



# Test Report : NPF-90-12

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90W 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	VERDICT
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	V1 : 8 mVp-p (Max)	PASS
2	CONSTANT CURRENT REGION	V1: 7.2V ~ 12 V	I/P : 230VAC O/P:LED MODE Ta:25°C	OP= 7.2V / 7.494A OP= 11V / 7.517A	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -4%~ 4% (Max)	I/P : 90 VAC / 305 VAC O/P : FULL/ NO LOAD Ta : 25°C	V1 : -0.22 %~ 0.77 %	PASS
4	LINE REGULATION	V1 : -0.5%~ 0.5% (Max)	I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0 %	PASS
5	LOAD REGULATION	V1 : -1.5%~ 1.5% (Max)	I/P : 230 VAC O/P : FULL~NO LOAD Ta : 25°C	V1 : -0.47 %~ 0.52 %	PASS
6	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C	230VAC/ 308 ms 115VAC/ 322 ms	PASS
7	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C	230VAC/ 60 ms 115VAC/ 62 ms	PASS
8	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/ 20 ms 115VAC/ 19 ms	PASS
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	PASS
10	DYNAMIC LOAD	V1 : 1200 mVp-p	I/P : 230 VAC (1).O/P : FULL /NO LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /NO LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 460 mVp-p (2) 1130 mVp-p	PASS

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	87 V~305 V	PASS
			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 : (1) OK (2) OK (3) OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 90 VAC ~ 305 VAC O/P : FULL ~NO LOAD Ta : 25°C	TEST : OK	PASS
3	POWER FACTOR	115V/ 0.98 (TYP) 230V/ 0.96 (TYP) 277V/ 0.94 (TYP)	I/P : 115 VAC I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.997 / 115 VAC PF= 0.972 / 230 VAC PF= 0.948 / 277 VAC	PASS
4	EFFICIENCY	89% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	89.61%	PASS
5	INPUT CURRENT	115V/ 0.95 A (TYP) 230V/ 0.5 A (TYP) 277V/ 0.4 A (TYP)	I/P : 115 VAC I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.833 A / 115 VAC I = 0.422 A / 230 VAC I = 0.358 A / 277 VAC	PASS
6	INRUSH CURRENT	230V/ 60 A (TYP) Twidth =550 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 45.6 A Twidth = 392 us	PASS
7	LEAKAGE CURRENT	< 0.25 mA / 277 VAC	I/P : 305 VAC O/P : NO LOAD Ta : 25°C	L-CASE : 0.003 mA N-CASE : 0.003 mA	PASS
8	NO LOAD CONSUMPTION	< 0.15 W	I/P : 230VAC O/P : NO LOAD Ta : 25°C	0.06 W	PASS
9	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 230V/115VAC Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 277VAC	I/P : 115 VAC I/P : 230 VAC O/P : 60% LOAD I/P : 277 VAC O/P : 75%LOAD Ta : 25°C	THD : 5.98% /115VAC THD : 15.46% /230VAC THD : 15.64% /277VAC	PASS

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 % ~ 108 %	I/P : 100 VAC I/P : 230 VAC I/P : 305 VAC O/P : TESTING Ta : 25°C	100.3 %/ 100 VAC 100.5 %/ 230 VAC 100.5 %/ 305 VAC Constant current limiting, recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 15 V ~ 17 V	I/P : 90 VAC I/P : 230 VAC I/P : 305 VAC O/P : NO LOAD Ta : 25°C	16.1 V/ 90 VAC 16.1 V/ 230 VAC 16.1 V/ 305 VAC Shut down o/p voltage , re-power on to recover	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , re-power on to recover	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup mode , recovers automatically after fault condition is removed	PASS

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q2 Rated 800 V 9A	I/P : High-Line +3V = 308 V O/P : (1)FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	(1) 700 V (2) 574 V (3) 704 V	PASS
2	Diode Peak Voltage	Q101 Rated 60 V 79 A	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on (2)Output Short (3) FULL LOAD continue Ta : 25°C	(1) 53.8 V (2) 41.6 V (3) 54.0 V	PASS
3	Input Capacitor Voltage	C5 Rated 82uF / 450 V	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on /Off (2) NO LOAD Turn on /Off (3) FULL LOAD /MIN LOAD Change Ta : 25°C	(1) 446 V (2) 447 V (3) 447 V	PASS
4	Control IC Voltage Test	U1 Rated 28V	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on /Off (2) NO LOAD Turn on /Off (3) FULL LOAD /MIN LOAD Change Ta : 25°C	(1) 17.1 V (2) 17.2 V (3) 17.2 V	PASS
5	PFC Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 600 V 10A	I/P : High-Line +3V = 308 V O/P : (1)FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	(1) 496 V (2) 448 V (3) 464 V	PASS

