



Test Report: EPP-150-27

150W Single Output with PFC Function

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control 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	VERDICT
1	RIPPLE & NOISE	V1 : 240 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 44.4 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 26.46 V ~ 28.35 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	25.694 V ~ 29.487 V/ 230 VAC 25.695 V ~ 29.487 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1 % ~ -1 % (Max)	I/P : 100VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.03 % ~ -0.03 %	P
4	LINE REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.03 % ~ -0.03 %	P
5	LOAD REGULATION	V1 : 1 % ~ -1 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : 0.03 % ~ -0.03 %	P
6	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 2000 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 390 ms 115VAC/ 750 ms	P
7	RISE TIME	230VAC : 30 ms (Max) 115VAC : 30 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 7 ms 115VAC/ 7 ms	P
8	HOLD UP TIME	230VAC : 16 ms (TYP) 115VAC : 16 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 22 ms 115VAC/ 21 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 2700 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1)298 mVp-p (2)252 mVp-p (3)265 mVp-p (4)2560 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	59V~264V	P
			I/P : LOW-LINE-3V= 87 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST : OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 100 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP) 0.98 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.963 / 230 VAC PF= 0.995 / 115 VAC	P
4	EFFICIENCY	92 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	92.53 %	P
5	INPUT CURRENT	230V/ 1 A (TYP) 115V/ 1.8 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 0.75 A/ 230 VAC I= 1.49 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 70 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I= 57 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.11 mA N-FG : 0.11 mA	P
8	NO LOAD CONSUMPTION	< 0.5 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.37 W < 0.42 W	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105% ~ 145 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	125 %/ 230 VAC 125 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 30.2V ~ 34.05 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	31.834V/ 230 VAC 31.821V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : RTH2 : $110 \pm 10^{\circ}\text{C}$ TSW1 : $110 \pm 5^{\circ}\text{C}$ O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	AUXILIARY POWER (AUX)	12V@0.3A for driver a fan, tolerance $\pm 10\%$ at main output 100% load	I/P : 230 VAC O/P : FULL LOAD	FAN VOLTAGE : 12.546V	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q6 Rated : STD10NM60N 8A/650V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 448 V (2) 436 V (3) 432 V	P
2	Diode Peak Voltage	Q100 Rated : PFR30L100CT 30A/100V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 68.4 V (2) 27 V (3) 67.2 V	P
3	Input Capacitor Voltage	C5 Rated : 100u/420V 105°C 18*25 PAG	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 408 V (2) 406 V (3) 408 V	P
4	Control IC Voltage Test	U 1 Rated : NCP1605 10V~20V U900 Rated : L6599AD 8.85V~16V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 16.9 V (2) 17.8 V (3) 13.9 V (4) 15 V (5) 15 V (6) 13.9 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : STF28NM50N 21A/500V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 478 V (2) 448 V (3) 452 V	P

