



Test Report: RS-150-5

150W Single Output Switching 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

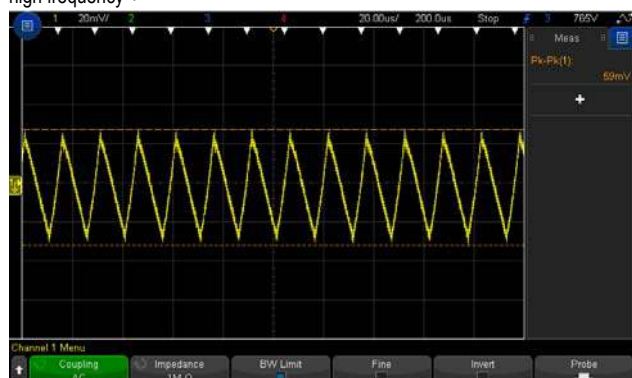
ENVIRONMENT TEST

DESIGN VERIFY TEST

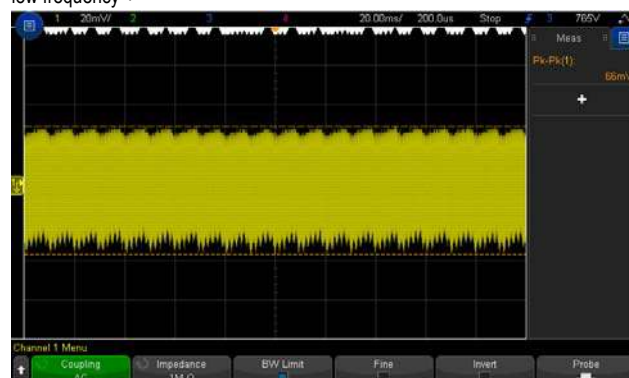
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.75 V~5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.67V~5.60V/230VAC 4.67V~5.60V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2%~ 2 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.81 %~ 0.67%
3	LINE REGULATION (Max)	V1: -0.5 %~ 0.5 %	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.04 %~0.04%
4	LOAD REGULATION(Max)	V1: -1 %~1 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.81 %~ 0.67%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	1.2 %
6	RIPPLE & NOISE(Max)	V1: 80 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	66mVp-p

high frequency :



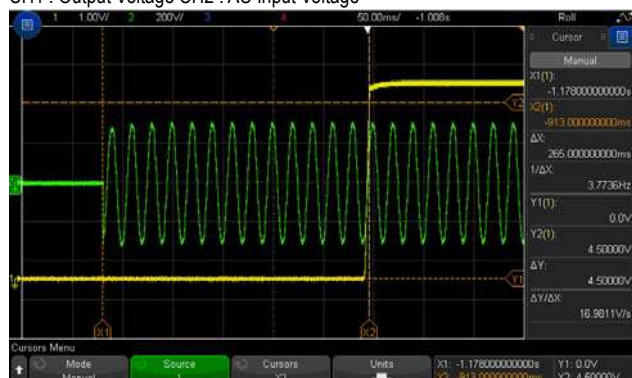
low frequency :



7	SET UP TIME(Max)	800ms /230VAC 1200ms /115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 265 ms 115VAC/ 285ms
---	------------------	---------------------------------	--	---------------------------------

