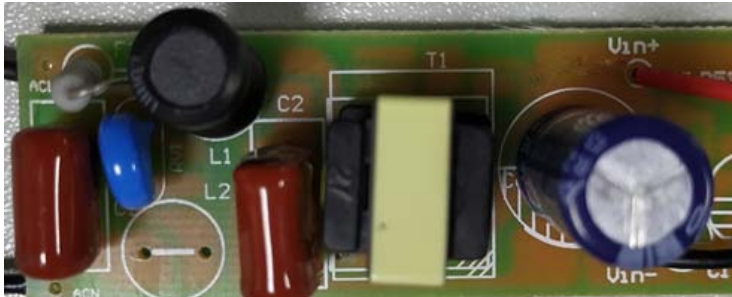




14W LED Driver Module Using UL83B



Subject

UL83B LED Driver_14W_0.18A_Demo Board Manual

Key features:

- AC Input Range 176Vac~264Vac
 - High Efficiency(90%@220Vac,full load)
 - High PF(0.956@220Vac,full load)
 - Excellent line voltage regulation and load regulation(<math><\pm 2\%</math>)
-

Revision History

Revise Date	Version	Reason/Issue
2019/5/20	A	First Issue



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1. LED Demo Board Specification

1.1. Input Characteristics

- AC input voltage rating 220Vac ~ 240Vac
- AC input voltage range 176Vac~264Vac
- AC input frequency range 57Hz ~ 63Hz

1.2. Output Characteristics

- Output Voltage 66Vdc~78Vdc
- Typical output current 0.18A

1.3. Performance Specifications

- Maximum Output Power 14W

1.4. Protection Function

- Over Voltage Protection (OVP) Shut down and auto recovery
- LED Short Protection (SCP) Shut down and auto recovery
- Over Temperature Protection (OTP) Shut down and auto recovery

1.5. Environment

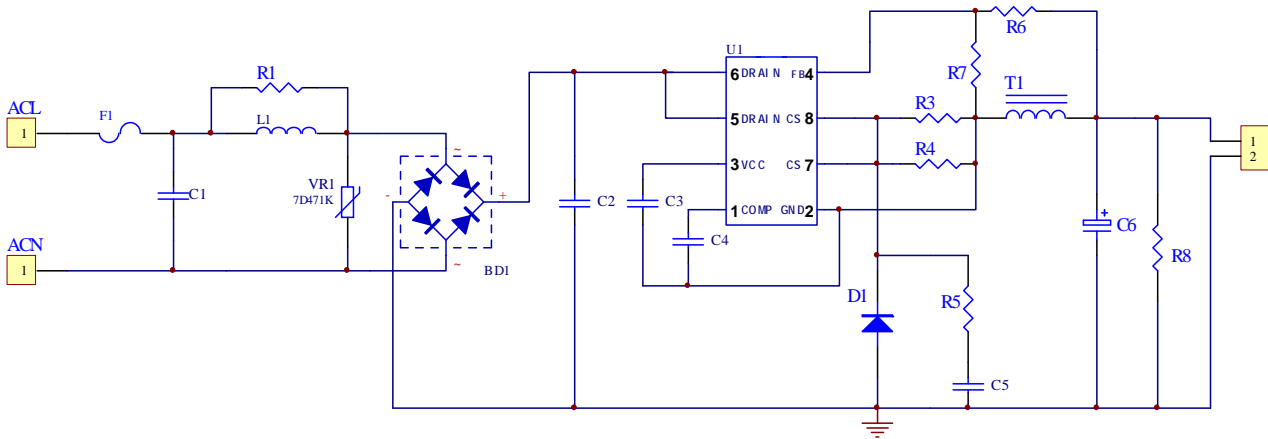
- Operation Temperature 0°C to 40 °C
- Operation Humidity 20% to 90% R.H
- Storage Temperature -40°C to 60 °C
- Storage Humidity 0% to 90% R.H



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2. LED Demo Board Information

