

Subject

LD7839 Demo Board Manual

Model Name

LD7839_42W_R10_TEST (42V/1000mA)

TOP VIEW



Size : 150mm(L) x 45mm(W) x 30mm(H)

Key Features

- ✓ **PSR Topology**
- ✓ **Current Accuracy < 3%**
- ✓ **Excellent CC Capability**
- ✓ **High Power Factor > 0.9 @ Full Load**
- ✓ **LOW Current Total harmonic distortion < 10%**
- ✓ **Efficiency > 86% @ Normal Line**
- ✓ **Fast Start-up Time < 0.5sec**
- ✓ **AC On/ Off Test by 0.5sec**
- ✓ **LED Short / Open protection**
- ✓ **Support isolation 0-10V dimming**

PSR Solution_42W Dimmer LED Driver for Panel light
LD7839+LD8116B 42W_R10_TEST

Lighting Power Design Check List

MODEL NAME (機種名稱)	LD7839_DB-10.a	TOTAL PAGE: (共)	23 (頁)
P.M. (機種負責人)	Neo_Cheng	DATE: (日期)	2020 (年) / 01 (月) / 09 (日)

NO. (項目)	TEST ITEM (測試項目)	SPEC. (規格)	NAME. (擔當者)	PAGE (頁數)			RESULT (結果)
1	Input Characteristics - Efficiency (輸入特性 - 效率)	> 86%	Brad_Hsu	11	~	12	PASS
2	Input Characteristics - Power Factor (輸入特性 - 功率因素)	> 0.9	Brad_Hsu	13	~	13	PASS
3	Input Characteristics - THD of Input Current (輸入特性 - 總電流諧波失真度)	≤ 10%	Brad_Hsu	14	~	14	PASS
4	Output Characteristics - Current Accuracy (輸出特性 - 電流精確度)	≤ 3%	Brad_Hsu	15	~	15	PASS
5	Output Characteristics - Current Ripple (輸出特性 - 電流漣波)	≤ 35%	Brad_Hsu	15	~	15	PASS
6	Turn On Delay Time (開機延遲時間)	≤ 0.5 sec	Brad_Hsu	16	~	16	PASS
7	Power Saving Measurement (LED 待機功耗測試)	< 0.5W	Brad_Hsu	16	~	16	PASS
8	LED Open Voltage Test (LED 開路電壓測試)	< 50V	Brad_Hsu	17	~	17	PASS
9	LED Short Dissipation Test (LED 短路功耗測試)	Function	Brad_Hsu	17	~	17	PASS
10	Power Component Stress Voltage (功率元件電壓耐受度)	< De-rating	Brad_Hsu	18	~	18	PASS
11	AC On/Off Test (快速開關機測試)	< 0.5 sec	Brad_Hsu	19	~	19	PASS
12	AC Voltage transition Test (輸入電壓轉換測試)	< De-rating	Brad_Hsu	19	~	19	PASS
13	0-10V Dimming test (直流調光測試)	Function	Brad_Hsu	20	~	22	PASS
14	Thermal Test of Key Components (溫昇測試)	< 80% x De-rating	Brad_Hsu	23	~	23	PASS

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1. LED Driver Module Specification

Description	Symbol	Min	Typ	Max	Units	Comment
Input characteristic						
Voltage	V_{IN}	90	-	277	V_{AC}	2 Wire W/O FG.
Frequency	F_{LINE}	47	50/60	63	Hz	
Power Factor	PF	0.9	0.92	-		
THD	THD_I	-	8	10	%	at I_{OUT} , max condition
Output Characteristic						
Output Voltage	V_{OUT}	30	-	42	V	
Output Current	I_{OUT}	0.95	1	1.05	A	
Output Power	P_{OUT}	-	40	45	W	
Efficiency	η	87	-	-	%	Measured at the end of PCB, $T_A = 25^\circ C$
Output Ripple Current Ratio	I_{RIPPLE}	-	-	35	%	Oscilloscope at 20MHz bandwidth
Turn On Delay Time		-	-	0.5	Sec	Delay time from AC_ON to output current begin

