



Test Report: NPF-120D-20

120W Single Output LED Driver

■ 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

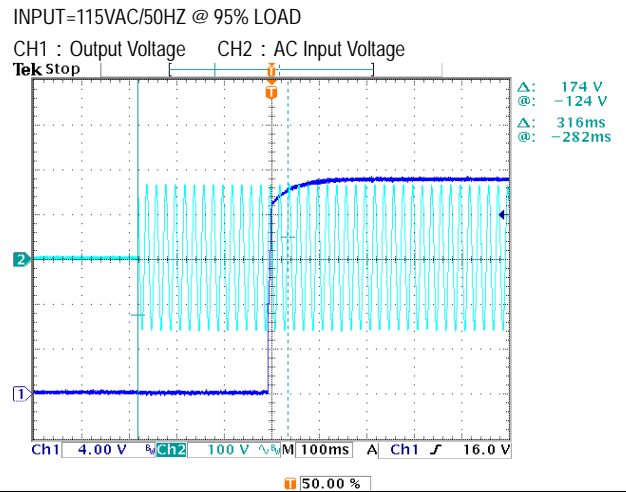
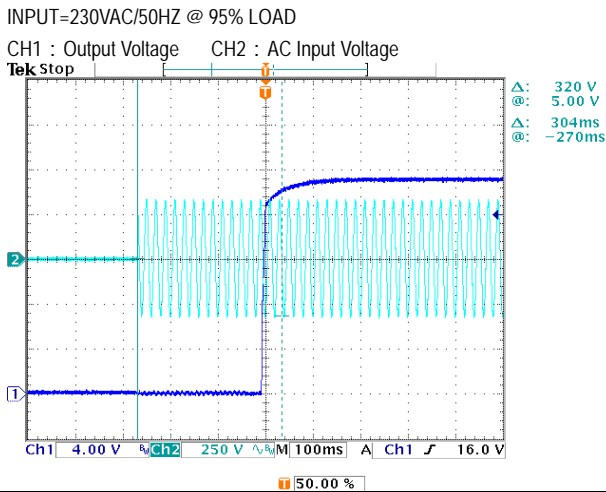
■ RELIABILITY TEST

Environment Test

DESIGN VERIFY TEST

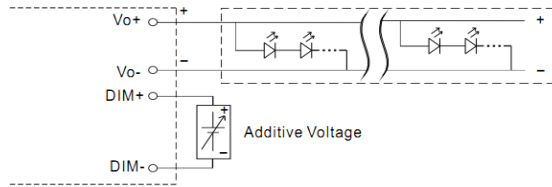
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	12-20V	I/P: 230VAC O/P: LED MODE Ta: 25°C	7.5 V~20 V
2	CURRENT RIPPLE	5% max@rated current	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	1.07 %
3	CURRENT TOLERANCE	±5%	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	1.41 %
4	OVER/UNDERSHOOT TEST	<±5 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5 %
5	AUXILIARY DC OUTPUT (For BE-Type only)	Nominal 12V (deviation 11.4-12.6) @0.2A for BE-Type only	I/P: 230 VAC O/P: FULL LOAD	11.90V
6	SET UP TIME(Max)	230VAC/ 500ms 115VAC/ 500ms	I/P: 230 VAC I/P: 115 VAC O/P: 95% LOAD Ta: 25°C	230VAC/ 304 ms 115VAC/ 316 ms

