9W PCBA LED Driver

Demo Board User Manual

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CONTENTS

1. LED DRIVER SPECIFICATION

1.1. Input specifications

- AC input voltage range 180Vac～440Vac
- AC input voltage frequency range 47Hz～63Hz

1.2. Output specifications

- Output voltage 55V
- Output current 0.142A
- Output current accuracy ±2%

1.3. Other specifications

- Max. output power (Po_max) 8W
- Efficiency (ŋ) >87%@230Vac with full load
- Power factor (PF) >0.95@230Vac with full load
- Total harmonic distortion (THD) <15%@230Vac with full load
- Turn on delay time <0.1S @100Vac with full load
- **EMI (EN55015)** **PASS**
- **Surge voltage＞4KV** **PASS**

1.4. Protections

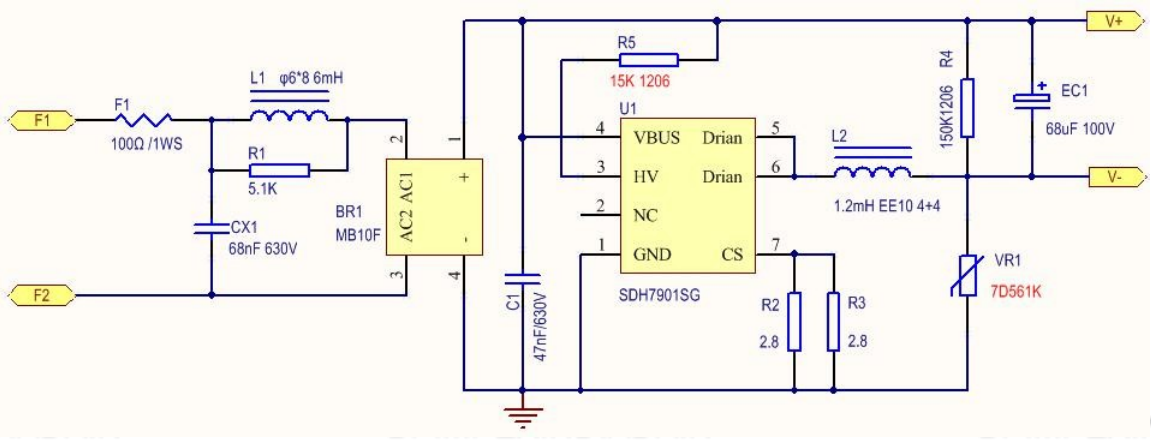
- Output short circuit protection Auto restart
- Output open circuit protection Auto restart

1.5. Working environment

- Operating temperature range -20° C～+85° C
- Storage temperature range -40° C～+120° C

2. LED DRIVER DOCUMENTATION

2.1. Schematic diagram



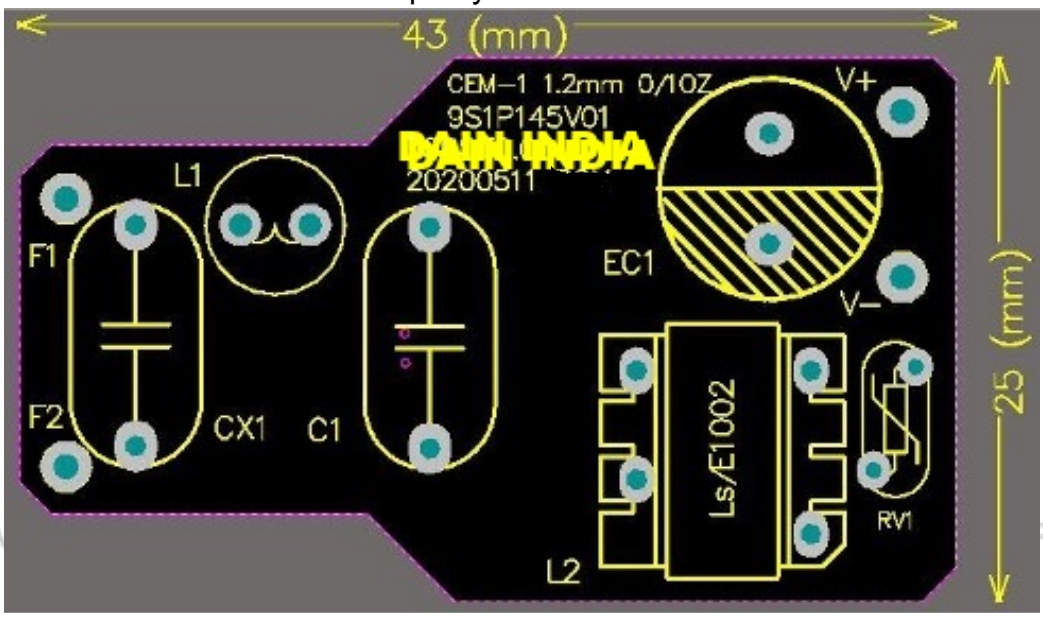
2.2 Bill of materials (BOM)

