



Test Report : NPF-90D-24

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 : 12 mVp-p (Max)	PASS
2	CONSTANT CURRENT REGION	V1: 14.4V ~ 24 V	I/P : 230VAC O/P:LED MODE Ta:25°C	OP= 14.4V / 3.694A OP= 23V / 3.727A	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -4 %~ 4 % (Max)	I/P : 90 VAC / 305 VAC O/P : FULL/ NO LOAD Ta : 25°C	V1 : -0.12 %~ 0.50 %	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 : -0.12 %~ 0.13 %	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/ 264 ms 115VAC/ 284 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/ 55 ms 115VAC/ 47 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/ 20 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 : 2400 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) 386 mVp-p (2) 1100 mVp-p	PASS

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DIMMER TEST

SPEC:

*Output constant current level can be adjusted through output cable by connecting a resistance or 0 ~ 10Vdc or 10V PWM signal between DIM + and DIM - .

*Reference resistance value for output current adjustment (Typical)

Resistance value	Single driver	Short	10 K Ω	20 K Ω	30 K Ω	40 K Ω	50 K Ω	60 K Ω	70 K Ω	80 K Ω	90 K Ω	100 K Ω	OPEN
	Multiple drives (N=driver quantity for synchronized dimming operation)	Short	10 K Ω /N	20 K Ω /N	30 K Ω /N	40 K Ω /N	50 K Ω /N	60 K Ω /N	70 K Ω /N	80 K Ω /N	90 K Ω /N	100 K Ω /N	
Percentage of rated current		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

*0 ~ 10V dimming function for output current adjustment (Typical)

Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
Percentage of rated current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

*10V PWM signal for output current adjustment (Typical): Frequency range: 100Hz~3KHz

Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
Percentage of rated current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

TEST RESULT: I/P : 230 VAC; Ta : 25°C

1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0A	0.303A	0.701A	1.094A	1.483A	1.870A	2.260A	2.648A	3.039A	3.426A	3.774A	3.739A
	%	0%	8.08%	18.69%	29.17%	39.55%	49.87%	60.27%	70.61%	81.04%	91.36%	100.64%	99.71%
2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0A	0.311A	0.706A	1.090A	1.478A	1.865A	2.261A	2.642A	3.035A	3.432A	3.741A	3.739A
	%	0%	8.29%	18.83%	29.07%	39.41%	49.73%	60.29%	70.45%	80.93%	91.52%	99.76%	99.71%
3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0A	0.304A	0.696A	1.095A	1.487A	1.884A	2.276A	2.668A	2.971A	3.456A	3.768A	3.739A
	%	0%	8.11%	18.56%	29.20%	39.65%	50.24%	60.69%	71.15%	79.23%	92.16%	100.48%	99.71%

PASS

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= 0.996 / 115 VAC PF= 0.978 / 230 VAC PF= 0.959 / 277 VAC	PASS
4	EFFICIENCY	90% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.27%	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 = 0.823 A / 115 VAC I = 0.415 A / 230 VAC I = 0.351 A / 277 VAC	PASS
6	INRUSH CURRENT	230V/ 60 A (TYP) Twidh =550 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 52.4 A Twidh = 376 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	< 0.5 W	I/P : 230VAC O/P : NO LOAD Ta : 25°C	0.27 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 : 6.37% /115VAC THD : 16.12% /230VAC THD : 16.06% /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	99.3 %/ 100 VAC 99.7 %/ 230 VAC 99.7 %/ 305 VAC Constant current limiting, recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 28 V ~ 34 V	I/P : 90 VAC I/P : 230 VAC I/P : 305 VAC O/P : NO LOAD Ta : 25°C	31.3 V/ 90 VAC 31.3 V/ 230 VAC 31.2 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) 728 V (2) 542 V (3) 744 V	PASS
2	Diode Peak Voltage	Q101 Rated 100 V 62 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) 75.2 V (2) 49.6 V (3) 75.6 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) 448 V (2) 450 V (3) 445 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) 17.0 V (2) 17.2 V (3) 17.0 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) 478 V (2) 452 V (3) 462 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 : 2.639 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-90D-24 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 <table><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>65.0°C</td><td>84.4°C</td></tr><tr><td>2</td><td>C105</td><td>61.0°C</td><td>79.2°C</td></tr><tr><td>3</td><td>T1</td><td>71.7°C</td><td>90.5°C</td></tr><tr><td>4</td><td>Q1</td><td>74.9°C</td><td>96.0°C</td></tr><tr><td>5</td><td>Q2</td><td>76.2°C</td><td>96.6°C</td></tr><tr><td>6</td><td>Q101</td><td>62.0°C</td><td>80.4°C</td></tr><tr><td>7</td><td>L3</td><td>63.1°C</td><td>83.8°C</td></tr><tr><td>8</td><td>BD1</td><td>71.3°C</td><td>91.6°C</td></tr><tr><td>9</td><td>D6</td><td>71.2°C</td><td>92.0°C</td></tr><tr><td>10</td><td>LF100</td><td>53.0°C</td><td>71.2°C</td></tr><tr><td>11</td><td>C110</td><td>56.1°C</td><td>74.4°C</td></tr><tr><td>12</td><td>RTH2</td><td>62.9°C</td><td>82.4°C</td></tr><tr><td>13</td><td>C205</td><td>59.1°C</td><td>77.7°C</td></tr><tr><td>14</td><td>C41</td><td>64.3°C</td><td>83.4°C</td></tr><tr><td>15</td><td>C45</td><td>64.0°C</td><td>83.3°C</td></tr><tr><td>16</td><td>C11</td><td>71.5°C</td><td>92.4°C</td></tr><tr><td>17</td><td>ZNR2</td><td>68.7°C</td><td>89.2°C</td></tr><tr><td>18</td><td>D5</td><td>65.9°C</td><td>86.7°C</td></tr><tr><td>19</td><td>U1</td><td>66.3°C</td><td>86.4°C</td></tr><tr><td>20</td><td>D10</td><td>80.4°C</td><td>100.3°C</td></tr><tr><td>21</td><td>TC</td><td>48.7°C</td><td>72.1°C</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta= 28.6 °C	HIGH AMBIENT Ta= 48.3 °C	1	C5	65.0°C	84.4°C	2	C105	61.0°C	79.2°C	3	T1	71.7°C	90.5°C	4	Q1	74.9°C	96.0°C	5	Q2	76.2°C	96.6°C	6	Q101	62.0°C	80.4°C	7	L3	63.1°C	83.8°C	8	BD1	71.3°C	91.6°C	9	D6	71.2°C	92.0°C	10	LF100	53.0°C	71.2°C	11	C110	56.1°C	74.4°C	12	RTH2	62.9°C	82.4°C	13	C205	59.1°C	77.7°C	14	C41	64.3°C	83.4°C	15	C45	64.0°C	83.3°C	16	C11	71.5°C	92.4°C	17	ZNR2	68.7°C	89.2°C	18	D5	65.9°C	86.7°C	19	U1	66.3°C	86.4°C	20	D10	80.4°C	100.3°C	21	TC	48.7°C	72.1°C	PASS
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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℃	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	NPF-90D-24 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta=25℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=50℃ LIFE TIME	(1) 326013 HRS (2) 63879 HRS (3) 91668 HRS (4) 165292 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 231.2KHRS		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50000 hours @ Tcase 75℃		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHOUB/ ZHUOKB	SKY	LIUWY

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