






Features :

- Universal AC input / Full range
- Built-in constant current limiting circuit with adjustable OCP level
- Protections: Short circuit / Overload / Over voltage
- Fully isolated plastic case with IP64 level
- IP64 design for indoor or outdoor installations
- Optional dimming function : 1~10VDC(D type) or PWM controlled(P type)
- **UL1310 Class 2 power unit**
- Pass LPS
- Cooling by free air convection
- 100% full load burn-in test
- Low cost, high reliability
- Suitable for LED lighting and moving sign applications (Note.9)
- 2 years warranty

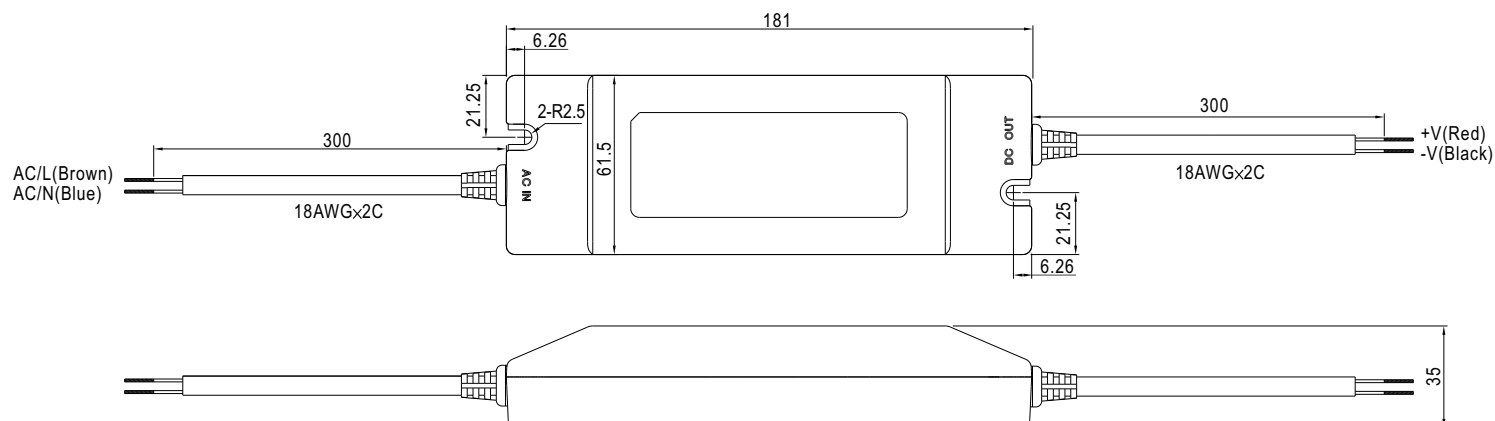
SPECIFICATION

LPS IP64  (for 48V only)  US (except for 48V) 

