



Test Report: SPX-120-12

120W Single Output Switching Power Supply

DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Other Test

Component Stress Test

SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

RELIABILITY 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: 230 VAC O/P:FULL LOAD Ta:25 κ	V1: 203 mVpp (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.8V~13.5 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25 κ	10.527 V~13.841 V /230VAC 10.525 V~13.841 V/115VAC	P
3	CURRENT ADJ RANGE	5A~10A	I/P: 230 VAC O/P:FULL LOAD Ta:25 κ	3.9 2 5 A~ 10.9 6 4 A	P
4	CONSTANT CURRENT REGION	6V~12V	I/P: 230 VAC O/P:CV MODE Ta:25 κ	O/P=6V: 10.082 A O/P=11V:10.124 A	P
5	OUTPUT VOLTAGE TOLERANCE	V1: -25 % ~ 25 % (Max)	I/P: 100 VAC /264VAC O/P:FULL/ 0% LOAD Ta:25 κ	V1: -0.6 %~0.6 %	P
6	LINE REGULATION	V1: - 0.5% ~ 05 % (Max)	I/P:100 VAC ~264 VAC O/P:FULL LOAD Ta:25 κ	V1: -0.06 %~0.06 %	P
7	LOAD REGULATION	V1: - 2% ~ 2% (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25 κ	V1: -0.52 %~0.52 %	P
8	SET UP TIME	230VAC/ 2500 ms (Max) 115VAC/ 2500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25 κ	230VAC/ 885 ms 115 VAC/ 70 ms	P
9	RISE TIME	230VAC/ 50 ms (Max) 115VAC/ 50 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25 κ	230VAC/ 96 ms 115 VAC/ 95 ms	P
10	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 κ	230VAC/ 23 ms 115 VAC/ 2 ms	P
11	OVER/UNDERSHOOT TEST	<+ _5%	I/P: 230 VAC O/P:FULL LOAD Ta:25 κ	TEST:< 5 %	P
12	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230 VAC O/P:(1)FULL /Min LOAD 90 % D U T Y / 1 K H Z (2)FULL /Min LOAD 90 % D U T Y / 1 2 0 H Z Ta:25 κ	81.8 m V p - p 85.2 m V p - p	P