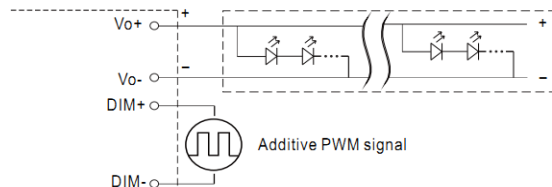


7 DIMMING TEST

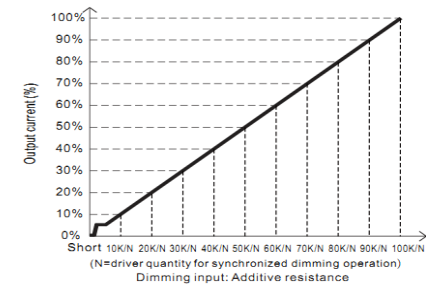
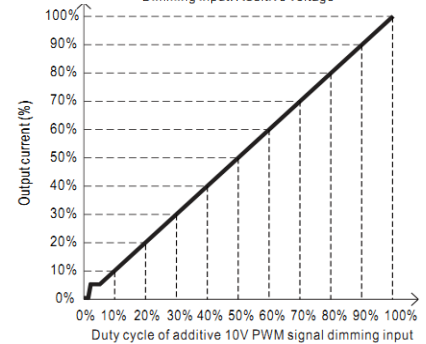
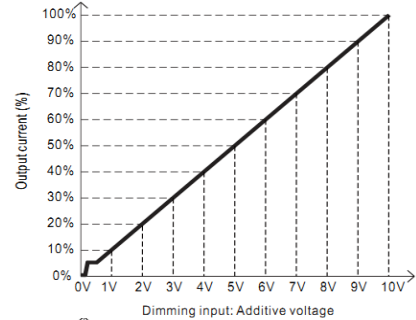
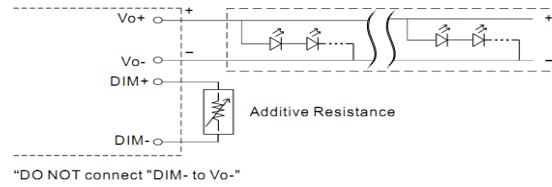
- Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10Vdc, or 10V PWM signal or resistance.
- Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- Dimming source current from power supply: 100uA (typ.)
- © Applying additive 0 ~ 10VDC



- © Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



- © Applying additive resistance:



Note : 1. Min. dimming level is about 6% and the output current is not defined when $0\% < I_{out} < 6\%$.
 2. The output current could drop down to 0% when dimming input is about $0k\Omega$ or 0Vdc, or 10V PWM signal with 0% duty cycle.

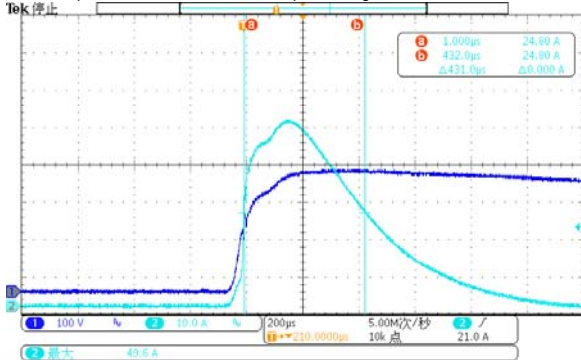
※ Auxiliary DC operation (for BE-type)
 • AUX+, with mark ***, is added for BE-Type, used as the Auxiliary DC output with respect to DIM-.

I/P: 230 VAC
 O/P: DIMMING TEST
 Ta: 25°C

1	V	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPE N
	Output Current	0	0.697	1.261	1.826	2.391	2.956	3.522	4.086	4.651	5.218	5.781	6.00
%	0%	11.62%	21.02%	30.43%	39.85%	49.27%	58.70%	68.10%	77.52%	86.97%	96.35%	100.0%	
2	PWM(100Hz)	0V	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.713	1.286	1.865	2.439	3.018	3.59	4.17	4.747	5.318	5.863	6.00
	%	0%	11.88%	21.43%	31.08%	40.65%	50.30%	59.83%	69.50%	79.12%	88.63%	97.72%	100.00%
3	R	0%	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	0.713	1.286	1.865	2.439	3.018	3.59	4.17	4.747	5.318	5.863	6.00
	%	0%	11.88%	21.43%	31.08%	40.65%	50.30%	59.83%	69.50%	79.12%	88.63%	97.72%	100.0%

