



# Test Report: LRS-200-48

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200W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

## ■ SAFETY TEST

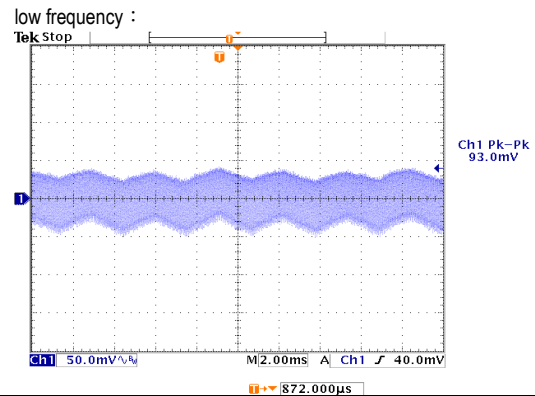
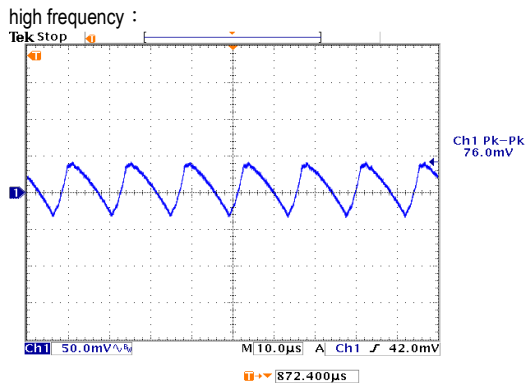
## ■ RELIABILITY TEST

ENVIRONMENT TEST

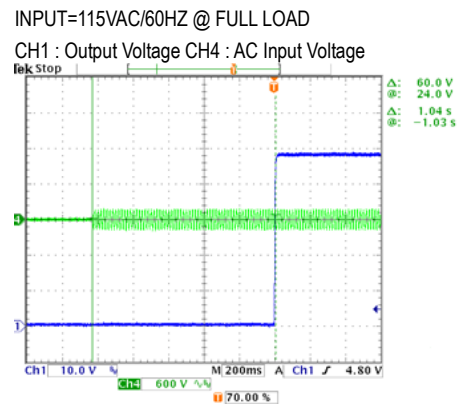
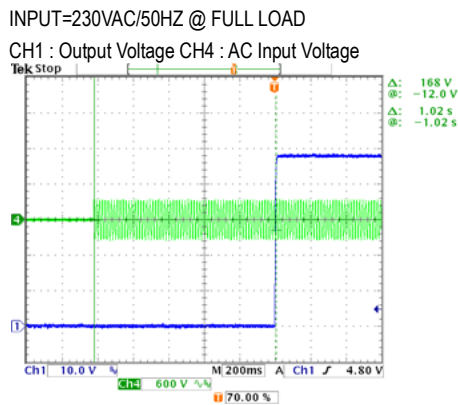
## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 43.2~ 52.8V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	42.673V~56.184V/230VAC 42.612V~56.151V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1%~ 1%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:- 0.031%~ 0.031%
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.031%~0.031%
4	LOAD REGULATION(Max)	V1:-0.5%~ 0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.031%~ 0.031%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%
6	RIPPLE & NOISE(Max)	V1: 200mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 93mVp-p



