DN05022/D

Low-Cost LED Dimming with Output Capacitor

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DESIGN NOTE

Table 1. DEVICE DETAILS

Device	Application	Input Voltage	Topology	I/O Isolation
NSIC2050B, NSI50010Y	AC LED, Dimmable	100−127 Vac	Bridge + CCR and PWM Sensing	No

Circuit Description

This circuit can be thought of as having two separate portions. There is an LED management portion and a dimmer management/PWM Signal portion.

The LED management portion charges the output capacitor to run the LEDs in a “DC” state. The dimmer management portion provides loading current for the TRIAC in a dimmer and provides a gate voltage to the series-pass MOSFET. The gate drive of the series MOSFET PWMs the LEDs at their peak current rating. The NSIC2050B Constant Current Regulators regulate the current through the LEDs. The NSI50010Y limits the power consumption of the dimmer management circuit.

For optimal performance, the gate voltage of the MOSFET (driven by the voltage divider of the 11 kΩ and 1.5 kΩ resistors) needs to be equal to the threshold voltage when the input voltage to the circuit is at the dimmer’s minimum conduction angle.

Also, some dimmers may require more than 10 mA of loading current, so the NSI50010Y may be replaced with another CCR such as the NSIC2020B (20 mA CCR), though power consumption will increase.

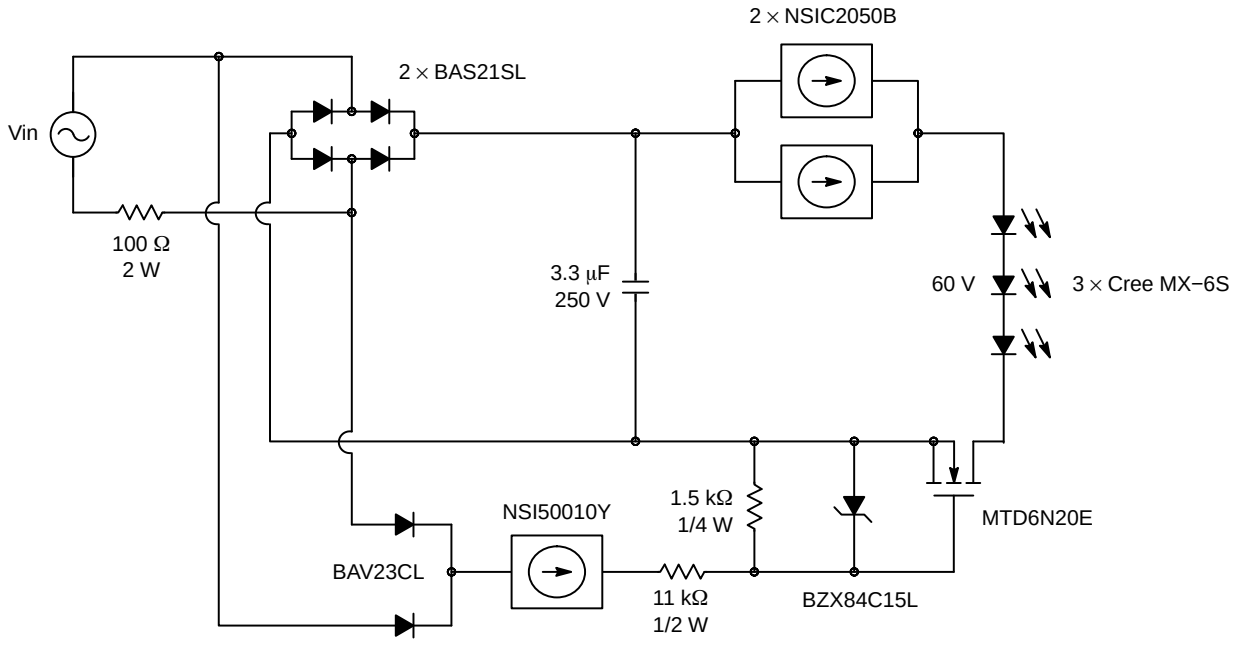

Figure 1. LED Lighting with CCRs, Dimmable Interface

Key Features

- PF = 0.8
- THD = 53.8%
- High Light Output
- Dimming a Function of the Dimmer's Range
- Low BOM Cost
- Dimmable

Table 2. CIRCUIT DATA

	Circuit Data	
$V_{RMS(IN)}$	100 V_{RMS}	127 V_{RMS}
$I_{RMS(IN)}$	112 mA	118 mA
PF	0.847	0.800
THD	44.2%	53.8%
$P_{(in)}$	9.53 W	12.1 W

Table 3. DIMMERS TESTED

Manufacturer	Serial Number
Lutron	500−15591A
Lutron	TGCL−153PH
Lutron	CTCL−153PDH
Pass & Seymour	450 W – CFL/LED

PUBLICATION ORDERING INFORMATION

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