



Test Report: ERPF-400-48

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

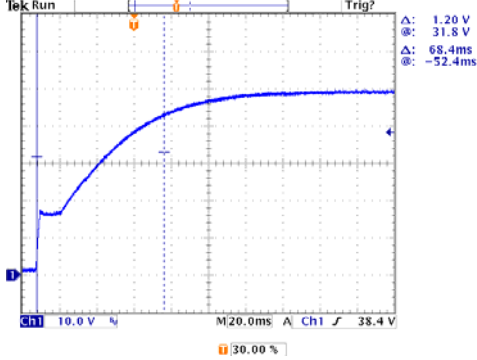
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE (For A-Type only)	43.2 V-52.8 V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	42.11 V- 56.15 V
2	OUTPUT VOLTAGE TOLERANCE	-1%~+1%	I/P: 90VAC / 264VAC O/P: FULL / NO LOAD Ta: 25°C	-0.11%~ 0.28%
3	LINE REGULATION	-0.5%~+0.5%	I/P: 200VAC ~ 264VAC O/P: FULL LOAD Ta: 25°C	-0.06 %~ 0.06 %
4	LOAD REGULATION	-0.5%~+0.5%	I/P: 230VAC O/P: FULL -NO LOAD Ta: 25°C	-0.1%~ 0.1%
5	OVER/UNDERSHOOT TEST	<±5 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5 %
6	RIPPLE & NOISE (Max)	240mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	40.8 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/ 536 ms 115VAC/ 680 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	230VAC/ 68.4 ms 115VAC/ 68.4 ms

Ta: 25°C

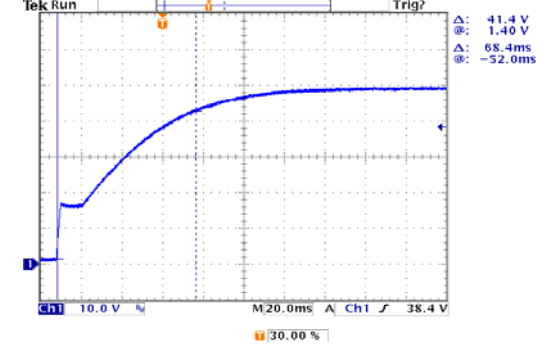
INPUT=230VAC/50HZ @ FULL LOAD

CH1: Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1: Output Voltage



9 HOLD UP TIME(Typ)

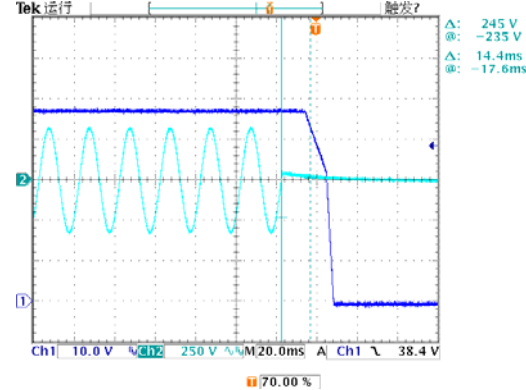
230VAC/ 10ms
115VAC/ 10ms

I/P: 230 VAC
I/P: 115 VAC
O/P: FULL LOAD
Ta: 25°C

230VAC/ 14.4 ms
115VAC/ 28.4 ms

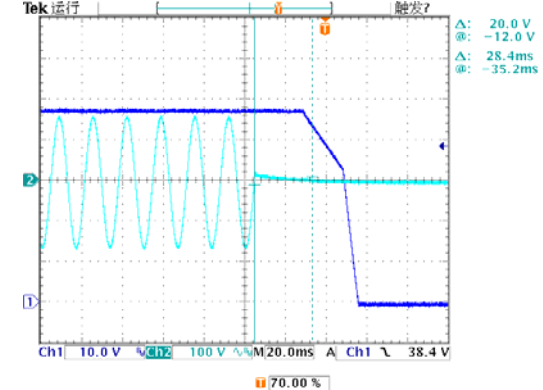
INPUT=230VAC/50HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1: Output Voltage CH2: AC Input Voltage



10 DYNAMIC LOAD

V1: 4800 mVp-p

I/P: 230VAC

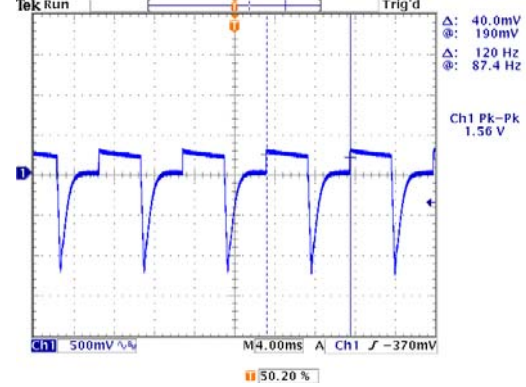
O/P:

(1) FULL/50% LOAD 50%DUTY / 120HZ
(2) FULL/50% LOAD 50%DUTY / 1KHZ

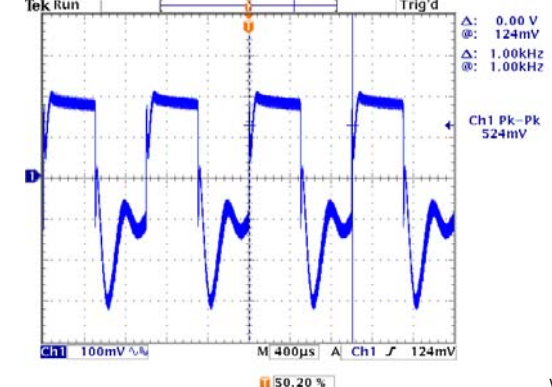
(1) 1560mVp-p
(2) 524 mVp-p

Ta: 25°C

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 = 1.94 A/ 115VAC I = 1.90 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 = 42.2 A/ 115VAC I = 83.5 A/ 230VAC
			<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2: Input current CH1: AC Input Voltage</p> <p>425.0 A 83.5 A 100 V 400us 2.50M次/秒 10k 点 -40.5 A 17 8月 2016 15:32:43</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/50HZ @ 50% LOAD</p> <p>CH2: Input current CH1: AC Input Voltage</p> <p>410.0 A 42.2 A 50.0 V 400us 2.50M次/秒 10k 点 -7.00 A 17 8月 2016 15:10:57</p> </div> </div>	
6	EFFICIENCY(Typ)	91%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	91.88 %
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= 0.985 / 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	1205 %/ 200VAC 120.5 %/ 230VAC 120.5 %/ 264VAC Constant Current Limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	55.2V-64.8V	I/P: 90VAC I/P: 230VAC I/P: 264VAC O/P: NO LOAD Ta: 25°C	58.7 V/ 90VAC 58.7 V/ 230VAC 58.7 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) 460 V (2) 482 V (3) 445 V
2	O/P Diode (MOSFET)	Q101 Rated 300V/10A	I/P: High-Line +3V =267V O/P: (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta: 25°C	(1) 203 V (2) 62.8 V (3) 200 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) 17.2 V (2) 17.2 V (3) 16.6 V (4) 17.0 V (5) 16.1 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) 470 V (2) 390 V (3) 458 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: 2.571 mA I/P-FG: 2.620 mA O/P-FG: 2.516 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-400-48 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 border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=35.7 °C</th> <th>HIGH AMBIENT Ta=37.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>100.7°C</td><td>101.1°C</td></tr> <tr><td>2</td><td>RTH1</td><td>107.6°C</td><td>107.5°C</td></tr> <tr><td>3</td><td>L1</td><td>110.0°C</td><td>110.7°C</td></tr> <tr><td>4</td><td>Q6</td><td>102.1°C</td><td>105.0°C</td></tr> <tr><td>5</td><td>C5</td><td>99.9°C</td><td>100.7°C</td></tr> <tr><td>6</td><td>Q1</td><td>104.4°C</td><td>105.1°C</td></tr> <tr><td>7</td><td>Q2</td><td>104.5°C</td><td>105.0°C</td></tr> <tr><td>8</td><td>C35</td><td>95.5°C</td><td>96.2°C</td></tr> <tr><td>9</td><td>D6</td><td>102.2°C</td><td>102.6°C</td></tr> <tr><td>10</td><td>T1</td><td>116.9°C</td><td>117.1°C</td></tr> <tr><td>11</td><td>U1</td><td>94.1°C</td><td>94.1°C</td></tr> <tr><td>12</td><td>Q101</td><td>96.2°C</td><td>96.0°C</td></tr> <tr><td>13</td><td>Q102</td><td>95.5°C</td><td>96.2°C</td></tr> <tr><td>14</td><td>Q103</td><td>93.8°C</td><td>94.1°C</td></tr> <tr><td>15</td><td>L100</td><td>109.5°C</td><td>108.3°C</td></tr> <tr><td>16</td><td>C121</td><td>91.4°C</td><td>91.8°C</td></tr> <tr><td>17</td><td>C107</td><td>80.6°C</td><td>80.9°C</td></tr> <tr><td>18</td><td>TSW1</td><td>84.8°C</td><td>85.2°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=35.7 °C	HIGH AMBIENT Ta=37.2 °C	1	BD1	100.7°C	101.1°C	2	RTH1	107.6°C	107.5°C	3	L1	110.0°C	110.7°C	4	Q6	102.1°C	105.0°C	5	C5	99.9°C	100.7°C	6	Q1	104.4°C	105.1°C	7	Q2	104.5°C	105.0°C	8	C35	95.5°C	96.2°C	9	D6	102.2°C	102.6°C	10	T1	116.9°C	117.1°C	11	U1	94.1°C	94.1°C	12	Q101	96.2°C	96.0°C	13	Q102	95.5°C	96.2°C	14	Q103	93.8°C	94.1°C	15	L100	109.5°C	108.3°C	16	C121	91.4°C	91.8°C	17	C107	80.6°C	80.9°C	18	TSW1	84.8°C	85.2°C
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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	±0.07 %/°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-400-48: 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) 167774 HRS (2) 91178 HRS (3) 188276 HRS (4) 340200 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