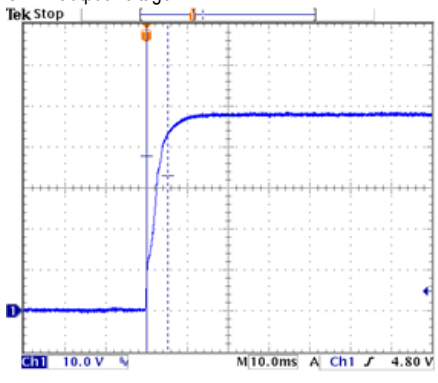
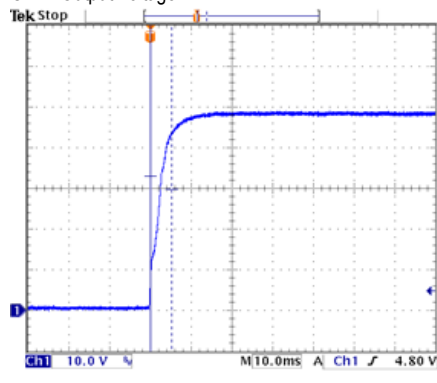
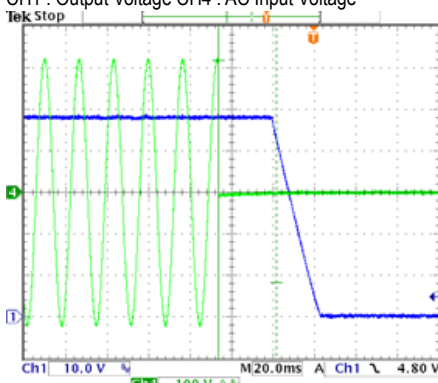
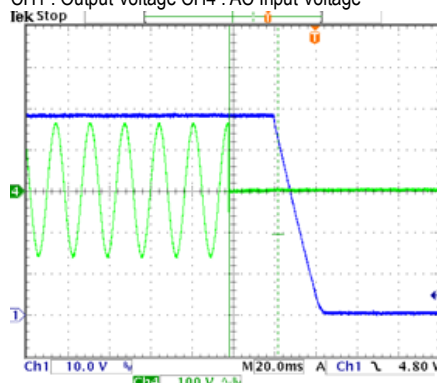
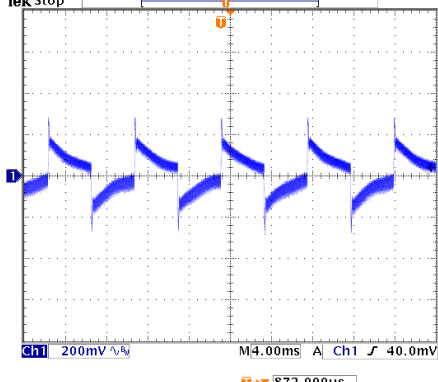
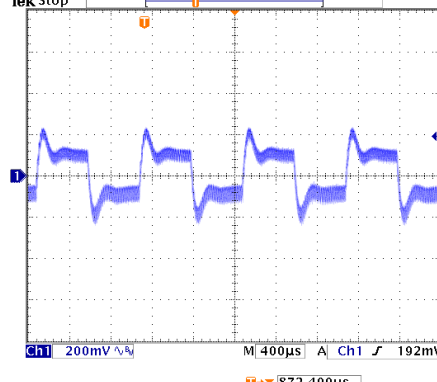
7	SET UP TIME(Max)	230VAC/1500ms 115VAC/ 1500ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 1024ms 115VAC/ 1040ms
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200W Single Output Switching Power Supply