No.	Symbol	Qty.	Descriptions	Supplier
1	F1	1	Wire wound resistors 100Ω/1WS 5%	
2	R1	1	5.1K 0805 5% SMD	
3	R2	1	2.8Ω 0805 1% SMD	
4	R3	1	2.8 Ω 0805 1% SMD	
5	R4	1	150K 1206 1% SMD	
6	R5	1	15K 1206 1% SMD	
7	RV1	1	VARISTOR 07D561	DAIN
8	CX1	1	Capacitor 683/630V CBB21	DAIN
9	C1	1	Capacitor 473/630V CBB21	DAIN
10	EC1	1	Capacitor electrolytic 68uF/100V	DAIN
11	DB1	1	MB10F SMA	DAIN
12	L1	1	ϕ6*8 6mH 0.2A ϕ0.08mm 465TsRef	
13	L2	1	Transformer EE10, Bobbin EE10,1.2mH	

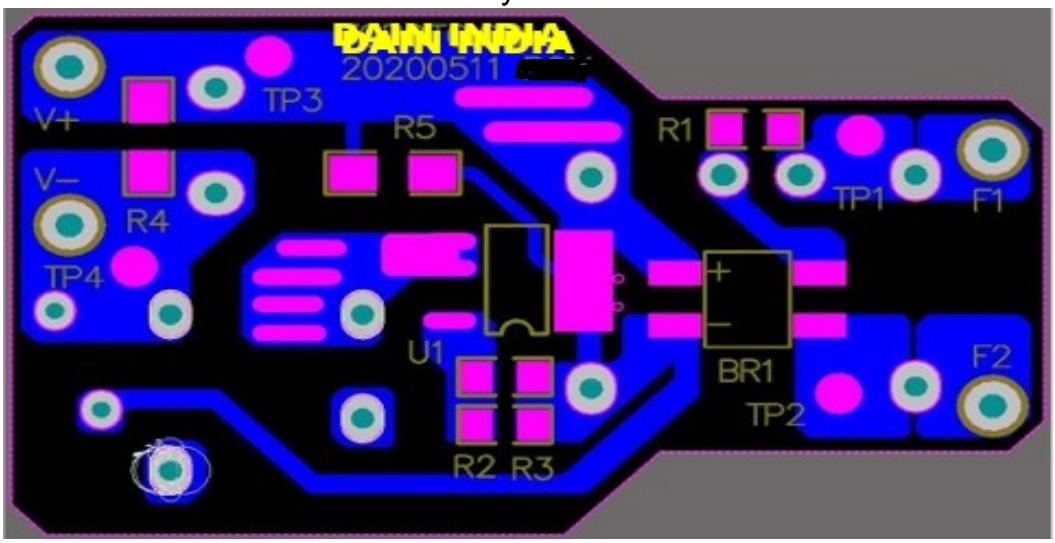
14	U1	1	SDH7901SG SOP7	
15	PCB	1	CEM-1 1.6mm 0/1OZ 43mmx25mm	

