



# TEST REPORT: ENP-180-24

## 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

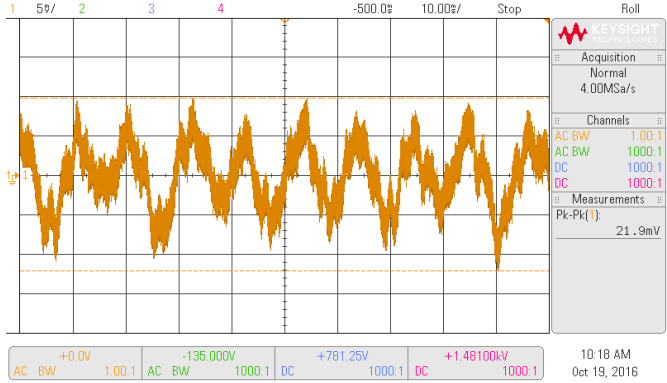
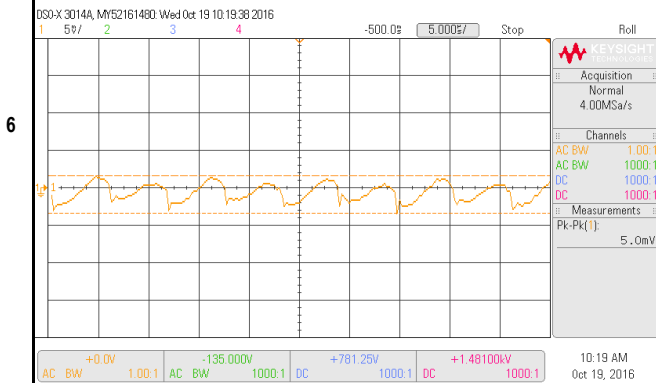
ENVIRONMENT TEST

**DESIGN VERIFY TEST**  
**OUTPUT FUNCTION**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 23.50V ~ 30.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 22.85V ~ 30.63V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.25% ~ 0.07%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.04% ~ -0.04%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.04% ~ -0.04%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 5.0 %
	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 21.9 mVp-p

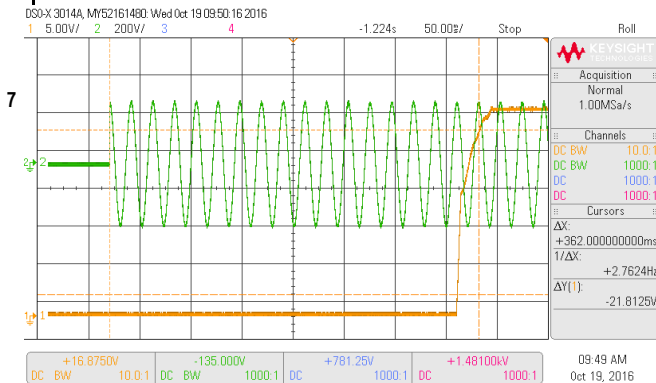
high frequency :

low frequency :

