



TEST REPORT: ENP-120-48

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

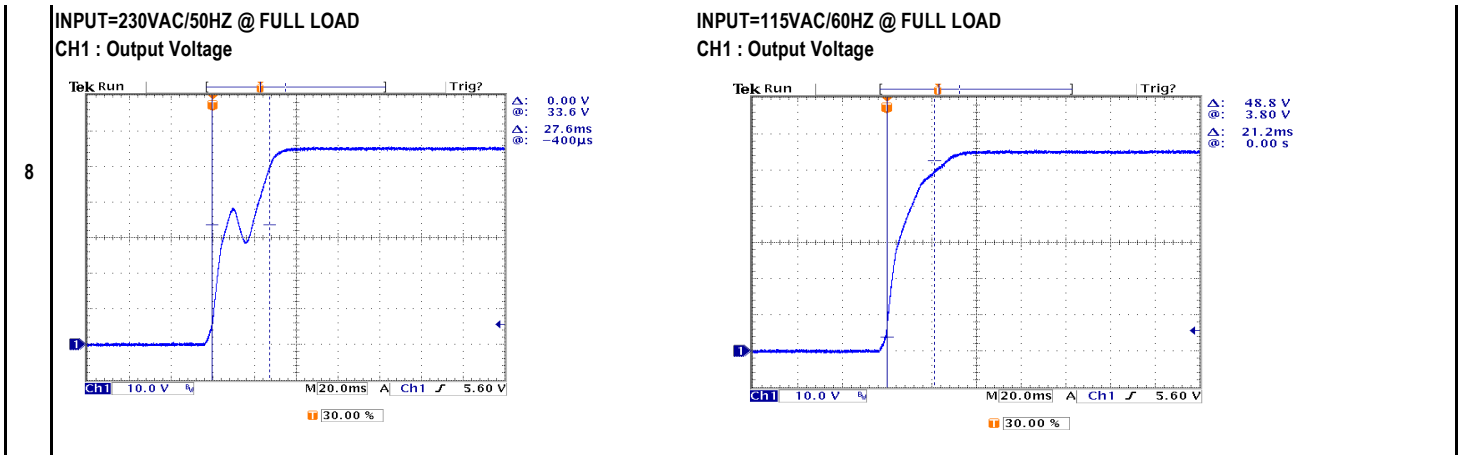
- Safety Test
- E.M.C. Test

■ RELIABILITY TEST

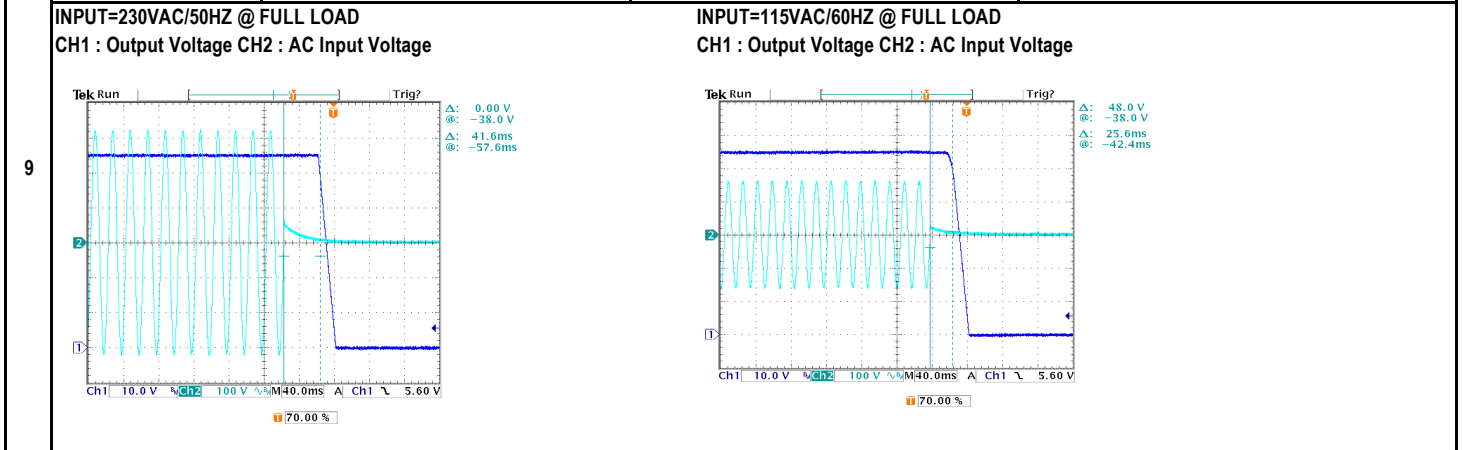
- ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION

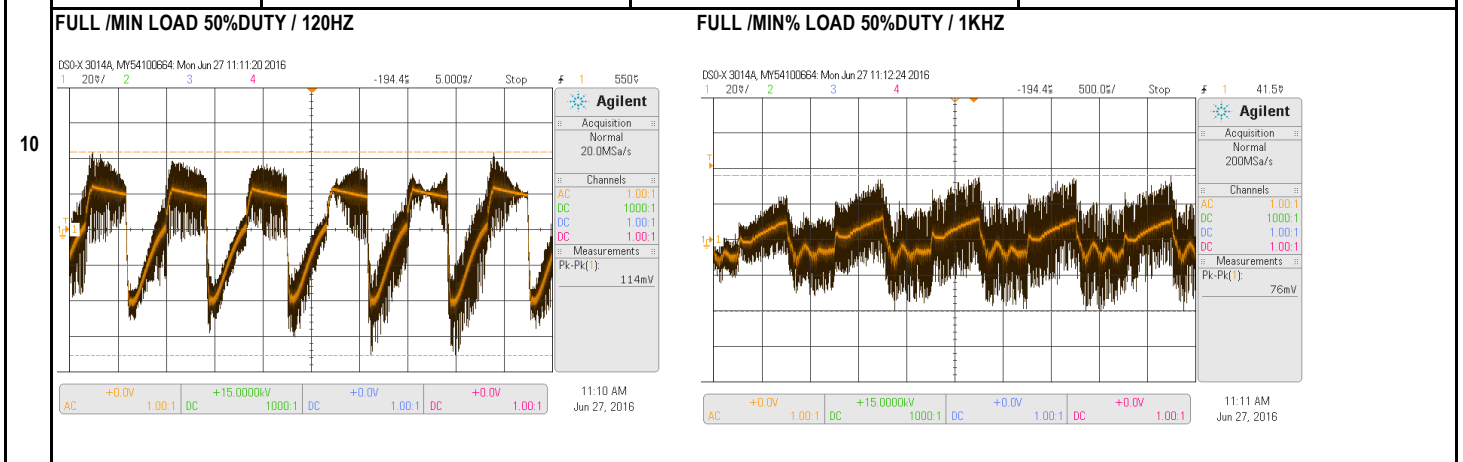
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 47.50V ~ 58.80V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 46.32V ~ 60.26V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.04% ~ 0.13%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.02%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.04% ~ -0.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 5.0 %
6	RIPPLE & NOISE(Max)	V1 : 350 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 145 mVp-p
7	SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC	230VAC : 232ms
		115VAC : 1000ms	I/P : 115VAC O/P: FULL LOAD TA : 25°C	115VAC : 232ms
7	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



HOLD UP TIME (TYP.)	230VAC : 20ms 115VAC : 20ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 41.6ms 115VAC : 25.6ms
----------------------------	--------------------------------	---	------------------------------------

