

115V, 5 Watt Dimmable 25mm Diameter DOB

This 115V reference design uses a single GVN3501A dual 520V constant current sink in an SO-8 package (Figure 1). The PCB is 25mm (<1") diameter, 1mm thick, aluminum-clad with all the circuitry and tracking on the top side. The bottom side is an isolated aluminum plane which conducts heat from the LEDs and the driver to the lamp fixture's metal structure. Please note that the PCB **must** be thermally coupled to fixture metalwork for heat sinking during evaluation.

The demonstration board's power can be increased safely from 5W to 6.9W by simply changing R3 from 91Ω to 57.2Ω.

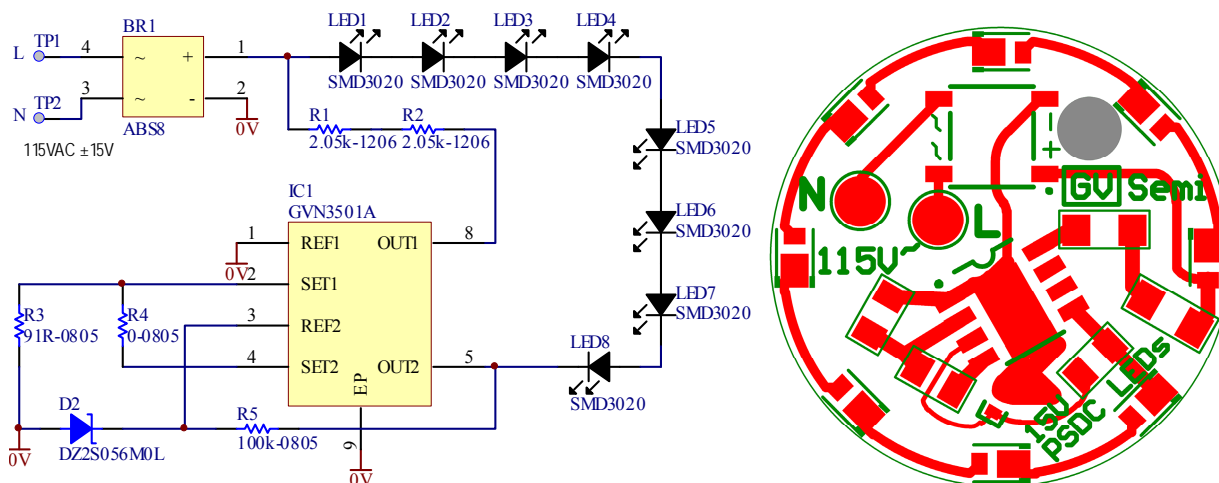


Figure 1. Schematic and PCB layout

Table 1. Performance Summary using 115 Lm/W LEDs

Power	Applications	Lumens	Lm/W	Dimming	PF	THD	Driver Efficiency	Stages
5W (as built: R3=91Ω)	Bulb, Downlight	400	80	TRIAC	> 90%	TBD	77%	1
6.9W (change R3 to 57.2Ω)		525	76			TBD	81%	

One constant current sink drives an LED string comprising eight 400mW, 3020 packaged, ProLight PSDC-FFVE 15V LEDs (Table 2, Table 3, Table 5). The second constant current sink controls a ballast (R1, R2) during the initial input voltage conduction angle to pass a phase-cut dimmer's TRIAC hold current.

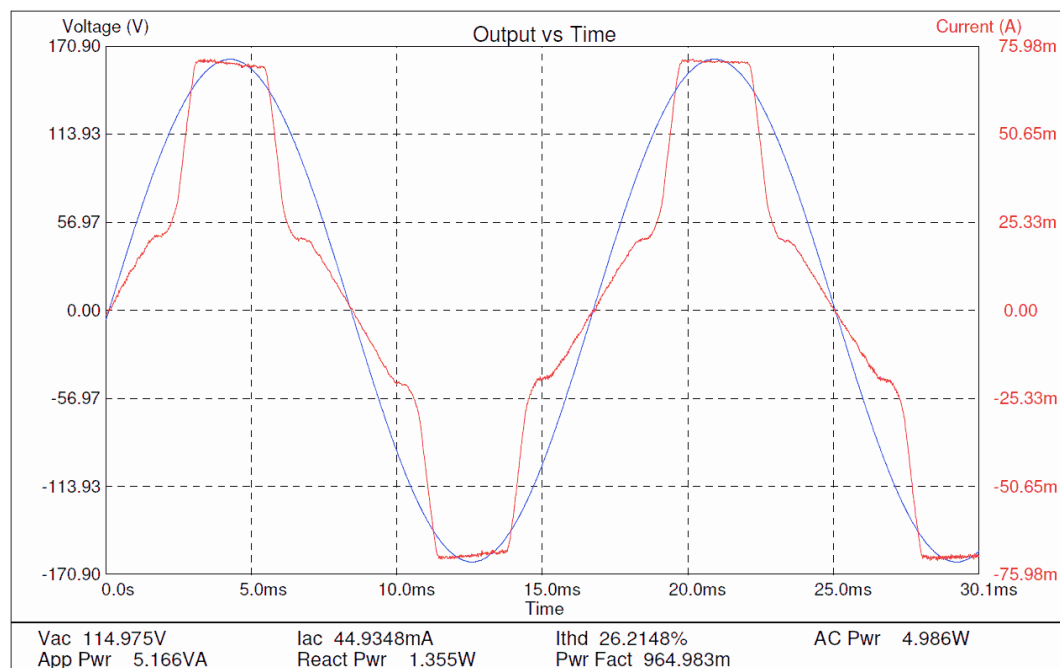


Figure 2. 5W Input Current (red) vs Input Voltage (blue)