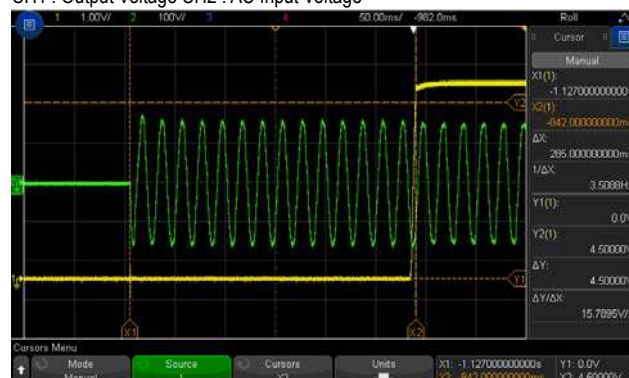
INPUT=230VAC/50HZ @ FULL LOAD

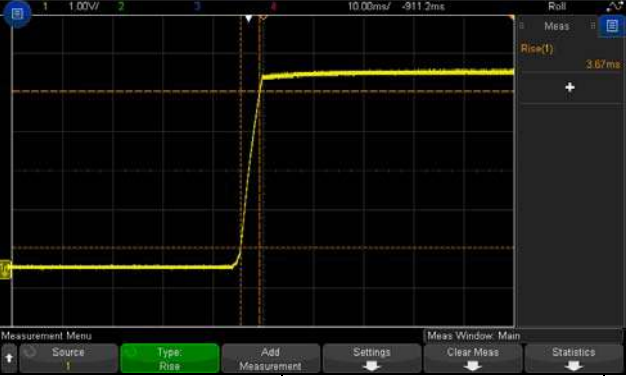
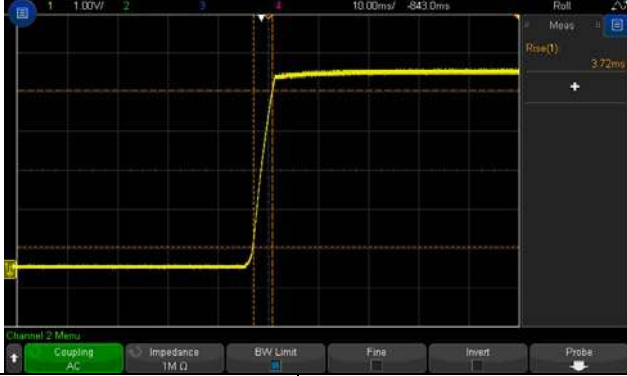
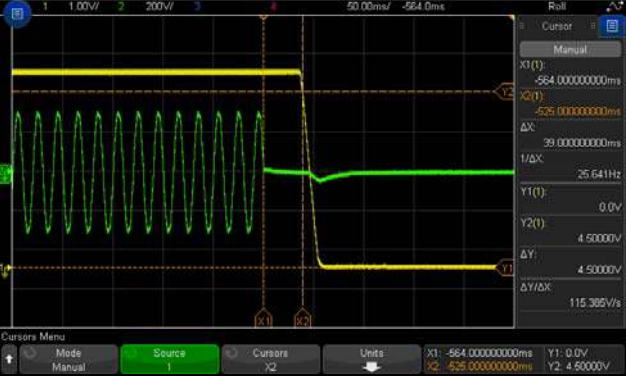
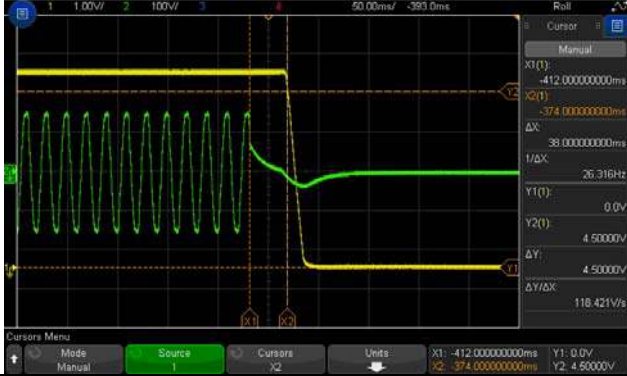
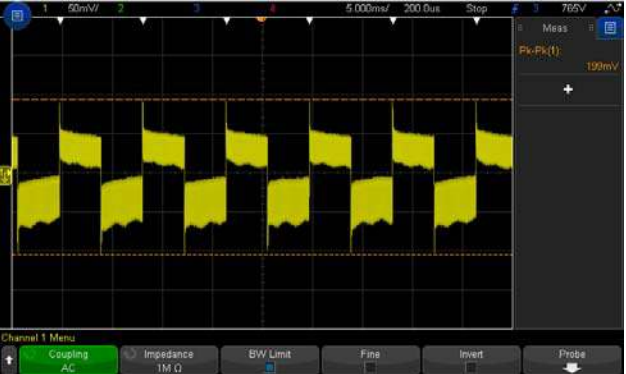
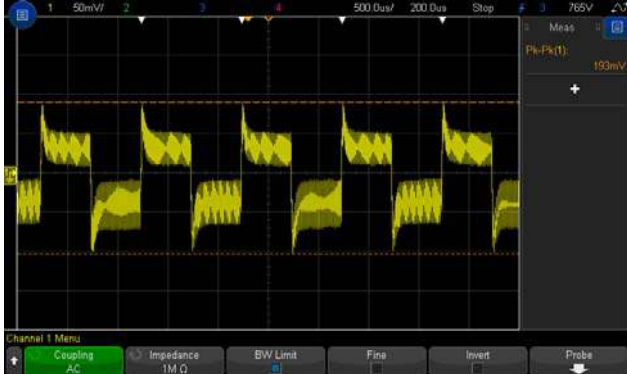
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

