



# Test Report:ERP-200-12

## 200W Single Output Switching Power Supply

### ■ DESIGN VERIFY TEST

- Output Function Test
- Input Function Test
- Protection Function Test
- Component Stress Test

### ■ SAFETY & E.M.C. TEST

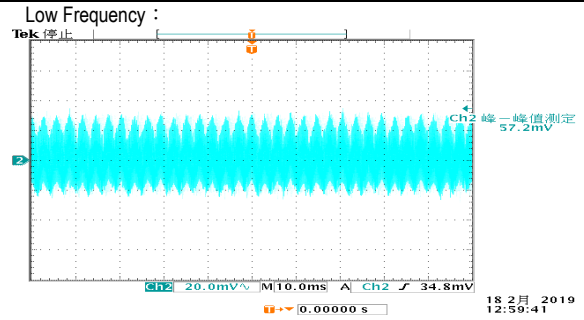
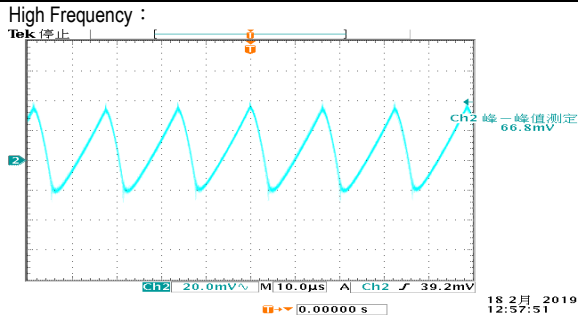
- Safety Test
- E.M.C. Test

### ■ RELIABILITY TEST

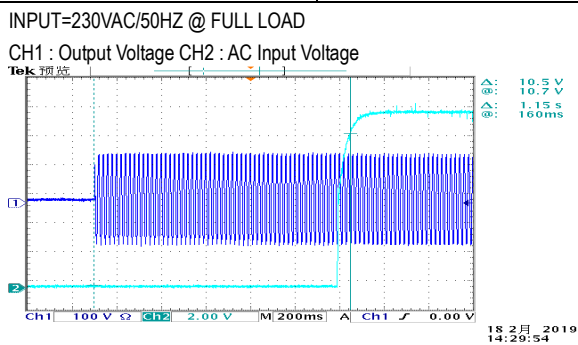
- Environment Test

### OUTPUT FUNCTION TEST

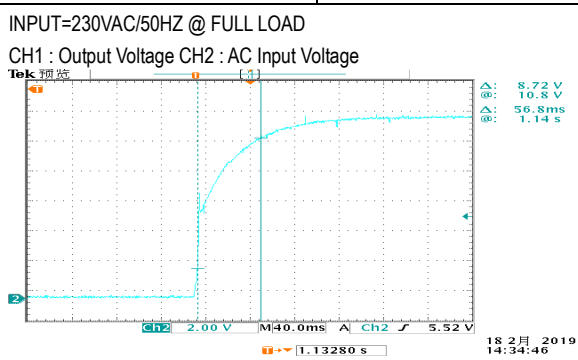
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.8 V~ 13.2 V	I/P: 230 VAC O/P:MIN LOAD Ta:25°C	10.22V~13.29 V/230VAC	PASS
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.0%~ 1.0 %	I/P: 180 VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25°C	V1: -0.05%~ 0.095%	PASS
3	LINE REGULATION	V1: -0.5%~ 0.5 %	I/P: 180 VAC ~ 264 VAC O/P:FULL LOAD Ta:25°C	V1: -0.083%~ 0.083%	PASS
4	LOAD REGULATION	V1: -0.5%~ 0.5 %	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.167 %~ +0.25%	PASS
5	RIPPLE & NOISE	V1: 150 mVp-p	I/P: 230 VAC O/P:(1) FULL LOAD (2) 0%~100% LOAD Ta:25°C	(1) <u>66.8</u> mVp-p (2) <u>57.2</u> mVp-p	PASS



6	SET UP TIME	230VAC/1500 ms (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	230 VAC/ 1150 ms	PASS
---	-------------	----------------------	--	------------------	------



7	RISE TIME	230VAC/ 200 ms (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	230 VAC/ 56.8 ms	PASS
---	-----------	----------------------	--	------------------	------