Table 1. Specification

2. LED Driver Application Circuit

2.1. Schematic

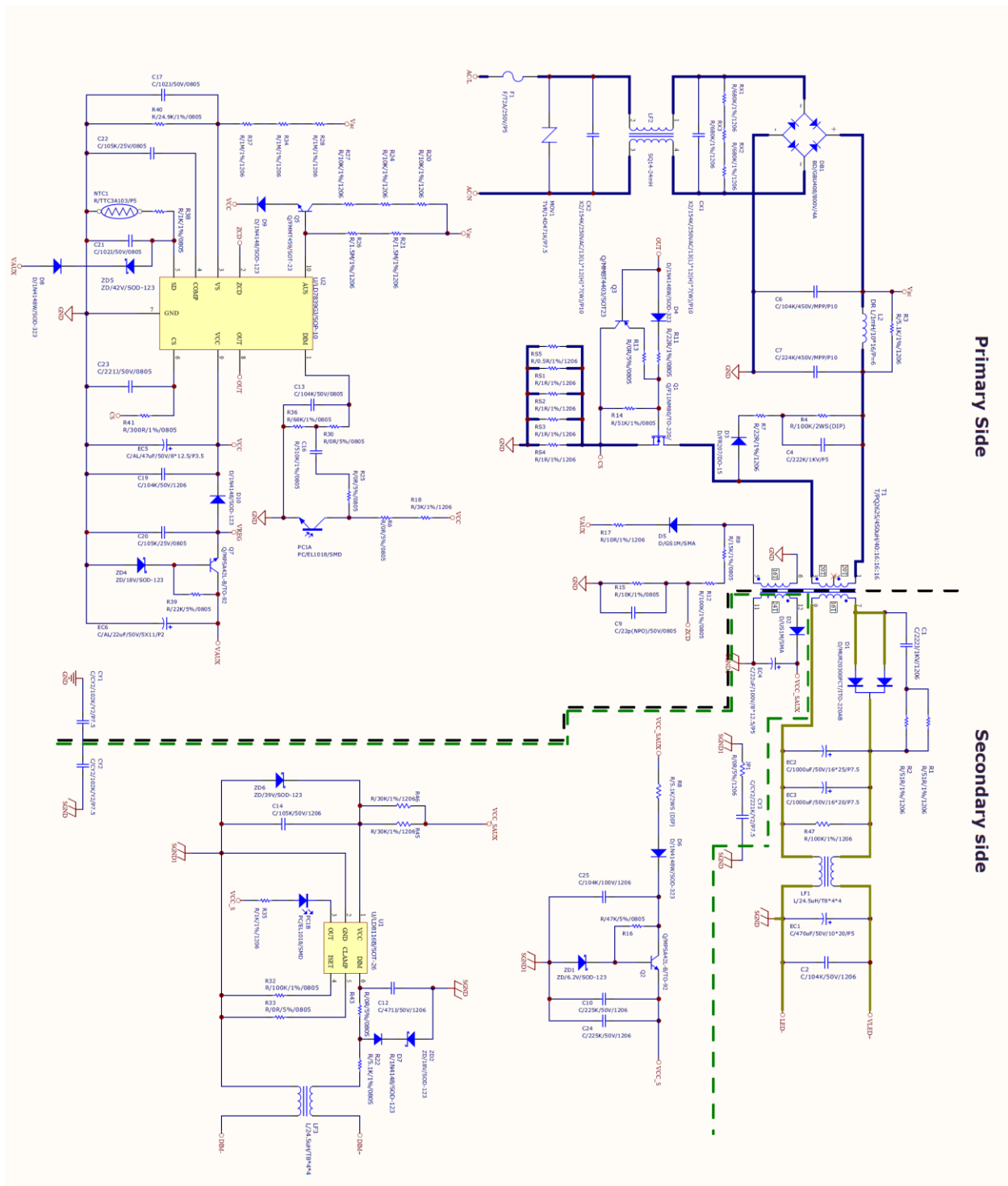


Fig. 1 Schematic

2.2. BOM List

Item	Designator	Comment	Quantity
1	C1	C/222J/1KV/1206	1
2	C2	C/104K/50V/1206	1
3	C4	C/222K/1KV/P5	1
4	C6	C/104K/450V/MPP/P10	1
5	C7	C/224K/450V/MPP/P10	1
6	C9	C/22p(NPO)/50V/0805	1
7	C10	C/225K/50V/1206	1
8	C12	C/471J/50V/1206	1
9	C13	C/104K/50V/0805	1
10	C14	C/105K/50V/1206	1
11	C16	R/510K/1%/0805	1
12	C17	C/102J/50V/0805	1
13	C19	C/104K/50V/1206	1
14	C20	C/105K/25V/0805	1
15	C21	C/102J/50V/0805	1
16	C22	C/105K/25V/0805	1
17	C23	C/221J/50V/0805	1
18	C24	C/225K/50V/1206	1
19	C25	C/104K/100V/1206	1
20	CX1	X2/154K/250Vac	1
21	CX2	X2/154K/250Vac	1
22	CY1	CY2/102K/250Vac/P7.5	1
23	CY2	CY2/102K/250Vac/P7.5	1
24	CY3	CY2/221K/250Vac/P7.5	1
25	D1	D/MUR20300FCT/ITO-220AB	1
26	D2	D/US1M/SMA	1
27	D3	D/FR207/DO-15	1
28	D4	D/1N4148W/SOD-323	1
29	D5	D/GS1M/SMA	1
30	D6	D/1N4148W/SOD-323	1
31	D7	R/1N4148/SOD-123	1
32	D8	D/1N4148W/SOD-323	1
33	D9	D/1N4148/SOD-123	1
34	D10	D/1N4148/SOD-123	1
35	DB1	BD/GBU408/800V/4A	1
36	EC1	C/470uF/50V/10*20/P5	1
37	EC2	C/1000uF/50V/16*25/P7.5	1
38	EC3	C/1000uF/50V/16*20/P7.5	1
39	EC4	C/22uF/100V/8*12.5/P5	1
40	EC5	C/47uF/50V/8X12.5/P3.5	1

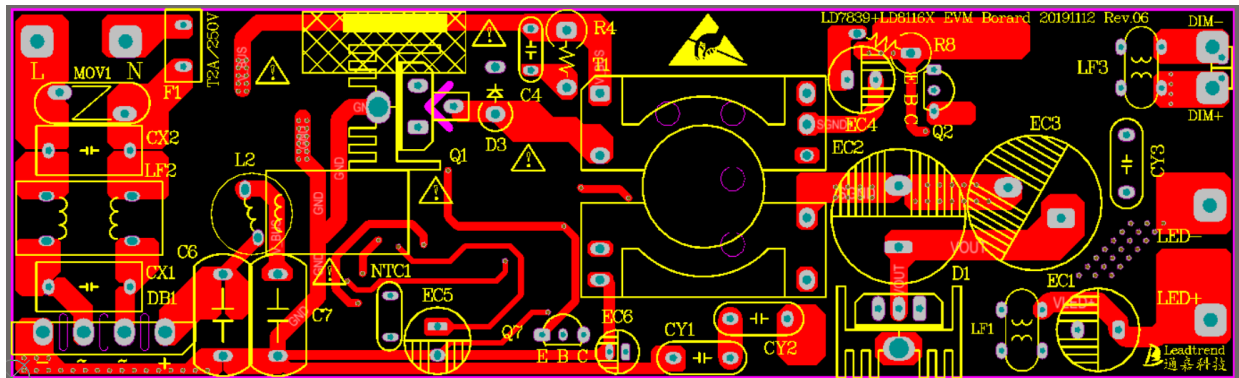
Item	Designator	Comment	Quantity
41	EC6	C/22uF/50V/5X11/P2	1
42	F1	F/T2A/250V/P5	1
43	L2	DR L/1mH/10*16/P=6	1
44	LF1	L/24.5uH/8*4*4	1
45	LF2	SQ14-24mH	1
46	LF3	L/24.5uH/8*4*4	1
47	MOV1	TVR/14D471K/P7.5	1
48	NTC1	TH/5mm/TTC3A103	1
49	PC1	PC/EL1018/SMD4	1
50	Q1	Q/F11NM80/TO-220/	1
51	Q2	Q/MPSA42L-B/ TO-92	1
52	Q3	Q/MMBT4403/SOT-23	1
53	Q5	Q/FMMT459/SOT-23	1
54	Q7	Q/MPSA42L-B/TO-92	1
55	R1	R/51R/1%/1206	1
56	R2	R/51R/1%/1206	1
57	R3	R/5.1K/1%/1206	1
58	R4	R/100K/2WS(DIP)	1
59	R6	R/0R/5%/0805	1
60	R7	R/22R/1%/1206	1
61	R8	R/5.1K/2WS (DIP)	1
62	R9	R/15K/1%/0805	1
63	R11	R/22R/1%/0805	1
64	R12	R/100K/1%/0805	1
65	R13	R/0R/5%/0805	1
66	R14	R/51K/1%/0805	1
67	R15	R/10K/1%/0805	1
68	R16	R/47K/5%/0805	1
69	R17	R/10R/5%/1206	1
70	R18	R/3K/1%/1206	1
71	R20	R/10K/1%/1206	1
72	R21	R/1.5M/1%/1206	1
73	R22	R/5.1K/1%/0805	1
74	R24	R/10K/1%/1206	1
75	R25	R/0R/5%/0805	1
76	R26	R/1.5M/1%/1206	1
77	R27	R/10K/1%/1206	1
78	R28	R/1M/1%/1206	1
79	R30	R/0R/5%/0805	1
80	R32	R/100K/1%/0805	1

Item	Designator	Comment	Quantity
81	R33	R/0R/5%/0805	1
82	R34	R/1M/1%/1206	1
83	R35	R/1K/1%/0805	1
84	R36	R/68K/1%/0805	1
85	R37	R/1M/1%/1206	1
86	R38	R/1K/1%/0805	1
87	R39	R/22K/5%/0805	1
88	R40	R/24.9K/1%/0805	1
89	R41	R/300R/1%/0805	1
90	R43	R/0R/5%/0805	1
91	R45	R/30K/1%/1206	1
92	R46	R/30K/1%/1206	1
93	R47	R/100K/1%/1206	1
94	RS1	R/1R/1%/1206	1
95	RS2	R/1R/1%/1206	1
96	RS3	R/1R/1%/1206	1
97	RS4	R/1R/1%/1206	1
98	RS5	R/0.5R/1%/1206	1
99	RX1	R/680K/1%/1206	1
100	RX2	R/680K/1%/1206	1
101	RX3	R/680K/1%/1206	1
102	T1	T/PQ2625/400uH/40:16:16:24	1
103	U1	U/LD8116BGL/SOT-26	1
104	U2	U/LD7839(FM4)GJ/SOP-10	1
105	ZD1	ZD/6.2V/SOD-123	1
106	ZD2	ZD/18V/SOD-123	1
107	ZD4	ZD/18V/SOD-123	1
108	ZD5	ZD/42V/SOD-123	1
109	ZD6	ZD/39V/SOD-123	1
110	JP1	R/0R/5%/1206	1

