



TEST REPORT: ENP-240-24

240W 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

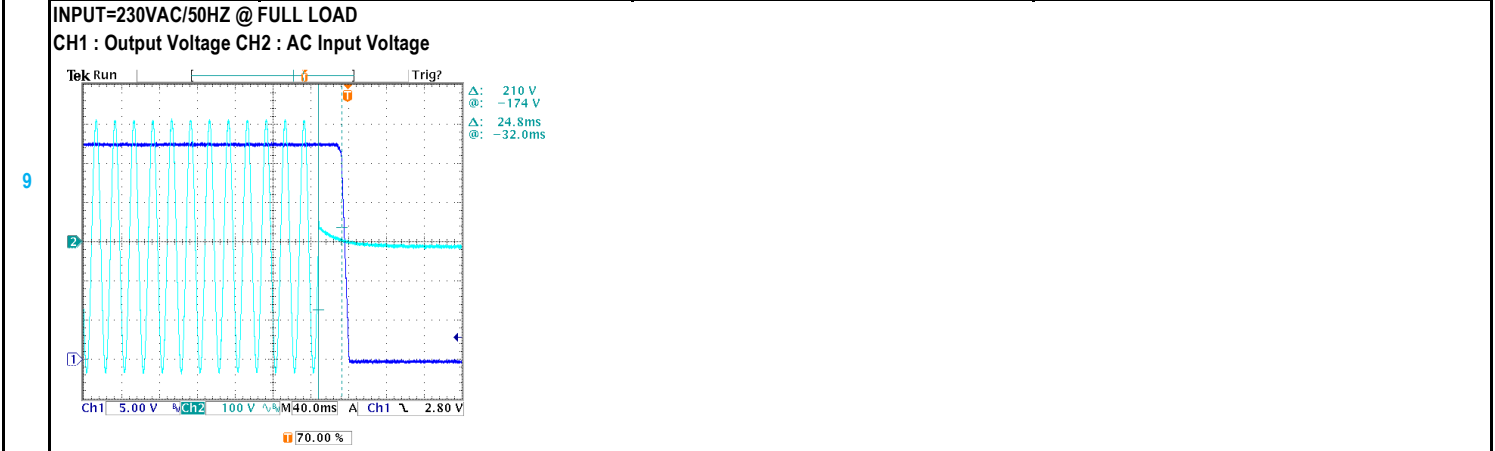
ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION

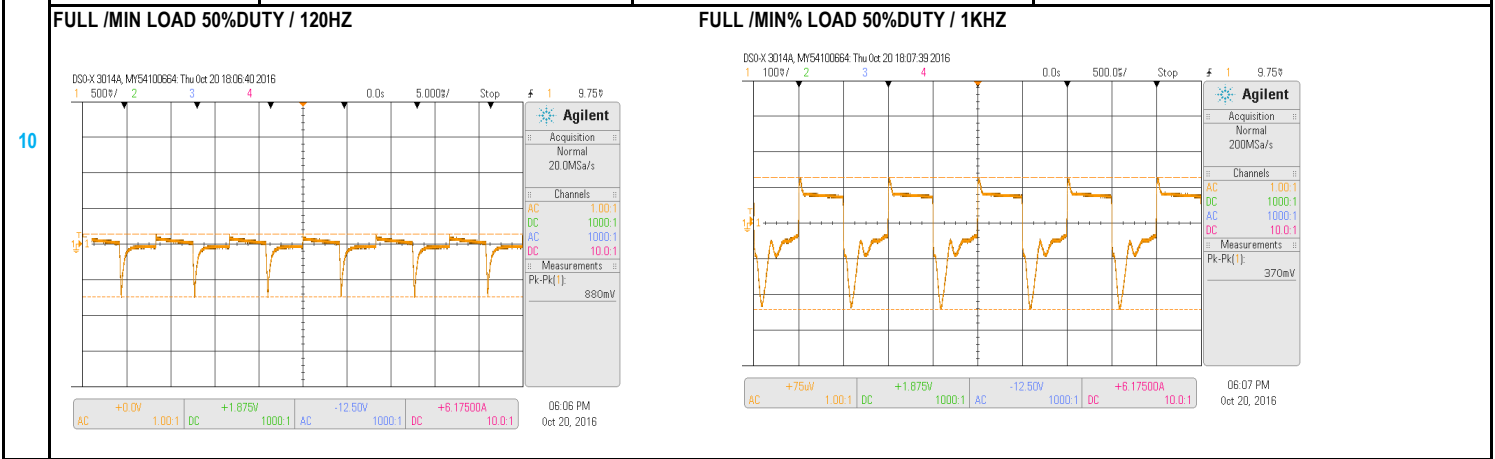
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 23.50V ~ 30.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 22.97V ~ 30.66V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.11% ~ -0.04%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.07% ~ -0.07%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.2 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 15.1 mVp-p
7	SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 396ms
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>				
	RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 23.6ms



HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 24.8ms
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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). 880mv (2). 370mv	unit:mVp-p
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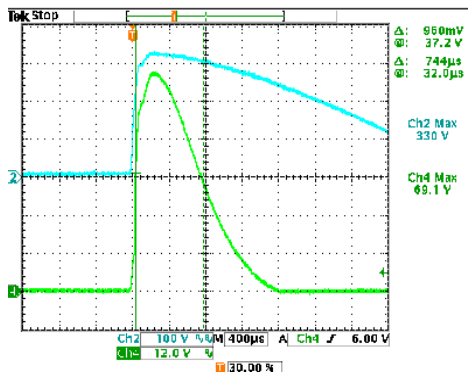


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	76.0VAC ~ 264VAC
			LOW-LINE = 97VAC HIGH-LINE = 300VAC	TEST : OK

			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.)	1.25 / 230VAC 2.5 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	I= 1.14 / 230VAC I= 2.29 / 115VAC																															
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P: MIN LOAD TA : 25°C	L-FG: 0.7 mA N-FG: 0.7 mA																															
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P: MIN LOAD TA : 25°C	< 0.135 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= 0.966 / 230VAC PF= 0.988 / 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>0.928</td></tr> <tr><td>60%</td><td>0.988</td><td>0.945</td></tr> <tr><td>70%</td><td>0.990</td><td>0.955</td></tr> <tr><td>80%</td><td>0.990</td><td>0.958</td></tr> <tr><td>90%</td><td>0.992</td><td>0.962</td></tr> <tr><td>100%</td><td>0.992</td><td>0.965</td></tr> </tbody> </table>			LOAD (%)	115VAC PF	230VAC PF	50%	0.985	0.928	60%	0.988	0.945	70%	0.990	0.955	80%	0.990	0.958	90%	0.992	0.962	100%	0.992	0.965										
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7	EFFICIENCY (TYP.)	92.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	94.5 %																															
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	INRUSH CURRENT (TYP.)	75A / 230VAC	I/P : 230VAC O/P: FULL LOAD TA : 25°C	I= 69.1A / 230VAC T50= 744.0us / 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%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING	115% 264VAC 115% 230VAC 115% 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	129% 264VAC 129% 230VAC 129% 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	33.308V 264VAC 33.348V 230VAC 33.44V 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 16.0A	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 436.00V (2). 428.00V 432.00V (3). 404.00V 428.00V (4). 420.00V 428.00V (5). 428.00V 420.00V (6). 424.00V 412.00V (7). 432.00V 424.00V
		Q100 Rated : 75V 80.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short	Q100 Q101 VDS : VDS : (1). 66.30V 62.30V (2). 15.70V 21.50V

2	O/P Diode (MOSFET)	Q101	Rated : 75V 80.0A	(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	(3). 66.30V 64.70V (4). 67.90V 61.50V (5). 68.70V 62.30V (6). 67.10V 62.30V (7). 67.10V 63.90V (8). 59.90V 59.10V (9). 57.5V 59.9V
3	Input Capacitor	C5	Rated : 180uf 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). 409.00V (2). 405.00V (3). 417.00V
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). 16.37V 16.06V (2). 16.38V 16.12V (3). 16.50V 16.18V (4). 1.93V 9.18V (5). 16.31V 15.75V
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)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). 439.00V 487.00V (2). 435.00V 503.00V (3). 439.00V 483.00V (4). 439.00V 483.00V (5). 431.00V 483.00V (6). 435.00V 435.00V (7). 447.00V 467.00V
6	PFC Diode	D1	Rated : 600V 15.0A	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). 409.00V 409.00V (2). 409.00V 417.00V (3). 413.00V 417.00V (4). 409.00V 417.00V

