



# TEST REPORT: ENP-180-12

## 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

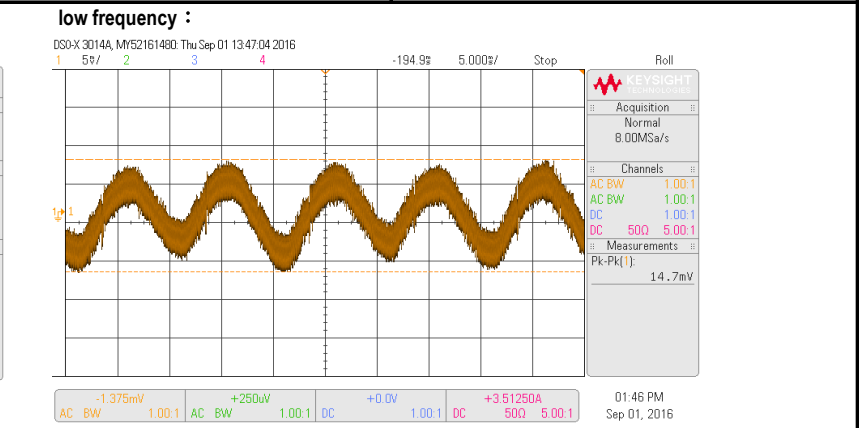
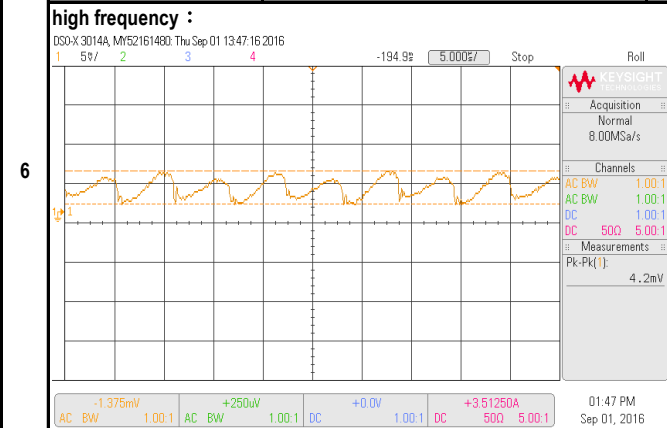
E.M.C. Test

