



TEST REPORT: ENP-120-12

120W Desktop Single Output Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

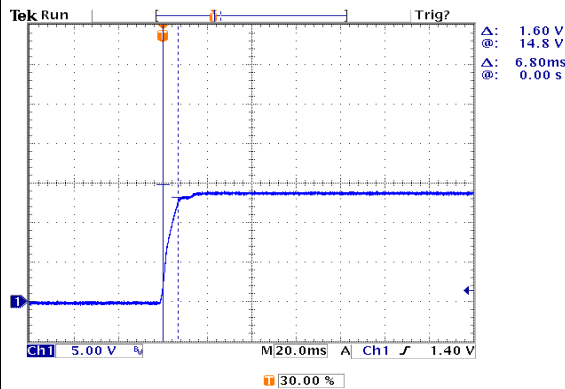
ENVIRONMENT TEST

DESIGN VERIFY TEST OUTPUT FUNCTION

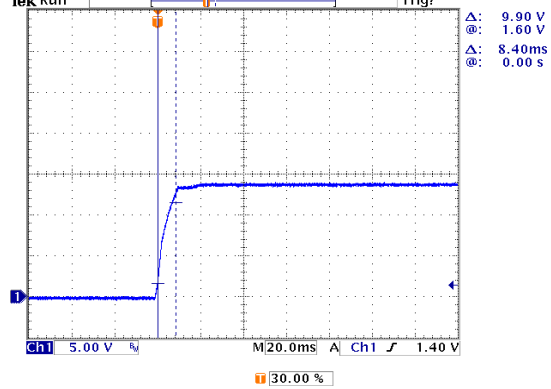
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.50V ~ 15.00V	I/P : 230VAC O/P: MIN LOAD TA: 25°C	CH1: 11.25V ~ 15.53V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA: 25°C	V1: 0.22% ~ 0.07%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA: 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA: 25°C	V1: 0.07% ~ -0.07%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA: 25°C	TEST< 5.0 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA: 25°C	V1 : 20.7 mVp-p
		high frequency : DSO-X 3014A, MY62161480 Mon Jun 27 10:08:00 2016 Acquisition: Normal, 8.00MSa/s Channels: AC BW 100.1, DC BW 1000.1, DC BW 100.1, AC BW 10.0.1 Measurements: Pk-Pk[1]: 13.1mV low frequency : DSO-X 3014A, MY62161480 Mon Jun 27 10:07:50 2016 Acquisition: Normal, 8.00MSa/s Channels: AC BW 100.1, DC BW 1000.1, DC BW 100.1, AC BW 10.0.1 Measurements: Pk-Pk[1]: 20.7mV		
7	SET UP TIME (MAX.)	230VAC : 1000ms 115VAC : 1000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 220ms 115VAC : 232ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Measurements: Δ: 324 V, Δ: 12.0 V, Δ: 220ms, Δ: -212ms INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Measurements: Δ: 208 V, Δ: 80.0 V, Δ: 232ms, Δ: -224ms		
	RISE TIME (MAX.)	230VAC : 100ms 115VAC : 100ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 6.8ms 115VAC : 8.4ms

8

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



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



HOLD UP TIME (TYP.)

230VAC : 20ms
115VAC : 20ms

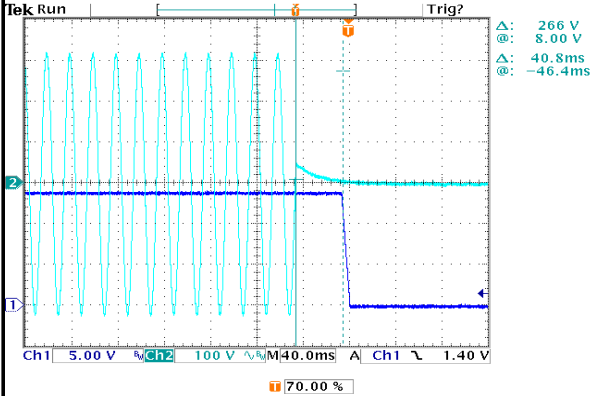
I/P : 230VAC
I/P : 115VAC
O/P: FULL LOAD
TA : 25°C

