



Test Report: NPF-120-24

120W 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

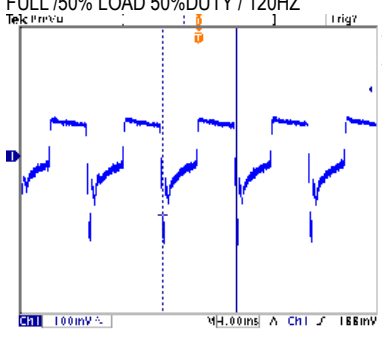
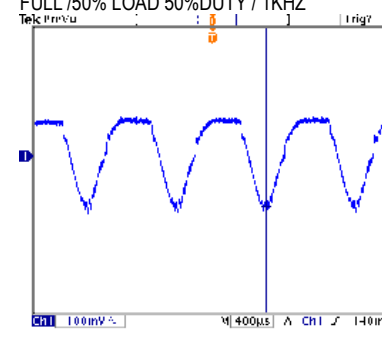
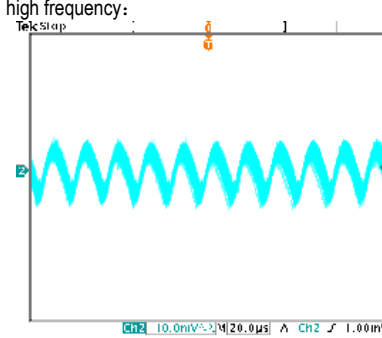
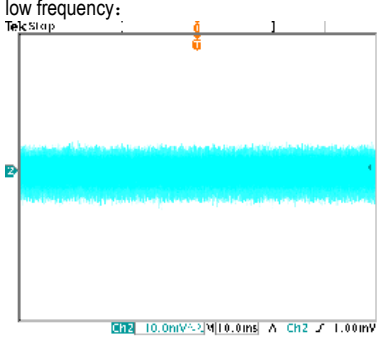
E.M.C. Test

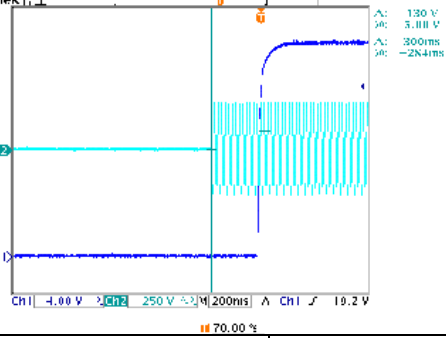
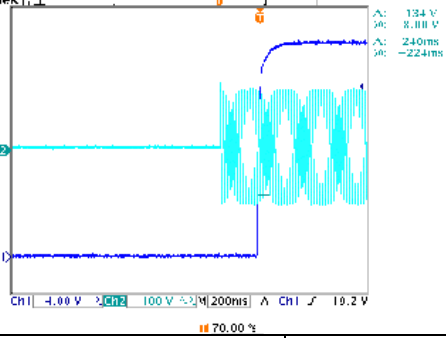
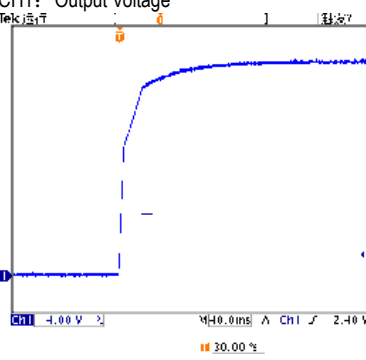
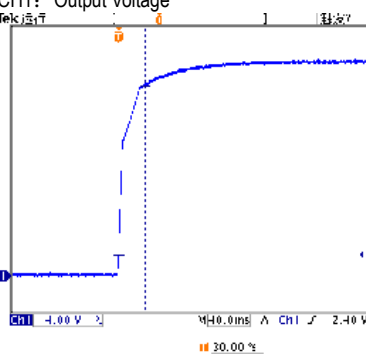
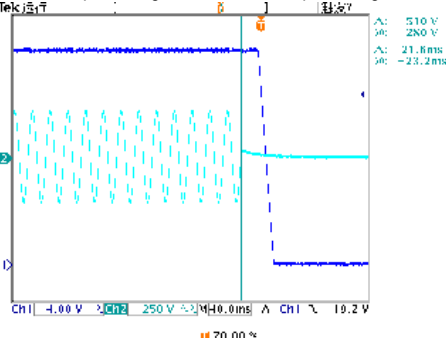
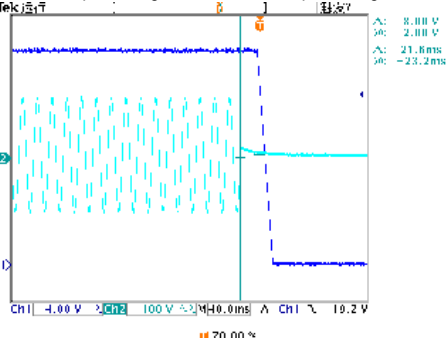
■ RELIABILITY TEST