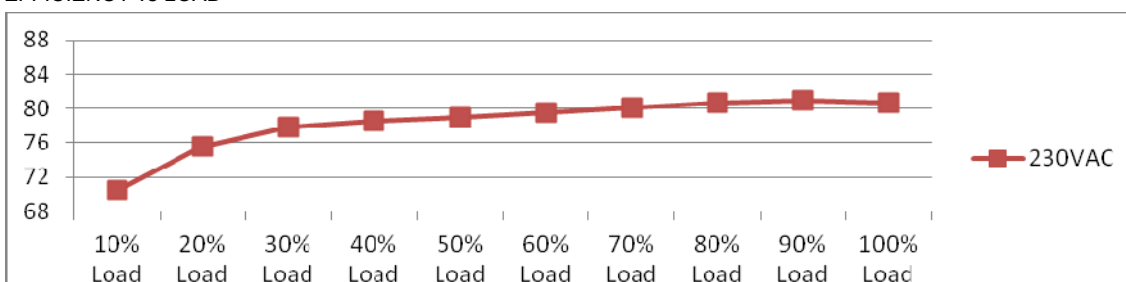


8	RISE TIME (Max)	20ms/ 230VAC 30ms/ 115VAC/	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 3.67ms 115VAC/ 3.72 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 			
	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (Typ.)	28ms/ 230VAC 20ms /115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 39 ms 115VAC/ 38 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
10	DYNAMIC LOAD	V1: 1000 mVp-p	I/P: 230VAC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C	199mVp-p 193mVp-p
	FULL /MIN LOAD 50%DUTY / 120HZ 			
	FULL /MIN LOAD 50%DUTY / 1KHZ 			

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	88VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	80V~264V
			I/P: LOW-LINE-3V=85 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)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 88 VAC ~264 VAC O/P: FULL~MIN LOAD Ta: 25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/2A 115V/3A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=1.03A/ 230VAC I=1.96A/ 115VAC
4	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.6 mA
5	EFFICIENCY(Typ.)	78%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	80.7%

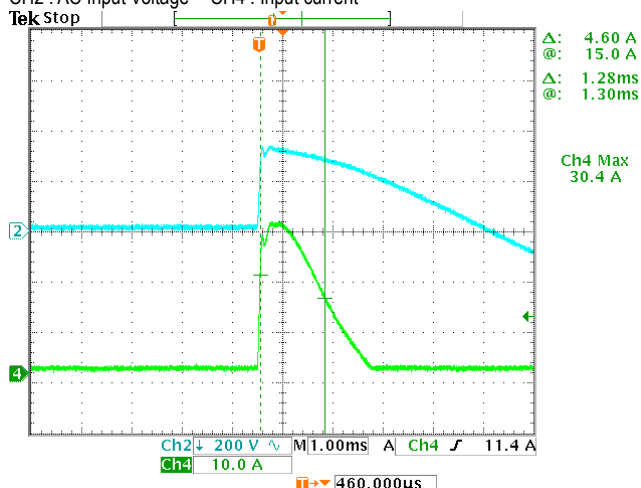
EFFICIENCY vs LOAD



6	INRUSH CURRENT(Typ.)	230V/40A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	30.4A
---	----------------------	------------------------	---	-------

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110 %~150%	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: TESTING Ta:25°C	123.8%/ 264VAC 129.8%/ 230VAC 142.6%/88VAC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	5.75V~6.75V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta:25°C	6.14V/ 264VAC 6.06V/ 230VAC 6.06V/ 88VAC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC 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	Q1 Rated : 9A/ 900 V	AC ON/OFF I/P: High-Line +3V =267V VDS: O/P: (1) Full Load (2) Output Short (3) Full load continue Ta:25°C	VDS: (1) 755V (2) 755V (3) 738V
2	O/P DIODE	D60 Rated : 30A/ 45 V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full load continue Ta:25°C	(1) 29.1V (2) 22.3V (3) 223V
3	Input Capacitor Voltage	C5 Rated : 330 μ / 200 V	I/P: High-Line +3V =267V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue Ta:25°C	(1) 186V (2) 184V (3) 184V (4) 182V
4	Control IC Voltage Test	U1 Rated : 8.4 V~ 21 V	AC ON/OFF 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 VRmin(LOW LINE) Ta:25°C	(1) 15.6V (2) 15.4V (3) 15.4V (4) 15.2V (5) 14.8V
5	Clamp Diode	D1 Rated : 2A/ 1000 V	AC ON/OFF I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2) Full load continue Ta : 25°C	(1) 827V (2) 779V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG:2 KVAC/min O/P-FG: 0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P- FG: 2.4 KVAC/min O/P - FG: 0.6 KVAC/min Ta:25°C	I/P-O/P:3.25mA I/P-FG:1.71mA O/P-FG:1.07mA 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: 600 VDC I/P- FG: 600 VDC Ta:25°C	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta: 25°C/70%RH	6 mΩ

