



## DEMO BOARD TEST REPORT

# 45W Isolated Constant Voltage LED Driver with KP2813A

## FEATURES

- Input and Output Isolation PSR Topology
- Efficiency >89% @90~277Vac 45V&1.0A
- High PF >0.95 & Low THD <10%
- Harmonics Meets IEC61000-3-2 Class C
- Fast Start-up time <300ms
- Excellent Line Regulation and Load Regulation
- Low Standby Power <200mW

## APPLICATIONS

- Two Stage Dimmable LED Driver

## INTRODUCTION

The DEMO board is a high performance isolated constant voltage LED driver which is controlled by KP2813A with High PF and Low THD.

Besides the multi-protection function, this demo also has very good efficiency, line & load regulation, low standby power loss and meets the EN55015 conducted and radiated EMI requirement. And the Demo Board is typically designed for the 45W application which support input voltage from 90Vac to 277Vac.

## DEMO BOARD SEPCIFICATION

Description	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	Vin	90		277	Vac	50/60Hz
Frequency	Fline	47	50/60	63	Hz	
Output Voltage	Vout		45		Vdc	
Output Current	Iout		1.0		A	
Total Output Power	Pout		45		W	
Power Factor	PF		>0.95			90Vac-277Vac @ 45V&1.0A
Total Harmonic Distortion	THD		<10		%	90Vac-277Vac @ 45V&1.0A
System Average Efficiency	$\eta$		>89		%	90Vac-277Vac @ 45V&1.0A
Voltage Ripple	Vripple			4	V	90Vac-277Vac @ 45V&1.0A
Line Regulation				3	%	90Vac-277Vac @ 45V&1.0A
Load Regulation				3	%	90Vac-277Vac @ 45V&1.0A
Standby Power	Pstandby			0.2	W	90Vac-277Vac @ No Load
Startup Time	Tst			0.3	s	Tested at 90/277Vac
EMI Margin		6			dB	EN55015
Surge Test		2			kV	Differential Mode @ 230Vac/50Hz

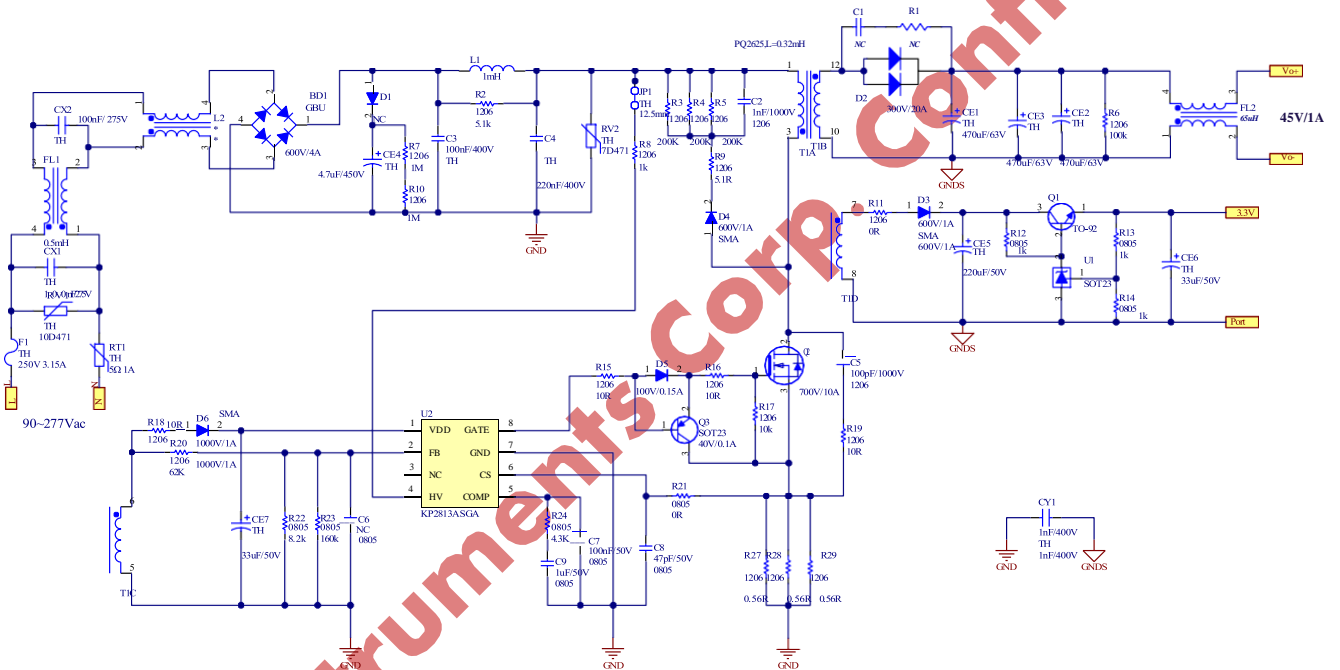
**Note:** The table above shows the minimum acceptable performance of the design. Actual performance is listed in the results section.

Demo Board of KP2813A\_D01\_REV1.1



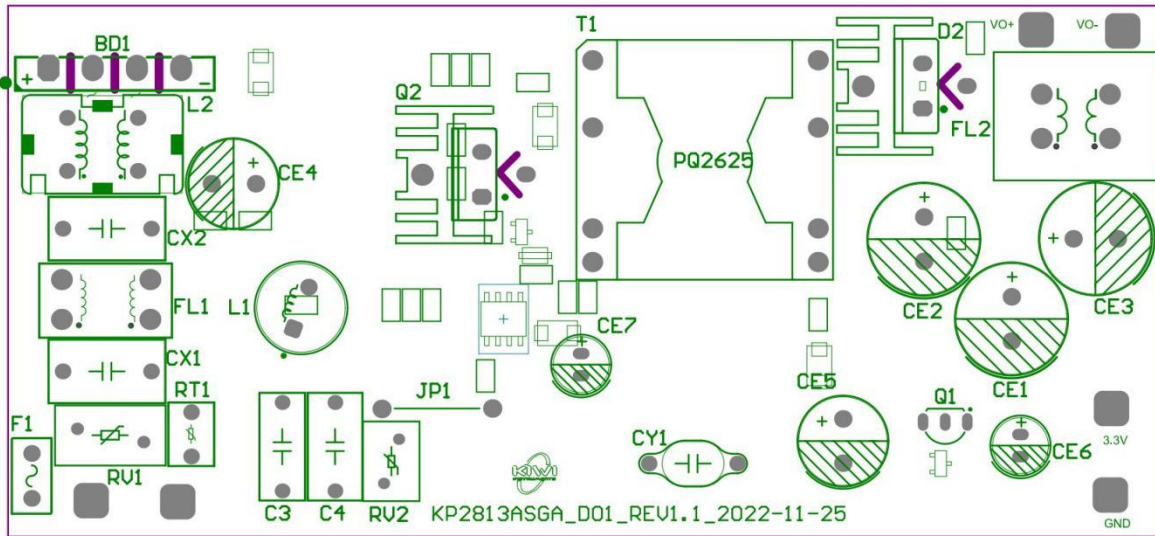
Board Size (in mm): L x W x H=130 x 60 x30

