TEST REPORT: ENP-240-48

240W Desktop Single Output 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

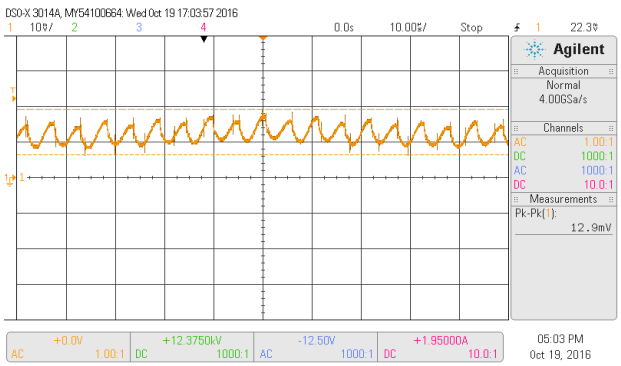
■ RELIABILITY TEST

- ENVIRONMENT TEST

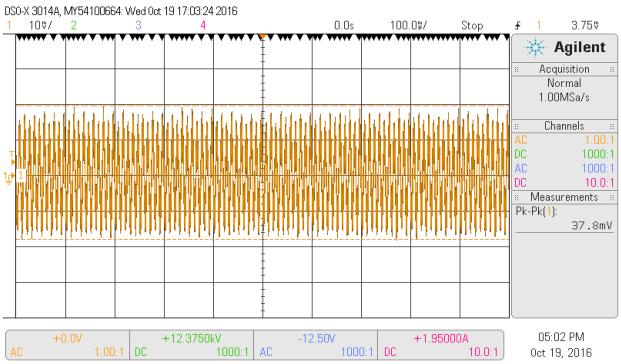
DESIGN VERIFY TEST
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 47.50V ~ 58.80V	I/P : 230VAC O/P: MIN LOAD TA : 25℃	CH1: 45.68V ~ 59.99V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25℃	V1: -0.04% ~ 0.02%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25℃	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25℃	V1: -0.02% ~ -0.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	TEST< 1.4 %
6	RIPPLE & NOISE(Max)	V1 : 350 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25℃	V1 : 37.8 mVp-p

high frequency :

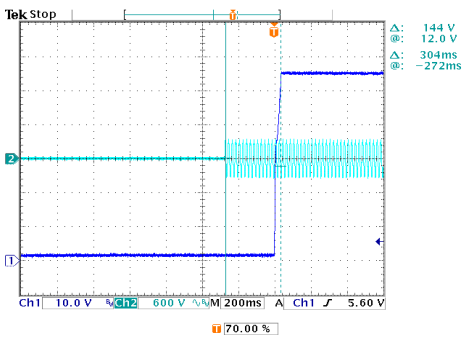


low frequency :