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: 6.67mA I/P-FG: 6.10mA O/P-FG: 7.84mA 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: 8.9GΩ I/P-FG: 4.7GΩ O/P-FG: 30GΩ 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
		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-240-24 1. ROOM AMBIENT BURN-IN : 1.0hrs 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>49.1°C</td><td>69.9°C</td></tr> <tr><td>2</td><td>BD1</td><td>44.9°C</td><td>66.0°C</td></tr> <tr><td>3</td><td>L2</td><td>92.3°C</td><td>106.5°C</td></tr> <tr><td>4</td><td>C10</td><td>53.9°C</td><td>74.4°C</td></tr> <tr><td>5</td><td>C11</td><td>55.4°C</td><td>76.1°C</td></tr> <tr><td>6</td><td>Q2</td><td>49.7°C</td><td>71.6°C</td></tr> <tr><td>7</td><td>RTH2</td><td>52.5°C</td><td>73.6°C</td></tr> <tr><td>8</td><td>Q901</td><td>51.3°C</td><td>72.6°C</td></tr> <tr><td>9</td><td>T2</td><td>61.9°C</td><td>82.7°C</td></tr> <tr><td>10</td><td>L1</td><td>51.2°C</td><td>72.9°C</td></tr> <tr><td>11</td><td>C5</td><td>57.2°C</td><td>78.0°C</td></tr> <tr><td>12</td><td>ZNR1</td><td>50.1°C</td><td>72.0°C</td></tr> <tr><td>13</td><td>Q35</td><td>54.5°C</td><td>76.5°C</td></tr> <tr><td>14</td><td>C46</td><td>63.1°C</td><td>84.4°C</td></tr> <tr><td>15</td><td>C54</td><td>79.2°C</td><td>100.0°C</td></tr> <tr><td>16</td><td>RTH3</td><td>54.9°C</td><td>75.9°C</td></tr> <tr><td>17</td><td>U1</td><td>48.3°C</td><td>70.9°C</td></tr> <tr><td>18</td><td>U901</td><td>66.2°C</td><td>84.5°C</td></tr> <tr><td>19</td><td>T1</td><td>68.8°C</td><td>89.4°C</td></tr> <tr><td>20</td><td>D103</td><td>49.1°C</td><td>72.7°C</td></tr> <tr><td>21</td><td>D104</td><td>68.1°C</td><td>88.9°C</td></tr> </tbody> </table>	CH.	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50 °C	1	C1	49.1°C	69.9°C	2	BD1	44.9°C	66.0°C	3	L2	92.3°C	106.5°C	4	C10	53.9°C	74.4°C	5	C11	55.4°C	76.1°C	6	Q2	49.7°C	71.6°C	7	RTH2	52.5°C	73.6°C	8	Q901	51.3°C	72.6°C	9	T2	61.9°C	82.7°C	10	L1	51.2°C	72.9°C	11	C5	57.2°C	78.0°C	12	ZNR1	50.1°C	72.0°C	13	Q35	54.5°C	76.5°C	14	C46	63.1°C	84.4°C	15	C54	79.2°C	100.0°C	16	RTH3	54.9°C	75.9°C	17	U1	48.3°C	70.9°C	18	U901	66.2°C	84.5°C	19	T1	68.8°C	89.4°C	20	D103	49.1°C	72.7°C	21	D104	68.1°C	88.9°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 112.0% 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	±0.01% /°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-240-24 :SUPPOSE C109 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). 724958 HRS (2). 151371 HRS (3). 242026 HRS (4). 330309 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1573.4K 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	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT ZENG