Table 2. BOM List

2.3. PCB Board File

TOP VIEW



BOTTOM VIEW

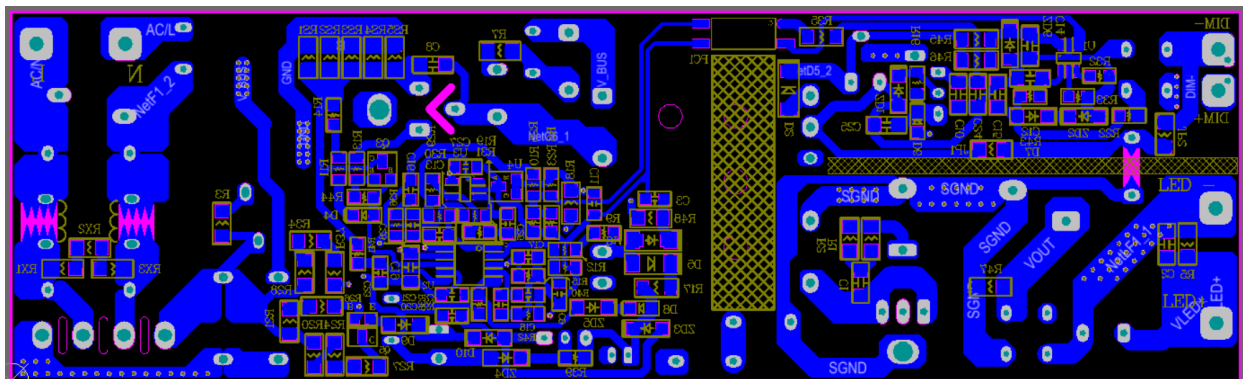


Fig. 2 PCB Board Site

2.4. Transformer Specification

- Bobbin : EQ2625, (6+6) 12PIN
- Core : EQ2625, PC40 /同等材質
- Inductance(PIN 1 - 3) : 400uH $\pm 5\%$ @100KHz/1V

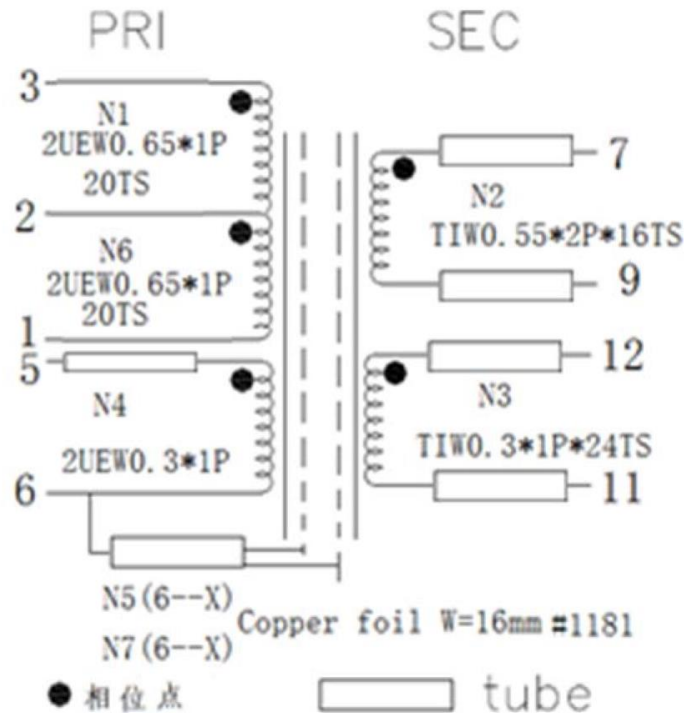


Fig. 3 Mechanical Schematic

WINDING (繞組)	DIAMETER AND TYPE (線徑及線種)	TURNS (圈 數)	ML TAPE (絕緣膠帶)	WINDING METHOD (繞線方式)
N1(3 --- 2)	2UEW 0.65mm * 1P	20TS	2Ts	密繞
N2(7 --- 9)	TIW 0.55mm*2P	16TS	1Ts	兩層密繞
N3(12 --- 11)	TIW 0.3mm*1P	24TS	2Ts	密繞
N4(5 --- 6)	2UEW 0.3mm*1P	16TS	2Ts	疏(均)繞
S1(6 --- X)	Copper Foil W=16mm #1181	1TS	2Ts	Note 3
N5(2-1)	2UEW 0.65mm * 1P	20TS	2Ts	密繞
S2(6 --- X)	Copper Foil W=16mm #1181	1TS	2Ts	Note 3
				外圈膠帶 2Ts

Table 3. Winding Procedure

3. Executive Summary

Test Equipment

Equipment	Equipment Model No.
Electrical Load	Chrome - 63113A
Power Meter	WT310
AC power source	Chroma 61602
Scope	TDS3014
Multi-function Meter	Fluke 187
Thermal Hunter	PT-3S
THD measurement	PM-100

3.1. Input Characteristics

3.1.1. Efficiency

Specification	Judgment
> 87%	PASS

V_{IN}	P_{in} (W)	I_o (mA)	V_o (V)	Efficiency (%)
90V _{AC} / 60Hz	47.411	0.9966	42.0835	88.46%
115V _{AC} / 60Hz	46.487	0.9859	42.0326	89.14%
230V _{AC} / 50Hz	46.233	0.9781	41.9734	88.80%
264V _{AC} / 50Hz	46.548	0.9803	41.9613	88.37%
277V _{AC} / 50Hz	46.588	0.9762	41.9591	87.92%

V_{IN}	P_{in} (W)	I_o (mA)	V_o (V)	Efficiency (%)
90V _{AC} / 60Hz	44.001	1.001	39.119	88.96%
115V _{AC} / 60Hz	43.212	0.992	39.067	89.69%
230V _{AC} / 50Hz	43.212	0.981	39.002	88.58%
264V _{AC} / 50Hz	43.525	0.981	39.001	87.93%
277V _{AC} / 50Hz	43.595	0.981	39.003	87.78%

V_{IN}	P_{in} (W)	I_o (mA)	V_o (V)	Efficiency (%)
90V _{AC} / 60Hz	40.868	1.006	36.139	88.97%
115V _{AC} / 60Hz	40.187	0.998	36.094	89.63%
230V _{AC} / 50Hz	40.296	0.988	36.038	88.35%
264V _{AC} / 50Hz	40.578	0.988	36.036	87.73%
277V _{AC} / 50Hz	40.633	0.987	36.033	87.52%

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V_{IN}	P_{in} (W)	I_o (mA)	V_o (V)	Efficiency (%)
90V _{AC} / 60Hz	37.779	1.013	33.169	88.95%
115V _{AC} / 60Hz	37.192	1.005	33.131	89.57%
230V _{AC} / 50Hz	37.258	0.994	33.070	88.18%
264V _{AC} / 50Hz	37.551	0.993	33.068	87.47%
277V _{AC} / 50Hz	37.624	0.993	33.065	87.25%

V_{IN}	P_{in} (W)	I_o (mA)	V_o (V)	Efficiency (%)
90V _{AC} / 60Hz	34.650	1.019	30.202	88.85%
115V _{AC} / 60Hz	34.144	1.012	30.168	89.40%
230V _{AC} / 50Hz	34.348	1.001	30.117	87.77%
264V _{AC} / 50Hz	34.611	0.999	30.107	86.88%
277V _{AC} / 50Hz	34.704	0.999	30.109	86.70%

