



Test Report: LRS-150-12

150W 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

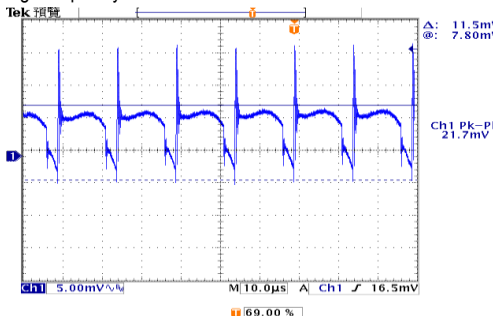
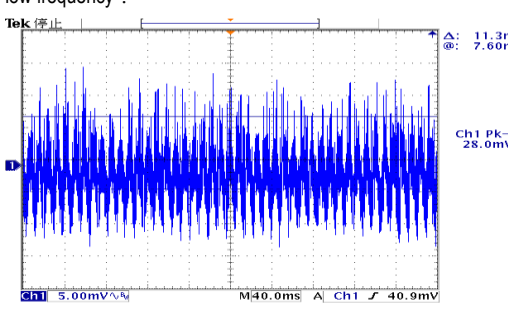
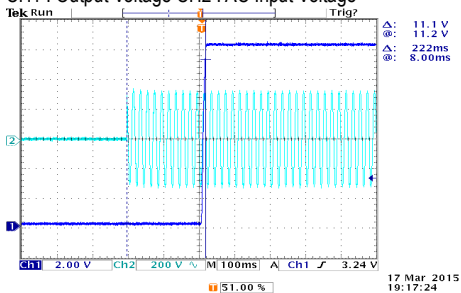
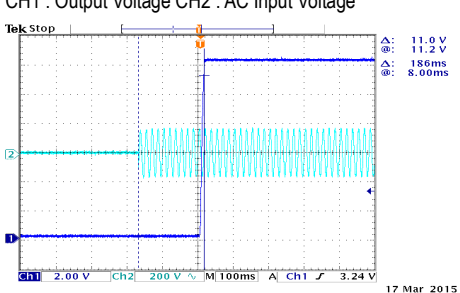
E.M.C. Test

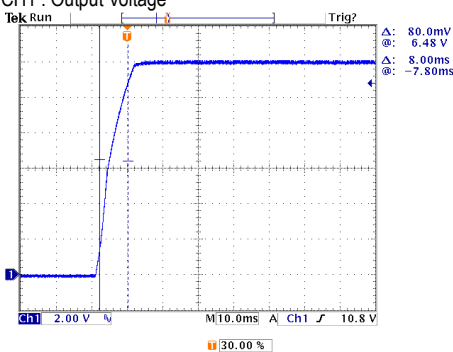
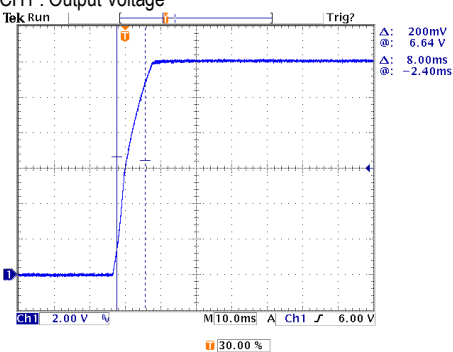
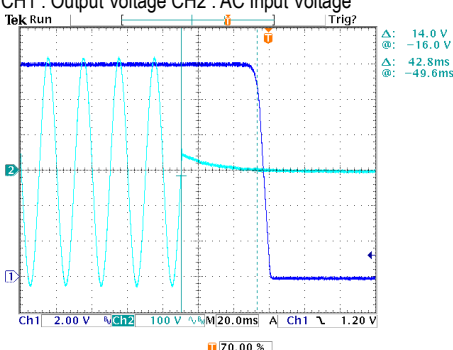
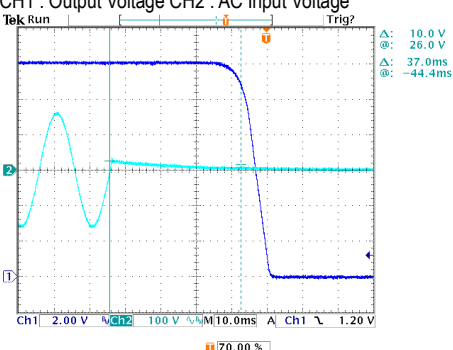
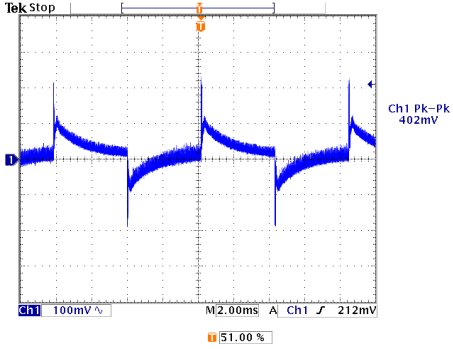
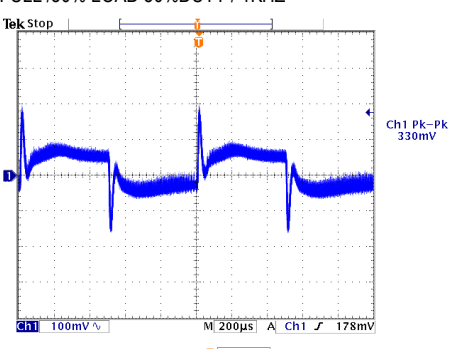
RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

