's voltage is small (i.e. when a 12 V supply voltage is used to power up a LED array composed of three Luxeon 1 devices).

This is the ideal case for the NUD4001 device to operate because the power dissipation on the device is significantly reduced when the LED's array voltage is close to the input

voltage (for further explanations, see design guide on Page 4 of device's data sheet).

The defaults of the demo board A are set to take a 12 V dc or ac input voltage and to provide a LED current of 350 mA. The settings can be changed to meet different application needs. However, the important thing to consider when changing the default settings of the board is not to exceed the NUD4001 device's ratings of voltage, current and power dissipation. Figure 1 illustrates the schematic diagram for the demo board A, and Figure 3 on the following page, shows a picture of a finished board.

The dc or ac input voltage is applied between the two terminals of the board. The connector named Con1 can be used as an alternative way to supply a dc voltage to the board from an IBM ac computer adapter with an output of 16 Vdc and 4.5 A.

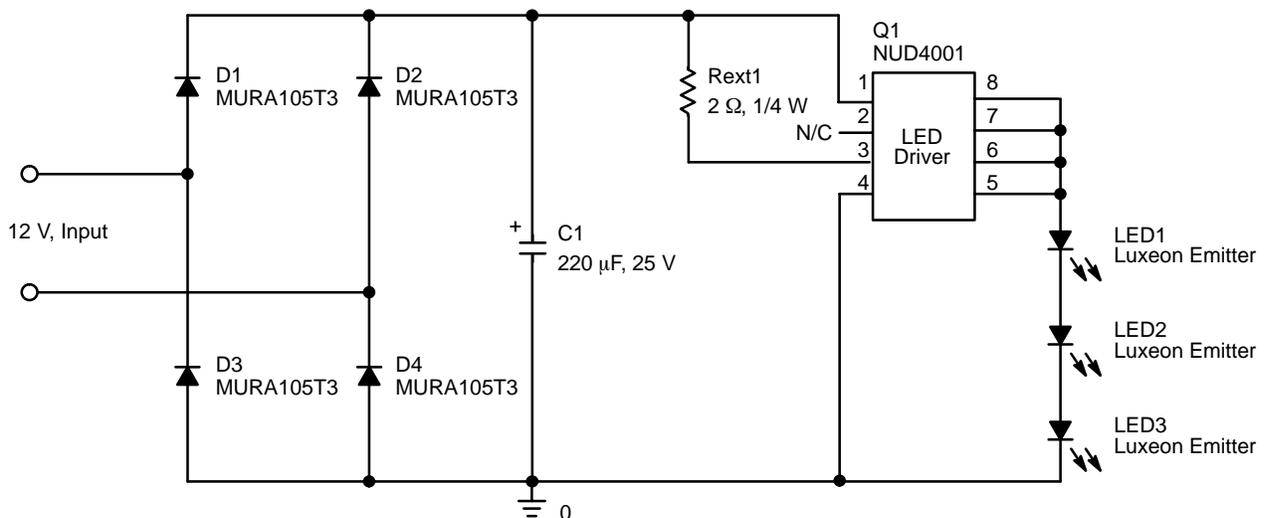


Figure 1. Schematic Diagram for Demo Board A

Demo Board B

The purpose of the demo board B is to illustrate a different circuit concept for applications where the voltage difference between the input voltage and the LED's voltage is large (i.e. when a 12 V supply voltage is used to power up a single LED Luxeon 1).

For this circuit, the NUD4001 device is configured to operate as a controller of an external high power transistor. This way, the high power transistor will drive most of the LED current (around 95%) and only a small portion (around 5%) will be driven by the NUD4001 device.

This type of circuit configuration allows higher power dissipation and higher LED current capability. The heat sink selection for the external transistor depends on the amount of power to be dissipated, which is defined by the conditions of each application circuit.

The defaults of the demo board B are similar than the demo board A. It is set to take a 12 V dc or ac input voltage and to provide a LED current of 350 mA. The settings can be changed to meet different application needs. However, the important thing to consider when changing the default settings of the board is not to exceed the NUD4001 and TIP32 devices' ratings of voltage, current and power dissipation.

Figure 2 illustrates the schematic diagram for the demo board B, and Figure 4 shows a picture of a finished board.

The dc or ac input voltage is applied between the two terminals of the board. The connector named Con1 can be used as an alternative way to supply a dc voltage to the board from an IBM ac computer adapter with an output of 16 Vdc and 4.5 A.

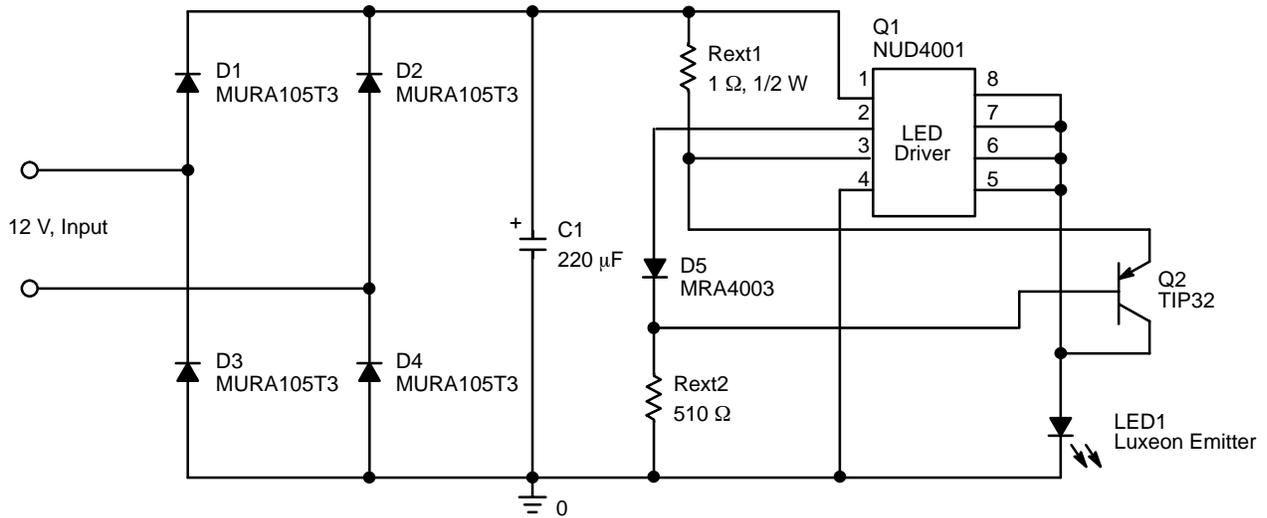


Figure 2. Schematic Diagram for Demo Board B



Figure 3. Picture of Finished Demo Board A



Figure 4. Picture of Finished Demo Board B

Notes

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your
local Sales Representative.