



# Test Report: NPF-120-42

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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	25.2~42V	I/P: 230VAC O/P: LED MODE Ta: 25°C	6V~41V	
2	OUTPUT VOLTAGE TOLERANCE	-1.0%~1.0%	I/P: 90 VAC / 305 VAC O/P: FULL/ NO LOAD Ta: 25°C	-0.03%~0.29%	
3	LINE REGULATION	-0.5%~0.5%	I/P: 100VAC~ 305VAC O/P: FULL LOAD Ta: 25°C	0%~0%	
4	LOAD REGULATION	-0.5%~0.5%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	-0.03%~0.04 %	
5	DYNAMIC LOAD	4200mVp-p	I/P: 230VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 676mVp-p (2) 472mVp-p	
6	OVER/UNDERSHOOT TEST	$\pm 5\%$	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5 %	
7	RIPPLE & NOISE (Max)	250mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	52.0mVp-p	



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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/ 292ms 115VAC/ 240ms
<p>INPUT=230VAC/50HZ @ 95% LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>		<p>INPUT=115VAC/50HZ @ 95% LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>	
9	RISE TIME (Max) 230VAC/ 80ms 115VAC/ 80ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD Ta: 25°C	230VAC/45.6ms 115VAC/40.8ms
<p>INPUT=230VAC/50HZ @ 95% LOAD</p> <p>CH1: Output Voltage</p>		<p>INPUT=115VAC/50HZ @ 95% LOAD</p> <p>CH1: Output Voltage</p>	
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/22.4ms 115VAC/22.4ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>		<p>INPUT=115VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p>	

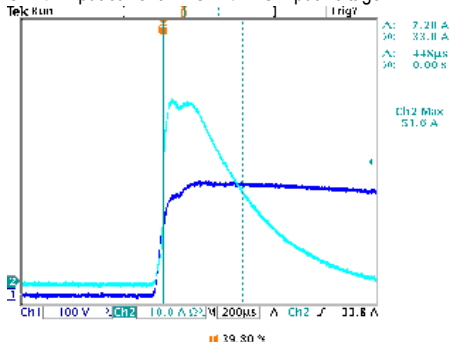


INPUT FUNCTION TEST

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=1.174A/ 115VAC I=0.591A/ 230VAC I=0.504A/ 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	0.095W
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: 5.73 %/115VAC THD: 14.27 %/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: 16.21 %
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=51.6A/ 230VAC Twidth =448us