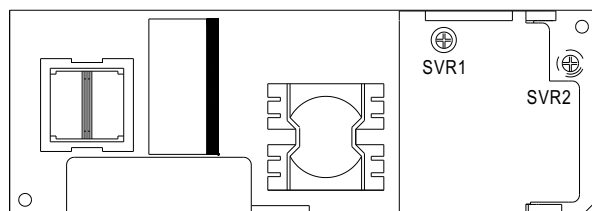
MODEL		ELN-60-9	ELN-60-12	ELN-60-15	ELN-60-24	ELN-60-27	ELN-60-48
OUTPUT	DC VOLTAGE	9V	12V	15V	24V	27V	48V
	LED OPERATION VOLTAGE Note.8	3 ~ 9V	6 ~ 12V	7.5 ~ 15V	12 ~ 24V	13.5 ~ 27V	24 ~ 48V
	RATED CURRENT	5A	5A	4A	2.5A	2.3A	1.3A
	CURRENT RANGE	0 ~ 5A	0 ~ 5A	0 ~ 4A	0 ~ 2.5A	0 ~ 2.3A	0 ~ 1.3A
	RATED POWER	45W	60W	60W	60W	62.1W	62.5W
	RIPPLE & NOISE (max.) Note.2	120mVp-p	120mVp-p	150mVp-p	150mVp-p	200mVp-p	250mVp-p
	VOLTAGE ADJ. RANGE Note.7	8.7 ~ 10.5V	10.8 ~ 13.2V	13.5 ~ 16.5V	21.6 ~ 26.4V	24.3 ~ 29.7V	43.2 ~ 52.8V
		Can be adjusted by internal potential meter SVR1					
	CURRENT ADJ. RANGE Note.7	-25% ~ 3%. Can be adjusted by internal potential meter SVR2					
	VOLTAGE TOLERANCE Note.3	±5.0%					
	LINE REGULATION	±1.0%					
	LOAD REGULATION	±2.0%					
INPUT	SETUP, RISE TIME Note.6	500ms, 30ms / 230VAC 1500ms, 30ms / 115VAC at full load					
	HOLD UP TIME (Typ.)	50ms/230VAC 16ms/115VAC at full load					
	VOLTAGE RANGE Note.4	90 ~ 264VAC 127 ~ 370VDC					
	FREQUENCY RANGE	47 ~ 63Hz					
	EFFICIENCY (Typ.)	82%	85%	86%	87%	87%	88%
	AC CURRENT (Typ.)	1.2A/115VAC 0.7A/230VAC					
PROTECTION	INRUSH CURRENT(max.)	COLD START 60A/230VAC					
	LEAKAGE CURRENT	0.25mA / 240VAC					
	OVER CURRENT	95 ~ 110%					
FUNCTION	OVER VOLTAGE	11 ~ 13.5V	13.8 ~ 16V	17.5 ~ 21V	28 ~ 32V	31 ~ 35V	54 ~ 60V
		Protection type : Shut down o/p voltage, re-power on to recover					
ENVIRONMENT	DIMMING CONTROL (OPTIONAL)	1 ~ 10VDC or PWM signal : 100Hz ~ 3KHz					
SAFETY & EMC	WORKING TEMP.	-20 ~ +60°C (Refer to output load derating curve)					
	WORKING HUMIDITY	20 ~ 90% RH non-condensing					
	STORAGE TEMP., HUMIDITY	-40 ~ +80°C, 10 ~ 95% RH					
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 50°C)					
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes					
OTHERS	SAFETY STANDARDS	UL1310 Class 2, CAN/CSA C22.2 No. 223-M91(except for 48V), IP64 approved ; design refer to TUV EN60950-1, EN61347-2-13					
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC					
	ISOLATION RESISTANCE	I/P-O/P:>100M Ohms / 500VDC / 25°C / 70% RH					
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B					
	HARMONIC CURRENT	Compliance to EN61000-3-2 Class A, EN61000-3-3					
NOTE	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024, light industry level, criteria A					
	MTBF	603Khrs min. MIL-HDBK-217F (25°C)					
	DIMENSION	181*61.5*35mm (L*W*H)					
	PACKING	0.4Kg; 24pcs/11Kg/0.75CUFT					
NOTE		1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C 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. 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. 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. 6. Length of set up time is measured at first cold start. Turning ON/OFF the power supply may lead to increase of the set up time. 7. Output voltage can be adjusted through the SVR1 on the PCB ; limit of output constant current level can be adjusted through the SVR2 on the PCB. 8. Constant current operation region is within the specified output voltage range above. This is the suitable operation region for LED related applications. 9. In the European market this product is only suitable for LED lighting applications that don't have to comply with the harmonic current requirements of EN61000-3-2 Class C.					

Mechanical Specification

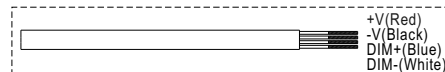
Case No.960A Unit:mm



Output voltage and current adjustment : remove the upper case and adjust through SVR1 & SVR2 shown in the diagram.

