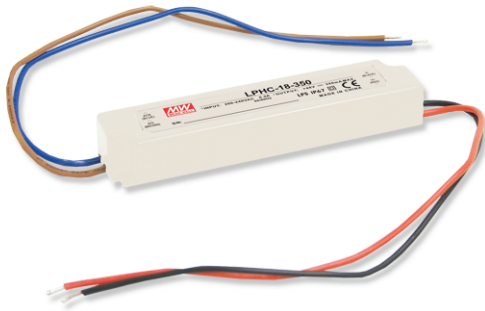




# 18W Single Output Switching Power Supply

# LPHC-18 series



### ■ Features :

- Constant current mode power supply
- 180-264VAC input only
- Fully encapsulated with IP67 level
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Cooling by free air convection
- Pass LPS
- 100% full load burn-in test
- Suitable for LED lighting and moving sign applications
- High reliability / Low cost
- 2 years warranty

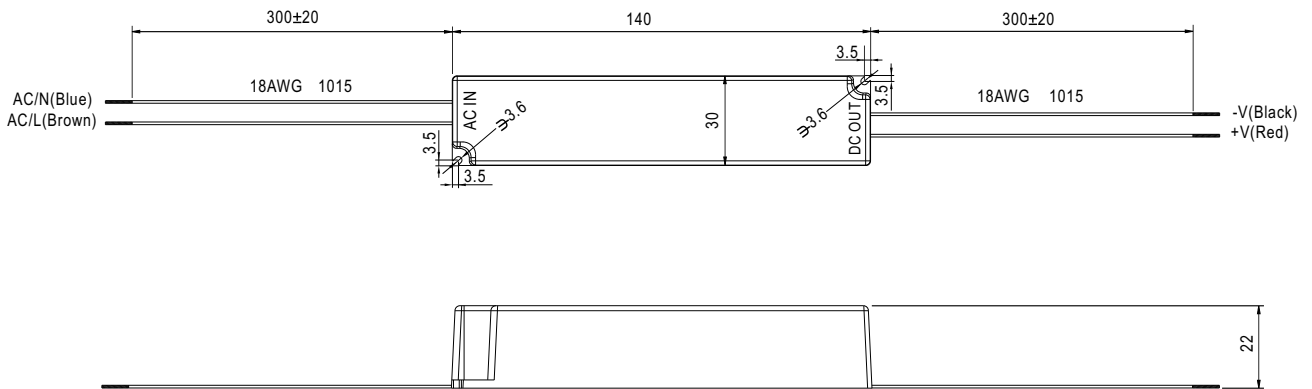
LPS IP67 CE

### SPECIFICATION

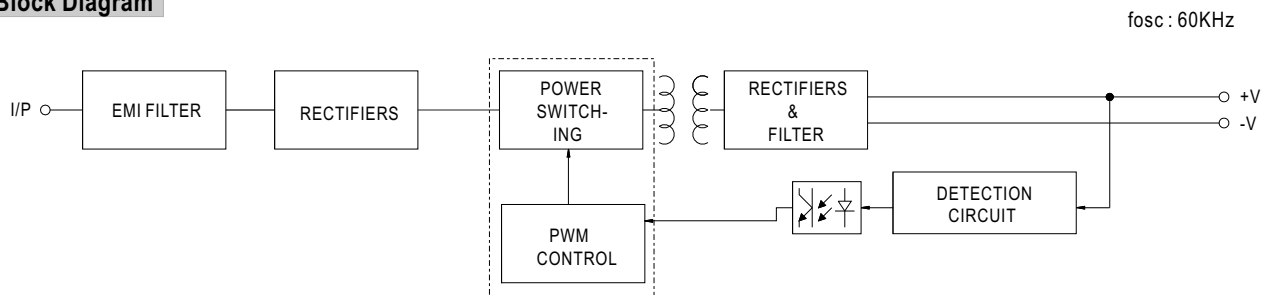
MODEL		LPHC-18-350	LPHC-18-700
OUTPUT	RATED CURRENT	350mA	700mA
	DC VOLTAGE RANGE	6~48V	6~25V
	RATED POWER	16.8W	17.5W
	RIPPLE & NOISE (max.) Note.2	300mVp-p	250mVp-p
	VOLTAGE TOLERANCE Note.3	±5.0%	
	LINE REGULATION	±1.0%	
	LOAD REGULATION	±3.0%	
	SETUP, RISE TIME	3600ms, 100ms / 230VAC	
HOLD UP TIME (Typ.)	20ms/230VAC at full load		
INPUT	VOLTAGE RANGE	180 ~ 264VAC    254 ~ 370VDC	
	FREQUENCY RANGE	47 ~ 63Hz	
	EFFICIENCY(Typ.)	80%	80%
	AC CURRENT	0.3A/230VAC	
	INRUSH CURRENT(max.)	Cold start 50A/230VAC	
	LEAKAGE CURRENT	0.25mA / 240VAC	
PROTECTION	CURRENT LIMIT	±5% rated output current Protection type : Constant current limiting type	
	OVER VOLTAGE	50.4~ 60V	28.75~ 33.75V
	OVER TEMPERATURE	Tj 170 t ypically (U1) Detect on main control IC Protection type : Hiccup mode, recovers automatically after temperature goes down	
ENVIRONMENT	WORKING TEMP.	-30 ~ 70°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	±0.2%/°C (0 ~ 50°C)	
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes	
SAFETY & EMC (Note 5)	SAFETY STANDARDS	IP67 approved; design refer to UL1310 Class 2, TUV EN60950-1, EN61347-2-13, CAN/CSA C22.2 No. 223-M91	
	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 A	
	HARMONIC CURRENT	Compliance to EN61000-3-2 Class A, EN61000-3-3	
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024, Light industry level, criteria A	
OTHERS	MTBF	1200.6K hrs min. MIL-HDBK-217F (25)	
	DIMENSION	140*30*22(L*W*H)	
	PACKING	0.175Kg; 70pcs/13.3Kgs/0.71CUFT	
NOTE	<ol style="list-style-type: none"> <li>1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.</li> <li>2. Ripple &amp; noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf &amp; 47uf parallel capacitor.</li> <li>3. Tolerance : includes set up tolerance, line regulation and load regulation.</li> <li>4. Derating may be needed under low input voltage. Please check the static characteristic for more details.</li> <li>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.</li> </ol>		

