



Test Report: LRS-350 N2-12

350W Single Output High Peak Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

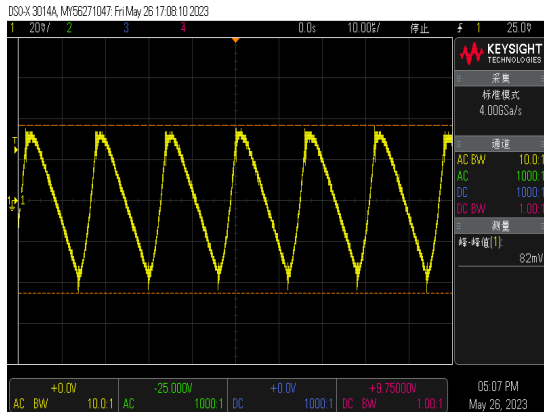
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

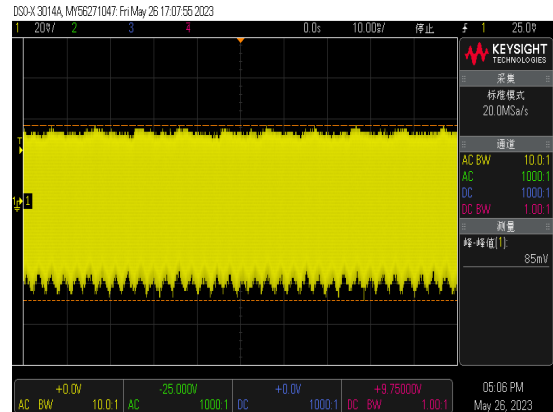
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.2 V ~ 13.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	9.63V~14.04V/230VAC 9.63V~14.04V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.5%~ +1.5 %	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.0 %~0.5 %
3	LINE REGULATION	V1: -0.5 %~ +0.5 %	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.08%~ 0%
4	LOAD REGULATION	V1: 1.0%~ +01.0%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.17%~ 0.25%
5	OVER/UNDERSHOOT TEST	<± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	1.67 %
6	RIPPLE & NOISE (Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 85 mVp-p

high frequency :



low frequency :



7	SET UP TIME(Max) 230VAC/1300ms 115VAC/1300ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/1120 ms 115VAC/ 1130ms
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	
8	RISE TIME (Max) 230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/3.2 ms 115VAC/ 3.4ms
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD 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/ 30ms 115VAC/ 19ms
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	

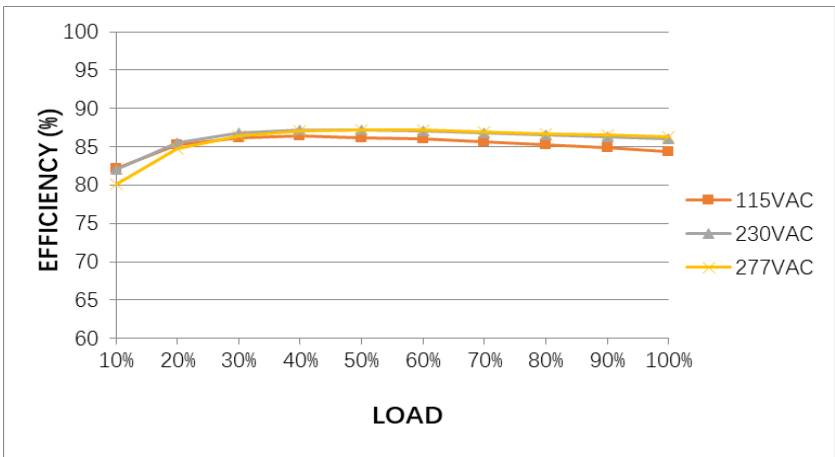
10	DYNAMIC LOAD	V1: 1200mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	257mVp-p 181mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>		

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)	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1) 90 V~ 264V (2) 240Vdc~370Vdc/FULL LOAD 240Vdc~370Vdc/50% LOAD (4) 240Vdc~370Vdc/FULL LOAD 240Vdc~370Vdc/50% LOAD TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:90 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/3.8A 115V/ 6.8 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =3.35A/ 230VAC I =6.22A/ 115VAC
4	LEAKAGE CURRENT	< 2mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.204mA N-FG : 0.206 mA

5	NO CONSUMPTION	LOAD < 1W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	0.70W/115VAC 0.75W/230VAC
6	EFFICIENCY(Typ.)	85%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	85.99 %

