



Test Report: ERPF-400-24

400W 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

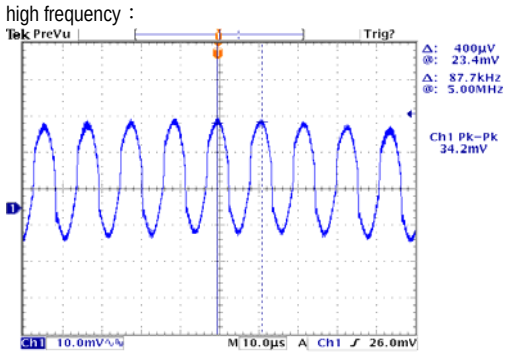
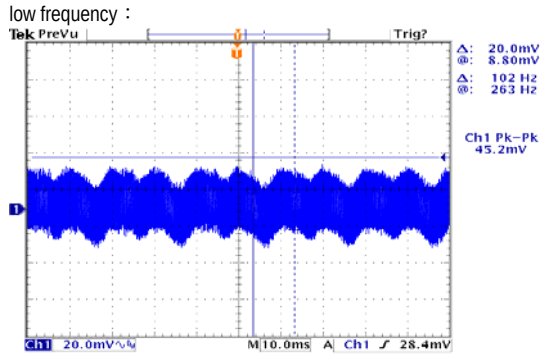
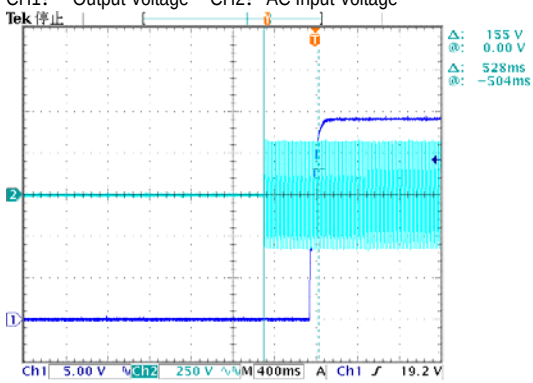
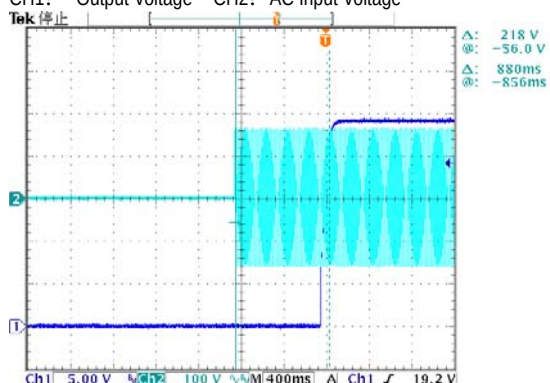
E.M.C. Test