Schematic

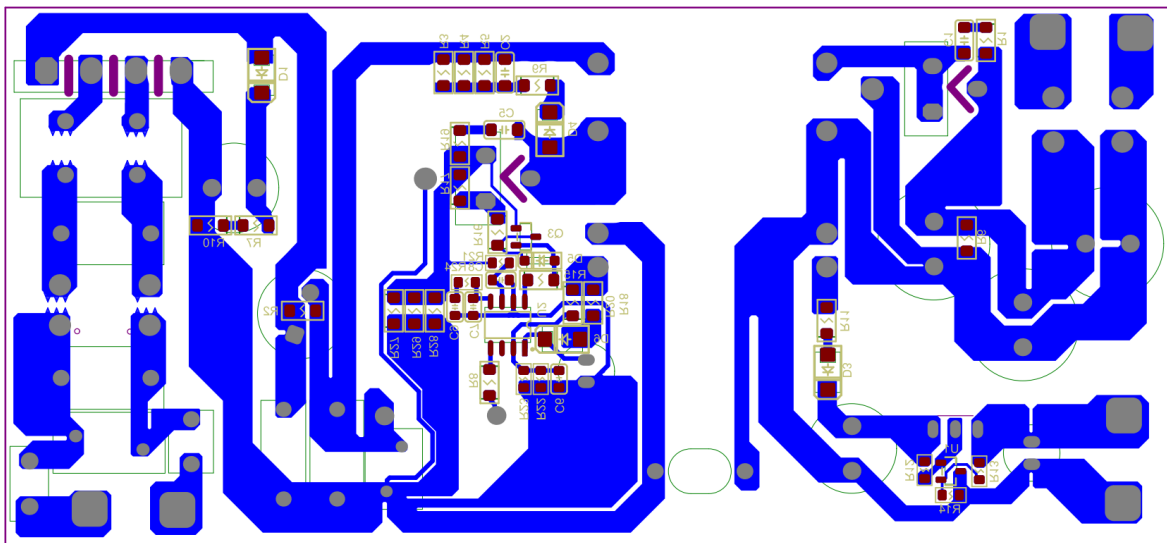


Printed Circuit Board Layout

Top Layer



Bottom Layer



### Bill of Material

No.	Designator	Value	Description	Package	Manufacturer	Part Number
1	BD1	600V/4A	BRD 4A 600V 1V	GBU	MDD	GBU406
2	C1, C6	NC				
3	C2	1nF/1000V	Ceramic Cap 1000V ±10% X7R	1206	WE	885342208018
4	C3	100nF/400V	CBB 400Vdc 12*5*9 P10	TH	STE	B22G104JN1B012 0090050EOZ
5	C4	220nF/400V	CBB 400Vdc 12*6*12.5 P10	TH	STE	B22G224JN1B012 0125060EOZ
6	C5	100pF/1000V	Ceramic Cap 1000V ±5% NPO	1206	WE	885342008009
7	C7	100nF/50V	Ceramic Cap 50V ±10% X7R	0805	WE	85012207098
8	C8	47pF/50V	Ceramic Cap 50V ±5% NPO	0805	WE	885012007055
9	C9	1µF/50V	Ceramic Cap 50V ±10% X7R	0805	WE	885012207103
10	CE1, CE2, CE3	470µF/63V	Electrolytic Cap 63V 12.5*20 P5.0	TH	AISHI	EW11JM471W20 OT
11	CE4	4.7µF/450V	Electrolytic Cap 450V 10*12 P5.0	TH	AISHI	ERK2WM4R7G12 OT
12	CE5	220µF/50V	Electrolytic Cap 50V 10*13 P5.0	TH	AISHI	EW11HM221G13 OT
13	CE6, CE7	33µF/50V	Electrolytic Cap 50V 6.3*11 P2.5	TH	AISHI	ERS1HM330E110 T
14	CX1, CX2	100nF/275V	X2 Capacitor 275Vac 13*7*13 P10	TH	WE	890324023023CS
15	CY1	1nF/400V	Y1 Capacitor 400Vac ±10% T5 P10	TH	STE	Q07F1D102MN0B 0S0N0
16	D1	1000V/1A	DIO FRD 1A 1000V 1.1V	DO-214AC (SMA)	MDD	M7
17	D2	300V/20A	20A, 300V, Trench Schottky(VF=0.62V@IF=20A)	ITO-220AB	Taiwan	300V/20A
18	D3, D4	600V/1A	DIO FRD 1A 600V 35nS 1.7V	SMA	MDD	ES1J
19	D5	100V/0.15A	DIO FRD 0.15A 100V 1.25V	SOD-123	World	1N4148W- SOD123
20	D6	1000V/1A	DIO FRD 1A 1000V 500nS 1.3V	SMA	CJ	RS1M
21	F1	250V 3.15A	Fuse 250V 3.15A	TH	CONQUER	MST 3.15A 250V
22	FL1	0.5mH	WE-TI Inductor, Isat=6.5A, Rdc=0.01Ω, XS	CMB	Wurth Elektronik	7448227005
23	FL2	65µH	WE-TI Inductor, Isat=5A, Rdc=13mΩ, CM	S	Wurth Elektronik	
24	JP1	12.5mm	12.5mm WIRE JUMPER	TH	NO	NOT HAVE-7
25	L1	1mH	Inductor Isat 0.80A Rdc 1.15Ω 10*14	TH	WE	7447480102
26	L2	10mH	COMMON INDUCTOR Isat 5A Rdc 50mΩ 24*14.5*25	MPQ	PuLuoDe	PDSQAT1918- 103MLB
27	Q1	400V/0.3A	TRansistor 400V 0.3A NPN	TO-92	Fairchild	KSP44
28	Q2	700V/12A	MOSFET 700V 12A 850mΩ	TO-220F	sisemi	SIF12N70F
29	Q3	40V/0.1A	TRansistor -40V -0.1A PNP	SOT23	LGE	MMBT3906LT1
30	R1	NC				
31	R2	5.1k	Chip Resistor ±1% 1/4W	1206	FH	RS-06K5101FT
32	R3, R4, R5	200K	Chip Resistor ±1% 1/4W	1206	FH	RS-06K2003FT
33	R6	100k	Chip Resistor ±1% 1/4W	1206	FH	RS-06K1003FT
34	R7, R10	1M	Chip Resistor ±1% 1/4W	1206	FH	RS-06K1004FT

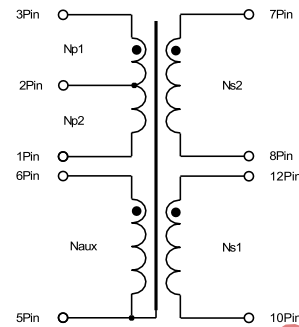
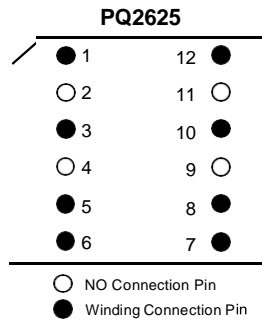


## 45W Isolated Constant Voltage LED Driver with KP2813A

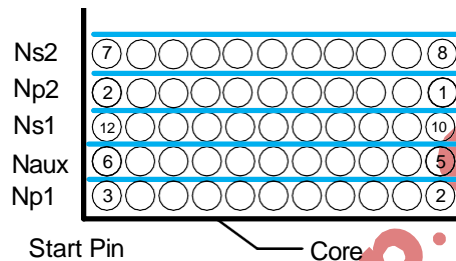
35	R20	62k	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RS-06K6202FT
36	R8	1k	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RS-06K1001FT
37	R9	5.1R	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RS-06L5R10FT
38	R11	0R	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RS-06000FT
39	R12	1k	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05K1001FT
40	R13	7.5K	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05K7501FT
41	R14	24K	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05K2402FT
42	R15, R16, R18, R19	10R	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RS-06K10R0FT
43	R17	10k	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RS-06K1002FT
44	R21	0R	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05000FT
45	R22	8.2k	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05K8201FT
46	R23	160k	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05K1603FT
47	R24	4.3K	Chip Resistor $\pm 1\%$ 1/8W	0805	FH	RS-05K4301FT
48	R27, R28, R29	0.56R	Chip Resistor $\pm 1\%$ 1/4W	1206	FH	RTT06R560FTP
49	RT1	5 $\Omega$ 1A	RES NTC 5 $\Omega$ 1A	TH	HEL	HEL5D-5
50	RV1	10D471	VARISTOR 300VAC 70J 2500A	TH	WE	820513011
51	RV2	7D471	VARISTOR 300VAC 35J 1200A	TH	WE	820573011
52	T1	PQ2625	6+6 Vertical	PQ2625	Taobao	PQ2625
53	U1	2.5V~36V	IC VOL REF 2.5V 100mA 1% 36V	SOT23	MDD	TL431
54	U2	KP2813A	High PF, Low THD Flyback PFC Constant Voltage Controller	SOP-8	KIWI	KP2813ASGA