Environment Test

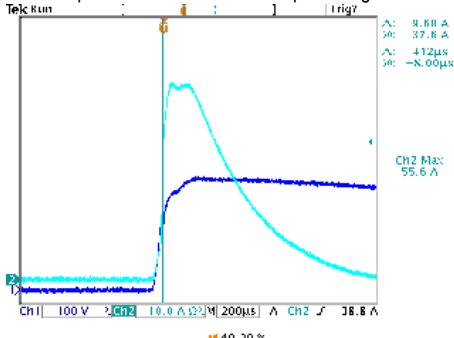
DESIGN VERIFY TEST

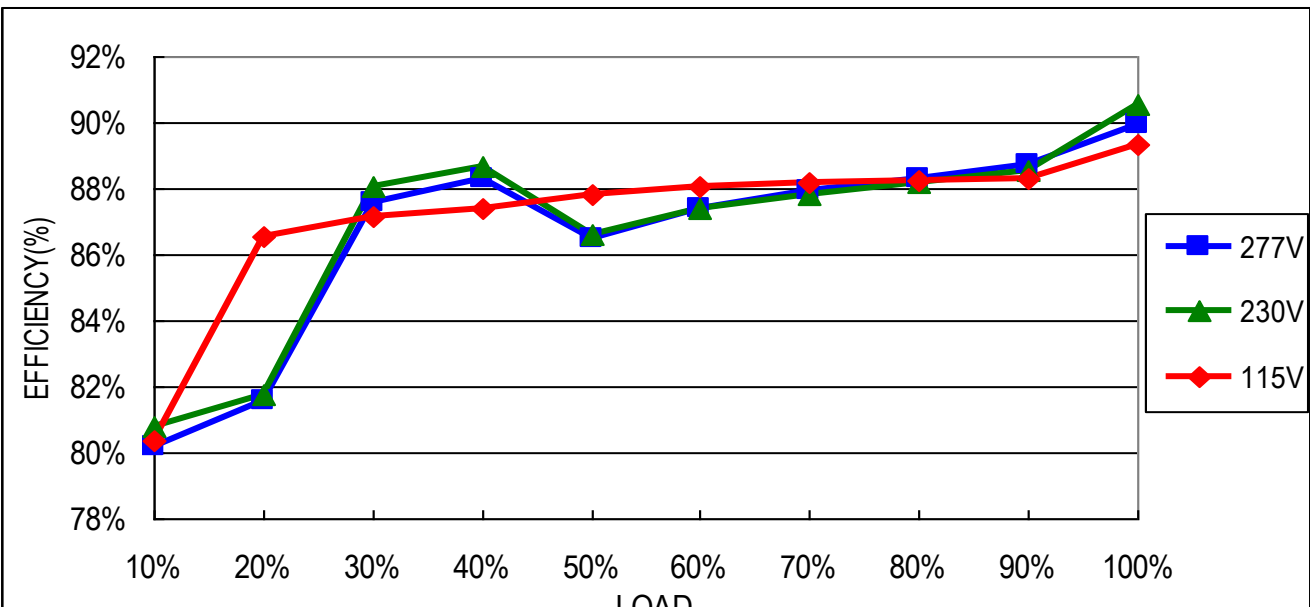
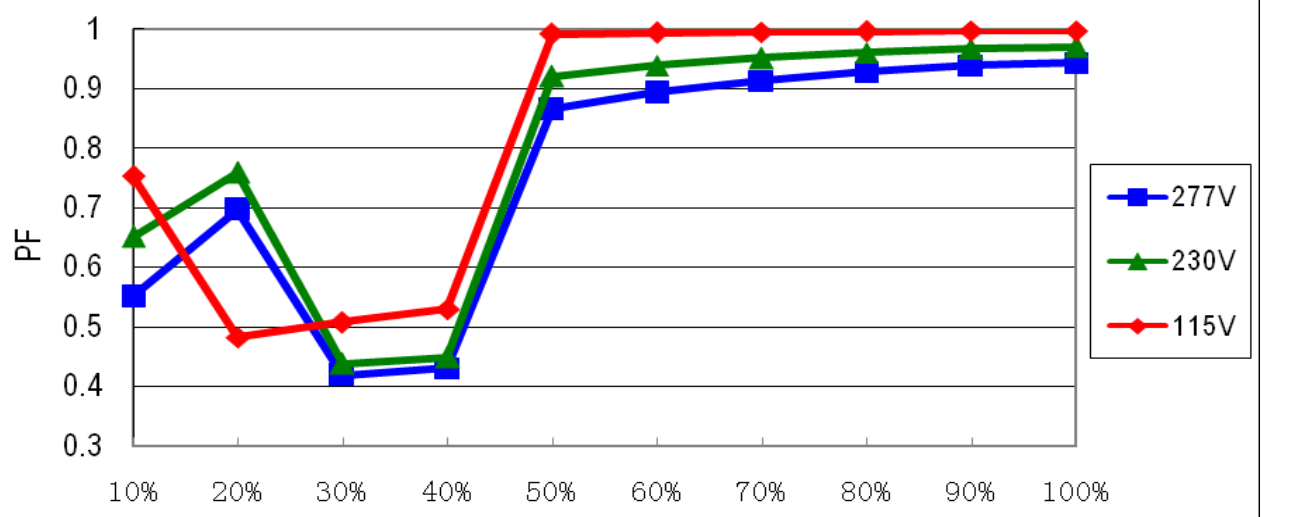
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	14.4~24V	I/P: 230VAC O/P: LED MODE Ta: 25°C	10.1V~23.7V
2	OUTPUT VOLTAGE TOLERANCE	-4.0%~4.0%	I/P: 90 VAC / 305 VAC O/P: FULL/ NO LOAD Ta: 25°C	-0.17%~ 0.38%
3	LINE REGULATION	-0.5%~0.5%	I/P: 100VAC~ 305VAC O/P: FULL LOAD Ta: 25°C	-0.004%~ 0%
4	LOAD REGULATION	-0.5%~ 0.5%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	-0.1%~0.01 %
5	DYNAMIC LOAD	2400mVp-p	I/P: 230VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 370mVp-p (2) 272mVp-p
FULL /50% LOAD 50%DUTY / 120HZ  FULL /50% LOAD 50%DUTY / 1KHZ 				
6	OVER/UNDERSHOOT TEST	$\pm 5\%$	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5 %
7	RIPPLE & NOISE (Max)	150mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	18.8mVp-p
high frequency:  low frequency: 				