2.3. PCB

Top Layer/silkscreen

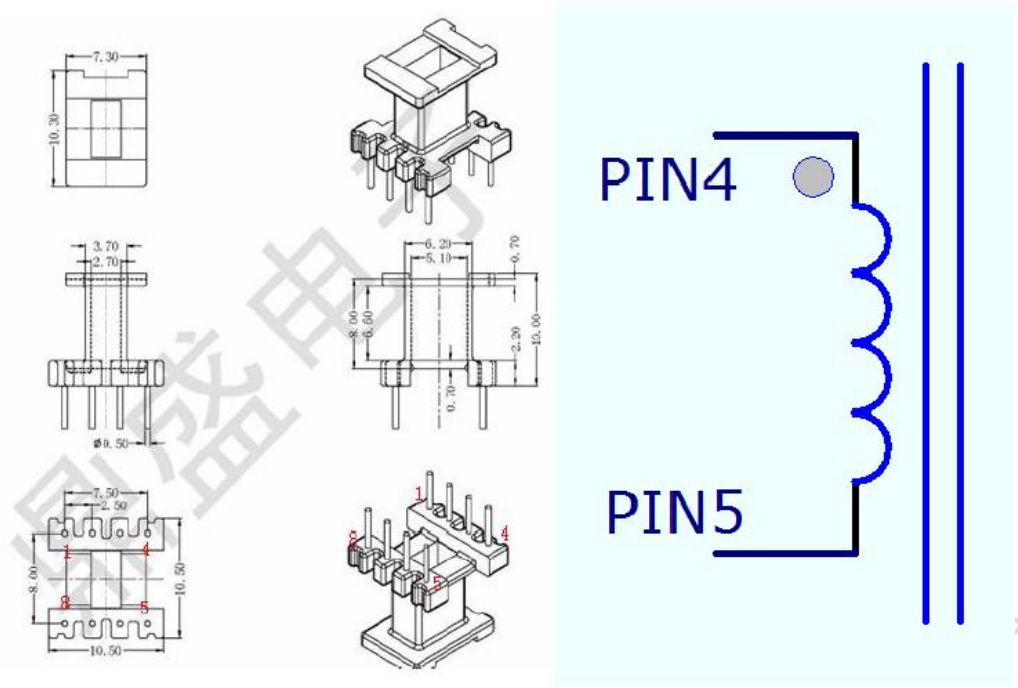


Bottom Layer/silkscreen



2.4. Transformer design-L2

2.4.1. Transformer winding structure



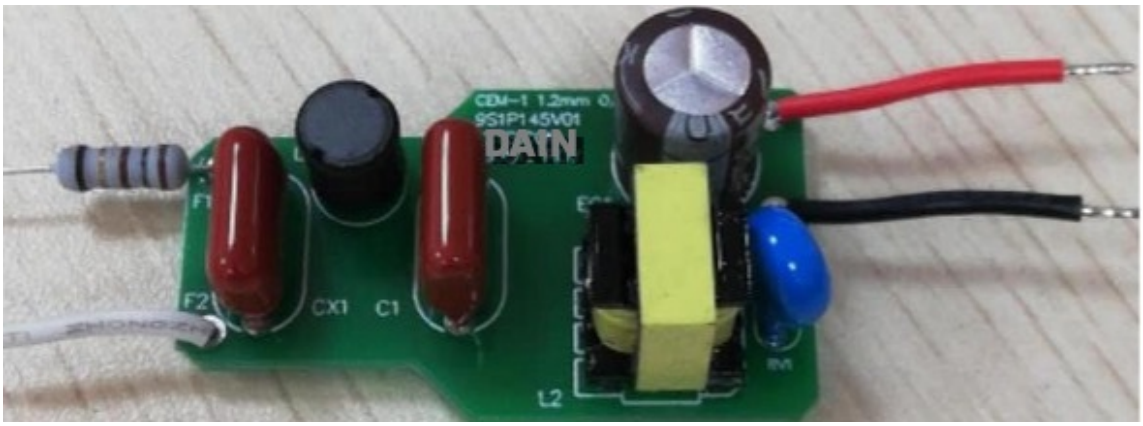
2.4.2. Design and test of inductance

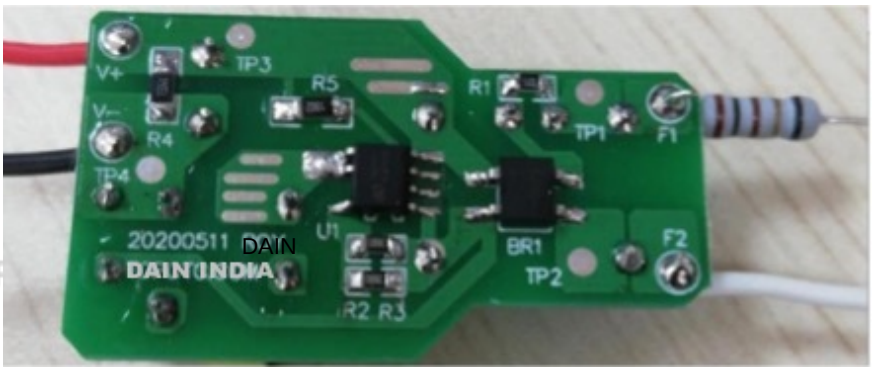
Parameter	Test method
Primary side magnetizing inductance	L=1.2mH±5%, test the inductance between PIN4 and PIN5, 10KHz, 0.5V
Description	Bobbin EE10

2.4.3. Winding method

Winding	Wire Diameter	Start	Turns	End	Tape
Primary winding	¢ 0.19mm*1	4	214T	5	2

2.5. DEMO LAYOUT





3. PERFORMANCE TEST EVALUATION

3.1. Performance highlights

- Efficiency >88%@230Vac
- High output current regulation @33V-55V
- PF>0.95, THD<15%@230Vac
- Low voltage current drop @170Vac
- Start time< 0.5S@ full voltage input full load

3.2. Overall performance

Test item	Test result
1.Input specification	
Efficiency (230Vac, full load)	89.45%
2.Output specification	
Current overshoot during the first startup	0%
Current overshoot during continuous startup	0%
3.Turn-on time	
Turn-on delay time (85Vac, full load)	<0.1S
4.PF and THD	