Table 4. Efficiency

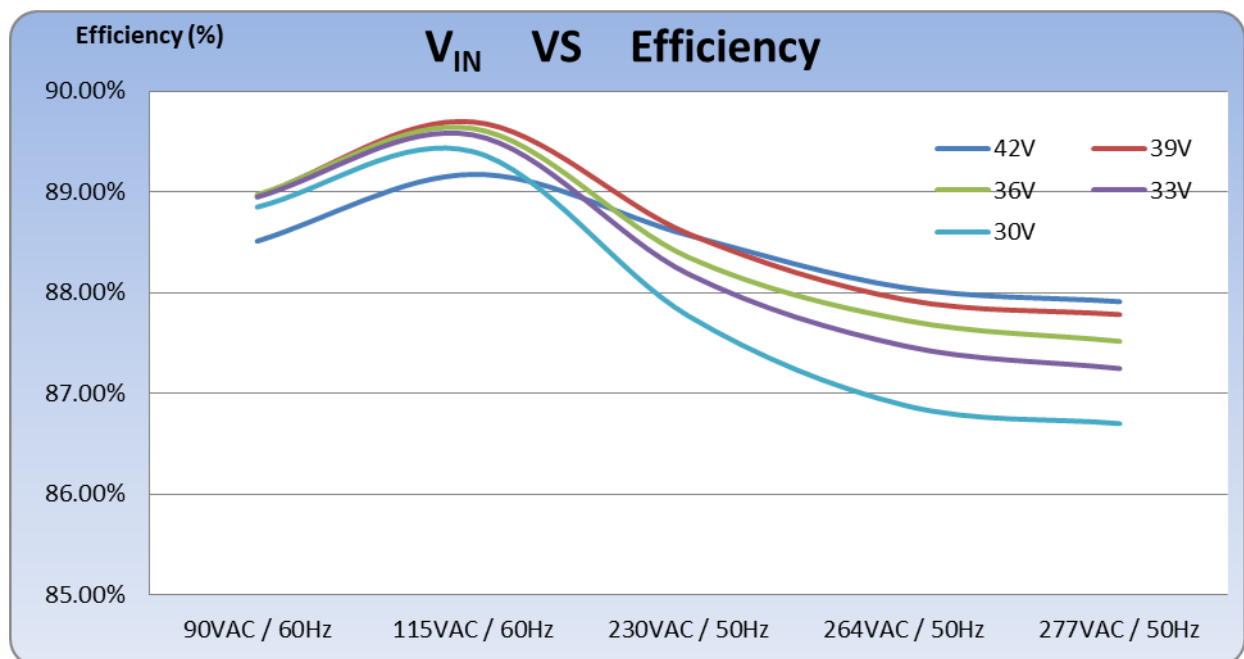


Fig. 4 V_{IN} vs. Efficiency

3.1.2. Power Factor

Specification	Judgment
≥ 0.9	PASS

V_o V_{IN}	42V	39V	36V	33V	30V
90V _{AC} /60Hz	0.9977	0.9974	0.9972	0.9966	0.9962
115V _{AC} /60Hz	0.9954	0.9937	0.9951	0.9921	0.9931
230V _{AC} /50Hz	0.9785	0.9715	0.9732	0.9645	0.9619
264V _{AC} /50Hz	0.9629	0.9537	0.9509	0.9359	0.9327
277V _{AC} /50Hz	0.9569	0.9448	0.9473	0.9335	0.9311

Table 5. Power Factor

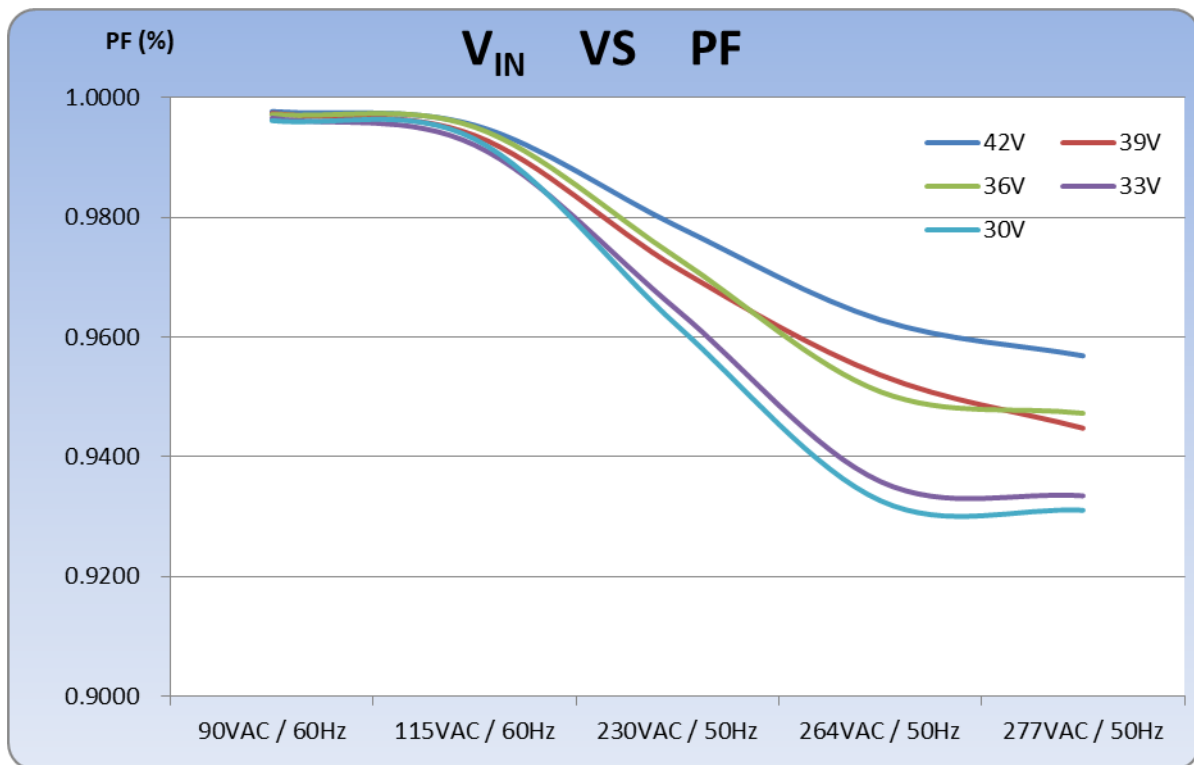


Fig. 5 V_{IN} vs. PF

3.1.3. THDi of Input Current

Specification	Judgment
$\leq 10\%$	Pass

V_o V_{IN}	42V	39V	36V	33V	30V
90V _{AC} /60Hz	5.20	5.45	5.84	6.32	6.88
115V _{AC} /60Hz	4.42	4.61	4.86	5.17	5.69
230V _{AC} /50Hz	4.46	4.51	4.71	5.57	5.63
264V _{AC} /50Hz	5.32	5.78	6.32	6.41	7.10
277V _{AC} /50Hz	5.74	6.01	6.58	6.83	7.50