2.1. Schematic



2.2. BOM

No.	Position	Description	Quan
1	C1	CL21 400V 150n P10	1
2	C2	CL21 400V 100n P10	1
3	C3	0805 50V 2.2uF	1
4	C4	0805 50V 1uF	1
5	C5	1206 1KV 68pF	1
6	C6	100u/100V ψ 10*16	1
7	R1 R7	0805 4.7K 5%	2
8	R3, R4	1206 2.2R 1%	2
9	R5	1206 33R 5%	1
10	R6	0805 270K 5%	1
11	R8	0805 150K 5%	1
12	VR1	7D471	1
13	F1	10R 1W	1
14	T1	EE13 1.6mH ϕ 0.2*270TS	1
15	U1	UTC UL83BG SOP8	1
16	BD1	UTC MB6S	1
17	D1	UTC ES1J SMA	1



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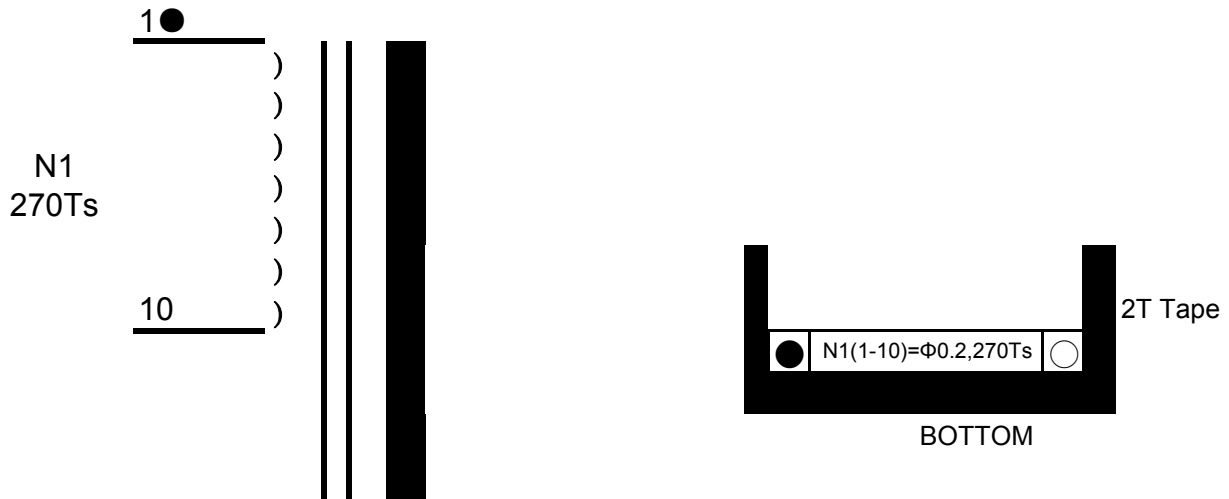
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2.3. Transformer Design

2.3.1 Transformer Specification(T1)

- 1) Bobbin: EE13 5+5
- 2) Core material: PC40(TDK or equivalent)
- 3) Lp 1-10: 1.6mH \pm 5% (10KHz/1.0V)

2.3.2 Transformer Diagram(T1)



Transformer Winding Data

Layer No.	Winding	Material	Start	Turns	Finish
1	N1	0.2Φ 2 UEW	1	270	10

2.4 Demo Board Snapshot



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3. Performance Evaluation

This document presented here is to describe the LED Driver Module performance.

The measuring data are tested at the PCB end, unless otherwise specified.

The Summarized Result :

Item	Test result
1. Input Characteristics	
Input Voltage rating	176Vac ~ 264Vac
Input Current (@Vin=176Vac, full load)	90mA
2. Output characteristics	
Maximum Output Power	14W
Output Typical Voltage	66Vdc~78Vdc
Output Typical Current	0.18A
3. Protection	
Short Circuit Protection	Auto Recovery
Over Load Protection	Auto Recovery

Test Equipment:

Item	Vendor	Model No:
1.AC Source	GW INSTRON	APS-9501
2.Digital Power meter	DECTECH	3330S
3.Electronic Load	PRODIGIT	3302C
4.Digital Oscilloscope	Tektronics	DPO3012
5.Multi-meter	Keithley	2000

3.1 Input Current(@FULL LOAD)

Input Voltage	Irms (mA)	SPEC	RESULT
176Vac/50Hz	81	N/A	N/A
200Vac/50Hz	74		
220Vac/50Hz	68		
240Vac/50Hz	64		
264Vac/50Hz	59		

