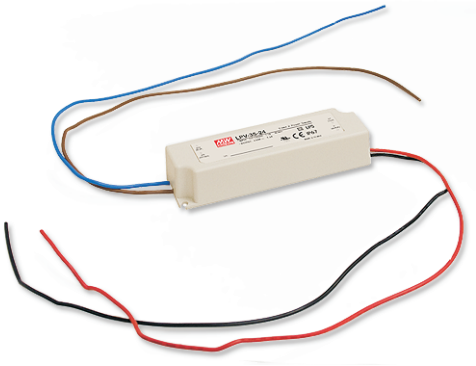
35W Single Output Switching Power Supply

LPV-35 series



Features :

- Constant voltage design
- Universal AC input / Full range
- Fully encapsulated with IP67 level
- Withstand 300VAC surge input for 5 seconds
- Protections: Short circuit / Overload / Over voltage
- Fully isolated plastic case
- Cooling by free air convection
- 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 (Note.8)
- 2 years warranty

LPS IP67

SPECIFICATION

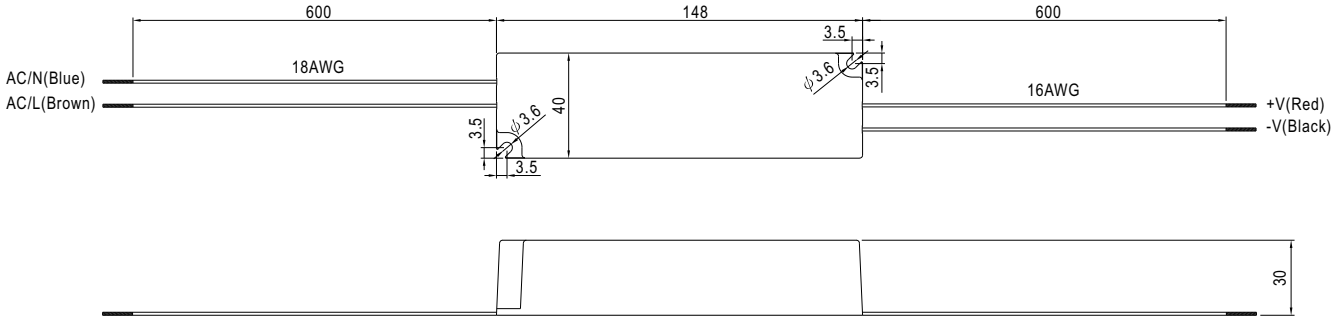
MODEL		LPV-35-5	LPV-35-12	LPV-35-15	LPV-35-24	LPV-35-36
OUTPUT	DC VOLTAGE	5V	12V	15V	24V	36V
	RATED CURRENT	5A	3A	2.4A	1.5A	1A
	CURRENT RANGE	0 ~ 6A (Note.7)	0 ~ 3A	0 ~ 2.4A	0 ~ 1.5A	0 ~ 1A
	RATED POWER	30W	36W	36W	36W	36W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	120mVp-p	120mVp-p	150mVp-p	150mVp-p
	VOLTAGE TOLERANCE Note.3	±6.0%	±5.0%			
	LINE REGULATION	±1.0%				
	LOAD REGULATION	±4.0%	±2.0%			
	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				
INPUT	VOLTAGE RANGE Note.4	90 ~ 264VAC 127 ~ 370VDC				
	FREQUENCY RANGE	47 ~ 63Hz				
	EFFICIENCY (Typ.)	77%	84%	84%	85%	85%
	AC CURRENT	1.1A/115VAC 0.7A/230VAC				
	INRUSH CURRENT(max.)	COLD START 30A/115VAC 60A/230VAC				
	LEAKAGE CURRENT	0.25mA / 240VAC				
PROTECTION	OVER CURRENT	110 ~ 150% rated output power				
		Protection type : Hiccup mode, recovers automatically after fault condition is removed				
	OVER VOLTAGE	5.75 ~ 6.75V	13.8 ~ 16.2V	17.25 ~ 20.25V	27.6 ~ 32.4V	41.4 ~ 48.6V
		Protection type : Shut down o/p voltage, re-power on to recover				
ENVIRONMENT	WORKING TEMP.	-30 ~ +75℃ (Refer to output load derating curve)				
	WORKING HUMIDITY	20 ~ 90% RH non-condensing				
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH				
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)				
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes				
SAFETY & EMC	SAFETY STANDARDS	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℃/ 70% RH				
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B				
	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	743.5Khrs min. MIL-HDBK-217F (25℃)				
	DIMENSION	148*40*30mm (L*W*H)				
	PACKING	0.34Kg; 40pcs/14.6Kg/0.63CUFT				

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ 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. LPV-35-5 can provide 6A of output current continuously. Based on the requirement of UL1310 class 2, the output current is only certified up to 5A for the test report of LPV-35-5.
8. In the European market this power supply can be used for LED lighting applications with input power up to 25W.

