



Non-Isolation 24V/350mA Driver Module

AC Input Voltage Range	LED DC Output Voltage/Current	Output Power
95V _{AC} /60Hz ~ 260V _{AC} /50Hz	24V/350mA	8.4W

Key Features

- AC input from 95V/60Hz to 260VAC/50Hz, DC 24V/350mA output power module
- Support power input 10.5W Bulb
- Built-in EMI solution circuit
- Fixed frequency mode and max. efficiency $\geq 80\%$
- Typical application : Bulb

Introduction

This application note describes a compact module that is able to drive LED bulbs up to 8.4W @350mA with EMI approval. A demo board based on SQ9910, with dimension at L40mm * W20mm* T19mm, is presented in terms of schematics, PCB diagram, Bill of Materials (BOM) and typical performance characteristics.

Specification

The Table 1 below represents related specification that can be achieved. Actual performance is described in the results section.

Performance

It is to drive output at 24V/350mA targeting to achieve high efficiency ($\eta_{MAX} > 80\%$) for AC universal input voltage range 95V_{AC} ~ 260V_{AC}. Actual performance is shown on Figure 2 and 3 depict efficiency and current variation versus input line voltage for this module that system designer can adopt it to achieve corresponding performance.

Components

Based on non-isolation buck topology, the SQ9910 is able to achieve high efficiency. Figure 1 explains the circuit in details with all related components.

BOM

BOM is shown on Table 2 on page 4.

PCB Layout

The PCB layout has dimension at 40mm×19mm×1.6mm in order to fit A19 bulb retrofit space. Detail layout is shown in Figure 4.

Power Module Photo

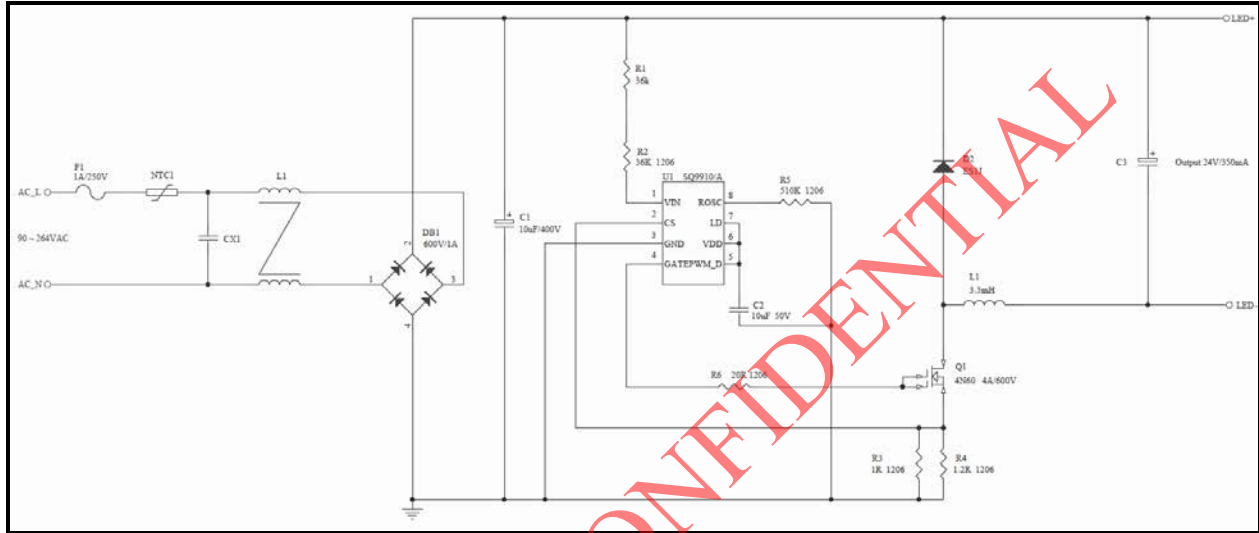
Top and bottom view of this power module are shown in Figure 5 ~ 6.



