



# Test Report: PLN-45-48

---

45W Single Output LED Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

## ■ DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RIPPLE & NOISE	V1 : 4.6 Vp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 2.33 Vp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 43.6 V ~ 51.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	42.15 V ~ 53.08 V / 230 VAC 42.13 V ~ 53.05 V / 115 VAC
3	OUTPUT VOLTAGE TOLERANCE	V1 : -10 % ~ 10 % (Max)	I/P : 100VAC / 295 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : -0.56 % ~ 0.56 %
4	LINE REGULATION	V1 : -3 % ~ 3 % (Max)	I/P : 100 VAC ~ 295 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.56K % ~ 0.56 %
5	LOAD REGULATION	V1 : -5 % ~ 5 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : -0.37 % ~ 0.37 %
6	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 1200 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 435 ms 115VAC/ 805 ms
7	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 10 %
8	CONSTANT CURRENT OPERATION VOLTAGE	36V ~48V	I/P : 230 VAC I/P : 115 VAC O/P : CV MODE Ta : 25°C	230VAC/ 31.15V~48 V 115VAC/ 31.13V~48 V

## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 VAC~ 295 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	75V~295V
			I/P : LOW-LINE-3V= 87V HIGH-LINE+10V=305 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 90 VAC ~ 295 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK
3	POWER FACTOR	0.9 / 230 VAC(TYP)	I/P : 230 VAC	PF= 0.94 / 230VAC
		0.92 / 115 VAC(TYP)	I/P : 115VAC	PF= 0.99 / 115VAC
		0.9 / 277VAC(TYP)	I/P : 277VAC O/P : 100% LOAD Ta : 25°C	PF= 0.903 / 277VAC
4	EFFICIENCY	87.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.4 %
5	INPUT CURRENT	230V/ 0.25 A	I/P : 230 VAC	I= 0.23 A/ 230 VAC
		115V/ 0.55 A	I/P : 115VAC O/P : FULL LOAD Ta : 25°C	I= 0.43 A/ 230 VAC
6	INRUSH CURRENT	230V/ 35 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I= 29 A/ 230 VAC
		COLD START		
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.35 mA N-FG : 0.32 mA

## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95%~110%	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	104 %/ 230 VAC 104 %/ 115 VAC Constant Current Limiting
2	OVER VOLTAGE PROTECTION	CH1 : 54V~ 60V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	57.38V/ 230 VAC 57.42V/ 115 VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 95 ± 10°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down
4	SHORT PROTECTION	NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode

## CONTROL FUNCTION TEST

1	CURRENT ADJ. RANGE	3 % ~ -25 %	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	0.532 A ~ 1.121 /230VAC 0.531 A ~ 1.102 A/115 VAC
---	--------------------	-------------	---	--

## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q 1 Rated : 10A/600V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 570 V (2) 574 V (3) 542 V
2	Diode Peak Voltage	D100 Rated : 10A/400V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 306 V (2) 258 V (3) 302 V
3	Clamp Diode Peak Voltage	D 2 Rated : 2A/800V GP20K	I/P : High-Line +3V = 298 V O/P : (1)Full load continue Ta : 25°C	(1) 462 V
4	Control IC Voltage Test	U1 Rated : 0.5V~ 22 V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 15.528 V (2) 14.204 V (3) 14.206 V

## ■ SAFETY & E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 1.5 KVAC/min	I/P-O/P : 4.2 KVAC/min I/P-FG : 2.4KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C	I/P-O/P : 5.25 mA I/P-FG : 4.51 mA O/P-FG : 2.225 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C /70%RH	I/P-O/P : 29.2 GΩ I/P-FG : 15.8 GΩ O/P-FG : 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	41 mΩ

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P : 230 VAC/50HZ O/P : 100% LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : 95% LOAD /50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : 95% LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : 95% LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : 95% LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : 95% LOAD Ta : 25°C	CRITERIA A

## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	TEMPERATURE RISE TEST	MODEL : PLN-45-24 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.9 °C 2. HIGH AMBIENT BURN-IN : 4 HRS I/P : 230VAC O/P : FULL LOAD Ta= 43 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 27.9 °C</th> <th>HIGH AMBIENT Ta= 43 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>59.1°C</td><td>68.9°C</td></tr> <tr><td>2</td><td>Q1</td><td>69.6°C</td><td>78.9°C</td></tr> <tr><td>3</td><td>D2</td><td>84.0°C</td><td>90.9°C</td></tr> <tr><td>4</td><td>C46</td><td>64.2°C</td><td>72.8°C</td></tr> <tr><td>5</td><td>T1 COIL</td><td>69.5°C</td><td>77.8°C</td></tr> <tr><td>6</td><td>D100</td><td>63.9°C</td><td>73.9°C</td></tr> <tr><td>7</td><td>C106</td><td>61.6°C</td><td>71.1°C</td></tr> <tr><td>8</td><td>TSW1</td><td>61.5°C</td><td>71.1°C</td></tr> <tr><td>9</td><td>U1</td><td>69.5°C</td><td>77.1°C</td></tr> <tr><td>10</td><td>C8</td><td>67.8°C</td><td>76.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 27.9 °C	HIGH AMBIENT Ta= 43 °C	1	BD1	59.1°C	68.9°C	2	Q1	69.6°C	78.9°C	3	D2	84.0°C	90.9°C	4	C46	64.2°C	72.8°C	5	T1 COIL	69.5°C	77.8°C	6	D100	63.9°C	73.9°C	7	C106	61.6°C	71.1°C	8	TSW1	61.5°C	71.1°C	9	U1	69.5°C	77.1°C	10	C8	67.8°C	76.8°C	
NO	Position	ROOM AMBIENT Ta= 27.9 °C	HIGH AMBIENT Ta= 43 °C																																													
1	BD1	59.1°C	68.9°C																																													
2	Q1	69.6°C	78.9°C																																													
3	D2	84.0°C	90.9°C																																													
4	C46	64.2°C	72.8°C																																													
5	T1 COIL	69.5°C	77.8°C																																													
6	D100	63.9°C	73.9°C																																													
7	C106	61.6°C	71.1°C																																													
8	TSW1	61.5°C	71.1°C																																													
9	U1	69.5°C	77.1°C																																													
10	C8	67.8°C	76.8°C																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : FULL LOAD O/P SHORT Ta : 25°C	TEST : OK																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 295VAC/100VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 295 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.015%(0~50°C)																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C ~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		OK																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +45°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC/Full Load		OK																																												



# 45W Single Output LED Power Supply

# PLN-45 series

8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	PLN-45-24 : SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME	(1) 303310HRS (2) 158147.5HRS
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 497.8K HRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20,000 hours @ Tcase 70°C; 50,000 hours @ Tcase 55°C	

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/10/7	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/11/10	PRODUCT SAMPLE W0910C56	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023