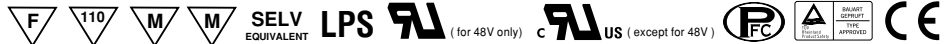




■ Features :

- Universal AC input / Full range
- High efficiency 89%
- Fully isolated plastic case with terminal block style of I/O
- Built-in constant current limiting circuit
- Adjustable output voltage and current level
- Protections: Short circuit/Over load/Over voltage/Over temperature
- Built-in active PFC function, comply with EN61000-3-2 class C ($\geq 75\%$ load)
- UL1310 class 2 power unit
- Pass LPS
- Cooling by free air convection
- 100% full load burn-in test
- High reliability
- Suitable for LED lighting and moving sign applications (Note.2)
- Compliance to worldwide safety regulations for lighting
- 2 years warranty

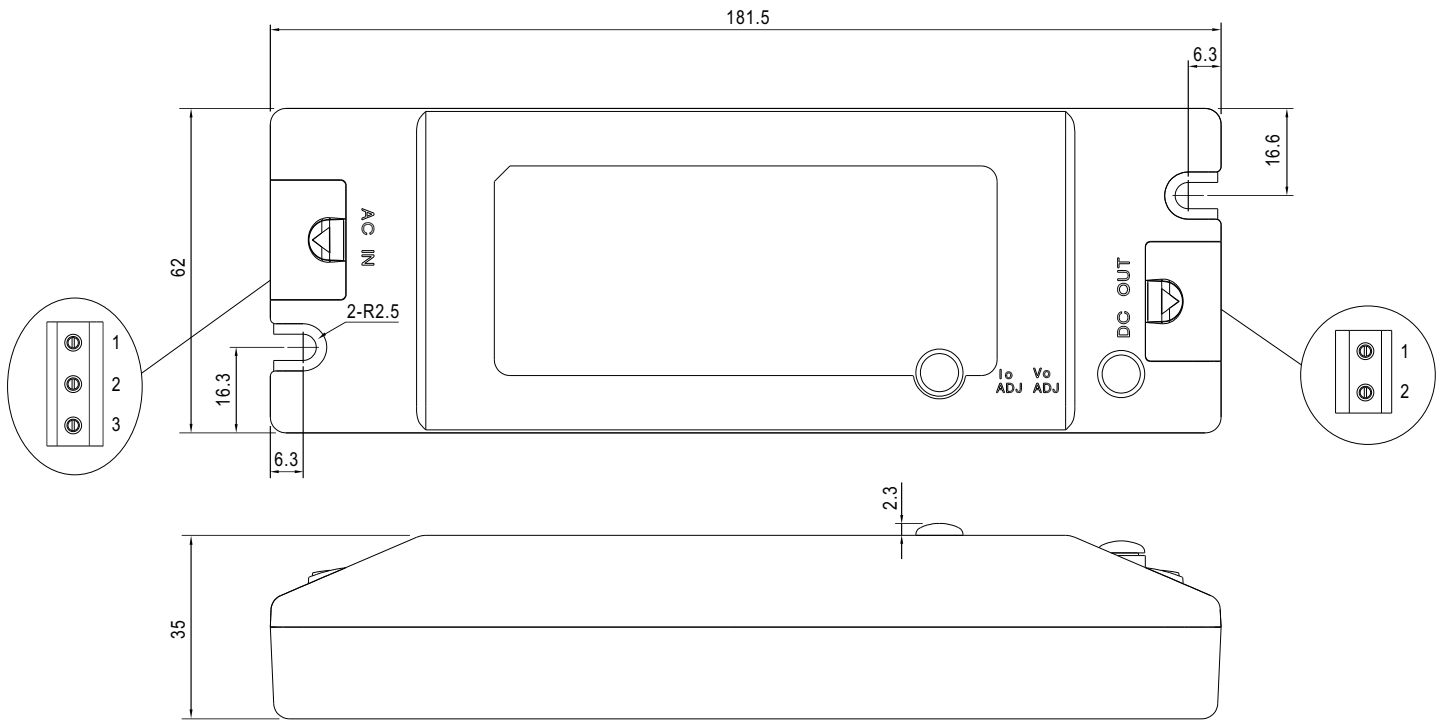


SPECIFICATION

MODEL	PLC-60-12	PLC-60-15	PLC-60-20	PLC-60-24	PLC-60-27	PLC-60-36	PLC-60-48	
OUTPUT	DC VOLTAGE	12V	15V	20V	24V	27V	36V	48V
	CONSTANT CURRENT REGION Note.6	8.4 ~ 12V	10.5 ~ 15V	14 ~ 20V	16.8 ~ 24V	18.9 ~ 27V	25.2 ~ 36V	33.6 ~ 48V
	RATED CURRENT	5A	4A	3A	2.5A	2.3A	1.7A	1.3A
	CURRENT RANGE	0 ~ 5A	0 ~ 4A	0 ~ 3A	0 ~ 2.5A	0 ~ 2.3A	0 ~ 1.7A	0 ~ 1.3A
	RATED POWER	60W	60W	60W	60W	62.1W	61W	62.5W
	RIPPLE & NOISE (max.) Note.2	2Vp-p	2.4Vp-p	1.8Vp-p	2.4Vp-p	2.7Vp-p	3.6Vp-p	4.6Vp-p
	VOLTAGE ADJ. RANGE Note.5	11.5 ~ 13V	14.5 ~ 16.2V	19.5 ~ 22V	24 ~ 26V	25 ~ 30V	32.5 ~ 39V	43.6 ~ 51.8V
	CURRENT ADJ. RANGE Note.5	3.75 ~ 5.15A	3 ~ 4.12A	2.25 ~ 3.09A	1.875 ~ 2.575A	1.725 ~ 2.369A	1.275 ~ 1.751A	0.975 ~ 1.339A
	VOLTAGE TOLERANCE Note.3	$\pm 10\%$						
	LINE REGULATION	$\pm 3.0\%$						
LOAD REGULATION	$\pm 5.0\%$							
SETUP TIME	1500ms / 230VAC 3000ms / 115VAC at full load							
INPUT	VOLTAGE RANGE Note.4	90 ~ 264VAC	127 ~ 370VDC					
	FREQUENCY RANGE	47 ~ 63Hz						
	POWER FACTOR	PF ≥ 0.9 at 75 ~ 100% load, 115VAC / 230VAC						
	EFFICIENCY(Typ.)	85%	86%	87.5%	87%	88%	89%	89%
	AC CURRENT	0.8A/115VAC	0.4A/230VAC					
	INRUSH CURRENT(max.)	40A/230VAC						