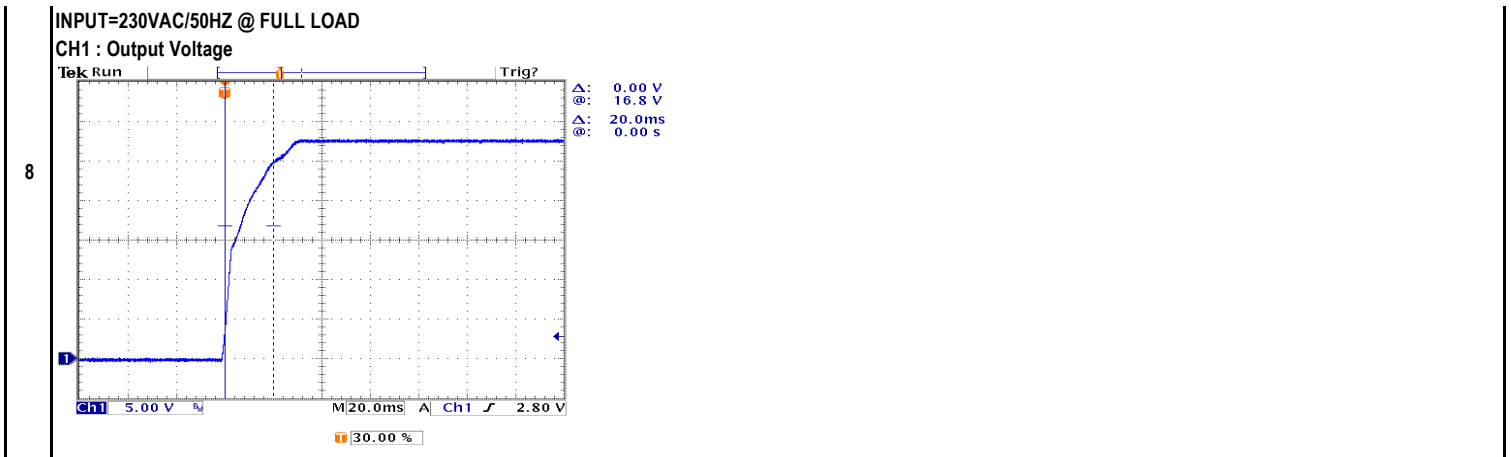


SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 362ms
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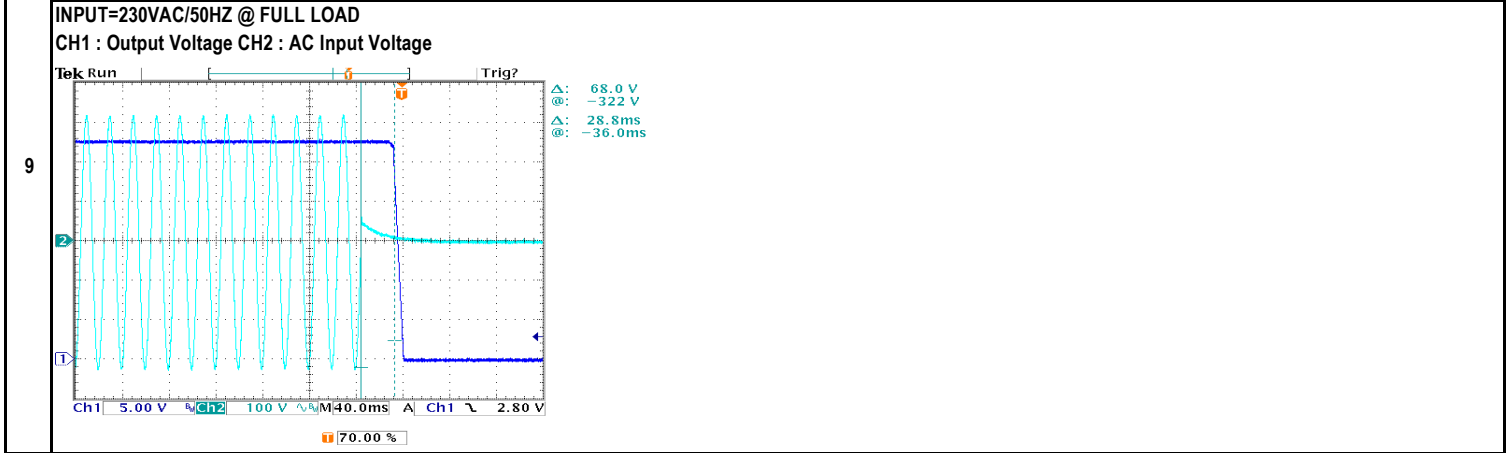
INPUT=230VAC/50HZ @ FULL LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage



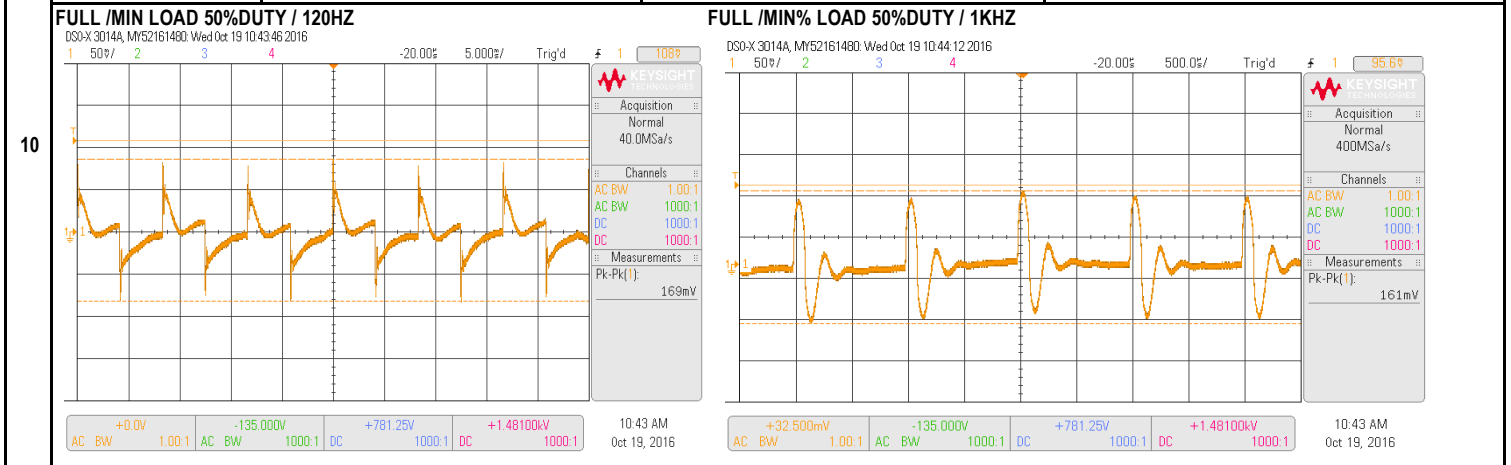
RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 20.0ms
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HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 28.8ms
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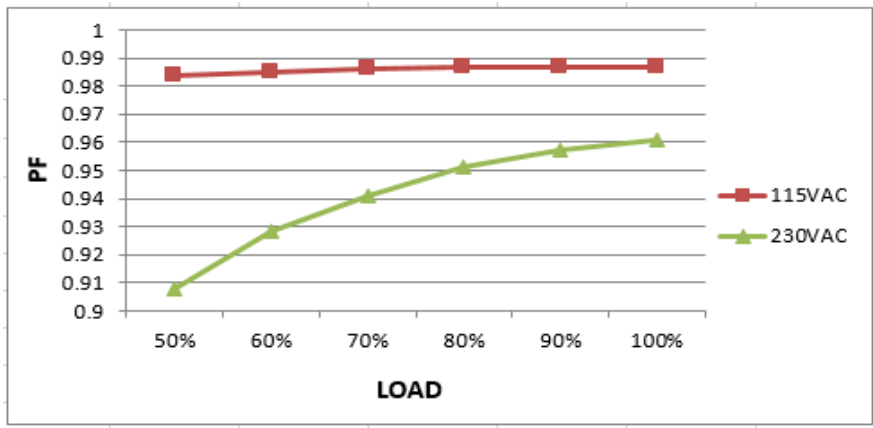


DYNAMIC LOAD	V1 : 2760 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C	V1: (1). 169mv (2). 161mv unit:mVp-p
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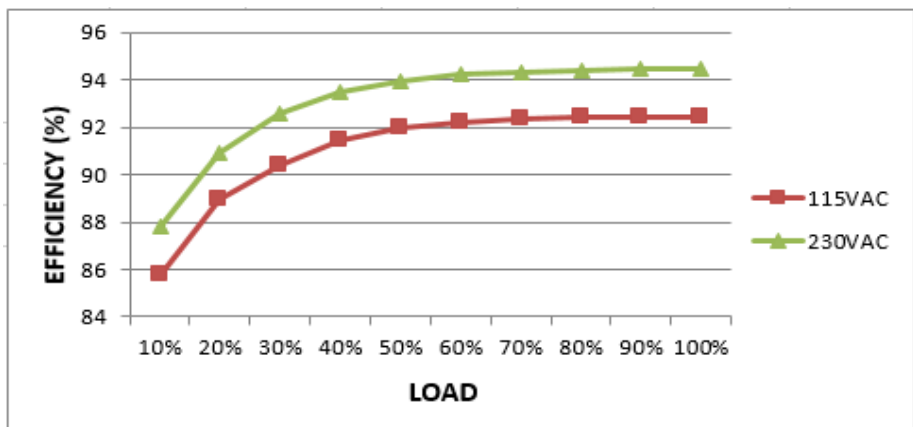


