



TEST REPORT: ENP-180-48

180W 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

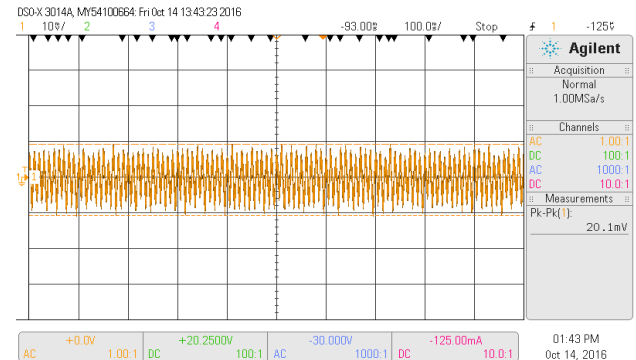
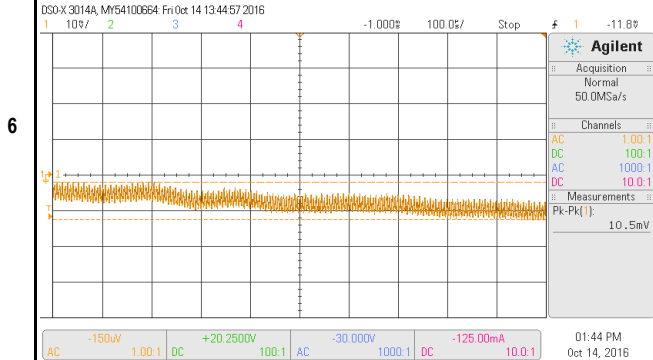
ENVIRONMENT TEST

**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°C	CH1: 45.94V ~ 60.16V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.23% ~ 0.27%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.01% ~ -0.01%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 0.7 %
	RIPPLE & NOISE(Max)	V1 : 350 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 20.1 mVp-p

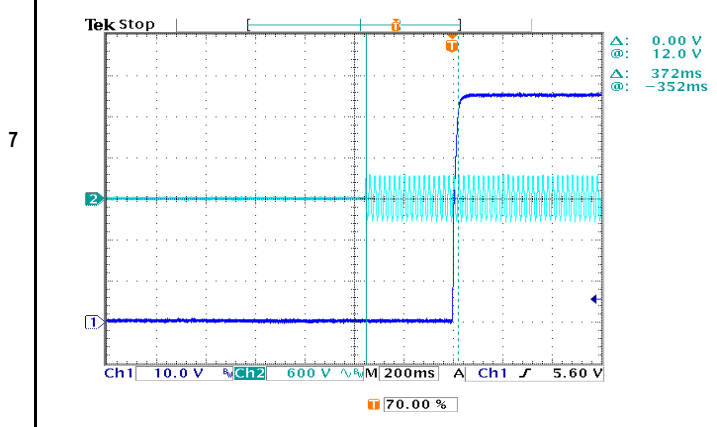
high frequency :

low frequency :



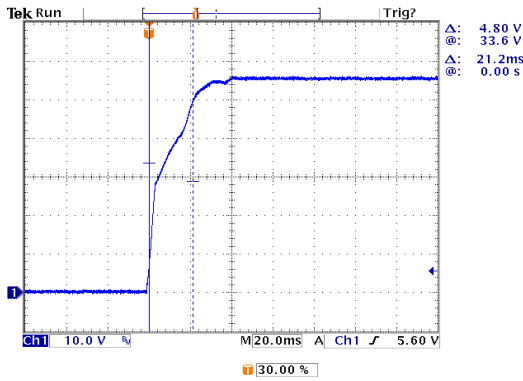
SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 372ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 21.2ms
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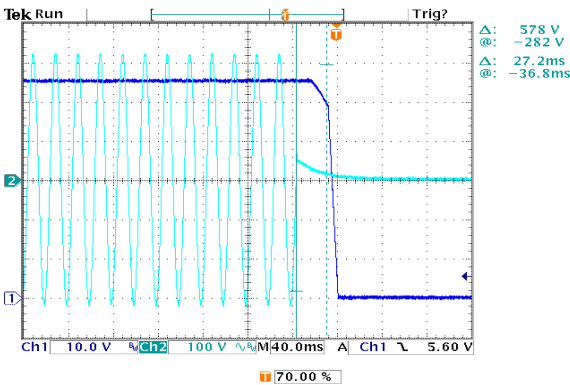
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



