60W Single Output LED Power Supply

PLP-60 series

Features :

- Universal AC input / Full range
- Protections: Short circuit / Overload / Over voltage
- Built-in active PFC function
- Cooling by free air convection
- Output current level adjustable
- 100% full load burn-in test
- High reliability
- Suitable for built-in applications of LED lighting
- 2 years warranty

SELV

SPECIFICATION

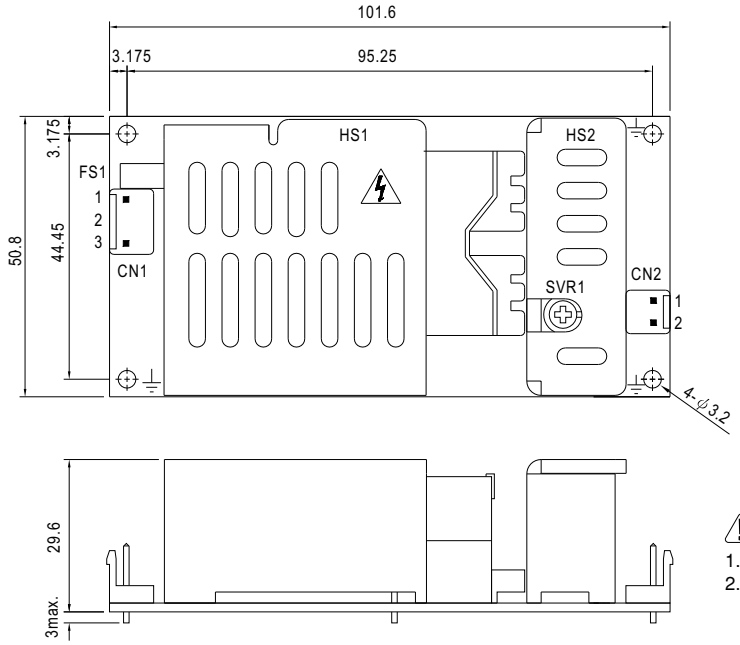
MODEL		PLP-60-12	PLP-60-24	PLP-60-48
OUTPUT	DC VOLTAGE	12V	24V	48V
	CONSTANT CURRENT OPERATION VOLTAGE Note.5	9 ~ 12V	18 ~ 24V	36 ~ 48V
	RATED CURRENT	5A	2.5A	1.3A
	CURRENT RANGE	0 ~ 5A	0 ~ 2.5A	0 ~ 1.3A
	RATED POWER	60W	60W	62.5W
	RIPPLE & NOISE (max.) Note.2	4.5Vp-p	4.5Vp-p	4.8Vp-p
	CURRENT ADJ. RANGE	3.75 ~ 5A	1.875 ~ 2.5A	0.975 ~ 1.3A
	VOLTAGE TOLERANCE Note.3	±10%		
	LINE REGULATION	±3.0%		
	LOAD REGULATION	±5.0%		
	SETUP TIME	1000ms / 230VAC 2000ms / 115VAC at full load		
INPUT	VOLTAGE RANGE Note.4	90 ~ 264VAC		
	FREQUENCY RANGE	47 ~ 63Hz		
	POWER FACTOR	PF≧0.9 at 75 ~ 100% load, 115VAC / 230VAC		
	EFFICIENCY(Typ.)	84%	88%	89%
	AC CURRENT	0.8A/115VAC 0.4A/230VAC		
	INRUSH CURRENT(max.)	42A/230VAC		
	LEAKAGE CURRENT	<0.75mA / 240VAC		
PROTECTION	OVER CURRENT Note.5	100 ~ 110%		
		Protection type : Constant current limiting, recovers automatically after fault condition is removed		
	SHORT CIRCUIT	Protection type : Hiccup mode, recovers automatically after fault condition is removed		
	OVER VOLTAGE	15 ~ 18V	28 ~ 35V	57 ~ 63V
		Protection type : Shut down o/p voltage, re-power on to recover		
ENVIRONMENT	WORKING TEMP.	-30 ~ +70℃ (Refer to output load derating curve)		
	WORKING HUMIDITY	20 ~ 95% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH		
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)		
	VIBRATION	10 ~ 500Hz, 2G 12min./1cycle, period for 72min. each along X, Y, Z axes		
SAFETY & EMC	SAFETY STANDARDS	TUV EN61347-1, EN61347-2-13 approved ; design refer to UL60950-1		
	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC I/P-FG:1.88KVAC O/P-FG:0.5KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH		
	EMI CONDUCTION & RADIATION	Compliance to EN55015		
	HARMONIC CURRENT	Compliance to EN61000-3-2 Class C(≧75% load); EN61000-3-3		
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024,EN61547, light industry level, criteria A		
OTHERS	MTBF	583.3Khrs min. MIL-HDBK-217F (25℃)		
	DIMENSION	101.6*50.8*29.6mm (L*W*H)		
	PACKING	0.16Kg; 96pcs/16.4Kg/0.89CUFT		

