



Test Report: **NPF-120D-12**

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

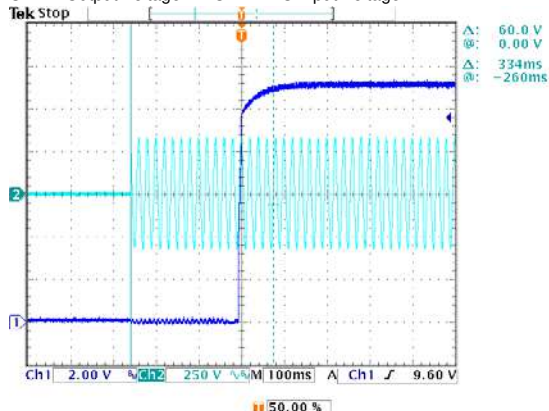
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	7.2~12V	I/P: 230VAC O/P: LED MODE Ta: 25°C	5.2 V~12 V
2	CURRENT RIPPLE	5% max@rated current	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	2.67 %
3	CURRENT TOLERANCE	±5%	I/P: 230VAC O/P: FULL/MIN LOAD Ta: 25°C	0.61 %
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	11.81V
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/ 334 ms 115VAC/ 286 ms

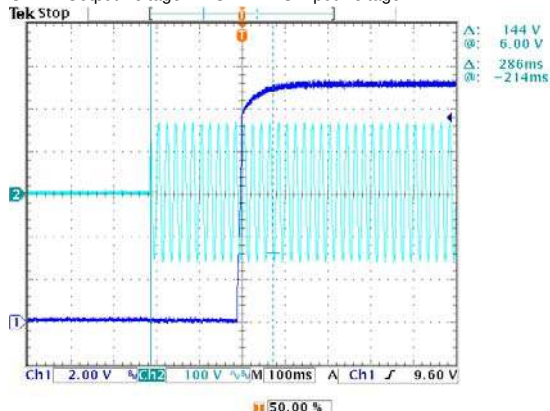
INPUT=230VAC/50HZ @ 95% LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



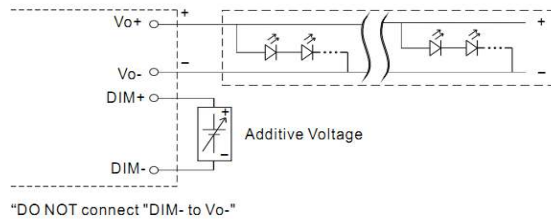
INPUT=115VAC/50HZ @ 95% LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

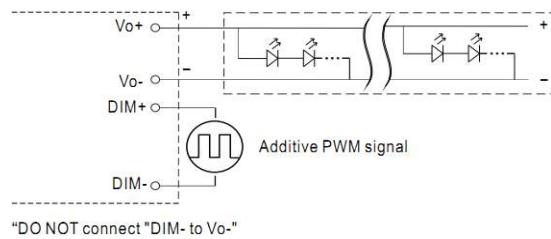


7 DIMMING TEST

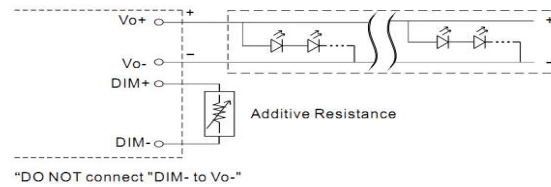
- Output constant current level can be adjusted by applying one of the three methodologies between DIM+ and DIM-: 0 ~ 10Vdc, or 10V PWM signal or resistance.
- Direct connecting to LEDs is suggested. It is not suitable to be used with additional drivers.
- Dimming source current from power supply: 100uA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