## Inductor Manufacture Guide---T1

### 1. Electrical Diagram



### 2. Winding Diagram



### 3. Winding Order

Number	Winding	Layer	Start	End	Wire Size	Turns	Note
1	Np1	Primary1	3	2	0.1mm*20P	18T	0.1mmΦ*20P 2UEW, Litz
2	Naux	Auxiliary	6	5	0.2mm	5T	0.2Φ*5, TIW-B
3	Ns1	Secondary1	12	10	0.65mm	16T	0.65Φ*16, TIW-B
4	Np2	Primary2	2	1	0.1mm*20P	17T	0.1mmΦ*20P 2UEW, Litz
5	Ns2	Secondary2	7	8	0.2mm	3T	0.2Φ*2, TIW-B

### 4. Electrical Specification

Items	Test Condition	Test Pin	Specification
Primary Inductance	Measured at 40kHz, 1.0 VRMS	Pins 1 - 3, all other windings open	0.32mH±5%
Primary Leakage Inductance	Measured at 40kHz, 1.0 VRMS	Pins 1 - 3, all other windings shorted	10μH Max
DC Resistance	Measured at 40kHz, 1.0 VRMS	Pins 1 - 3	0.7Ω Max
HI-POT Test	Primary to Secondary, 3750Vac	Pins1,3—10,12	<5mA, 1Min

### 5. Inductor BOM

Items	Description
1	<b>Core:</b> PQ2625, PC44 or equivalent, AE=118mm <sup>2</sup>
2	<b>Bobbin:</b> PQ2625, 6+6 Pin
3	<b>Wire:</b> Φ0.1mm*20P, 2UEW, Class B
4	<b>Triple Insulation Wire:</b> Φ0.65mm, TIW-B; Φ0.2mm, TIW-B;
5	<b>Tape:</b> 10mm(W)×0.06mm(TH)

## Test Result

### 1. Steady State Characteristics

#### 1.1 Efficiency, PF and THD

**Test Conditions:** Input: 90~277Vac; Output: 45V&0.1~1A.

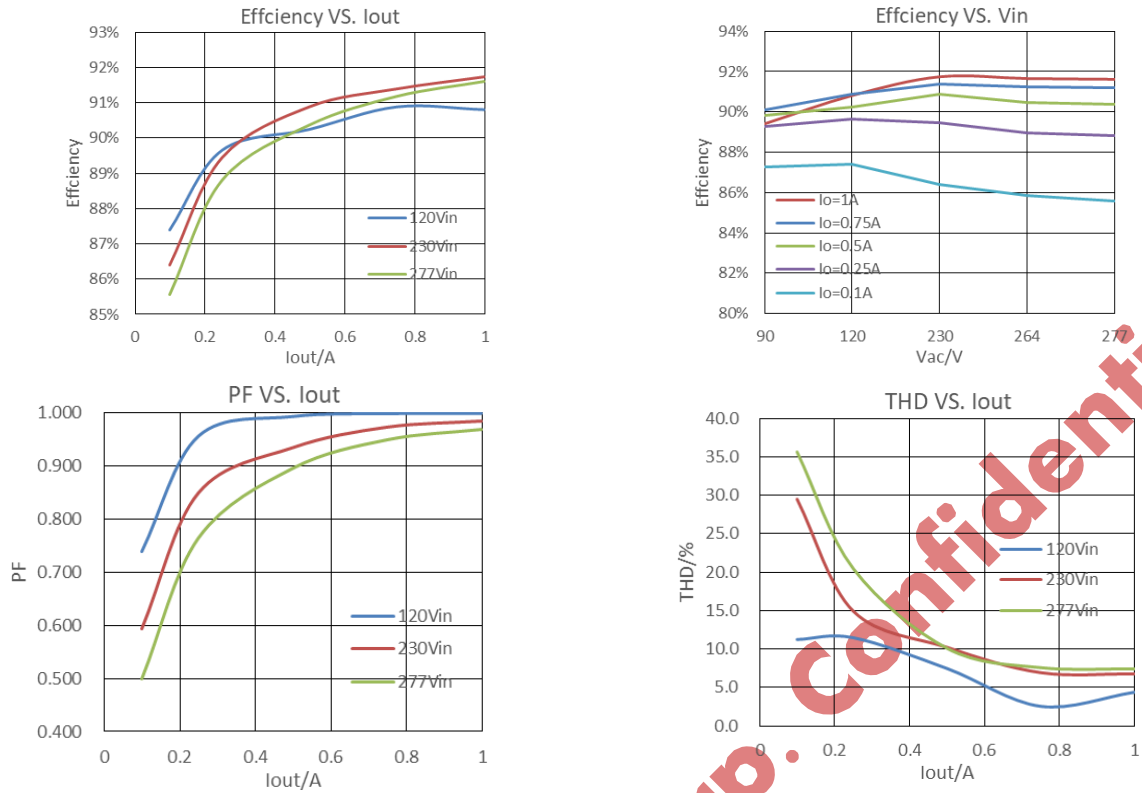
**Standard:** Eff>89%, PF>0.95, THD<10% @ 90~277Vac, 45V&1A.

**Result:** Pass

Io(A)	Vin(V)	F(Hz)	PF	THD	Vo(V)	Io(A)	Pin(W)	Eff(%)
1A	90	60	0.994	4.2%	46.192	0.999	51.609	89.43%
	120	60	0.997	4.4%	46.022	0.999	50.634	90.81%
	230	50	0.983	6.8%	45.686	0.999	49.761	91.73%
	264	50	0.973	7.2%	45.644	0.999	49.761	91.65%
	277	50	0.967	7.4%	45.616	0.999	49.751	91.61%
0.75A	90	60	0.998	4.3%	46.102	0.749	38.340	90.10%
	120	60	0.997	2.5%	45.837	0.749	37.786	90.89%
	230	50	0.972	6.9%	45.606	0.749	37.391	91.39%
	264	50	0.955	6.4%	45.549	0.749	37.408	91.23%
	277	50	0.948	7.5%	45.512	0.749	37.396	91.19%
0.5A	90	60	0.994	7.0%	45.797	0.499	25.459	89.84%
	120	60	0.991	7.4%	45.695	0.499	25.285	90.25%
	230	50	0.933	10.2%	45.391	0.499	24.943	90.88%
	264	50	0.908	9.9%	45.341	0.499	25.035	90.45%
	277	50	0.894	10.0%	45.335	0.499	25.053	90.38%
0.25A	90	60	0.963	12.4%	45.414	0.249	12.689	89.28%
	120	60	0.955	11.4%	45.365	0.249	12.622	89.66%
	230	50	0.848	14.9%	45.200	0.249	12.606	89.45%
	264	50	0.788	18.5%	45.126	0.249	12.651	88.98%
	277	50	0.763	20.4%	45.151	0.249	12.683	88.81%
0.1A	90	60	0.779	10.0%	45.178	0.099	5.140	87.25%
	120	60	0.738	11.2%	45.113	0.099	5.124	87.39%
	230	50	0.593	29.5%	44.990	0.099	5.169	86.40%
	264	50	0.522	34.7%	44.993	0.099	5.204	85.84%
	277	50	0.499	35.6%	44.988	0.099	5.219	85.56%