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HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 27.2ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

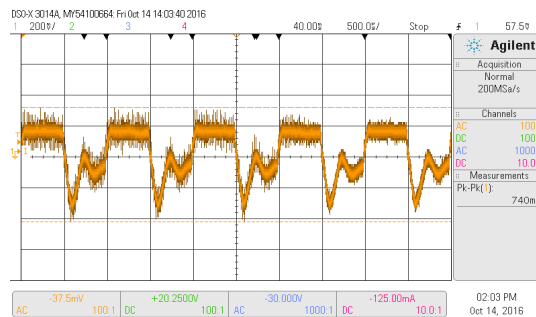
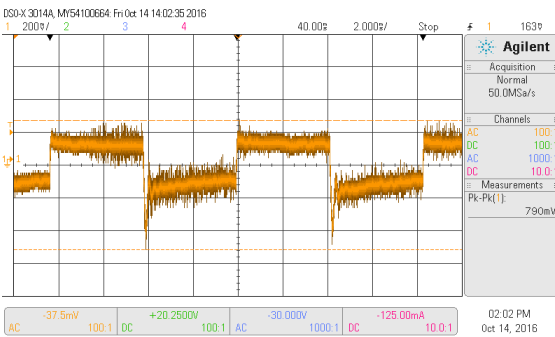


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DYNAMIC LOAD	V1 : 5520 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duy/120HZ (2)Full/Min load 50%duy/1KHZ TA : 25°C	V1: (1). 790mv (2). 740mv	unit:mVp-p
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FULL /MIN LOAD 50%DUTY / 120HZ

FULL /MIN% LOAD 50%DUTY / 1KHZ

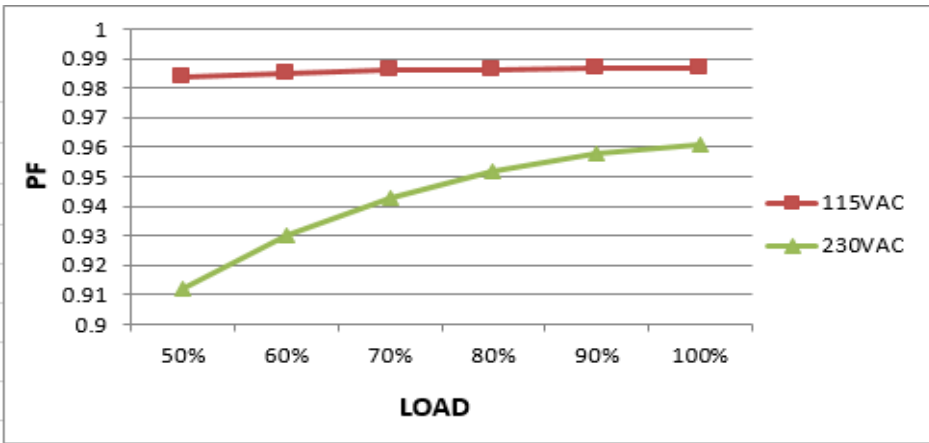


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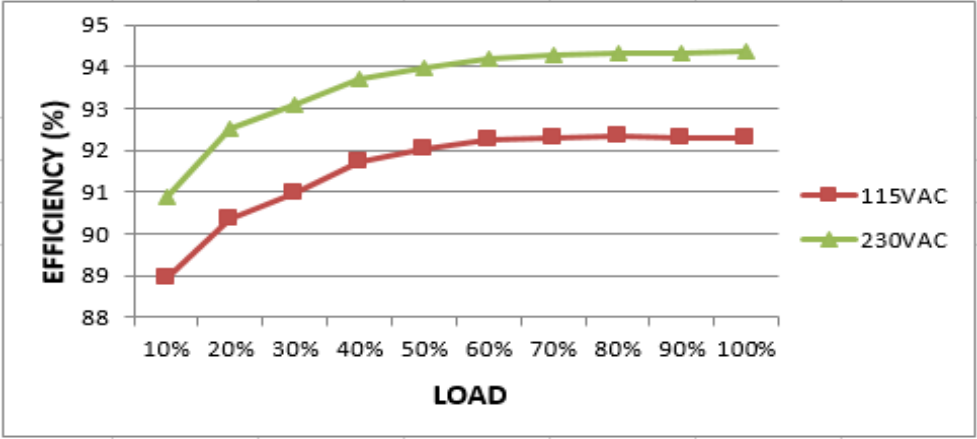
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	75.0VAC ~ 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°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.95 / 230VAC 1.9 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	I= 0.86 / 230VAC I= 1.73 / 115VAC
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P: MIN LOAD TA : 25°C	L-FG: 0.8 mA N-FG: 0.8 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P: MIN LOAD TA : 25°C	< 0.147 W
	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	PF= 0.982 / 230VAC PF= 0.996 / 115VAC