### ■ RELIABILITY TEST

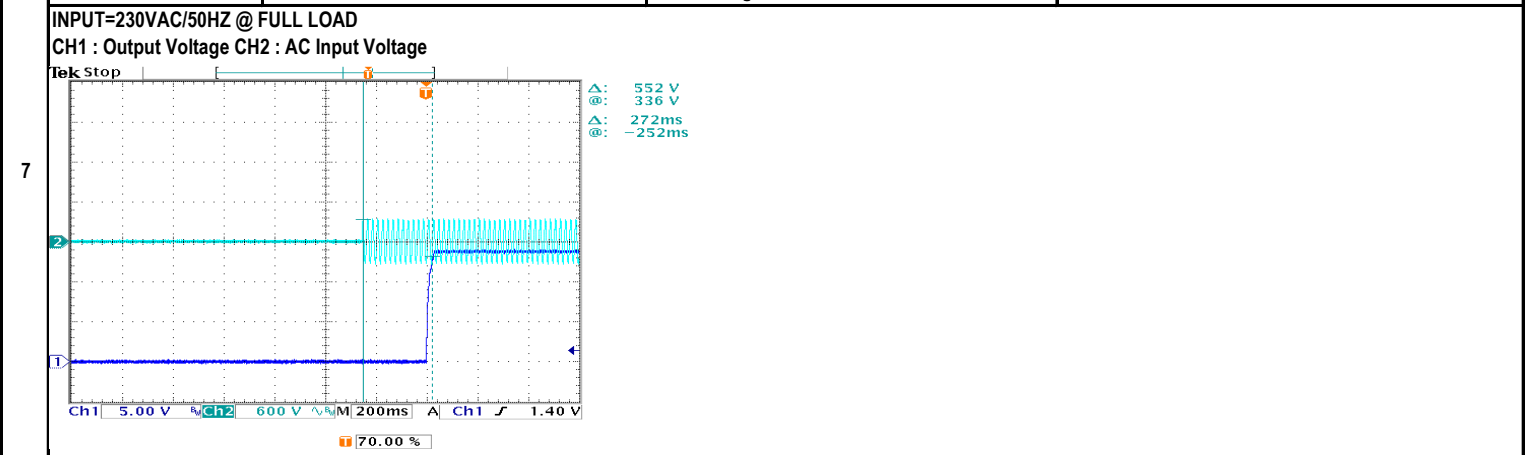
ENVIRONMENT TEST

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

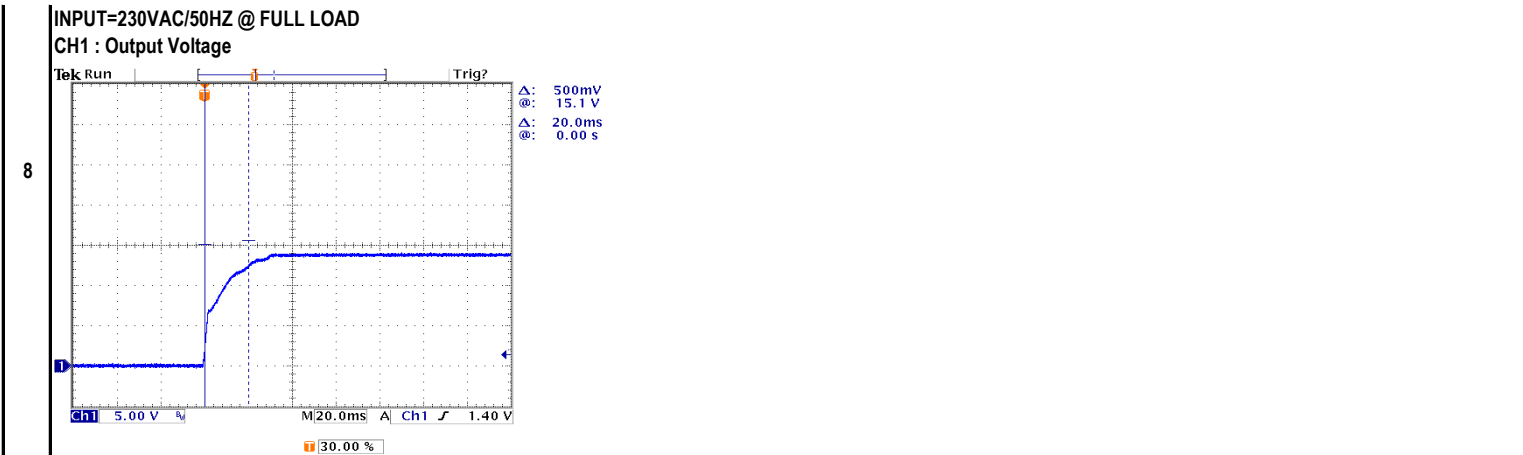
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.50V ~ 15.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 11.17V ~ 15.54V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.14% ~ -0.36%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.07%
4	LOAD REGULATION (MAX.)	V1 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.22% ~ -0.29%
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 : 14.7 mVp-p



