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

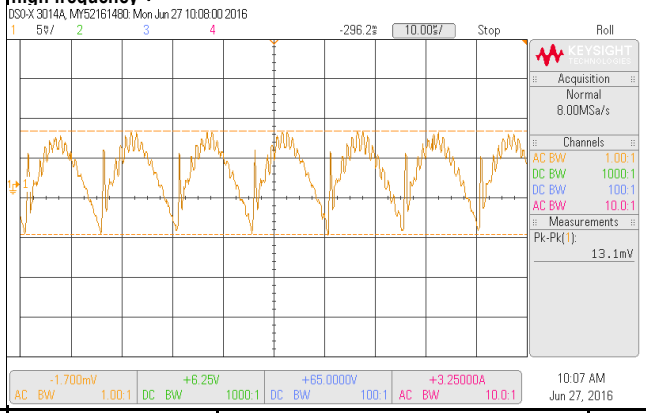
■ RELIABILITY TEST

- ENVIRONMENT TEST

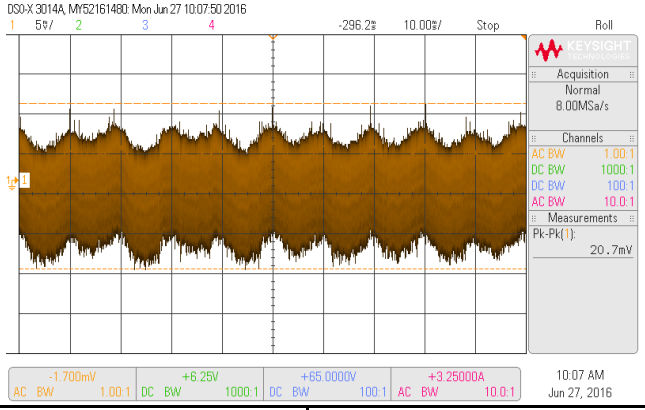
■ DESIGN VERIFY TEST
OUTPUT FUNCTION

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℃	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℃	V1: 0.22% ~ 0.07%
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 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25℃	V1: 0.07% ~ -0.07%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	TEST< 5.0 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25℃	V1 : 20.7 mVp-p

high frequency :

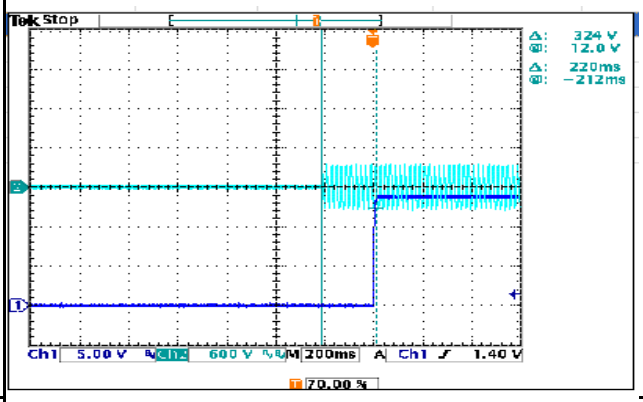


low frequency :

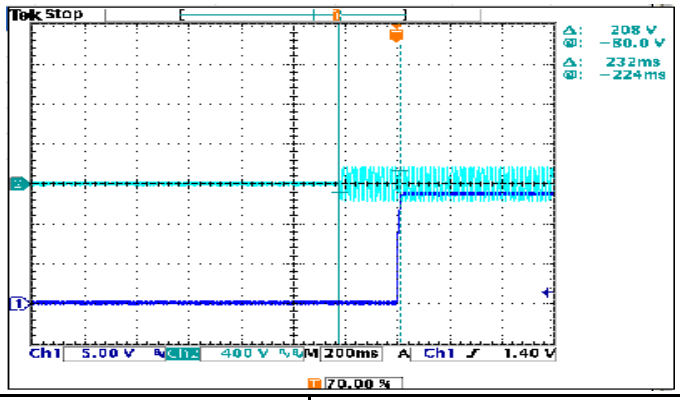


	SET UP TIME (MAX.)	230VAC : 1000ms 115VAC : 1000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 220ms 115VAC : 232ms