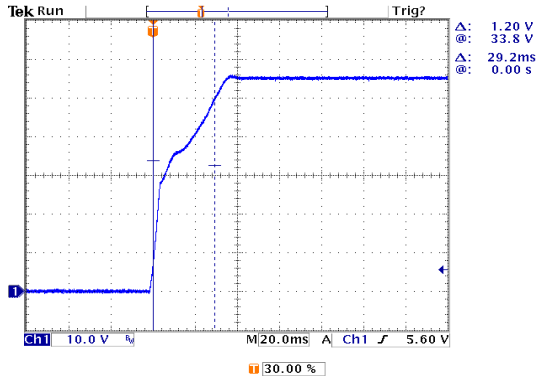
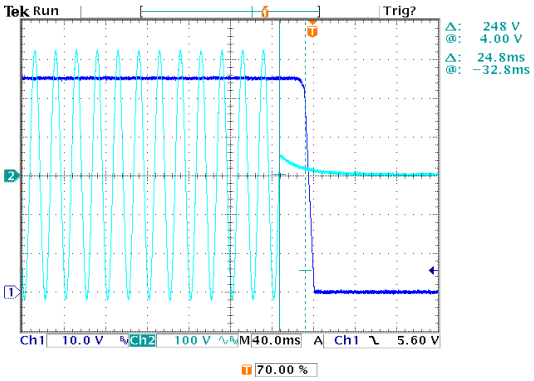
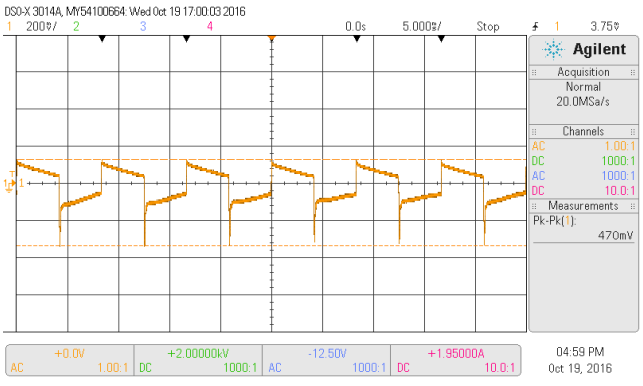
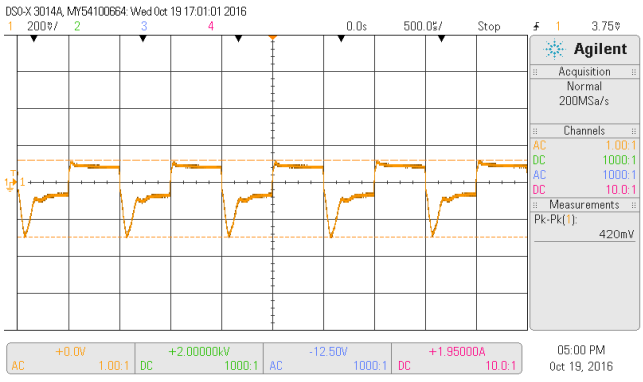


7	SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC O/P: FULL LOAD TA : 25℃	230VAC : 304ms

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

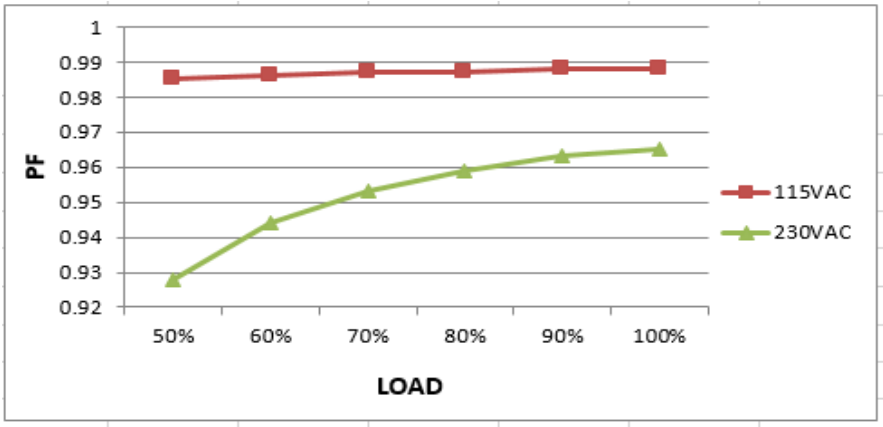
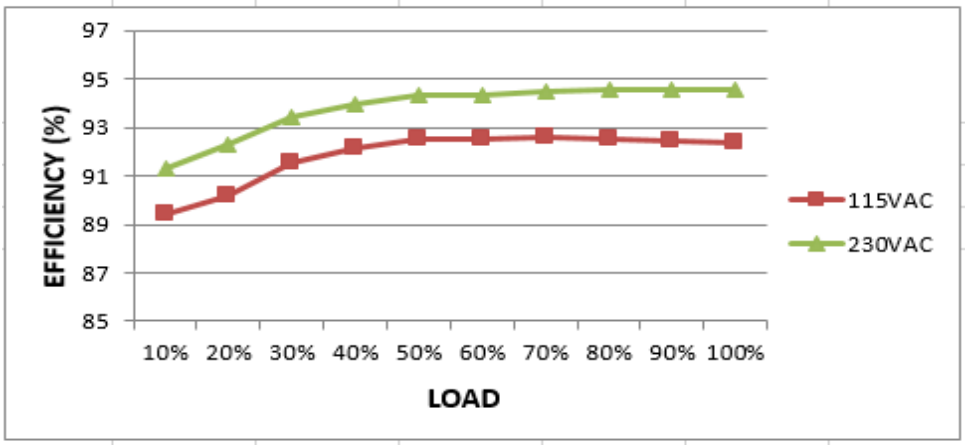