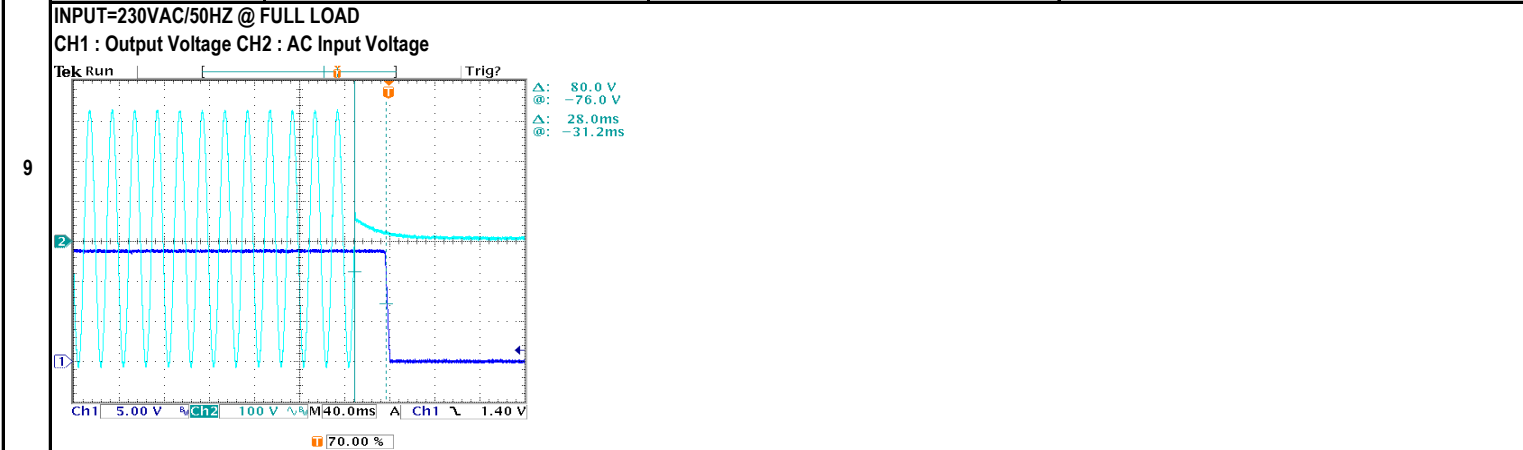
SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 272ms
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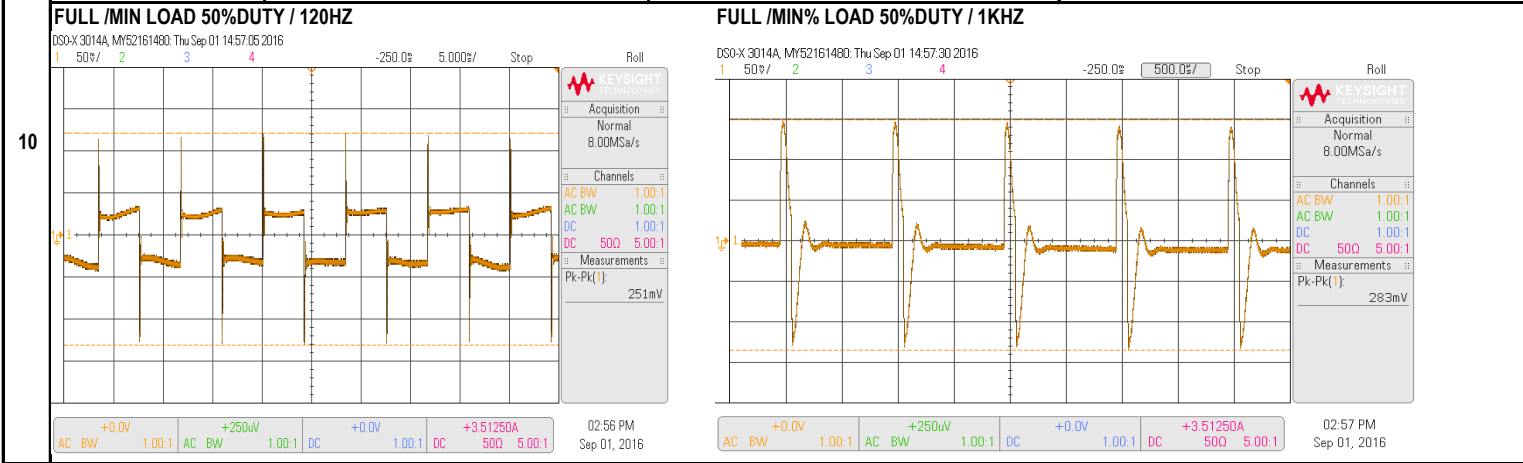
RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 20.0ms
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HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC	230VAC : 28.0ms
		O/P: FULL LOAD	
		TA : 25°C	



DYNAMIC LOAD	V1 : 1380 mVp-p	I/P : 230VAC	(1). (2). unit:mVp-p
		O/P:	V1: 251mv 283mv
		(1)Full/Min load 50%duty/120HZ	
		(2)Full/Min load 50%duty/1KHZ	
		TA : 25°C	



