



Test Report : NPF-60D-42

60W 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 : 200 mVp-p (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	V1 : 36 mVp-p (Max)	PASS
2	CONSTANT CURRENT REGION	V1: 25.2V ~ 42 V	I/P : 230VAC O/P:LED MODE Ta:25°C	OP= 25.2V / 0.988A OP= 41V / 0.990A	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -1 %~ 1 % (Max)	I/P : 90 VAC / 305 VAC O/P : FULL/ NO LOAD Ta : 25°C	V1 : -0.05 %~ 0.57 %	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 : -0.5 %~ 0.5 % (Max)	I/P : 230 VAC O/P : FULL~NO LOAD Ta : 25°C	V1 : -0.05 %~ 0.02 %	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/ 362 ms 115VAC/ 333 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/ 21 ms 115VAC/ 40 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 : 4200 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) 426 mVp-p (2) 836 mVp-p	PASS

11

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%

PASS

TEST RESULT: I/P : 230 VAC; Ta : 25℃

1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0A	0.152A	0.298A	0.444A	0.588A	0.732A	0.875A	1.018A	1.160A	1.301A	1.442A	1.511A
	%	0%	10.63%	20.84%	31.05%	41.12%	51.19%	61.19%	71.19%	81.12%	90.98%	100.84%	105.66%
2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0A	0.154A	0.300A	0.441A	0.587A	0.732A	0.881A	1.025A	1.168A	1.313A	1.455A	1.511A
	%	0%	10.77%	20.98%	30.83%	41.05%	51.19%	61.61%	71.68%	81.68%	91.82%	101.75%	105.66%
3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0A	0.148A	0.284A	0.421A	0.559A	0.697A	0.833A	0.969A	1.107A	1.243A	1.366A	1.510A
	%	0%	10.35%	19.86%	29.44%	39.09%	48.74%	58.25%	67.76%	77.41%	86.92%	95.52%	105.59%

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/ 0.97 (TYP) 230V/ 0.95 (TYP) 277V/ 0.92 (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= 0.981 / 230 VAC PF= 0.951 / 277 VAC	PASS
4	EFFICIENCY	90% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	91.17%	PASS
5	INPUT CURRENT	115V/ 0.8 A (TYP) 230V/ 0.4 A (TYP) 277V/ 0.32 A (TYP)	I/P : 115 VAC I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.572 A / 115 VAC I = 0.290 A / 230 VAC I = 0.248 A / 277 VAC	PASS
6	INRUSH CURRENT	230V/ 50 A (TYP) Twidh =270 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 46.0 A Twidh = 262 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	0.17 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 : 5.38% /115VAC THD : 12.99% /230VAC THD : 15.25% /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	102.1 %/ 100 VAC 102.1 %/ 230 VAC 102.2 %/ 305 VAC Constant current limiting, recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 46 V ~ 54 V	I/P : 90 VAC I/P : 230 VAC I/P : 305 VAC O/P : NO LOAD Ta : 25°C	50.7 V/ 90 VAC 50.7 V/ 230 VAC 50.7 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) 616 V (2) 488 V (3) 620 V	PASS
2	Diode Peak Voltage	D100 Rated 200 V 20 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) 177 V (2) 135 V (3) 176 V	PASS
3	Input Capacitor Voltage	C5 Rated 33uF / 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) 442 V (2) 440 V (3) 442 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) 17.2 V (2) 17.2 V (3) 17.3 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) 476 V (2) 460 V (3) 466 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 : 2.703 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	EN55015	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	OK Test by certified Lab	PASS
3	RADIATION	EN55015	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-60D-48 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=30.3 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=51.2 °C <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 30.3 °C</th><th>HIGH AMBIENT Ta= 51.2 °C</th></tr></thead><tbody><tr><td>1</td><td>L3</td><td>52.6°C</td><td>72.3°C</td></tr><tr><td>2</td><td>Q1</td><td>59.3°C</td><td>79.2°C</td></tr><tr><td>3</td><td>Q2</td><td>62.0°C</td><td>82.0°C</td></tr><tr><td>4</td><td>D6</td><td>57.7°C</td><td>77.5°C</td></tr><tr><td>5</td><td>C5</td><td>56.2°C</td><td>75.9°C</td></tr><tr><td>6</td><td>T1</td><td>63.5°C</td><td>83.4°C</td></tr><tr><td>7</td><td>C45</td><td>56.5°C</td><td>76.3°C</td></tr><tr><td>8</td><td>D100</td><td>56.5°C</td><td>76.2°C</td></tr><tr><td>9</td><td>C105</td><td>55.4°C</td><td>75.1°C</td></tr><tr><td>10</td><td>R5</td><td>59.0°C</td><td>78.8°C</td></tr><tr><td>11</td><td>U1</td><td>56.7°C</td><td>76.8°C</td></tr><tr><td>12</td><td>U100</td><td>52.6°C</td><td>72.7°C</td></tr><tr><td>13</td><td>RTH2</td><td>55.5°C</td><td>75.3°C</td></tr><tr><td>14</td><td>Tc</td><td>49.5°C</td><td>69.4°C</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta= 30.3 °C	HIGH AMBIENT Ta= 51.2 °C	1	L3	52.6°C	72.3°C	2	Q1	59.3°C	79.2°C	3	Q2	62.0°C	82.0°C	4	D6	57.7°C	77.5°C	5	C5	56.2°C	75.9°C	6	T1	63.5°C	83.4°C	7	C45	56.5°C	76.3°C	8	D100	56.5°C	76.2°C	9	C105	55.4°C	75.1°C	10	R5	59.0°C	78.8°C	11	U1	56.7°C	76.8°C	12	U100	52.6°C	72.7°C	13	RTH2	55.5°C	75.3°C	14	Tc	49.5°C	69.4°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-60D-48 : 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) 383473 HRS (2) 73639 HRS (3) 92583 HRS (4) 146341 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 314.05KHRS		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50000 hours @ Tcase 70℃		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ ZHUOKB	SKY	LIUWY

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