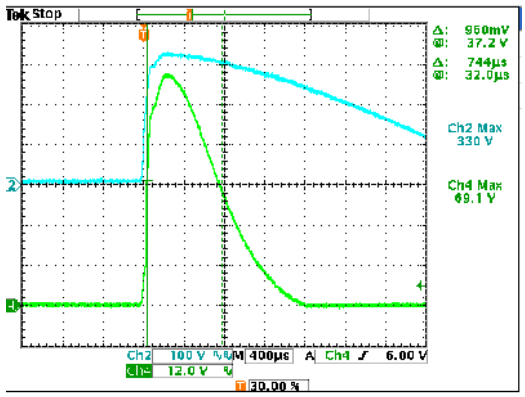
	RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25℃	230VAC : 29.2ms

8	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC O/P: FULL LOAD TA : 25℃	230VAC : 24.8ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
10	DYNAMIC LOAD	V1 : 5520 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25℃	(1). (2). unit:mVp-p V1: 470mv 420mv
	FULL /MIN LOAD 50%DUTY / 120HZ 			
	FULL /MIN% LOAD 50%DUTY / 1KHZ 			

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25℃	78.0VAC ~ 264VAC
			I/P : LOW-LINE = 97VAC	TEST : OK

			HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 264VAC O/P : FULL~MIN LOAD Ta : 25℃	TEST : OK
3	INPUT CURRENT (TYP.)	1.25 / 230VAC 2.5 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 1.15 / 230VAC I= 2.31 / 115VAC
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P: MIN LOAD TA : 25℃	L-FG: 0.65 mA N-FG: 0.65 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P: MIN LOAD TA : 25℃	< 0.141 W
6	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	PF= 0.968 / 230VAC PF= 0.989 / 115VAC
				
7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	94.2 %
				
	INRUSH CURRENT (TYP.)	75A / 230VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC O/P: FULL LOAD TA : 25℃	I= 69.1A / 230VAC T50= 774.0us / 230VAC

8	INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage 

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	1 110% ~ 125%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING	119% 264VAC 119% 230VAC 119% 100VAC Normally works within 110 ~ 125% rated output power for more than 3 seconds and switches to constant current limiting,with auto-recovery after the peak load condition is removed
		2 > 125%	TA : 25℃	127% 264VAC 127% 230VAC 127% 100VAC Constant current limiting, if >125% rated power, with auto-recovery after the overload condition is removed
2	OVER VOLTAGE PROTECTION	62.10V ~ 72.90V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD TA : 25℃	67.04V 264VAC 67.02V 230VAC 67.03V 90VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	Shut down O/P voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P. Active Shut down O/P voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta: 25℃	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q901 Rated : 600V 16.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Fulll load continue (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load Ta : 25℃	VIN: 267VAC 97VAC VDS: VDS: (1). 416.00V 428.00V (2). 424.00V 424.00V (3). 420.00V 420.00V (4). 416.00V 428.00V (5). 416.00V 428.00V (6). 416.00V 412.00V (7). 428.00V 424.00V
		Q100 Rated : 150V 30.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Fulll load continue	Q100 Q101 VDS : VDS : (1). 121.00V 111.00V (2). 10.00V 6.20V (3). 120.00V 119.00V