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor, direct connecting to LED's is not suggested for models with "RIPPLE & NOISE" > ±10% and using additional drivers is highly recommended.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. Derating may be needed under low input voltage. Please check the static characteristics for more details.
5. Constant current operation region is within 75% ~100% rated output voltage. This is the suitable operation region for LED related applications, but please reconfirm special electrical requirements for some specific system design.
6. Heat sink HS1,HS2 can not be shorted.
7. Heat sink HS1 must have safety isolation distance with system case.
8. The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete installation, the final equipment manufacturers must re-qualify EMC Directive on the complete installation again.

■ Mechanical Specification

Unit:mm



1.HS1,HS2 can not be shorted.
2.HS1 must have safety isolation distance with system case.

AC Input Connector (CN1) : JST B3P-VH or equivalent

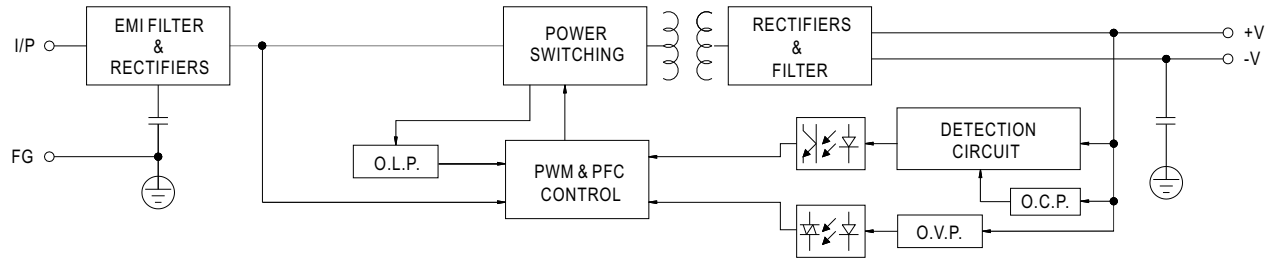
Pin No.	Assignment	Mating Housing	Terminal
1	AC/L	JST VHR or equivalent	JST SVH-21T-P1.1 or equivalent
2	No Pin		
3	AC/N		

DC Output Connector (CN2) : JST B2P-VH or equivalent

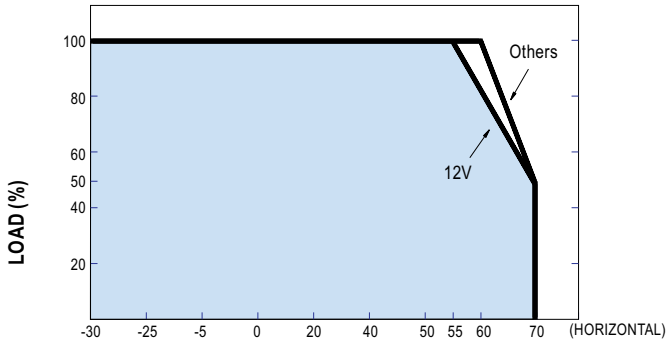
Pin No.	Assignment	Mating Housing	Terminal
1	+V	JST VHR or equivalent	JST SVH-21T-P1.1 or equivalent
2	-V		

