



TEST REPORT: EPP-200-24

200W Single Output With PFC Function

■ 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

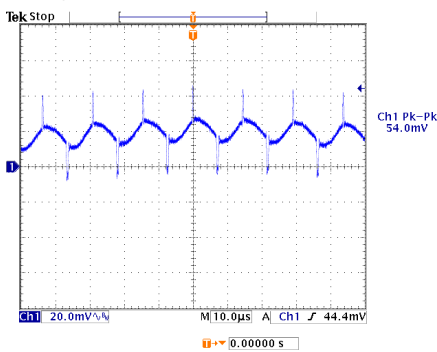
■ RELIABILITY TEST

ENVIRONMENT TEST

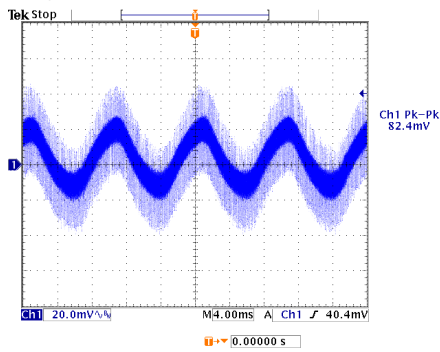
DESIGN VERIFY TEST
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22.80V ~ 25.20V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 22.08V ~ 25.77V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.58% ~ 0.50%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.04% ~ -0.04%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.905 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 82.4 mVp-p

high frequency :



low frequency :

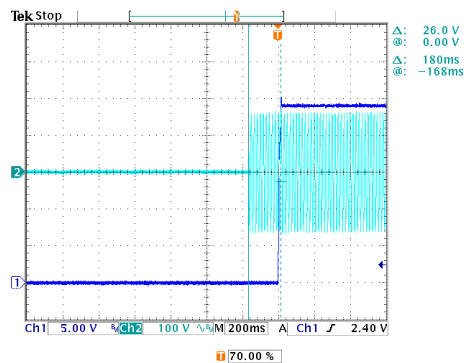
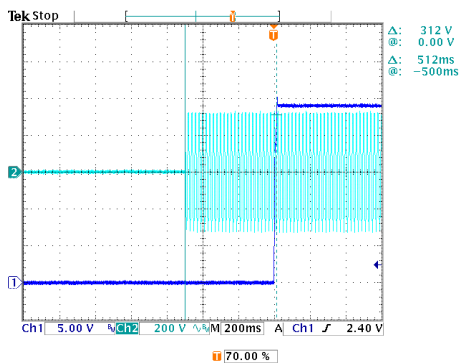