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Table 2. 5W Lamp Performance with R3=91Ω

Input Voltage	Input Power	Power Factor	LED Current	LED Power	LED Drive Efficiency
100 VAC	2.99 W	0.96	18.2 mA	2.15 W	71.9 %
110 VAC	4.54 W	0.95	27.8 mA	3.60 W	79.3 %
115 VAC	4.98 W	0.96	30.1 mA	3.85 W	77.3 %
120 VAC	5.39 W	0.97	32.1 mA	4.09 W	75.9 %
130 VAC	6.20 W	0.98	35.4 mA	4.52 W	72.9 %

Table 3. 6.9W Lamp Performance with R3=57.2Ω

Input Voltage	Input Power	Power Factor	LED Current	LED Power	LED Drive Efficiency
100 VAC	3.45 W	0.97	19.8 mA	2.37 W	68.7 %
110 VAC	5.94 W	0.95	36.7 mA	4.86 W	81.8 %
115 VAC	6.90 W	0.95	42.0 mA	5.63 W	81.6 %
120 VAC	7.50 W	0.96	44.9 mA	5.98 W	79.7 %
130 VAC	8.58 W	0.97	49.5 mA	6.56 W	76.5 %

Table 4. Bill of Materials for Figure 1

Component IDs	Quantity	Part Type	Requirement	Package
BR1	1	ABS8 bridge rectifier	0.25A/800V	ABS
D2	1	DZ2S056M0L zener diode	5.6V/150mW	SOD-523
IC1	1	GV Semi GVN3501A	GVN3501A	SO-8-EP
LED1, LED2, LED3, LED4, LED5, LED6, LED7, LED8	8	Prolight PSDC-FFVE	PSDC-FFVE	3020
R4	1	0Ω resistor	0Ω link	0805
R3	1	91Ω resistor	91Ω	0805
R5	1	100kΩ resistor	100kΩ	1206
R1, R2	2	2.05kΩ resistor	2.05kΩ	1206

Table 5. Prolight PSDC-FFVE 15V LED Characteristics at 26mA, T_J = 25°C

Part Number	Color	Luminous Flux Φ _v (lm)		CRI Minimum	Forward Voltage V _F (V)		
		Minimum	Typical		Minimum	Typical	Maximum
PSDC-FFVE-NR8	Warm White	45	52	80	14.0	15.0	16.0

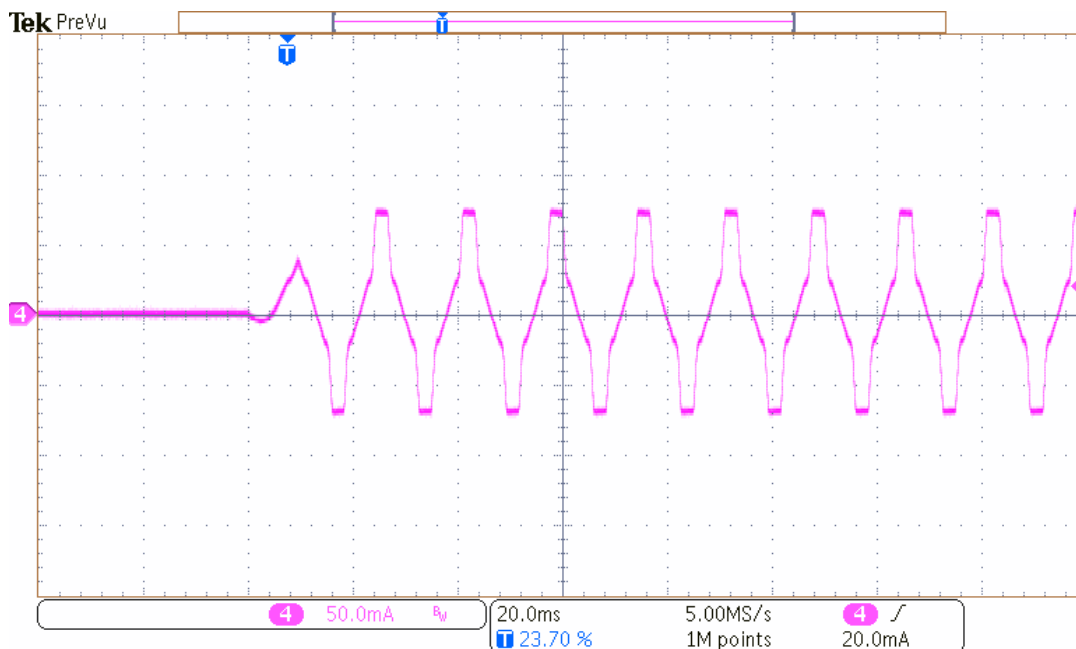


Figure 3. 5W Inrush Current is Self-limited to 75mA