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



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



7	RISE TIME (MAX.)	230VAC : 100ms 115VAC : 100ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 6.8ms 115VAC : 8.4ms

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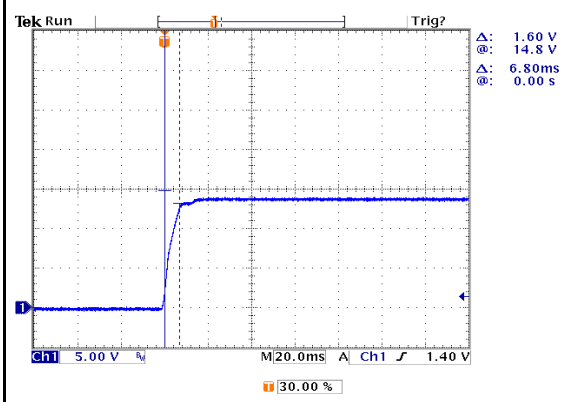
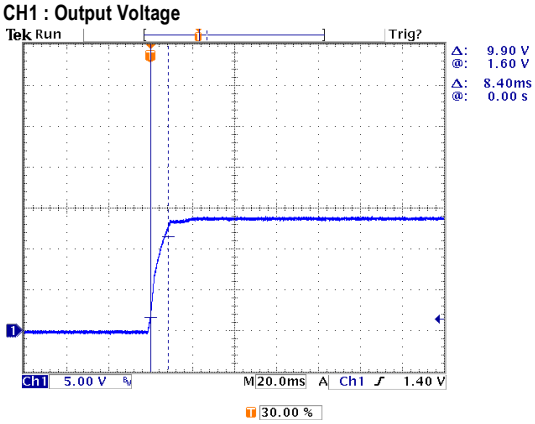
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



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



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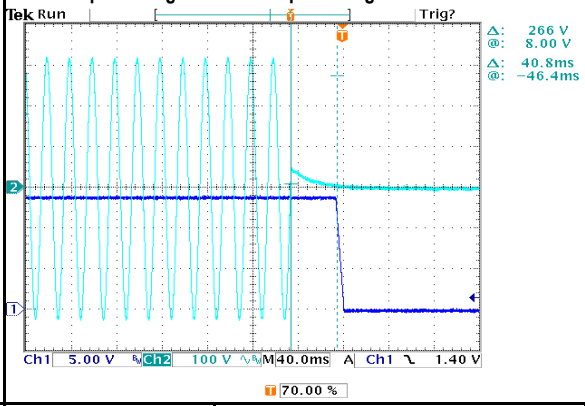
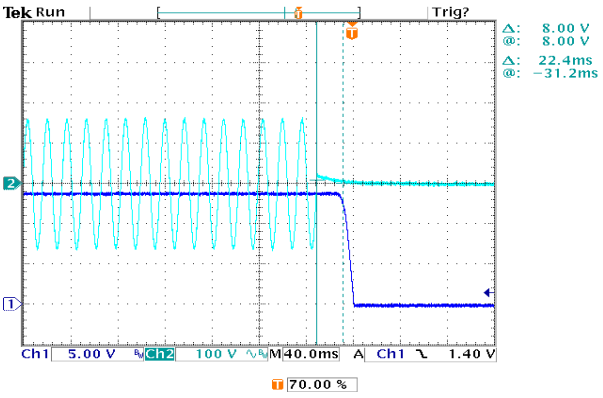
HOLD UP TIME (TYP.)	230VAC : 20ms 115VAC : 20ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 40.8ms 115VAC : 22.4ms