8	SET UP TIME(Max)	230VAC/ 500ms 115VAC/ 500ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD Ta: 25°C	230VAC/ 300ms 115VAC/ 240ms
	INPUT=230VAC/50HZ @ 95% LOAD CH1: Output Voltage CH2: AC Input Voltage  INPUT=115VAC/50HZ @ 95% LOAD CH1: Output Voltage CH2: AC Input Voltage 			
9	RISE TIME (Max)	230VAC/ 80ms 115VAC/ 80ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD Ta: 25°C	230VAC/30.4ms 115VAC/29.6ms
	INPUT=230VAC/50HZ @ 95% LOAD CH1: Output Voltage  INPUT=115VAC/50HZ @ 95% LOAD CH1: Output Voltage 			
10	HOLD UP TIME(Typ)	230VAC/ 16ms 115VAC/ 16ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/21.6ms 115VAC/21.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage  INPUT=115VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage 			

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V~305V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P: FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230VAC ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230VAC ON: 3Sec OFF: 3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 90 VAC ~305 VAC O/P: FULL~MIN LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	1.3A/115VAC 0.65A/230VAC 0.55A/277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	I=1.185A/ 115VAC I=0.602A/ 230VAC I=0.515A/ 277VAC
4	LEAKAGE CURRENT	< 0.25mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.003 mA N-FG: 0.003 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.124W
6	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 115V/230VAC	I/P: 115VAC I/P: 230VAC O/P: 60% LOAD	THD: 6.98 %/115VAC THD: 14.22 %/230VAC
		Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 277VAC	I/P: 277VAC O/P: 75% LOAD	THD: 16.83 %
7	INRUSH CURRENT(Typ)	60A/230VAC Twidth =520 us measured at 50% Ipeak COLD START	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I=55.6A/ 230VAC Twidth =412us
INPUT=230VAC/50HZ @ FULL LOAD CH2: Input current CH1: AC Input Voltage 				