	LEAKAGE CURRENT	<0.75mA / 240VAC						
PROTECTION	OVER CURRENT	95 ~ 110%	110% (max)					
	SHORT CIRCUIT	Protection type : Constant current limiting, recovers automatically after fault condition is removed						
	OVER VOLTAGE	13.8 ~ 16V	17.5 ~ 21V	23 ~ 26V	28 ~ 32V	31 ~ 35V	41 ~ 46V	54 ~ 60V
	OVER TEMPERATURE	95°C $\pm 10^\circ\text{C}$ (TSW1) detect on heatsink of power transistor Protection type : Shut down o/p voltage, recovers automatically after temperature goes down						
ENVIRONMENT	WORKING TEMP.	-30 ~ +50°C (Refer to output load derating curve)						
	WORKING HUMIDITY	20 ~ 95% RH non-condensing						
	STORAGE TEMP., HUMIDITY	-40 ~ +80°C, 10 ~ 95% RH						
	TEMP. COEFFICIENT	$\pm 0.03\%/^\circ\text{C}$ (0 ~ 50°C)						
	VIBRATION	10 ~ 500Hz, 2G 12min./1cycle, period for 72min. each along X, Y, Z axes						
SAFETY & EMC	SAFETY STANDARDS	UL1310 Class 2, TUV EN61347-1, EN61347-2-13, CAN/CSA C22.2 No. 223-M91(except for 48V) approved						
	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC I/P-FG:1.88KVAC O/P-FG:0.5KVAC						
	ISOLATION RESISTANCE	I/P-O/P:100M Ohms / 500VDC / 25°C / 70% RH						
	EMI CONDUCTION & RADIATION	Compliance to EN55015, EN55022 (CISPR22) Class B						
	HARMONIC CURRENT	Compliance to EN61000-3-2 Class C ($\geq 75\%$ 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	515Khrs min. MIL-HDBK-217F (25°C)						
	DIMENSION	181.5*62*35mm (L*W*H)						
	PACKING	0.41Kg; 30pcs/13.3Kg/0.67CUFT						
NOTE	<ol style="list-style-type: none"> 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. Direct connecting to LEDs is not suggested for models with "RIPPLE & NOISE" $> \pm 10\%$ 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. 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. 6. Constant current operation region is within 70% ~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. 7. 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