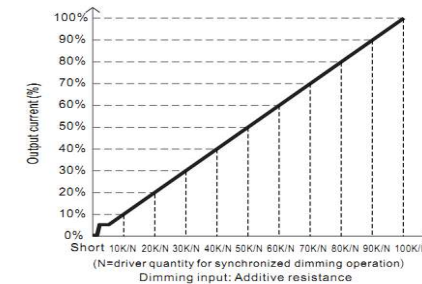
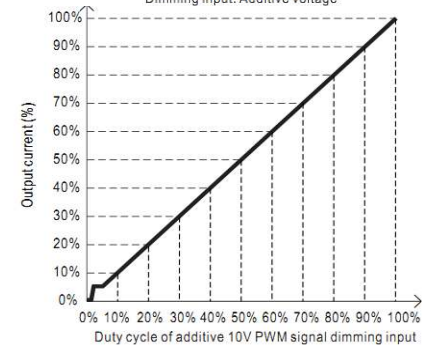
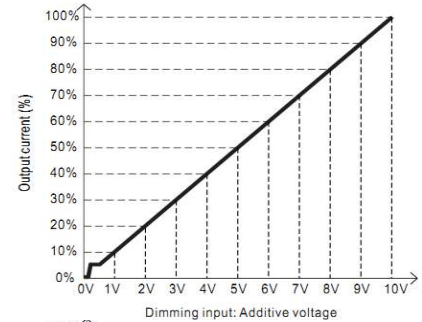
I/P: 230 VAC

O/P: DIMMING TEST

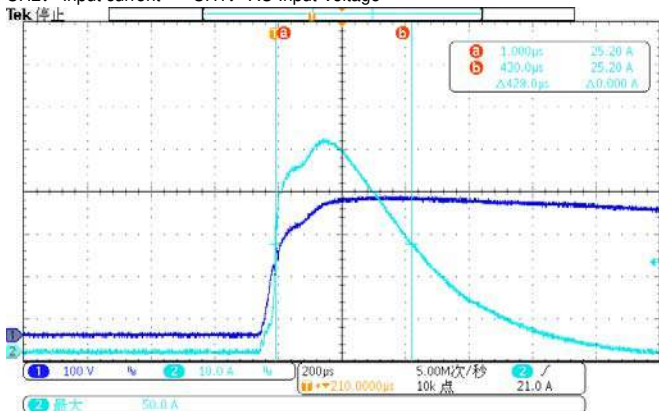
Ta: 25°C

1	V	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	1.242	2.219	3.161	4.14	5.077	6.056	7.000	7.976	8.921	9.787	10.00
	%	0%	12.42%	22.19%	31.61%	41.40%	50.77%	60.56%	70.00%	79.76%	89.21%	97.87%	100%
2	PWM(100Hz)	0V	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.983	1.952	2.925	3.896	4.867	5.839	6.809	7.78	8.752	9.723	10.00
	%	0%	9.83%	19.52%	29.25%	38.96%	48.67%	58.39%	68.09%	77.80%	87.52%	97.23%	100%
3	R	0%	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	1.014	1.999	2.991	3.969	4.952	5.922	6.899	7.872	8.832	9.792	10.00
	%	0%	10.14%	19.99%	29.91%	39.69%	49.52%	59.22%	68.99%	78.72%	88.32%	97.92%	100%