Power factor (230V full load)	>0.95
Harmonic (230V full load)	<15%
5.Protection	
Open circuit protection	OK
Short circuit protection	

Note: All the test were performed at 25℃,unless otherwise stated

3.3. Test equipment

Test equipment	Manufacturer	Model
AC input power supply	APC	AFC-500W
Digital power meter	YOKOGAWA	WT210
Digital load /LED	QINFZHI/YW	8713B1/1W
Multimeter	VICTOR	VC97
Oscilloscope	Rigol	DS2202
Temperature tester	Applent	AT4508

3.4. Input specification

3.4.1. Efficiency

	180Vac/50HZ	230Vac/50HZ	320Vac/50HZ	Spec.
55V	87.97%	89.45%	89.61%	>88% @230vac

3.4.2. PF and THD

	180Vac/50HZ	230Vac/50HZ	320Vac/50HZ	Spec.
PF	0.987	0.975	0.926	>0.9 @230vac
THD	9.23	9.65	13.71	<15% @230vac

3.4.3. Thermal test

Tested device	Vin=180Vac/50HZ	Vin=320Vac/50HZ
Transformer core (L1)	99.6°C	88.7°C
Transformer coil (L2)	103.6°C	96.3°C
Control IC (SDH6971S)	114.3°C	105.2°C
Output electrolytic capacitor (EC1)	96.1°C	92.3°C

Test description: At room temperature 25℃, place the DEMO at a drying oven with temp 85℃, enable it to work on full load (55V/145mA) for five hour, and then record the data