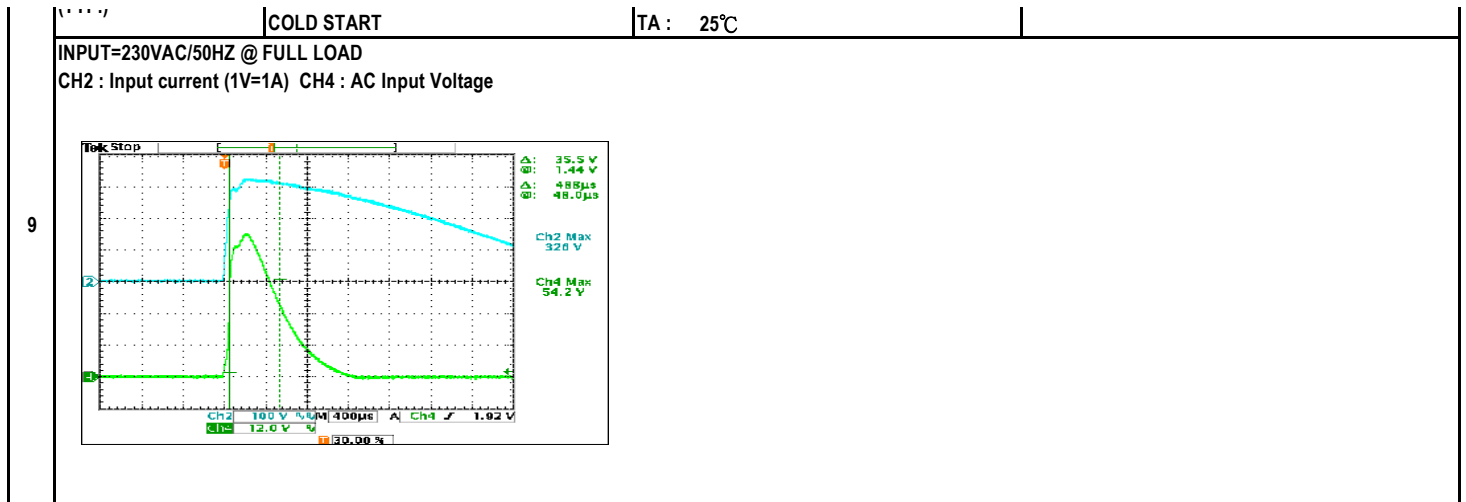


DYNAMIC LOAD	V1 : 5520 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C	V1: (1). 114mv (2). 76mv unit:mVp-p
---------------------	-----------------	--	--



INPUT FUNCTION TEST			
NO	TEST ITEM	SPECIFICATION	TEST CONDITION
			I/P : TESTING O/P : FULL LOAD Ta : 25°C
			63.0VAC ~ 264VAC