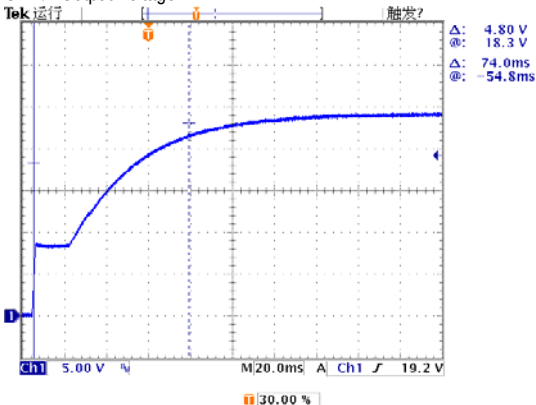
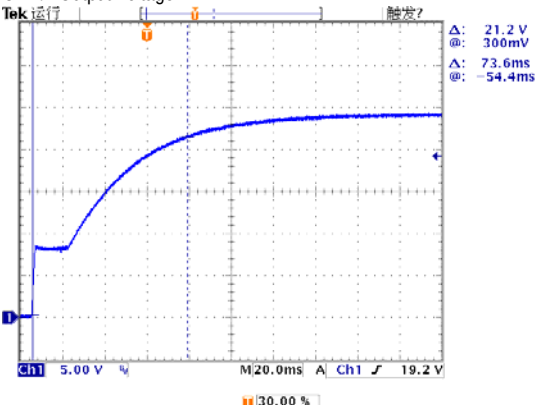
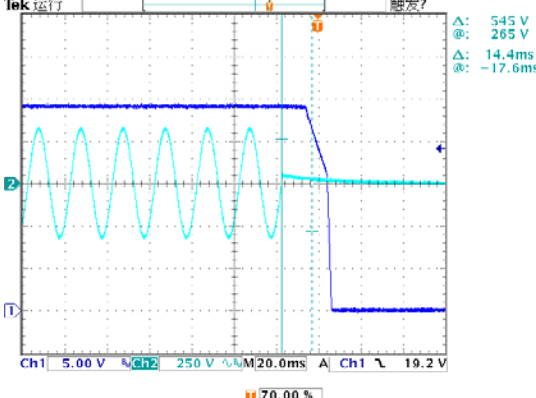
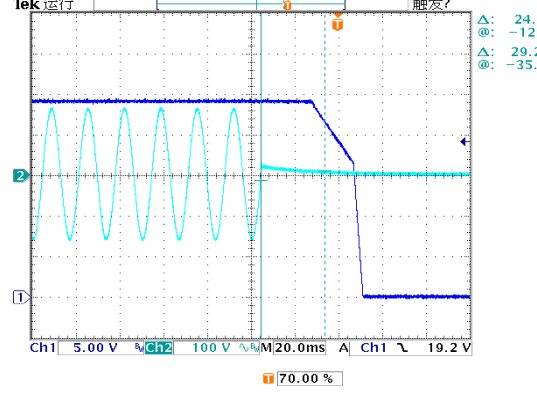
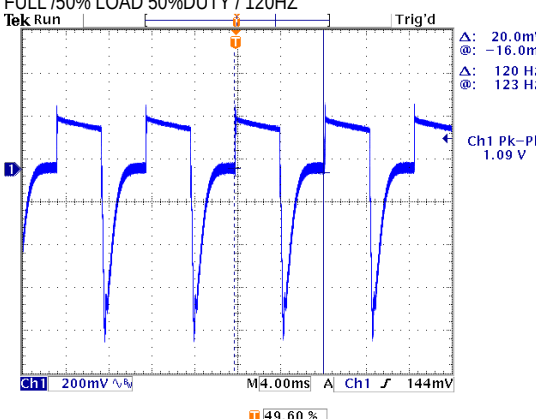
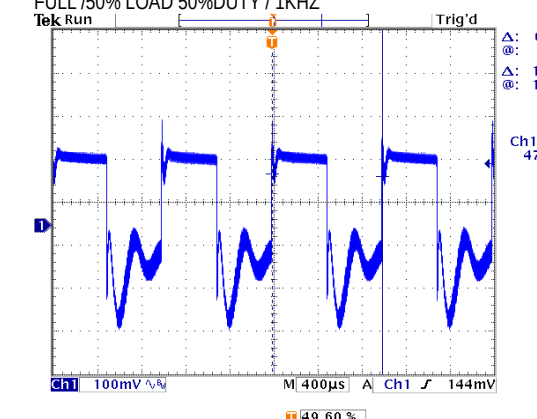
■ RELIABILITY TEST

Environment Test

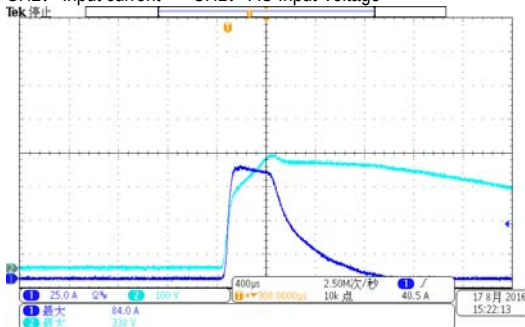
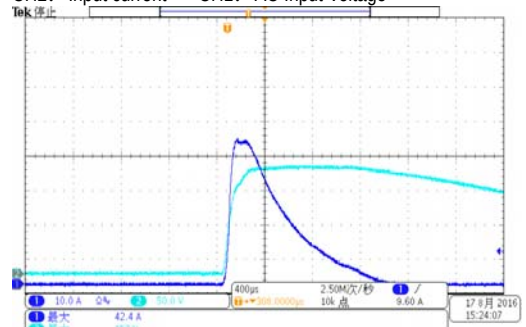
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE (For A-Type only)	21.6 V~26.4 V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	20.81 V~ 27.82 V
2	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P: 90VAC / 264VAC O/P: FULL / NO LOAD Ta: 25°C	-0.25%~ 0.50 %
3	LINE REGULATION	-0.5%~+0.5%	I/P: 200VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	0%~ 0%
4	LOAD REGULATION	-0.5%~+0.5%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	-0.12% ~ 0.12%
5	OVER/UNDERSHOOT TEST	<± 5 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5 %
6	RIPPLE & NOISE (Max)	150mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	45.2 mVp-p
high frequency :  Δ: 400μV @: 23.4mV Δ: 87.7kHz @: 5.00MHz Ch1 Pk-Pk 34.2mV M 10.0μs A Ch1 26.0mV low frequency :  Δ: 20.0mV @: 8.80mV Δ: 102 Hz @: 263 Hz Ch1 Pk-Pk 45.2mV M 10.0ms A Ch1 28.4mV				
7	SET UP TIME(Max)	230VAC/ 2000ms 115VAC/ 3000ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 528 ms 115VAC/ 880 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage  Δ: 155 V @: 0.00 V Δ: 528ms @: -504ms Ch1 5.00 V Ch2 250 V M 400ms A Ch1 19.2 V INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage  Δ: 218 V @: -56.0 V Δ: 880ms @: -856ms Ch1 5.00 V Ch2 100 V M 400ms A Ch1 19.2 V				