8	EFFICIENCY(Typ)	90.5%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.54%																																												
EFFICIENCY vs LOAD <table><thead><tr><th>LOAD</th><th>277V</th><th>230V</th><th>115V</th></tr></thead><tbody><tr><td>10%</td><td>80.2</td><td>80.5</td><td>80.5</td></tr><tr><td>20%</td><td>81.5</td><td>81.5</td><td>86.5</td></tr><tr><td>30%</td><td>87.5</td><td>88.0</td><td>87.5</td></tr><tr><td>40%</td><td>88.5</td><td>88.5</td><td>87.5</td></tr><tr><td>50%</td><td>86.5</td><td>86.5</td><td>87.5</td></tr><tr><td>60%</td><td>87.5</td><td>87.5</td><td>88.0</td></tr><tr><td>70%</td><td>88.0</td><td>88.0</td><td>88.0</td></tr><tr><td>80%</td><td>88.5</td><td>88.5</td><td>88.5</td></tr><tr><td>90%</td><td>89.0</td><td>89.0</td><td>88.5</td></tr><tr><td>100%</td><td>90.0</td><td>90.5</td><td>89.5</td></tr></tbody></table>					LOAD	277V	230V	115V	10%	80.2	80.5	80.5	20%	81.5	81.5	86.5	30%	87.5	88.0	87.5	40%	88.5	88.5	87.5	50%	86.5	86.5	87.5	60%	87.5	87.5	88.0	70%	88.0	88.0	88.0	80%	88.5	88.5	88.5	90%	89.0	89.0	88.5	100%	90.0	90.5	89.5
LOAD	277V	230V	115V																																													
10%	80.2	80.5	80.5																																													
20%	81.5	81.5	86.5																																													
30%	87.5	88.0	87.5																																													
40%	88.5	88.5	87.5																																													
50%	86.5	86.5	87.5																																													
60%	87.5	87.5	88.0																																													
70%	88.0	88.0	88.0																																													
80%	88.5	88.5	88.5																																													
90%	89.0	89.0	88.5																																													
100%	90.0	90.5	89.5																																													
9	POWER FACTOR	0.97/ 115VAC 0.96/ 230VAC 0.94/ 277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	PF=0.9965/ 115VAC PF=0.9775/ 230VAC PF=0.9485/ 277VAC																																												
Constant Current Mode <table><thead><tr><th>LOAD</th><th>277V</th><th>230V</th><th>115V</th></tr></thead><tbody><tr><td>10%</td><td>0.55</td><td>0.65</td><td>0.75</td></tr><tr><td>20%</td><td>0.70</td><td>0.75</td><td>0.48</td></tr><tr><td>30%</td><td>0.42</td><td>0.42</td><td>0.50</td></tr><tr><td>40%</td><td>0.42</td><td>0.45</td><td>0.52</td></tr><tr><td>50%</td><td>0.85</td><td>0.92</td><td>0.98</td></tr><tr><td>60%</td><td>0.88</td><td>0.93</td><td>0.98</td></tr><tr><td>70%</td><td>0.90</td><td>0.94</td><td>0.98</td></tr><tr><td>80%</td><td>0.92</td><td>0.95</td><td>0.98</td></tr><tr><td>90%</td><td>0.93</td><td>0.96</td><td>0.98</td></tr><tr><td>100%</td><td>0.94</td><td>0.97</td><td>0.98</td></tr></tbody></table>					LOAD	277V	230V	115V	10%	0.55	0.65	0.75	20%	0.70	0.75	0.48	30%	0.42	0.42	0.50	40%	0.42	0.45	0.52	50%	0.85	0.92	0.98	60%	0.88	0.93	0.98	70%	0.90	0.94	0.98	80%	0.92	0.95	0.98	90%	0.93	0.96	0.98	100%	0.94	0.97	0.98
LOAD	277V	230V	115V																																													
10%	0.55	0.65	0.75																																													
20%	0.70	0.75	0.48																																													
30%	0.42	0.42	0.50																																													
40%	0.42	0.45	0.52																																													
50%	0.85	0.92	0.98																																													
60%	0.88	0.93	0.98																																													
70%	0.90	0.94	0.98																																													
80%	0.92	0.95	0.98																																													
90%	0.93	0.96	0.98																																													
100%	0.94	0.97	0.98																																													