## 45W Isolated Constant Voltage LED Driver with KP2813A



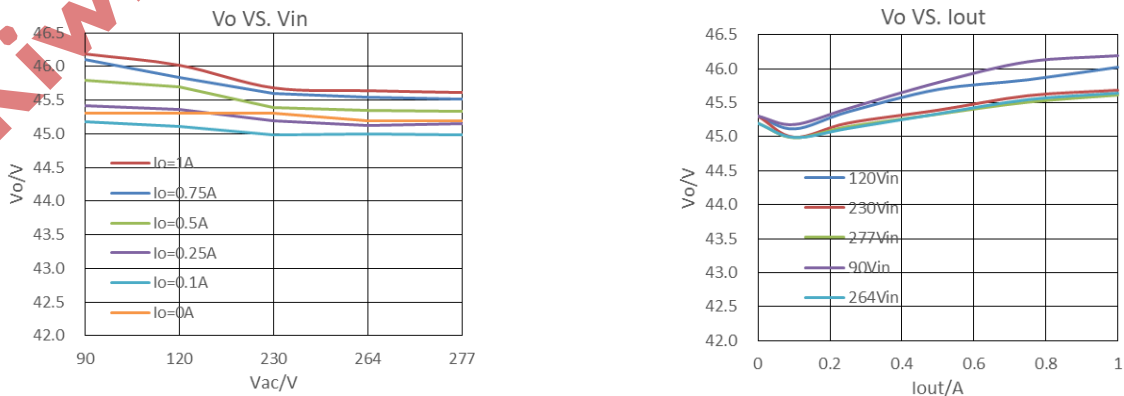
### 1.2 Line&Load Regulation

**Test Conditions:** Input: 90-277Vac; Output: 45V&0~1.0A.

**Standard:** Line&Load Regulation <3%

**Result:** Pass

Vin(V)	Io(A)						Load Reg
	Io=0A	Io=0.1A	Io=0.25A	Io=0.5A	Io=0.75A	Io=1A	
90	45.30	45.18	45.41	45.80	46.10	46.19	2.22%
120	45.30	45.11	45.37	45.70	45.84	46.02	2.00%
230	45.30	44.99	45.20	45.39	45.61	45.69	1.54%
264	45.20	44.99	45.13	45.34	45.55	45.64	1.44%
277	45.20	44.99	45.15	45.34	45.51	45.62	1.39%
Line Reg	0.22%	0.42%	0.64%	1.01%	1.29%	1.25%	/





**1.3 Harmonic Current**

**Test Conditions:** Input: 230Vac; Output: 45V&1.0A /45V&0.5A.

**Standard:** IEC61000-3-2 Class C

**Result:** Pass

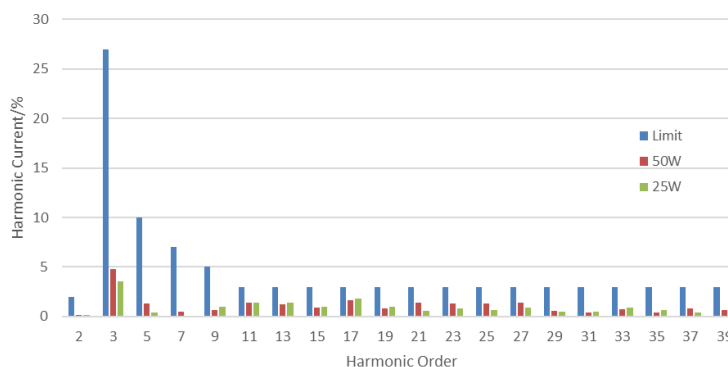
**Harmonic Current Limit Value and Actual Value @ 45V&1.0A**

Harmonic NO.	Limit (%)	Actual Value(%)	Pass Fail	Harmonic NO.	Limit (%)	Actual Value(%)	Pass Fail
2	2	0.18	Pass	3	27	4.79	Pass
5	10	1.32	Pass	7	7	0.46	Pass
9	5	0.64	Pass	11	3	1.37	Pass
13	3	1.23	Pass	15	3	0.87	Pass
17	3	1.6	Pass	19	3	0.82	Pass
21	3	1.41	Pass	23	3	1.32	Pass
25	3	1.28	Pass	27	3	1.37	Pass
29	3	0.59	Pass	31	3	0.36	Pass
33	3	0.73	Pass	35	3	0.41	Pass
37	3	0.82	Pass	39	3	0.68	Pass

**Harmonic Current Limit Value and Actual Value @ 45V&0.5A**

Harmonic NO.	Limit (%)	Actual Value(%)	Pass Fail	Harmonic NO.	Limit (%)	Actual Value(%)	Pass Fail
2	2	0.14	Pass	3	27	3.55	Pass
5	10	0.41	Pass	7	7	0.09	Pass
9	5	1.00	Pass	11	3	1.37	Pass
13	3	1.41	Pass	15	3	1.00	Pass
17	3	1.78	Pass	19	3	0.96	Pass
21	3	0.55	Pass	23	3	0.82	Pass
25	3	0.68	Pass	27	3	0.91	Pass
29	3	0.46	Pass	31	3	0.50	Pass
33	3	0.91	Pass	35	3	0.68	Pass
37	3	0.36	Pass	39	3	0.41	Pass