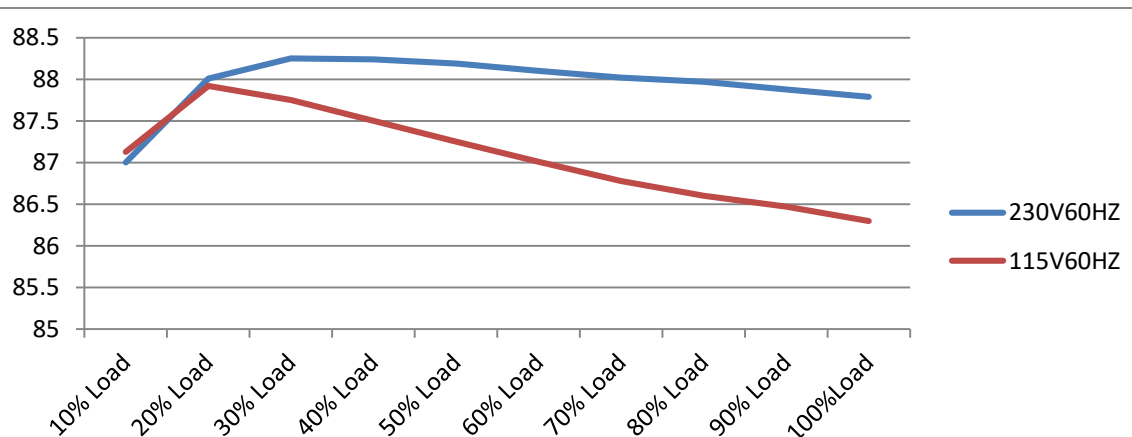
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.2 V~ 13.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	9.89V~14.24V/230VAC 9.89V~14.24V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1 %~ -1 %	I/P: 100~132VAC/200~264VAC by switch O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.08 %~0%
3	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 100~132VAC/200~264VAC by switch O/P:FULL LOAD Ta:25°C	V1: 0 %~0%
4	LOAD REGULATION(Max)	V1: 0.5 %~ -0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.08%~0%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5 %
6	RIPPLE & NOISE(Max)	V1: 150 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 28mVp-p
high frequency :  low frequency : 				
7	SET UP TIME(Max)	230VAC/500ms 115VAC/500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 222ms 115VAC/186ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 				

