


Features :

- Constant voltage mode power supply
- Universal AC input / Full range
- Fully encapsulated with IP67 level
- Withstand 300VAC surge input for 5 seconds
- Protections: Short circuit / Over current / Over voltage
- Fully isolated plastic case
- Cooling by free air convection
- Small and compact size
- UL1310 Class 2 power unit
- Pass LPS
- 100% full load burn-in test
- Low cost, high reliability
- Suitable for LED lighting and moving sign applications
- 2 years warranty

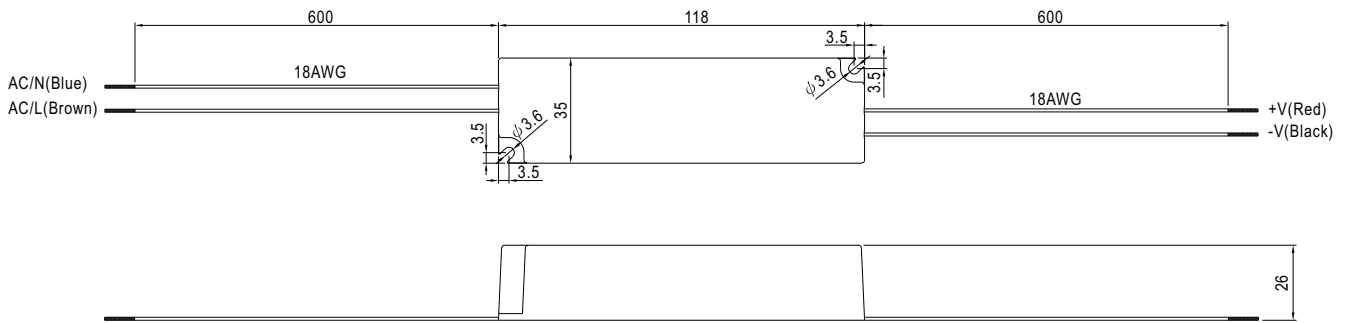
LPS IP67   
SPECIFICATION

MODEL		LPV-20-5	LPV-20-12	LPV-20-15	LPV-20-24
OUTPUT	DC VOLTAGE	5V	12V	15V	24V
	RATED CURRENT	3A	1.67A	1.33A	0.84A
	CURRENT RANGE	0 ~ 3A	0 ~ 1.67A	0 ~ 1.33A	0 ~ 0.84A
	RATED POWER	15W	20W	20W	20.2W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	120mVp-p	120mVp-p	150mVp-p
	VOLTAGE TOLERANCE Note.3	±5.0%			
	LINE REGULATION	±1.0%			
	LOAD REGULATION	±2.0%			
INPUT	SETUP, RISE TIME Note.6	500ms, 20ms / 230VAC 500ms, 20ms / 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.)	77%	81%	83%	83%
	AC CURRENT	0.55A/115VAC 0.35A/230VAC			
PROTECTION	INRUSH CURRENT(max.)	COLD START 35A/115VAC 70A/230VAC			
	LEAKAGE CURRENT	0.25mA / 240VAC			
	OVER CURRENT	110 ~ 150% rated output power Protection type : Hiccup mode, recovers automatically after fault condition is removed			
ENVIRONMENT	OVER VOLTAGE	5.75 ~ 6.75V	13.8 ~ 16V	17.5 ~ 21V	28 ~ 32V
	WORKING TEMP.	-30 ~ +70°C (Refer to output load derating curve)			
	WORKING HUMIDITY	20 ~ 90% RH non-condensing			
SAFETY & EMC	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	UL879, UL1310 Class 2, CAN/CSA C22.2 No. 223-M91, IP67 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	786.5Khrs min. MIL-HDBK-217F (25°C)			
	DIMENSION	118*35*26mm (L*W*H)			
PACKING		0.22Kg; 60pcs/14.2Kg/0.62CUFT			

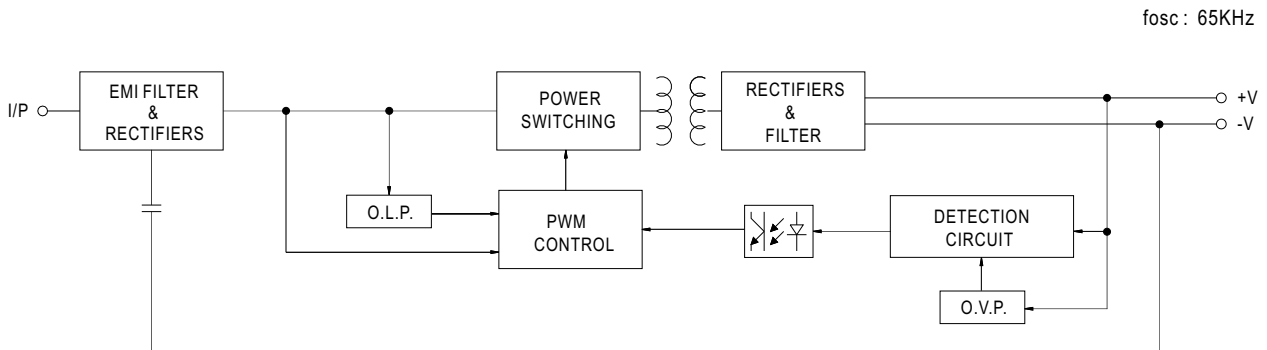
1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uF & 47uF parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation 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.