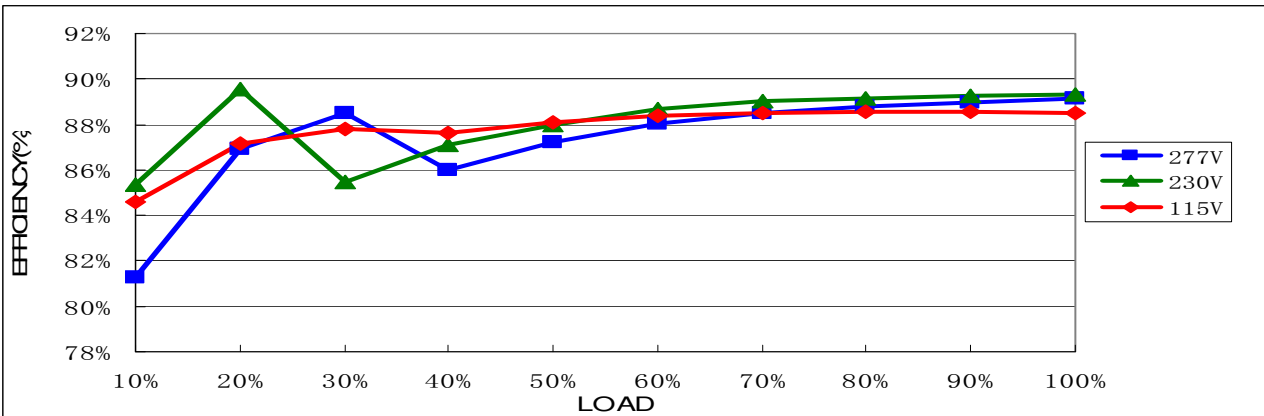
TEST RESULT: OK



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=1.147A/ 115VAC I=0.577A/ 230VAC I=0.495A/ 277VAC
4	LEAKAGE CURRENT	< 0.25mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.003 mA N-FG: 0.003 mA
5	STANDBY POWER CONSUMPTION	< 0.5W	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.392 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=50.0A/ 230VAC Twidth =429 us
INPUT=230VAC/50HZ @ FULL LOAD CH2: Input current CH1: AC Input Voltage  Tek 停止 1 100 V 2 10.0 A 200µs 5.00M次/秒 21.0 A 2 10.0 A 210.000µs 10k 点				
7	EFFICIENCY(Typ)	87.5% (BLANK-TYPE) 87.5% (BE-TYPE)	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	88.35% (BLANK-TYPE) 87.77% (BE-TYPE)

EFFICIENCY vs LOAD



8

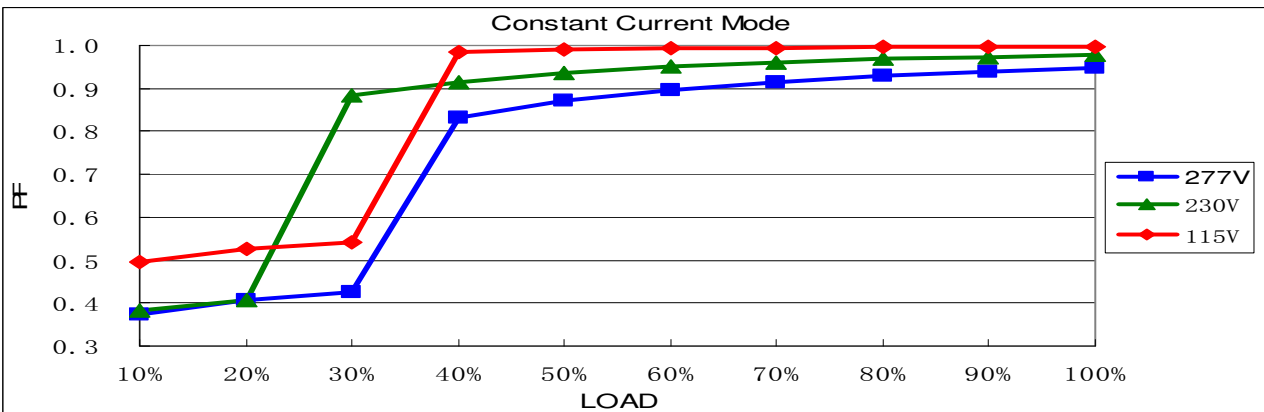
POWER FACTOR

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=0.977/ 230VAC
PF=0.944/ 277VAC