8	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 74.0 ms 115VAC/ 73.6 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage 	
9	HOLD UP TIME(Typ)	230VAC/ 10ms 115VAC/ 10ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 14.4 ms 115VAC/ 29.2 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: 2400 mVp-p	I/P: 230VAC O/P: (1) FULL/50% LOAD 50%DUTY / 120HZ (2) FULL/50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 1090mVp-p (2) 474 mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87 V~ 300 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: FULL/NO LOAD 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: 90 VAC ~264 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	3A/115VAC 2.5A/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD/50% LOAD Ta: 25°C	I = 1.97 A/ 115VAC I = 1.93 A/ 230VAC
4	LEAKAGE CURRENT	< 1mA / 240VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.438 mA N-FG: 0.445 mA
5	INRUSH CURRENT(Typ)	45A/115VAC 90A/230VAC COLD START	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD/50% LOAD Ta: 25°C	I = 42.4 A/ 115VAC I = 84.0 A/ 230VAC
INPUT=230VAC/50HZ @ FULL LOAD CH2: Input current CH1: AC Input Voltage  INPUT=115VAC/50HZ @ 50% LOAD CH2: Input current CH1: AC Input Voltage 				
6	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.81 %
7	POWER FACTOR	0.98/ 115VAC 0.95/ 230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD/50% LOAD Ta: 25°C	PF= 0.998 / 115VAC PF= 0.986 / 230VAC