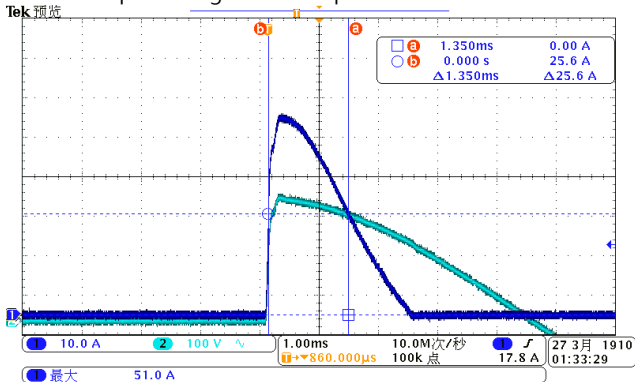
EFFICIENCY vs LOAD



7	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 =51.0A/ 230VAC I =50.2A/ 115VAC T50=1350us/230V
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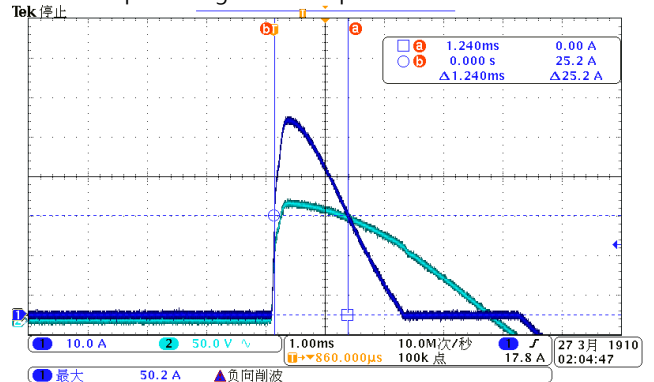
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current

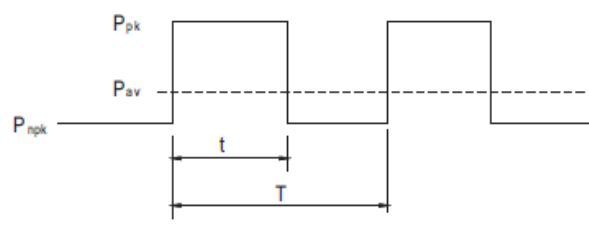


INPUT=115VAC/60HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current



FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PEAK POWER	I/P: 230 VAC O/P: PEAK LOAD (1Hour NO DAMAGE) Ta: 25°C Test Result : PASS Function Manual 1. Peak Power $P_{av} = \frac{P_{pk} \times t + P_{ngk} \times (T-t)}{T} \leq P_{rated}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t \leq 5 \text{ sec}$ 		P _{av} : Average output power (W) P _{pk} : Peak output power (W) P _{ngk} : Non-peak output power(W) P _{rated} : Rated output power(W) t : Peak power width(sec) T : Period(sec)

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105 %~ 200%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	122.07%/ 264VAC 122.07%/ 230VAC 122.06%/100VAC PROTECTION TYPE : Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover. 222.84%/ 264VAC 220.69%/ 230VAC 218.92%/100VAC PROTECTION TYPE : Ouput power >200% rated, hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.8V~16.2V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta: 25°C	15.6V/ 264VAC 16.0V/ 230VAC 16.0V/ 90VAC PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recaver.

3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P:FULL LOAD	O.T.P. Active Protection type : Shut down and latch off o/p voltage, re-power on to recover.
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COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated 20A/650 V	AC ON/OFF I/P:High-Line +3V =300V VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)PEAK LOAD I/P:Low-Line -3V = 97V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz() (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)PEAK LOAD Ta:25°C	300VAC VDS: (1) 600V (2) 571V (3) 587V (4) 583V (5) 591V (6) 599V 97VAC VDS: (1) 442V (2) 470V (3) 434V (4) 430V (5) 434V (6) 438V (7) 470V (8) 458V

2	Diode Peak Voltage	<p>D101 Rated 40A/ 100V</p> <p>D103 Rated 40A/100V</p>	<p>AC ON/OFF I/P:High-Line +3V =300 V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD</p> <p>Ta:25°C</p>	<p>D101: VDS: (1) 94.9V (2) 95.7V (3) 97.3V (4) 95.7V (5) 95.7V (6) 91.7V (7) 91.7V (8) 94.9V</p> <p>D103: VDS: (1) 94.9V (2) 95.7V (3) 98.9V (4) 98.1V (5) 98.1V (6) 98.9V (7) 95.7V (8) 96.5V</p>
3	Input Capacitor Voltage	<p>C5 Rated: 680uF / 200 V Surge voltage: 250V</p>	<p>I/P:High-Line +3V =300V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue</p> <p>Ta:25°C</p>	<p>(1)224V (2)212V (3)214V (4)210V</p>
4	Control IC Voltage Test	<p>U1 Rated 10 V~ 28 V</p>	<p>AC ON/OFF I/P:High-Line +3V =300V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(Low LINE)</p> <p>Ta:25°C</p>	<p>(1) 19.3V (2) 19.9V (3) 19.3V (4) 18.7V (5) 19.3V</p>