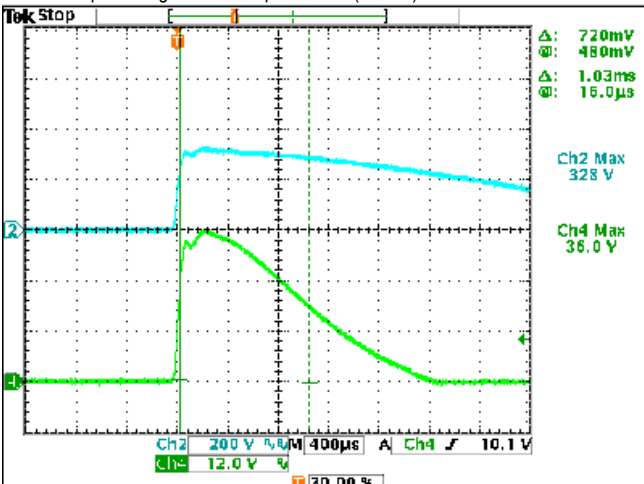
8	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 8ms 115VAC/ 8ms
INPUT=230VAC/50HZ @ FULL LOAD		INPUT=115VAC/60HZ @ FULL LOAD		
CH1 : Output Voltage		CH1 : Output Voltage		
				
9	HOLD UP TIME (Typ.)	230VAC/40ms 115VAC/35ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/42.8ms 115VAC/37ms
INPUT=230VAC/50HZ @ FULL LOAD		INPUT=115VAC/60HZ @ FULL LOAD		
CH1 : Output Voltage CH2 : AC Input Voltage		CH1 : Output Voltage CH2 : AC Input Voltage		
				
10	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	402mVp-p 330mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		
				
11	TRANSIENT RECOVERY TIME	V1: 1200 mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	207mVp-p 0us

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85~132VAC/170~264VAC by switch 240 ~ 370VDC (switch on 230VAC)	I/P:TESTING O/P:FULL LOAD Ta:25°C	78V~132V 131V~264V 230 ~ 370VDC (switch on 230VAC)
			I/P: (1)LOW-LINE-3V=82V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) 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)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:170 VAC ~264 VAC O/P:FULL ~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 1.7 A 115V/ 3.0 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.18A/ 230VAC I =2.34A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.450mA N-FG : 0.450mA
5	NO LOAD CONSUMPTION	< 0.5 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.2108W < 0.3891W
6	EFFICIENCY(Typ.)	87.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	87.79%

EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/60A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I=36A/ 230VAC T50= 1030us/230VAC
INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 				

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~ 140 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25°C	123.6%/ 264VAC 123.12%/ 230VAC 124.48%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.8 V~ 16.2 V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta:25°C	15.25V/ 264VAC 15.23V/ 230VAC 15.25V/ 85VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 264VAC I/P: 85VAC O/P: FULL LOAD	O.T.P. Active PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 85VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

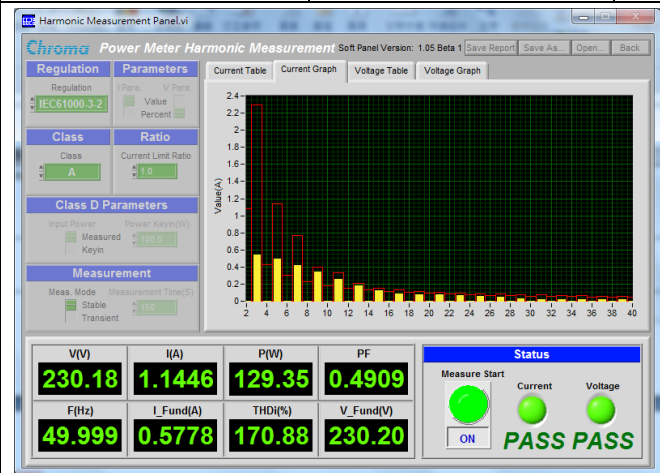
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated :13 A/600V VGS :± 25 V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4) 0%→400% Load. I/P:Low-Line -3V = 97V O/P: (1)Full Load (2)Output Short (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4) 0%→400% Load. Ta:25°C	VDS: (1) 562V (2) 506V (3) 556V (4) 566V VDS: (1) 448V (2) 404V (3) 442V (4) 472V
4	Diode Peak Voltage	Q101 Rated :20 A/100V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4) 0%→400% Load. (5).NO LOAD Ta:25°C	Q101: VDS: (1) 98.0V (2) 94.8V (3) 96.8V (4) 98.8V (5) 86.0V
5	Input Capacitor Voltage	C5 Rated: :330μ/200 V 105°C	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) 162V (2) 163V (3) 164V
6	Control IC Voltage Test	PWM IC U1 Rated : 28 V 10.5V(MIN)	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR 下限.LOW LINE Ta:25°C	(1) 16.2V (2) 12.4V (3) 15.2V (4) 18.0V (5) 12.4V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5 KVAC/min Ta:25°C	I/P-O/P: 3.746mA I/P-FG: 4.70mA O/P-FG: 3.38m A NO DAMAGE