Table 6. THD_i

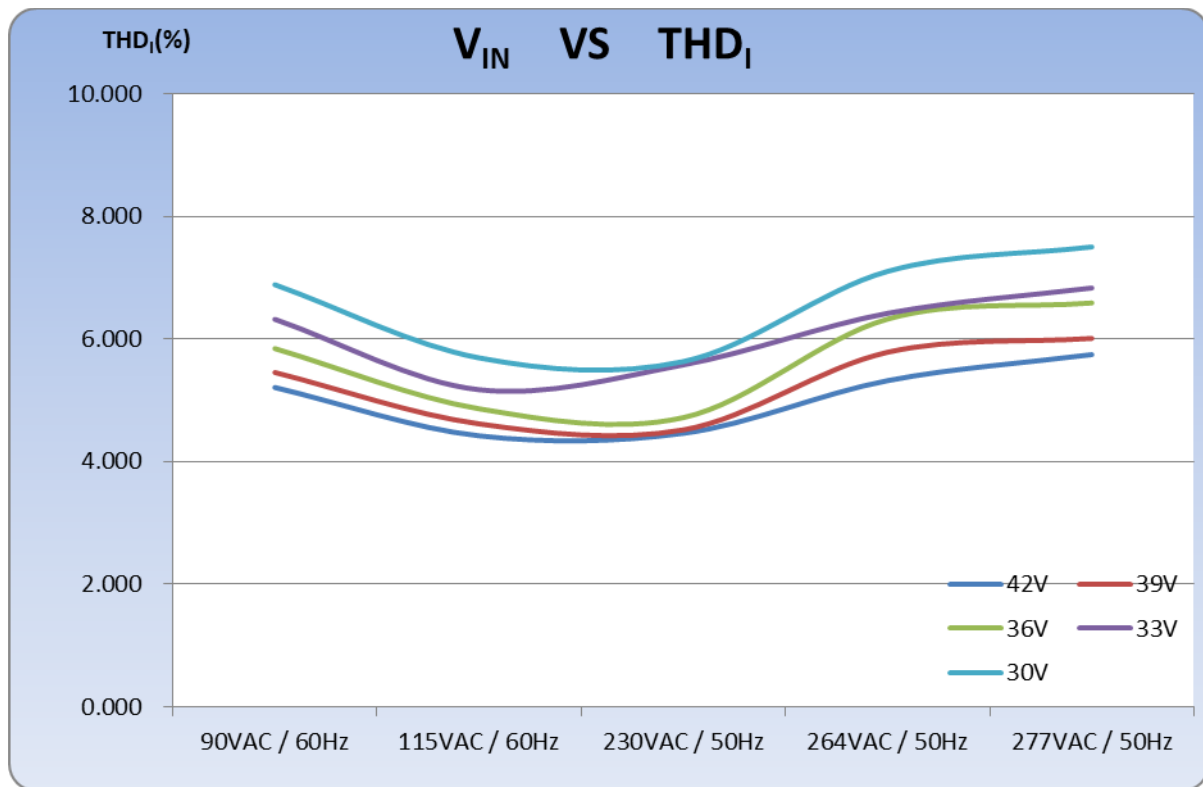


Fig. 6 V_{IN} vs. THD_i

3.2. Output Characteristics

3.2.1 Current Regulation

Specification	Judgment
$\leq \pm 3\%$	PASS

$V_{IN} \backslash V_O$	42V	39V	36V	33V	30V	Load Regulation
90Vac/60Hz	1.0095	1.0154	1.0214	1.0269	1.0355	$\pm 1.27\%$
115Vac/60Hz	1.0100	1.0172	1.0221	1.0297	1.0368	$\pm 1.31\%$
230Vac/50Hz	1.0135	1.0217	1.0272	1.0359	1.0444	$\pm 1.50\%$
264Vac/50Hz	1.0167	1.0232	1.0265	1.0321	1.0396	$\pm 1.11\%$
277Vac/50Hz	1.0155	1.0198	1.0242	1.0320	1.0389	$\pm 1.14\%$
Line Regulation	$\pm 0.36\%$	$\pm 0.38\%$	$\pm 0.28\%$	$\pm 0.44\%$	$\pm 0.43\%$	$\pm 1.70\%$

Table 7 Output Current(mA)

$$\text{Cross Regulation} = \pm \frac{I_{MAX} - I_{MIN}}{I_{MAX} + I_{MIN}} \times 100\%$$

3.2.2 Current Ripple

Specification	Judgment
$\leq 35\%$	Pass

Definition of Current Ripple (%): $(I_{PK-PK} / I_{LED}) * 100$

$V_{IN} \backslash V_O$	42V	39V	36V	33V	30V
90V _{AC} /60Hz	25.888%	25.046%	25.046%	24.926%	28.058%
115V _{AC} /60Hz	24.140%	23.788%	25.252%	26.456%	27.871%
230V _{AC} /50Hz	27.044%	27.917%	29.760%	31.202%	33.767%
264V _{AC} /50Hz	26.849%	27.718%	29.154%	31.008%	33.640%
277V _{AC} /50Hz	26.648%	27.722%	29.182%	31.025%	33.624%

Table 8 Current Ripple (%)

3.3. Turn On Delay Time

Input	T _{Turn on delay}	Specification	Judgment
90V _{AC} / 60Hz	490.93ms	≤0.5 sec	PASS

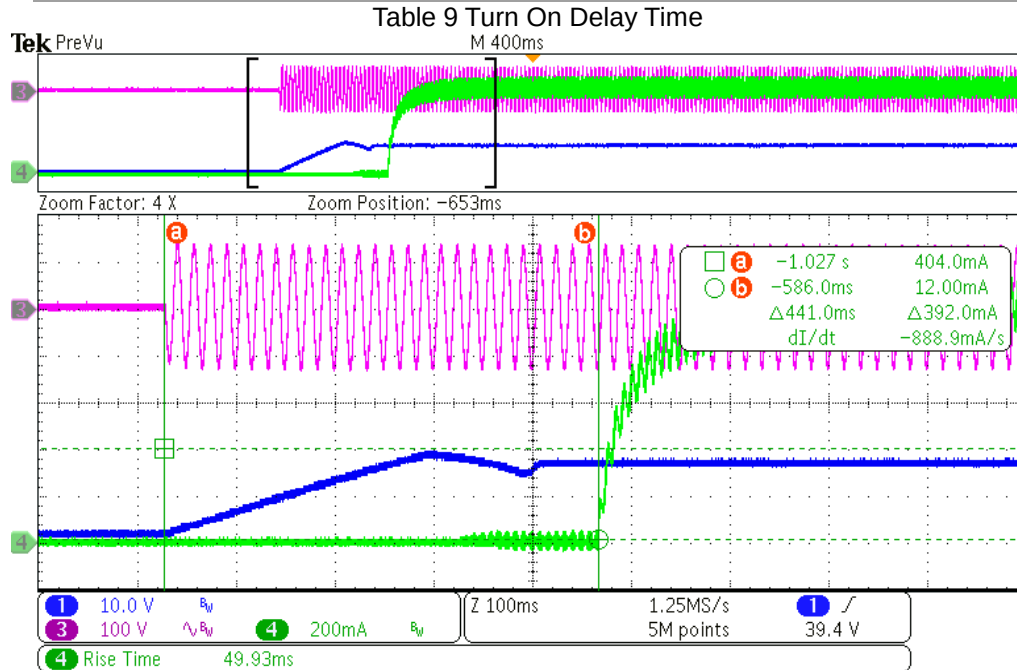


Fig. 7 Start-up Waveforms @ 90V_{ac}/60Hz
CH1:V_{CC}, CH3:V_{AC}, CH4:I_{OUT}

3.4. Power Saving Measurement

3.4.1. LED open circuit during power saving measurement test

Specification	Judgment
≤ 0.5W	Pass

Input Voltage	90V _{AC} /60Hz	115V _{AC} /60Hz	230V _{AC} /50Hz	264V _{AC} /50Hz	277V _{AC} /50Hz
MAX. Output Voltage(V)	49.2	49.3	49.5	49.5	49.6
Input Power(mW)	112.52	137.58	301.25	373.01	400.02

Table 10 Power Saving (mW) With LED open

3.5. Abnormal Test

3.5.1. LED Open Voltage Test

Specification	Judgment
< 50V	PASS

Input Voltage	90V _{AC} /60Hz	115V _{AC} /60Hz	230V _{AC} /50Hz	277V _{AC} /50Hz
MAX. Output Voltage (V)	49.2	49.3	49.5	49.6

