

85~265 VAC, High Efficiency 18W LED Driver

SUMMARY AND FEATURES

- Wide Input Voltage 85 to 265VAC, 50/60Hz
- 88% high efficiency
- Current Accuracy $\pm 2\%$
- Output Current Adjustable

DEMO BOARD GENERAL DESCRIPTION

The DB870-C01A demo board is a High-Brightness LED power driver to supply a string of LEDs using the FT870B IC from a universal AC input voltage. The DB870-C01A can supply a maximum output current of 680mA to drive 25V LED strings from a wide input voltage 85 to 265VAC, 50/60Hz.

The report contains the LED driver specification, a circuit diagram, a complete bill of materials, the printed circuit board layouts, and performance data.

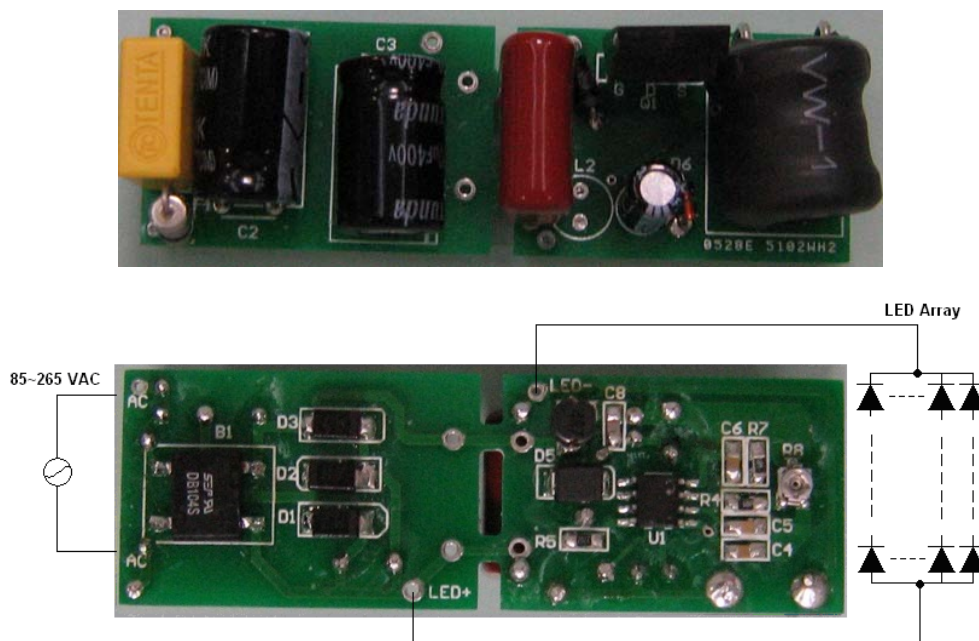


Figure 1. Demo Board Picture

SYSTEM SPECIFICATION

DESCRIPTION	SYMBOL	MIN	TYP	MAX	UNITS	COMMENT
Input						
Voltage	V _{in}	85		265	VAC	
Frequency	F _{line}		50		Hz	
Output						
Output voltage	V _{out}	24	25	26	V	
Output current	I _{out}	620	630	680	mA	
Efficiency						
Full Load		86.6	87.5	88	%	
Switching frequency						
Oscillator frequency	F _{osc}	20	25	30	KHz	
Oscillator Modulation Swing	Δ F _{osc}		±4		%	
LED Parameter						
LED Power	P _{LED}		0.05		W	Dia. 5mm LED
LED Current	I _{LED}	15	16	18	mA	Dia. 5mm LED
LED Connect	Serial	Parallel	Total			
	8	38	304			