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 1.684 mA I/P-FG : 0.784 mA O/P-FG : 0.276 mA NO DAMAGE	P
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/70%RH	I/P-O/P : 30 GΩ I/P-FG : 30 GΩ O/P-FG : 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	27mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
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	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
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	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																																																													
1	TEMPERATURE RISE TEST	<div>MODEL : EPP-150-24</div> <div>1. ROOM AMBIENT BURN-IN : 4 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta=34.1 °C</div> <div>2. HIGH AMBIENT BURN-IN : 2 HRS</div> <div>I/P : 230VAC O/P : FULL LOAD Ta= 52.6 °C</div> <table><tr><th>NO</th><th>Position</th><th>PART NUMBER</th><th>ROOM AMBIENT Ta= 34.1 °C</th><th>HIGH AMBIENT Ta= 52.6 °C</th></tr><tr><td>1</td><td>LF2</td><td>TR781-R6</td><td>43.9°C</td><td>62.8°C</td></tr><tr><td>2</td><td>BD1</td><td>6A/800V SILICON GBU608</td><td>42.4°C</td><td>61.8°C</td></tr><tr><td>3</td><td>L2</td><td>TR1030</td><td>45.8°C</td><td>64.7°C</td></tr><tr><td>4</td><td>L1</td><td>TF2383</td><td>52.1°C</td><td>71.2°C</td></tr><tr><td>5</td><td>Q1</td><td>STF28NM50N 21A/500V</td><td>47.1°C</td><td>66.2°C</td></tr><tr><td>6</td><td>D5</td><td>BYV29X-600 7A/600V</td><td>56.7°C</td><td>74.3°C</td></tr><tr><td>7</td><td>C5</td><td>100u/420V 105°C 18*25 PAG</td><td>44.1°C</td><td>62.2°C</td></tr><tr><td>8</td><td>LF1</td><td>TR962</td><td>37.6°C</td><td>56.7°C</td></tr><tr><td>9</td><td>Q5</td><td>SMD FET STD10NM60N 8A/650V</td><td>40.2°C</td><td>59.4°C</td></tr><tr><td>10</td><td>Q6</td><td>SMD FET STD10NM60N 8A/650V</td><td>39.4°C</td><td>59.2°C</td></tr><tr><td>11</td><td>U900</td><td>PWM L6599AD</td><td>44.6°C</td><td>64.3°C</td></tr><tr><td>12</td><td>C38</td><td>47u/35V L6Kh 5*11 ZLH</td><td>40.7°C</td><td>59.7°C</td></tr><tr><td>13</td><td>C36</td><td>150u/25V UL6Kh 6.3*11 ZLH</td><td>44.5°C</td><td>63.5°C</td></tr><tr><td>14</td><td>C251</td><td>100u/25V L5Kh 5*11 YXJ</td><td>46.4°C</td><td>63.1°C</td></tr><tr><td>15</td><td>T1</td><td>TF2386</td><td>69.3°C</td><td>89.2°C</td></tr><tr><td>16</td><td>Q101</td><td>IRFB3607PBF 80A/75V</td><td>39.4°C</td><td>59.2°C</td></tr><tr><td>17</td><td>Q100</td><td>IRFB3607PBF 80A/75V</td><td>37.1°C</td><td>56.8°C</td></tr><tr><td>18</td><td>C105</td><td>680u/35V UL10Kh 10*25 KZM</td><td>35.3°C</td><td>54.6°C</td></tr><tr><td>19</td><td>C106</td><td>680u/35V UL10Kh 10*25 KZM</td><td>37.5°C</td><td>57.0°C</td></tr><tr><td>20</td><td>C201</td><td>100u/25V UL10Kh 6.3*11 YXM</td><td>39.3°C</td><td>58.7°C</td></tr><tr><td>21</td><td>C107</td><td>220u/35V UL8Kh 8*11.5 ZLH</td><td>43.2°C</td><td>61.3°C</td></tr><tr><td>22</td><td>RTH2</td><td>NTC 100KΩ 3Φ TTC3A104F4193EY 1%</td><td>45.7°C</td><td>64.8°C</td></tr><tr><td>23</td><td>TSW2</td><td>BW-DCP-R0 115°C 40mm P</td><td>38.8°C</td><td>58.5°C</td></tr><tr><td>24</td><td>U1</td><td>PWM NCP1605DR2G</td><td>43.2°C</td><td>62.0°C</td></tr></table>			NO	Position	PART NUMBER	ROOM AMBIENT Ta= 34.1 °C	HIGH AMBIENT Ta= 52.6 °C	1	LF2	TR781-R6	43.9°C	62.8°C	2	BD1	6A/800V SILICON GBU608	42.4°C	61.8°C	3	L2	TR1030	45.8°C	64.7°C	4	L1	TF2383	52.1°C	71.2°C	5	Q1	STF28NM50N 21A/500V	47.1°C	66.2°C	6	D5	BYV29X-600 7A/600V	56.7°C	74.3°C	7	C5	100u/420V 105°C 18*25 PAG	44.1°C	62.2°C	8	LF1	TR962	37.6°C	56.7°C	9	Q5	SMD FET STD10NM60N 8A/650V	40.2°C	59.4°C	10	Q6	SMD FET STD10NM60N 8A/650V	39.4°C	59.2°C	11	U900	PWM L6599AD	44.6°C	64.3°C	12	C38	47u/35V L6Kh 5*11 ZLH	40.7°C	59.7°C	13	C36	150u/25V UL6Kh 6.3*11 ZLH	44.5°C	63.5°C	14	C251	100u/25V L5Kh 5*11 YXJ	46.4°C	63.1°C	15	T1	TF2386	69.3°C	89.2°C	16	Q101	IRFB3607PBF 80A/75V	39.4°C	59.2°C	17	Q100	IRFB3607PBF 80A/75V	37.1°C	56.8°C	18	C105	680u/35V UL10Kh 10*25 KZM	35.3°C	54.6°C	19	C106	680u/35V UL10Kh 10*25 KZM	37.5°C	57.0°C	20	C201	100u/25V UL10Kh 6.3*11 YXM	39.3°C	58.7°C	21	C107	220u/35V UL8Kh 8*11.5 ZLH	43.2°C	61.3°C	22	RTH2	NTC 100KΩ 3Φ TTC3A104F4193EY 1%	45.7°C	64.8°C	23	TSW2	BW-DCP-R0 115°C 40mm P	38.8°C	58.5°C	24	U1	PWM NCP1605DR2G	43.2°C	62.0°C	P
NO	Position	PART NUMBER	ROOM AMBIENT Ta= 34.1 °C	HIGH AMBIENT Ta= 52.6 °C																																																																																																																														
1	LF2	TR781-R6	43.9°C	62.8°C																																																																																																																														
2	BD1	6A/800V SILICON GBU608	42.4°C	61.8°C																																																																																																																														
3	L2	TR1030	45.8°C	64.7°C																																																																																																																														