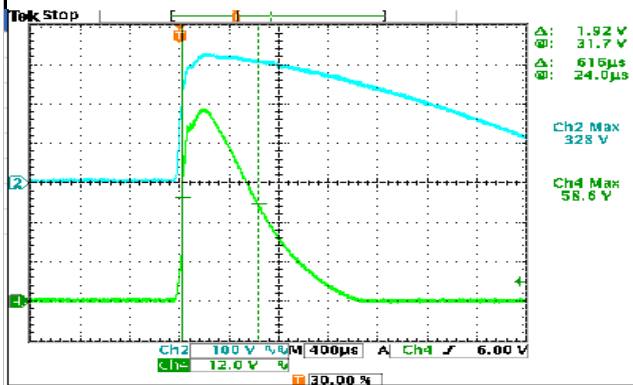
INPUT FUNCTION TEST			
NO	TEST ITEM	SPECIFICATION	TEST CONDITION
	INPUT VOLTAGE		I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P :
			73.0VAC ~ 264VAC



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= 1.73 / 115VAC																															
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.82 mA N-FG: 0.82 mA																															
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.126 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= 0.96 / 230VAC PF= 0.981 / 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>0.985</td><td>0.905</td></tr> <tr><td>60%</td><td>0.986</td><td>0.925</td></tr> <tr><td>70%</td><td>0.987</td><td>0.940</td></tr> <tr><td>80%</td><td>0.988</td><td>0.950</td></tr> <tr><td>90%</td><td>0.989</td><td>0.955</td></tr> <tr><td>100%</td><td>0.990</td><td>0.960</td></tr> </tbody> </table>			Load (%)	115VAC PF	230VAC PF	50%	0.985	0.905	60%	0.986	0.925	70%	0.987	0.940	80%	0.988	0.950	90%	0.989	0.955	100%	0.990	0.960										
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7	EFFICIENCY (TYP.)	91.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	93.44 %																															
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	INRUSH CURRENT (TYP.)	70A / 230VAC	I/P : 230VAC O/P : FULL LOAD TA : 25°C	I= 58.6A / 230VAC																															

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : Input current (1V=1A) CH4 : AC Input Voltage (1V=1A)



### 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	114.94% 264VAC 114.98% 230VAC 114.96% 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  125.76% 264VAC 125.76% 230VAC 125.76% 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	16.60V 264VAC 16.59V 230VAC 16.57V 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 : 500V 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). 450.00V 434.00V (2). 450.00V 430.00V (3). 418.00V 361.00V (4). 438.00V 426.00V (5). 442.00V 422.00V (6). 442.00V 430.00V (7). 446.00V 434.00V
		Q100 Rated : 60V 80.0A	I/P : 267VAC VDS :	Q100 Q101 VDS : VDS :

2	O/P Diode (MOSFET)	Q101 Rated : 60V 80.0A	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 (8) NO LOAD (9) Burst mode Ta : 25°C	(1). 34.20V 39.80V (2). 20.10V 28.10V (3). 33.10V 38.20V (4). 35.30V 40.60V (5). 35.70V 41.00V (6). 34.90V 39.80V (7). 34.10V 36.90V (8). 39.00V 45.40V (9). 26.9V 37.7V
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	(1). 420.00V (2). 406.00V (3). 420.00V
4	Control IC	U1 Rated : 28V (max) 10V (min) U901 Rated : 20V (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). 18.90V 17.30V (2). 20.10V 18.10V (3). 18.10V 17.10V (4). 16.50V 16.50V (5). 15.70V 14.30V
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: VDS: (1). 531.00V 515.00V (2). 503.00V 487.00V (3). 462.00V 519.00V (4). 531.00V 515.00V (5). 527.00V 515.00V (6). 531.00V 515.00V (7). 523.00V 515.00V
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). 446.00V 422.00V (2). 450.00V 414.00V (3). 450.00V 414.00V (4). 446.00V 418.00V

### 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: 8.12mA I/P-FG: 7.54mA O/P-FG: 7.30mA 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°C/70%RH	I/P-O/P: 13.4GΩ I/P-FG: 6.8GΩ O/P-FG: 23.8GΩ NO DAMAGE
3	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 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-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>68.8°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	68.8°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)																																																																																								



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-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 159K hrs min. Telcordia SR-332 (Bellcore) ; 46.3K 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