3.5. Output specification

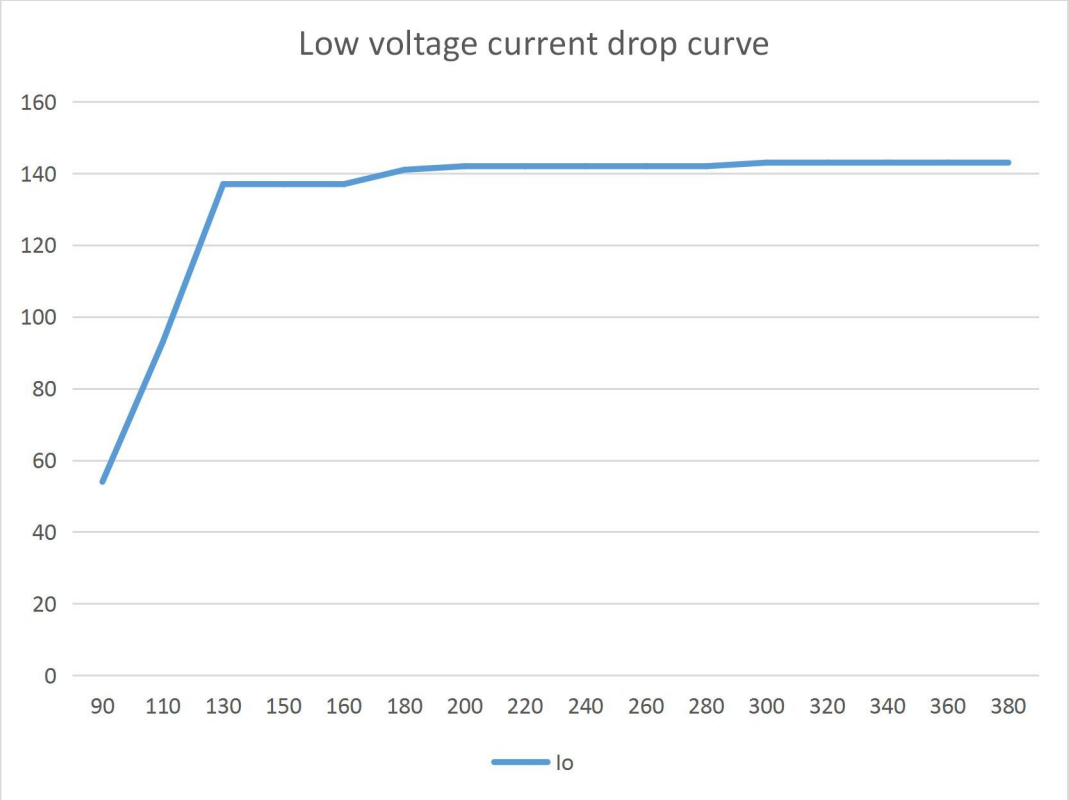
3.5.1. LED current regulation

Output voltage	Output current (mA)					
	180Vac/50HZ	230Vac/50HZ	320Vac/50HZ	380Vac/50HZ	440Vac/50HZ	Linear change
55V	142	143	144	145	146	4
42V	143	144	145	147	147	4
30V	144	145	146	147	147	3
Load change	2	2	2	2	1	

3.5.2. LED current-temperature characteristics

Full load 55V	Output current (mA)					
	180Vac/50HZ	230Vac/50HZ	320Vac/50HZ	380Vac/50HZ	440Vac/50HZ	Linear change
25℃	142	143	144	145	146	4
85℃	140	141	141	142	143	2
Temperature change	2	2	3	3	3	2

3.5.3. LED low voltage current drop curve



3.5.4. LED current ripple

Input voltage	Ripple current (peak-peak)
180Vac/50HZ	36.73mA
440Vac/50HZ	33.83mA

3.5.5. Turn-on delay time

Input voltage	Turn-on delay time	Spec.
180Vac/50HZ	0.14S	<0.1S
320Vac/50HZ	0.05S	

4. PROTECTIONS

4.1. Overvoltage protection

Max. output voltage at no load

	180Vac/50HZ	230Vac/50HZ	320Vac/50HZ	440Vac/50HZ	Spec.
Output voltage (V)	90.5	92.2	99.8	100.4	<110V

4.2. MOSFET VDS limit

	Vds_max	Spec.
440Vac/50Hz@ normal working at full load	620V	Vds_max<650V
440Vac/50Hz@ start at full load	642V	
440Vac/50Hz@ output open circuited	616V	
440Vac/50Hz@ output short circuited	624V	