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	105%~135%	I/P: 200VAC I/P: 230VAC I/P: 264VAC O/P: TESTING Ta: 25°C	119.25 %/ 200VAC 119.25 %/ 230VAC 119.25 %/ 264VAC Constant Current Limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	27.6V~32.4V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	28.35 V/ 90VAC 28.35 V/ 230VAC 28.65V/ 264VAC Shut down o/p voltage, re-power on to recovery
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 200VAC I/P: 230VAC I/P: 264VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 90VAC I/P: 264VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Constant Current Limiting, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q 2 Rated 600V/20A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 450 V (2) 480 V (3) 446 V
2	O/P Diode (MOSFET)	Q101 Rated 150V/20A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 120 V (2) 127 V (3) 108 V
3	Input Capacitor	C5 Rated 180u/ 400V	I/P: High-Line +3V =267 V O/P: (1) FULL LOAD input on/off (2) NO LOAD input on /Off (3) FULL LOAD /NO LOAD Change Ta: 25°C	(1) 398 V (2) 384 V (3) 390 V
4	Control IC	U3 Rated 30V (MAX.)	I/P: High-Line +3V =267 V O/P: ((1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P (5) Low Line No Load Vo(min) Ta: 25°C	(1) 16.3 V (2) 16.7 V (3) 16.3 V (4) 16.3 V (5) 15.9 V
5	PFC Power Transistor	Q 6 Rated 600V/23.8A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 476 V (2) 404 V (3) 456 V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.0KVAC/min I/P-FG: 2.0KVAC/min O/P-FG: 0.5KVAC/min	I/P-O/P: 3.6KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG: 0.6 KVAC/min Ta: 25°C	I/P-O/P: 2.671 mA I/P-FG: 2.720 mA O/P-FG: 2.316 mA 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: >9999 MΩ I/P-FG: >9999 MΩ O/P-FG: >9999 MΩ
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	14 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
2	CONDUCTION	EN55022	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55022	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
4	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N: 1KV L,N-PE: 2KV	I/P: 230VAC/50HZ O/P: FULL LOAD L-N: 1KV L,N-PE: 2KV Ta: 25°C	CRITERIA A
5	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																												
1	TEMPERATURE RISE TEST	MODEL: ERPF-400-24 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=35.7 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=37.2 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=35.7 °C</th><th>HIGH AMBIENT Ta=37.2 °C</th></tr><tr><td>1</td><td>BD1</td><td>106.7°C</td><td>107.5°C</td></tr><tr><td>2</td><td>RTH1</td><td>111.8°C</td><td>112.6°C</td></tr><tr><td>3</td><td>L1</td><td>114.8°C</td><td>115.8°C</td></tr><tr><td>4</td><td>Q6</td><td>105.8°C</td><td>106.9°C</td></tr><tr><td>5</td><td>C5</td><td>102.4°C</td><td>103.5°C</td></tr><tr><td>6</td><td>Q1</td><td>108.5°C</td><td>109.8°C</td></tr><tr><td>7</td><td>Q2</td><td>107.5°C</td><td>108.8°C</td></tr><tr><td>8</td><td>C35</td><td>98.3°C</td><td>99.5°C</td></tr><tr><td>9</td><td>D6</td><td>104.6°C</td><td>106.0°C</td></tr><tr><td>10</td><td>T1</td><td>117.2°C</td><td>118.0°C</td></tr><tr><td>11</td><td>Q101</td><td>108.9°C</td><td>109.9°C</td></tr><tr><td>12</td><td>Q102</td><td>105.4°C</td><td>106.2°C</td></tr><tr><td>13</td><td>Q103</td><td>101.2°C</td><td>102.0°C</td></tr><tr><td>14</td><td>L100</td><td>118.1°C</td><td>119.1°C</td></tr><tr><td>15</td><td>C121</td><td>97.9°C</td><td>98.8°C</td></tr><tr><td>16</td><td>C107</td><td>88.8°C</td><td>89.5°C</td></tr><tr><td>17</td><td>R17</td><td>115.0°C</td><td>116.2°C</td></tr><tr><td>18</td><td>TSW1</td><td>89.5°C</td><td>91.2°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta=35.7 °C	HIGH AMBIENT Ta=37.2 °C	1	BD1	106.7°C	107.5°C	2	RTH1	111.8°C	112.6°C	3	L1	114.8°C	115.8°C	4	Q6	105.8°C	106.9°C	5	C5	102.4°C	103.5°C	6	Q1	108.5°C	109.8°C	7	Q2	107.5°C	108.8°C	8	C35	98.3°C	99.5°C	9	D6	104.6°C	106.0°C	10	T1	117.2°C	118.0°C	11	Q101	108.9°C	109.9°C	12	Q102	105.4°C	106.2°C	13	Q103	101.2°C	102.0°C	14	L100	118.1°C	119.1°C	15	C121	97.9°C	98.8°C	16	C107	88.8°C	89.5°C	17	R17	115.0°C	116.2°C	18	TSW1	89.5°C	91.2°C
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12	Q102	105.4°C	106.2°C																																																																													
13	Q103	101.2°C	102.0°C																																																																													
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15	C121	97.9°C	98.8°C																																																																													
16	C107	88.8°C	89.5°C																																																																													
17	R17	115.0°C	116.2°C																																																																													
18	TSW1	89.5°C	91.2°C																																																																													
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/90VAC O/P: FULL LOAD/50% LOAD Ta= -35°C	TEST: OK																																																																												
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 35°C NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta=35°C HUMIDITY= 95 %R.H	TEST: OK																																																																												
4	TEMPERATURE COEFFICIENT	±0.1 %/°C (0~35°C)	I/P: 230 VAC O/P: FULL LOAD	± 0.084 %/°C (0~35°C)																																																																												
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -35°C ~ +90°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																																																																												



6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -35℃ ~ +40℃ 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 AC on 3 sec/AC off 1 sec TEST	TEST: OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10min/sweep cycle (4) Acceleration: 3G (5) Test Time: 60min in each axis (X.Y.Z) (6) Ta: 25℃	TEST: OK
8	CAPACITOR LIFE CYCLE	ERPF-400-24: SUPPOSE C102 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= 35 ℃ LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 35 ℃ LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 35 ℃ LIFE TIME	(1) 65603 HRS (2) 34683 HRS (3) 99712 HRS (4) 213810 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 233.422K hrs min. MIL-HDBK-217F (25℃)	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	CHENZH/ZHUOKB	SKY	LIUWY