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min	I/P-O/P : 4.2 KVAC/min Ta : 25°C	I/P-O/P : 2.709 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C /70%RH	I/P-O/P : >9999 MΩ NO DAMAGE	PASS

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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	OK	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	OK Test by certified Lab	PASS
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	OK Test by certified Lab	PASS
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	PASS
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	PASS
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
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 : NPF-90-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=28.6 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=48.3 °C			PASS																																																																																								
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 28.6 °C</th> <th>HIGH AMBIENT Ta= 48.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>65.3°C</td><td>82.7°C</td></tr> <tr><td>2</td><td>C105</td><td>68.4°C</td><td>85.5°C</td></tr> <tr><td>3</td><td>T1</td><td>73.7°C</td><td>91.1°C</td></tr> <tr><td>4</td><td>Q1</td><td>73.5°C</td><td>94.1°C</td></tr> <tr><td>5</td><td>Q2</td><td>76.8°C</td><td>97.0°C</td></tr> <tr><td>6</td><td>Q101</td><td>68.6°C</td><td>86.3°C</td></tr> <tr><td>7</td><td>Q102</td><td>65.4°C</td><td>82.9°C</td></tr> <tr><td>8</td><td>L3</td><td>62.5°C</td><td>81.1°C</td></tr> <tr><td>9</td><td>BD1</td><td>70.0°C</td><td>89.9°C</td></tr> <tr><td>10</td><td>D6</td><td>68.7°C</td><td>87.8°C</td></tr> <tr><td>11</td><td>LF100</td><td>61.7°C</td><td>79.0°C</td></tr> <tr><td>12</td><td>C110</td><td>64.5°C</td><td>81.4°C</td></tr> <tr><td>13</td><td>RTH2</td><td>63.6°C</td><td>80.9°C</td></tr> <tr><td>14</td><td>C41</td><td>65.8°C</td><td>82.7°C</td></tr> <tr><td>15</td><td>C45</td><td>65.4°C</td><td>82.4°C</td></tr> <tr><td>16</td><td>C11</td><td>70.8°C</td><td>90.8°C</td></tr> <tr><td>17</td><td>ZNR2</td><td>67.3°C</td><td>86.6°C</td></tr> <tr><td>18</td><td>D5</td><td>62.8°C</td><td>82.8°C</td></tr> <tr><td>19</td><td>U1</td><td>65.9°C</td><td>83.6°C</td></tr> <tr><td>20</td><td>D10</td><td>82.9°C</td><td>101.4°C</td></tr> <tr><td>21</td><td>TC</td><td>54.5°C</td><td>75.0°C</td></tr> </tbody> </table>	NO	Position		ROOM AMBIENT Ta= 28.6 °C	HIGH AMBIENT Ta= 48.3 °C	1	C5	65.3°C	82.7°C	2	C105	68.4°C	85.5°C	3	T1	73.7°C	91.1°C	4	Q1	73.5°C	94.1°C	5	Q2	76.8°C	97.0°C	6	Q101	68.6°C	86.3°C	7	Q102	65.4°C	82.9°C	8	L3	62.5°C	81.1°C	9	BD1	70.0°C	89.9°C	10	D6	68.7°C	87.8°C	11	LF100	61.7°C	79.0°C	12	C110	64.5°C	81.4°C	13	RTH2	63.6°C	80.9°C	14	C41	65.8°C	82.7°C	15	C45	65.4°C	82.4°C	16	C11	70.8°C	90.8°C	17	ZNR2	67.3°C	86.6°C	18	D5	62.8°C	82.8°C	19	U1	65.9°C	83.6°C	20	D10	82.9°C	101.4°C	21	TC	54.5°C	75.0°C		
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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°C/-30°C	TEST : OK	PASS																																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95% R.H	TEST : OK	PASS																																																																																								
4	TEMPERATURE COEFFICIENT	±0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.004 %(0~50°C)	PASS																																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +85°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	PASS																																																																																								
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +55°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	PASS																																																																																								

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 : 90min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	NPF-90-12 : 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=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=50 °C LIFE TIME	(1) 181988 HRS (2) 38484 HRS (3) 63505 HRS (4) 144850 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 292.8KHRS		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50000 hours @ Tcase 75°C		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHOUB/ ZHUOKB	SKY	LIUWY

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