TEST RESULT: OK

INPUT FUNCTION TEST

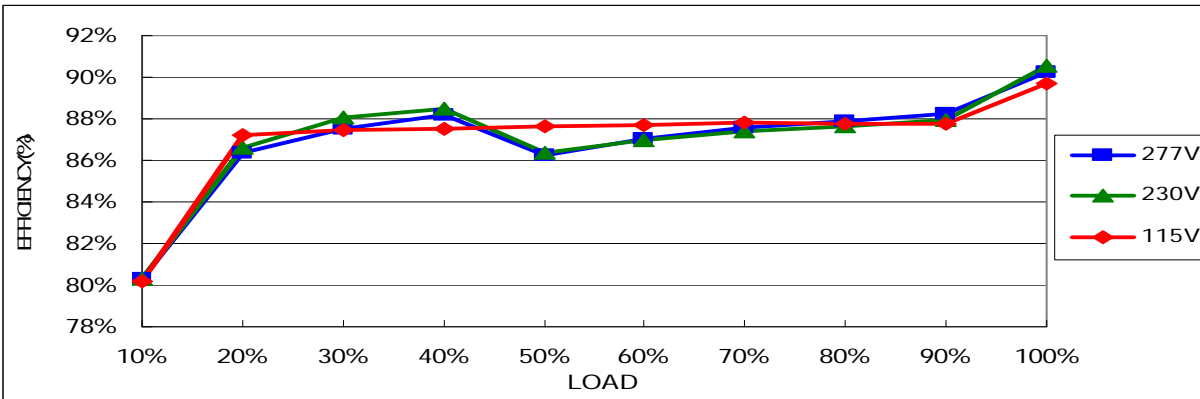
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC-305VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V-305V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P: FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230VAC ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230VAC ON: 3Sec OFF: 3Sec 12HOURS (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 =1.115A/ 115VAC I =0.597A/ 230VAC I =0.515A/ 277VAC
4	LEAKAGE CURRENT	< 0.25mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.023 mA N-FG: 0.023 mA
5	STANDBY POWER CONSUMPTION	< 0.5W	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.385 W
6	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= 49.6 A/ 230VAC Twidth = 431 us
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2: Input current CH1: AC Input Voltage</p> 				
7	EFFICIENCY(Typ)	89.0% (BLANK-TYPE) 88.5% (BE-TYPE)	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.12% (BLANK-TYPE) 88.92% (BE-TYPE)



120W Single Output LED Driver

NPF-120D series

EFFICIENCY vs LOAD



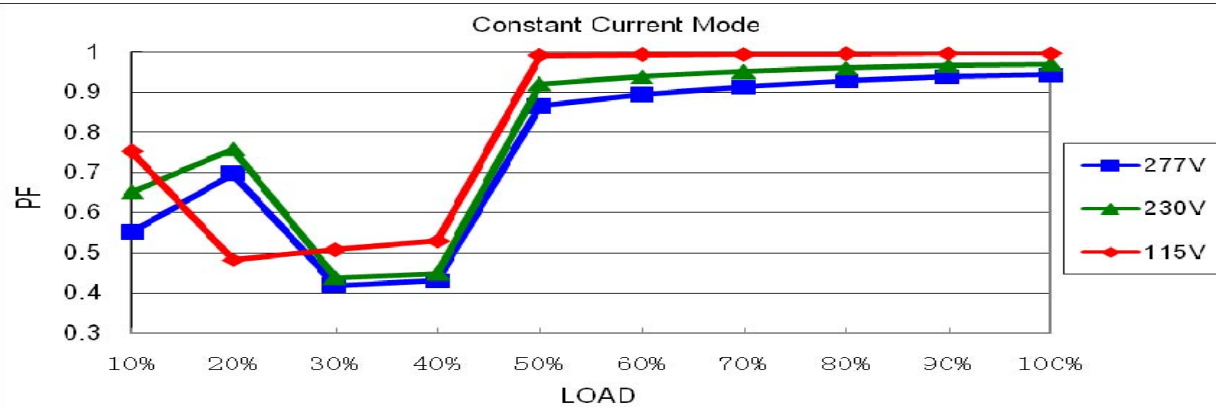
8 POWER FACTOR

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=0.996/ 115VAC
PF=0.972/ 230VAC
PF=0.956/ 277VAC