Table 11 Over Voltage Level at output open

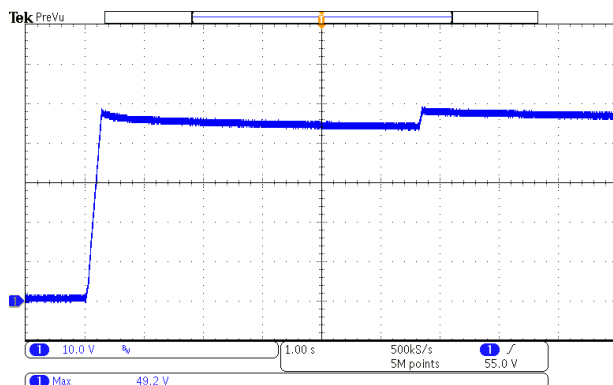


Fig. 8 LED Open Test @ 90Vac/60Hz
CH1: V_{OUT}

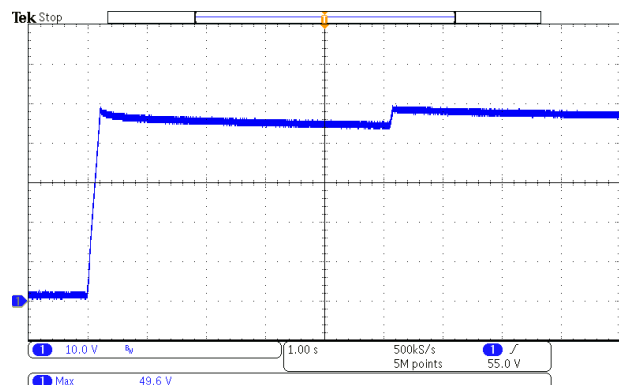


Fig. 9 LED Open Test @ 277Vac/50Hz
CH1: V_{OUT}

3.5.2. LED Short Dissipation Test

Specification	V _{IN} (V _{AC})	P _{IN_Peak} (W)	Judgment
Auto Recovery	277V _{AC} / 50Hz	0.93	PASS

Table 12 Input Power during LED short

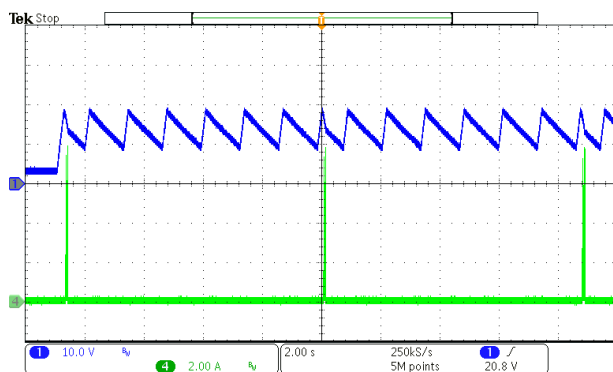


Fig. 10 LED Short Test @ 90Vac/60Hz
CH1: V_{CC}, CH4: I_{OUT}

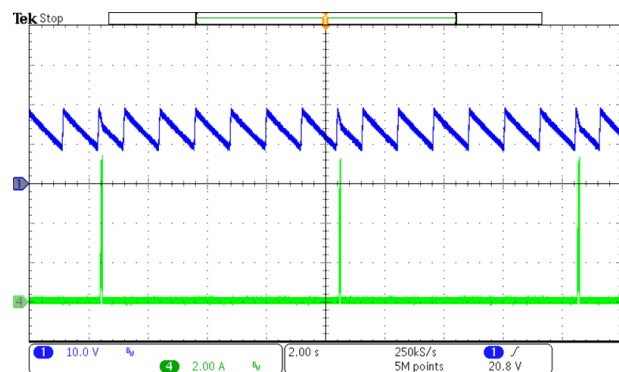


Fig. 11 LED Short Test @ 264Vac/50Hz
CH1: V_{CC}, CH4: I_{OUT}

Note : Measured at PCB terminal end.

3.6. Key Component Stress Voltage

Specification	Judgment
< 85% De-rating	PASS

NO.	Location	Max Rating(V)	Steady State (277V / 50Hz)	
			Measurement	De-rating (%)
			V	V
1	Q2	800	596	74.5%
2	D1	300	237	79.01%

Table 13 MOS and Diode Stress Voltage @ Steady State

NO.	Location	Max Rating(V)	Transient State (277V / 50Hz)	
			Measurement	De-rating (%)
			V	V
1	Q2	800	581	72.62%
2	D1	300	237	79.01%