■ Block Diagram

fosc : 90KHz(115VAC)
120KHz(230VAC)

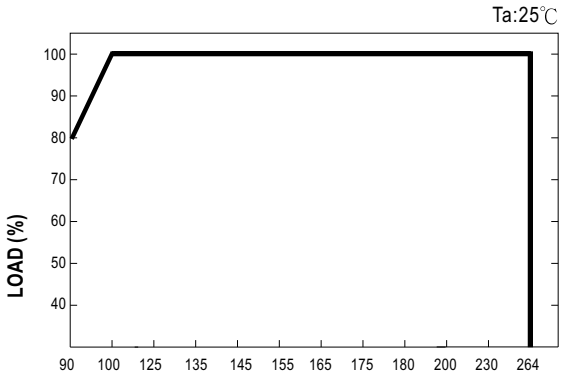


■ Derating Curve



AMBIENT TEMPERATURE (℃)

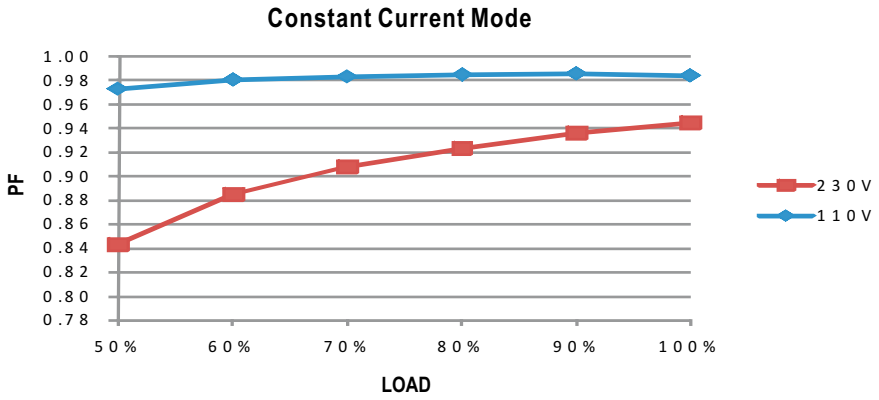
■ Static Characteristics



INPUT VOLTAGE (V) 60Hz

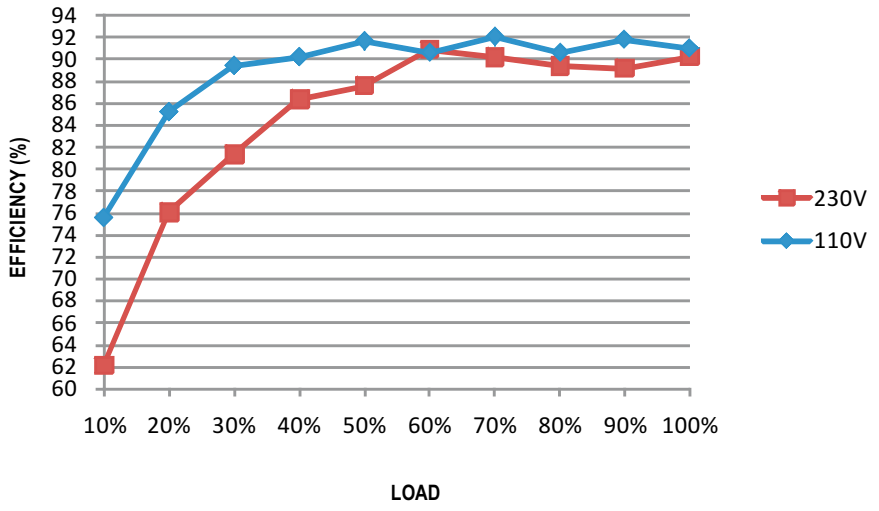
■ Power Factor Characteristic

Power factor will be higher than 0.9 when output loading is 75% or higher.