Case No.991A Unit:mm



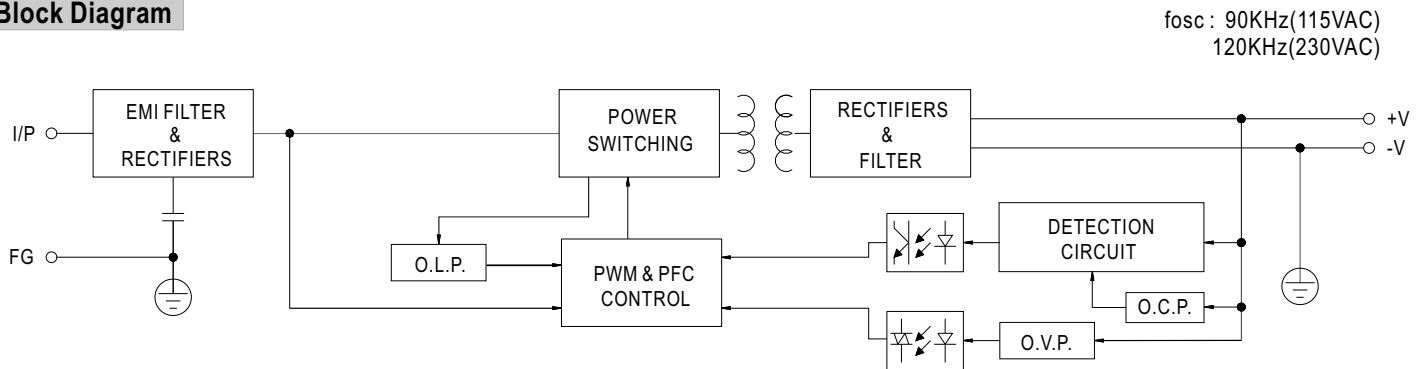
Terminal Pin No. Assignment (TB1):
SWITCLAB MB310-75003

Pin No.	Assignment
1	AC/L
2	AC/N
3	FG ⊕

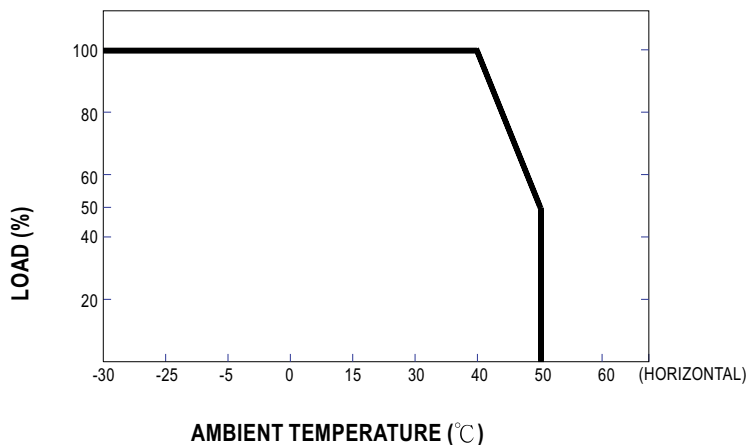
Terminal Pin No. Assignment (TB2):
SWITCLAB MB310-75002