Table 14 MOS and Diode Stress Voltage @ Transient State

3.7. MOSFET Voltage and I_{LED} Waveforms

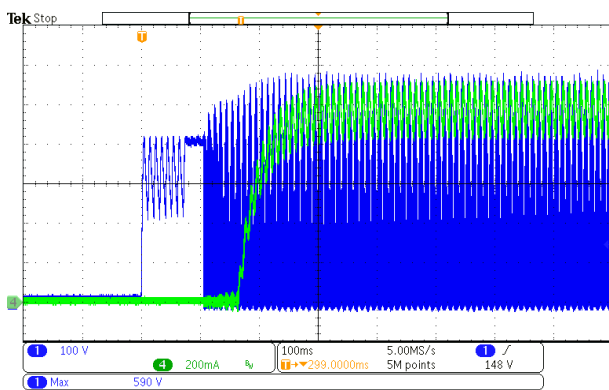


Fig. 12 Drain waveforms @ 277Vac/50Hz
CH1: MOSFET_Drain, CH4: I_{LED}

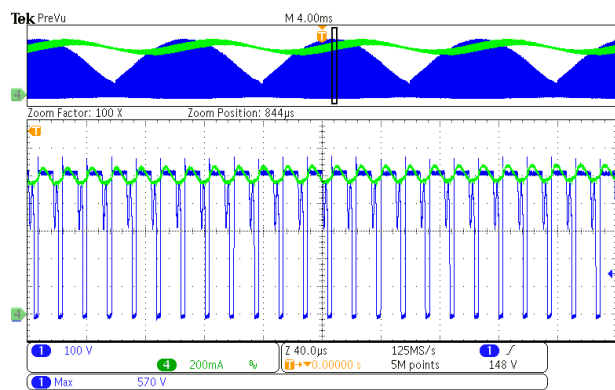


Fig. 13 Drain waveforms @ 277Vac/50Hz
CH1: MOSFET_Drain, CH4: I_{LED}

3.8. AC On/Off Test

Specification	Judgment
No Latch Ton=0.5S and Toff=0.5S	PASS

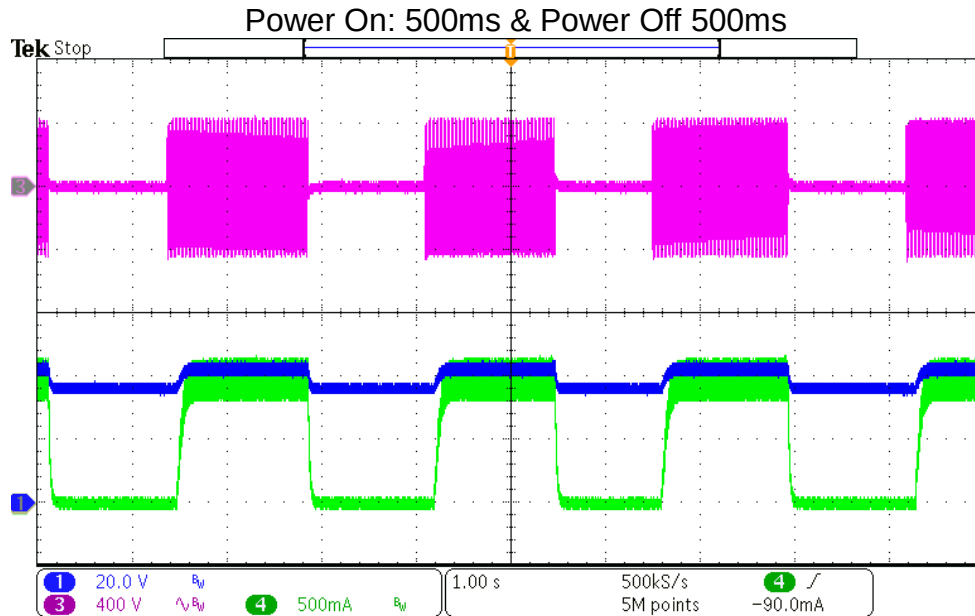


Fig. 14 AC On/Off Test @ 277V_{AC}/50Hz
CH1: V_{OUT}, CH3: V_{AC}, CH4: I_{LED}

3.9. AC Voltage transition Test

Specification	Judgment
< 90% De-rating	PASS

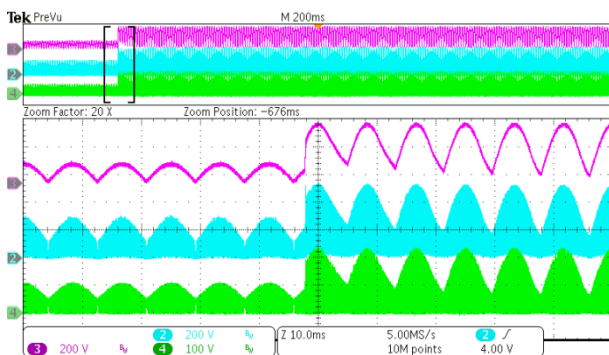


Fig. 15 Drain & Schottky @ 90 - 277Vac
CH2: MOSFET_Drain, CH3: HV, CH4: Schottky

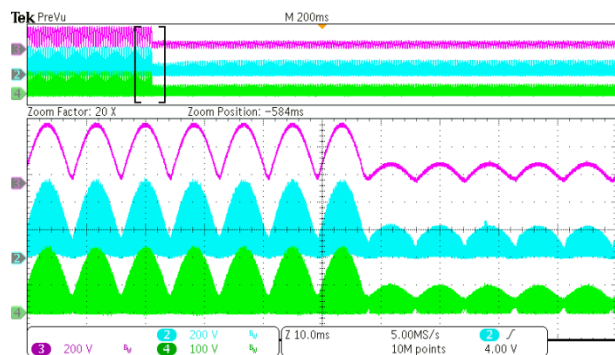


Fig. 16 Drain & Schottky @ 277Vac - 90Vac
CH2: MOSFET_Drain, CH3: HV, CH4: Schottky

3.10. 0-10V Dimming Test

0-10V Dimming Test 42V (LED 14PCS or LED electrical load)									
V _{IN}	90Vac	100Vac	115Vac	132Vac	198Vac	220Vac	240Vac	264Vac	277Vac
V _{DIM}	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)
0V	0.110	0.106	0.106	0.107	0.108	0.107	0.107	0.108	0.108
1V	0.110	0.106	0.106	0.107	0.108	0.107	0.107	0.108	0.108
2V	0.148	0.145	0.146	0.146	0.147	0.148	0.147	0.147	0.147
3V	0.253	0.250	0.249	0.250	0.253	0.251	0.251	0.252	0.252
4V	0.356	0.349	0.350	0.352	0.354	0.355	0.356	0.357	0.357
5V	0.465	0.460	0.462	0.461	0.463	0.463	0.464	0.466	0.466
6V	0.585	0.582	0.581	0.582	0.587	0.584	0.583	0.586	0.587
7V	0.706	0.703	0.707	0.703	0.709	0.711	0.706	0.706	0.707
8V	0.827	0.826	0.827	0.828	0.830	0.833	0.834	0.830	0.832
9V	0.949	0.946	0.948	0.949	0.950	0.953	0.953	0.955	0.953
10V	1.009	1.013	1.011	1.010	1.010	1.013	1.014	1.016	1.015

Table 15 Dimming performance test at full range @ V_{LED} = 42V

0-10V Dimming Test 30V (LED 10PCS or LED electrical load)									
V _{IN}	90Vac	100Vac	115Vac	132Vac	198Vac	220Vac	240Vac	264Vac	277Vac
V _{DIM}	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)	I _o (A)
0V	0.117	0.116	0.116	0.116	0.117	0.116	0.116	0.117	0.117
1V	0.117	0.116	0.116	0.117	0.116	0.117	0.116	0.117	0.117
2V	0.156	0.156	0.155	0.156	0.157	0.156	0.156	0.156	0.156
3V	0.263	0.262	0.262	0.263	0.263	0.264	0.264	0.265	0.265
4V	0.366	0.367	0.368	0.369	0.371	0.373	0.372	0.375	0.374
5V	0.478	0.479	0.480	0.481	0.483	0.484	0.483	0.486	0.487
6V	0.605	0.601	0.603	0.603	0.606	0.607	0.607	0.608	0.609
7V	0.727	0.728	0.724	0.726	0.730	0.728	0.728	0.731	0.733
8V	0.850	0.850	0.848	0.848	0.857	0.853	0.852	0.853	0.855
9V	0.972	0.973	0.974	0.970	0.978	0.981	0.975	0.975	0.975
10V	1.035	1.036	1.037	1.034	1.040	1.043	1.042	1.039	1.039

