Test Report： NPF-120-15

120W 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

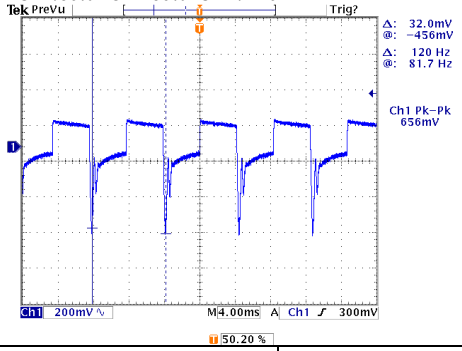
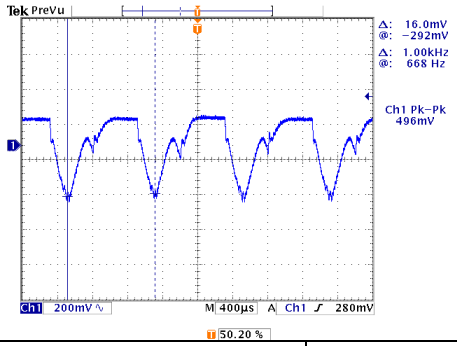
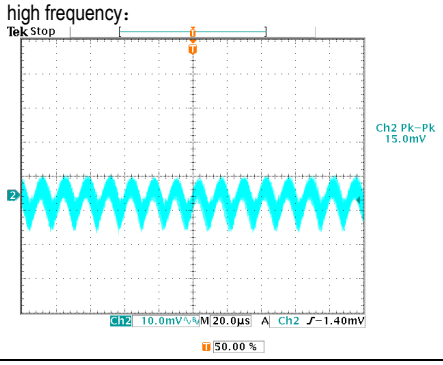
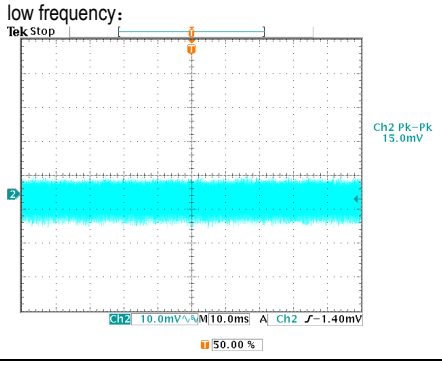
Safety Test
E.M.C. Test

■ RELIABILITY TEST

Environment Test

■ DESIGN VERIFY TEST

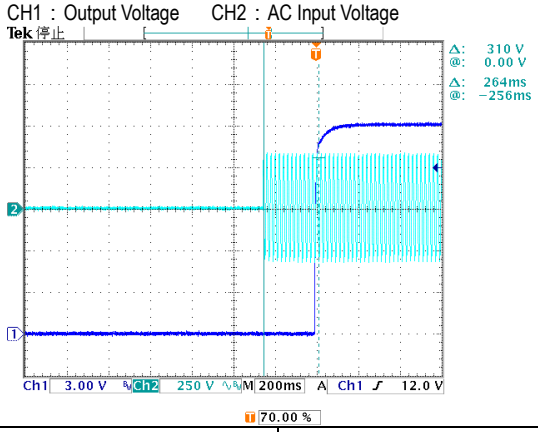
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONSTANT CURRENT REGION	9~15V	I/P： 230VAC O/P：LED MODE Ta：25℃	5.5V~15V
2	OUTPUT VOLTAGE TOLERANCE	-4.0%~4.0%	I/P：90 VAC ~ 305 VAC O/P：FULL/ NO LOAD Ta：25℃	-0.507% ~0.316%
3	LINE REGULATION	-0.5%~0.5%	I/P： 100VAC~ 305VAC O/P：FULL LOAD Ta：25℃	0% ~ 0.198%
4	LOAD REGULATION	-1.5%~ 1.5%	I/P： 230VAC O/P：FULL ~NO LOAD Ta：25℃	-0.309% ~ 0.316%
5	DYNAMIC LOAD	1500mVp-p	I/P： 230VAC O/P ： (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta：25℃	 (1) 656mVp-p (2) 496mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ  FULL /50% LOAD 50%DUTY / 1KHZ 			
6	OVER/UNDERSHOOT TEST	<±5 %	I/P： 230VAC O/P：FULL LOAD Ta：25℃	<5 %
7	RIPPLE & NOISE (Max)	150mVp-p	I/P： 230VAC O/P：FULL LOAD Ta：25℃	15mVp-p
	high frequency：  low frequency： 			