230VAC : 40.8ms
115VAC : 22.4ms

9

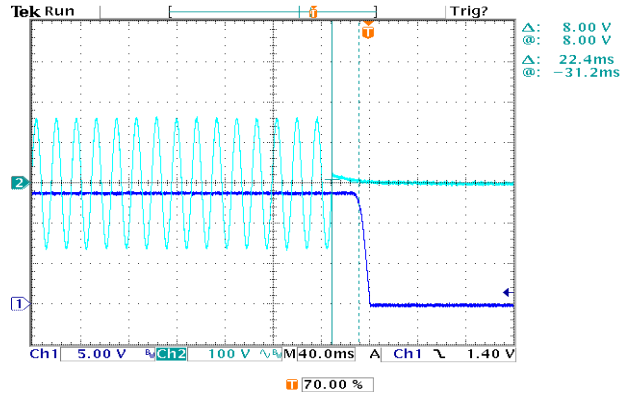
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



DYNAMIC LOAD

V1 : 1380 mVp-p

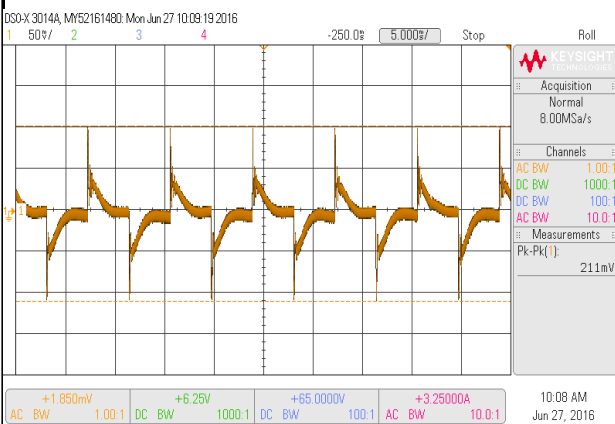
I/P : 230VAC
O/P:
(1)Full/Min load 50% duty/120HZ
(2)Full/Min load 50% duty/1KHZ
TA : 25°C