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



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



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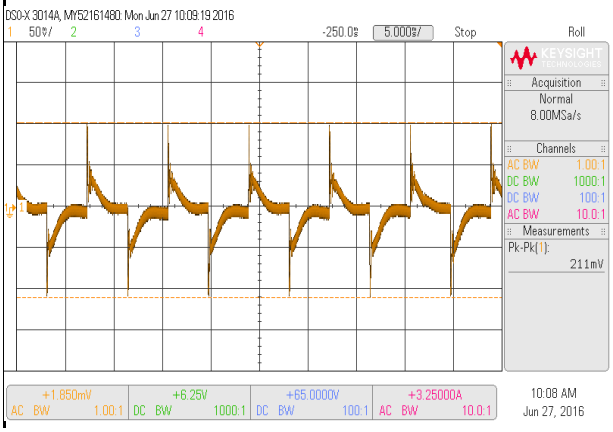
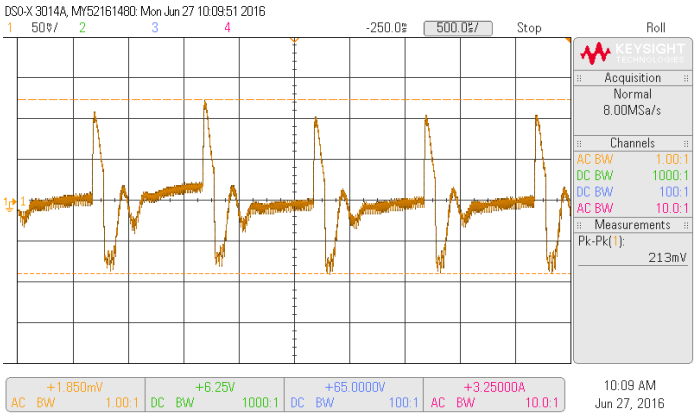
DYNAMIC LOAD	V1 : 1380 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25℃	(1). (2). unit:mVp-p V1: 211mv 213mv

FULL /MIN LOAD 50%DUTY / 120HZ

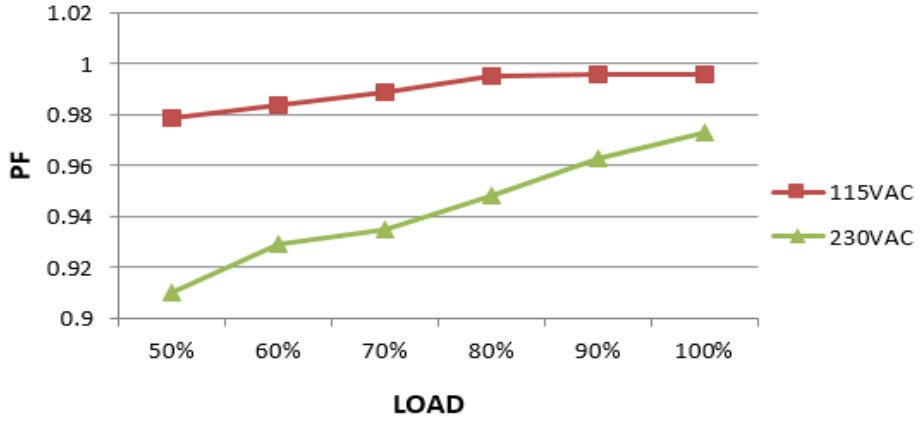
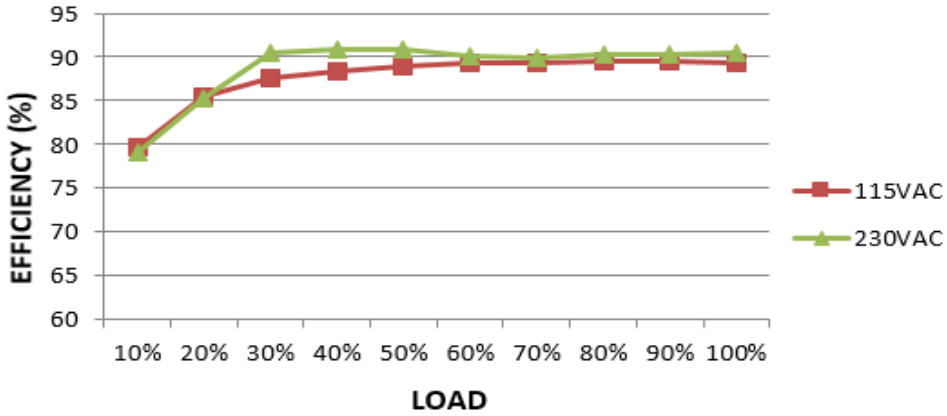


