



Test Report: LRS-50-3.3

50W 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

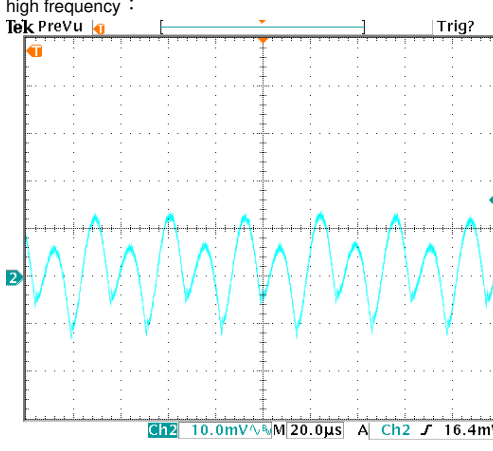
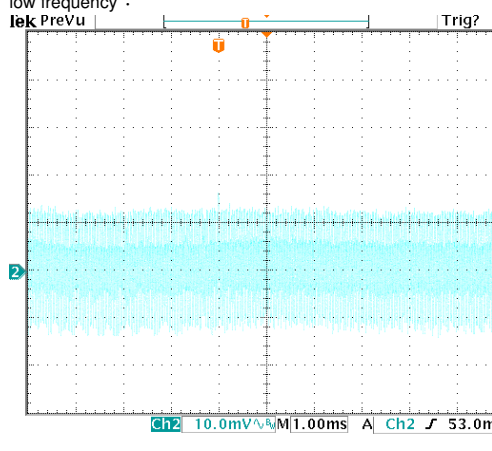
E.M.C. Test

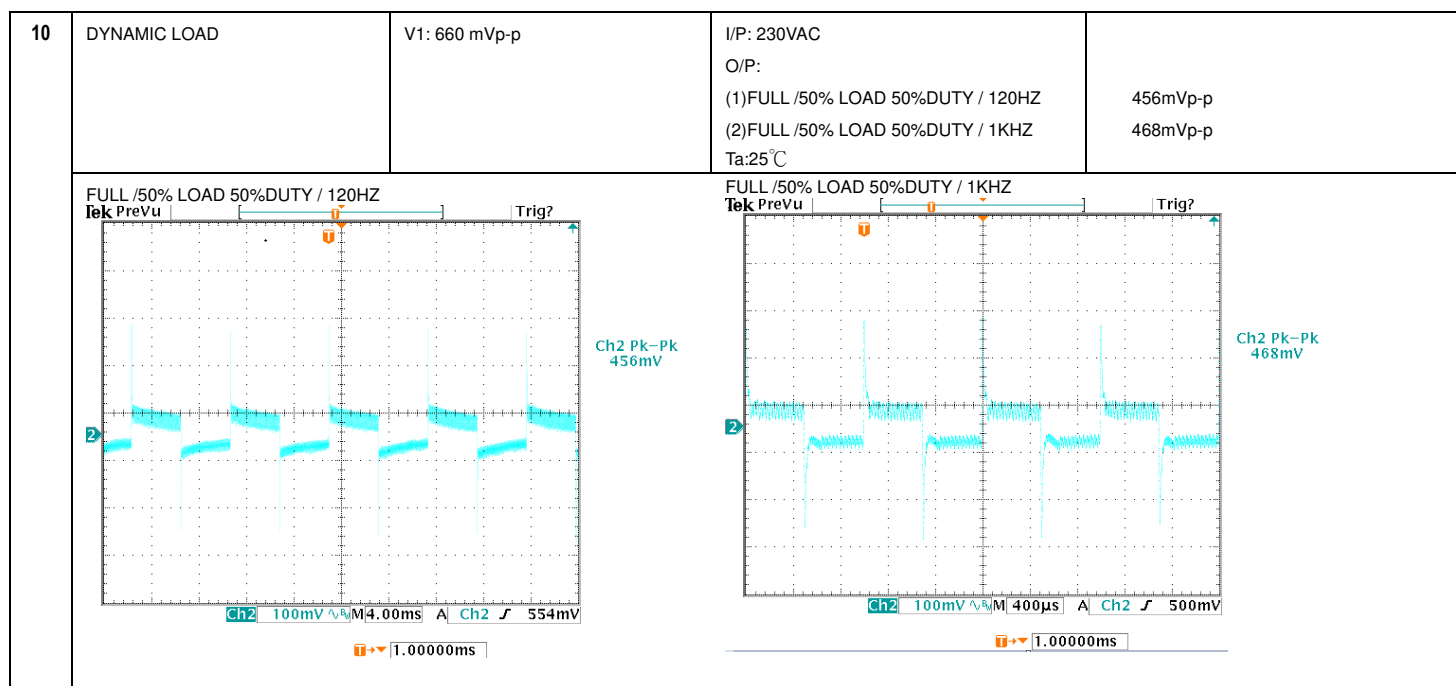
■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST

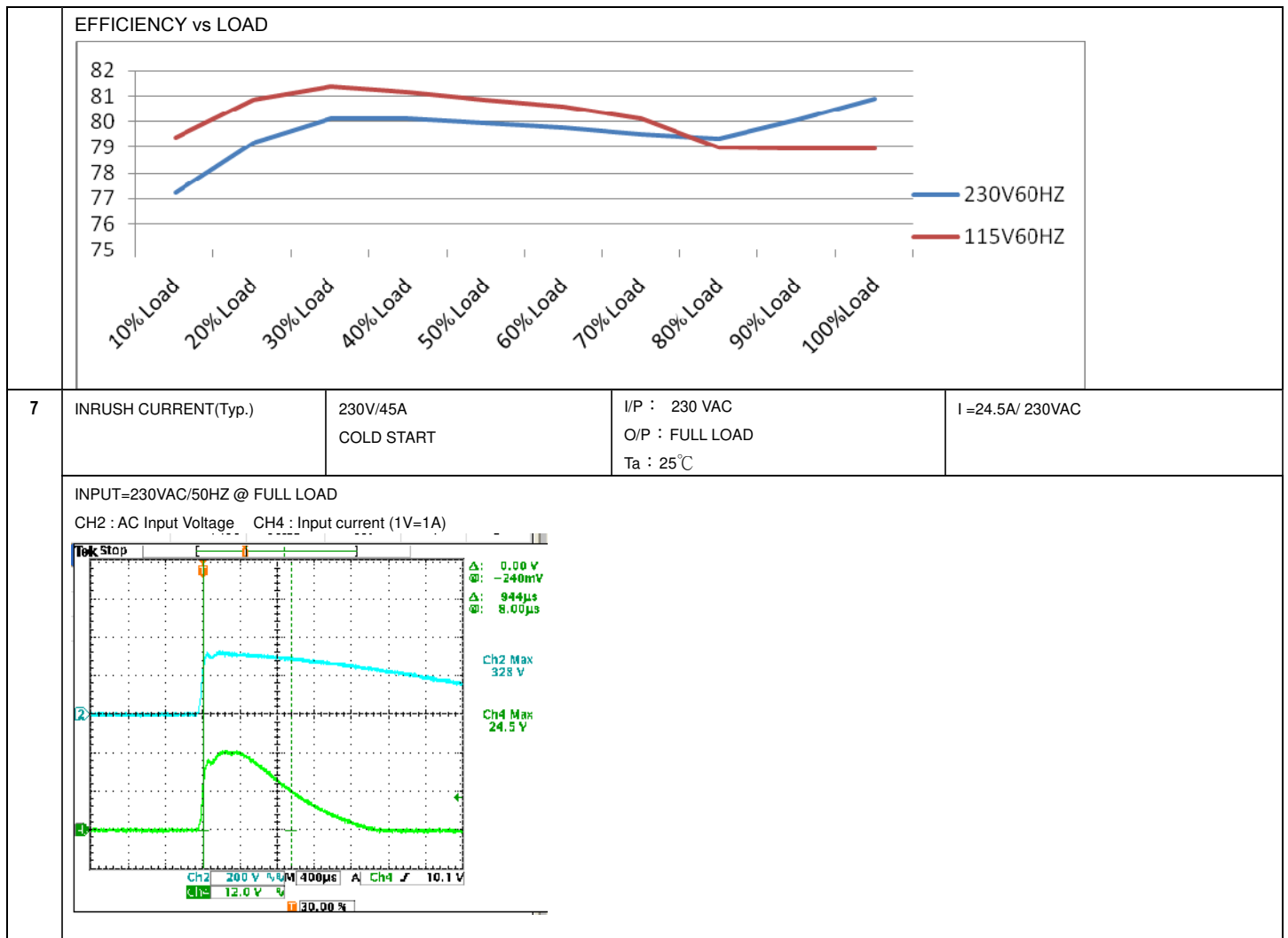
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 2.97 V~ 3.6 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	2.912~3.7975V/230VAC 2.923V~3.805V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 3 %~ -3 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.2923%~0.2923 %
3	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0 %
4	LOAD REGULATION(Max)	V1: 2 %~ -2 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.2923 %~0.2923 %
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<10%
6	RIPPLE & NOISE(Max)	V1: 80 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 30.4 mVp-p
high frequency :  Ch2 Pk-Pk 28.6mV Ch2 10.0mV/V 20.0µs A Ch2 16.4mV 1.00000ms low frequency :  Ch2 Pk-Pk 30.4mV Ch2 10.0mV/V 1.00ms A Ch2 53.0mV 1.00000ms				
7	SET UP TIME(Max)	230VAC/1000ms 115VAC/2000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/392 ms 115VAC/600 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	



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC 120VDC~373VDC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	78VAC~264VAC 113VDC~373VDC
			I/P: (1) LOW-LINE-3V=82 V 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: 100 VAC ~264 VAC O/P: FULL ~MIN LOAD Ta: 25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 0.56A 115V/ 0.95A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =0.34258A/ 230VAC I =0.562A/ 115VAC
4	LEAKAGE CURRENT	<0.75 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.32 mA N-FG : 0.32 mA
5	NO LOAD CONSUMPTION	< 0.2W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.1547 W < 0.1621 W
6	EFFICIENCY(Typ.)	80%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	80.91%