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



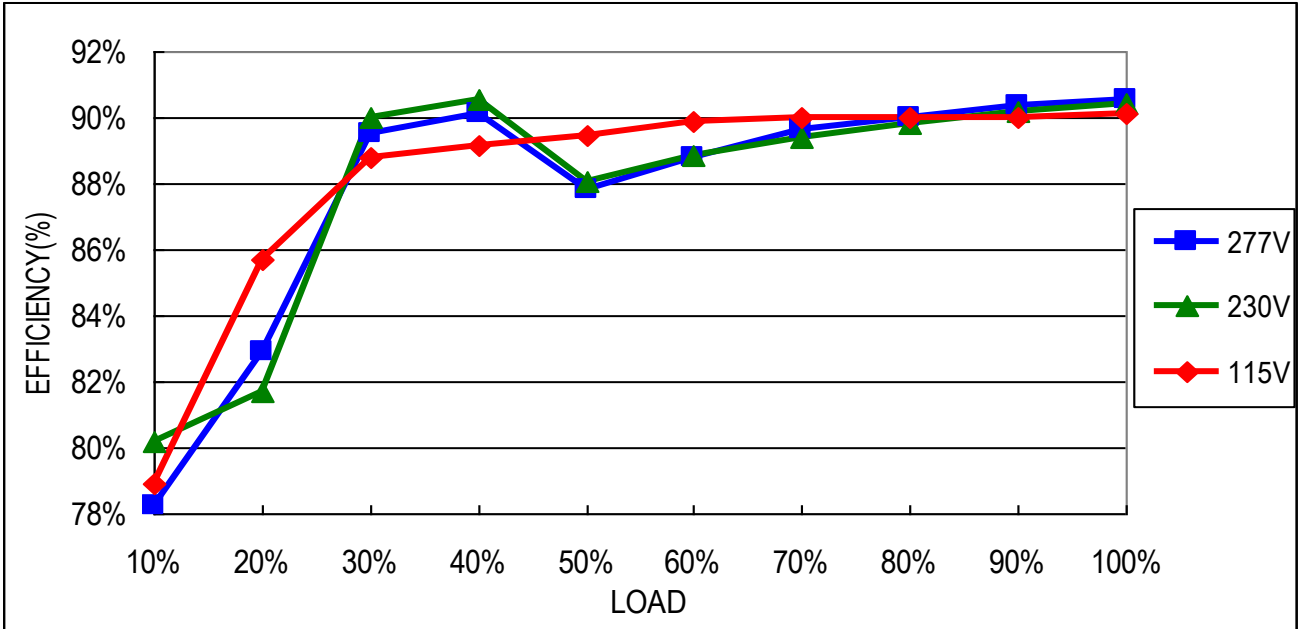


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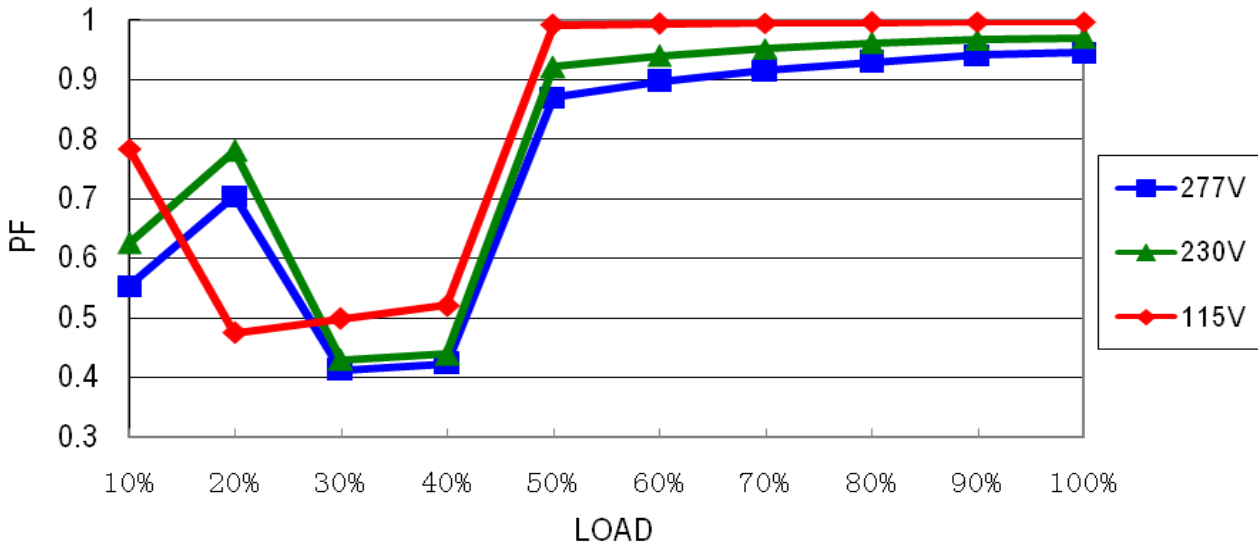
8	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.44%
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EFFICIENCY vs LOAD



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=0.998/ 115VAC PF=0.981/ 230VAC PF=0.952/ 277VAC
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Constant Current Mode





## 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	100.86%/ 230VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	46V~54V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	50.4V/ 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