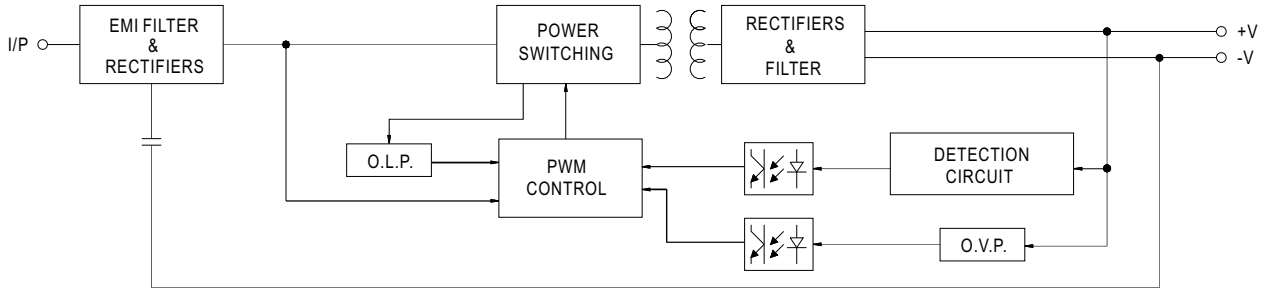
■ Mechanical Specification

Case No.975A Unit:mm

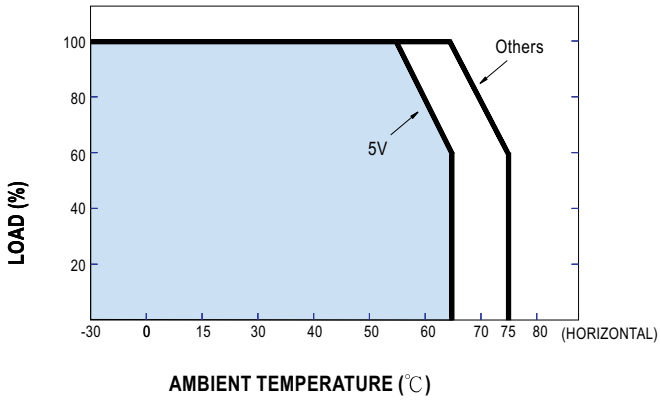


■ Block Diagram

fosc : 65KHz

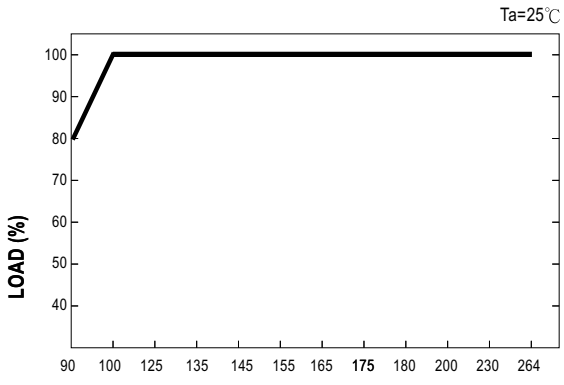


■ Derating Curve



AMBIENT TEMPERATURE (℃)

■ Static Characteristics



INPUT VOLTAGE (V) 60Hz

MODEL：LPV-35-36

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1:150 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25℃	V1: 53 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1:5 %~ -5 % (Max)	I/P: 100VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25℃	V1: 0.09 %~ -0.09 %	P
3	LINE REGULATION	V1: 1 %~ -1 % (Max)	I/P: 100 VAC ~ 264 VAC O/P:FULL LOAD Ta:25℃	V1: 0.03 %~ -0.03 %	P
4	LOAD REGULATION	V1: 2%~ -2% (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0.09 %~ -0.09 %	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℃	230VAC/ 155 ms 115VAC/ 117 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℃	230VAC/ 11 ms 115VAC/ 10 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℃	230VAC/ 123 ms 115VAC/ 27 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	TEST: <5 %	P
9	DYNAMIC LOAD	V1: 3600 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25℃	196 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℃	57 V~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: 100VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK	P
3	EFFICIENCY	85% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	85.9 %	P
4	INPUT CURRENT	230V/ 0.7 A (TYP) 115V/ 1.1 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 0.36 A/ 230 VAC I = 0.62 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 60 A (TYP) 115V/ 30 A(TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 51 A/ 230 VAC I = 26 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P: 264 VAC O/P:Min LOAD Ta:25℃	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℃	137 %/ 230 VAC 132 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1: 41.4V~48.6V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25℃	43.55 V/ 230 VAC 43.51 V/ 115 VAC Shut down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P:FULL LOAD Ta:25℃	NO DAMAGE Hiccup Mode	P