Table 1. Related Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
AC input voltage	V_{AC}	90		260	V	
LED DC output voltage	V_{LED}		24		V	
LED output current	$I_{LED(SET)}$		350		mA	

Figure 1. A Complete Application Circuit



SEQUOIA CONFIDENTIAL



Figure 2. Efficiency versus AC Input Line Voltage

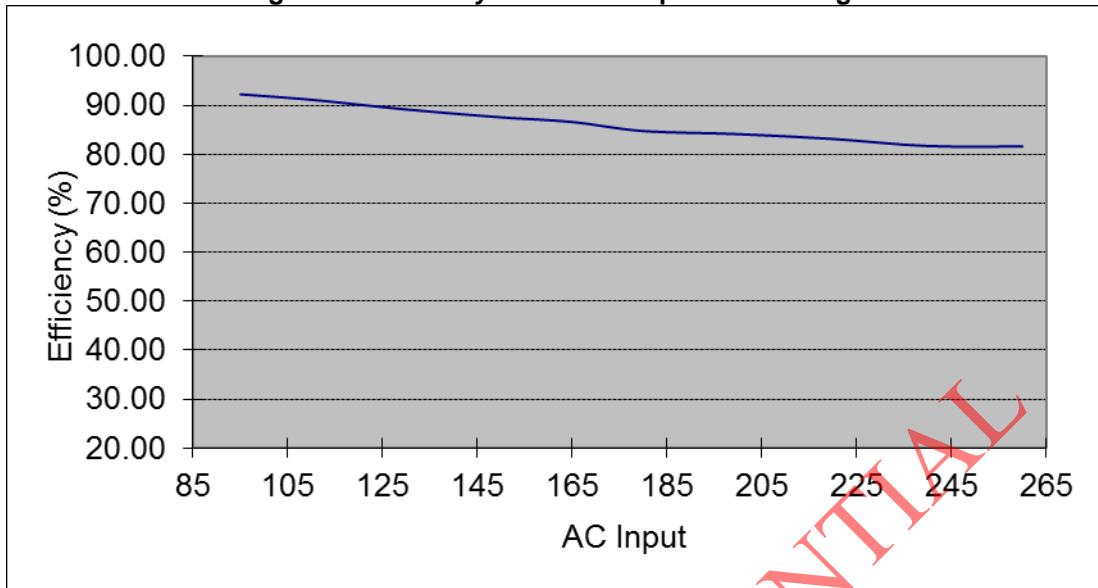


Figure 3. Current Variation versus AC Input Line Voltage

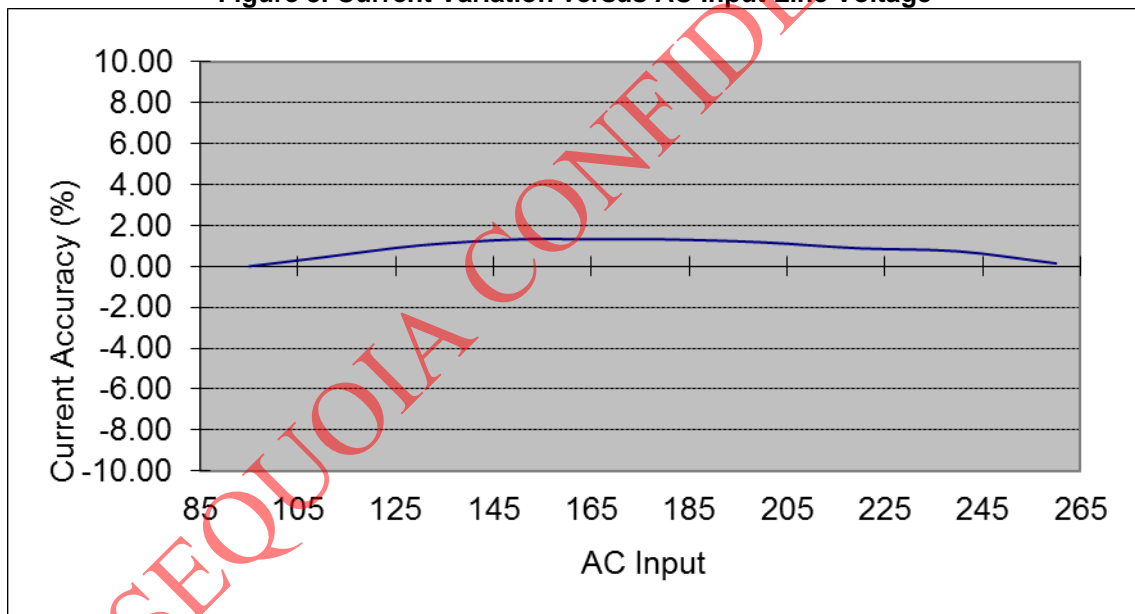




Table 2 : Bill of Material

Item	Symbol	Description	Category	Qty	Note
1	R1	36K / 1206 / J	RESISTOR	1	
2	R2	36K / 1206 / J	RESISTOR	1	
3	R3	1R / 1206 / F	RESISTOR	1	
4	R4	1.2R / 1206 / F	RESISTOR	1	
5	R5	510K / 1206 / J	RESISTOR	1	
5	R6	30R / 1206 / J	RESISTOR	1	
6	C1	SK 10uF/400V 10*17MM	CAPACITOR	1	Su'scon
7	C2	4.7UF /50V SMD	CAPACITOR	1	Su'scon
8	C3	SK 4.7UF/400V 8*12MM	CAPACITOR	1	Su'scon