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %~ 108 %	I/P: 230VAC O/P: TESTING Ta: 25°C	101.57%/ 230VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	28V~34V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	31.37V/ 230VAC Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 295VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed

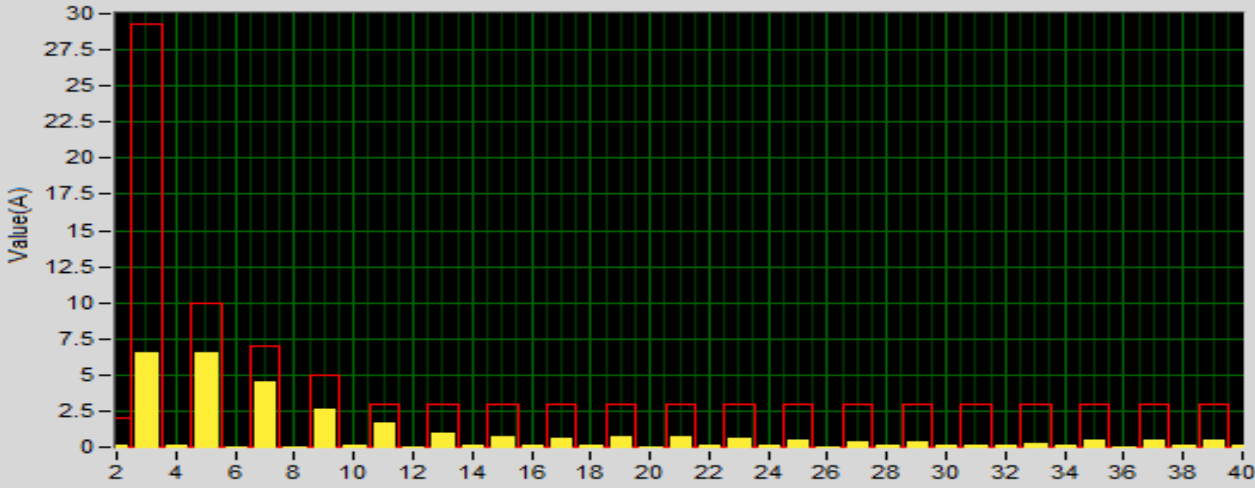
COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q 2 Rated 730V/10A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 712V (2) 600V (3) 688V
2	Diode Peak Voltage	Q101 Rated 120V/56A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 104V (2) 79.6V (3) 103V
3	Input Capacitor Voltage	C5 Rated 100u/ 450V	I/P: High-Line +3V =308 V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change Ta: 25°C	(1) 448V (2) 444V (3) 448V
4	Control IC Voltage Test	U1 Rated 28V	I/P: High-Line +3V =308 V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change Ta: 25°C	(1) 17.1V (2) 17.2V (3) 17.2V
5	PFC Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 600V/15A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 496V (2) 452V (3) 484V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min	I/P-O/P: 4.2KVAC/min Ta: 25°C	I/P-O/P: 2.098mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500VDC Ta: 25°C	I/P-O/P: >9999MΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 115VAC/230VAC/50HZ O/P: 60%/FULL LOAD I/P: 277VAC/50HZ O/P: 75%/FULL LOAD Ta:25°C	PASS
				