PERFORMANCE DATA

Efficiency

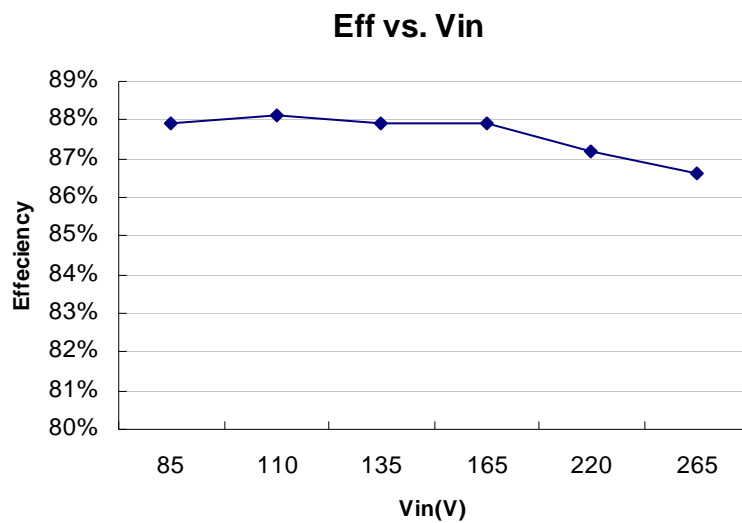


Figure 4 Efficiency vs. Vin

Line Regulation

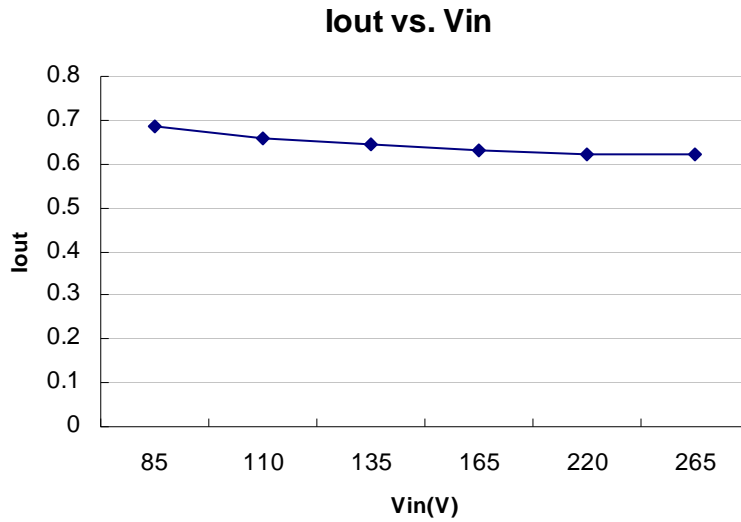


Figure 5 Line Regulation

Current Accuracy

$$\Delta I = \frac{I_{LED} - I_{avg}}{I_{avg}} \quad (\text{ILED: LED Current @ } V_{in}; \text{ Iavg: LED average Current in 85~265VAC})$$