V1: (1). 211mv (2). 213mv

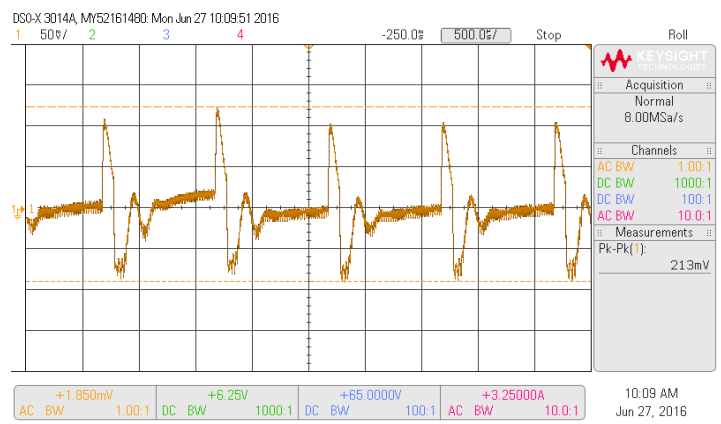
unit:mVp-p

10

FULL /MIN LOAD 50%DUTY / 120HZ

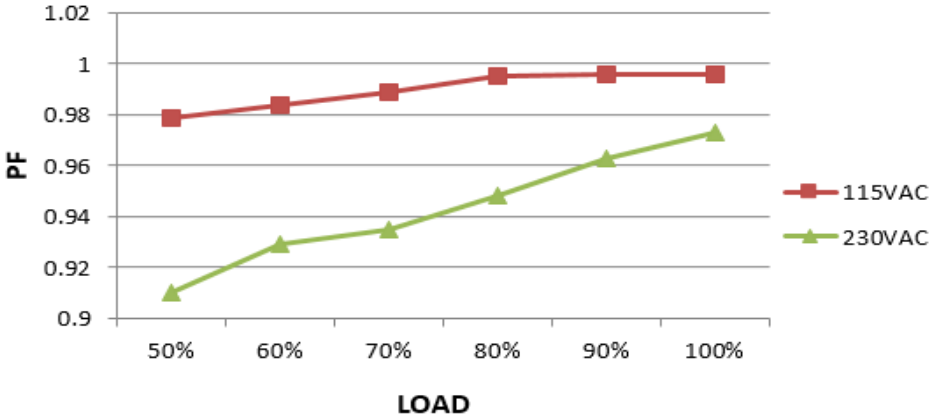
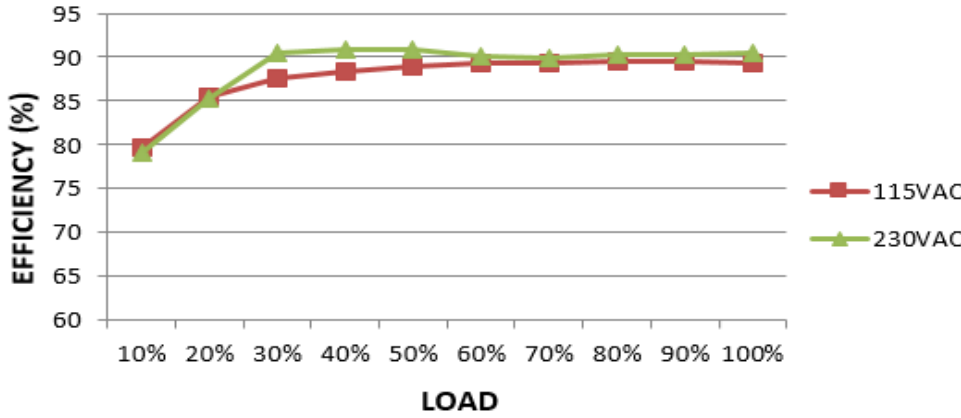


FULL /MIN LOAD 50%DUTY / 1KHZ



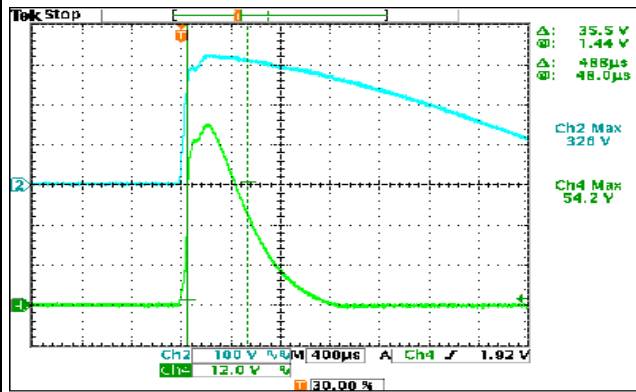
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
			I/P : TESTING	62.0VAC ~ 264VAC