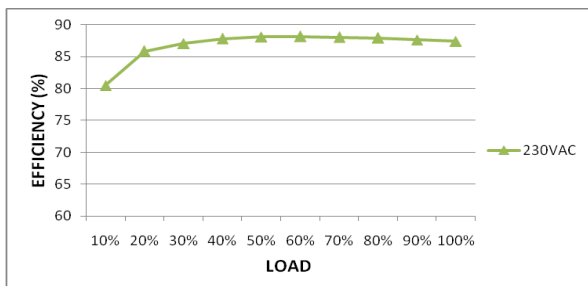


8	HOLD UP TIME	230VAC/ 20 ms (Typ)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 42.4 ms	PASS
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>					
9	OVER/UNDERSHOOT TEST	< ± 5 %	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: 2.006 %	PASS
10	DYNAMIC LOAD	V1: 1200mVp-p	I/P : 230 VAC (1)O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2)O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3)O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4)O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 458mVp-p (2) 320 mVp-p (3) 288mVp-p (4) 480mVp-p	PASS

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180 VAC~ 264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	177 V~ 300 V	PASS
			(1)I/P: LOW-LINE-3V= 177 V HIGH-LINE+15%= 300 V O/P:FULL /MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (2) I/P:230VAC ON: 2.5 Sec . OFF: 2.5 Sec 20MIN ( AC POWER ON/OFF NO DAMAGE )	TEST: (1) OK (2) OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ	I/P: 180 VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK	PASS
3	EFFICIENCY	87% (Typ)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	87.425%	PASS

EFFICIENCY vs LOAD



4	INPUT CURRENT	230 V/ 4.0 A (Typ)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 1.73 A/ 230VAC	PASS
5	INRUSH CURRENT	230 V/90 A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 46.9A/ 230VAC	PASS
<p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current</p>					
6	LEAKAGE CURRENT	< 1 mA / 240VAC	I/P: 264 VAC O/P:NO LOAD Ta:25°C	L-FG: 0.6533 mA N-FG: 0.6518 mA	PASS

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110 %~ 140% RATED OUTPUT POWER	I/P: 180 VAC I/P: 230 VAC I/P: 264 VAC O/P:TESTING Ta:25°C	116.96%/ 180 VAC 116.92 %/ 230VAC 117.73%/ 264 VAC ■ Protection type :Constant current limiting, recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1: 13.8 V~ 16.2V	I/P: 180 VAC I/P: 230 VAC I/P: 264 VAC O/P:MIN LOAD Ta:25°C	14.78V/180 VAC 14.87V/ 230VAC 14.89V/264 VAC ■ Protection type : Hiccup mode, recovers automatically after fault condition is removed	PASS
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P:FULL LOAD	O.T.P. Active: OK ■ Protection type :Shut down o/p voltage · recovers automatically after temperature goes down	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE OK ■ Hiccup mode, recovers automatically after fault condition is removed	PASS

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q2 Rated : 650V /15A	I/P: High-Line +3V =267 V O/P: (1)Full Load input on/off (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	VDS (1) 552V/6.52A (2) 570V/8.68A (3) 550V/6.48A (4)558V/6.60 A (5) 552V/6.4 A	PASS

			<p>(6)Dynamic Load Full Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8) NO LOAD (9) 200% Load 开机</p> <p>I/P: Low-Line -3V = 177 V O/P: (1)Full Load input on/off (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 Full Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8) NO LOAD (9) 200% Load 开机</p>	<p>(6) 552V/6.56A (7) 570V/8.6A (8) 488V/4.76A (9) 558V/8.56A</p> <p>VDS (1) 404V/5.34A (2) 444V/6.88A (3) 398V/5.32A (4) 398V/5.34A (5) 400V/5.32A (6) 408V/5.32A (7)448V /6.84A (8) 330V/3.50A (9) 434V/6.80A</p>																							
2	Diode Peak Voltage	D102/D103 Rated D102: 100V/ 20A D103 :150V/ 30A	<p>I/P: High-Line +3V = 267 V O/P: (1)Full Load input on/off (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 Full Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8) NO LOAD (9)200% Load 开机</p>	<table border="1"> <tr> <td>D102</td> <td>D103</td> </tr> <tr> <td>VDS</td> <td>VDS</td> </tr> <tr> <td>(1) 69.6V</td> <td>76.4V</td> </tr> <tr> <td>(2) 68.4 V</td> <td>72.4V</td> </tr> <tr> <td>(3) 68.0V</td> <td>76.8V</td> </tr> <tr> <td>(4)68.0 V</td> <td>75.6V</td> </tr> <tr> <td>(5) 66.8 V</td> <td>77.6V</td> </tr> <tr> <td>(6) 66.4 V</td> <td>77.6V</td> </tr> <tr> <td>(7)66.8 V</td> <td>77.2V</td> </tr> <tr> <td>(8) 64. V</td> <td>75.6V</td> </tr> <tr> <td>(9)66.8V</td> <td>73.2V</td> </tr> </table>	D102	D103	VDS	VDS	(1) 69.6V	76.4V	(2) 68.4 V	72.4V	(3) 68.0V	76.8V	(4)68.0 V	75.6V	(5) 66.8 V	77.6V	(6) 66.4 V	77.6V	(7)66.8 V	77.2V	(8) 64. V	75.6V	(9)66.8V	73.2V	PASS
D102	D103																										
VDS	VDS																										
(1) 69.6V	76.4V																										
(2) 68.4 V	72.4V																										
(3) 68.0V	76.8V																										
(4)68.0 V	75.6V																										
(5) 66.8 V	77.6V																										
(6) 66.4 V	77.6V																										
(7)66.8 V	77.2V																										
(8) 64. V	75.6V																										
(9)66.8V	73.2V																										
3	Clamp Diode Peak Voltage	D11 Rated 600 V 1 A	<p>I/P: High-Line +3V = 267 V O/P: (1)Full Load input on/off (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 Full Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8) NO LOAD (9) 200% Load 开机</p> <p>Ta:25°C</p>	<p>(1) 372V (2) 372V (3) 384V (4) 374V (5) 372V (6) 388V (7) 376V (8) 376V (9) 376V</p>	PASS																						
4	Input Capacitor Voltage	C5 Rated 120u F/ 400V	<p>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</p>	<p>(1) 372 V (2) 352 V (3) 354 V</p>	PASS																						