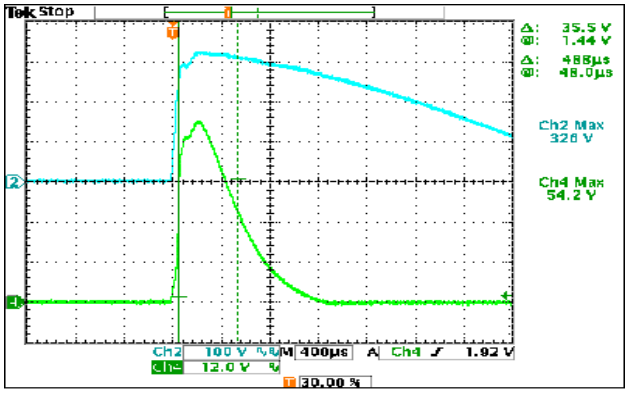
FULL /MIN% LOAD 50%DUTY / 1KHZ



INPUT FUNCTION TEST

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

			O/P : FULL LOAD Ta : 25℃	
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℃	TEST : OK
3	INPUT CURRENT (TYP.)	0.63 / 230VAC 1.25 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 0.59 / 230VAC I= 1.18 / 115VAC
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P: MIN LOAD TA : 25℃	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℃	< 0.134 W
	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	PF= 0.976 / 230VAC PF= 0.988 / 115VAC
6				
	EFFICIENCY (TYP.)	89.5%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	90.005 %
7				
	INRUSH CURRENT (TYP.)	65A / 230VAC COLD START	I/P : 230VAC O/P: FULL LOAD TA : 25℃	I= 54.2A / 230VAC T50= 488.0us / 230VAC

9	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%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING	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
		2 > 125%	TA : 25℃	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℃	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℃	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed
5	EFF TEST	(100%+75%+50%+25%)/4≧89% 10%load≧79%	I/P: 230VAC I/P: 115VAC O/P: 100%~10%LOAD Ta: 25℃	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)Fulll load continue Ta： 25℃	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)Fulll load continue Ta： 25℃	(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℃	 (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 (2)Output Short Change (4)O.V.P Ta： 25℃	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)Fulll load continue PASS Ta： 25℃	 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℃	 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： (1)Dynamic Load Full/Min Load (2)Fulll load continue Ta： 25℃	 (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℃	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℃/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℃/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℃	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 Ta： 25℃	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℃	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

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℃ 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 51.1℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 112.0% LOAD Ta : 25℃	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -35.0℃	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50℃ HUMIDITY= 95.0% RH	TEST : OK
5	TEMPERATURE COEFFICIENT	±0.03% /℃(0~50℃)	I/P : 230VAC O/P : FULL LOAD	±0.004% /℃(0~50℃)
6	STORAGE TEMPERATURE TEST	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		TEST : OK
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 : 3G		TEST : OK

ZR1	49.1℃	66.6℃			
LF1	49.9℃	68.1℃			
BD1	64.5℃	85.5℃			
L1	54.3℃	72.2℃			
L2	57.8℃	75.1℃			
Q1	76.6℃	98.0℃			
Q2	77.4℃	100.3℃			
D5	77.0℃	98.5℃			
C5	60.7℃	78.9℃			
U1	54.3℃	73.0℃			
D30	87.7℃	109.4℃			
C52	69.9℃	91.7℃			
T1	82.1℃	102.1℃			
Q100	80.1℃	100.0℃			
C108	61.6℃	80.4℃			
LF100	50.9℃	70.0℃			
RT1	66.7℃	84.2℃			
TSW1	69.7℃	89.5℃			
TA	29.6℃	51.1℃			

		(5) Test Time：60min in each axis (X.Y.Z) (6) Ta：25℃							
9	CAPACITOR LIFE CYCLE	ENP-120-24 :SUPPOSE C108 IS THE MOST CRITICAL COMPONENT							
		(1) I/P： 230VAC	O/P：FULL LOAD	Ta=	25℃	LIFE TIME	(1).	385582	HRS
		(2) I/P： 230VAC	O/P：FULL LOAD	Ta=	50℃	LIFE TIME	(2).	82209	HRS
		(3) I/P： 230VAC	O/P：FULL LOAD	Ta=	50℃	LIFE TIME	(3).	130376	HRS
		(4) I/P： 230VAC	O/P：FULL LOAD	Ta=	50℃	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℃)							
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