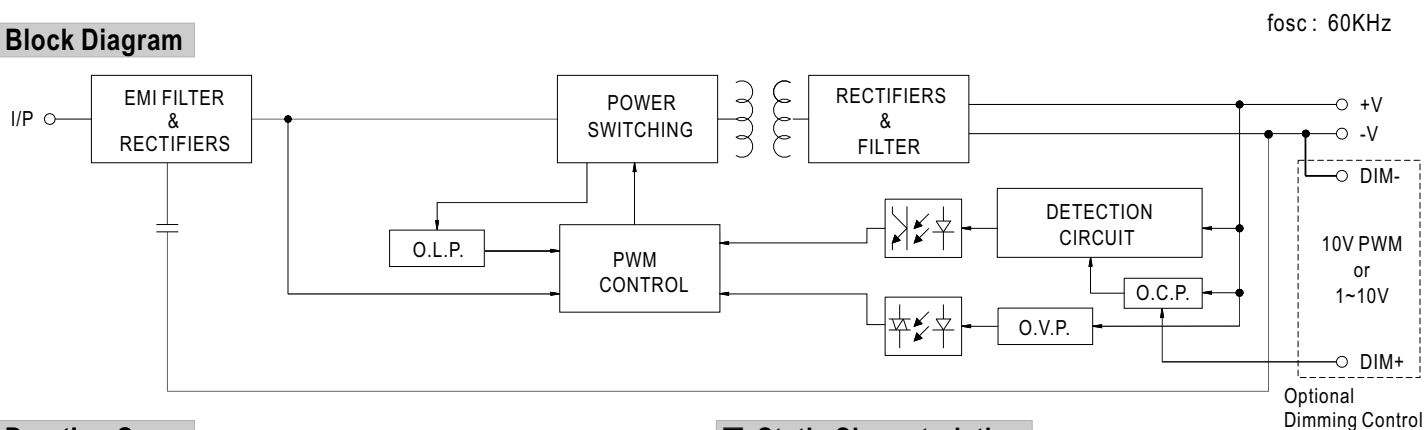


OUTPUT(with optional dimming function)