Pin No.	Assignment
1	+V
2	-V

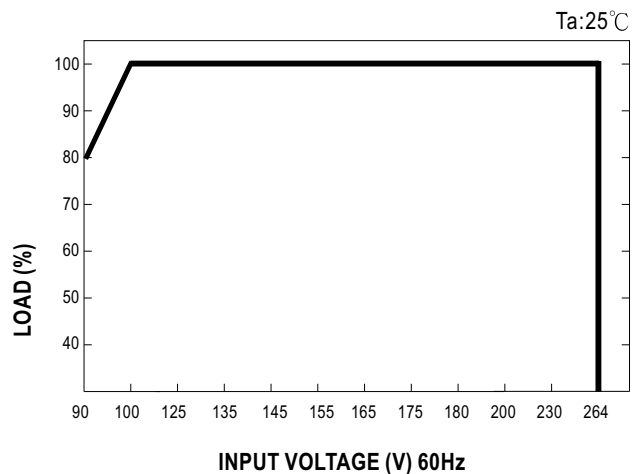
■ Block Diagram



■ Derating Curve



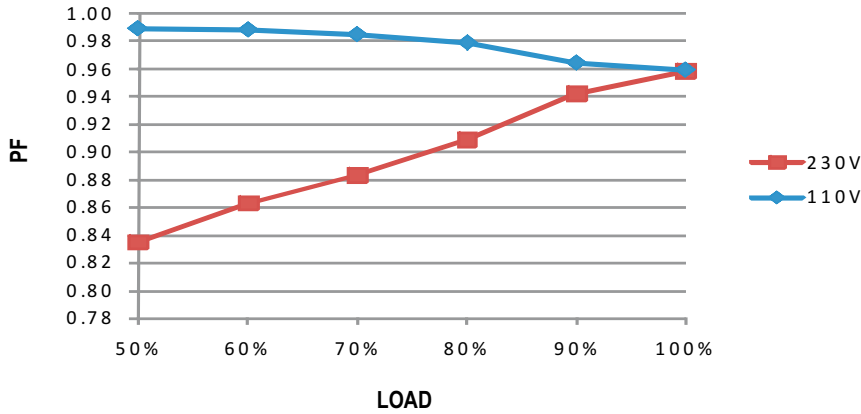
■ Static Characteristics



Power Factor Characteristic

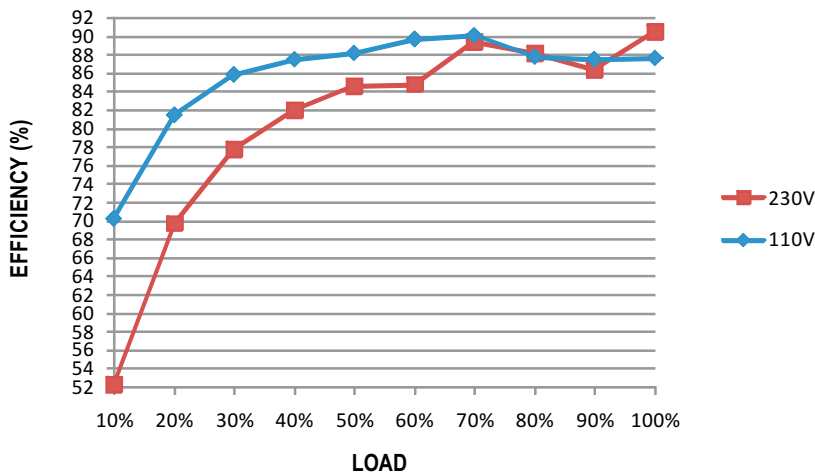
Power factor will be higher than 0.9 when output loading is 75% or higher.

Constant Current Mode



EFFICIENCY vs LOAD (48V Model)

