



TEST REPORT: ENP-360-12

360W Level VI Desktop Type Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

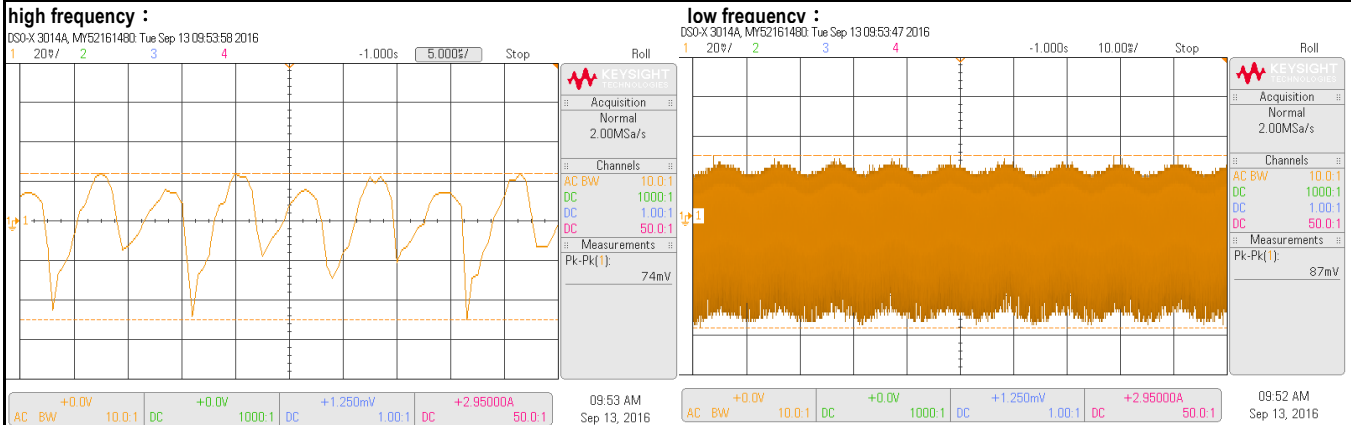
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

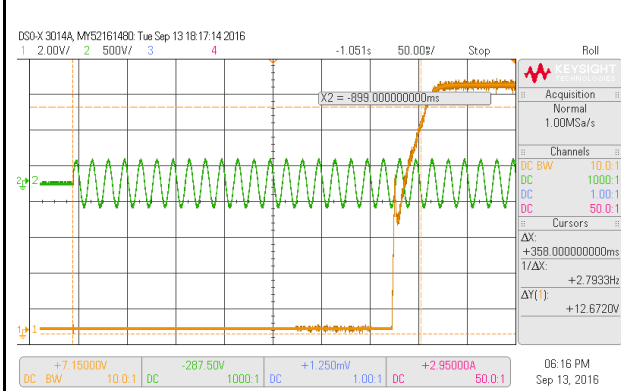
DESIGN VERIFY TEST
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.50V ~ 15.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 11.09V ~ 15.87V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.14% ~ -0.28%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.07% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.15% ~ -0.22%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 5.000 %
	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 87 mVp-p



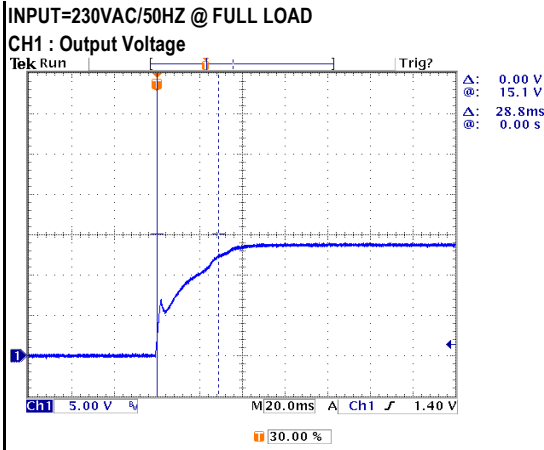
SET UP TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 358ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