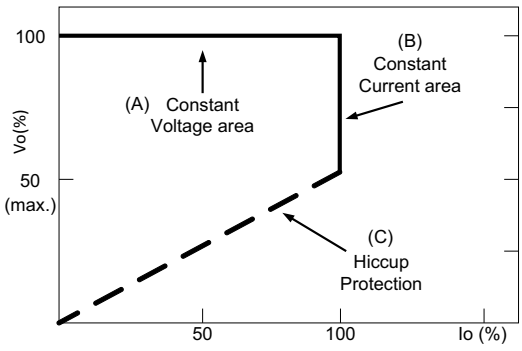
■ EFFICIENCY vs LOAD (48V Model)

PLP-60 series possess superior working efficiency that up to 89% can be reached in field applications.



■ DRIVING METHODS OF LED MODULE

There are two major kinds of LED drive method "direct drive" and "with LED driver".
A typical LED power supply may either work in "constant voltage mode (CV) or constant current mode (CC)" to drive the LEDs.
Mean Well's LED power supply with CV+ CC characteristic can be operated at both CV mode [with LED driver, at area (A)] and CC mode [direct drive, at area (B)].



Typical LED power supply I-V curve

MODEL：PLP-60-48

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1： 4.8 Vp-p (Max)	I/P： 230VAC O/P：FULL LOAD Ta：25℃	V1： 3.58 Vp-p (Max)	P
2	CURRENT ADJUST RANGE	CH1： 0.975 A ~1.3 A	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	0.37 A~ 1.41 A/ 230 VAC 0.32 A ~ 1.44 A/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1： 10 %~ -10 % (Max)	I/P： 100 VAC / 264 VAC O/P：FULL/ MIN LOAD Ta：25℃	V1： 1.1 %~ -1.1 %	P
4	LINE REGULATION	V1：3 %~ -3 % (Max)	I/P：100 VAC ~ 264 VAC O/P：FULL LOAD Ta：25℃	V1： 0.7 %~ -0.7 %	P
5	LOAD REGULATION	V1： 5 %~ -5 % (Max)	I/P： 230 VAC O/P：FULL ~MIN LOAD Ta：25℃	V1： 1.1 %~ -1.1 %	P
6	SET UP TIME	230VAC： 1000 ms (Max) 115VAC： 2000 ms (Max)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 710 ms 115VAC/ 1420 ms	P
7	OVER/UNDERSHOOT TEST	< ±10%	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	TEST： < 10 %	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC~264 VAC	I/P：TESTING O/P：FULL LOAD Ta：25℃	71 V~264V	P
			I/P： LOW-LINE-3V= 97V HIGH-LINE+15%=300 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 OSC	I/P：100VAC ~ 264 VAC O/P：FULL~MIN LOAD Ta：25℃	TEST： OK	P
3	POWER FACTOR	0.9 / 230 VAC(TYP) 0.9 / 115 VAC(TYP)	I/P： 230 VAC I/P： 115 VAC O/P：75%~100% LOAD Ta：25℃	0.952 /230VAC@full load 0.994 /115VAC@full load 0.918 /230VAC@75% load 0.986 /115VAC@75% load	P
4	EFFICIENCY	89 % (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	89.48 %	P
5	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.8 A (TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I = 0.33 A/ 230 VAC I = 0.652 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 42 A (TYP) COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 32 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P： 264 VAC O/P：Min LOAD Ta：25℃	L-FG： 0.28 mA N-FG： 0.28 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	100 %~ 110 %	I/P： 230 VAC I/P： 115 VAC O/P：TESTING Ta：25℃	102.7 %/ 230 VAC 106 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1： 57~ 63 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	60.3 V/ 230 VAC 60.3 V/ 115 VAC Shut down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 264 VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Hiccup Mode	P

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：PLP-60-24
1. ROOM AMBIENT BURN-IN：1 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 28.2 ℃
2. HIGH AMBIENT BURN-IN： 13 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 57.4 ℃