Harmonic Current



### 1.4 Output Voltage Ripple

**Test Conditions:** Input: 90-277Vac; Output: 45V&1.0A.

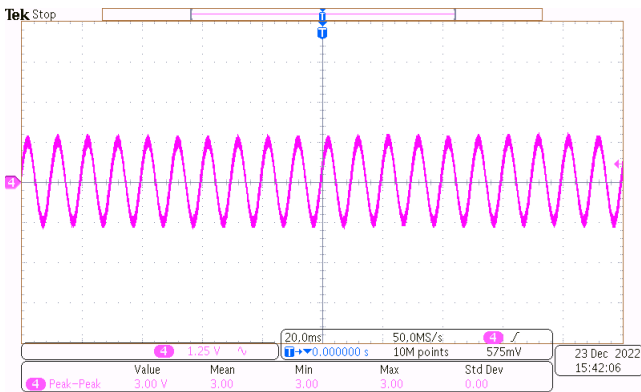
**Standard:** Pk-pk Ripple <4V

**Result:** Pass

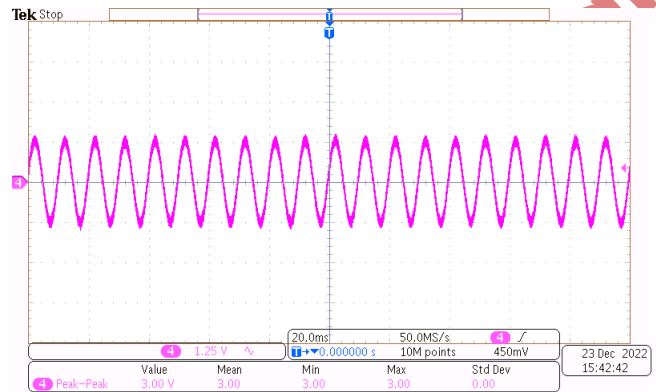
**Waveforms:**

**Test Condition:** 90Vac/60Hz Input, 45V&1.0A Output

**Test Condition:** 277Vac/50Hz Input, 45V&1.0A Output



(CH4: Vo)  
Comments: Vpeak-peak=3V



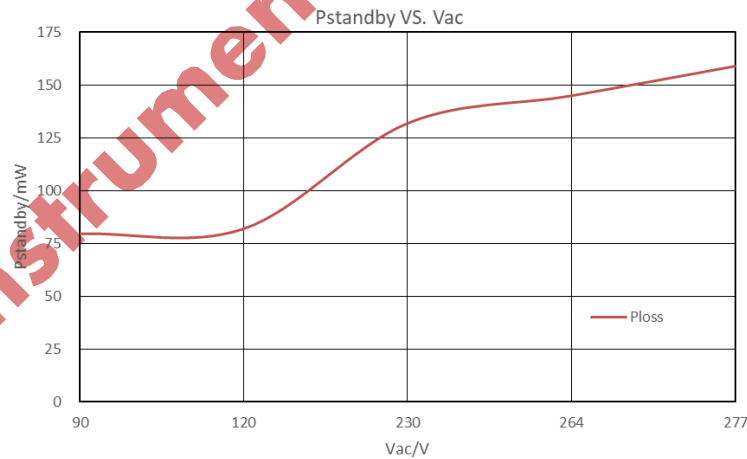
(CH4: Vo)  
Comments: Vpeak-peak=3V

### 1.5 Standby Power

**Test Conditions:** Input: 90-277Vac; Output: No Load.

**Standard:** P<sub>Standby</sub> < 0.2W

**Result:** Pass



## 2 Dynamic Characteristics

### 2.1 Start-up Characteristics

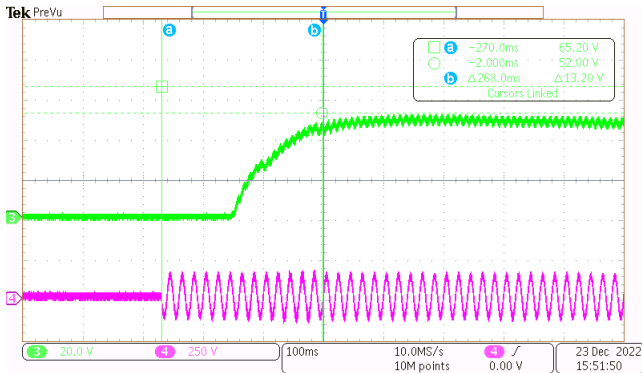
**Test Conditions:** Input: 90~277Vac; Output: 45V&1.0A.

**Standard:** Start up time <300ms, and no flicker and no overshoot

**Result:** Pass

**Waveforms:**

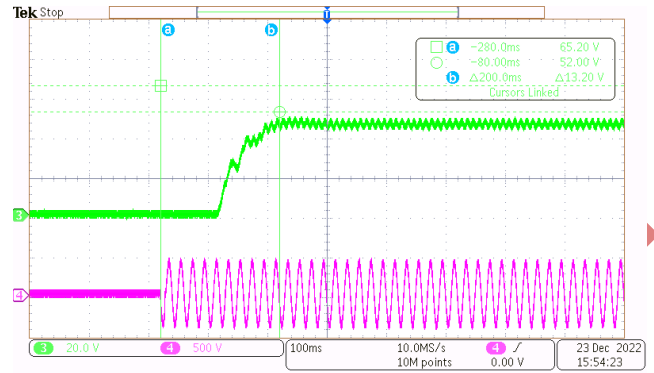
**Test Condition: 90Vac/60Hz Input, 45V&1.0A Output**



(CH3: Vo; CH4: Vin)

**Comments:** Current rise time 268ms, No flicker and no overshoot

**Test Condition: 277Vac/50Hz Input, 45V&1.0A Output**



(CH3: Vo; CH4: Vin)

**Comments:** Current rise time 200ms, No flicker and no overshoot

## 2.2 Power off Characteristics

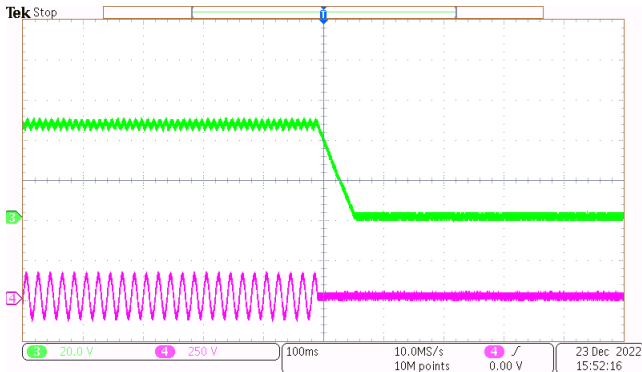
**Test Conditions:** Input: 90~277Vac; Output: 45V&1.0A.

**Standard:** No flicker and no overshoot

**Result:** Pass

**Waveforms:**

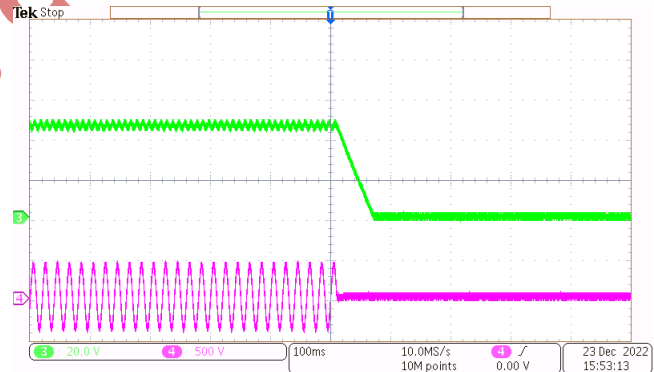
**Test Condition: 90Vac/60Hz Input, 45V&1.0A Output**



(CH3: Vo; CH4: Vin)

**Comments:** OK, No flicker and no overshoot

**Test Condition: 277Vac/50Hz Input, 45V&1.0A Output**



(CH3: Vo; CH4: Vin)

**Comments:** OK, No flicker and no overshoot

## 2.3 Dynamic Load Response

**Test Conditions:** Input: 120~230Vac; Output: 45V&0→1.0A, 0.25A/μs, 1sec.

**Standard:** Vo\_ripple < ± 20% Vo\_rate.

**Result:** Pass

**Waveforms:**

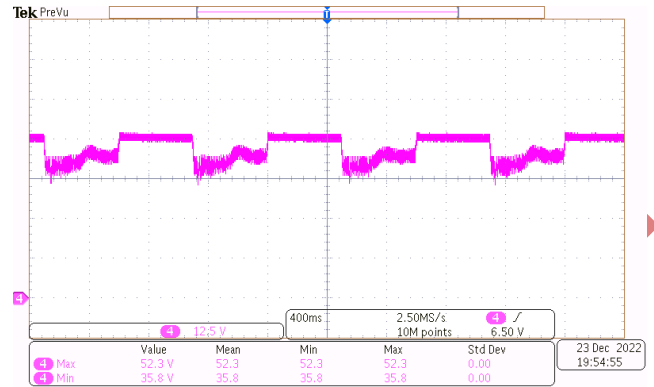
**Test Condition:** 120Vac/60Hz Input, 0→1A, 0.25A/μs



(CH4: Vo)

**Comments:** OK, Vo\_max=116%Vo\_rate,  
Vo\_min=84%Vo\_rate

**Test Condition:** 230Vac/50Hz Input, 0→1A, 0.25A/μs



(CH4: Vo)

**Comments:** OK, Vo\_max=116%  
Vo\_rate, Vo\_min=80%Vo\_rate

## 2.4 Fast Transient Response

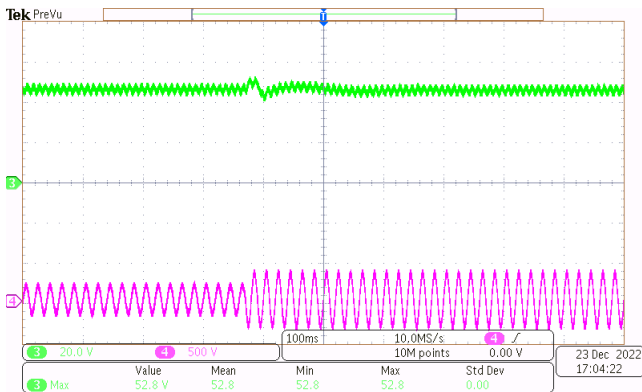
**Test Conditions:** Input: 120→230Vac; Output: 45V&1.0A.