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC/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	I/P-O/P:3.19mA I/P-FG:2.71mA O/P-FG:3.43m A 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: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:>9999 MΩ I/P-FG: >9999MΩ O/P-FG: >9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	6 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
2	RADIATION	EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL 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-350N2-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 26.2 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 51.1 °C																																																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=26.2 °C</th> <th>HIGH AMBIENT Ta=51.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>RTH1</td><td>98.6°C</td><td>112.1°C</td></tr> <tr><td>2</td><td>RTH2</td><td>96.5°C</td><td>110.1°C</td></tr> <tr><td>3</td><td>BD1</td><td>50.8°C</td><td>73.4°C</td></tr> <tr><td>4</td><td>C6</td><td>36.7°C</td><td>60.3°C</td></tr> <tr><td>5</td><td>R23</td><td>33.7°C</td><td>58.8°C</td></tr> <tr><td>6</td><td>J6</td><td>60.7°C</td><td>83.8°C</td></tr> <tr><td>7</td><td>D10</td><td>35.0°C</td><td>60.0°C</td></tr> <tr><td>8</td><td>Q1</td><td>42.6°C</td><td>67.6°C</td></tr> <tr><td>9</td><td>Q2</td><td>42.4°C</td><td>67.5°C</td></tr> <tr><td>10</td><td>U1</td><td>33.6°C</td><td>58.2°C</td></tr> <tr><td>11</td><td>T1</td><td>71.5°C</td><td>96.4°C</td></tr> <tr><td>12</td><td>C37</td><td>34.1°C</td><td>58.8°C</td></tr> <tr><td>13</td><td>C200</td><td>42.8°C</td><td>67.0°C</td></tr> <tr><td>14</td><td>C201</td><td>46.7°C</td><td>71.2°C</td></tr> <tr><td>15</td><td>L100</td><td>69.9°C</td><td>94.9°C</td></tr> <tr><td>16</td><td>D102</td><td>57.7°C</td><td>80.3°C</td></tr> <tr><td>17</td><td>D103</td><td>74.5°C</td><td>96.2°C</td></tr> <tr><td>18</td><td>D104</td><td>74.6°C</td><td>96.4°C</td></tr> <tr><td>19</td><td>C106</td><td>54.1°C</td><td>78.6°C</td></tr> <tr><td>20</td><td>C107</td><td>48.9°C</td><td>72.8°C</td></tr> <tr><td>21</td><td>R112</td><td>75.7°C</td><td>99.3°C</td></tr> <tr><td>22</td><td>RTH3</td><td>55.3°C</td><td>80.1°C</td></tr> <tr><td>23</td><td>TC(D104)</td><td>58.2°C</td><td>79.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=26.2 °C	HIGH AMBIENT Ta=51.1 °C	1	RTH1	98.6°C	112.1°C	2	RTH2	96.5°C	110.1°C	3	BD1	50.8°C	73.4°C	4	C6	36.7°C	60.3°C	5	R23	33.7°C	58.8°C	6	J6	60.7°C	83.8°C	7	D10	35.0°C	60.0°C	8	Q1	42.6°C	67.6°C	9	Q2	42.4°C	67.5°C	10	U1	33.6°C	58.2°C	11	T1	71.5°C	96.4°C	12	C37	34.1°C	58.8°C	13	C200	42.8°C	67.0°C	14	C201	46.7°C	71.2°C	15	L100	69.9°C	94.9°C	16	D102	57.7°C	80.3°C	17	D103	74.5°C	96.2°C	18	D104	74.6°C	96.4°C	19	C106	54.1°C	78.6°C	20	C107	48.9°C	72.8°C	21	R112	75.7°C	99.3°C	22	RTH3	55.3°C	80.1°C	23	TC(D104)	58.2°C	79.7°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 124 * 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= -30/-25 °C	TEST : OK																																																																																																

4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C/95 %R.H 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	± 0.003 %/°C(0~50°C)
6	STORAGE TEMPERATURE TEST	-40~85°C	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 : 10 CYCLE 5. Input/Output condition : STATIC	
7	THERMAL SHOCK TEST	-25~50°C	1. Thermal shock Temperature : -30°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 : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test	
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
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) 533902HRS (2) 97034HRS (3) 174748HRS (4) 286493HRS	
10	MTBF	Conducted by Parts Stress Analysis Prediction 1857.9K hrs min. Telcordia SR-332 (Bellcore) ; 226.2K hrs min. MIL-HDBK-217F (25°C)		
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/HUANGMK	WENF	LINKX

2020.10.1 TAG-QA-009