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

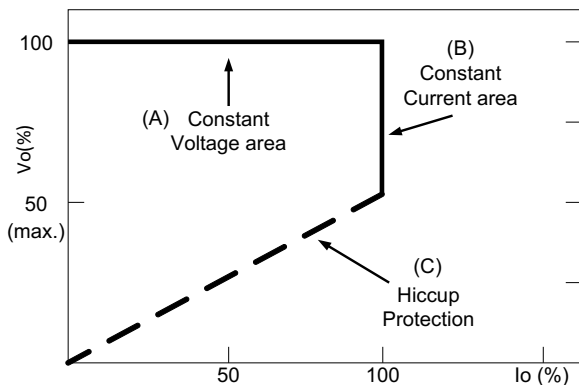


DRIVING METHODS OF LED MODULE

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 : PLC-60-24

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 2.4 Vp-p (Max)	I/P : 230VAC O/P : 100% LOAD Ta : 25°C	V1 : 1.3 Vp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 23.5 V- 26 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	21.31 V- 26.63 V / 230 VAC 21.31 V- 26.63 V / 115 VAC	P
3	OUTPUT CURRENT ADJUST RANGE	CH1 : 2.575 A-1.875 A	I/P : 230 VAC I/P : 115 VAC Ta : 25°C	1.39 A- 3.24 A / 230 VAC 1.4 A- 3.21 A / 115 VAC	P
4	OUTPUT VOLTAGE TOLERANCE	V1 : 10 %- -10 % (Max)	I/P : 100 VAC / 264 VAC O/P : 100% LOAD / MIN LOAD Ta : 25°C	V1 : 2.7 %- -2.7 %	P
5	LINE REGULATION	V1 : 3 %- -3 % (Max)	I/P : 100VAC ~ 264 VAC O/P : 100% LOAD Ta : 25°C	V1 : 2.7 %- -2.7 %	P
6	LOAD REGULATION	V1 : 5 %- -5 % (Max)	I/P : 230 VAC O/P : 100% LOAD ~MIN LOAD Ta : 25°C	V1 : 0.2 %- -0.2 %	P
7	SET UP TIME	230VAC : 1500 ms (Max) 115 VAC : 3000 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : 100% LOAD Ta : 25°C	230VAC/ 1236 ms 115VAC/ 2472 ms	P
8	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230 VAC O/P : 100% LOAD Ta : 25°C	TEST : <10 %	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC-264 VAC	I/P : TESTING O/P : 100% LOAD Ta : 25°C	87V-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	POWER FACTOR	0.90 / 230 VAC(TYP) 0.90 / 115 VAC(TYP) ≥ 0.9 at 75 - 100% load	I/P : 230 VAC I/P : 115 VAC O/P : 100% LOAD Ta : 25°C	0.963 /230VAC 100% LOAD 0.983 /115 VAC 100% LOAD 0.973 /230 VAC 75% LOAD 0.981 /115 VAC 75% LOAD ≥ 0.9 at 75 ~ 100% load	P
4	EFFICIENCY	87 % (TYP)	I/P : 230 VAC O/P : 100% LOAD Ta : 25°C	87.595 %	P
5	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.8 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : 100% LOAD Ta : 25°C	I = 0.3 A/ 230 VAC I = 0.6 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 40 A (TYP) COLD START	I/P : 230 VAC O/P : 100% LOAD Ta : 25°C	I = 22 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA/ 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.32 mA N-FG : 0.32 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110 % (MAX)	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	105 %/ 230 VAC 105 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 28 V- 32V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	30.5 V/ 230 VAC 30.5 V/ 115 VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 95 ± 10°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : 100% LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : 100% LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT																																																																																
1	TEMPERATURE RISE TEST	MODEL : PLC-60-24 1. ROOM AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : 100% LOAD Ta= 30.6 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : 100% LOAD Ta= 39.6 °C			P																																																																																
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 30.6 °C</th> <th>HIGH AMBIENT Ta= 39.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>US4KB80 4A/800V SHI</td><td>75.1°C</td><td>81.9°C</td></tr> <tr><td>2</td><td>Q1</td><td>K2843 10A/600V TOS</td><td>85.4°C</td><td>91.4°C</td></tr> <tr><td>3</td><td>LF2</td><td>TR-689</td><td>64.9°C</td><td>71.5°C</td></tr> <tr><td>4</td><td>L1</td><td>TR-623</td><td>73.2°C</td><td>79.6°C</td></tr> <tr><td>5</td><td>R5</td><td>100K/2W R/MO</td><td>90.6°C</td><td>96.6°C</td></tr> <tr><td>6</td><td>D2</td><td>GP30J 3A/600V ZOW</td><td>96.5°C</td><td>103.1°C</td></tr> <tr><td>7</td><td>C46</td><td>100U/25V RUB 105°C YXG</td><td>78.8°C</td><td>85.5°C</td></tr> <tr><td>8</td><td>T1 COIL</td><td>TF-1547 LS</td><td>83.0°C</td><td>89.9°C</td></tr> <tr><td>9</td><td>D100</td><td>BYV32E 20A/200V PH</td><td>79.7°C</td><td>87.0°C</td></tr> <tr><td>10</td><td>C106</td><td>1000U/35V NCC 105°C KY</td><td>78.0°C</td><td>85.2°C</td></tr> <tr><td>11</td><td>TSW1</td><td>ST-95</td><td>75.5°C</td><td>82.6°C</td></tr> <tr><td>12</td><td>U1</td><td>TDA4863G INFINEON</td><td>81.4°C</td><td>88.0°C</td></tr> <tr><td>13</td><td>LF100</td><td>TR-706</td><td>68.7°C</td><td>76.6°C</td></tr> <tr><td>14</td><td>C7</td><td>474/450V/105°C NISSEI</td><td>80.0°C</td><td>86.3°C</td></tr> <tr><td>15</td><td>CASE</td><td>UPCASE</td><td>60.1°C</td><td>70.6°C</td></tr> </tbody> </table>	NO	Position		P/N	ROOM AMBIENT Ta= 30.6 °C	HIGH AMBIENT Ta= 39.6 °C	1	BD1	US4KB80 4A/800V SHI	75.1°C	81.9°C	2	Q1	K2843 10A/600V TOS	85.4°C	91.4°C	3	LF2	TR-689	64.9°C	71.5°C	4	L1	TR-623	73.2°C	79.6°C	5	R5	100K/2W R/MO	90.6°C	96.6°C	6	D2	GP30J 3A/600V ZOW	96.5°C	103.1°C	7	C46	100U/25V RUB 105°C YXG	78.8°C	85.5°C	8	T1 COIL	TF-1547 LS	83.0°C	89.9°C	9	D100	BYV32E 20A/200V PH	79.7°C	87.0°C	10	C106	1000U/35V NCC 105°C KY	78.0°C	85.2°C	11	TSW1	ST-95	75.5°C	82.6°C	12	U1	TDA4863G INFINEON	81.4°C	88.0°C	13	LF100	TR-706	68.7°C	76.6°C	14	C7	474/450V/105°C NISSEI	80.0°C	86.3°C	15	CASE	UPCASE	60.1°C	70.6°C		
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15	CASE	UPCASE	60.1°C	70.6°C																																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 103 % 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= -30 °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	± 0.01 %(0-50°C)	P																																																																																
6	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Time : 72min (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 : 3.75 KVAC/min I/P-FG : 1.88KVAC/min O/P-FG : 0.5KVAC/min	I/P-O/P : 4.2KVAC/min I/P-FG : 2.25KVAC/min O/P-FG : 0.6KVAC/min Ta : 25°C	I/P-O/P : 5.13 mA I/P-FG : 4.15 mA O/P-FG : 2.432 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 Ta : 25°C	I/P-O/P : 30 GΩ I/P-FG : 25 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°C	49 mΩ	P
4	APPROVAL	TUV : Certificate NO : R50102381 UL : File NO : E307078			P