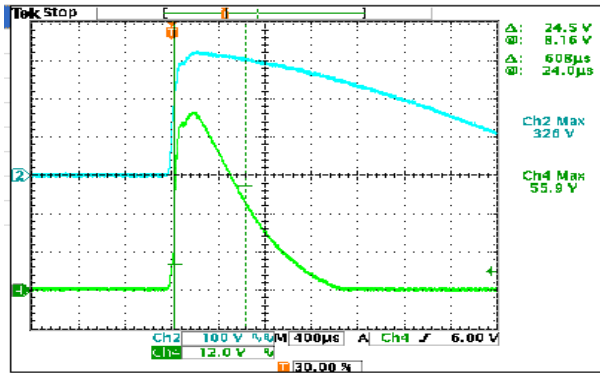
6	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	94.3 %
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7	INRUSH CURRENT (TYP.)	70A / 230VAC	I/P : 230VAC O/P: FULL LOAD TA : 25°C	I= 55.9A / 230VAC T50= 608.0us / 230VAC
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INPUT=230VAC/50HZ @ FULL LOAD
 CH2 : Input current (1V=1A) CH4 : AC Input Voltage

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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	118% 264VAC 118% 230VAC 118% 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	130% 264VAC 130% 230VAC 130% 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	67.11V 264VAC 67.16V 230VAC 67.20V 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 12.0A	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: ID: VDS: ID: (1). 451.00V 3.0A 460.00V 4.0A (2). 451.00V 5.1A 447.00V 4.8A (3). 460.00V 3.8A 464.00V 3.9A (4). 460.00V 3.9A 460.00V 3.9A (5). 472.00V 3.9A 464.00V 3.9A (6). 455.00V 3.9A 460.00V 4.0A (7). 439.00V 5.6A 439.00V 5.6A
		Q100 Rated : 150V 30.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short	Q100 Q101 VDS : VDS : (1). 126.10V 114.80V (2). 16.00V 13.00V

2	O/P Diode (MOSFET)				(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 (8) NO LOAD Ta : 25°C	(3). 127.40V 114.80V (4). 126.50V 114.70V (5). 126.50V 116.30V (6). 127.40V 116.30V (7). 121.90V 12.92V (8). 122.80V 110.70V
3	Input Capacitor	C5	Rated : 150uf	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°C	(1). 419.00V (2). 411.00V (3). 419.00V
4	Control IC	U1	Rated : 28V (max) 10V (min)		I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 U901 (1). 18.40V 17.38V (2). 17.90V 17.38V (3). 17.70V 17.38V (4). 15.40V 15.60V (5). 15.43V 15.75V
5	PFC Power Transistor	Q1	Rated : 600V	18.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue 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°C	VIN: 267VAC 97VAC VDS: ID: VDS: ID: (1). 516.00V 12.6A 479.00V 9.3A (2). 455.00V 4.3A 423.00V 1.2A (3). 516.00V 12.6A 475.00V 12.6A (4). 516.00V 14.2A 475.00V 12.6A (5). 516.00V 13.8A 479.00V 13.8A (6). 495.00V 7.5A 471.00V 9.8A (7). 495.00V 7.5A 479.00V 9.2A
6	PFC Diode	D1	Rated : 600V	8.0A	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 50%Duty/120Hz Ta : 25°C	267VAC 97VAC (1). 486.00V 421.00V (2). 445.00V 429.00V (3). 454.00V 441.00V (4). 441.00V 433.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.750KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 0.500KVAC /min	I/P-O/P: 4.125KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 8.70mA I/P-FG: 7.66mA O/P-FG: 7.99mA 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: 7.3GΩ I/P-FG: 3.7GΩ 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	13.0mΩ