P.F vs LOAD



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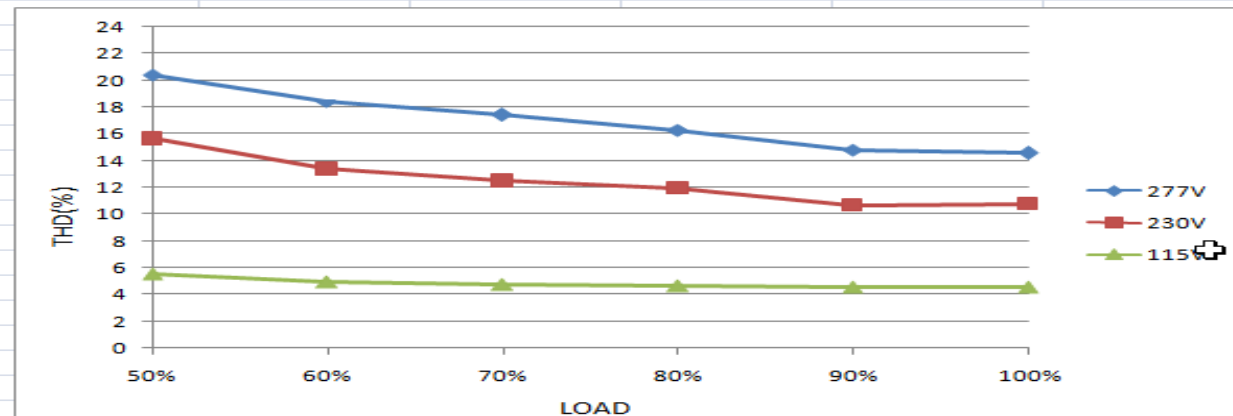
TOTAL HARMONIC
DISTORTION

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=4.854% @60% load /115VAC
THD=13.24 % @60% load /230VAC
THD=15.39% @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	102.28%/ 230VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	15V~17V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	16.51V/ 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) 668V (2) 652V (3) 630V
2	Diode Peak Voltage	Q101 Rated 75V/80A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 72.6V (2) 59.0V (3) 68.8V
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) 438V (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) 17.0V (2) 10.2 V (3) 17.5V
5	PFC Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 600V/15A	I/P: High-Line +3V =308V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 490V (2) 486V (3) 489V



120W Single Output LED Driver

NPF-120D series

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: 1.898 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

