



# Test Report: SPV-150-24

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150W Single Output With PFC Function

## ■ DESIGN VERIFY TEST

Output Function Test  
Input Function Test  
Protection Function Test  
Control 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	V1:150 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25°C	V1: 20 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 20V- 26.4V Adjustment by VR	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	19.99 V~ 27.62 V/ 230 VAC 19.99 V~ 27.62 V/ 115 VAC	P
3	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.8V-26.4V Adjustment by 1V-5.5VDC external control	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	4.783 V~ 26.38 V/ 230 VAC 4.78 V~ 26.38 V/ 115 VAC	P
4	OUTPUT VOLTAGE TOLERANCE	V1: 1%- -1% (Max)	I/P: 135VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.024 %- 0.024 %	P
5	LINE REGULATION	V1: 0.2 %- -0.2 % (Max)	I/P: 135VAC - 264 VAC O/P:FULL LOAD Ta:25°C	V1: 0 %- 0 %	P
6	LOAD REGULATION	V1: 0.5 %- -0.5 % (Max)	I/P: 230 VAC O/P:FULL -MIN LOAD Ta:25°C	V1: 0 %- -0.024 %	P
7	SET UP TIME	230VAC: 800 ms (Max) 115 VAC: 2500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 489.6 ms 115VAC/ 978 ms	P
8	RISE TIME	230VAC: 50 ms (Max) 115VAC: 50 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 15.2 ms 115VAC/ 15.3 ms	P
9	HOLD UP TIME	230VAC: 16 ms (TYP) 115VAC: 16 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 42.56 ms 115VAC/ 42.91 ms	P
10	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: <5 %	P
11	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	154 mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	88VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	55.38 V~264V	P
			I/P: LOW-LINE-3V= 85 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: 88VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK	P
3	POWER FACTOR	0.94 / 230 VAC(TYP) 0.98 / 115 VAC(TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	PF= 0.958 / 230 VAC PF= 0.998 / 115 VAC	P
4	EFFICIENCY	83 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	84.7 %	P
5	INPUT CURRENT	230V/ 1.25 A (TYP) 115V/ 2.5 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 0.806 A/ 230 VAC I = 1.588 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 40 A (TYP) 115V/ 20 A(TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 25.3 A/ 230 VAC I = 23.3 A/ 115 VAC	P
7	LEAKAGE CURRENT	< 1 mA / 240 VAC	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.8 mA N-FG: 0.8 mA	P

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 150%	I/P: 230 VAC I/P: 115 VAC O/P: TESTING Ta:25°C	134%/ 230 VAC 134 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1: 27.6V~ 32.4V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta:25°C	29.1 V/ 230 VAC 29 V/ 115 VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC: TSW1: 80 ± 5°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL 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: FULL LOAD Ta:25°C	NO DAMAGE Constant Current Limiting	P

### CONTROL FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE CONTROL	RC/-V: 0 ~ 0.8VDC : POWER ON 4 ~ 6VDC : POWER OFF	I/P: 230 VAC O/P: FULL LOAD Ta:25°C	POWER ON: 0 V~1.8 V POWER OFF: 1.83V~ 6.4 V	P
2	PROGRAMMING SETTING	PV/-V: 1V~5.5V for output 4.8V~26.4V PV/-S : 1V±0.5%for output=4.8V±5% PV/-S: 2.5V±0.5%for output=12V±2.5% PV/-S : 5V±0.5%for output=24V±2.5%	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta:25°C	PV/-V : 5 V for output = 23.99 V PV/-V : 2.5 V for output =11.918V PV/-V : 1 V for output =4.765V PV/-V: 5 V for output = 23.99V PV/-V: 2.5V for output = 11.919V PV/-V 1V for output = 4.759V	P

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q1 Rated IRFP460A : 500V/20A  Q2 Rated 2SK3878 : 900V 9 A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Output Short Ta:25°C	(1) 414 V (2) 390 V  (1) 824 V (2) 932 V	P
2	Diode Peak <b>Voltage</b>	D19 Rated S20LC20U 20A/200V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2)Output Short Ta:25°C	(1) 99.6 V (2) 123 V	P
3	Clamp Diode Peak <b>Voltage</b>	D4 Rated BYV26EGP 1A/1KV	I/P:High-Line +3V = 267 V O/P: (1) Dynamic Load 90%Duty/1KHz Ta:25°C	(1) 753 V	P
4	<b>Input Capacitor Voltage</b>	C5 Rated 150 u /400V/85°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) 390 V (2) 424 V (3) 396 V	P
5	<b>Control IC Voltage Test</b>	U1 Rated ML4800 CP: 16 V	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) 12.847 V (2) 13.81 V (3) 12.96 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-FG: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25°C	I/P-O/P: 6.85 mA I/P-FG: 5.57 mA O/P-FG: 7.64 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 I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C / 70%RH	I/P-O/P: 11.6 GΩ I/P-FG: 13.4 GΩ O/P-FG: 15.4 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C / 70%RH	2 mΩ	P