9	CX1	224 / 275V X1	CAPACITOR	1	
10	BD1	DB105S 1A/600V	BRIDGE	1	YS
11	D2	Fast recovery diode ES1J 1A 600V	DIODE	1	YS
12	U1	SQ9910 SO-8	IC	1	SMD
13	Q1	MOSFET 5A500V TO-252	MOS	1	SMD
14	NTC1	SCK052 DIP or 5D-7	TH	1	SMD
15	F1	1A/250V	FUSE	1	
16	L1	UU9.8 0.2mm 50mH	CHOKE	1	
17	L2	DR12*16 0.28mm 3.5mH	CHOKE	1	
18	AC Line	UL1007 60MM Stripping tinned at both ends each is 5mm white	CONNECT	2	
19	DC Line	UL1007 60MM Stripping tinned at both ends each is 5mm Red	CONNECT	1	
20	DC Line	UL1007 60MM Stripping tinned at both ends each is 5mm Black	CONNECT	1	
21	PCB	PCB : FR-4 L40mm*W19mm*T1.6mm	PCB	1	
		TOTAL		23	



Figure 4. Picture of PCB Layout (Dimension at 40mm×19mm×1.6mm)

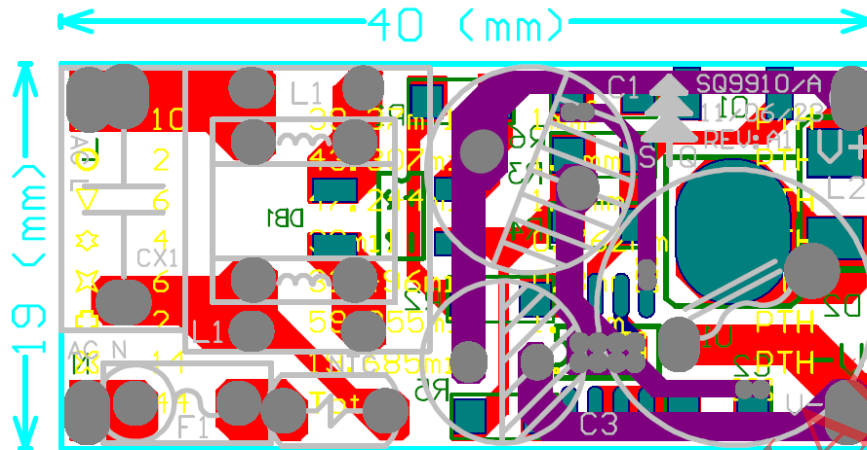


Figure 5. Top View of this Power Module



Figure 6. Bottom View of this Power Module