8	SET UP TIME(Max)	230VAC/ 500ms 115VAC/ 500ms	I/P： 230 VAC I/P： 115 VAC O/P：95% LOAD Ta：25℃	230VAC/ 264ms 115VAC/ 208ms

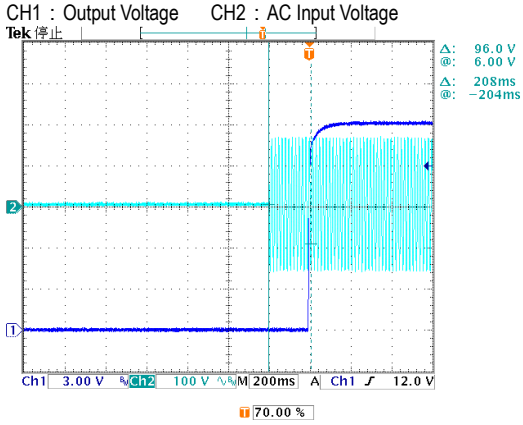
INPUT=230VAC/50HZ @ 95% LOAD

CH1 ：Output Voltage CH2 ：AC Input Voltage



INPUT=115VAC/60HZ @ 95% LOAD

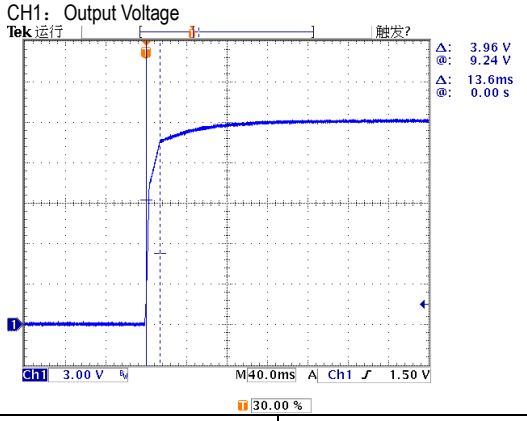
CH1 ：Output Voltage CH2 ：AC Input Voltage