**Standard:** Vo\_ripple < ±30%Vo\_rate

**Result:** Pass

**Waveforms:**

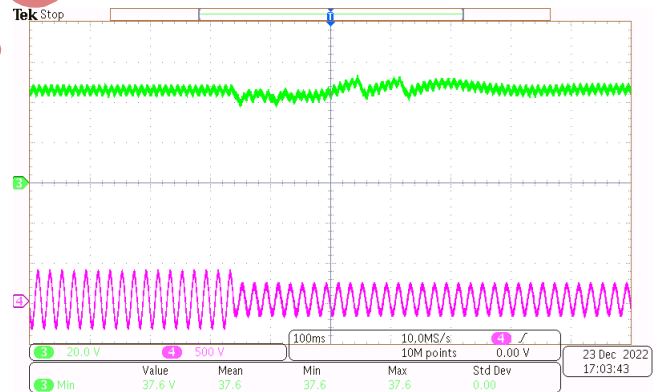
**Test Condition:** 120→230Vac Input, 45V&1.0A Output



(CH3: Vo; CH4: Vin)

**Comments:** OK, Vo\_max=117%Vo\_rate

**Test Condition:** 230→120Vac Input, 45V&1.0A Output



(CH3: Vo; CH4: Vin)

**Comments:** OK, Vo\_min=83.5%Vo\_rate

## 3 Reliability Testing

### 3.1 Output Short Protection

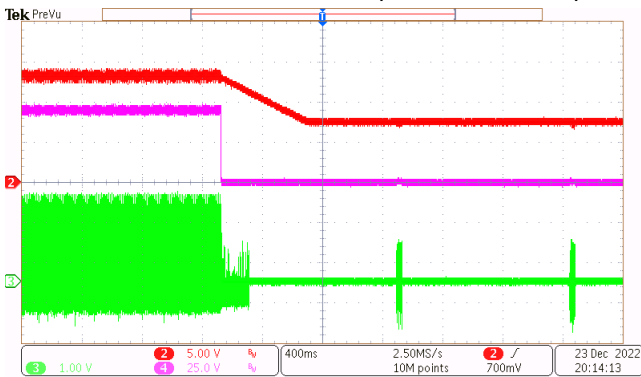
**Test Conditions:** Input: 230Vac; Output: 45V&1.0A.

**Standard:** Output is auto recovery and no component damaged.

**Result:** Pass

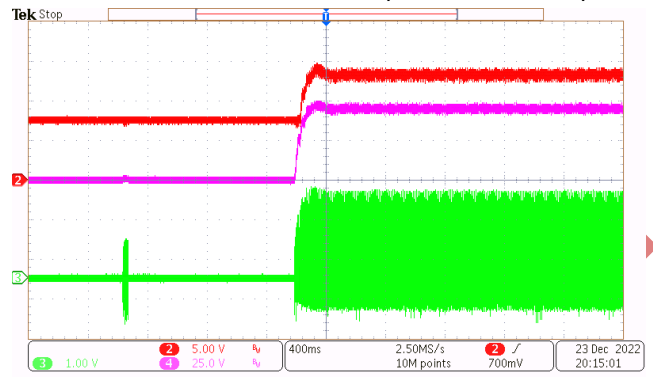
**Waveforms:**

Test Condition: 230Vac/50Hz Input, 45V&1.0A Output



(CH2: VCC; CH3: VFB; CH4: Vo)  
Comments: Protect function is OK

Test Condition: 230Vac/50Hz Input, 45V&1.0A Output



(CH2: VCC; CH3: VFB; CH4: Vo)  
Comments: Auto recovery function is OK

### 3.2 Over Load Protection

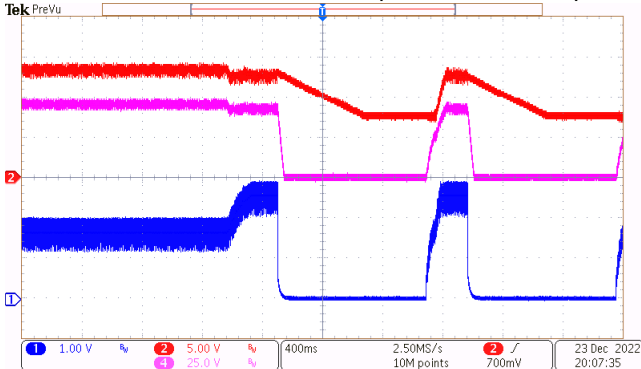
Test Conditions: Input: 120~230Vac; Output: 45V&1.0A.

Standard: Output is auto recovery and no component damaged.

Result: Pass

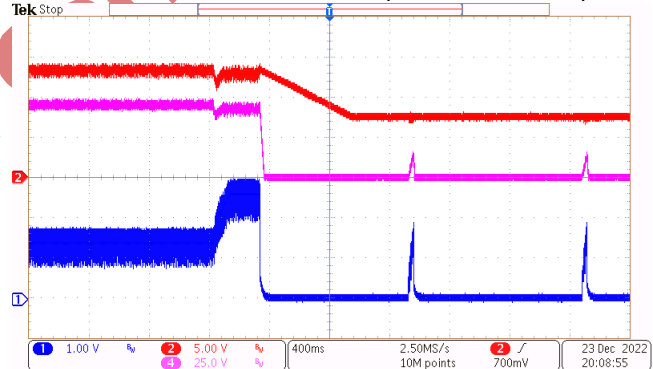
#### Waveforms:

Test Condition: 120Vac/60Hz Input, 45V&1.0A Output



(CH1: Vcomp; CH2: VCC; CH4: Vo)  
Comments: OK,  $I_{o\_olp}=1.25A$

Test Condition: 230Vac/50Hz Input, 45V&1.0A Output



(CH1: Vcomp; CH2: VCC; CH4: Vo)  
Comments: OK,  $I_{o\_olp}=1.93A$

### 3.3 Maximum Stress of Flyback MOSFET

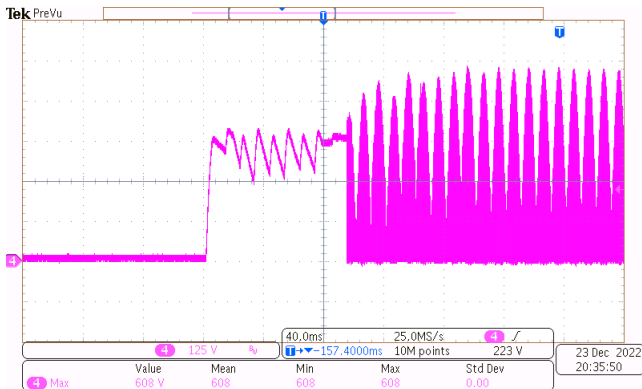
Test Conditions: Input: 277Vac; Output: 45V&1.0A.