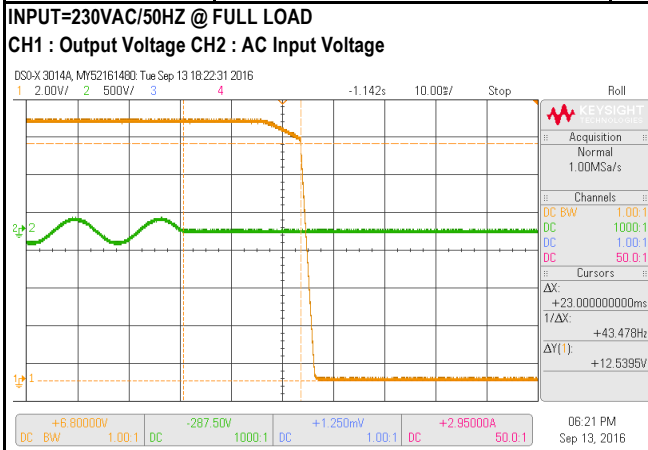
RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 28.8ms
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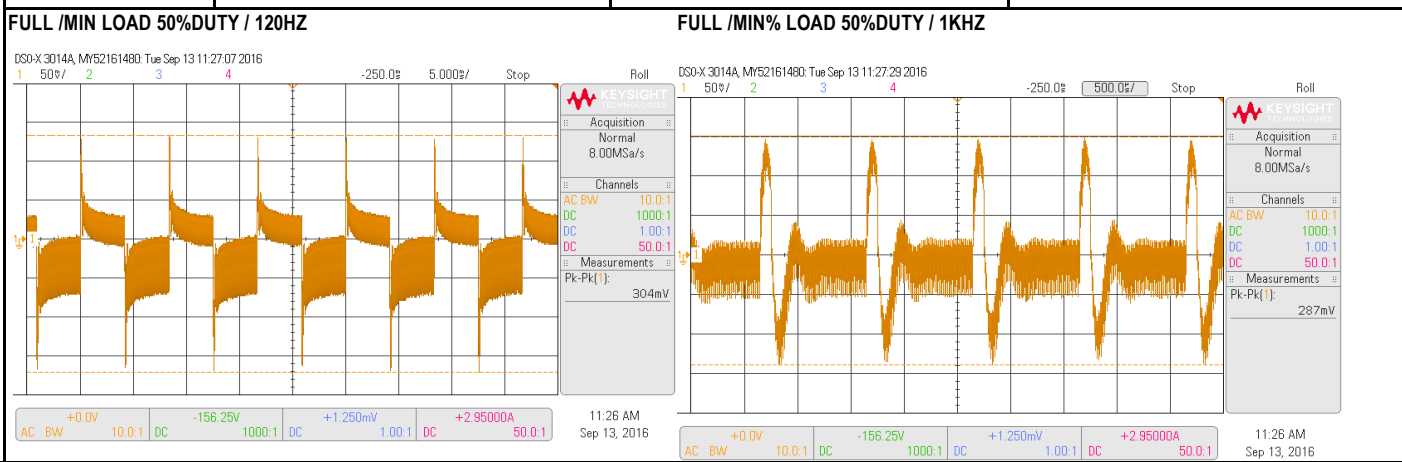
HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC	230VAC : 23.2ms
		O/P: FULL LOAD	
		TA : 25°C	

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DYNAMIC LOAD	V1 : 1380 mVp-p	I/P : 230VAC	(1). (2). unit:mVp-p
		O/P:	V1: 304mv 287mv
		(1)Full/Min load 50%duty/120HZ	
		(2)Full/Min load 50%duty/1KHZ	
		TA : 25°C	

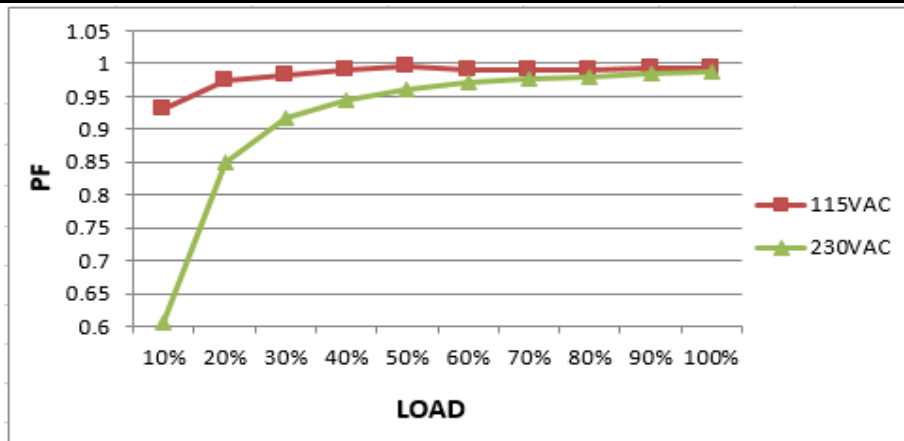
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INPUT FUNCTION TEST