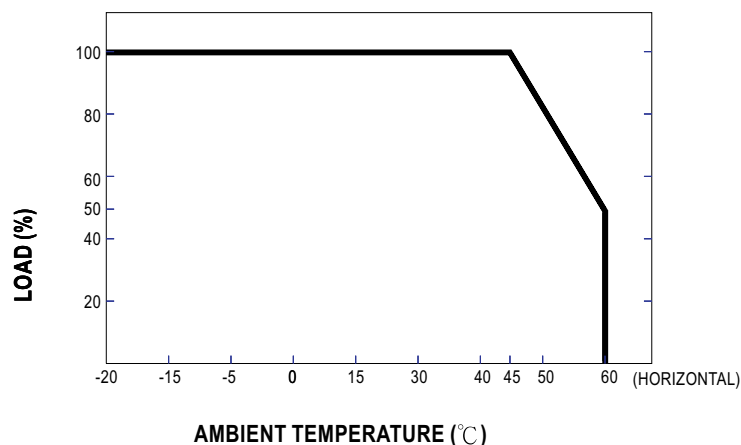


SVR1	Output voltage adjustment
SVR2	Output current adjustment

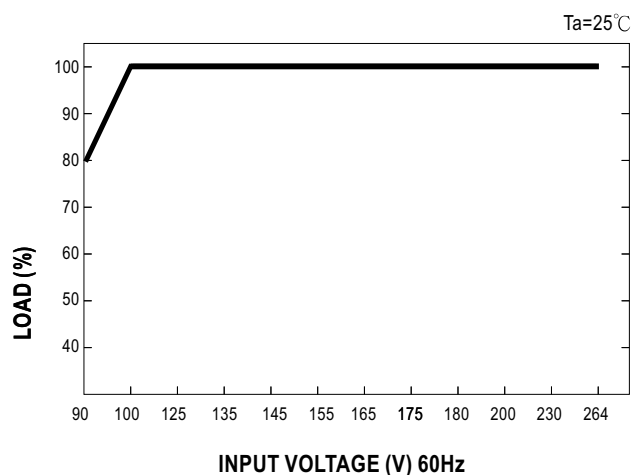
Block Diagram



Derating Curve



Static Characteristics

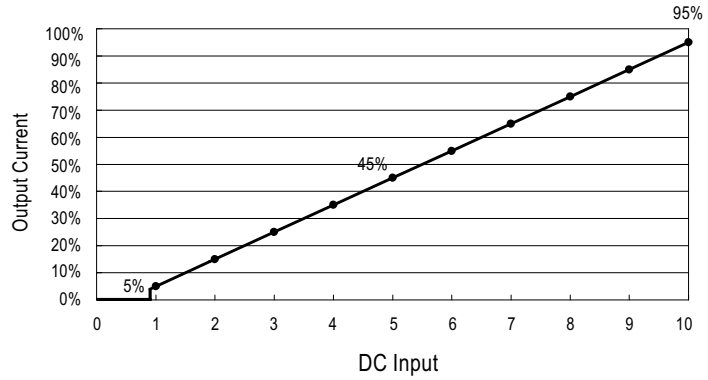
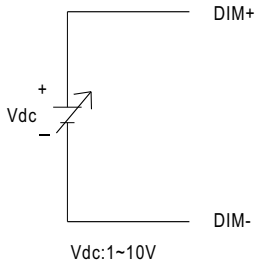


■ Dimming Control (Optional)

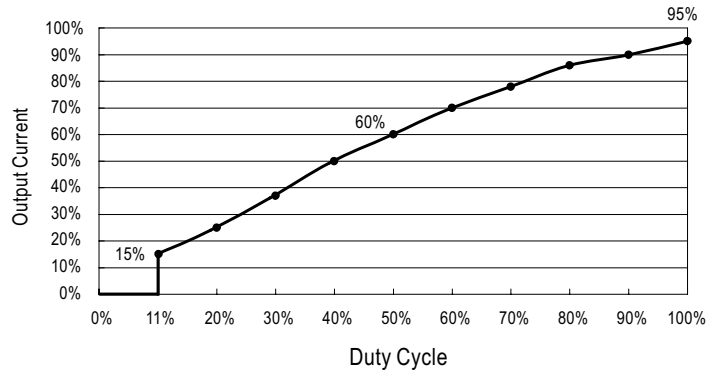
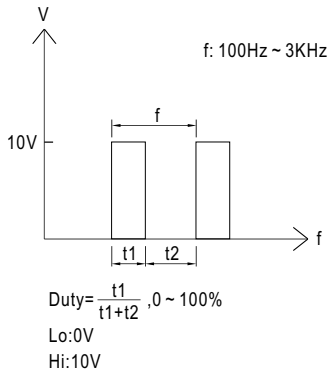
Level of output current can be adjusted through the dimming control function.

When there is no signal sending to the control wires (open circuit between the two control wires), the power supply unit will operate as 0V (D-type) or 0% duty (P-type) of input signal and hence the output current will be zero.

(1) 1~10V (D type, & : ELN-60-12D)



(2) PWM (P type, & : ELN-60-12P)