1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 264VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.63 / 230VAC 1.25 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	I= 0.59 / 230VAC I= 1.18 / 115VAC
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P : MIN LOAD Ta : 25°C	L-FG: 0.52 mA N-FG: 0.5 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD Ta : 25°C	< 0.134 W
6	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	PF= 0.976 / 230VAC PF= 0.988 / 115VAC
		 The graph shows Power Factor (PF) on the y-axis (ranging from 0.9 to 1.02) versus Load on the x-axis (ranging from 50% to 100%). Two data series are plotted: 115VAC (red line with square markers) and 230VAC (green line with triangle markers). The 115VAC series starts at approximately 0.98 at 50% load and increases to nearly 1.0 at 100% load. The 230VAC series starts at approximately 0.91 at 50% load and increases to approximately 0.975 at 100% load.		
7	EFFICIENCY (TYP.)	89.5%	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	90.005 %
		 The graph shows Efficiency (%) on the y-axis (ranging from 60 to 95) versus Load on the x-axis (ranging from 10% to 100%). Two data series are plotted: 115VAC (red line with square markers) and 230VAC (green line with triangle markers). The 115VAC series starts at approximately 80% at 10% load, rises to about 88% at 30% load, and then gradually increases to about 90% at 100% load. The 230VAC series starts at approximately 79% at 10% load, rises to about 91% at 30% load, and then remains relatively stable around 90% up to 100% load.		
	INRUSH CURRENT (TYP.)	65A / 230VAC COLD START	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	I= 54.2A / 230VAC T50= 488.0us / 230VAC

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : Input current (1V=1A) CH4 : AC Input Voltage



INPUT=115VAC/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% 2 > 125%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA: 25°C	113.18% 264VAC 113.14% 230VAC 113.16% 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 129.88% 264VAC 129.88% 230VAC 129.88% 100VAC Constant current limiting, if >125% rated power, with auto-recovery after the overload condition is removed
2	OVER VOLTAGE PROTECTION	15.50V ~ 18.20V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD TA: 25°C	16.58V 264VAC 16.58V 230VAC 16.57V 90VAC Shut down o/p voltage, re-power on to recover
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: 120VAC I/P: 90VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed
5	EFF TEST	$(100\%+75\%+50\%+25\%)/4 \geq 89\%$ 10%load $\geq 79\%$	I/P: 230VAC I/P: 115VAC O/P: 100%~10%LOAD Ta: 25°C	230VAC= 89.67% 115VAC= 89.22%

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q2 Rated : 800V 12.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 267VAC 97VAC VDS: VDS: (1). 700.00V 559.00V (2). 503.00V 422.00V (3). 643.00V 511.00V
		Q100 Rated : 75V 80.0A	I/P : 267VAC VDS :	Q100 VDS :

2	O/P Diode (MOSFET)		O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 52.10V (2). 64.20V (3). 38.90V
3	Input Capacitor	C5 Rated : 100uf 400V SURGE VOLTAGE:450V	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°C	(1). 405.00V (2). 389.00V (3). 401.00V
4	Control IC	U1 Rated : 28V (max) 9V (min)	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Output Short Change (4)O.V.P Ta : 25°C	U1 (1). 19.10V (2). 11.10V (3). 11.10V (4). 24.30V
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)Full load continue PASS Ta : 25°C	VIN: 267VAC 97VAC VDS: VDS: (1). 458.00V 362.00V (2). 402.00V 356.00V (3). 426.00V 312.00V
6	PFC Diode	D5 Rated : 600V 8.0A	I/P : 267VAC I/P : 97VAC O/P : (1)Full Load Turn on (2) Output Short Ta : 25°C	267VAC 97VAC (1). 422.00V 318.00V (2). 390.00V 278.00V
8	Clamp Diode	D30 Rated : 600V 3.0A	I/P : 267VAC O/P : 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1). 567.00V (2). 539.00V

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: 3.600KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 5.90mA I/P-FG: 5.12mA O/P-FG: 4.30mA 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°C/70%RH	I/P-O/P: 15.1GΩ I/P-FG: 6.2GΩ O/P-FG: 30.0GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C/70%RH	15.0mΩ

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°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /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 : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	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°C	CRITERIA A
---	-------	---	--	------------