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	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 : SPV-150-24 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 30.2 °C 2. HIGH AMBIENT BURN-IN : 14 HRS I/P : 230VAC O/P : FULL LOAD Ta= 53.2 °C			<b>P</b>																																																																																																																								
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>PART NUMBER</th> <th>ROOM AMBIENT Ta= 30.2 °C</th> <th>HIGH AMBIENT Ta= 53.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>D10XB60</td><td>87.7°C</td><td>105.3°C</td></tr> <tr><td>2</td><td>Q1</td><td>IRFP-460A</td><td>62.1°C</td><td>81.3°C</td></tr> <tr><td>3</td><td>D3</td><td>BYC10-600</td><td>58.2°C</td><td>78.0°C</td></tr> <tr><td>4</td><td>Q2</td><td>2SK3878</td><td>62.3°C</td><td>81.5°C</td></tr> <tr><td>5</td><td>TSW1</td><td>ST-22W-R2 75°C 90mm</td><td>65.3°C</td><td>80.8°C</td></tr> <tr><td>6</td><td>L1</td><td>TR-337</td><td>84.5°C</td><td>104.4°C</td></tr> <tr><td>7</td><td>TI COIL</td><td>TF-884</td><td>88.9°C</td><td>111.0°C</td></tr> <tr><td>8</td><td>L2</td><td>TR-336</td><td>91.7°C</td><td>111.1°C</td></tr> <tr><td>9</td><td>D19</td><td>SBL3060PT 30A/60V</td><td>61.2°C</td><td>79.7°C</td></tr> <tr><td>10</td><td>C52</td><td>1500u/35V</td><td>81.5°C</td><td>97.0°C</td></tr> <tr><td>11</td><td>C53</td><td>1500u/35V</td><td>79.2°C</td><td>96.0°C</td></tr> <tr><td>12</td><td>C1</td><td>0.68uF/250VAC</td><td>49.3°C</td><td>67.7°C</td></tr> <tr><td>13</td><td>LF2</td><td>TF-360</td><td>64.4°C</td><td>83.0°C</td></tr> <tr><td>14</td><td>U1</td><td>4800CP</td><td>57.7°C</td><td>77.0°C</td></tr> <tr><td>15</td><td>D4</td><td>BYV26EGP</td><td>89.4°C</td><td>108.5°C</td></tr> <tr><td>16</td><td>RTH2</td><td>5K</td><td>93.8°C</td><td>117.4°C</td></tr> <tr><td>17</td><td>C32</td><td>4.7u/50V</td><td>52.3°C</td><td>71.2°C</td></tr> <tr><td>18</td><td>C33</td><td>10u/50V</td><td>64.4°C</td><td>83.4°C</td></tr> <tr><td>19</td><td>C34</td><td>100u/35V</td><td>65.7°C</td><td>84.5°C</td></tr> <tr><td>20</td><td>C39</td><td>47u/25V</td><td>56.5°C</td><td>75.6°C</td></tr> <tr><td>21</td><td>C29</td><td>100u/25V</td><td>109.5°C</td><td>130.6°C</td></tr> <tr><td>22</td><td>C60</td><td>47u/50V</td><td>88.1°C</td><td>108.6°C</td></tr> <tr><td>23</td><td>D10</td><td>HER102</td><td>74.9°C</td><td>95.3°C</td></tr> </tbody> </table>	NO	Position		PART NUMBER	ROOM AMBIENT Ta= 30.2 °C	HIGH AMBIENT Ta= 53.2 °C	1	BD1	D10XB60	87.7°C	105.3°C	2	Q1	IRFP-460A	62.1°C	81.3°C	3	D3	BYC10-600	58.2°C	78.0°C	4	Q2	2SK3878	62.3°C	81.5°C	5	TSW1	ST-22W-R2 75°C 90mm	65.3°C	80.8°C	6	L1	TR-337	84.5°C	104.4°C	7	TI COIL	TF-884	88.9°C	111.0°C	8	L2	TR-336	91.7°C	111.1°C	9	D19	SBL3060PT 30A/60V	61.2°C	79.7°C	10	C52	1500u/35V	81.5°C	97.0°C	11	C53	1500u/35V	79.2°C	96.0°C	12	C1	0.68uF/250VAC	49.3°C	67.7°C	13	LF2	TF-360	64.4°C	83.0°C	14	U1	4800CP	57.7°C	77.0°C	15	D4	BYV26EGP	89.4°C	108.5°C	16	RTH2	5K	93.8°C	117.4°C	17	C32	4.7u/50V	52.3°C	71.2°C	18	C33	10u/50V	64.4°C	83.4°C	19	C34	100u/35V	65.7°C	84.5°C	20	C39	47u/25V	56.5°C	75.6°C	21	C29	100u/25V	109.5°C	130.6°C	22	C60	47u/50V	88.1°C	108.6°C	23	D10	HER102	74.9°C	95.3°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 133 % LOAD Ta : 25°C	TEST : OK	<b>P</b>																																																																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -25 °C	TEST : OK	<b>P</b>																																																																																																																								
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 : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	<b>P</b>																																																																																																																								
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.008 %/°C (0-50°C)	<b>P</b>																																																																																																																								

6	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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -25°C~ +45°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 AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK	P
8	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
9	CAPACITOR LIFE CYCLE	SUPPOSE C52 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= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 89766HRS (2) 53418HRS (3) 73434HRS (4) 82030HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 207 KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 40°C		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/7/30	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023