1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	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= 1.17 / 115VAC																															
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.54 mA N-FG: 0.54 mA																															
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1325 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= 0.975 / 230VAC PF= 0.992 / 115VAC																															
		<table border="1"> <caption>Power Factor (PF) vs Load</caption> <thead> <tr> <th>Load (%)</th> <th>115VAC PF</th> <th>230VAC PF</th> </tr> </thead> <tbody> <tr><td>50%</td><td>0.982</td><td>0.930</td></tr> <tr><td>60%</td><td>0.985</td><td>0.948</td></tr> <tr><td>70%</td><td>0.995</td><td>0.955</td></tr> <tr><td>80%</td><td>0.995</td><td>0.965</td></tr> <tr><td>90%</td><td>0.995</td><td>0.975</td></tr> <tr><td>100%</td><td>0.995</td><td>0.985</td></tr> </tbody> </table>			Load (%)	115VAC PF	230VAC PF	50%	0.982	0.930	60%	0.985	0.948	70%	0.995	0.955	80%	0.995	0.965	90%	0.995	0.975	100%	0.995	0.985										
Load (%)	115VAC PF	230VAC PF																																	
50%	0.982	0.930																																	
60%	0.985	0.948																																	
70%	0.995	0.955																																	
80%	0.995	0.965																																	
90%	0.995	0.975																																	
100%	0.995	0.985																																	
7	EFFICIENCY (TYP.)	91.5%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	91.7 %																															
		<table border="1"> <caption>Efficiency (%) vs Load</caption> <thead> <tr> <th>Load (%)</th> <th>115VAC Efficiency (%)</th> <th>230VAC Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>80.5</td><td>77.0</td></tr> <tr><td>20%</td><td>86.5</td><td>84.5</td></tr> <tr><td>30%</td><td>89.0</td><td>88.5</td></tr> <tr><td>40%</td><td>89.5</td><td>89.5</td></tr> <tr><td>50%</td><td>90.5</td><td>91.0</td></tr> <tr><td>60%</td><td>90.5</td><td>90.5</td></tr> <tr><td>70%</td><td>91.0</td><td>90.5</td></tr> <tr><td>80%</td><td>91.0</td><td>91.0</td></tr> <tr><td>90%</td><td>91.5</td><td>91.5</td></tr> <tr><td>100%</td><td>91.5</td><td>91.7</td></tr> </tbody> </table>			Load (%)	115VAC Efficiency (%)	230VAC Efficiency (%)	10%	80.5	77.0	20%	86.5	84.5	30%	89.0	88.5	40%	89.5	89.5	50%	90.5	91.0	60%	90.5	90.5	70%	91.0	90.5	80%	91.0	91.0	90%	91.5	91.5	100%
Load (%)	115VAC Efficiency (%)	230VAC Efficiency (%)																																	
10%	80.5	77.0																																	
20%	86.5	84.5																																	
30%	89.0	88.5																																	
40%	89.5	89.5																																	
50%	90.5	91.0																																	
60%	90.5	90.5																																	
70%	91.0	90.5																																	
80%	91.0	91.0																																	
90%	91.5	91.5																																	
100%	91.5	91.7																																	
	INRUSH CURRENT (TYP.)	65A / 230VAC	I/P : 230VAC O/P : FULL LOAD	I= 52.4A / 230VAC T50= 488.0us / 230VAC																															



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	114% 264VAC 114% 230VAC 114% 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°C	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°C	65.22 264VAC 65.22 230VAC 65.22 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: 264VAC I/P: 90VAC O/P: FULL LOAD Ta: 25°C	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	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). 573.00V 505.00V (2). 405.00V 166.00V (3). 597.00V 453.00V
2	O/P Diode (MOSFET)	Q100 Rated : 300V 20A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q100 VDS : (1). 206.00V (2). 128.00V (3). 200.00V
		C5 Rated : 100uf 400V	I/P : 267VAC O/P : (1)Full Load Turn on /Off	(1). 398.00V

3	Input Capacitor		(2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(2). 398.00V (3). 398.00V
4	Control IC	U1 Rated : 28V (max) 10V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short Change (4)O.V.P Ta : 25°C	U1 (1). 18.80V (2). 10.93V (3). 10.93V (4). 21.40V
5	PFC Power Transistor	Q1 Rated : 600V 15.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load contin PASS Ta : 25°C	VIN: 267VAC 97VAC VDS: 469.00V 368.00V (1). 469.00V (2). 376.00V 135.00V (3). 429.00V 317.00V
6	PFC Diode	D5 Rated : 600V 6.0A	I/P : 267VAC I/P : 97VAC O/P : (1)Full Load Turn on (2) Output Short Ta : 25°C	267VAC 97VAC (1). 417.00V 300.00V (2). 0.00V 0.00V
7	Clamp Diode	D30 Rated : 800V 2.0A	I/P : 267VAC O/P : (1)Dynamic Load Full/Min Load (2)Full load continue Ta : 25°C	(1). 541.00V (2). 541.00V

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°C	I/P-O/P: 6.07mA I/P-FG: 5.18mA O/P-FG: 4.44mA 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: 11.3GΩ I/P-FG: 4.7GΩ O/P-FG: 19.9GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C/70%RH	21.0mΩ

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 border="1"> <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 (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK																																																									
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 (2) I/P : 230VAC O/P : FULL LOAD Ta= 50°C	(1). 385582 HRS (2). 82209 HRS																																																									



ENP-120 series

		(3) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (3). 130376 HRS
		(4) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (4). 204838 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1997.9K hrs min. Telcordia SR-332 (Bellcore) ; 257.1K 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

12.10.30 A50-F031