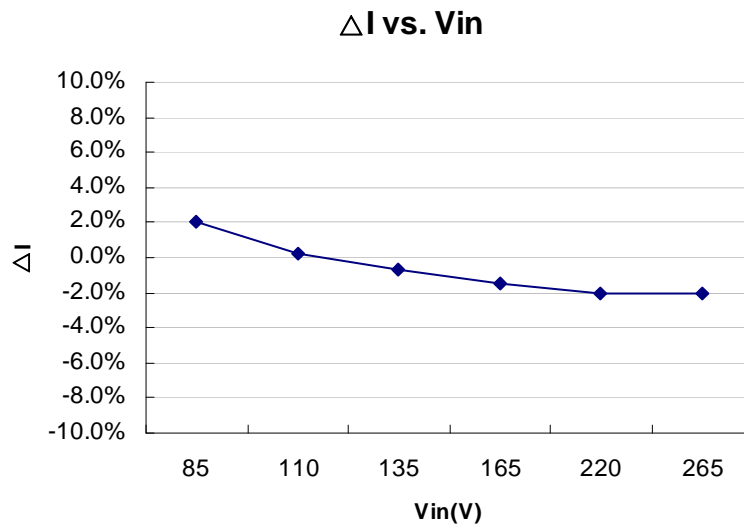


Figure 6 LED Current Accuracy

SCHEMATIC

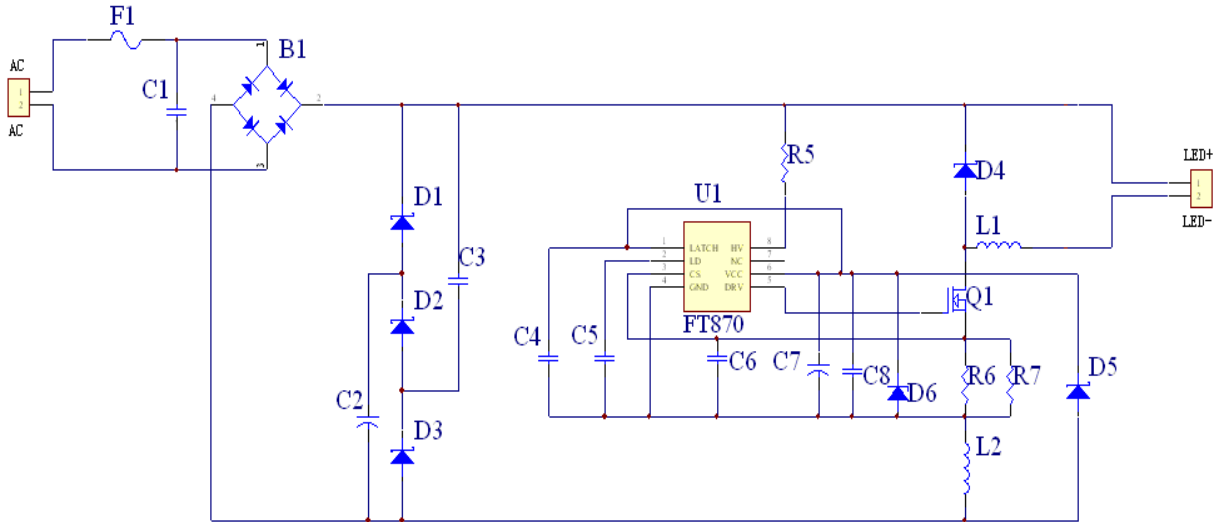
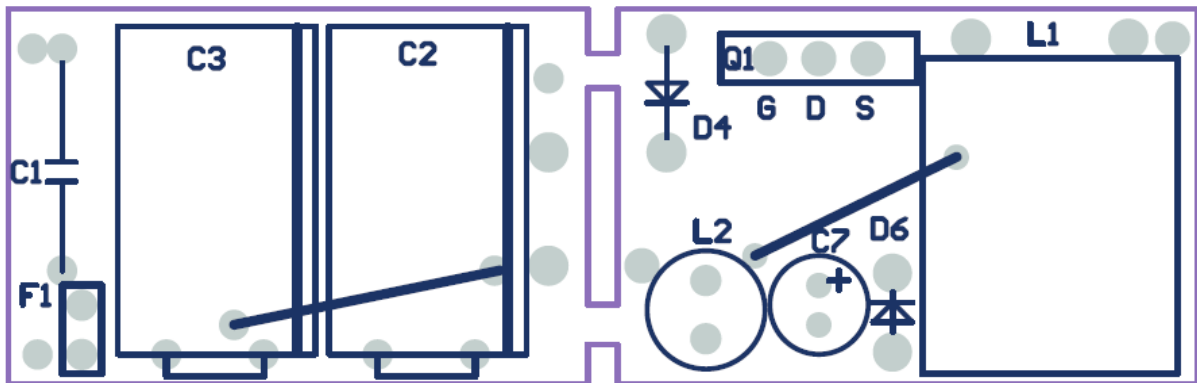
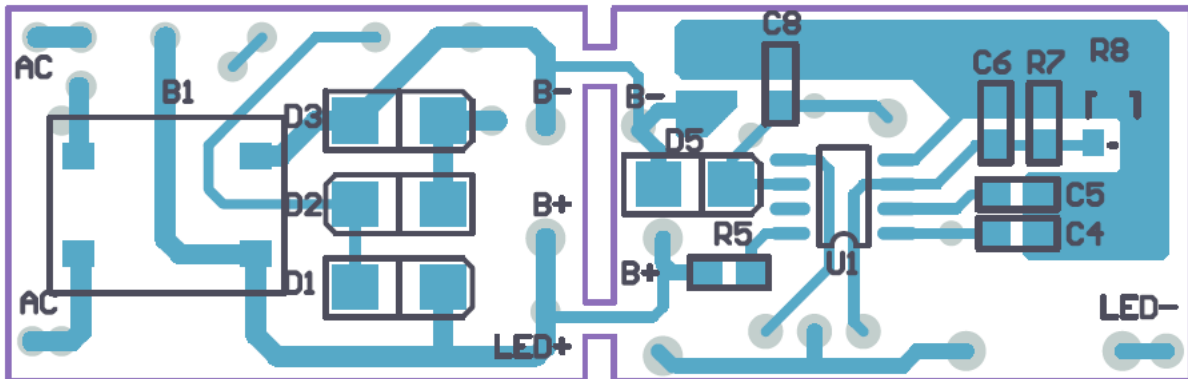


Figure 2. Demo Board Schematic

PCB LAYOUT



Top View



Bottom View

Figure 3. Printed Circuit Layout

BILL OF MATERIALS

RefDes	DESCRIPTION	QTY	PACKAGE	MANUFACTURE	MANUFACTURE'S PART NUMBER
B1	400V, 1A single phase diode bridge	1	DF-S	STS	DB104S
C1	0.1 μ F, 300VAC EMI suppression capacitor	1	Radial		
C2, C3	47 μ F, 250V electrolytic capacitor	1	Radial		
C4, C5, C8	1nF, 25V ceramic chip capacitor	1	SMD0805		
C6	100pF ceramic chip capacitor	1	SMD0805		
C7	4.7 μ F, 50V electrolytic capacitor	1	Radial		
D1, D2, D3	1000V, 1A diode	1	DO-214		1N4007
D4	600V, 1A ultrafast diode	1	DO-214AA	ON Semi	MUR160T3
D5	600V, 1A ultrafast diode	1	DO-41	ON Semi	MURS160T3
D6	12V, 0.5W Zener diode	1	DO-35		
F1	1A, 250VAC fuse	1	Axial		
L1	0.8mH, 700mA rms, 1.1A sat inductor	2	Radial	HaiRuiDa	
L2	4.7 μ H, 700mA rms, 1A sat inductor	1	Radial		
Q1	600V, 4A, N-channel FET	1	TO-220		4N60
R5	22K Ω , 1/8W chip resistor	1	SMD0805		
R6	1.2 Ω , 1/8W chip resistor	2	SMD0805		
R7	100 Ω top adjust trimpot	1	SOT-23		
U1	Universal LED Driver	1	SOP8	FMD	FT870B