2	O/P Diode (MOSFET)	Q101	Rated：	150V	30.0A	(4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load (8/) NO LOAD Ta： 25℃	(4). (5). (6). (7). (8).	122.00V 124.00V 122.00V 118.00V 116.00V	115.00V 115.00V 115.00V 4.00V 116.00V
3	Input Capacitor	C5	Rated：	180uf	420V	I/P： 267VAC O/P： (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta： 25℃	 (1). (2). (3).	 416.00V 404.00V 416.00V	
4	Control IC	U1 U901	Rated： Rated：	28V 10V 20V 10V	(max) (min) (max) (min)	I/P： 267VAC O/P： (1)Full Load (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta： 25℃	 (1). (2). (3). (4). (5).	U1 16.43V 16.43V 16.56V 16.37V 16.37V	U901 16.13V 16.13V 16.13V 16.13V 16.06V
5	PFC Power Transistor	Q1	Rated：	600V	20.0A	I/P： 267VAC I/P： 97VAC VDS： O/P： (1)Full Load Turn on (2) Output Short (3)Fulll load contin PASS (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load Ta： 25℃	 VIN: (1). (2). (3). (4). (5). (6). (7).	 267VAC VDS: 475.00V 434.00V 459.00V 499.00V 495.00V 483.00V 491.00V	 97VAC VDS: 503.00V 446.00V 507.00V 511.00V 511.00V 503.00V 515.00V
6	PFC Diode	D1	Rated：	600V	15.0A	I/P： 267VAC I/P： 97VAC O/P： (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta： 25℃	 (1). (2). (3). (4).	 267VAC 418.00V 418.00V 418.00V 451.00V	 97VAC 418.00V 418.00V 418.00V 438.00V

■SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P： 3.000KVAC /min I/P-FG： 2.000KVAC /min O/P-FG： 0.500KVAC /min	I/P-O/P: 3.6KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta： 25℃	I/P-O/P: 6.64mA I/P-FG: 6.07mA O/P-FG: 7.89mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P： 500VDC>100MΩ I/P-FG： 500VDC>100MΩ O/P-FG： 500VDC>100MΩ	I/P-O/P: 500VDC I/P-FG: 500VDC O/P-FG: 500VDC Ta： 25℃/70%RH	I/P-O/P: 10.1GΩ I/P-FG: 5.1GΩ O/P-FG: 30GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta： 25℃/70%RH	26.0mΩ

E.M.C. TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	PASS
2	CONDUCTION	EN55022 CLASS B	I/P： 230VAC /50HZ O/P： FULL LOAD / 50% LOAD Ta： 25℃	PASS Test by certified Lab
3	CONDUCTION	EN55022 CLASS B	I/P： 230VAC /50HZ O/P： FULL LOAD	PASS Test by certified Lab

			Ta： 25℃	
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR：8KV / Contact：4KV	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT： 1KV	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	CRITERIA A
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N:1KV；L/N-PE:2KV	I/P： 230VAC /50HZ O/P： FULL LOAD Ta： 25℃	CRITERIA A