Mechanical Specification

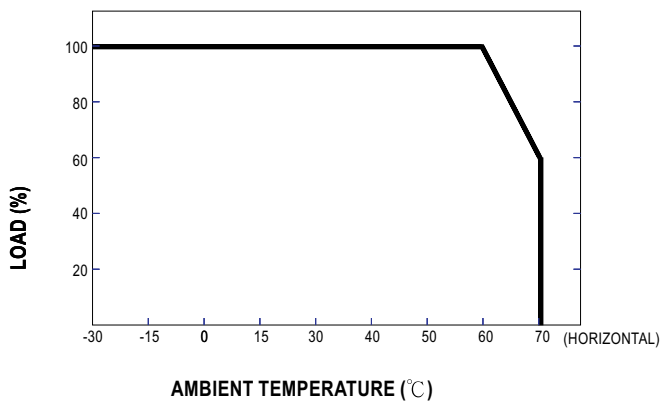
Case No. 972A Unit:mm



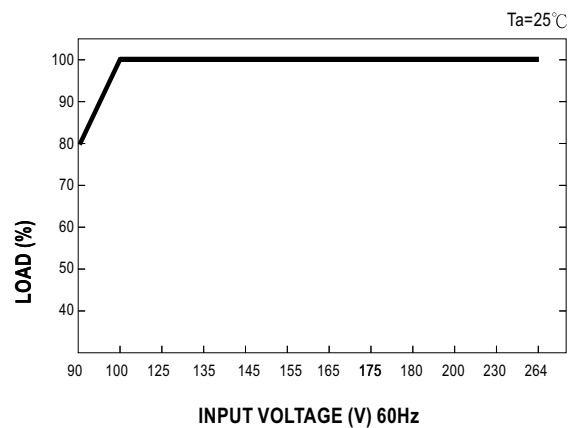
Block Diagram



Derating Curve



Static Characteristics



MODEL : LPV-20-15

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 120 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25°C	V1: 23 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1: 5 %~ -5 % (Max)	I/P: 100 VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.2 %~ -0.2 %	P
3	LINE REGULATION	V1: 1 %~ -1 % (Max)	I/P: 100VAC ~ 264 VAC O/P:FULL LOAD Ta:25°C	V1: 0.04 %~ -0.04 %	P
4	LOAD REGULATION	V1: 2 %~ 2 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.2 %~ -0.2 %	P
5	SET UP TIME	230VAC: 500 ms (Max) 115 VAC: 500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 162 ms 115VAC/ 324 ms	P
6	RISE TIME	230VAC: 20 ms (Max) 115VAC: 20 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 8.5 ms 115VAC/ 7 ms	P
7	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/ 97 ms 115VAC/ 20 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: 1500 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	338 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: FULL LOAD Ta: 25°C	62V~264V	P
			I/P: LOW-LINE-3V= 87 V 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: 100 VAC ~ 264 VAC O/P: FULL~MIN LOAD Ta: 25°C	TEST: OK	P
3	EFFICIENCY	83% (TYP)	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	83.1%	P
4	INPUT CURRENT	230V/ 0.35 A (TYP) 115V/ 0.55 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 0.24 A/ 230 VAC I = 0.42 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 70 A (TYP) 115V/ 35 A (TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 61 A/ 230 VAC I = 31 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P: 240 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	110%~ 150 %	I/P: 230 VAC I/P: 115 VAC O/P: TESTING Ta: 25°C	141.8%/ 230 VAC 134%/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1: 17.5 V~ 21 V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	18.8V/ 230 VAC 18.8V/ 115 VAC Shut off o/p voltage clamping by zener diode	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																						
1	TEMPERATURE RISE TEST	MODEL : LPV-20-24 1. ROOM AMBIENT BURN-IN : 45 HRS I/P: 230VAC O/P: FULL LOAD Ta=32.4 °C 2. HIGH AMBIENT BURN-IN : 12 HRS I/P: 230VAC O/P: FULL LOAD Ta=65.4 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta=32.4 °C</th><th>HIGH AMBIENT Ta=65.4 °C</th></tr><tr><td>1</td><td>U1</td><td>NCP1230</td><td>55.6°C</td><td>82.4°C</td></tr><tr><td>2</td><td>C5</td><td>47U/400V 105°C KM</td><td>56.5°C</td><td>83.1°C</td></tr><tr><td>3</td><td>BD1</td><td>2A/600V</td><td>54.3°C</td><td>80.7°C</td></tr><tr><td>4</td><td>LF1</td><td>LF-802</td><td>54.0°C</td><td>80.8°C</td></tr><tr><td>5</td><td>D1</td><td>EGP20J 2A/600V</td><td>71.6°C</td><td>99.7°C</td></tr><tr><td>6</td><td>Q1</td><td>2SK2865 2A/600V</td><td>74.2°C</td><td>103.1°C</td></tr><tr><td>7</td><td>ZD1</td><td>P6KE180A</td><td>61.8°C</td><td>83.5°C</td></tr><tr><td>8</td><td>D100</td><td>31DQ10 3A/100V</td><td>71.1°C</td><td>96.5°C</td></tr><tr><td>9</td><td>C40</td><td>47U/25V 