			(4)Full load continue Ta:25°C	(4) 356V	
5	Control IC Voltage Test	U1 Rated 30 V U101 Rated 30V	I/P: High-Line +3V = 267 V O/P:(1).FULL LOAD (2). Output Short (3).O.L.P (4).O.V.P. (5).NO LOAD VR 下限.LOW LINE (6)No/FULL LOAD 切换 Ta:25°C	U1 U101 (1) 21.0V 13.0V (2) 21.0V 1.65V (3) 21.0V 1.86V (4) 19.2V 14.0V (5) 19.3V 9.24V (6) 19.4V 13.0V	PASS
6	VCC Diode Peak Voltage	D30 Rated: :1A/400V D200 Rated: :1A/200V	I/P: High-Line +3V = 267VAC O/P: (1) 100%Load input on/off (2) Output Short (3) NO Load (4) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz	D30 D200 (1) 146V 120V (2) 163V 13.9V (3) 110V 93.2V (4) 149V 119V	PASS

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	AERDICT
1	WITHSTAND AOLTAGE	I/P-FG: 2.0 KAC/min I/P-O/P: 3.0 KAC/min O/P-FG: 0.5 KAC/min EN 60950-1	I/P-FG: 2.4 KAC/min I/P-O/P: 3.6 KAC/min O/P-FG: 0.6 KAC/min Ta:25°C	I/P-FG: 3.713 mA I/P-O/P: 3.284mA O/P-FG: 3.003mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-FG: 500ADC>100MΩ I/P-O/P:500ADC>100MΩ O/P-FG:500ADC>100MΩ	I/P-FG: 500 ADC I/P-O/P: 500 ADC O/P-FG: 500 ADC Ta:25°C	I/P-FG: >9999 MΩ I/P-O/P: >9999 MΩ O/P-FG: >9999 MΩ NO DAMAGE	PASS
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ EN 60950-1	40 A / 2 min Ta:25°C	10 mΩ	PASS

