Test Report：NPF-40D-12

40W 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℃	V1： 22 mVp-p (Max)	PASS
2	CONSTANT CURRENT REGION	V1： 7.2V ~ 12 V	I/P：230VAC O/P:LED MODE Ta:25℃	OP= 7.2V / 3.343A OP= 11V / 3.350A	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1： -4 %~ 4 % (Max)	I/P：90 VAC / 305 VAC O/P：FULL/ NO LOAD Ta：25℃	V1： -0.31 %~ 0.36 %	PASS
4	LINE REGULATION	V1： -0.5 %~ 0.5 % (Max)	I/P：100 VAC ~ 305 VAC O/P：FULL LOAD Ta：25℃	V1： -0.05 %~ 0 %	PASS
5	LOAD REGULATION	V1： -1.5 %~ 1.5 % (Max)	I/P： 230 VAC O/P：FULL~NO LOAD Ta：25℃	V1： -0.34 %~ 0.32 %	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℃	230VAC/ 187 ms 115VAC/ 176 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℃	230VAC/ 11 ms 115VAC/ 12 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℃	230VAC/ 26 ms 115VAC/ 16 ms	PASS
9	OVER/UNDERSHOOT TEST	＜ ±5%	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	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℃	(1) 261 mVp-p (2) 544 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 KΩ	20 KΩ	30 KΩ	40 KΩ	50 KΩ	60 KΩ	70 KΩ	80 KΩ	90 KΩ	100 KΩ	OPEN
	Multiple drives（N=driver quantity for synchronized dimming operation）	Short	10 KΩ /N	20 KΩ /N	30 KΩ /N	40 KΩ /N	50 KΩ /N	60 KΩ /N	70 KΩ /N	80 KΩ /N	90 KΩ /N	100 KΩ /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℃

1	Resistance value	SHORT	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0A	0.340A	0.678A	1.017A	1.354A	1.691A	2.027A	2.361A	2.699A	3.030A	3.347A	3.402A
	%	0%	10.18%	20.30%	30.45%	40.54%	50.63%	60.69%	70.69%	80.81%	90.72%	100.21%	101.86%
2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0A	0.344A	0.680A	1.006A	1.345A	1.678A	2.022A	2.358A	2.688A	3.024A	3.353A	3.400A
	%	0%	10.30%	20.36%	30.12%	40.27%	50.24%	60.54%	70.60%	80.48%	90.54%	100.39%	101.80%
3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0A	0.361A	0.690A	1.023A	1.353A	1.684A	2.014A	2.346A	2.678A	3.005A	3.305A	3.402A
	%	0%	10.81%	20.66%	30.63%	40.51%	50.42%	60.30%	70.24%	80.18%	89.97%	98.95%	101.86%

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℃	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℃	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℃	PF= 0.996 / 115 VAC PF= 0.977 / 230 VAC PF= 0.955 / 277 VAC	PASS
4	EFFICIENCY	86% (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	88.29%	PASS
5	INPUT CURRENT	115V/ 0.6 A (TYP) 230V/ 0.3 A (TYP) 277V/ 0.25 A (TYP)	I/P： 115 VAC I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	I = 0.377 A/ 115 VAC I = 0.191 A/ 230 VAC I = 0.162 A/ 277 VAC	PASS
6	INRUSH CURRENT	230V/ 50 A (TYP) Twidth =270 us measured at 50% Ipeak COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 44.6 A Twidth = 208 us	PASS
7	LEAKAGE CURRENT	< 0.25 mA / 277 VAC	I/P： 305 VAC O/P：NO LOAD Ta：25℃	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℃	0.14 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℃	THD： 6.81% /115VAC THD： 14.58% /230VAC THD： 15.06% /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℃	101.3 %/ 100 VAC 101.3 %/ 230 VAC 101.3 %/ 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℃	15.5 V/ 90 VAC 15.5 V/ 230 VAC 15.5 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℃	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℃	(1) 636 V (2) 494 V (3) 630 V	PASS
2	Diode Peak Voltage	D100 Rated 60 V 40 A	I/P：High-Line +3V = 308 V O/P： (1) FULL LOAD Turn on (2)Output Short (3) FULL LOAD continue Ta：25℃	(1) 50.4 V (2) 37.6 V (3) 49.8 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℃	(1) 442 V (2) 446 V (3) 448 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℃	(1) 17.2 V (2) 17.4 V (3) 17.4 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℃	(1) 462 V (2) 420 V (3) 446 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℃	I/P-O/P： 2.685 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P：500VDC>100MΩ	I/P-O/P： 500 VDC Ta：25℃/70%RH	I/P-O/P： >9999 MΩ NO DAMAGE	PASS

E.M.C TEST

NO	TEST ITEM	SPECICATION	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℃	OK	PASS
2	CONDUCTION	EN55015	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	OK Test by certified Lab	PASS
3	RADIATION	EN55015	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	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℃	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℃	CRITERIA A	PASS
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	PASS
7	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： NPF-40D-12
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=33.0 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=52.2 ℃
<table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 33.0 ℃</th><th>HIGH AMBIENT Ta= 52.2 ℃</th></tr><tr><td>1</td><td>L3</td><td>48.1℃</td><td>64.5℃</td></tr><tr><td>2</td><td>Q1</td><td>57.0℃</td><td>74.4℃</td></tr><tr><td>3</td><td>Q2</td><td>59.5℃</td><td>77.0℃</td></tr><tr><td>4</td><td>D6</td><td>55.6℃</td><td>72.9℃</td></tr><tr><td>5</td><td>C5</td><td>53.6℃</td><td>70.5℃</td></tr><tr><td>6</td><td>T1</td><td>61.5℃</td><td>78.3℃</td></tr><tr><td>7</td><td>C45</td><td>55.3℃</td><td>72.2℃</td></tr><tr><td>8</td><td>D100</td><td>61.6℃</td><td>79.0℃</td></tr><tr><td>9</td><td>C105</td><td>59.7℃</td><td>76.8℃</td></tr><tr><td>10</td><td>C106</td><td>57.5℃</td><td>74.4℃</td></tr><tr><td>11</td><td>R5</td><td>57.2℃</td><td>74.5℃</td></tr><tr><td>12</td><td>U1</td><td>54.4℃</td><td>71.6℃</td></tr><tr><td>13</td><td>U100</td><td>54.7℃</td><td>71.2℃</td></tr><tr><td>14</td><td>RTH2</td><td>53.8℃</td><td>70.7℃</td></tr><tr><td>15</td><td>Tc</td><td>53.3℃</td><td>70.1℃</td></tr></table></td><td>PASS</td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P：305VAC/100VAC
O/P：FULL LOAD
Ta= -45℃/-30℃</td><td>TEST：OK</td><td>PASS</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃
NO DAMAGE</td><td>I/P：315 VAC
O/P：FULL LOAD
Ta= 50 ℃
HUMIDITY= 95% R.H</td><td>TEST：OK</td><td>PASS</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>±0.03 %(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>±0.004 %(0~50℃)</td><td>PASS</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +85℃
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</td><td>OK</td><td>PASS</td></tr>
<tr><td>6</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +55℃
2. Temperature change rate ：25℃ / 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</td><td>OK</td><td>PASS</td></tr>
</table>

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-40D-12：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) 479020 HRS (2) 97900 HRS (3) 117313 HRS (4) 222002 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE：368KHRS		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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