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 ☐ FAIL
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 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 ☐ LIGHT INDUSTRY AIR: 8KV / Contact: 4KV ☒ INDUSTRY AIR: 8KV / Contact: 4KV ☐ Din rail Model : AIR: 15KV / Contact: 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 ☐ LIGHT INDUSTRY INPUT : 1KV ☐ MEDICAL ☒ 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 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 : RS-150-5 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 28.9 ℃ 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 41.8℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 28.9 ℃</th><th>HIGH AMBIENT Ta=41.8 ℃</th></tr><tr><td>1</td><td>LF1</td><td>63.5℃</td><td>84.0℃</td></tr><tr><td>2</td><td>BD1</td><td>86.0℃</td><td>104.3℃</td></tr><tr><td>3</td><td>C5</td><td>71.8℃</td><td>89.7℃</td></tr><tr><td>4</td><td>T1</td><td>97.0℃</td><td>108.7℃</td></tr><tr><td>5</td><td>D61</td><td>102.2℃</td><td>118.8℃</td></tr><tr><td>6</td><td>ZD1</td><td>96.4℃</td><td>103.2℃</td></tr><tr><td>7</td><td>D1</td><td>95.9℃</td><td>103.7℃</td></tr><tr><td>8</td><td>Q1</td><td>83.0℃</td><td>94.5℃</td></tr><tr><td>9</td><td>D60</td><td>100.2℃</td><td>119.9℃</td></tr><tr><td>10</td><td>C62</td><td>86.9℃</td><td>96.8℃</td></tr><tr><td>11</td><td>L60</td><td>95.8℃</td><td>111.3℃</td></tr><tr><td>12</td><td>U1</td><td>97.2℃</td><td>104.2℃</td></tr><tr><td>13</td><td>ZD2</td><td>110.3℃</td><td>115.0℃</td></tr><tr><td>14</td><td>R59</td><td>101.2℃</td><td>108.4℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 28.9 ℃	HIGH AMBIENT Ta=41.8 ℃	1	LF1	63.5℃	84.0℃	2	BD1	86.0℃	104.3℃	3	C5	71.8℃	89.7℃	4	T1	97.0℃	108.7℃	5	D61	102.2℃	118.8℃	6	ZD1	96.4℃	103.2℃	7	D1	95.9℃	103.7℃	8	Q1	83.0℃	94.5℃	9	D60	100.2℃	119.9℃	10	C62	86.9℃	96.8℃	11	L60	95.8℃	111.3℃	12	U1	97.2℃	104.2℃	13	ZD2	110.3℃	115.0℃	14	R59	101.2℃	108.4℃
NO	Position	ROOM AMBIENT Ta= 28.9 ℃	HIGH AMBIENT Ta=41.8 ℃																																																													
1	LF1	63.5℃	84.0℃																																																													
2	BD1	86.0℃	104.3℃																																																													
3	C5	71.8℃	89.7℃																																																													
4	T1	97.0℃	108.7℃																																																													
5	D61	102.2℃	118.8℃																																																													
6	ZD1	96.4℃	103.2℃																																																													
7	D1	95.9℃	103.7℃																																																													
8	Q1	83.0℃	94.5℃																																																													
9	D60	100.2℃	119.9℃																																																													
10	C62	86.9℃	96.8℃																																																													
11	L60	95.8℃	111.3℃																																																													
12	U1	97.2℃	104.2℃																																																													
13	ZD2	110.3℃	115.0℃																																																													
14	R59	101.2℃	108.4℃																																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 125% LOAD Ta : 25℃	TEST : OK																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/88VAC O/P : 100 % LOAD Ta= -25℃	TEST : OK																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL40℃ /95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=40 ℃ HUMIDITY= 95 %R.H	TEST : OK																																																												
5	TEMPERATURE COEFFICIENT	± 0.03%/℃ (0~50℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.0067%/℃ (0~50℃)																																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45℃~ +90℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC		TEST : OK																																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30℃~ +45℃ 2. Temperature change rate : 25℃ / 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		TEST : 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 : 180min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C62 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) 66492.6HRS (2) 28942.6HRS (3) 56170.9 HRS (4) 130106HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 244K 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	LIUTT		Wangdz

2018.4.30 GP-A50-F010