4	L1	TF2383	52.1°C	71.2°C																																																																																																																														
5	Q1	STF28NM50N 21A/500V	47.1°C	66.2°C																																																																																																																														
6	D5	BYV29X-600 7A/600V	56.7°C	74.3°C																																																																																																																														
7	C5	100u/420V 105°C 18*25 PAG	44.1°C	62.2°C																																																																																																																														
8	LF1	TR962	37.6°C	56.7°C																																																																																																																														
9	Q5	SMD FET STD10NM60N 8A/650V	40.2°C	59.4°C																																																																																																																														
10	Q6	SMD FET STD10NM60N 8A/650V	39.4°C	59.2°C																																																																																																																														
11	U900	PWM L6599AD	44.6°C	64.3°C																																																																																																																														
12	C38	47u/35V L6Kh 5*11 ZLH	40.7°C	59.7°C																																																																																																																														
13	C36	150u/25V UL6Kh 6.3*11 ZLH	44.5°C	63.5°C																																																																																																																														
14	C251	100u/25V L5Kh 5*11 YXJ	46.4°C	63.1°C																																																																																																																														
15	T1	TF2386	69.3°C	89.2°C																																																																																																																														
16	Q101	IRFB3607PBF 80A/75V	39.4°C	59.2°C																																																																																																																														
17	Q100	IRFB3607PBF 80A/75V	37.1°C	56.8°C																																																																																																																														
18	C105	680u/35V UL10Kh 10*25 KZM	35.3°C	54.6°C																																																																																																																														
19	C106	680u/35V UL10Kh 10*25 KZM	37.5°C	57.0°C																																																																																																																														
20	C201	100u/25V UL10Kh 6.3*11 YXM	39.3°C	58.7°C																																																																																																																														
21	C107	220u/35V UL8Kh 8*11.5 ZLH	43.2°C	61.3°C																																																																																																																														
22	RTH2	NTC 100KΩ 3Φ TTC3A104F4193EY 1%	45.7°C	64.8°C																																																																																																																														
23	TSW2	BW-DCP-R0 115°C 40mm P	38.8°C	58.5°C																																																																																																																														
24	U1	PWM NCP1605DR2G	43.2°C	62.0°C																																																																																																																														
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 122 % LOAD Ta : 25°C	TEST : OK	P																																																																																																																													
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35 °C	TEST : OK	P																																																																																																																													
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																																																													
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.007 %/°C (0~50°C)	P																																																																																																																													

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°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	OK	P
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	OK	P
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	EPP-150-24:SUPPOSE C106 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= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 2888088HRS (2) 483044HRS (3) 493097HRS (4) 496530HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 207.1 KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2012/5/7	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2012/5/30	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023