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
		EN55022	I/P : 230VAC /50HZ	PASS

3	CONDUCTION	CLASS B	O/P : FULL LOAD Ta : 25°C	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-180-24 1. ROOM AMBIENT BURN-IN : 1.5hrs IP: 230VAC O/P: 100% LOAD TA= 25.0°C 2. HIGH AMBIENT BURN-IN : 1.5hrs IP: 230VAC O/P: 100% LOAD TA= 50.0°C	<table border="1"> <thead> <tr> <th>CH.</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25 °C</th> <th>HIGH AMBIENT Ta= 50°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C1</td><td>43.7°C</td><td>64.8°C</td></tr> <tr><td>2</td><td>ZR1</td><td>39.8°C</td><td>61.4°C</td></tr> <tr><td>3</td><td>RT1</td><td>50.0°C</td><td>95.8°C</td></tr> <tr><td>4</td><td>LF1</td><td>47.5°C</td><td>67.9°C</td></tr> <tr><td>5</td><td>LF2</td><td>48.3°C</td><td>68.8°C</td></tr> <tr><td>6</td><td>BD1</td><td>45.2°C</td><td>66.8°C</td></tr> <tr><td>7</td><td>C11</td><td>46.2°C</td><td>67.1°C</td></tr> <tr><td>8</td><td>C10</td><td>45.6°C</td><td>66.7°C</td></tr> <tr><td>9</td><td>L2</td><td>44.8°C</td><td>66.1°C</td></tr> <tr><td>10</td><td>L1</td><td>53.3°C</td><td>73.8°C</td></tr> <tr><td>11</td><td>C5</td><td>49.2°C</td><td>69.8°C</td></tr> <tr><td>12</td><td>Q1</td><td>46.2°C</td><td>68.4°C</td></tr> <tr><td>13</td><td>D1</td><td>46.6°C</td><td>68.6°C</td></tr> <tr><td>14</td><td>Q902</td><td>46.7°C</td><td>69.1°C</td></tr> <tr><td>15</td><td>C90</td><td>53.9°C</td><td>74.4°C</td></tr> <tr><td>16</td><td>RT9</td><td>56.6°C</td><td>76.4°C</td></tr> <tr><td>17</td><td>T1-1</td><td>77.7°C</td><td>95.2°C</td></tr> <tr><td>18</td><td>Q101</td><td>46.4°C</td><td>68.2°C</td></tr> <tr><td>19</td><td>C107</td><td>46.0°C</td><td>67.4°C</td></tr> <tr><td>20</td><td>U1</td><td>47.6°C</td><td>68.6°C</td></tr> <tr><td>21</td><td>C202</td><td>45.4°C</td><td>66.8°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50°C	1	C1	43.7°C	64.8°C	2	ZR1	39.8°C	61.4°C	3	RT1	50.0°C	95.8°C	4	LF1	47.5°C	67.9°C	5	LF2	48.3°C	68.8°C	6	BD1	45.2°C	66.8°C	7	C11	46.2°C	67.1°C	8	C10	45.6°C	66.7°C	9	L2	44.8°C	66.1°C	10	L1	53.3°C	73.8°C	11	C5	49.2°C	69.8°C	12	Q1	46.2°C	68.4°C	13	D1	46.6°C	68.6°C	14	Q902	46.7°C	69.1°C	15	C90	53.9°C	74.4°C	16	RT9	56.6°C	76.4°C	17	T1-1	77.7°C	95.2°C	18	Q101	46.4°C	68.2°C	19	C107	46.0°C	67.4°C	20	U1	47.6°C	68.6°C	21	C202	45.4°C	66.8°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 117.0% 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	±0.05% /°C(0~50°C)	I/P : 230VAC O/P : FULL LOAD	0.003% /°C(0~50°C)																																																																																								
		1. Thermal shock Temperature : -45°C~+90°C		TEST : OK																																																																																								



6	STORAGE TEMPERATURE TEST	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	
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-180-24 :SUPPOSE C107 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). 854450 HRS (2). 193900 HRS (3). 258262 HRS (4). 333113 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 170.6K 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