INPUT FUNCTION TEST			
NO	TEST ITEM	SPECIFICATION	RESULT
	INPUT VOLTAGE		I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P :
			72.0VAC ~ 264VAC

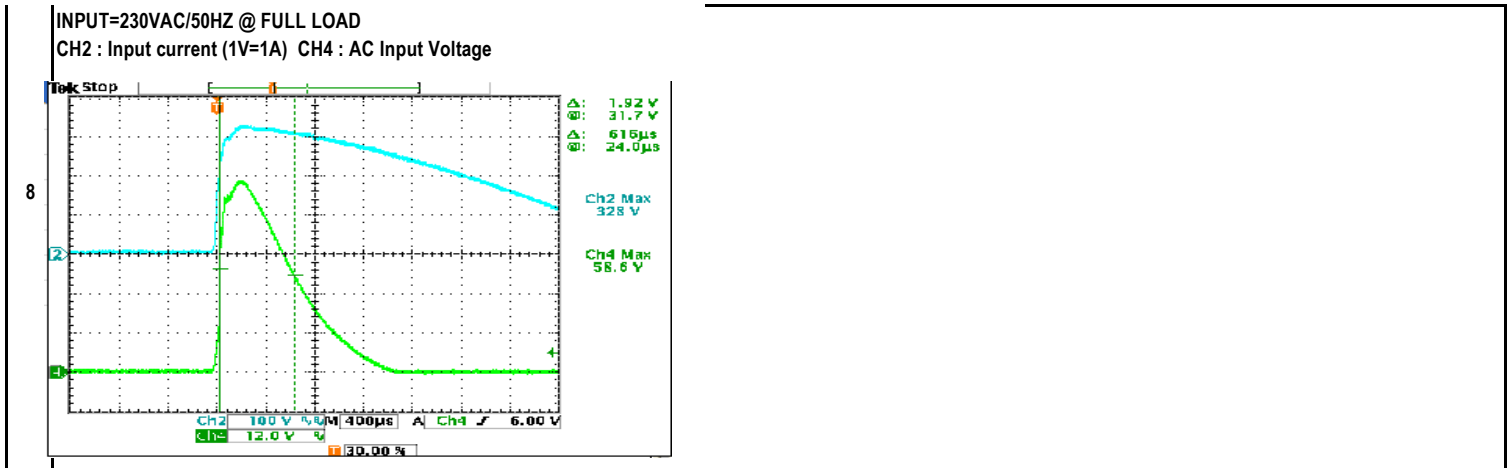
1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.95 / 230VAC 1.9 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	I= 0.86 / 230VAC I= 1.72 / 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	< 0.131 W
	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	PF= 0.959 / 230VAC PF= 0.981 / 115VAC



7	EFFICIENCY (TYP.)	92.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	94.36 %
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	INRUSH CURRENT (TYP.)	70A / 230VAC	I/P : 230VAC O/P: FULL LOAD TA : 25°C	I= 58.6A / 230VAC T50= 616.0us / 230VAC
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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	119% 264VAC 119% 230VAC 119% 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	133.84% 264VAC 133.84% 230VAC 133.84% 100VAC Constant current limiting, if >125% rated power, with auto-recovery after the overload condition is removed
2	OVER VOLTAGE PROTECTION	31.00V ~ 36.50V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD TA : 25°C	33.72V 264VAC 33.58V 230VAC 33.67V 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: VDS: (1). 420.00V 424.00V (2). 424.00V 424.00V (3). 420.00V 428.00V (4). 412.00V 424.00V (5). 428.00V 424.00V (6). 440.00V 424.00V (7). 432.00V 440.00V
		Q100 Rated : 75V 80.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue	Q100 Q101 VDS : VDS : (1). 66.00V 65.20V (2). 67.70V 65.60V (3). 65.20V 65.20V