P.F vs LOAD



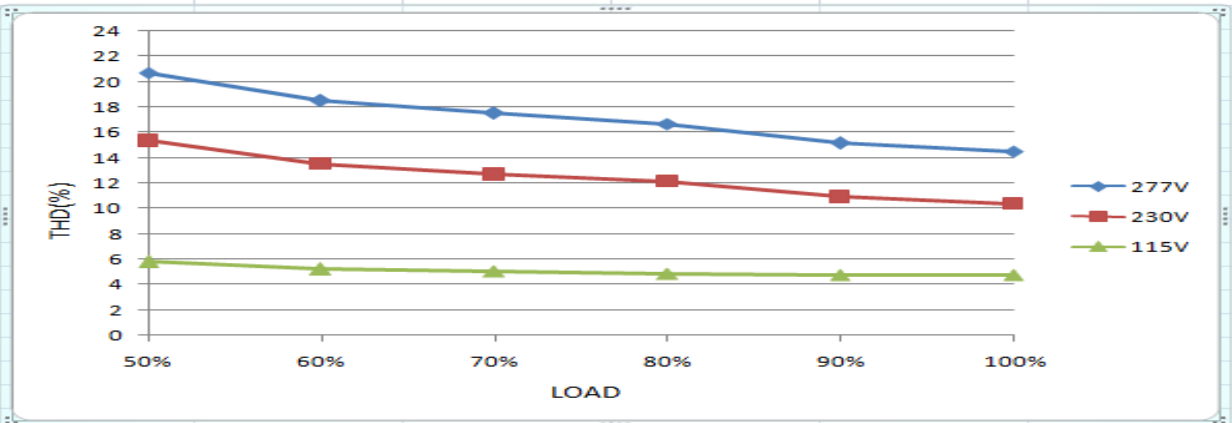
9 TOTAL HARMONIC DISTORTION

THD < 20%
(@load ≥ 60%/115VAC, 230VAC;
@load ≥ 75%/277VAC)

I/P: 115 VAC/60% LOAD
I/P: 230 VAC/60% LOAD
I/P: 277 VAC/75% LOAD
Ta: 25°C

THD=5.32% @60% load /115VAC
THD=13.75 % @60% load /230VAC
THD=16.89% @75% load /277VAC

THD vs LOAD





PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	95 %- 108 %	I/P: 230VAC O/P: TESTING Ta: 25°C	101.28%/ 230VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	23 V-27V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	25.16V/ 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 CIRCUIT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC 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) 664V (2) 590V (3) 640V
2	Diode Peak Voltage	Q101 Rated 120V/56A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 85.1V (2) 76.1V (3) 82.1V
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) 445V (3) 448V
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) 17.2V (2) 10.6 V (3) 17.1V
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) 497V (2) 485V (3) 480V



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: 1.998 mA 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**