105°C YXF</td><td>59.8°C</td><td>87.2°C</td></tr><tr><td>10</td><td>C105</td><td>220u/25V LL3K KF</td><td>61.0°C</td><td>87.0°C</td></tr><tr><td>11</td><td>L100</td><td>DR006C 6*8 0.55Φ 6.8uH</td><td>56.7°C</td><td>83.2°C</td></tr><tr><td>12</td><td>T1</td><td>TF1768</td><td>67.0°C</td><td>93.4°C</td></tr><tr><td>13</td><td>CASE</td><td>UPCASE</td><td>53.7°C</td><td>80.1°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta=32.4 °C	HIGH AMBIENT Ta=65.4 °C	1	U1	NCP1230	55.6°C	82.4°C	2	C5	47U/400V 105°C KM	56.5°C	83.1°C	3	BD1	2A/600V	54.3°C	80.7°C	4	LF1	LF-802	54.0°C	80.8°C	5	D1	EGP20J 2A/600V	71.6°C	99.7°C	6	Q1	2SK2865 2A/600V	74.2°C	103.1°C	7	ZD1	P6KE180A	61.8°C	83.5°C	8	D100	31DQ10 3A/100V	71.1°C	96.5°C	9	C40	47U/25V 105°C YXF	59.8°C	87.2°C	10	C105	220u/25V LL3K KF	61.0°C	87.0°C	11	L100	DR006C 6*8 0.55Φ 6.8uH	56.7°C	83.2°C	12	T1	TF1768	67.0°C	93.4°C	13	CASE	UPCASE	53.7°C	80.1°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230 VAC O/P:140 % 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 60°C NO DAMAGE	I/P: 272 VAC O/P:FULL LOAD Ta=60 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																						
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P: 230 VAC O/P:FULL LOAD	± 0.003 %(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: 3.6 KVAC/min Ta:25°C	I/P-O/P: 0.855 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: 12.1 GΩ NO DAMAGE	P
3	APPROVAL	TUV: Certificate NO : UL: File NO :			N

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 230/240/220VAC/ 50HZ O/P:100/75/50/25%LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P: 230VAC(50HZ)//115V(60HZ) O/P:FULL/ 50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P: 230VAC(50HZ)//115V(60HZ) O/P:FULL/ 50% 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				

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	LPV-20-24 :SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta=25 °C LIFE TIME=102712 HRS I/P: 230VAC O/P:FULL LOAD Ta=60 °C LIFE TIME=14739 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 786.5KHRS			P
3	ORT (Ongoing Reliability test)	LPV-20-24:I/P : 230VAC O/P : FULL LOAD TA=50°C Sample=10pcs	TEST TIME=1464HRS		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 STD4NK60Z-1 4A/600V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Output Short Ta:25℃	(1) 510 V (2) 566 V	P
2	Diode Peak Voltage	D100 Rated HER303 3A/200V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2)Output Short Ta:25℃	(1) 130 V (2) 120 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℃	(1) 500 V	P
4	Input Capacitor Voltage	C5 Rated 47u/400V 105℃ KM	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℃	(1) 376 V (2) 374 V (3) 376 V	P
5	Control IC Voltage Test	U1Rated NCP1230 /18V	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℃	(1) 13.7 V (2) 9.7 V (3) 13.7 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2008/4/1	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2008/6/20	PRODUCT SAMPLE W0804D14	PASS	SANFORD SU	VINCENT TSENG
2008/8/1	PRODUCT SAMPLE W0806D10	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023