SET UP TIME (MAX.)
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

230VAC : 700ms
115VAC : 700ms

I/P : 230VAC
I/P : 115VAC

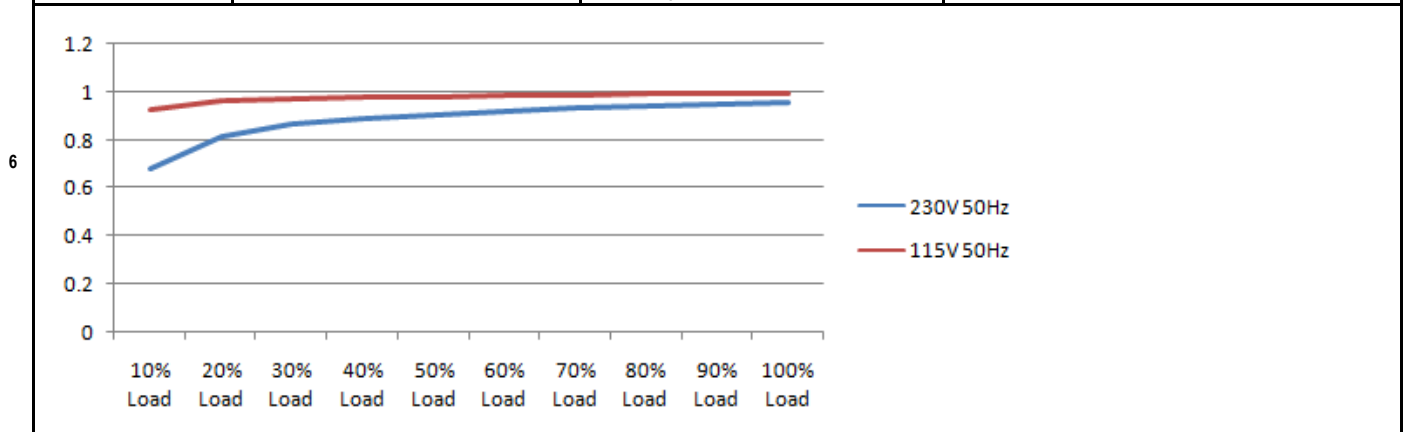
230VAC 512ms
115VAC 180ms



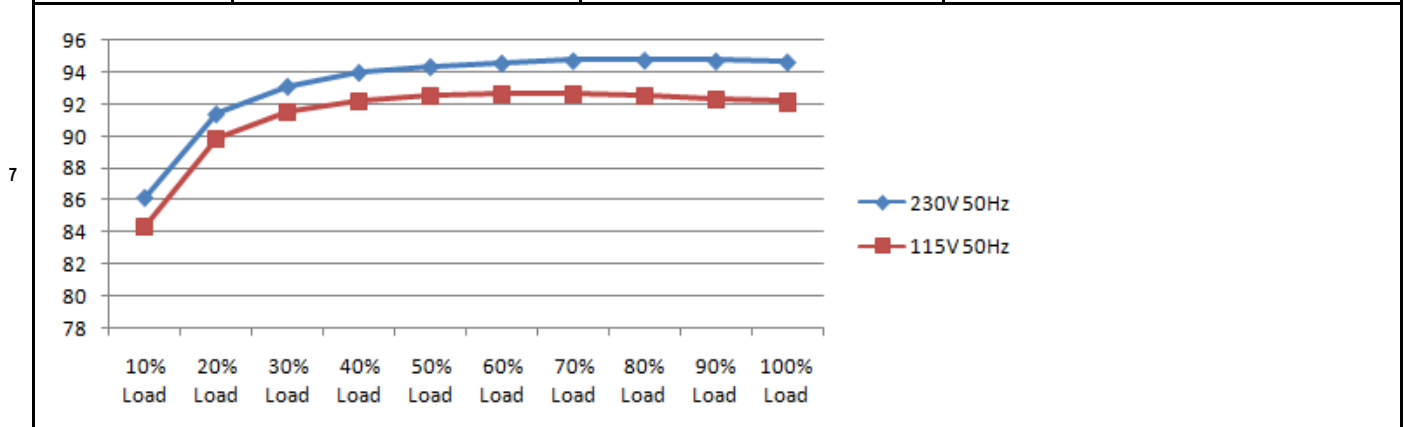
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 12.8ms 115VAC : 12.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
9	HOLD UP TIME (TYP.)	230VAC : 12ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 20.2ms 115VAC : 20.2ms
	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 : 2400 mVp-p	I/P : 230VAC O/P: (1) Full/Min load 50% duty/120HZ (2) Full/Min load 50% duty/1KHZ TA: 25°C	V1: (1). 920.0mv (2). 586.0mv unit:mVp-p
	FULL/Min LOAD 50%DUTY / 120HZ	FULL/Min LOAD 50%DUTY / 1KHZ		