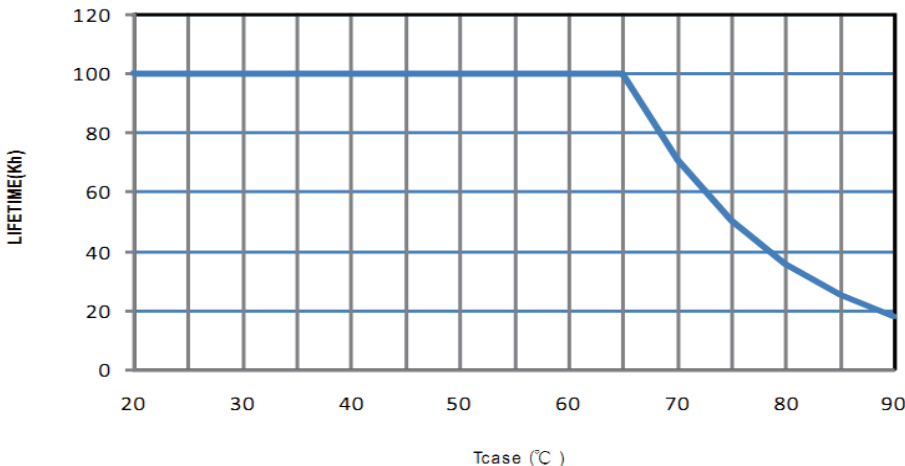
ENVIRONMENT TEST

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℃ 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 51.1℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 29.2 ℃</th><th>HIGH AMBIENT Ta=51.1 ℃</th></tr><tr><td>1</td><td>C5</td><td>77.0℃</td><td>98.7℃</td></tr><tr><td>2</td><td>C105</td><td>77.0℃</td><td>98.0℃</td></tr><tr><td>3</td><td>T1</td><td>85.3℃</td><td>107.8℃</td></tr><tr><td>4</td><td>Q1</td><td>82.1℃</td><td>105.6℃</td></tr><tr><td>5</td><td>Q2</td><td>89.3℃</td><td>115.6℃</td></tr><tr><td>6</td><td>Q101</td><td>91.6℃</td><td>112.6℃</td></tr><tr><td>7</td><td>L3</td><td>70.9℃</td><td>92.1℃</td></tr><tr><td>8</td><td>D6</td><td>83.5℃</td><td>106.8℃</td></tr><tr><td>9</td><td>D10</td><td>93.4℃</td><td>119.1℃</td></tr><tr><td>10</td><td>U101</td><td>76.4℃</td><td>97.4℃</td></tr><tr><td>11</td><td>C45</td><td>74.2℃</td><td>95.4℃</td></tr><tr><td>12</td><td>R7</td><td>91.7℃</td><td>116.1℃</td></tr><tr><td>13</td><td>R15</td><td>84.5℃</td><td>108.4℃</td></tr><tr><td>14</td><td>U1</td><td>71.5℃</td><td>92.7℃</td></tr><tr><td>15</td><td>C106</td><td>77.6℃</td><td>98.3℃</td></tr><tr><td>16</td><td>RTH3</td><td>71.8℃</td><td>92.7℃</td></tr><tr><td>17</td><td>TC</td><td>66.1℃</td><td>86.3℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 29.2 ℃	HIGH AMBIENT Ta=51.1 ℃	1	C5	77.0℃	98.7℃	2	C105	77.0℃	98.0℃	3	T1	85.3℃	107.8℃	4	Q1	82.1℃	105.6℃	5	Q2	89.3℃	115.6℃	6	Q101	91.6℃	112.6℃	7	L3	70.9℃	92.1℃	8	D6	83.5℃	106.8℃	9	D10	93.4℃	119.1℃	10	U101	76.4℃	97.4℃	11	C45	74.2℃	95.4℃	12	R7	91.7℃	116.1℃	13	R15	84.5℃	108.4℃	14	U1	71.5℃	92.7℃	15	C106	77.6℃	98.3℃	16	RTH3	71.8℃	92.7℃	17	TC	66.1℃	86.3℃
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5	Q2	89.3℃	115.6℃																																																																									
6	Q101	91.6℃	112.6℃																																																																									
7	L3	70.9℃	92.1℃																																																																									
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9	D10	93.4℃	119.1℃																																																																									
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16	RTH3	71.8℃	92.7℃																																																																									
17	TC	66.1℃	86.3℃																																																																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 305VAC/100VAC O/P: FULL LOAD Ta= -45℃ / -30℃	TEST: OK																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 ℃ NO DAMAGE	I/P: 315VAC O/P: FULL LOAD Ta=45 ℃ HUMIDITY= 95% R.H	TEST: OK																																																																								
4	TEMPERATURE COEFFICIENT	±0.03%/℃ (0~50℃)	I/P: 230 VAC O/P: FULL LOAD	±0.002%/℃ (0~50℃)																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45℃ ~ +90℃ 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		TEST: OK																																																																								



120W Single Output LED Driver

NPF-120D series

6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -45℃ ~ +50℃ 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 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℃	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 ℃ LIFE TIME (2) I/P: 230VAC O/P: FULL LOAD Ta= 45 ℃ LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 45 ℃ LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 45 ℃ 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℃)																					
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50000 hours @ TC 75℃  <table><caption>Data points estimated from the Lifetime vs Tcase graph</caption><tr><th>Tcase (°C)</th><th>Lifetime (kh)</th></tr><tr><td>20</td><td>100</td></tr><tr><td>30</td><td>100</td></tr><tr><td>40</td><td>100</td></tr><tr><td>50</td><td>100</td></tr><tr><td>60</td><td>100</td></tr><tr><td>65</td><td>100</td></tr><tr><td>70</td><td>70</td></tr><tr><td>80</td><td>40</td></tr><tr><td>90</td><td>20</td></tr></table>		Tcase (°C)	Lifetime (kh)	20	100	30	100	40	100	50	100	60	100	65	100	70	70	80	40	90	20
Tcase (°C)	Lifetime (kh)																						
20	100																						
30	100																						
40	100																						
50	100																						
60	100																						
65	100																						
70	70																						
80	40																						
90	20																						

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHUOKB/CHENZH	SKY	LIUWY