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： LPV-35-24
1. ROOM AMBIENT BURN-IN：2.5 HRS
I/P: 230VAC O/P: FULL LOAD Ta= 28.4 ℃
2. HIGH AMBIENT BURN-IN：3 HRS
I/P: 230VAC O/P: FULL LOAD Ta= 67.2 ℃

<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta=28.4 ℃</th><th>HIGH AMBIENT Ta= 67.2℃</th></tr>
<tr><td>1</td><td>LF1</td><td>LF-158</td><td>48.4℃</td><td>83.3℃</td></tr>
<tr><td>2</td><td>BD1</td><td>2A/800V KBP208G</td><td>57.2℃</td><td>92.7℃</td></tr>
<tr><td>3</td><td>C5</td><td>100u/400V 105℃ KMG</td><td>60.3℃</td><td>96.1℃</td></tr>
<tr><td>4</td><td>D1</td><td>EGP20J 2A/600V</td><td>78.3℃</td><td>114.9℃</td></tr>
<tr><td>5</td><td>T1</td><td>TF-1793</td><td>71.6℃</td><td>107.3℃</td></tr>
<tr><td>6</td><td>U1</td><td>NCP1230D65R2G</td><td>59.6℃</td><td>95.1℃</td></tr>
<tr><td>7</td><td>Q1</td><td>STF6NM60N :600 V/ 4.6A</td><td>86.1℃</td><td>105℃</td></tr>
<tr><td>8</td><td>C40</td><td>47u/50V UL10Kh YXM</td><td>69.2℃</td><td>106.0℃</td></tr>
<tr><td>9</td><td>D40</td><td>1A/100V 1N4002</td><td>74.8℃</td><td>112.6℃</td></tr>
<tr><td>10</td><td>D100</td><td>FMX-12SL 10A/200V</td><td>78.6℃</td><td>113.2℃</td></tr>
<tr><td>11</td><td>C105</td><td>330u/35V L7Kh 10*16 YXG</td><td>65.8℃</td><td>100.3℃</td></tr>
<tr><td>12</td><td>L100</td><td>RB010E-R2</td><td>67.4℃</td><td>101.8℃</td></tr>
<tr><td>13</td><td>LF100</td><td>TR574</td><td>54.2℃</td><td>88.9℃</td></tr>
<tr><td>14</td><td>CASE</td><td>UPCASE</td><td>53.6℃</td><td>90℃</td></tr>
</table></td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P: 230 VAC
O/P:125 % LOAD
Ta:32.9℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P: 230 VAC
O/P: 100 % LOAD
Ta= -35 ℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 65℃
NO DAMAGE</td><td>I/P: 272 VAC
O/P:FULL LOAD
Ta= 65 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0~50℃)</td><td>I/P: 230 VAC
O/P:FULL LOAD</td><td>± 0.005 %(0~50℃)</td><td>P</td></tr>
<tr><td>6</td><td>VIBRATION TEST</td><td colspan="2">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℃</td><td>TEST：OK</td><td>P</td></tr>
</table>

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	I/P-O/P: 1.912 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25℃ / 70%RH	I/P-O/P: 22.1 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: 230/240/220 VAC/50HZ O/P:100/75/50/25% LOAD Ta:25℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC (50HZ)/115V(60HZ) O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P: 230 VAC (50HZ) /115(60HZ) O/P:FULL 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:FULL LOAD Ta:25℃	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℃	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℃	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-35-24：SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta=25 ℃ LIFE TIME=158798 HRS I/P: 230VAC O/P:FULL LOAD Ta=65 ℃ LIFE TIME=13343 HRS I/P: 230VAC O/P:75% LOAD Ta=65 ℃ LIFE TIME=19559 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 743.5 KHRS			P
3	ORT (Ongoing Reliability test)	LPV-35-24:I/P：230VAC O/P：FULL LOAD TA=50℃ Sample=10pcs TEST TIME=3504HRS			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 STF6NM60N :600 V/ 4.6A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Output Short Ta:25℃	(1) 576 V (2) 584 V	P
2	Diode Peak **Voltage**	D100Rated SF10LC40 10A/400V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2)Output Short Ta:25℃	(1) 344 V (2) 346 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) 518 V	P
4	**Input Capacitor Voltage**	C5 Rated 120u/400V 105℃ KMG	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) 369 V (2) 374 V (3) 374 V	P
5	**Control IC Voltage Test**	U1 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) 12.34 V (2) 10.29 V (3) 12.34 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2008/5/5	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2008/9/4	PRODUCT SAMPLE W0806C09	PASS	SANFORD SU	VINCENT TSENG
2008/9/16	PRODUCT SAMPLE W0808D12	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023