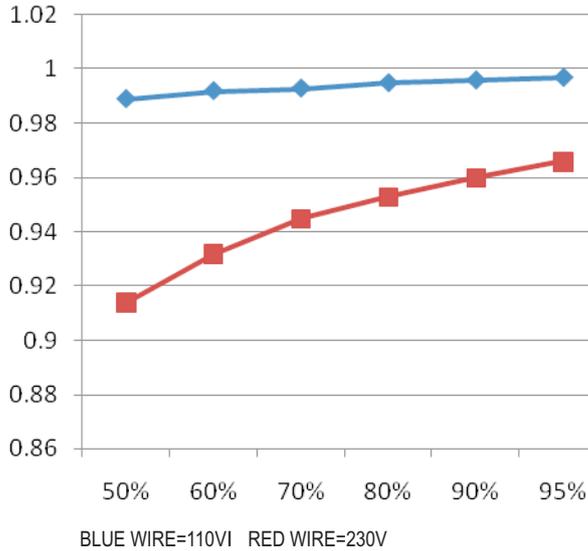
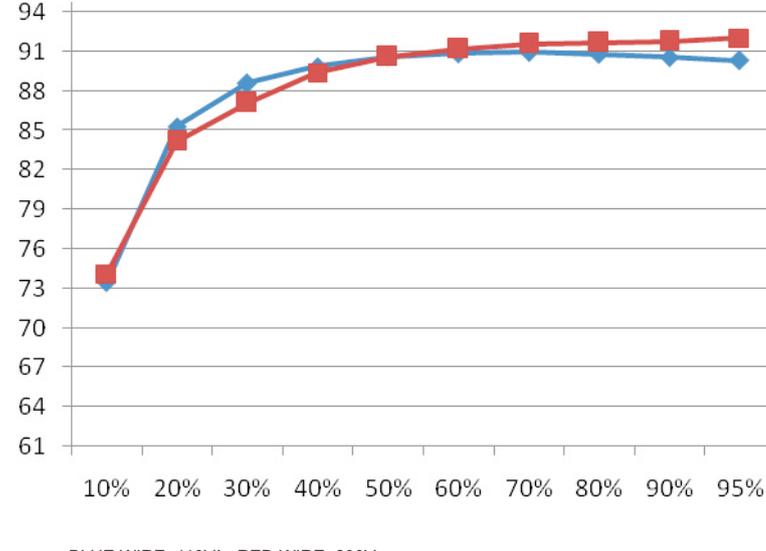
INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25 κ	79 V ~ 2 6 4 V	P
			I/P: (1) LOW-LINE - 3 V = 8 7 V (2) HIGH-LINE = 2 6 4 V O/P : FULL / MIN LOAD ON : 3 0 S_e .oFF: 30 Sec 10MIN (A C P O W E R O N / O F F N O D A M A	TEST: OK	
2	INPUT FREQUENCY RANGE	47 H Z ~ 6 3 H Z NO DAMAGE OSC	I/P: 100 VAC ~264VAC O/P:FULL~MIN LOAD Ta:25 κ	OK	P
3	POWER FACTOR	0.95/ 230 VAC FULL LOAD (TYP) 0.98/ 115 VAC FULL LOAD (TYP) 0.9/ 230 VAC 50% LOAD (TYP) 0.9/ 115 VAC 50%LOAD (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD / 50% LOAD Ta:25 κ	PF=0.9627/230V/100%LOAD PF=0.9946 /115V/100%LOAD PF=0.9259 /230V/50%LOAD PF=0.9881/115V/50%LOAD	P
4	EFFICIENCY	92 % (T Y P)	I/P: 230 VAC O/P:FULL LOAD Ta:25 κ	92 . 5 2 %	P
5	INPUT CURRENT	230 V/ 0.6 A 115 V/ 1.4 A	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25 κ	I = 0.59 A/ 230VAC I = 1.6 A/ 115VAC	P
6	INRUSH CURRENT	23 0 V / 7 5 A (T y p) C O L D S T A R T	I/P: 230 VAC O/P:FULL LOAD Ta:25 κ	I = 65 A/230VAC	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 % ~ 1 0 8 %	I/P: 264VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25 κ	10 6 % / 2 6 4 V A C 10 6 % / 2 3 0 V A C 10 6 % / 1 0 0 V A C Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	V1: 14V~17V	I/P: 264VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25 κ	15 . 1 V / 2 6 4 V A C 15 . 2 V / 2 3 0 V A C 15 . 2 V / 1 0 0 V A C Shut down of volāge with auto recovery or re-power on to recovery	P
3	OVER TEMPERATURE PROTECTION	SPEC: RTH2: 85±10κ O.T.P. NO DAMAGE	I/P: 230 VAC O/P:FULL LOAD	O . T . P . A c t i v e Shut down of volāge with auto recovery or re-power on to recovery	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NODAMAGE	I/P: 264VAC O/P: FULL LOAD Ta:25 κ	NO DAMAGE Hiccup Mode	P

OTHER TEST

NO	TEST ITEM	RESULT
1	POWER FACTOR CHARACTERISTIC CONSTANT CURRENT MODE	CONSTANT CURRENT MODE I/P:230V/110V O/P:100/90/80/70/60/50% LOAD Ta25 κ  <p>BLUE WIRE=110VI RED WIRE=230V</p>
2	EFFICIENCY VS LOAD	I/P:230V/110V O/P:100/90/80/70/60/50/40/30/20/10% LOAD Ta25 κ  <p>BLUE WIRE=110VI RED WIRE=230V</p>

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q5 Rated STF13NM50N 12A/500V	I/PK High-Line +3V = 267V O/PK (1) Full Load Turn on (2) Output Short (3) Full load continue TaK 25k	(1) 468 V (2) 466 V (3) 458 V	P
2	Diode Peak Voltage	Q101 Rated IRF1404PbF 202A/40V	I/PK High-Line +3V = 267V O/PK (1) Full Load Turn on (2) Output Short (3) Full load continue TaK 25k	(1) 34 V (2) 351 V (3) 328 V	P
		Q102 Rated IRF1404PbF 202A/40V	I/PK High-Line +3V = 267V O/PK (1) Full Load Turn on (2) Output Short (3) Full load continue TaK 25k	(1) 336 V (2) 356 V (3) 335 V	
3	Input Capacitor Voltage	C5 Rated: 82u/450V 10Kh KXG	I/PK High-Line +3V = 267V O/PK (1) Full Load Turn on/ (2) Min load Turn on / Off (3) Full Load /Min load Change TaK 25k	(1) 4368 V (2) 4373 V (3) 449 V	P
4	Control IC Voltage Test	U 900 Rated L6599AD 885V~16V	I/PK High-Line +3V = 267V O/PK (1) Full Load Turn on/ (2) Min load Turn on / Off (3) Full Load /Min load Change TaK 25k	(1) 141 V (2) 14 V (3) 14 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated STP21NM60N 17A/600V	I/PK High-Line +3V = 267V O/PK (1) Full Load Turn on (2) Output Short (3) Full load continue TaK 25k	(1) 482 V (2) 474 V (3) 478 V	P