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55015	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
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
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
6	SURGE	EN61000-4-5 INDUSTRY L-N: 2KV	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																								
1	TEMPERATURE RISE TEST	MODEL: NPF-120-24 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 29.2℃ 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 51.1℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 29.2 ℃</th><th>HIGH AMBIENT Ta=51.1 ℃</th></tr><tr><td>1</td><td>C5</td><td>77.0℃</td><td>98.7℃</td></tr><tr><td>2</td><td>C105</td><td>77.0℃</td><td>98.0℃</td></tr><tr><td>3</td><td>T1</td><td>85.3℃</td><td>107.8℃</td></tr><tr><td>4</td><td>Q1</td><td>82.1℃</td><td>105.6℃</td></tr><tr><td>5</td><td>Q2</td><td>89.3℃</td><td>115.6℃</td></tr><tr><td>6</td><td>Q101</td><td>91.6℃</td><td>112.6℃</td></tr><tr><td>7</td><td>L3</td><td>70.9℃</td><td>92.1℃</td></tr><tr><td>8</td><td>D6</td><td>83.5℃</td><td>106.8℃</td></tr><tr><td>9</td><td>D10</td><td>93.4℃</td><td>119.1℃</td></tr><tr><td>10</td><td>U101</td><td>76.4℃</td><td>97.4℃</td></tr><tr><td>11</td><td>C45</td><td>74.2℃</td><td>95.4℃</td></tr><tr><td>12</td><td>R7</td><td>91.7℃</td><td>116.1℃</td></tr><tr><td>13</td><td>R15</td><td>84.5℃</td><td>108.4℃</td></tr><tr><td>14</td><td>U1</td><td>71.5℃</td><td>92.7℃</td></tr><tr><td>15</td><td>C106</td><td>77.6℃</td><td>98.3℃</td></tr><tr><td>16</td><td>RTH3</td><td>71.8℃</td><td>92.7℃</td></tr><tr><td>17</td><td>TC</td><td>66.1℃</td><td>86.3℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 29.2 ℃	HIGH AMBIENT Ta=51.1 ℃	1	C5	77.0℃	98.7℃	2	C105	77.0℃	98.0℃	3	T1	85.3℃	107.8℃	4	Q1	82.1℃	105.6℃	5	Q2	89.3℃	115.6℃	6	Q101	91.6℃	112.6℃	7	L3	70.9℃	92.1℃	8	D6	83.5℃	106.8℃	9	D10	93.4℃	119.1℃	10	U101	76.4℃	97.4℃	11	C45	74.2℃	95.4℃	12	R7	91.7℃	116.1℃	13	R15	84.5℃	108.4℃	14	U1	71.5℃	92.7℃	15	C106	77.6℃	98.3℃	16	RTH3	71.8℃	92.7℃	17	TC	66.1℃	86.3℃
NO	Position	ROOM AMBIENT Ta= 29.2 ℃	HIGH AMBIENT Ta=51.1 ℃																																																																									
1	C5	77.0℃	98.7℃																																																																									
2	C105	77.0℃	98.0℃																																																																									
3	T1	85.3℃	107.8℃																																																																									
4	Q1	82.1℃	105.6℃																																																																									
5	Q2	89.3℃	115.6℃																																																																									
6	Q101	91.6℃	112.6℃																																																																									
7	L3	70.9℃	92.1℃																																																																									
8	D6	83.5℃	106.8℃																																																																									
9	D10	93.4℃	119.1℃																																																																									
10	U101	76.4℃	97.4℃																																																																									
11	C45	74.2℃	95.4℃																																																																									
12	R7	91.7℃	116.1℃																																																																									
13	R15	84.5℃	108.4℃																																																																									
14	U1	71.5℃	92.7℃																																																																									
15	C106	77.6℃	98.3℃																																																																									
16	RTH3	71.8℃	92.7℃																																																																									
17	TC	66.1℃	86.3℃																																																																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 305VAC/100VAC O/P: FULL LOAD Ta= -45℃/-30℃	TEST: OK																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 ℃ NO DAMAGE	I/P: 315VAC O/P: FULL LOAD Ta=45 ℃ HUMIDITY= 95% R.H	TEST: OK																																																																								
4	TEMPERATURE COEFFICIENT	±0.03%/℃ (0~50℃)	I/P: 230 VAC O/P: FULL LOAD	±0.002%/℃ (0~50℃)																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45℃~ +90℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 5 CYCLE 5. Input/Output condition: STATIC		TEST: OK																																																																								



120W Single Output Switching Power Supply

NPF-120 series

6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -45°C ~ +50°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 58 sec, turn off 2 sec;	TEST: OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 12min/sweep cycle (4) Acceleration: 5G (5) Test Time: 72min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
8	CAPACITOR LIFE CYCLE	NPF-120-24: SUPPOSE C105 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= 45 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 45 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 45 °C LIFE TIME	(1) 111747 HRS (2) 29735 HRS (3) 74698 HRS (4) 87047 HRS
9	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE: 295.1K HRS	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): 50000 hours @ TC 70°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY