Test Report： NPF-120D-15

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

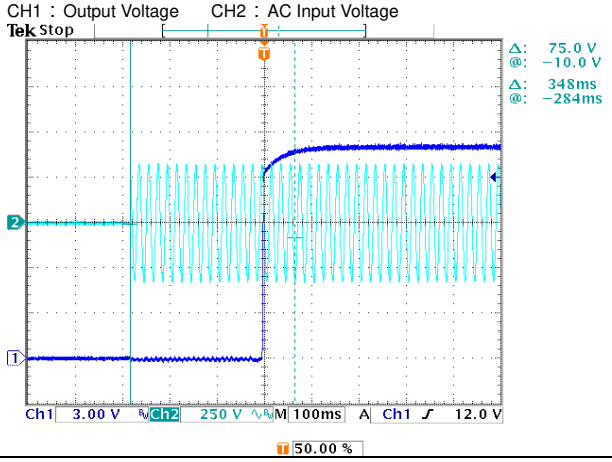
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANTCURRENT REGION	9 V~15 V	I/P： 230VAC O/P：LED MODE Ta：25℃	6.5 V~14.8 V
2	CURRENT RIPPLE	5% max@rated current	I/P： 230VAC O/P：FULL/MIN LOAD Ta：25℃	2.07 %
3	CURRENT TOLERANCE	±5%	I/P： 230VAC O/P：FULL/MIN LOAD Ta：25℃	1.62 %
4	OVER/UNDERSHOOT TEST	<±5 %	I/P： 230VAC O/P：FULL LOAD Ta：25℃	<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	11.84V
6	SET UP TIME(Max)	230VAC/ 500ms 115VAC/ 500ms	I/P： 230 VAC I/P： 115 VAC O/P：95% LOAD Ta：25℃	230VAC/ 348 ms 115VAC/ 358 ms

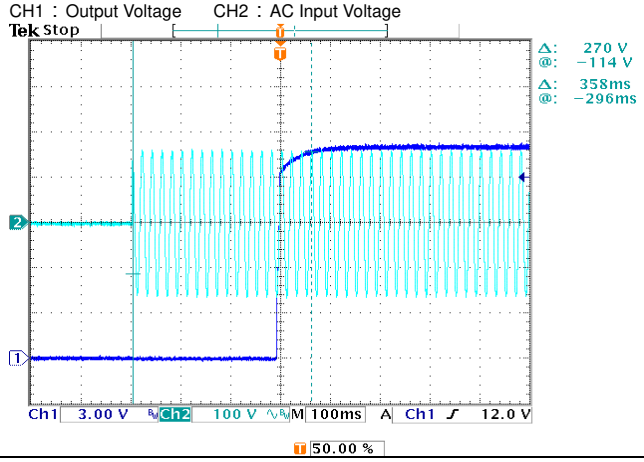
INPUT=230VAC/50HZ @ 95% LOAD

CH1 ：Output Voltage CH2 ：AC Input Voltage



INPUT=115VAC/50HZ @ 95% LOAD

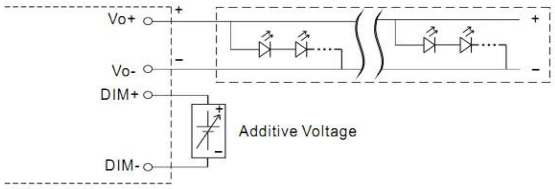
CH1 ：Output Voltage CH2 ：AC Input Voltage



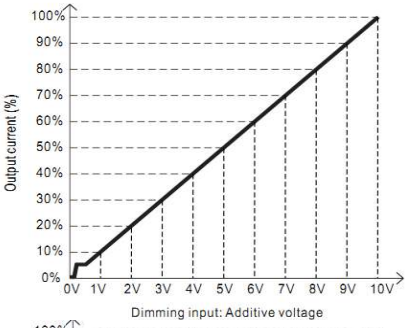
7 DIMMING TEST

- 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.)

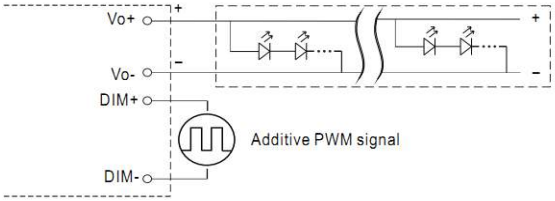
◎ Applying additive 0 ~ 10VDC



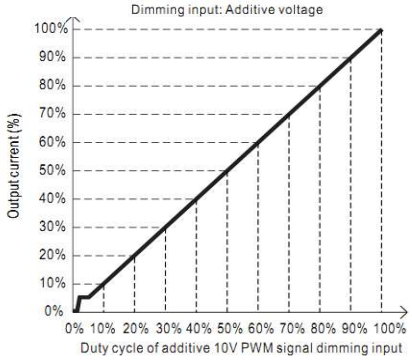
"DO NOT connect "DIM- to Vo-"



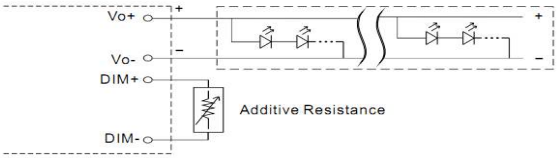
◎ Applying additive 10V PWM signal (frequency range 100Hz ~ 3KHz):



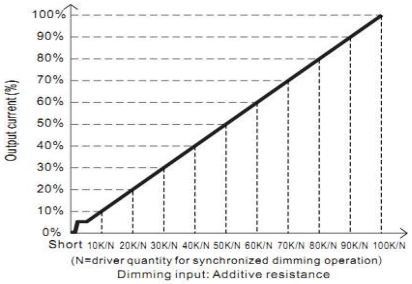
"DO NOT connect "DIM- to Vo-"



◎ Applying additive resistance:



"DO NOT connect "DIM- to Vo-"



Note : 1. Min. dimming level is about 6% and the output current is not defined when 0%< Iout<6%.
2. The output current could drop down to 0% when dimming input is about 0kΩ 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

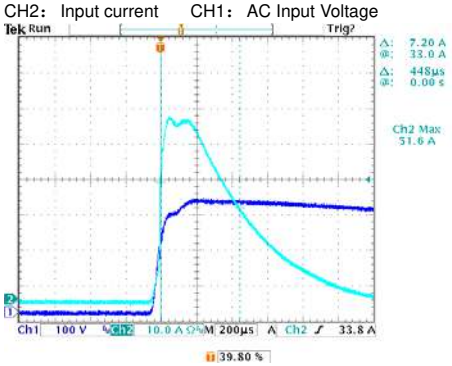
O/P：DIMMING TEST

Ta：25℃

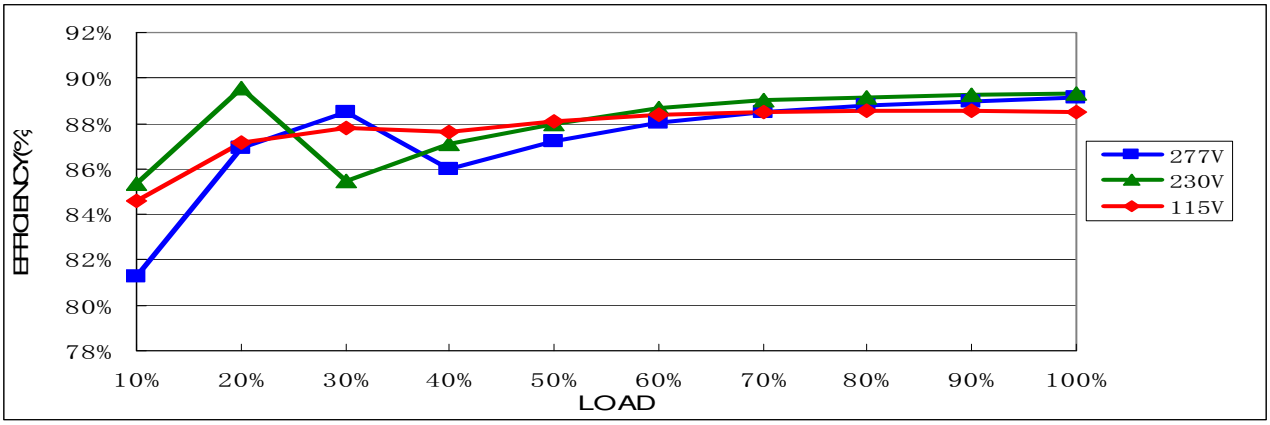
1	V	Short	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	1.06	1.794	2.529	3.264	3.999	4.735	5.468	6.203	6.937	7.674	8.00
	%	0%	13.25%	22.43%	31.61%	40.80%	49.99%	59.19%	68.35%	77.54%	86.71%	95.93%	100.00%
2	PWM(100Hz)	0V	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	1.08	1.828	2.589	3.344	4.11	4.871	5.644	6.42	7.191	7.826	8.00
	%	0%	13.50%	22.85%	32.36%	41.80%	51.38%	60.89%	70.55%	80.25%	89.89%	97.83%	100.00%
3	R	0%	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output Current	0	1.08	1.828	2.589	3.344	4.11	4.871	5.644	6.42	7.191	7.826	8.00
	%	0%	13.50%	22.85%	32.36%	41.80%	51.38%	60.89%	70.55%	80.25%	89.89%	97.83%	100.00%

TEST RESULT：OK

INPUT FUNCTION TEST

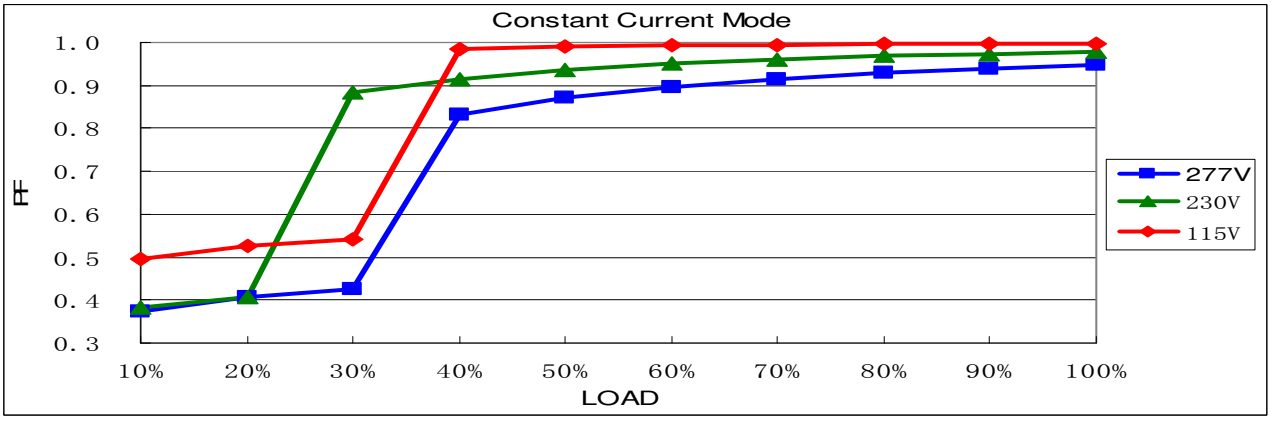
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305VAC	I/P：TESTING O/P：FULL LOAD Ta：25℃	87V~305V
			I/P： (1)LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P：FULL/MIN LOAD ON： 30 Sec OFF： 30 Sec 10MIN (2)230VAC ON： 0.5 Sec OFF： 0.5 Sec 20MIN (3)230VAC ON：3Sec OFF：3Sec 12HOURS (POWER 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℃	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℃	I =1.127A/ 115VAC I =0.587A/ 230VAC I =0.505A/ 277VAC
4	LEAKAGE CURRENT	< 0.25mA / 277VAC	I/P： 277 VAC O/P：NO LOAD Ta：25℃	L-FG： 0.005 mA N-FG： 0.005 mA
5	STANDBY POWER CONSUMPTION	< 0.5W	I/P：230VAC O/P：NO LOAD Ta：25℃	0.422 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℃	I=51.6A/ 230VAC Twidth =448 us
	INPUT=230VAC/50HZ @ FULL LOAD CH2： Input current CH1： AC Input Voltage 			
7	EFFICIENCY(Typ)	88.0% （BLANK-TYPE） 87.5% （BE-TYPE）	I/P： 230VAC O/P：FULL LOAD Ta：25℃	88.85%（BLANK-TYPE） 87.87%（BE-TYPE）

EFFICIENCY vs LOAD



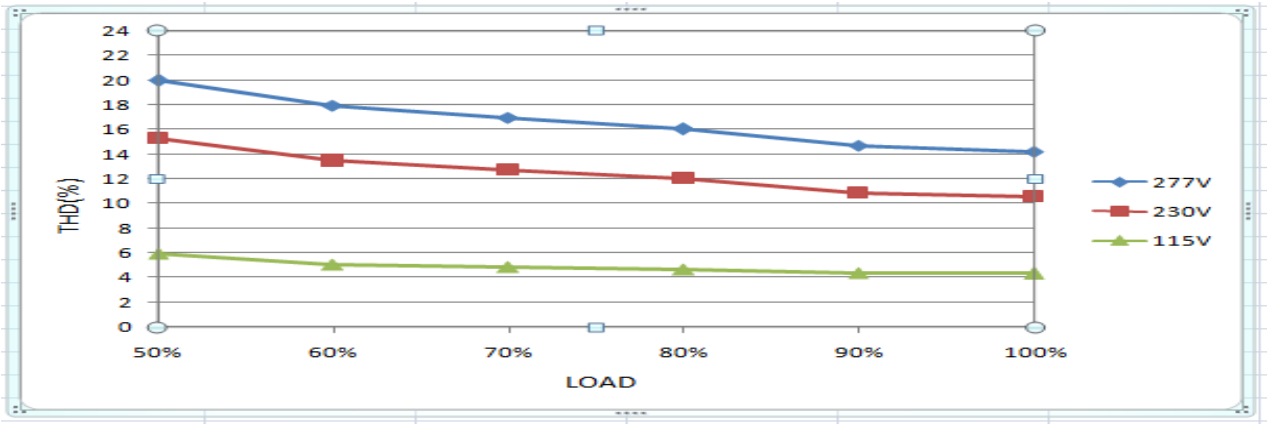
8	POWER FACTOR	0.97/ 115VAC 0.96/ 230VAC 0.94/ 277VAC	I/P： 115 VAC I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	PF=0.995/ 115VAC PF=0.972/ 230VAC PF=0.954/ 277VAC

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℃	THD=5.54% @60% load /115VAC THD=15.24 % @60% load /230VAC THD=16.95% @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℃	102.38%/ 230VAC Constant current limiting，recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	17.5V~21V	I/P： 230VAC O/P：NO LOAD Ta：25℃	18.47V/ 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℃	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℃	 (1) 687V (2) 618V (3) 670V
2	**Diode Peak Voltage**	Q101 Rated 100V/62A	I/P：High-Line +3V =308V O/P： (1) Full Load Turn on (2) Output Short (3) Full load continue Ta：25℃	 (1) 75V (2) 56.5V (3) 70V
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℃	 (1) 448V (2) 440V (3) 445V
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℃	 (1) 17.8V (2) 10.5 V (3) 17.4V
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℃	 (1) 525V (2) 473V (3) 515V

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℃	I/P-O/P： 1.858 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P：500VDC>100MΩ	I/P-O/P： 500VDC Ta：25℃	I/P-O/P： ＞9999MΩ

E.M.C TEST

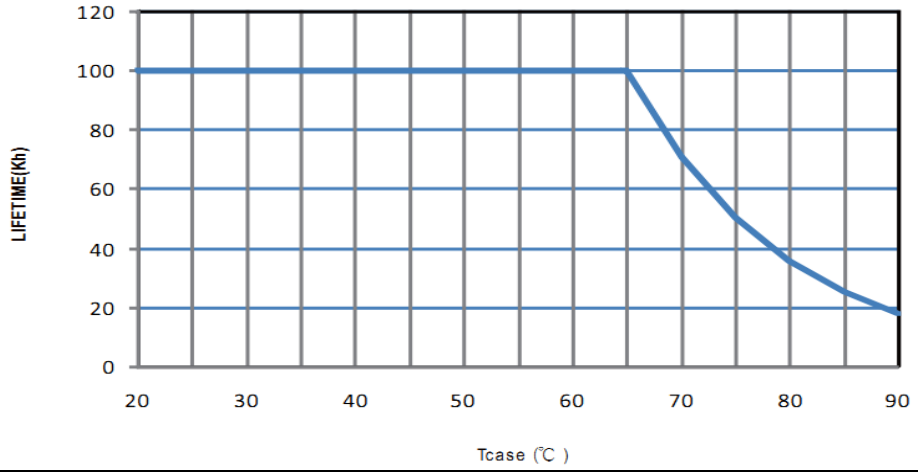
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P：115VAC/230VAC/50HZ O/P：60%/FULL LOAD I/P：277VAC/50HZ O/P：75%/FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55015	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55015	I/P：230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT：1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
6	SURGE	EN61000-4-5 INDUSTRY L-N：2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
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></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">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></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></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 45 ℃
NO DAMAGE</td><td>I/P： 315VAC
O/P： FULL LOAD
Ta=45 ℃
HUMIDITY= 95% R.H</td><td>TEST： OK</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>±0.002%/℃(0~50℃)</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">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</td><td>TEST： OK</td></tr>
</table>

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℃	



TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHUOKB/CHENZH	SKY	LIUWY