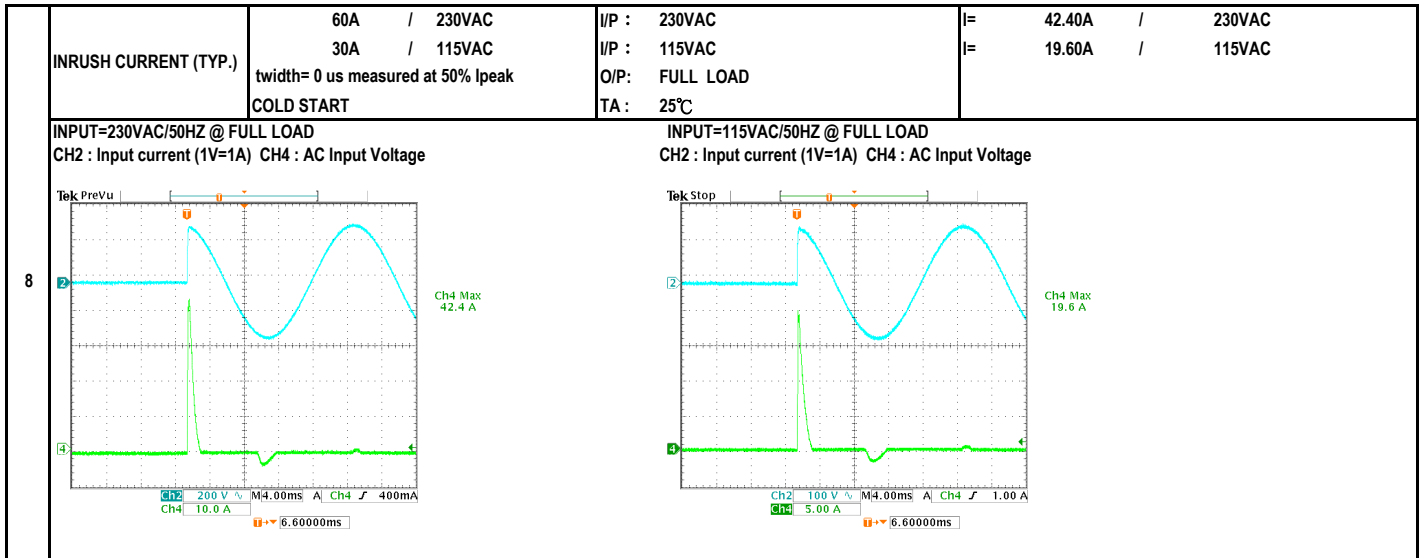
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	68.0VAC ~ 264VAC
			I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	1 / 230VAC	I/P : 230VAC	I= 0.972 / 230VAC
		2 / 115VAC	I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 1.992 / 115VAC
4	LEAKAGE CURRENT	< 0.19mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.0139 mA N-FG: 0.0134 mA O/P-FG: 0.056 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.3496 W
	POWER FACTOR (TYP.)	0.94 / 230VAC	I/P : 230VAC	PF= 0.957 / 230VAC
		0.98 / 115VAC	I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.99 / 115VAC



7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	94.66 %
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110% ~ 140%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING TA : 25°C	120.90% 264VAC 120.90% 230VAC 120.90% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	26.40V ~ 31.20V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	29.30V 264VAC 29.40V 230VAC 29.30V 80VAC Shut down Re- power ON
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode
4	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down Re- power ON

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~15 %	I/P: 230VAC O/P: FULL LOAD TA : 25°C	11.475 V/ 0.4997 A ripple & noise: * mv Tolerance: -4.38% %

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 500V 13.0A Q6 Rated : 500V 13.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q5 Q6 (1). 490.00V 494.00V (2). 482.00V 490.00V (3). 442.00V 450.00V
2	Input Capacitor	C5 Rated : 100uf 420V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 419.00V (2). 417.00V (3). 419.00V

3	Control IC	U1	Rated :	38.0V	(max)	I/P :	267VAC	U1	U101	
				13.0V	(min)	O/P :	(1) Full Load (2) Output Short (3) O.L.P (4) O.V.P (5) Low Line No Load Vo(min)			(1).
		U101	Rated :	24V	(max)					
				6V	(min)	Ta :	25°C			
4	O/P Diode (MOSFET)	Q101	Rated :	60V	76A	I/P :	267VAC	Q101	Q102	
						O/P :	(1) Full Load Turn on (2) Output Short (3) Full load continue	(1).	57.20V	58.00V
		Q102	Rated :	60V	76A	Ta :	25°C	(2).	7.90V	8.80V
								(3).	55.20V	56.80V
5	PFC Power Transistor	Q1	Rated :	600V	20.2A	I/P :	267VAC			
						O/P :	(1) Full Load Turn on (2) Output Short (3) Full load continue			(1).
						Ta :	25°C	(2).	546.00V	
								(3).	502.00V	
6	PFC Diode	D1	Rated :	600V	5.0A	I/P :	267VAC			
						O/P :	(1) Full Load Turn on (2) Output Short (3) Dynamic Load Full/Min Load 90%Duty/5KHz (4) Dynamic Load Full/Min Load 50%Duty/120Hz			(1).
						Ta :	25°C	(2).	478.00V	
								(3).	476.00V	
								(4).	460.00V	