3.2 PF&THD(@FULL LOAD)

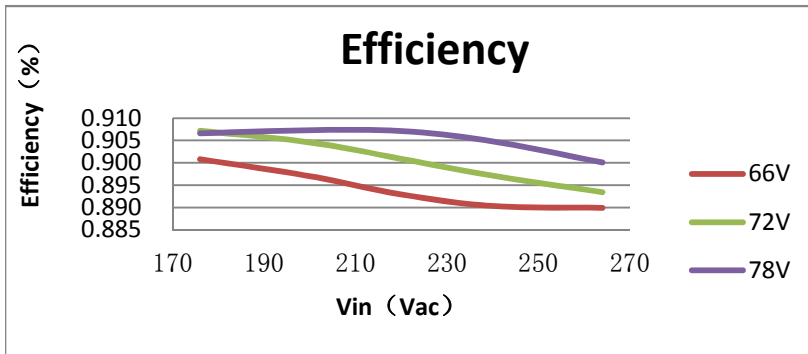
VIN (Vac)	PF	THD (%)	SPEC	RESULT
176	0.974	16.0	PF>0.9 THD<20%	OK
200	0.967	14.7		
220	0.956	14.6		
240	0.943	15.0		
264	0.924	15.4		



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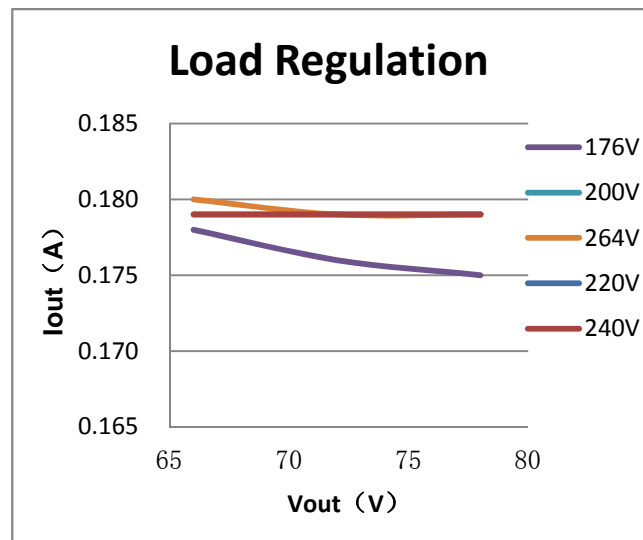
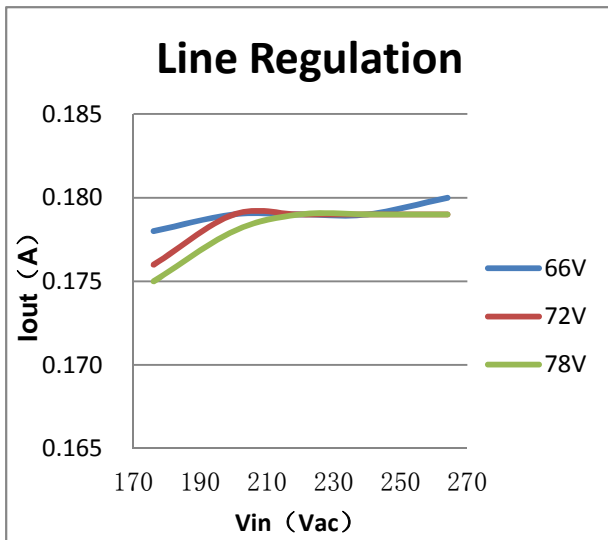
3.3 Efficiency

load (V) \ Vin (Vac)	176	200	220	240	264
66	0.901	0.897	0.893	0.890	0.890
72	0.907	0.905	0.901	0.897	0.893
78	0.907	0.907	0.907	0.905	0.900



3.4 Line Regulation & Load Regulation

Input Voltage (Vac)	Pin (W) & Iout (A)						Load Regulation
	Vout=66V		Vout=72V		Vout=78V		
176	13.10	0.178	14.03	0.176	14.95	0.175	0.83%
200	13.23	0.179	14.31	0.179	15.37	0.178	0.28%
220	13.29	0.179	14.37	0.179	15.46	0.179	0.00%
240	13.33	0.179	14.43	0.179	15.50	0.179	0.00%
264	13.41	0.180	14.49	0.179	15.58	0.179	0.28%
Line	0.56%		0.83%		1.11%		\