9	RISE TIME (Max)	230VAC/ 80ms 115VAC/ 80ms	I/P： 230 VAC I/P： 115 VAC O/P：95% LOAD Ta：25℃	230VAC/13.6ms 115VAC/12.8ms

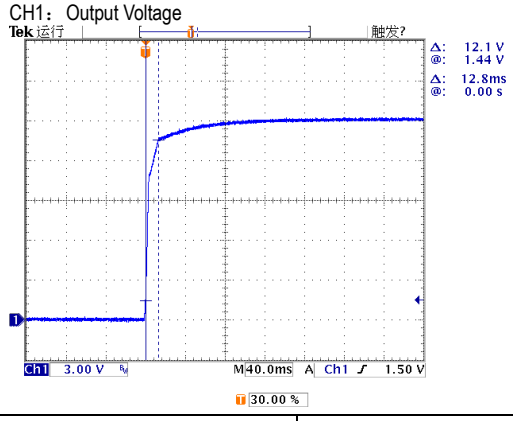
INPUT=230VAC/50HZ @ 95% LOAD

CH1：Output Voltage



INPUT=115VAC/60HZ @ 95% LOAD

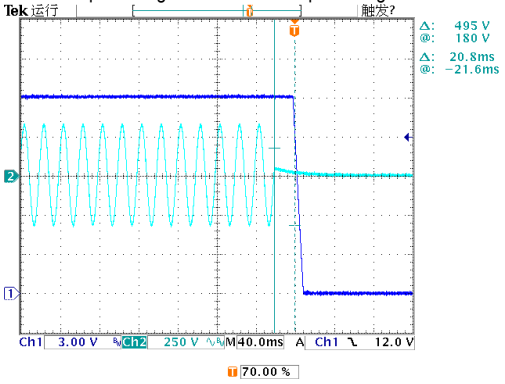
CH1：Output Voltage



10	HOLD UP TIME(Typ)	230VAC/ 16ms 115VAC/ 16ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/20.8ms 115VAC/20.8ms

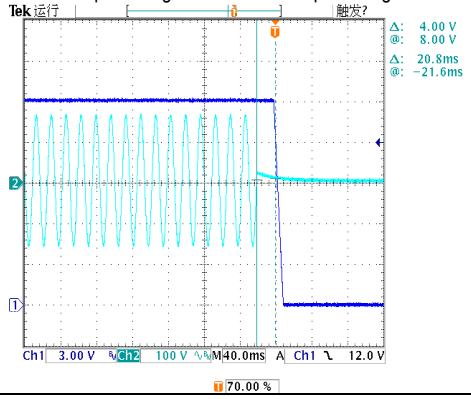
INPUT=230VAC/50HZ @ FULL LOAD

CH1：Output Voltage CH2：AC Input Voltage

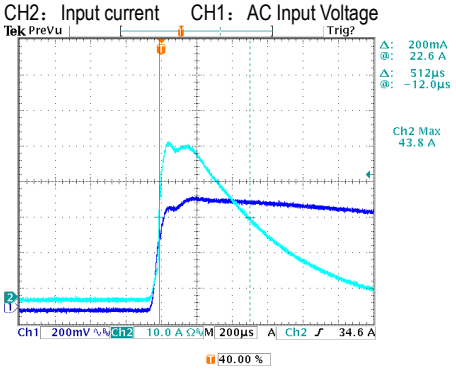


INPUT=115VAC/60HZ @ FULL LOAD

CH1：Output Voltage CH2：AC Input Voltage

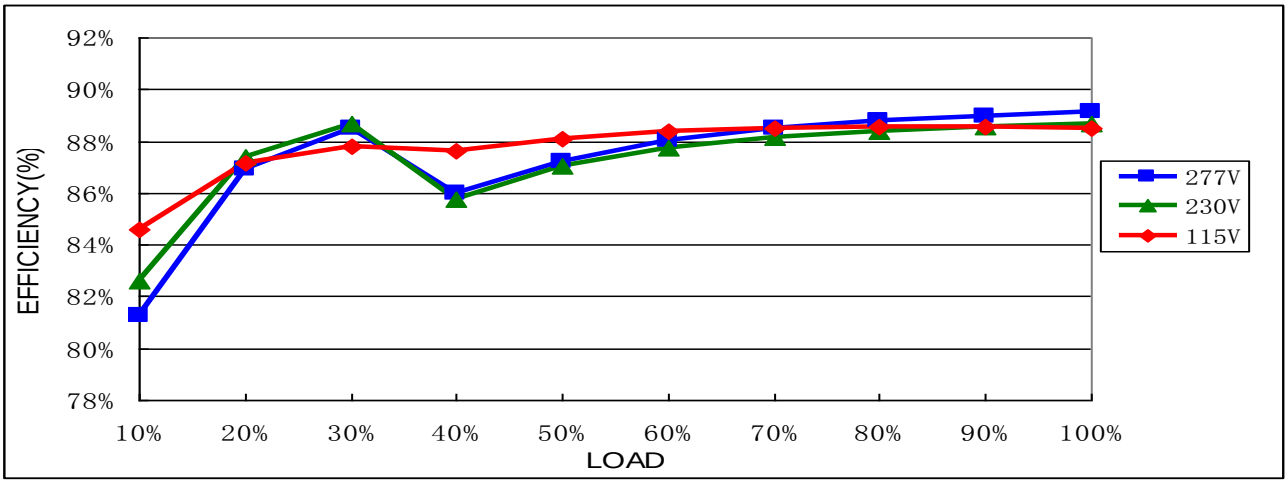


INPUT FUNCTION TEST

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 =1.18A/ 115VAC I =0.59A/ 230VAC I =0.51A/ 277VAC
4	LEAKAGE CURRENT	< 0.25mA / 277VAC	I/P： 277 VAC O/P：NO LOAD Ta：25℃	L-FG： 0.003 mA N-FG： 0.003 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P：230VAC O/P：NO LOAD Ta：25℃	0.081W
6	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 115V/230VAC	I/P： 115VAC I/P： 230VAC O/P：60% LOAD	THD： 6.06 %/115VAC THD： 13.91 %/230VAC
		Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 277VAC	I/P： 277VAC O/P：75% LOAD	THD： 16.68 %
7	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=43.8A/ 230VAC Twidth =512us
	INPUT=230VAC/50HZ @ FULL LOAD CH2： Input current CH1： AC Input Voltage 			