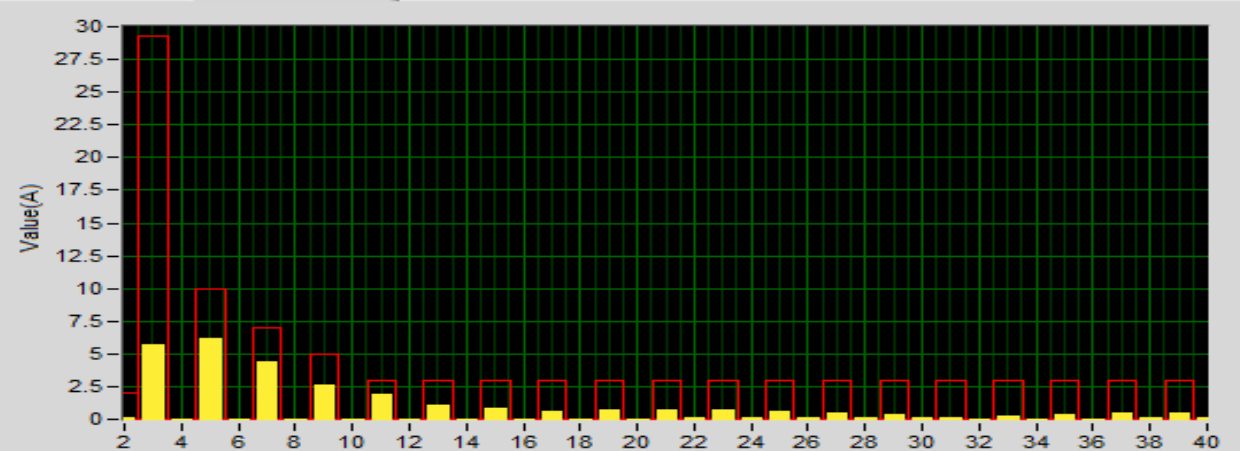
## COMPONENT STRESS TEST

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) 640V (2) 500V (3) 636V
2	Diode Peak Voltage	Q101 Rated 200V/20A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 175V (2) 114V (3) 169V
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) 447V
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) 17.7V (2) 17.3V (3) 17.3V
5	PFC Transistor ( D to S) or (C to E) Peak Voltage	Q 1 Rated 600V/11A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 470V (2) 458V (3) 468V

**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: 1.93mA 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-120-48 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 border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 29.2 ℃</th> <th>HIGH AMBIENT Ta=51.1 ℃</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>71.6℃</td><td>90.1℃</td></tr> <tr><td>2</td><td>C105</td><td>65.6℃</td><td>84.5℃</td></tr> <tr><td>3</td><td>T1</td><td>73.3℃</td><td>92.4℃</td></tr> <tr><td>4</td><td>Q1</td><td>76.3℃</td><td>95.8℃</td></tr> <tr><td>5</td><td>Q2</td><td>82.6℃</td><td>102.8℃</td></tr> <tr><td>6</td><td>Q101</td><td>68.4℃</td><td>86.7℃</td></tr> <tr><td>7</td><td>L3</td><td>77.4℃</td><td>96.9℃</td></tr> <tr><td>8</td><td>D6</td><td>86.1℃</td><td>106.7℃</td></tr> <tr><td>9</td><td>C45</td><td>67.3℃</td><td>85.9℃</td></tr> <tr><td>10</td><td>R7</td><td>84.3℃</td><td>104.1℃</td></tr> <tr><td>11</td><td>U1</td><td>66.7℃</td><td>85.4℃</td></tr> <tr><td>12</td><td>C106</td><td>61.9℃</td><td>80.6℃</td></tr> <tr><td>13</td><td>RTH3</td><td>64.9℃</td><td>83.4℃</td></tr> <tr><td>15</td><td>TC</td><td>68.4℃</td><td>87.3℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 29.2 ℃	HIGH AMBIENT Ta=51.1 ℃	1	C5	71.6℃	90.1℃	2	C105	65.6℃	84.5℃	3	T1	73.3℃	92.4℃	4	Q1	76.3℃	95.8℃	5	Q2	82.6℃	102.8℃	6	Q101	68.4℃	86.7℃	7	L3	77.4℃	96.9℃	8	D6	86.1℃	106.7℃	9	C45	67.3℃	85.9℃	10	R7	84.3℃	104.1℃	11	U1	66.7℃	85.4℃	12	C106	61.9℃	80.6℃	13	RTH3	64.9℃	83.4℃	15	TC	68.4℃	87.3℃
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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																																																												



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**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-120-48: 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) 174464 HRS (2) 53707 HRS (3) 99512 HRS (4) 103761 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