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min	I/P-O/P: 3.600KVAC /min	I/P-O/P: 1.01mA
		I/P-FG : 2.000KVAC /min	I/P-FG: 2.400KVAC /min	I/P-FG: 1.41mA
		O/P-FG : 0.500KVAC /min	O/P-FG: 0.600KVAC /min	O/P-FG: 0.60mA
			Ta : 25°C	NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC	I/P-O/P: 9999MΩ
		I/P-FG : 500VDC>100MΩ	I/P-FG: 500VDC	I/P-FG: 9999MΩ
			Ta : 25°C/70%RH	NO DAMAGE

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
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /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 : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230VAC /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 : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A



RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																
1	TEMPERATURE RISE TEST	MODEL : EPP-200-24 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 18.5°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 49.3°C																																																																		
		<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT 18.5°C</th> <th>HIGH AMBIENT Ta: 49.3°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>RTH1</td><td>64.1°C</td><td>82.3°C</td></tr> <tr><td>2</td><td>LF1</td><td>28.2°C</td><td>57.0°C</td></tr> <tr><td>3</td><td>LF2</td><td>29.2°C</td><td>59.7°C</td></tr> <tr><td>4</td><td>L2</td><td>31.0°C</td><td>61.3°C</td></tr> <tr><td>5</td><td>BD1</td><td>39.3°C</td><td>69.1°C</td></tr> <tr><td>6</td><td>C5</td><td>30.2°C</td><td>59.8°C</td></tr> <tr><td>7</td><td>Q1</td><td>44.5°C</td><td>74.9°C</td></tr> <tr><td>8</td><td>C81</td><td>23.0°C</td><td>53.0°C</td></tr> <tr><td>9</td><td>RTH2</td><td>24.8°C</td><td>54.5°C</td></tr> <tr><td>10</td><td>T1 COIL</td><td>47.7°C</td><td>78.2°C</td></tr> <tr><td>11</td><td>T1 BOB</td><td>43.6°C</td><td>73.0°C</td></tr> <tr><td>12</td><td>L100</td><td>37.6°C</td><td>69.4°C</td></tr> <tr><td>13</td><td>C105</td><td>38.2°C</td><td>68.5°C</td></tr> <tr><td>14</td><td>L1</td><td>46.1°C</td><td>77.3°C</td></tr> <tr><td>15</td><td>U1</td><td>39.3°C</td><td>69.0°C</td></tr> </tbody> </table>			NO.	Position	ROOM AMBIENT 18.5°C	HIGH AMBIENT Ta: 49.3°C	1	RTH1	64.1°C	82.3°C	2	LF1	28.2°C	57.0°C	3	LF2	29.2°C	59.7°C	4	L2	31.0°C	61.3°C	5	BD1	39.3°C	69.1°C	6	C5	30.2°C	59.8°C	7	Q1	44.5°C	74.9°C	8	C81	23.0°C	53.0°C	9	RTH2	24.8°C	54.5°C	10	T1 COIL	47.7°C	78.2°C	11	T1 BOB	43.6°C	73.0°C	12	L100	37.6°C	69.4°C	13	C105	38.2°C	68.5°C	14	L1	46.1°C	77.3°C	15	U1	39.3°C	69.0°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 119.00% LOAD Ta : 25°C	TEST : OK																																																																
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK																																																																
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0°C~50°C)																																																																
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		TEST : OK																																																																
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +55°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		TEST : OK																																																																
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 2G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK																																																																
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0°C LIFE TIME	(1). 437778 HRS (2). 80132 HRS (3). 179640 HRS (4). 297469.9 HRS																																																																	
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 500.2 KHRS																																																																		
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50°C																																																																		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