Standard:  $V_{DS\_peak} < 90\% * V_{dsmax}$

Result: Pass

#### Waveforms:

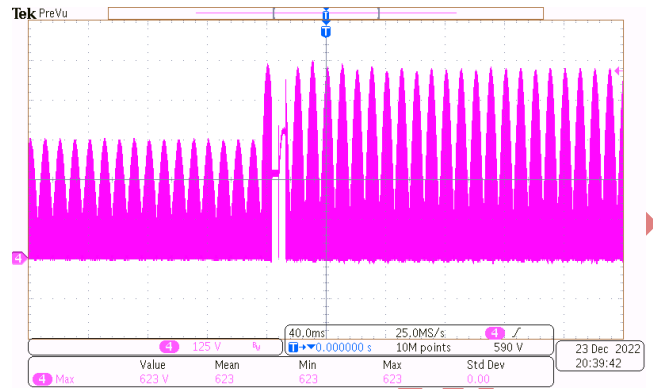
**Test Condition:** 277Vac/50Hz Input, 45V&1.0A Output  
AC Power ON



(CH4: VDS)

Comments: OK VDS\_peak=608V

**Test Condition:** 277Vac/50Hz Input, 54V&1.8A Output  
90Vac→277Vac



(CH4: VDS)

Comments: OK VDS\_peak=623V

### 3.4 Maximum Stress of Flyback Output Diode

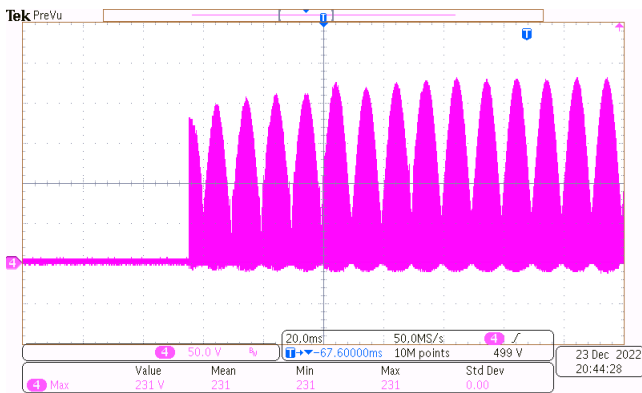
**Test Conditions:** Input: 277Vac; Output: 45V&1.0A.

**Standard:** VDS\_peak < 90% \* Vdsmax

**Result:** Pass

**Waveforms:**

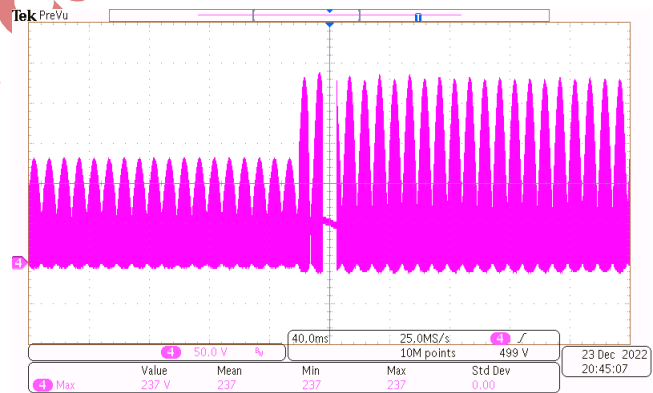
**Test Condition:** 277Vac/50Hz Input, 45V&1.0A Output  
AC Power ON



(CH4: VD)

Comments: OK VD\_peak=231V

**Test Condition:** 277Vac/50Hz Input, 54V&1.8A Output  
90Vac→277Vac



(CH4: VD)

Comments: OK VD\_peak=237V

### 3.5 Maximum Stress of Transformer

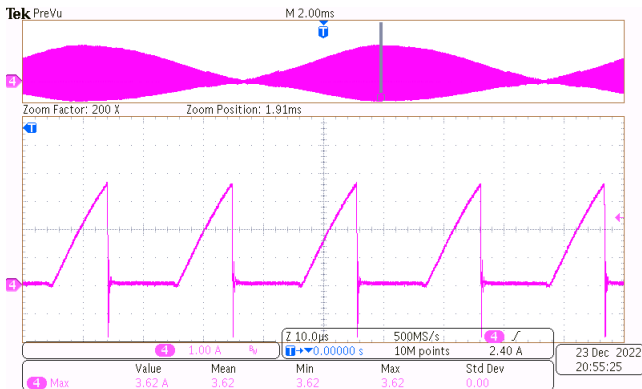
**Test Conditions:** Input: Input: 90~277Vac; Output: 45V&1.0A.

**Standard:** Bmax < 0.3T

**Result:** Pass

**Waveforms:**

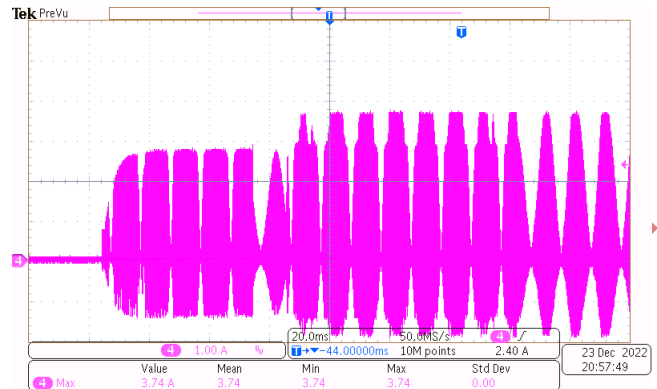
**Test Condition: 90Vac/60Hz Input, 45V&1.0A Output**



(CH4: IL)

Comments: OK Bmax=0.28T

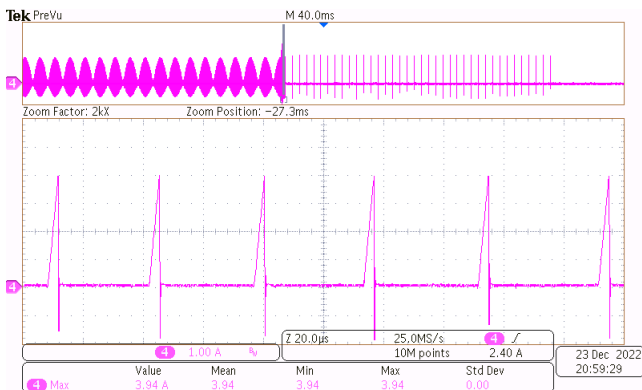
**Test Condition: 90Vac/60Hz Input, 45V&1.0A Output  
AC Power ON**



(CH4: IL)

Comments: OK Bmax=0.29T

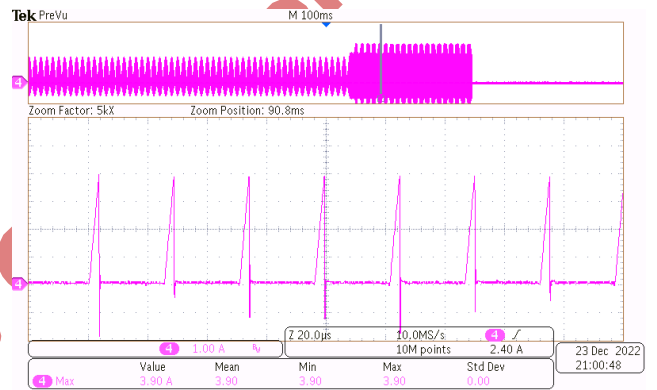
**Test Condition: 277Vac/50Hz Input, 45V&1.0A Output  
Output Short**



(CH4: IL)

Comments: OK Bmax=0.30T

**Test Condition: 277Vac/50Hz Input, 45V&1.0A Output  
Output Over Load**



(CH4: IL)

Comments: OK Bmax=0.30T

### 3.6 Thermal Test

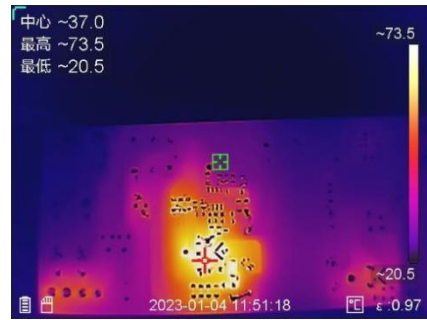
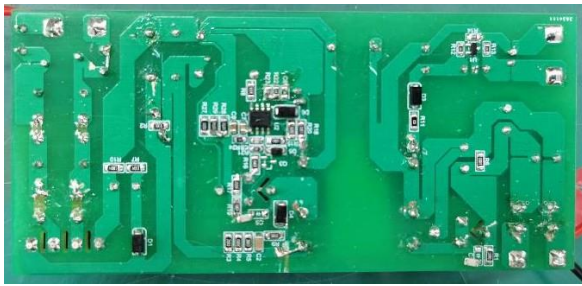
**Test Conditions:** Input: 90/277Vac; Output: 45V&1.0A. Burn-in 0.5Hour @ confined container and steady environment with no airflow, Ta is the temperature inside the cardboard box.