■ Mechanical Specification

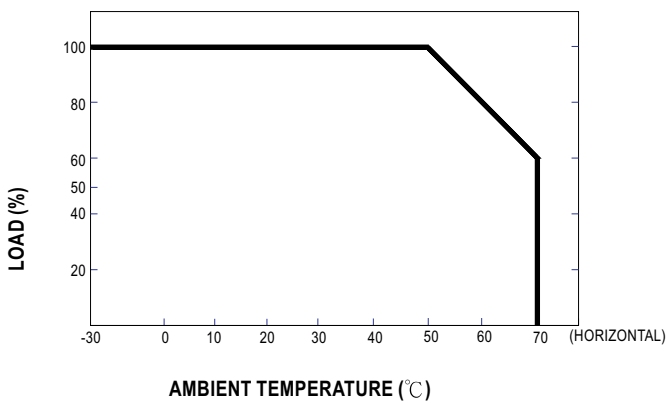
Unit:mm



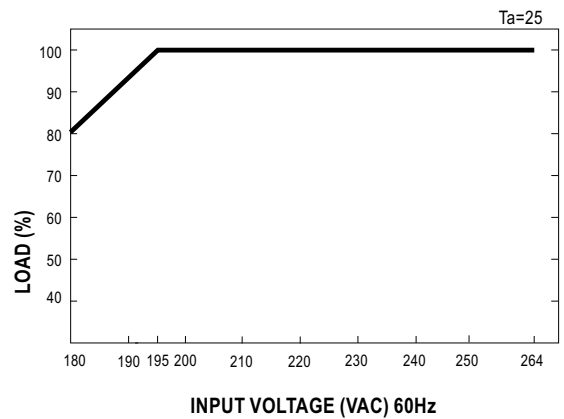
■ Block Diagram



■ Derating Curve



■ Static Characteristics





# Test Report: LPHC-18-700

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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

**■ ESIGN VERIFY TEST**
**OUTPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 250 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 40.8 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 : 0.22 %~ -0.22 %	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 : 0.2 %~ -0.2 %	P
5	SET UP TIME	230VAC : 3600 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 2229 ms	P
6	RISE TIME	230VAC : 100 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 16 ms	P
7	HOLD UP TIME	230VAC : 20 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 69 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 : 2500 mVp-p	I/P : 230VAC O/P : FULL /Min LOAD 90%DUTY/ 1KHZ Ta : 25°C	220 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 )	83 V~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	82.3 %	P
4	INPUT CURRENT	230V/ 0.3 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 0.19 A/ 230 VAC	P
5	INRUSH CURRENT	230V/ 50 A (TYP)  COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 42 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	100 %/ 230 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 28.75 V~33.75 V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	29.98 V/ 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) 524 V	P
2	Diode Peak Voltage	D 10 Rated : 3A/200V HER303  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) 125 V (2) 123 V  (1) 31.6 V (2) 26.8 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) 392 V	P
4	Input Capacitor Voltage	C5 Rated : 27uF/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) 368.4 V (2) 375.8 V (3) 378.4 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) 30.43 V (2) 24.56 V (3) 24.7 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 : 0.418 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			<b>P</b>
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	<b>P</b>
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	<b>P</b>
4	TEMPERATURE COEFFICIENT	± 0.2 % (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.06 % (0-50°C)	<b>P</b>
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	<b>P</b>
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	<b>P</b>



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

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

2003/12/12 A50-F023