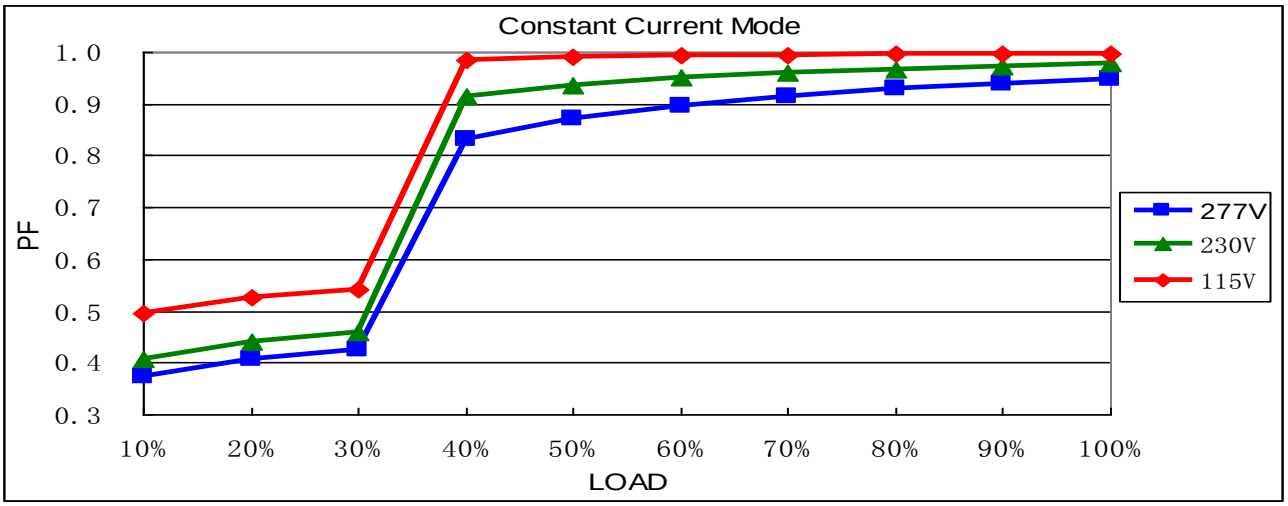
8	EFFICIENCY(Typ)	89%	I/P： 230VAC O/P：FULL LOAD Ta：25℃	89.44%

EFFICIENCY vs LOAD



9	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=0.993/ 115VAC PF=0.982/ 230VAC PF=0.952/ 277VAC

P.F vs LOAD



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %~ 108 %	I/P： 230VAC O/P：TESTING Ta：25℃	101.22%/ 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℃	19.33V/ 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 PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 295VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Hiccup mode，recovers automatically after fault condition is removed

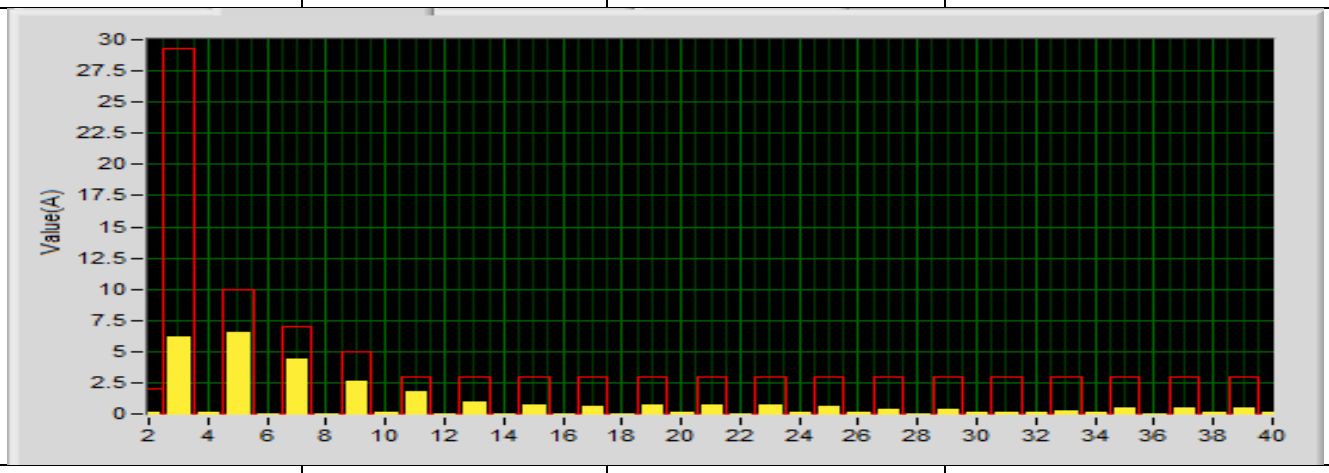
COMPONENT STRESS TEST

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) 677V (2) 608V (3) 673V
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) 71V (2) 56.5V (3) 71V
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) 447V
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) 9.5 V (3) 17.8V
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) 505V (2) 473V (3) 505V

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：1.92mA 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-120-24
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-120-24：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	MIL-HDBK-217F TOTAL FAILURE RATE：295.1K HRS	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life)： 50000 hours @ TC 70℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHUOKB/ZHANGZJ	SKY	LIUWY