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% LOAD/75%LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : 100% LOAD /50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : 100% LOAD Ta : 25°C	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°C	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°C	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°C	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	PLC-60-24 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P : 230VAC O/P : 100% LOAD Ta= 25 °C LIFE TIME= 116971 HRS I/P : 230VAC O/P : 100% LOAD Ta= 50 °C LIFE TIME= 46886 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 515K HRS			P
3	ORT (Ongoing Reliability test)	I/P : 230VAC O/P : FULL LOAD TA=50.6°C Sample=20pcs TEST TIME=840HRS			P



COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 2SK2843 : 600V 10A	I/P : High-Line +3V = 267 V O/P : (1) 100% LOAD Turn on (2) Output Short Ta : 25°C	(1) 524 V (2) 520 V	P
2	Diode Peak Voltage	D100 Rated BYV32E-200 : 200V 20A	I/P : High-Line +3V = 267 V O/P : (1) 100% LOAD Turn on (2)Output Short Ta : 25°C	(1) 143 V (2) 120 V	P
3	Clamp Diode Peak Voltage	D2 Rated GP30J : 600V 3A	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz Ta : 25°C	(1) 508 V	P
4	Control IC Voltage Test	U1 Rated TDA4863G : 22V	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) 16.32 V (2) 12.77 V (3) 16.32 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/7/28	W0905D32	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023