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3.5 Thermal Testing

Test@FULL LOAD (78V 0.18A) Ambient 30°C

input voltage	176Vac	264Vac
U1(UL83B)	83°C	95°C
D1(ES1J)	65°C	71°C
R5(33R)	58°C	62°C
T1 Wire	75°C	80°C
T1 Core	67°C	72°C

3.6. Protection

3.6.1. Over Voltage Protection (OVP)

Shut down and auto recovery

3.6.2. Short Circuit Protection

Shut down and auto recovery

3.6.3. Over Temperature Protection (OTP)

Shut down and auto recovery



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4 Waveforms

4.1 T1 current waveform

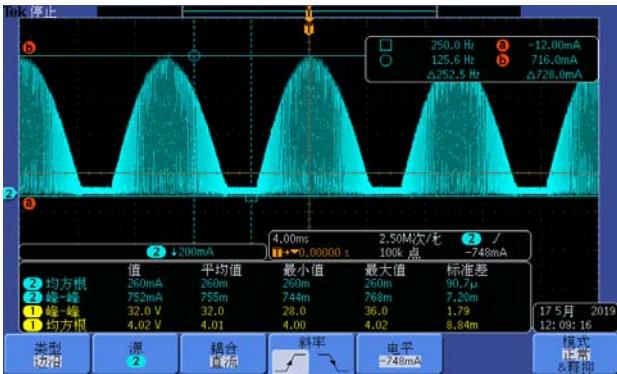


Fig1.T1 current waveform@176Vac FULL LOAD

CH2= I_{T1} , I_{T1} =728mA

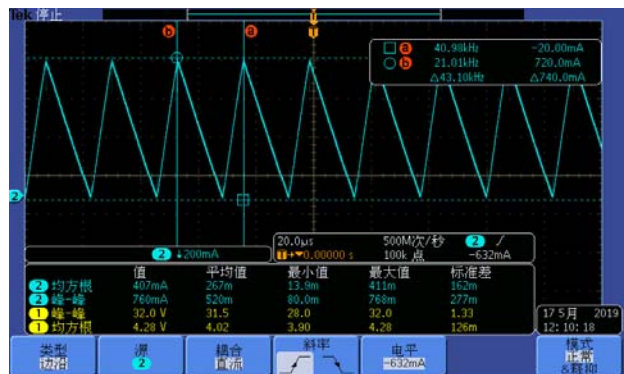