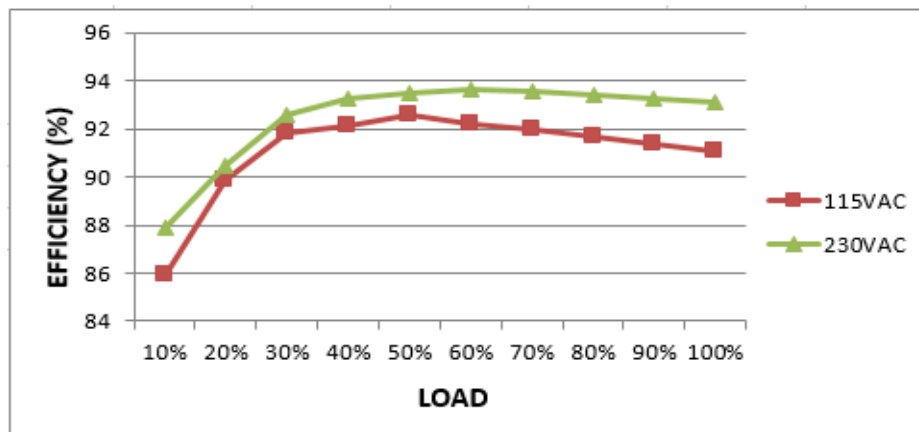
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC (PLEASE CHECK DERATING CURVE)	I/P : TESTING O/P : FULL LOAD Ta : 25°C	51.0VAC ~ 264VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
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.)	1.9 / 230VAC 3.8 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 1.7 / 230VAC I= 3.41 / 115VAC
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.74 mA N-FG: 0.74 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.35 W
	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.987 230VAC PF= 0.993 115VAC

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EFFICIENCY (TYP.)	91.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	93.61 %
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8	INRUSH CURRENT (TYP.)	60A / 230VAC	I/P : 230VAC O/P: FULL LOAD TA : 25°C	I= 36.5A / 230VAC T50= 1690.0us / 230VAC
	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% 2 > 125%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA : 25°C	119.7 264VAC 119.6 230VAC 119.7 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 138% 264VAC 139% 230VAC 139% 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	16.35V 264VAC 16.35V 230VAC 16.35V 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°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	Q901 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 (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°C	VIN: 267VAC 97VAC VDS: VDS: (1). 531.00V 535.00V (2). 527.00V 539.00V (3). 430.00V 462.00V (4). 527.00V 527.00V (5). 523.00V 539.00V (6). 527.00V 539.00V (7). 474.00V 486.00V

2	O/P Diode (MOSFET)	Q100	Rated :	40V	120.0A	I/P : 267VAC VDS :	Q100	Q101	VDS : VDS :
		Q101	Rated :	40V	120.0A	O/P : (1) Full Load Turn on (1). (2) Output Short (2). (3) Full load continue (3). (4) Dynamic Load Full/Min Load 90%Duty/1KHz (4). (5) Dynamic Load Full/Min Load 90%Duty/5KHz (5). (6) Dynamic Load Full/Min Load 50%Duty/120Hz (6). (7) 0%→400% Load (7). (8) NO LOAD (8). Ta : 25°C			
3	Input Capacitor	C5	Rated :	180uf	420V	I/P : 267VAC O/P : (1) Full Load Turn on /Off (1). (2) Min load Turn on /Off (2). (3) Full Load /Min load Change (3). Ta : 25°C			418.00V 386.00V 418.00V
4	Control IC	U1	Rated :	20V (max) 10V (min)		I/P : 267VAC O/P : (1) Full Load Turn on /Off (1). (2) Output Short (2). Change (3). (4) O.V.P (4). (5) Low Line No Load Vo(min) (5). Ta : 25°C	U1	U901	U901
		U901	Rated :	24V (max) 8V (min)			17.50V 15.50V 17.50V 16.90V 14.90V	20.20V 16.40V 16.00V 9.60V 16.80V	
5	PFC Power Transistor	Q1	Rated :	650V	22.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1) Full Load Turn on (1). (2) Output Short (2). (3) Full load continue (3). (4) Dynamic Load Full/Min Load 90%Duty/1KHz (4). (5) Dynamic Load Full/Min Load 90%Duty/5KHz (5). (6) Dynamic Load Full/Min Load 50%Duty/120Hz (6). (7) 0%→400% Load (7). Ta : 25°C	VIN:	267VAC	97VAC
							VDS:	VDS:	VDS:
							(1).	501.00V	493.00V
							(2).	493.00V	485.00V
							(3).	497.00V	489.00V
							(4).	501.00V	489.00V
							(5).	501.00V	493.00V
							(6).	497.00V	469.00V
							(7).	445.00V	457.00V
6	PFC Diode	D1	Rated :	600V	6.0A	I/P : 267VAC I/P : 97VAC O/P : (1) Full Load Turn on (1). (2) Output Short (2). (3) Dynamic Load Full/Min Load 90%Duty/5KHz (3). (4) Dynamic Load Full/Min Load 50%Duty/120Hz (4). Ta : 25°C	267VAC	97VAC	97VAC
							(1).	457	445.00V
							(2).	469	449.00V
							(3).	457	449.00V
							(4).	453	445.00V