Table 16 Dimming performance test at full range @ V_{LED} = 30V

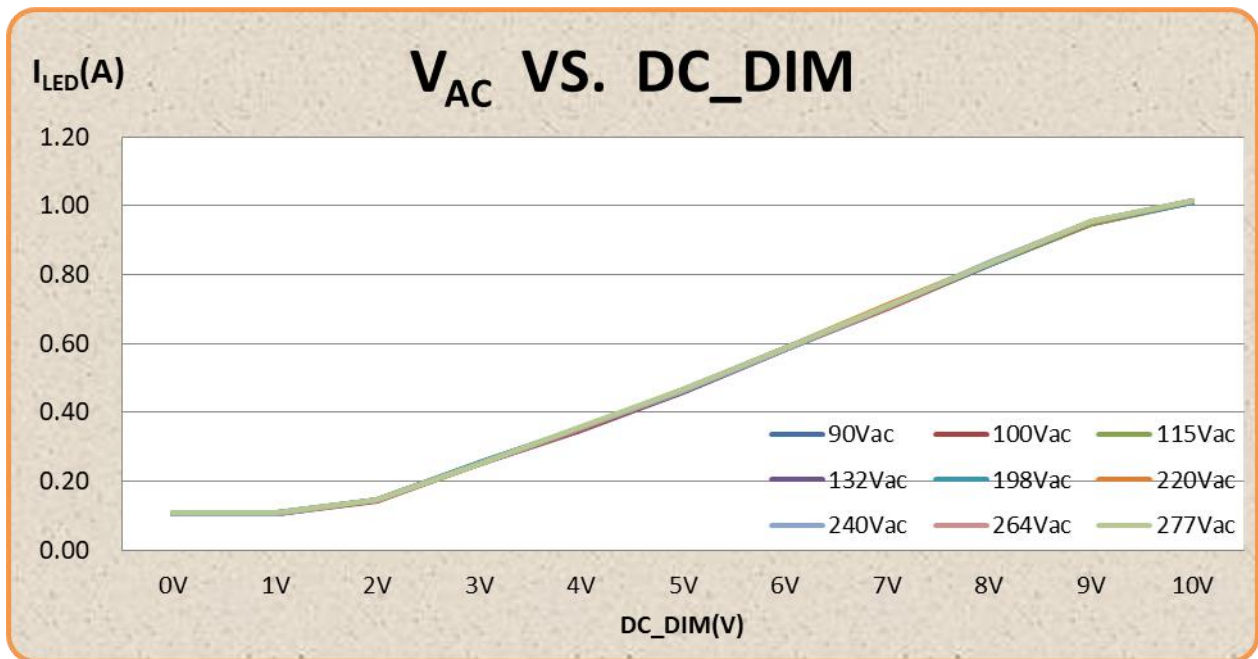


Fig. 17 Dimming performance test at full range @ $V_{LED} = 42V$

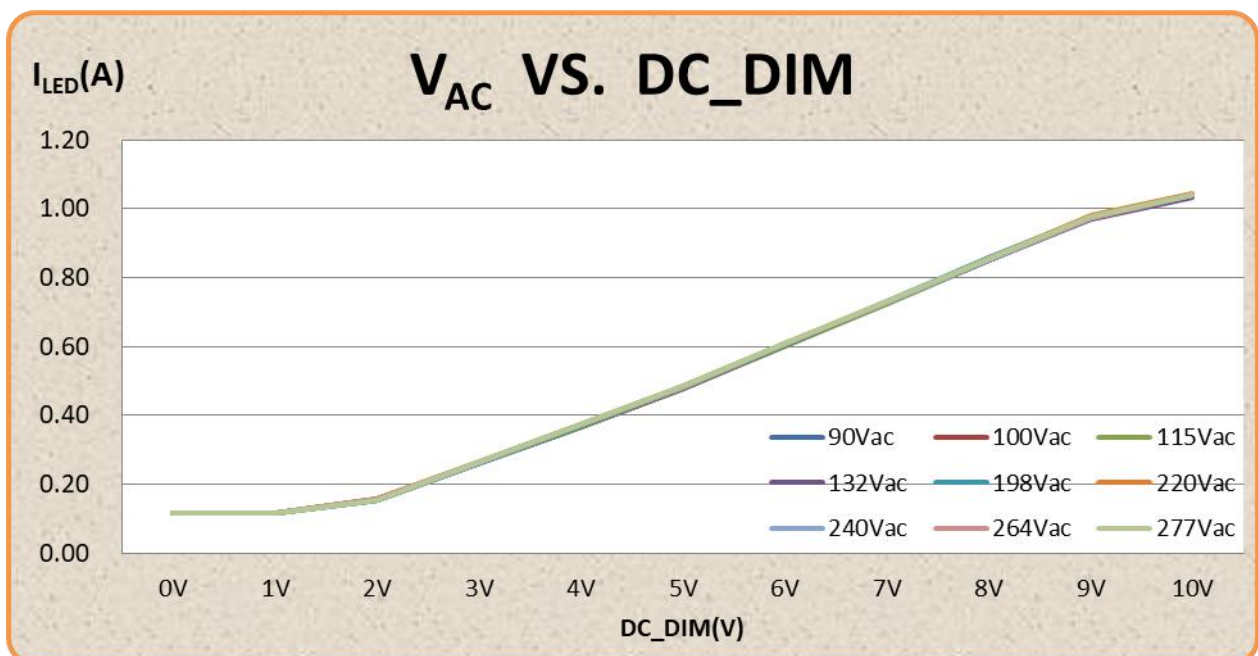
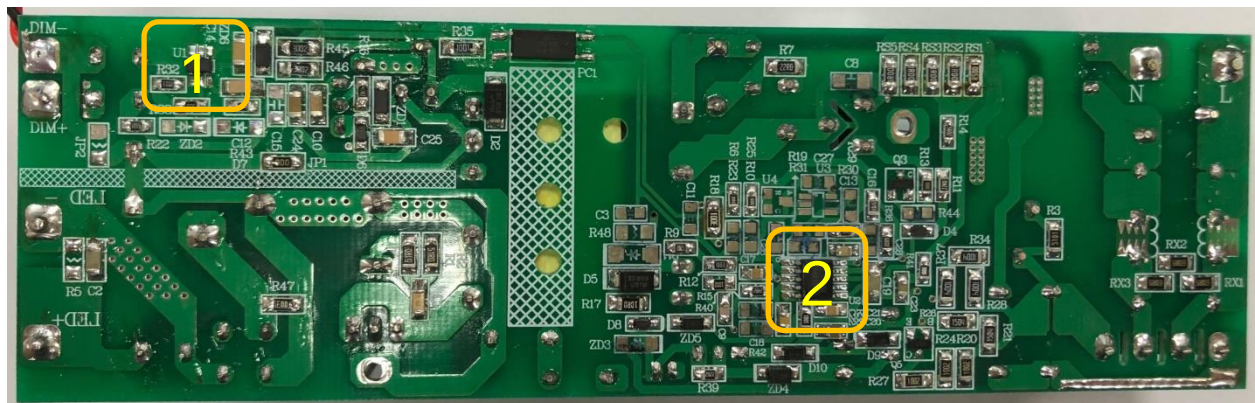
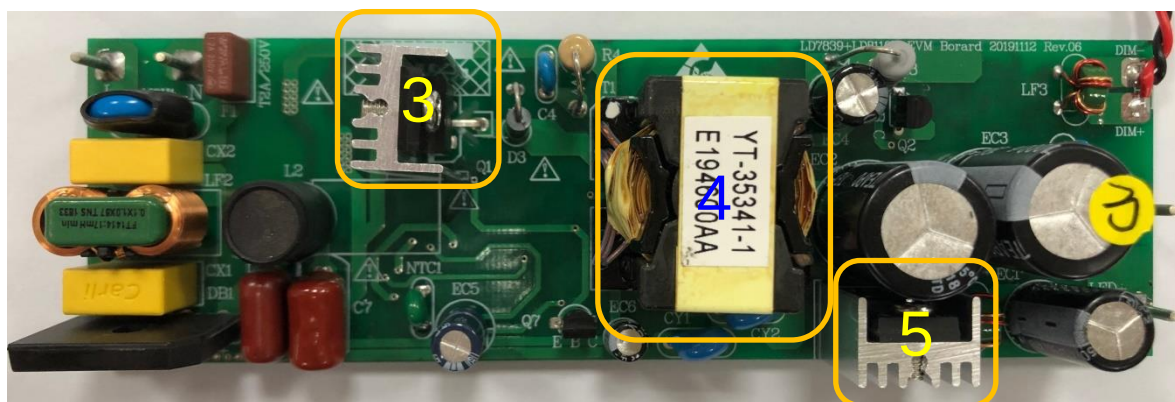


Fig. 18 Dimming performance test at full range @ $V_{LED} = 30V$

3.11. Thermal Test

Test Result:



Thermal Test 置於 350(L) x 200(H) x 180(W)的塑膠殼中

Input condition	90V/60Hz	277V/50Hz
Output condition	42V/1A	42V/1A
U1(LD8116O)(1)	57.2°C	56.3°C
U2(LD7839)(2)	61.5°C	60.8°C
MOSFET (3)	73.9°C	69.5°C
X'FRM (4)	79.4°C	82.7°C
Output Diode(5)	84.9°C	91.6°C
Case	43.1°C	44.8°C
Ambient	41°C room temp	

Table 17 Thermal Test of Key Components