2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:9999M Ω I/P-FG: 9999M Ω O/P-FG:9999M Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40A / 2min Ta:25°C	28m Ω

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P: 75%LOAD Ta:25°C	PASS
 The screenshot shows the Chroma Power Meter Harmonic Measurement software interface. It includes a 'Regulation' section with 'IEC61000-3-2' selected, a 'Class' section with 'A' selected, and a 'Class D Parameters' section. The 'Measurement' section shows 'Stable' mode. The 'Current Table' and 'Voltage Table' are visible, along with a 'Current Graph' showing harmonic distortion. The 'Status' section shows 'Measure Start' and 'Current' and 'Voltage' buttons, with 'PASS PASS' displayed.				
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	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
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

6	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
7	Test by certified Lab & Test Report Prepare			

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	TEMPERATURE RISE TEST	MODEL : LRS-150-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=25.5℃ 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=45.3℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 25.5 °C</th><th>HIGH AMBIENT Ta=45.3 °C</th></tr><tr><td>1</td><td>D5</td><td>88.0℃</td><td>109.5℃</td></tr><tr><td>2</td><td>C35</td><td>68.5℃</td><td>85.0℃</td></tr><tr><td>3</td><td>Q1</td><td>85.9℃</td><td>105.6℃</td></tr><tr><td>4</td><td>BD1</td><td>76.0℃</td><td>91.7℃</td></tr><tr><td>5</td><td>Q100</td><td>89.0℃</td><td>109.9℃</td></tr><tr><td>6</td><td>C106</td><td>81.2℃</td><td>95.6℃</td></tr><tr><td>7</td><td>LF1</td><td>64.7℃</td><td>81.8℃</td></tr><tr><td>8</td><td>RTH10</td><td>65.9℃</td><td>82.4℃</td></tr><tr><td>9</td><td>R14</td><td>81.5℃</td><td>98.3℃</td></tr><tr><td>10</td><td>T1</td><td>85.5℃</td><td>101.4℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta=45.3 °C	1	D5	88.0℃	109.5℃	2	C35	68.5℃	85.0℃	3	Q1	85.9℃	105.6℃	4	BD1	76.0℃	91.7℃	5	Q100	89.0℃	109.9℃	6	C106	81.2℃	95.6℃	7	LF1	64.7℃	81.8℃	8	RTH10	65.9℃	82.4℃	9	R14	81.5℃	98.3℃	10	T1	85.5℃	101.4℃
NO	Position	ROOM AMBIENT Ta= 25.5 °C	HIGH AMBIENT Ta=45.3 °C																																													
1	D5	88.0℃	109.5℃																																													
2	C35	68.5℃	85.0℃																																													
3	Q1	85.9℃	105.6℃																																													
4	BD1	76.0℃	91.7℃																																													
5	Q100	89.0℃	109.9℃																																													
6	C106	81.2℃	95.6℃																																													
7	LF1	64.7℃	81.8℃																																													
8	RTH10	65.9℃	82.4℃																																													
9	R14	81.5℃	98.3℃																																													
10	T1	85.5℃	101.4℃																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 115 % LOAD Ta : 25℃	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℃)	I/P : 230 VAC O/P : FULL LOAD	±0.006%/°C(0~50℃)																																												

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C~ +85°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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°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) 54008HRS (2) 13928HRS (3) 27956HRS (4) 57114HRS
10	MTBF	2707.7K hrs min. Telcordia SR-332 (Bellcore) ; 558.2Khrs 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

2007/3/20 A50-S014