2	O/P Diode (MOSFET)	Q101	Rated : 75V 80.0A	(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 (9) Burst mode Ta : 25°C	(4). 67.30V 66.00V (5). 69.30V 65.60V (6). 66.90V 65.20V (7). 68.10V 66.90V (8). 62.40V 63.20V (9). 63.6V 64.0V
3	Input Capacitor	C5	Rated : 150uf 420V Surge Voltage: 470V	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	C5 (1). 411.00V (2). 415.00V (3). 420.00V
4	Control IC	U1 U901	Rated : 28V (max) 10V (min) Rated : 20V (max) 10V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 U901 (1). 17.40V 17.00V (2). 17.40V 16.80V (3). 17.60V 17.20V (4). 16.40V 16.60V (5). 15.80V 15.60V
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 continu 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: VDS: (1). 452.00V 444.00V (2). 444.00V 420.00V (3). 424.00V 440.00V (4). 440.00V 440.00V (5). 432.00V 444.00V (6). 420.00V 428.00V (7). 444.00V 440.00V
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 (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25°C	267VAC 97VAC (1). 428.00V 411.00V (2). 424.00V 428.00V (3). 428.00V 416.00V (4). 428.00V 411.00V

### 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: 7.00mA I/P-FG: 6.26mA O/P-FG: 8.33mA 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: 8.2GΩ I/P-FG: 4.2GΩ O/P-FG: 30.0GΩ NO DAMAGE
2	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C/70%RH	26.0mΩ

#### 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	PASS Test by certified Lab

4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	Ta : 25°C 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>84.8°C</td></tr> <tr><td>2</td><td>ZR1</td><td>39.8°C</td><td>81.4°C</td></tr> <tr><td>3</td><td>RT1</td><td>50.0°C</td><td>95.6°C</td></tr> <tr><td>4</td><td>LF1</td><td>47.5°C</td><td>87.9°C</td></tr> <tr><td>5</td><td>LF2</td><td>48.3°C</td><td>88.8°C</td></tr> <tr><td>6</td><td>BD1</td><td>45.2°C</td><td>86.8°C</td></tr> <tr><td>7</td><td>C11</td><td>46.2°C</td><td>87.1°C</td></tr> <tr><td>8</td><td>C10</td><td>45.6°C</td><td>86.7°C</td></tr> <tr><td>9</td><td>L2</td><td>44.8°C</td><td>86.1°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>89.8°C</td></tr> <tr><td>12</td><td>Q1</td><td>46.2°C</td><td>88.4°C</td></tr> <tr><td>13</td><td>D1</td><td>46.6°C</td><td>88.6°C</td></tr> <tr><td>14</td><td>Q902</td><td>46.7°C</td><td>89.1°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>78.4°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>88.2°C</td></tr> <tr><td>19</td><td>C107</td><td>46.0°C</td><td>87.4°C</td></tr> <tr><td>20</td><td>U1</td><td>47.6°C</td><td>88.8°C</td></tr> <tr><td>21</td><td>C202</td><td>45.4°C</td><td>86.8°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50°C	1	C1	43.7°C	84.8°C	2	ZR1	39.8°C	81.4°C	3	RT1	50.0°C	95.6°C	4	LF1	47.5°C	87.9°C	5	LF2	48.3°C	88.8°C	6	BD1	45.2°C	86.8°C	7	C11	46.2°C	87.1°C	8	C10	45.6°C	86.7°C	9	L2	44.8°C	86.1°C	10	L1	53.3°C	73.8°C	11	C5	49.2°C	89.8°C	12	Q1	46.2°C	88.4°C	13	D1	46.6°C	88.6°C	14	Q902	46.7°C	89.1°C	15	C90	53.9°C	74.4°C	16	RT9	56.6°C	78.4°C	17	T1-1	77.7°C	95.2°C	18	Q101	46.4°C	88.2°C	19	C107	46.0°C	87.4°C	20	U1	47.6°C	88.8°C	21	C202	45.4°C	86.8°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)																																																																																								
	STORAGE	1. Thermal shock Temperature : -45°C~+90°C 2. Temperature change rate : 25°C / MIN		TEST : OK																																																																																								



6	STORAGE TEMPERATURE TEST	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 1600.7K hrs min. Telcordia SR-332 (Bellcore) ; 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	

<b>TEST RESULT</b>	<b>TESTER</b>	<b>REVIEW</b>	<b>APPROVAL</b>
PASS	DANIEL GAO	SANFORD SU	VINCENT ZENG