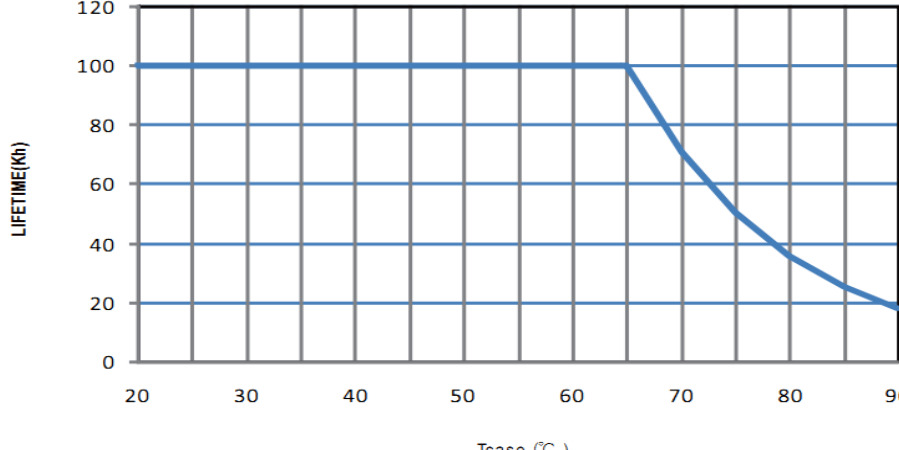
ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																								
1	TEMPERATURE RISE TEST	MODEL: NPF-120D-24 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 29.2°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 51.1°C																																																																										
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 29.2 °C</th> <th>HIGH AMBIENT Ta=51.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>77.0°C</td><td>98.7°C</td></tr> <tr><td>2</td><td>C105</td><td>77.0°C</td><td>98.0°C</td></tr> <tr><td>3</td><td>T1</td><td>85.3°C</td><td>107.8°C</td></tr> <tr><td>4</td><td>Q1</td><td>82.1°C</td><td>105.6°C</td></tr> <tr><td>5</td><td>Q2</td><td>89.3°C</td><td>115.6°C</td></tr> <tr><td>6</td><td>Q101</td><td>91.6°C</td><td>112.6°C</td></tr> <tr><td>7</td><td>L3</td><td>70.9°C</td><td>92.1°C</td></tr> <tr><td>8</td><td>D6</td><td>83.5°C</td><td>106.8°C</td></tr> <tr><td>9</td><td>D10</td><td>93.4°C</td><td>119.1°C</td></tr> <tr><td>10</td><td>U101</td><td>76.4°C</td><td>97.4°C</td></tr> <tr><td>11</td><td>C45</td><td>74.2°C</td><td>95.4°C</td></tr> <tr><td>12</td><td>R7</td><td>91.7°C</td><td>116.1°C</td></tr> <tr><td>13</td><td>R15</td><td>84.5°C</td><td>108.4°C</td></tr> <tr><td>14</td><td>U1</td><td>71.5°C</td><td>92.7°C</td></tr> <tr><td>15</td><td>C106</td><td>77.6°C</td><td>98.3°C</td></tr> <tr><td>16</td><td>RTH3</td><td>71.8°C</td><td>92.7°C</td></tr> <tr><td>17</td><td>TC</td><td>66.1°C</td><td>86.3°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 29.2 °C	HIGH AMBIENT Ta=51.1 °C	1	C5	77.0°C	98.7°C	2	C105	77.0°C	98.0°C	3	T1	85.3°C	107.8°C	4	Q1	82.1°C	105.6°C	5	Q2	89.3°C	115.6°C	6	Q101	91.6°C	112.6°C	7	L3	70.9°C	92.1°C	8	D6	83.5°C	106.8°C	9	D10	93.4°C	119.1°C	10	U101	76.4°C	97.4°C	11	C45	74.2°C	95.4°C	12	R7	91.7°C	116.1°C	13	R15	84.5°C	108.4°C	14	U1	71.5°C	92.7°C	15	C106	77.6°C	98.3°C	16	RTH3	71.8°C	92.7°C	17	TC	66.1°C	86.3°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																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C NO DAMAGE	I/P: 315VAC O/P: FULL LOAD Ta=45 °C HUMIDITY= 95% R.H	TEST: OK																																																																								
4	TEMPERATURE COEFFICIENT	±0.03%/°C (0-50°C)	I/P: 230 VAC O/P: FULL LOAD	±0.002%/°C (0-50°C)																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45°C ~ +90°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		TEST: OK																																																																								



120W Single Output LED Driver

NPF-120D 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-120D-24: 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) 111747 HRS (2) 29735 HRS (3) 74698 HRS (4) 87047 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 877.8K hrs min. Telcordia SR-332 (Bellcore) 233.9K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50000 hours @ TC 75°C 	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHUOKB/CHENZH	SKY	LIUWY