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110 %~ 150 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	128.4%/ 264VAC 130.1%/ 230VAC 129.8%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	3.8 V~4.45 V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C	4.36V/ 264VAC 4.36V/ 230VAC 4.36V/ 85VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
3	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 10A/ 600 V	I/P:High-Line +3V =267V AC ON/OFF 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. Ta:25℃	VDS: (1)526V (2)476V (3)523V (4)524V (5)518V (6)540V (7)510V
2	Diode Peak Voltage	Q100 Rated 75A/60 V	I/P:High-Line +3V =267 V AC ON/OFF 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 (8).NO LOAD Ta:25℃	Q100: VDS: (1)34.8V (2)32.2V (3)35.2V (4)35.2V (5)35.0V (6)35.0V (7)34.8V (8)35.2V
3	Input Capacitor Voltage	C5 Rated: 100u/400V 105℃ 18*25 CLA IIR	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℃	(1)374V (2)376V (3)376V
4	Control IC Voltage Test	PWM IC U1 Rated 10.8 V~30V	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 Min. LOW LINE Ta:25℃	(1) 24.8V (2) 16.8V (3) 27.3V (4) 18.4V (5) 13.6V
5	Clamp Diode Peak Voltage	D5 Rated : 3A/600V	I/P : High-Line +3V = 267 V AC ON/OFF O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25℃	(1)388 V (2)390 V

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:1.25KVAC/min	I/P-O/P: 4.125KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5 KVAC/min Ta:25°C	I/P-O/P:2.135mA I/P-FG: 2.098 mA O/P-FG:2.065m 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: 9999MΩ 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	8mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100%LOAD Ta:25°C	PASS
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-50-5 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=27.0℃ 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=43.1℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=27.0℃</th><th>HIGH AMBIENT Ta=43.1℃</th></tr><tr><td>1</td><td>LF1</td><td>60.7℃</td><td>78.7℃</td></tr><tr><td>2</td><td>BD1</td><td>68.1℃</td><td>85.1℃</td></tr><tr><td>3</td><td>C5</td><td>65.3℃</td><td>82.8℃</td></tr><tr><td>4</td><td>D5</td><td>93.2℃</td><td>105.1℃</td></tr><tr><td>5</td><td>Q1</td><td>85.4℃</td><td>99.5℃</td></tr><tr><td>6</td><td>C35</td><td>80.2℃</td><td>96.3℃</td></tr><tr><td>7</td><td>T1coil</td><td>79.7℃</td><td>96.9℃</td></tr><tr><td>8</td><td>T1core</td><td>87.4℃</td><td>104.1℃</td></tr><tr><td>9</td><td>C105</td><td>73.0℃</td><td>87℃</td></tr><tr><td>10</td><td>C106</td><td>68.4℃</td><td>82℃</td></tr><tr><td>11</td><td>L100</td><td>80.4℃</td><td>97.6℃</td></tr><tr><td>12</td><td>Q100</td><td>73.7℃</td><td>88.3℃</td></tr><tr><td>13</td><td>U1</td><td>80.2℃</td><td>95.9℃</td></tr><tr><td>14</td><td>D30</td><td>93.2℃</td><td>106.1℃</td></tr><tr><td>15</td><td>D40</td><td>62.4℃</td><td>79.4℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta=27.0℃	HIGH AMBIENT Ta=43.1℃	1	LF1	60.7℃	78.7℃	2	BD1	68.1℃	85.1℃	3	C5	65.3℃	82.8℃	4	D5	93.2℃	105.1℃	5	Q1	85.4℃	99.5℃	6	C35	80.2℃	96.3℃	7	T1coil	79.7℃	96.9℃	8	T1core	87.4℃	104.1℃	9	C105	73.0℃	87℃	10	C106	68.4℃	82℃	11	L100	80.4℃	97.6℃	12	Q100	73.7℃	88.3℃	13	U1	80.2℃	95.9℃	14	D30	93.2℃	106.1℃	15	D40	62.4℃	79.4℃
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 130% LOAD Ta : 25℃	TEST : OK																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	1. I/P : 264VAC/ O/P : 100 % LOAD 2. I/P : 100VAC/ O/P : 75 % LOAD/75% Ta= -30℃	TEST : OK																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50℃ HUMIDITY= 95 %R.H	TEST : OK																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃ (0~50℃)	I/P : 230 VAC O/P : FULL LOAD	±0.02%/℃ (0~50℃)																																																																
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃~ +85℃ 2. Temperature change rate : 25℃ / 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℃~ 70℃ 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 : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK																																																																



50W Single Output Switching Power Supply

LRS-50 series

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℃	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50 ℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 ℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 ℃ LIFE TIME	(1) 90182HRS (2) 26047HRS (3) 82411HRS (4) 153720HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 645KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50℃	

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

2007/3/20 A50-S014