<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta=28.2 ℃</th><th>HIGH AMBIENT Ta=57.4 ℃</th></tr>
<tr><td>1</td><td>LF2</td><td>LF-159</td><td>55.1℃</td><td>83.3℃</td></tr>
<tr><td>2</td><td>BD1</td><td>4A/800V US4KB80R-7000</td><td>63.3℃</td><td>90.0℃</td></tr>
<tr><td>3</td><td>C8</td><td>224 450 10% P=10 MMX</td><td>57.5℃</td><td>85.3℃</td></tr>
<tr><td>4</td><td>L1</td><td>TR-853</td><td>68.2℃</td><td>94.6℃</td></tr>
<tr><td>5</td><td>C51</td><td>100u/25V UL10Kh 6.3*11 YXM</td><td>60.1℃</td><td>86.3℃</td></tr>
<tr><td>6</td><td>T1</td><td>TF-1883</td><td>66.8℃</td><td>93.0℃</td></tr>
<tr><td>7</td><td>Q1</td><td>STP10NK70ZFP 10A/700V</td><td>68.7℃</td><td>97.3℃</td></tr>
<tr><td>8</td><td>D2</td><td>HER206 2A/600V</td><td>75.5℃</td><td>102.2℃</td></tr>
<tr><td>9</td><td>U1</td><td>PWM L6561D</td><td>66.1℃</td><td>90.9℃</td></tr>
<tr><td>10</td><td>D100</td><td>FMX-12SL 10A/200V</td><td>70.4℃</td><td>95.4℃</td></tr>
<tr><td>11</td><td>C105</td><td>1000u/35V UL10Kh 12.5*20 KY</td><td>56.7℃</td><td>81.7℃</td></tr>
<tr><td>12</td><td>C101</td><td>47u/25V L5Kh 5*11 KY</td><td>61.4℃</td><td>87.0℃</td></tr>
</table>
</td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P： 105 % LOAD
Ta：25℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 230 VAC
O/P：LED=23V LOAD
Ta= -35 ℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 60 ℃
NO DAMAGE</td><td>I/P： 272 VAC
O/P：FULL LOAD
Ta= 60 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.01 %(0~50℃)</td><td>P</td></tr>
<tr><td>6</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set
(1) Waveform： Sine Wave
(2) Frequency：10~500Hz
(3) Sweep Time：12min/sweep cycle
(4) Acceleration：2G
(5) Test Time：1 hour in each axis (X.Y.Z)
(6) Ta：25℃</td><td>TEST：OK</td><td>P</td></tr>
</table>

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P： 3.75 KVAC/min I/P-FG： 1.88 KVAC/min O/P-FG： 0.5 KVAC/min	I/P-O/P： 4 KVAC/min I/P-FG：2.256 KVAC/min O/P-FG：0.6 KVAC/min Ta：25℃	I/P-O/P： 3.8 mA I/P-FG： 3.46 mA O/P-FG： 1.363 mA NO DAMAGE	P
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℃/70%RH	I/P-O/P： 30 GΩ I/P-FG： 30 GΩ O/P-FG： 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta：25℃ / 70%RH	7 mΩ	P
4	APPROVAL	TUV： Certificate NO ： UL： File NO ：			N/A

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P： 230 VAC/50HZ O/P：100%/75% LOAD Ta：25℃	PASS	P
2	CONDUCTION	EN55015 CLASS B	I/P： 230 V(50HZ)/115V(60HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab	P
3	RADIATION	EN55015 CLASS B	I/P：230 V(50HZ)/115V(60HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT： 1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N ：1KV L,N-PE：2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	PLP-60-24：SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME= 423279.2 HRS I/P： 230VAC O/P：FULL LOAD Ta= 60 ℃ LIFE TIME= 50064 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE： 583.3K HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated： STP10NK70ZFP 10A/700V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short Ta：25℃	(1) 576 V (2) 632 V	P
2	Diode Peak Voltage	D 100 Rated： FCF10A40 10A/400V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2)Output Short Ta：25℃	(1) 336 V (2) 236 V	P
3	Clamp Diode Peak Voltage	D 2 Rated： HER206 2A/600V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2)Output Short Ta：25℃	(1) 580 V (2) 540 V	P
4	Control IC Voltage Test	U1 Rated： PWM L6561D 10.3V~18V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on /Off (2) Min load Turn on /Off Ta：25℃	(1) 14.4 V (2) 10.8 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/3/20	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/6/16	PRODUCT SAMPLE W0904D29	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023