**Standard:** Final product will be cased and potted, the open frame thermal test data is only for reference.

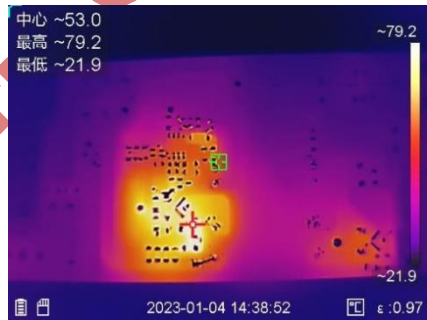
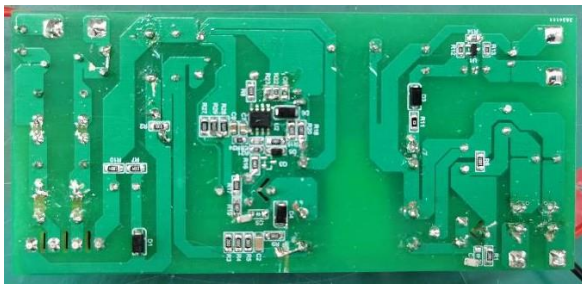
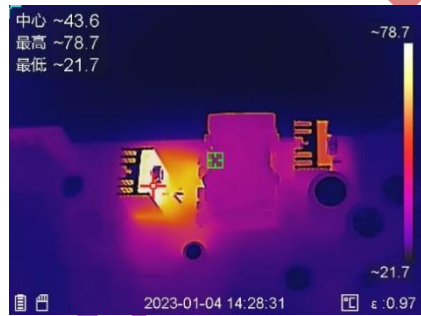
**Result:** Pass

90Vac/60Hz, Ta=25°C





277Vac/50Hz, Ta=25°C



3.7 EMC Test

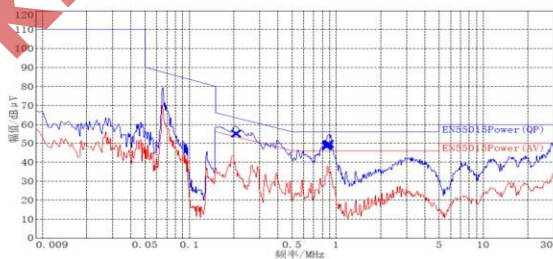
Test Conditions: Input: 120/230Vac; Output: 45V&1.0A.

Standard:

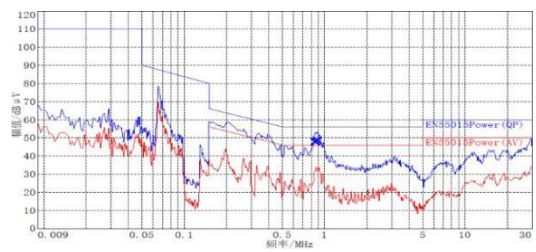
Standard	EN55015
Content	CE/CDN
Requirement	>6dB Margin

Result: CE test Pass; CDN test no Pass

Test Condition: Vin=120Vac/60Hz, CE



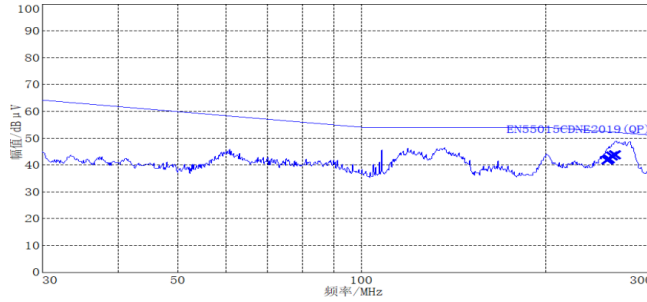
CE EMI---LINE



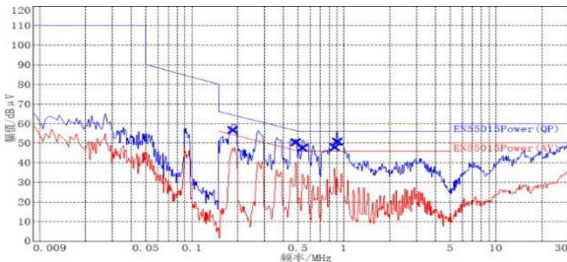
CE EMI---NEUTRAL



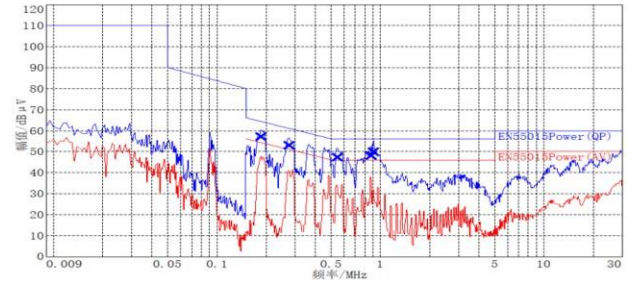
Test Condition: Vin=120Vac/60Hz, CDN



Test Condition: Vin=230Vac/50Hz, CE

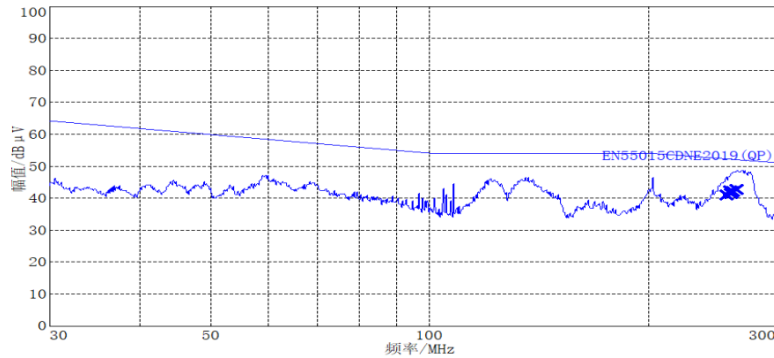


CE EMI--LINE



CE EMI--NEUTRAL

Test Condition: Vin=230Vac/50Hz, CDN



### 3.8 Surge Test

Test Conditions: Input: 230Vac; Output: 45V&1A.

Standard: >2000V

Result: Pass

Input Voltage (Vac)	Surge Level (V)	Injection Location	Injection Phase (°)	Test Result (Pass/Fail)
220Vac/50Hz	+2000	L to N	0	Pass
	+2000	L to N	90	Pass
	+2000	L to N	180	Pass
	+2000	L to N	270	Pass
	-2000	L to N	0	Pass
	-2000	L to N	90	Pass
	-2000	L to N	180	Pass
	-2000	L to N	270	Pass

A: Normal performance within limits specified by the manufacturer, requestor or purchaser;

B: Temporary loss of function or degradation of performance, which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;

C: Temporary loss of function or degradation of performance, the correction of which requires operator intervention;

D: Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data.

Test Result: A (A/B/C/D)

### Test Setup Guide

1. Connect the “Vo+” and “Vo-” terminal to the positive and negative end of the load.
2. Set the AC Power Source between 90Vac and 277Vac.
3. Connect the AC Power Source terminal to the “L” and “N” terminals on the Demo Board.

Turn on the AC Power Source to make system startup; and Turn off the AC Power Source to make system shutdown.



---

## Revision History

DATE	REV	DESCRIPTION
2022/12/30	1.1	First Release