



Test Report: **ERPF-400-12**

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)	10.8V~13.2V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	10.13V~ 13.47 V
2	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P: 90VAC / 264VAC O/P: FULL/ NO LOAD Ta: 25°C	-0.41%~ 0.41%
3	LINE REGULATION	-0.5%~+0.5%	I/P: 200VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	-0.14 %~ 0.305 %
4	LOAD REGULATION	-0.5%~+0.5%	I/P: 230VAC O/P: FULL -NO LOAD Ta: 25°C	-0.138%~ 0.306 %
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	37 mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>high frequency :</p> </div> <div style="width: 45%;"> <p>low frequency :</p> </div> </div>				
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/ 520 ms 115VAC/ 672 ms
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage</p> </div> </div>				
8	RISE TIME (Max)	230VAC/ 100ms 115VAC/ 100ms	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 68.0 ms 115VAC/ 66.8 ms

	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage</p>	
<p>9 HOLD UP TIME(Typ)</p>	<p>230VAC/ 10ms 115VAC/ 10ms</p>	<p>I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C</p>	<p>230VAC/ 14.4 ms 115VAC/ 14.4 ms</p>
	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage</p>	
<p>10 DYNAMIC LOAD</p>	<p>V1: 1200 mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta: 25°C</p>	<p>(1) 880mVp-p (2) 548mVp-p</p>
	<p>FULL /50% LOAD 50%DUTY / 120HZ</p>	<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>	

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	3.0A/115VAC 2.5A/230VAC	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD/50% LOAD Ta: 25°C	I = 1.59 A/ 115VAC I = 1.07 A/ 230VAC
4	LEAKAGE CURRENT	< 1mA / 240VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.448 mA N-FG: 0.345 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
			<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2: Input current CH1: AC Input Voltage</p> <p>17 8月 2016 15:22:13</p> </div> <div style="text-align: center;"> <p>INPUT=115VAC/50HZ @ 50% LOAD</p> <p>CH2: Input current CH1: AC Input Voltage</p> <p>17 8月 2016 15:24:07</p> </div> </div>	
6	EFFICIENCY(Typ)	89%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.33 %
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= 0.995 / 115VAC PF= 0.985 / 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	118.9 %/ 200VAC 120.2 %/ 230VAC 121.2%/ 264VAC Constant Current Limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.8V-16.2V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	14.67 V/ 90VAC 14.67 V/ 230VAC 14.67 V/ 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) 440 V (2) 488 V (3) 436 V
2	O/P Diode (MOSFET)	Q101 Rated 100V/60A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 51.2 V (2) 55.2 V (3) 60.0 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) 392 V (2) 384 V (3) 388 V
4	Control IC	U1 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) 512 V (2) 384 V (3) 496 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: 3.110 mA I/P-FG: 2.954 mA O/P-FG: 2.110 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	13 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-400-12 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=34.3 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta=35.1 °C																																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=34.3 °C</th> <th>HIGH AMBIENT Ta=35.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>98.1°C</td><td>101.0°C</td></tr> <tr><td>2</td><td>RTH1</td><td>113.2°C</td><td>115.2°C</td></tr> <tr><td>3</td><td>L1</td><td>115.2°C</td><td>119.4°C</td></tr> <tr><td>4</td><td>Q6</td><td>112.6°C</td><td>116.0°C</td></tr> <tr><td>5</td><td>C5</td><td>100.1°C</td><td>103.2°C</td></tr> <tr><td>6</td><td>Q1</td><td>104.5°C</td><td>107.1°C</td></tr> <tr><td>7</td><td>Q2</td><td>107.8°C</td><td>110.4°C</td></tr> <tr><td>8</td><td>D6</td><td>106.4°C</td><td>109.7°C</td></tr> <tr><td>9</td><td>C35</td><td>97.0°C</td><td>100.0°C</td></tr> <tr><td>10</td><td>T1</td><td>111.7°C</td><td>115.1°C</td></tr> <tr><td>11</td><td>U1</td><td>96.3°C</td><td>99.2°C</td></tr> <tr><td>12</td><td>Q101</td><td>107.1°C</td><td>110.5°C</td></tr> <tr><td>13</td><td>Q102</td><td>109.3°C</td><td>112.1°C</td></tr> <tr><td>14</td><td>Q103</td><td>104.4°C</td><td>106.7°C</td></tr> <tr><td>15</td><td>L100</td><td>116.8°C</td><td>120.2°C</td></tr> <tr><td>16</td><td>C122</td><td>96.0°C</td><td>98.9°C</td></tr> <tr><td>17</td><td>C106</td><td>91.2°C</td><td>93.8°C</td></tr> <tr><td>18</td><td>R17</td><td>111.8°C</td><td>115.1°C</td></tr> <tr><td>19</td><td>TSW1</td><td>90.7°C</td><td>92.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=34.3 °C	HIGH AMBIENT Ta=35.1 °C	1	BD1	98.1°C	101.0°C	2	RTH1	113.2°C	115.2°C	3	L1	115.2°C	119.4°C	4	Q6	112.6°C	116.0°C	5	C5	100.1°C	103.2°C	6	Q1	104.5°C	107.1°C	7	Q2	107.8°C	110.4°C	8	D6	106.4°C	109.7°C	9	C35	97.0°C	100.0°C	10	T1	111.7°C	115.1°C	11	U1	96.3°C	99.2°C	12	Q101	107.1°C	110.5°C	13	Q102	109.3°C	112.1°C	14	Q103	104.4°C	106.7°C	15	L100	116.8°C	120.2°C	16	C122	96.0°C	98.9°C	17	C106	91.2°C	93.8°C	18	R17	111.8°C	115.1°C	19	TSW1	90.7°C	92.4°C
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18	R17	111.8°C	115.1°C																																																																																	
19	TSW1	90.7°C	92.4°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	±0.021 %/°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°C ~ +40°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 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°C	TEST: OK
8	CAPACITOR LIFE CYCLE	ERPF-400-12: SUPPOSE C102 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= 35 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 35 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 35 °C LIFE TIME	(1) 71374 HRS (2) 31514 HRS (3) 102275 HRS (4) 226259 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 233.422K hrs min. MIL-HDBK-217F (25°C)	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	CHENZH/ZHUOKB	SKY	LIUWY