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	AERDICT
1	CONDUCTION	EN55022  CLASS A	I/P:230 AAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	PASS
2	RADIATION	EN55022  CLASS A	I/P: 230 AAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	PASS
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY Contact:4KV	I/P: 230 AAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 AAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
5	SURGE	EN61000-4-5 INDUSTRY L-N :1KV L,N-PE:2KV	I/P: 230 AAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
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 : ERP-200-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=29.3°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=40.0°C																																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=29.3 °C</th> <th>HIGH AMBIENT Ta=40.0 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZNR1</td><td>63.9°C</td><td>70.7°C</td></tr> <tr><td>2</td><td>C1</td><td>65.0°C</td><td>72.9°C</td></tr> <tr><td>3</td><td>LF1</td><td>75.1°C</td><td>82.4°C</td></tr> <tr><td>4</td><td>BD1</td><td>80.4°C</td><td>88.2°C</td></tr> <tr><td>5</td><td>RTH1</td><td>110.2°C</td><td>115.0°C</td></tr> <tr><td>6</td><td>C6</td><td>84.7°C</td><td>92.6°C</td></tr> <tr><td>7</td><td>Q1</td><td>87.8°C</td><td>95.9°C</td></tr> <tr><td>8</td><td>Q2</td><td>87.5°C</td><td>95.3°C</td></tr> <tr><td>9</td><td>C37</td><td>85.2°C</td><td>93.2°C</td></tr> <tr><td>10</td><td>D10</td><td>84.3°C</td><td>91.8°C</td></tr> <tr><td>11</td><td>R18</td><td>90.8°C</td><td>98.9°C</td></tr> <tr><td>12</td><td>U1</td><td>82.4°C</td><td>89.4°C</td></tr> <tr><td>13</td><td>T1</td><td>97.5°C</td><td>106.0°C</td></tr> <tr><td>14</td><td>D102</td><td>104.1°C</td><td>110.4°C</td></tr> <tr><td>15</td><td>D103</td><td>97.2°C</td><td>104.8°C</td></tr> <tr><td>16</td><td>C201</td><td>77.5°C</td><td>85.4°C</td></tr> <tr><td>17</td><td>L100</td><td>94.8°C</td><td>103.4°C</td></tr> <tr><td>18</td><td>C105</td><td>78.3°C</td><td>86.3°C</td></tr> <tr><td>19</td><td>C106</td><td>75.4°C</td><td>82.0°C</td></tr> <tr><td>20</td><td>D104</td><td>90.6°C</td><td>98.5°C</td></tr> <tr><td>21</td><td>TSW1</td><td>86.2°C</td><td>92.3°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=29.3 °C	HIGH AMBIENT Ta=40.0 °C	1	ZNR1	63.9°C	70.7°C	2	C1	65.0°C	72.9°C	3	LF1	75.1°C	82.4°C	4	BD1	80.4°C	88.2°C	5	RTH1	110.2°C	115.0°C	6	C6	84.7°C	92.6°C	7	Q1	87.8°C	95.9°C	8	Q2	87.5°C	95.3°C	9	C37	85.2°C	93.2°C	10	D10	84.3°C	91.8°C	11	R18	90.8°C	98.9°C	12	U1	82.4°C	89.4°C	13	T1	97.5°C	106.0°C	14	D102	104.1°C	110.4°C	15	D103	97.2°C	104.8°C	16	C201	77.5°C	85.4°C	17	L100	94.8°C	103.4°C	18	C105	78.3°C	86.3°C	19	C106	75.4°C	82.0°C	20	D104	90.6°C	98.5°C	21	TSW1	86.2°C	92.3°C
NO	Position	ROOM AMBIENT Ta=29.3 °C	HIGH AMBIENT Ta=40.0 °C																																																																																									
1	ZNR1	63.9°C	70.7°C																																																																																									
2	C1	65.0°C	72.9°C																																																																																									
3	LF1	75.1°C	82.4°C																																																																																									
4	BD1	80.4°C	88.2°C																																																																																									
5	RTH1	110.2°C	115.0°C																																																																																									
6	C6	84.7°C	92.6°C																																																																																									
7	Q1	87.8°C	95.9°C																																																																																									
8	Q2	87.5°C	95.3°C																																																																																									
9	C37	85.2°C	93.2°C																																																																																									
10	D10	84.3°C	91.8°C																																																																																									
11	R18	90.8°C	98.9°C																																																																																									
12	U1	82.4°C	89.4°C																																																																																									
13	T1	97.5°C	106.0°C																																																																																									
14	D102	104.1°C	110.4°C																																																																																									
15	D103	97.2°C	104.8°C																																																																																									
16	C201	77.5°C	85.4°C																																																																																									
17	L100	94.8°C	103.4°C																																																																																									
18	C105	78.3°C	86.3°C																																																																																									
19	C106	75.4°C	82.0°C																																																																																									
20	D104	90.6°C	98.5°C																																																																																									
21	TSW1	86.2°C	92.3°C																																																																																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/180VAC O/P : 100%/80% LOAD Ta= -35°C	TEST : OK																																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta=40°C HUMIDITY= 95 %R.H	TEST : OK																																																																																								
4	TEMPERATURE COEFFICIENT	±0.05 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.008 %/°C (0~50°C)																																																																																								
5	STORAGE TEMPERATURE TEST	-35°C~ +90°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 TEST : OK																																																																																									
6	THERMAL SHOCK TEST	-30~+40°C	1. Thermal shock Temperature : -35°C~ +45°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16CYCLE 5. Input/Output condition : 15cycle:230VAC/ FULL LOAD AC on 3 sec/AC off 1 sec TEST																																																																																									



			1cycle:230VAC/ FULL LOAD Burn In Test TEST : OK
7	VIBRATION TEST	10~ 500Hz, 3G 12min./1cycle, period for 72min. 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 : 4G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25°C TEST : OK
8	CAPACITOR LIFE CYCLE	ERP-200-12 : SUPPOSE C105 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= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 122927 HRS (2) 74113 HRS (3) 155875 HRS (4) 296160 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 2233.7K hrs min. Telcordia SR-332 (Bellcore) ; 262.9K hrs min. MIL-HDBK-217F (25°C)	
10	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=40°C Demonstration Mean Time Between Failure :30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/ZHOUB	WENF	LIUWY