Fig2.Spread T1 current waveform@176Vac FULL LOA

CH2= I_{T1} , I_{T1} =740mA; f=43KHZ

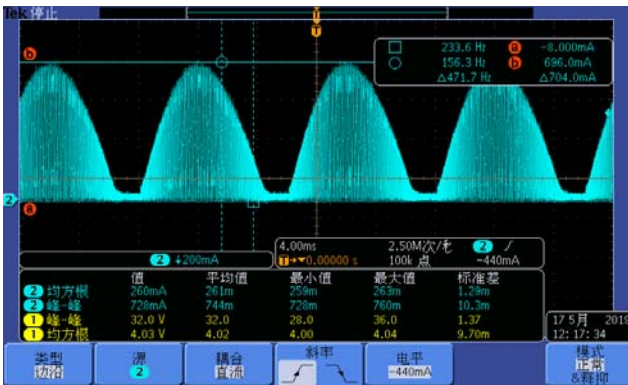


Fig3.T1 current waveform@264Vac FULL LOAD

CH2= I_{T1} , I_{T1} =704mA

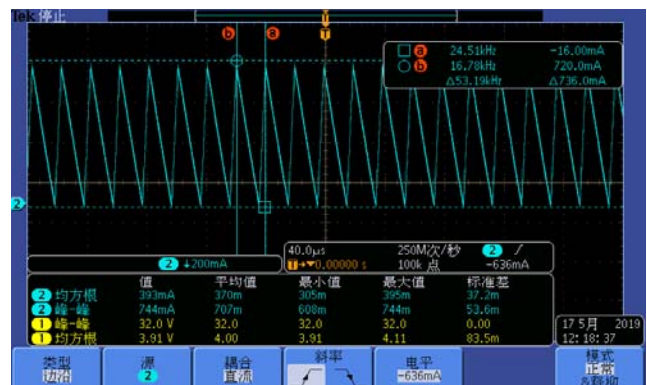


Fig4.Spread T1 current waveform@264Vac FULL LOA

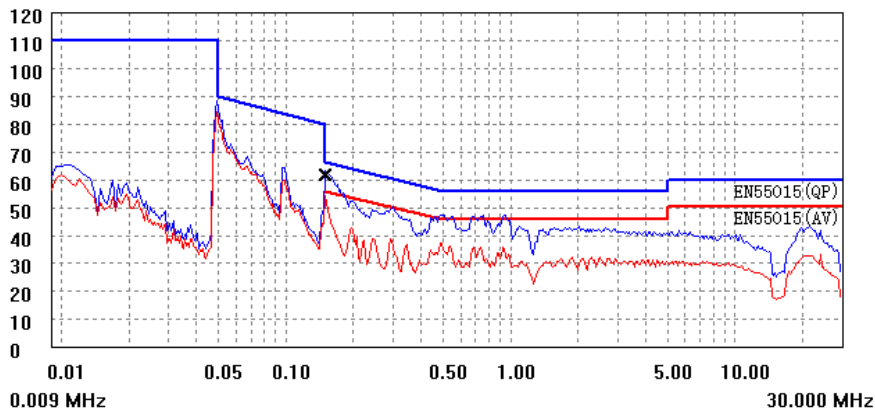
CH2= I_{T1} , I_{T1} =736mA, f=53KHZ



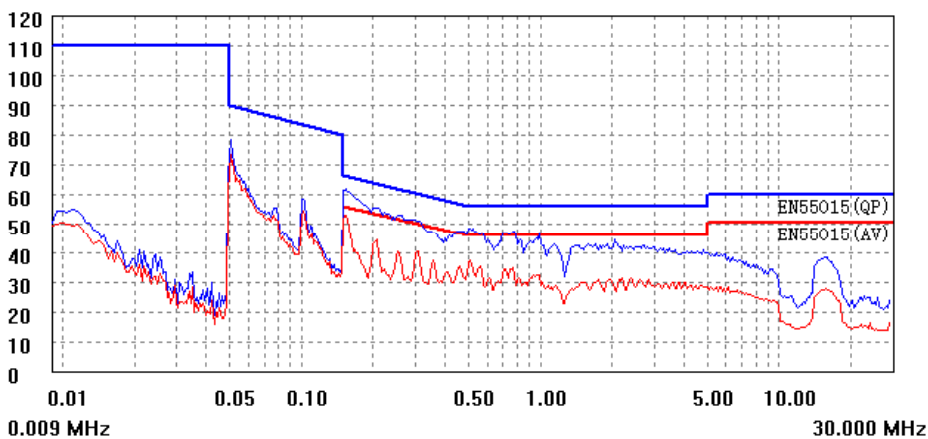
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5 EMI

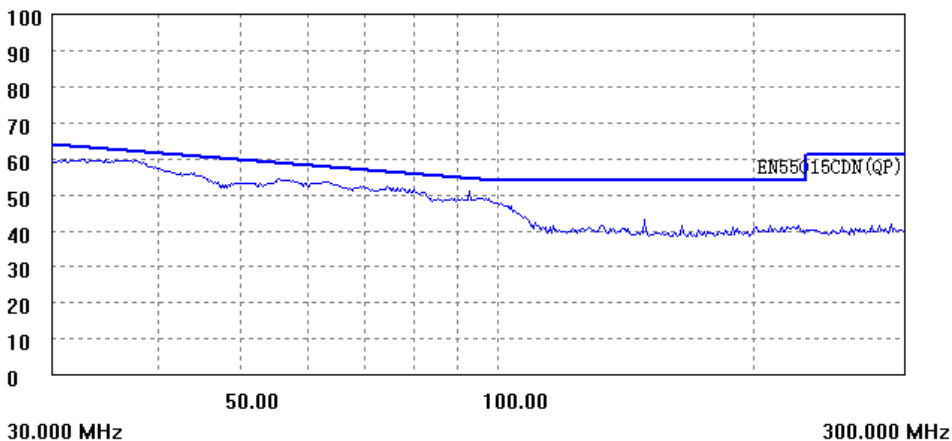
5.1 Vin=220Vac/50Hz, Load LED 72V 180mA Live Conduction



5.2 Vin=220Vac/50Hz, Load LED72V 180mA Netural Conduction



5.3 Vin=220Vac/50Hz, Load LED72V 180mA Radiated



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