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: 7.99mA I/P-FG: 7.31mA O/P-FG: 8.10mA 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: 7.2GΩ I/P-FG: 4.7GΩ O/P-FG: 18.8GΩ NO DAMAGE
2	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C/70%RH	25.0mΩ

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
		EN55022	I/P : 230VAC /50HZ	PASS

2	CONDUCTION	CLASS B	O/P : FULL LOAD / 50% LOAD Ta : 25°C	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-360-24 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 30.6°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 49.6°C	<table border="1"> <tr><td>1</td><td>BD1</td><td>59.0°C</td><td>78.0°C</td></tr> <tr><td>2</td><td>C2</td><td>56.7°C</td><td>75.7°C</td></tr> <tr><td>3</td><td>LF2</td><td>58.8°C</td><td>77.8°C</td></tr> <tr><td>4</td><td>C10</td><td>59.9°C</td><td>78.9°C</td></tr> <tr><td>5</td><td>RY1</td><td>63.4°C</td><td>82.4°C</td></tr> <tr><td>6</td><td>L1</td><td>62.4°C</td><td>81.4°C</td></tr> <tr><td>7</td><td>Q2</td><td>61.6°C</td><td>80.6°C</td></tr> <tr><td>8</td><td>C5</td><td>61.3°C</td><td>80.3°C</td></tr> <tr><td>9</td><td>Q901</td><td>62.9°C</td><td>81.9°C</td></tr> <tr><td>10</td><td>C44</td><td>61.9°C</td><td>80.9°C</td></tr> <tr><td>11</td><td>C90</td><td>66.3°C</td><td>85.3°C</td></tr> <tr><td>12</td><td>C42</td><td>65.1°C</td><td>84.1°C</td></tr> <tr><td>13</td><td>C43</td><td>63.3°C</td><td>82.3°C</td></tr> <tr><td>14</td><td>T1</td><td>73.8°C</td><td>92.8°C</td></tr> <tr><td>15</td><td>U1</td><td>56.4°C</td><td>75.4°C</td></tr> <tr><td>16</td><td>U901</td><td>59.4°C</td><td>78.4°C</td></tr> <tr><td>17</td><td>Q100</td><td>69.5°C</td><td>88.5°C</td></tr> <tr><td>18</td><td>Q101</td><td>70.9°C</td><td>89.9°C</td></tr> <tr><td>19</td><td>C105</td><td>65.8°C</td><td>84.8°C</td></tr> <tr><td>20</td><td>C202</td><td>65.3°C</td><td>84.3°C</td></tr> <tr><td>21</td><td>TSW1</td><td>61.4°C</td><td>80.4°C</td></tr> </table>	1	BD1	59.0°C	78.0°C	2	C2	56.7°C	75.7°C	3	LF2	58.8°C	77.8°C	4	C10	59.9°C	78.9°C	5	RY1	63.4°C	82.4°C	6	L1	62.4°C	81.4°C	7	Q2	61.6°C	80.6°C	8	C5	61.3°C	80.3°C	9	Q901	62.9°C	81.9°C	10	C44	61.9°C	80.9°C	11	C90	66.3°C	85.3°C	12	C42	65.1°C	84.1°C	13	C43	63.3°C	82.3°C	14	T1	73.8°C	92.8°C	15	U1	56.4°C	75.4°C	16	U901	59.4°C	78.4°C	17	Q100	69.5°C	88.5°C	18	Q101	70.9°C	89.9°C	19	C105	65.8°C	84.8°C	20	C202	65.3°C	84.3°C	21	TSW1	61.4°C	80.4°C	
1	BD1	59.0°C	78.0°C																																																																																					
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9	Q901	62.9°C	81.9°C																																																																																					
10	C44	61.9°C	80.9°C																																																																																					
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21	TSW1	61.4°C	80.4°C																																																																																					
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 115.0% 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 : -30.0°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	±0.05% /°C (0~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.03% /°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 : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	ENP-360-24 :SUPPOSE C105 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). 351392 HRS (2). 54766 HRS (3). 116054 HRS (4). 199280 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1199.8K hrs min. Telcordia SR-332 (Bellcore) ; 147.5K 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