SAFETY & EMC TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min<10mA I/P-FG:1.88 KVAC/min<10mA O/P-FG:1.5KVAC/min<10mA	I/P-O/P: 4 KVAC/min I/P-FG: 2.256KVAC/min O/P-FG: 1.8 KVAC/min Ta:25 κ	I/P-O/P: 2.612 mA I/P-FG: 2.350 mA O/P-FG: 3.62 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 κ	I/P-O/P: 30 G Ω I/P-FG: 11 G Ω O/P-FG: 30 G Ω NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40 A / 2 min Ta:25 κ	11 m Ω	P
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25 κ	L-FG: 0225 mA N-FG: 0225 mA	P
5	APPROVAL	TUV: Certificate NO K E3 3 4 9 4 0 UL: File NO K R50185176			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C CLASS D	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25 κ	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25 κ	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25 κ	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25 κ	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY IN P U T : 2 K V	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25 κ	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L - N : 2 K V L, N - P E : 4 K V	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25 κ	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																					
1.	THERMO TRACER TEST Before potted (ROOM AMBIENT)	MODEL:SPX-120-12A TEST CONDITION:230V FULL LOAD TA=23.8 K		<table border="1"> <thead> <tr> <th>Position</th> <th>Temp</th> </tr> </thead> <tbody> <tr><td>P1</td><td>LF2</td><td>55.1°C</td></tr> <tr><td>P2</td><td>LF3</td><td>71.0°C</td></tr> <tr><td>P3</td><td>C9</td><td>72.0°C</td></tr> <tr><td>P4</td><td>BD1</td><td>50.9°C</td></tr> <tr><td>P5</td><td>Q1</td><td>51.7°C</td></tr> <tr><td>P6</td><td>L1 coil</td><td>67.5°C</td></tr> <tr><td>P7</td><td>Q5</td><td>59.3°C</td></tr> <tr><td>P8</td><td>C5</td><td>52.1°C</td></tr> <tr><td>P9</td><td>T1 coil</td><td>56.3°C</td></tr> <tr><td>P10</td><td>C16</td><td>46.9°C</td></tr> <tr><td>P11</td><td>C201</td><td>46.1°C</td></tr> <tr><td>P12</td><td>Q102</td><td>51.5°C</td></tr> <tr><td>P13</td><td>C104</td><td>44.8°C</td></tr> <tr><td>P14</td><td>C102</td><td>44.4°C</td></tr> <tr><td>P15</td><td>LF100</td><td>43.0°C</td></tr> </tbody> </table>	Position	Temp	P1	LF2	55.1°C	P2	LF3	71.0°C	P3	C9	72.0°C	P4	BD1	50.9°C	P5	Q1	51.7°C	P6	L1 coil	67.5°C	P7	Q5	59.3°C	P8	C5	52.1°C	P9	T1 coil	56.3°C	P10	C16	46.9°C	P11	C201	46.1°C	P12	Q102	51.5°C	P13	C104	44.8°C	P14	C102	44.4°C	P15	LF100	43.0°C	P																																						
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2	TEMPERATURE RISE TEST	MODELK SPX-120H-12 1. ROOM AMBIENT BURN-IN 2.5 HRS I/P K 230VAC O/P FULLLOAD Ta=27 K 2. HIGH AMBIENT BURN-IN 5.5 HRS I/P K 230VAC O/P FULLLOAD Ta=54 K		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 27.6 °C</th> <th>HIGH AMBIENT Ta= 54.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>4A/800V GLASS GBU408</td><td>51.7 °C</td><td>72.2 °C</td></tr> <tr><td>2</td><td>Q1</td><td>IRFB20N50K 20A/500V</td><td>54.5 °C</td><td>74.4 °C</td></tr> <tr><td>3</td><td>L2</td><td>TF2072</td><td>54.9 °C</td><td>74.9 °C</td></tr> <tr><td>4</td><td>Q5</td><td>STF13NM50N 12A/500V</td><td>54.9 °C</td><td>74.9 °C</td></tr> <tr><td>5</td><td>D2</td><td>BYV29X-600 7A/600V</td><td>57.5 °C</td><td>76.8 °C</td></tr> <tr><td>6</td><td>RTH2</td><td>1/2W 200KΩ 1%</td><td>53.0 °C</td><td>73.0 °C</td></tr> <tr><td>7</td><td>C5</td><td>82u/450V 10Kh 105k 18 * 3 0 KXG</td><td>51.3 °C</td><td>71.5 °C</td></tr> <tr><td>8</td><td>T1</td><td>TF2073</td><td>65.8 °C</td><td>85.2 °C</td></tr> <tr><td>9</td><td>Q101</td><td>IRF1404PbF 202A/40V</td><td>59.1 °C</td><td>79.7 °C</td></tr> <tr><td>10</td><td>D9</td><td>BYV26EGP 1A/1KV</td><td>53.6 °C</td><td>73.6 °C</td></tr> <tr><td>11</td><td>C102</td><td>1500u/16V UL10Kh 10*20 ZLH</td><td>55.4 °C</td><td>76.3 °C</td></tr> <tr><td>12</td><td>C201</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>54.4 °C</td><td>75.1 °C</td></tr> <tr><td>13</td><td>C38</td><td>100u/25V UL10Kh 6.3*11 YXM</td><td>53.6 °C</td><td>73.5 °C</td></tr> <tr><td>14</td><td>U900</td><td>PWM L6599AD</td><td>53.3 °C</td><td>73.4 °C</td></tr> <tr><td>15</td><td>U1</td><td>NCP1608B</td><td>55.9 °C</td><td>75.8 °C</td></tr> <tr><td>16</td><td>CASE</td><td>UP CASE</td><td>43.8 °C</td><td>66.4 °C</td></tr> </tbody> </table>	NO	Position	P/N	ROOM AMBIENT Ta= 27.6 °C	HIGH AMBIENT Ta= 54.8 °C	1	BD1	4A/800V GLASS GBU408	51.7 °C	72.2 °C	2	Q1	IRFB20N50K 20A/500V	54.5 °C	74.4 °C	3	L2	TF2072	54.9 °C	74.9 °C	4	Q5	STF13NM50N 12A/500V	54.9 °C	74.9 °C	5	D2	BYV29X-600 7A/600V	57.5 °C	76.8 °C	6	RTH2	1/2W 200KΩ 1%	53.0 °C	73.0 °C	7	C5	82u/450V 10Kh 105k 18 * 3 0 KXG	51.3 °C	71.5 °C	8	T1	TF2073	65.8 °C	85.2 °C	9	Q101	IRF1404PbF 202A/40V	59.1 °C	79.7 °C	10	D9	BYV26EGP 1A/1KV	53.6 °C	73.6 °C	11	C102	1500u/16V UL10Kh 10*20 ZLH	55.4 °C	76.3 °C	12	C201	47u/50V UL10Kh 6.3*11 YXM	54.4 °C	75.1 °C	13	C38	100u/25V UL10Kh 6.3*11 YXM	53.6 °C	73.5 °C	14	U900	PWM L6599AD	53.3 °C	73.4 °C	15	U1	NCP1608B	55.9 °C	75.8 °C	16	CASE	UP CASE	43.8 °C	66.4 °C	P
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3	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/ PK 26 4 V A C O/ PK O/P SHORT TEST Ta K 25k	TESTK OK	P																																																																																					
4	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/ PK 26 4 V A C / 2 3 0 V A C / 1 0 O/ PK 95% load Ta = - 4 0 k	TESTK OK	P																																																																																					