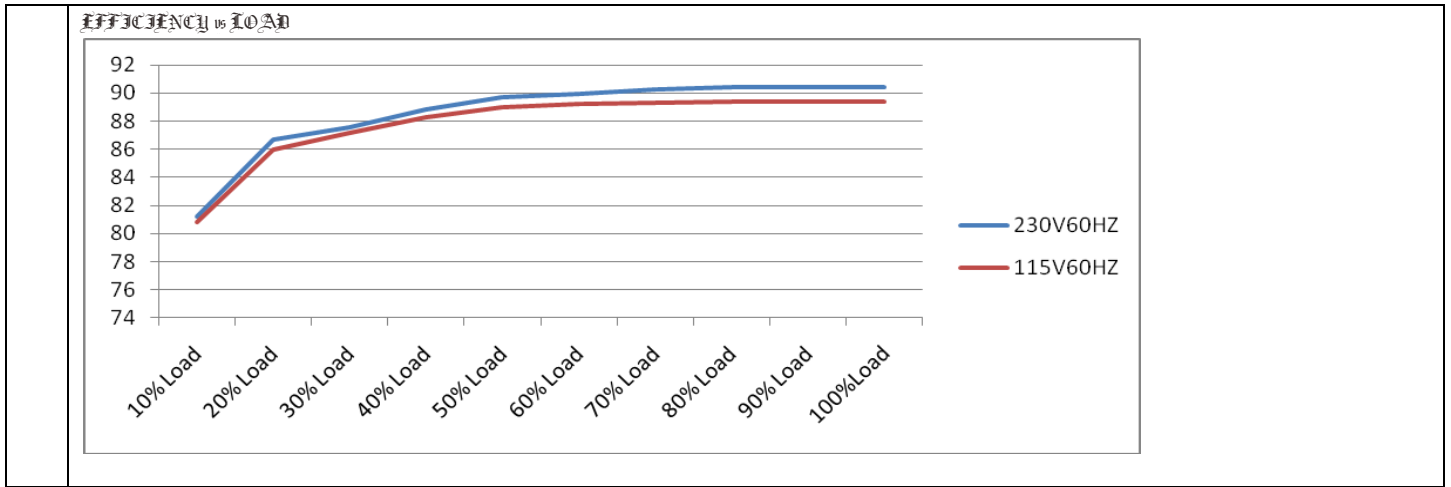
LRS-200 series

8	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/5.20ms 115VAC/5.20ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p> 		
9	HOLD UP TIME(Typ )	230VAC/ 16ms 115VAC/ 12ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 28.0ms 115VAC/ 23.6ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH4 : AC Input Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH4 : AC Input Voltage</p> 		
10	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	568mVp-p 464mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p> 		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p> 		



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 132VAC / 180 ~ 264VAC by switch 240 ~ 370VDC (switch on 230VAC)	I/P:TESTING O/P:FULL LOAD Ta:25°C  I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS ( POWER ON/OFF NO DAMAGE )	81V~132V 167V~264V 229VDC ~ 370VDC(switch on 230VAC)  TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 180 VAC ~264 VAC 90 VAC ~132 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ)	230V/ 2.2A 115V/ 4A	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I =2.02A/ 230VAC I =3.70A/ 115VAC
4	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P: 240 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.495mA N-FG: 0.495mA
5	NO LOAD CONSUMPTION	< 0.75 W	I/P: 115VAC I/P: 230VAC O/P: NO LOAD Ta: 25°C	< 0.73W < 0.68W
6	INRUSH CURRENT(Typ)	230V/ 60A 115V/ 60A COLD START	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I =50.8A/ 230VAC I =47.2A/ 115VAC
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2 : Input current (1V=1A) CH4 : AC Input Voltage</p> <p>Ch2 Max 50.8 V</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/50HZ @ FULL LOAD</p> <p>CH2 : Input current (1V=1A) CH4 : AC Input Voltage</p> <p>Ch2 Max 47.2 V</p> </div> </div>				
7	EFFICIENCY(Typ)	90%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.42%



### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110 %~ 140 %	I/P: 230VAC I/P: 115VAC O/P: TESTING Ta: 25°C	128.18%/ 230VAC 126.13%/115VAC Shut down and latch off o/p voltage, re-power on to recover
2	OVER VOLTAGE PROTECTION	CH: 55.2 V~ 64.8 V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	60.5V/ 230VAC 61.3V/115VAC Shut down and latch off o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down and latch off o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Shut down and latch off o/p voltage, re-power on to recover

## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	Q 1 Rated 15A/650V	I/P:High-Line +3V =267V O/P: (1)Full Load Turn on (2)Dynamic Load 100% Load/ Min. Load 90%Duty/5KHz (2)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	(1)412V (2)398V (3)402V
2	<b>Diode Peak Voltage</b>	Q102 Rated 20 A/300V  Q103 Rated 10A/400V	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2)Output Short Ta:25°C	Q101: (1)154V (2)243V  Q103: (1)326V (2)334V
3	<b>Input Capacitor Voltage</b>	C5 Rated: 330 $\mu$ / 200V	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25°C	(1)178V (2)178V (3)180V
4	<b>Control IC Voltage Test</b>	PWM IC U1 Rated 28 V (MAX.) 10V (MIN.)	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Output short (3)No load VR ( min ) Ta:25°C	U1 (1) 20.5V (2) 19.6V (3) 20.1V

## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75 KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	/P-O/P: 2.48mA I/P-FG: 3.33mA O/P-FG:2.66 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 9999M $\Omega$ I/P-FG: 9999M $\Omega$ O/P-FG: 9999M $\Omega$ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m $\Omega$	40A / 2min Ta:25°C	24 m $\Omega$