■RELIABILITY 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： ENP-240-24
1. ROOM AMBIENT BURN-IN： 1.0hrs
IP: 230VAC O/P: 100% LOAD TA= 25.0℃
2. HIGH AMBIENT BURN-IN： 1.5hrs
IP: 230VAC O/P: 100% LOAD TA= 50.0℃
<table>
<tr><th>CH.</th><th>Position</th><th>ROOM AMBIENT Ta= 25℃</th><th>HIGH AMBIENT Ta= 50℃</th></tr>
<tr><td>1</td><td>C1</td><td>49.1℃</td><td>69.9℃</td></tr>
<tr><td>2</td><td>BD1</td><td>44.9℃</td><td>66.0℃</td></tr>
<tr><td>3</td><td>L2</td><td>92.3℃</td><td>106.5℃</td></tr>
<tr><td>4</td><td>C10</td><td>53.9℃</td><td>74.4℃</td></tr>
<tr><td>5</td><td>C11</td><td>55.4℃</td><td>76.1℃</td></tr>
<tr><td>6</td><td>Q2</td><td>49.7℃</td><td>71.6℃</td></tr>
<tr><td>7</td><td>RTH2</td><td>52.5℃</td><td>73.6℃</td></tr>
<tr><td>8</td><td>Q901</td><td>51.3℃</td><td>72.6℃</td></tr>
<tr><td>9</td><td>T2</td><td>61.9℃</td><td>82.7℃</td></tr>
<tr><td>10</td><td>L1</td><td>51.2℃</td><td>72.9℃</td></tr>
<tr><td>11</td><td>C5</td><td>57.2℃</td><td>78.0℃</td></tr>
<tr><td>12</td><td>ZNR1</td><td>50.1℃</td><td>72.0℃</td></tr>
<tr><td>13</td><td>Q35</td><td>54.5℃</td><td>76.5℃</td></tr>
<tr><td>14</td><td>C46</td><td>63.1℃</td><td>84.4℃</td></tr>
<tr><td>15</td><td>C54</td><td>79.2℃</td><td>100.0℃</td></tr>
<tr><td>16</td><td>RTH3</td><td>54.9℃</td><td>75.9℃</td></tr>
<tr><td>17</td><td>U1</td><td>48.3℃</td><td>70.9℃</td></tr>
<tr><td>18</td><td>U901</td><td>66.2℃</td><td>84.5℃</td></tr>
<tr><td>19</td><td>T1</td><td>68.8℃</td><td>89.4℃</td></tr>
<tr><td>20</td><td>D103</td><td>49.1℃</td><td>72.7℃</td></tr>
<tr><td>21</td><td>D104</td><td>68.1℃</td><td>88.9℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230VAC
O/P： 112.0% LOAD
Ta： 25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE TURN ON TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 264VAC / 1000VAC
O/P： FULL LOAD
Ta： -35.0℃</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50℃
NO DAMAGE</td><td>I/P： 272VAC
O/P： FULL LOAD
Ta： 50℃
HUMIDITY= 95.0% RH</td><td>TEST：OK</td></tr>
<tr><td>5</td><td>TEMPERATURE COEFFICIENT</td><td>±0.05% /℃(0~50℃)</td><td>I/P： 230VAC
O/P： FULL LOAD</td><td>±0.01% /℃(0~50℃)</td></tr>
<tr><td></td><td>STORAGE</td><td>1. Thermal shock Temperature： -45℃~ +90℃
2. Temperature change rate ：25℃ / MIN</td><td></td><td>TEST：OK</td></tr>
</table>

6	STORAGE TEMPERATURE TEST	3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：5 CYCLE 5. Input/Output condition： STATIC	
7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -35℃ ~ 55℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：16 CYCLE 5. Input/Output condition： 230VAC Full Load AC ON/OFF test turn on 3sec；turn off 1sec @ 15cycle Full Load burn in@ 1cycle	TEST：OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (4) Acceleration： 2G (5) Test Time：60min in each axis (X.Y.Z) (6) Ta：25℃	TEST：OK
9	CAPACITOR LIFE CYCLE	ENP-240-24 :SUPPOSE C109 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：FULL LOAD Ta= 50℃ LIFE TIME (4) I/P： 230VAC O/P：FULL LOAD Ta= 50℃ LIFE TIME	(1). 724958 HRS (2). 151371 HRS (3). 242026 HRS (4). 330309 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 170.5K hrs min. MIL-HDBK-217F (25℃)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): 30000HRS @ TA 50℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT ZENG