5	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 κ NO DAMAGE	I/ PK 26.4 V A C O/ PK 95% load Ta = 60κ H U M I D I T Y = 9 5 % R . H	TESTK OK	P
6	TEMPERATURE COEFFICIENT	+0.03% (0 ~ 50 °C)	I/ PK 23.0 V A C O/ PK FULL LOAD	± 0% (0 ~ 50)	P
7	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45 ~ +90 2. Temperature change rate : 25 / MIN 3. Dwell time low and high temperature : 30 MIN / E A C H 4. Total test cycle: 5 CYCLE 5. Input/Output condition: S T A T I C		OK	P
8.	THERMAL SHOCK TEST	1. Thermal shock Temperature: -35°C~+65°C 2. Temperature change rate : 25°C/ MIN 3. Dwell time low and high temperature : 30 MIN / E A C H 4. Total test cycle: 10 CYCLE 5. Input/Output condition: 23.0 V A C / F u l l L o a d T U R N O N / 5 8 S E C T U R N O F F / 2 S E C .		OK	P
9	VIBRATION TEST	1 Carton & 1 Set (1) WaveformK S i n e W a v e (2) FrequencyK 10~500Hz (3) Sweep TimeK 12min/sweep cycle (4) AccelerationK 5G (5) Test TimeK 72min in each axis (X.Y.Z) (6) TaK 25°C		TESTK OK	P
10	CAPACITOR LIFE CYCLE	SPX-120H-12:SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/ PK 23.0 V A C O/ P FULL LOAD Ta= 25 °C L I F E T I M E (2) I/ PK 23.0 V A C O/ P FULL LOAD Ta= 60 °C L I F E T I M E		(1) 456184.8 HRS (2) 62424 HRS	P
11	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 192.2 K H R S			P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/3/3	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/5/10	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023