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																									
1	TEMPERATURE RISE TEST	MODEL : ENP-120-24																																																											
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 29.6°C																																																											
		2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 51.1°C																																																											
		<table><tr><td>ZR1</td><td>49.1°C</td><td>66.6°C</td></tr><tr><td>LF1</td><td>49.9°C</td><td>68.1°C</td></tr><tr><td>BD1</td><td>64.5°C</td><td>85.5°C</td></tr><tr><td>L1</td><td>54.3°C</td><td>72.2°C</td></tr><tr><td>L2</td><td>57.8°C</td><td>75.1°C</td></tr><tr><td>Q1</td><td>76.6°C</td><td>98.0°C</td></tr><tr><td>Q2</td><td>77.4°C</td><td>100.3°C</td></tr><tr><td>D5</td><td>77.0°C</td><td>98.5°C</td></tr><tr><td>C5</td><td>60.7°C</td><td>78.9°C</td></tr><tr><td>U1</td><td>54.3°C</td><td>73.0°C</td></tr><tr><td>D30</td><td>87.7°C</td><td>109.4°C</td></tr><tr><td>C52</td><td>69.9°C</td><td>91.7°C</td></tr><tr><td>T1</td><td>82.1°C</td><td>102.1°C</td></tr><tr><td>Q100</td><td>80.1°C</td><td>100.0°C</td></tr><tr><td>C108</td><td>61.6°C</td><td>80.4°C</td></tr><tr><td>LF100</td><td>50.9°C</td><td>70.0°C</td></tr><tr><td>RT1</td><td>66.7°C</td><td>84.2°C</td></tr><tr><td>TSW1</td><td>69.7°C</td><td>89.5°C</td></tr><tr><td>TA</td><td>29.6°C</td><td>51.1°C</td></tr></table>			ZR1	49.1°C	66.6°C	LF1	49.9°C	68.1°C	BD1	64.5°C	85.5°C	L1	54.3°C	72.2°C	L2	57.8°C	75.1°C	Q1	76.6°C	98.0°C	Q2	77.4°C	100.3°C	D5	77.0°C	98.5°C	C5	60.7°C	78.9°C	U1	54.3°C	73.0°C	D30	87.7°C	109.4°C	C52	69.9°C	91.7°C	T1	82.1°C	102.1°C	Q100	80.1°C	100.0°C	C108	61.6°C	80.4°C	LF100	50.9°C	70.0°C	RT1	66.7°C	84.2°C	TSW1	69.7°C	89.5°C	TA	29.6°C	51.1°C
		ZR1	49.1°C	66.6°C																																																									
		LF1	49.9°C	68.1°C																																																									
		BD1	64.5°C	85.5°C																																																									
		L1	54.3°C	72.2°C																																																									
		L2	57.8°C	75.1°C																																																									
		Q1	76.6°C	98.0°C																																																									
		Q2	77.4°C	100.3°C																																																									
		D5	77.0°C	98.5°C																																																									
		C5	60.7°C	78.9°C																																																									
		U1	54.3°C	73.0°C																																																									
		D30	87.7°C	109.4°C																																																									
		C52	69.9°C	91.7°C																																																									
		T1	82.1°C	102.1°C																																																									
		Q100	80.1°C	100.0°C																																																									
		C108	61.6°C	80.4°C																																																									
		LF100	50.9°C	70.0°C																																																									
RT1	66.7°C	84.2°C																																																											
TSW1	69.7°C	89.5°C																																																											
TA	29.6°C	51.1°C																																																											
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 112.0% LOAD Ta : 25°C	TEST : OK																																																									
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -35.0°C	TEST : OK																																																									
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK																																																									
5	TEMPERATURE COEFFICIENT	±0.03% /°C (0~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.004% /°C (0~50°C)																																																									
6	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																																																									
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ 55°C 2. Temperature change rate : 25°C / 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 : 3G		TEST : OK																																																									

		(5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	ENP-120-24 :SUPPOSE C108 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= 50°C LIFE TIME (3) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (4) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME	(1). 385582 HRS (2). 82209 HRS (3). 130376 HRS (4). 204838 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 257K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): 30000HRS @ TA 50°C	

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