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EN55032 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
2	RADIATION	EN55032 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
4	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																
1	TEMPERATURE RISE TEST	MODEL: LRS-200-24 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=24.6°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=48.6°C																																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.6 °C</th> <th>HIGH AMBIENT Ta=40.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>U1</td><td>58.3°C</td><td>79.7°C</td></tr> <tr><td>2</td><td>LF1</td><td>50.5°C</td><td>73.3°C</td></tr> <tr><td>3</td><td>BD1</td><td>54.0°C</td><td>75.8°C</td></tr> <tr><td>4</td><td>C36</td><td>62.8°C</td><td>86.5°C</td></tr> <tr><td>5</td><td>C5</td><td>59.3°C</td><td>80.1°C</td></tr> <tr><td>6</td><td>C6</td><td>60.1°C</td><td>80.6°C</td></tr> <tr><td>7</td><td>T2</td><td>59.2°C</td><td>81.1°C</td></tr> <tr><td>8</td><td>Q1</td><td>64.5°C</td><td>88.4°C</td></tr> <tr><td>9</td><td>Q2</td><td>60.4°C</td><td>83.9°C</td></tr> <tr><td>10</td><td>T1coil</td><td>85.4°C</td><td>108.6°C</td></tr> <tr><td>11</td><td>RTH3</td><td>79.2°C</td><td>102.2°C</td></tr> <tr><td>12</td><td>L100</td><td>84.3°C</td><td>108.8°C</td></tr> <tr><td>13</td><td>C106</td><td>49.5°C</td><td>73.9°C</td></tr> <tr><td>14</td><td>Q102</td><td>68.0°C</td><td>89.7°C</td></tr> <tr><td>15</td><td>Q103</td><td>71.7°C</td><td>93.7°C</td></tr> <tr><td>16</td><td>C201</td><td>56.7°C</td><td>80.2°C</td></tr> <tr><td>17</td><td>C200</td><td>64.6°C</td><td>88.1°C</td></tr> <tr><td>18</td><td>L101</td><td>65.9°C</td><td>88.5°C</td></tr> <tr><td>19</td><td>RTH1</td><td>86.7°C</td><td>106.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 24.6 °C	HIGH AMBIENT Ta=40.8 °C	1	U1	58.3°C	79.7°C	2	LF1	50.5°C	73.3°C	3	BD1	54.0°C	75.8°C	4	C36	62.8°C	86.5°C	5	C5	59.3°C	80.1°C	6	C6	60.1°C	80.6°C	7	T2	59.2°C	81.1°C	8	Q1	64.5°C	88.4°C	9	Q2	60.4°C	83.9°C	10	T1coil	85.4°C	108.6°C	11	RTH3	79.2°C	102.2°C	12	L100	84.3°C	108.8°C	13	C106	49.5°C	73.9°C	14	Q102	68.0°C	89.7°C	15	Q103	71.7°C	93.7°C	16	C201	56.7°C	80.2°C	17	C200	64.6°C	88.1°C	18	L101	65.9°C	88.5°C	19	RTH1	86.7°C	106.9°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P: 230 VAC O/P: 125% LOAD Ta: 25°C	TEST: OK																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/100VAC O/P: 100 % LOAD Ta= -25 °C	TEST: OK																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P: 272 VAC O/P: FULL LOAD Ta= 50 °C HUMIDITY= 95%R.H	TEST: OK																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P: 230 VAC O/P: FULL LOAD	±0.005%/°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		OK																																																																																





200W Single Output Switching Power Supply

# LRS-200 series

7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -25°C ~ 70°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10min/sweep cycle (4) Acceleration: 5G (5) Test Time: 60min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C106 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: 75% LOAD Ta= 50 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 50 °C LIFE TIME	(1) 553675HRS (2) 93919HRS (3) 138388HRS (4) 183951HRS
10	MTBF	2346.6K hrs min. Telcordia SR-332 (Bellcore) ; 279.4Khrs min. MIL-HDBK-217F (25°C)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C	

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