MODEL : ELN-60-12

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 120 mVp-p (Max)	I/P: 230VAC O/P: 100% LOAD Ta:25°C	V1: 16 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.8V~ 13.2V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	10.27V~ 13.77 V/ 230 VAC 10.27V~ 13.77 V/ 115 VAC	P
3	OUTPUT CURRENT ADJUST RANGE	CH1:3.75 A-5.15 A	I/P: 230 VAC I/P: 115 VAC Ta:25°C	0.9 A~ 5.72 A/ 230 VAC 0.9 A~ 5.72 A/ 115 VAC	P
4	OUTPUT VOLTAGE TOLERANCE	V1: 5 %~ -5 % (Max)	I/P: 100 VAC / 264 VAC O/P: 100% LOAD / MIN LOAD Ta:25°C	V1: 0.7 %~ -0.7 %	P
5	LINE REGULATION	V1: 1 %~ -1 % (Max)	I/P: 100VAC ~ 264 VAC O/P: 100% LOAD Ta:25°C	V1: 0.05 %~ -0.05 %	P
6	LOAD REGULATION	V1: 2%~ -2 % (Max)	I/P: 230 VAC O/P: 100% LOAD -MIN LOAD Ta:25°C	V1: 0.7 %~ -0.7 %	P
7	SET UP TIME	230VAC: 500 ms (Max) 115 VAC: 1500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: 100% LOAD Ta:25°C	230VAC/ 304 ms 115VAC/ 912 ms	P
8	RISE TIME	230VAC: 30 ms (Max) 115VAC: 30 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: 100% LOAD Ta:25°C	230VAC/ 12 ms 115VAC/ 11 ms	P
9	HOLD UP TIME	230VAC: 50 ms (TYP) 115VAC 16 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 85 Ms 115VAC/ 17.7 ms	P
10	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P: 100% LOAD Ta:25°C	TEST: <5 %	P
11	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230 VAC O/P: 100% LOAD /Min LOAD 90%DUTY/1KHZ Ta:25°C	303 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P: TESTING O/P: 100% LOAD Ta: 25°C	64V~264V	P
			I/P: LOW-LINE-3V= 87V HIGH-LINE+15%=300 V O/P: 100% LOAD /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: 90 VAC ~ 264 VAC O/P: 100% LOAD ~MIN LOAD Ta: 25°C	TEST: OK	P
3	EFFICIENCY	85 % (TYP)	I/P: 230 VAC O/P: 100% LOAD Ta: 25°C	85.6 %	P
4	INPUT CURRENT	230V/ 0.7 A (TYP) 115V/ 1.2 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P: 100% LOAD Ta: 25°C	I = 0.58 A/ 230 VAC I = 0.96 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 60 A (TYP) COLD START	I/P: 230 VAC O/P: 100% LOAD Ta: 25°C	I = 58.6 A/ 230 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P: 264 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.01 mA N-FG: 0.01 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 %-110 %	I/P: 230 VAC I/P: 115 VAC O/P: TESTING Ta: 25°C	100 %/ 230 VAC 100 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1: 13.8V~ 16V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	15.1 V/ 230 VAC 15.1 V/ 115 VAC Shunt down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P: 100% LOAD Ta: 25°C	NO DAMAGE Constant Current Limiting	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																											
1	TEMPERATURE RISE TEST	<div>MODEL : ELN-60-12</div> <div>1. ROOM AMBIENT BURN-IN : 112 HRS</div> <div> I/P: 230VAC O/P: 100% LOAD Ta= 33.8 °C</div> <div>2. HIGH AMBIENT BURN-IN : 2HRS</div> <div> I/P: 230VAC O/P: 100% LOAD Ta= 41 °C</div> <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 33.8 °C</th><th>HIGH AMBIENT Ta= 41 °C</th></tr><tr><td>1</td><td>U1</td><td>NCP1200D60R2G</td><td>63.5°C</td><td>66.3°C</td></tr><tr><td>2</td><td>BD1</td><td>KBJ408G 4A/800V</td><td>80.7°C</td><td>83.6°C</td></tr><tr><td>3</td><td>LF1</td><td>LF130</td><td>65.9°C</td><td>68.7°C</td></tr><tr><td>4</td><td>C5</td><td>120u/400V 105°C KM</td><td>70.5°C</td><td>73.7°C</td></tr><tr><td>5</td><td>C36</td><td>100U/35V 105°C KF</td><td>72.4°C</td><td>75.4°C</td></tr><tr><td>6</td><td>Q1</td><td>K2843 10A/600V</td><td>90.8°C</td><td>93.3°C</td></tr><tr><td>7</td><td>D1</td><td>EGP20J 2A/600V</td><td>100.8°C</td><td>105.1°C</td></tr><tr><td>8</td><td>ZD1</td><td>P6KE200A</td><td>89.2°C</td><td>91.8°C</td></tr><tr><td>9</td><td>T1 COIL</td><td>TF-1603</td><td>96.2°C</td><td>98.5°C</td></tr><tr><td>10</td><td>PCB</td><td>T1 between U2</td><td>86.3°C</td><td>88.3°C</td></tr><tr><td>11</td><td>D100</td><td>YG865C10R 20A/100V</td><td>99.3°C</td><td>101.2°C</td></tr><tr><td>12</td><td>C105</td><td>1000u/16V 105°C KF</td><td>94.4°C</td><td>96.5°C</td></tr><tr><td>13</td><td>L100</td><td>RB010E</td><td>89.5°C</td><td>91.4°C</td></tr><tr><td>14</td><td>CASE</td><td>UP CASE</td><td>76.8°C</td><td>77.1°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 33.8 °C	HIGH AMBIENT Ta= 41 °C	1	U1	NCP1200D60R2G	63.5°C	66.3°C	2	BD1	KBJ408G 4A/800V	80.7°C	83.6°C	3	LF1	LF130	65.9°C	68.7°C	4	C5	120u/400V 105°C KM	70.5°C	73.7°C	5	C36	100U/35V 105°C KF	72.4°C	75.4°C	6	Q1	K2843 10A/600V	90.8°C	93.3°C	7	D1	EGP20J 2A/600V	100.8°C	105.1°C	8	ZD1	P6KE200A	89.2°C	91.8°C	9	T1 COIL	TF-1603	96.2°C	98.5°C	10	PCB	T1 between U2	86.3°C	88.3°C	11	D100	YG865C10R 20A/100V	99.3°C	101.2°C	12	C105	1000u/16V 105°C KF	94.4°C	96.5°C	13	L100	RB010E	89.5°C	91.4°C	14	CASE	UP CASE	76.8°C	77.1°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230 VAC O/P: 105 % LOAD Ta:25°C	TEST : OK	P																																																																											
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 230 VAC O/P: 100 % LOAD Ta= -20 °C	TEST : OK	P																																																																											
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C NO DAMAGE	I/P: 272 VAC O/P: 100% LOAD Ta= 40°C HUMIDITY= 95 %R.H	TEST : OK	P																																																																											
5	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P: 230 VAC O/P:100% LOAD	± 0 %(0-50°C)	P																																																																											
6	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency:10-500Hz (3) Sweep Time:10min/sweep cycle (4) Acceleration:2G (5) Test Time:1 hour in each axis (X.Y.Z) (6) Ta:25°C		TEST : OK	P																																																																											

