



# Test Report: LPHC-18-350

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18W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection 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	VERDICT
1	RIPPLE & NOISE	V1 : 300 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 100 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : 5 %~ -5 % (Max)	I/P : 195 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.21 %~ -0.21 %	P
3	LINE REGULATION	V1 : 1 %~ -1 % (Max) %~	I/P : 195 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.03 %~ -0.03 %	P
4	LOAD REGULATION	V1 : 3 %~ -3 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.21 %~ -0.21 %	P
5	SET UP TIME	230VAC : 3600 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 2504 ms	P
6	RISE TIME	230VAC : 100 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 26 ms	P
7	HOLD UP TIME	230VAC : 20 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 75 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	P
9	DYNAMIC LOAD	V1 : 4800 mVp-p	I/P : 230VAC O/P : FULL /Min LOAD 90%DUTY/ 1KHZ Ta : 25°C	181 mVp-p	P

## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	195VAC~264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE-3V= 192 V HIGH-LINE+15%=300V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	85V~264V  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 195 VAC ~ 264 VAC O/P : FULL -MIN LOAD Ta : 25°C	TEST : OK	P
3	EFFICIENCY	80 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	82.7 %	P
4	INPUT CURRENT	230V/ 0.3 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 0.171 A/ 230 VAC	P
5	INRUSH CURRENT	230V/ 50 A (TYP)  COLD START	I/P : 230 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 40 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 %- 105 %	I/P : 230 VAC O/P : TESTING Ta : 25°C	102.5%/ 230 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 50.4 V- 60 V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	57.3V/ 230 VAC Shut off o/p voltage, clamping by zener diode	P
3	OVER TEMPERATURE PROTECTION	SPEC : Tj 170°C typically (U1) Detect On main control IC	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Hiccup Mode recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant Current Limiting	P

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	U1 Rated : VIPER22A 730V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short Ta : 25°C	(1) 648 V (2) 452 V	P
2	Diode Peak Voltage	D 10 Rated : 3A/600V HER306  D 11 Rated : 1N4148 75V /0.2A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short Ta : 25°C	(1) 266 V (2) 258 V  (1) 28.4 V (2) 19.4 V	P
3	Clamp Diode Peak Voltage	D 1 Rated : 2A/800V GP20K	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz Ta : 25°C	(1) 400 V	P
4	Input Capacitor Voltage	C5 Rated : 27uF/400V 105°C KF	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) 371 V (2) 377.8 V (3) 377.8 V	P
5	Control IC Voltage Test	U1 Rated : VIPER22A 9V-38V	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) 30.6 V (2) 25.56 V (3) 25.41 V	P

**■ SAFETY & E.M.C. TEST**
**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min	I/P-O/P : 3.6 KVAC/min Ta : 25°C	I/P-O/P : 0.777 mA  NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70%RH	I/P-O/P : 30 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 A	I/P : 240/230/220 VAC/50HZ O/P : 100,75,50,25% LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL 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 : FULL 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 : FULL 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 : FULL LOAD Ta : 25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : LPHC-18-350 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 30.5 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50.2 °C			P
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	P
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P
4	TEMPERATURE COEFFICIENT	± 0.2 % (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.06 % (0-50°C)	P
5	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	P
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +55°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	P

7	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	P
8	CAPACITOR LIFE CYCLE	LPHC-18-350:SUPPOSE C15 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= 50 °C LIFE TIME (2) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME	(1) 524217.6HRS (2) 107190.4HRS (3) 113331.2HRS	P
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 1200.6K HRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20,000 hours @ Tcase 75°C; 50,000 hours @ Tcase 60°C		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/8/7	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023