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3 KVAC/min	I/P-O/P: 3.6KVAC/min Ta:25℃	I/P-O/P: 3.06 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25℃	I/P-O/P: 8 GΩ NO DAMAGE	P
3	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 D	I/P: 230 VAC/50HZ O/P: 100% LOAD Ta:25℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P: 100% LOAD /50% LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P: 100% 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: 100% LOAD Ta:25℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P: 100% 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: 100% 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	ELN-60-9 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P: 100% LOAD Ta= 25 °C LIFE TIME= 19411 HRS I/P: 230VAC O/P: 100% LOAD Ta= 40 °C LIFE TIME= 9756 HRS I/P: 230VAC O/P: 75% LOAD Ta= 40 °C LIFE TIME= 20927 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 603K HRS			P
3	ORT (Ongoing Reliability test)	ELN-60-24:I/P : 230VAC O/P : FULL LOAD TA=45℃ Sample=10pcs TEST TIME=1536HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 2SK2843 10A/600V	I/P: High-Line +3V = 267 V O/P: (1) 100% LOAD Turn on (2) Output Short Ta: 25°C	(1) 578 V (2) 546 V	P
2	Diode Peak Voltage	D100 Rated FME-220A 20A/100V	I/P: High-Line +3V = 267 V O/P: (1) 100% LOAD Turn on (2) Output Short Ta: 25°C	(1) 92 V (2) 81 V	P
3	Clamp Diode Peak Voltage	D1 Rated EGP20J 2A/600V	I/P: High-Line +3V = 267 V O/P: (1) Dynamic Load 90% Duty/1KHz Ta: 25°C	(1) 520 V	P
4	Input Capacitor Voltage	C5 Rated 120u / 400V/ 105°C	I/P: High-Line +3V = 267 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) 376 V (2) 374 V (3) 376 V	P
5	Control IC Voltage Test	U1 Rated 1200D60R2G: 16V	I/P: High-Line +3V = 267 V O/P: (1) 100% LOAD Turn on /Off (2) Min load Turn on /Off (3) 100% /Min load Change Ta: 25°C	(1) 14.4 V (2) 11.3 V (3) 14.4 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2007/5/21	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2007/6/21	PRODUCT SAMPLE W0706A01	PASS	VINCENT TSENG	MAX LIN
2007/8/15	PRODUCT SAMPLE W0708A07	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023