



Test Report: EPP-150-12

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 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 135 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 11.76 V ~ 12.6 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	11.514 V ~ 13.045 V/ 230 VAC 11.514 V ~ 13.044 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 2 % ~ -2 % (Max)	I/P : 100VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.08 % ~ -0.08 %	P
4	LINE REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0 %	P
5	LOAD REGULATION	V1 : 1 % ~ -1 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.05 % ~ -0.05 %	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/ 306 ms 115VAC/ 610 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/ 16 ms 115VAC/ 16 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/ 19 ms 115VAC/ 19 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 : 1200 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)932 mVp-p (2)840 mVp-p (3)688 mVp-p (4)704 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 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)	60V~264V TEST : OK	P
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= 0.970 / 230 VAC PF= 0.995 / 115 VAC	P
4	EFFICIENCY	91.5% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	92.336 %	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= 0.74 A/ 230 VAC I= 1.5 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	< 0.42 W < 0.39 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	124 %/ 230 VAC 124 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 13.2V ~ 15.6 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	14.349 V/ 230 VAC 14.375 V/ 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 : 11.735 V	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) 422 V (2) 418 V (3) 416 V	P
2	Diode Peak Voltage	Q100 Rated : IRFB3607PBF 80A/75V	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) 33.6 V (2) 35.8 V (3) 32.4 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) 402 V (2) 406 V (3) 418 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 V (2) 15.2 V (3) 12.9 V (4) 15.3 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) 462 V (2) 444 V (3) 446 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 : 1.625 mA I/P-FG : 0.807 mA O/P-FG : 0.285 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	27 mΩ	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-150-12</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><thead><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></thead><tbody><tr><td>1</td><td>LF2</td><td>TR781-R6</td><td>44.3°C</td><td>63.1°C</td></tr><tr><td>2</td><td>BD1</td><td>6A/800V SILICON GBU608</td><td>49.9°C</td><td>67.3°C</td></tr><tr><td>3</td><td>L2</td><td>TR1030</td><td>46.4°C</td><td>64.4°C</td></tr><tr><td>4</td><td>L1</td><td>TF2383</td><td>51.9°C</td><td>71.3°C</td></tr><tr><td>5</td><td>Q1</td><td>STF28NM50N 21A/500V</td><td>45.8°C</td><td>63.9°C</td></tr><tr><td>6</td><td>D5</td><td>BYV29X-600 7A/600V</td><td>58.2°C</td><td>74.4°C</td></tr><tr><td>7</td><td>C5</td><td>100u/420V 105°C 18*25 PAG</td><td>41.4°C</td><td>59.1°C</td></tr><tr><td>8</td><td>LF1</td><td>TR962</td><td>35.1°C</td><td>53.7°C</td></tr><tr><td>9</td><td>Q5</td><td>SMD FET STD10NM60N 8A/650V</td><td>39.6°C</td><td>58.2°C</td></tr><tr><td>10</td><td>Q6</td><td>SMD FET STD10NM60N 8A/650V</td><td>38.4°C</td><td>57.7°C</td></tr><tr><td>11</td><td>U900</td><td>PWM L6599AD</td><td>43.6°C</td><td>62.5°C</td></tr><tr><td>12</td><td>C921</td><td>47u/35V L6Kh 5*11 ZLH</td><td>42.1°C</td><td>60.6°C</td></tr><tr><td>13</td><td>C36</td><td>150u/25V UL6Kh 6.3*11 ZLH</td><td>41.7°C</td><td>60.7°C</td></tr><tr><td>14</td><td>C251</td><td>100u/25V L5Kh 5*11 YXJ</td><td>41.7°C</td><td>61.1°C</td></tr><tr><td>15</td><td>T1</td><td>TF2384</td><td>51.0°C</td><td>69.3°C</td></tr><tr><td>16</td><td>Q101</td><td>IRFB3607PBF 80A/75V</td><td>45.7°C</td><td>65.8°C</td></tr><tr><td>17</td><td>Q100</td><td>IRFB3607PBF 80A/75V</td><td>40.1°C</td><td>59.5°C</td></tr><tr><td>18</td><td>C105</td><td>1800u/16V UL10Kh 10*23 ZLH</td><td>40.0°C</td><td>59.2°C</td></tr><tr><td>19</td><td>C106</td><td>1800u/16V UL10Kh 10*23 ZLH</td><td>41.1°C</td><td>60.7°C</td></tr><tr><td>20</td><td>C201</td><td>100u/25V UL10Kh 6.3*11 YXM</td><td>43.0°C</td><td>62.7°C</td></tr><tr><td>21</td><td>C107</td><td>470u/16V UL8Kh 8*11.5 ZLH</td><td>46.1°C</td><td>65.3°C</td></tr><tr><td>22</td><td>RTH2</td><td>NTC 100KΩ 3Φ TTC3A104F4193EY 1%</td><td>43.7°C</td><td>62.3°C</td></tr><tr><td>23</td><td>TSW2</td><td>BW-DCP-R0 115°C 40mm P</td><td>43.7°C</td><td>63.2°C</td></tr><tr><td>24</td><td>U1</td><td>PWM NCP1605DR2G</td><td>44.7°C</td><td>62.0°C</td></tr></tbody></table>			NO	Position	PART NUMBER	ROOM AMBIENT Ta= 34.1 °C	HIGH AMBIENT Ta= 52.6 °C	1	LF2	TR781-R6	44.3°C	63.1°C	2	BD1	6A/800V SILICON GBU608	49.9°C	67.3°C	3	L2	TR1030	46.4°C	64.4°C	4	L1	TF2383	51.9°C	71.3°C	5	Q1	STF28NM50N 21A/500V	45.8°C	63.9°C	6	D5	BYV29X-600 7A/600V	58.2°C	74.4°C	7	C5	100u/420V 105°C 18*25 PAG	41.4°C	59.1°C	8	LF1	TR962	35.1°C	53.7°C	9	Q5	SMD FET STD10NM60N 8A/650V	39.6°C	58.2°C	10	Q6	SMD FET STD10NM60N 8A/650V	38.4°C	57.7°C	11	U900	PWM L6599AD	43.6°C	62.5°C	12	C921	47u/35V L6Kh 5*11 ZLH	42.1°C	60.6°C	13	C36	150u/25V UL6Kh 6.3*11 ZLH	41.7°C	60.7°C	14	C251	100u/25V L5Kh 5*11 YXJ	41.7°C	61.1°C	15	T1	TF2384	51.0°C	69.3°C	16	Q101	IRFB3607PBF 80A/75V	45.7°C	65.8°C	17	Q100	IRFB3607PBF 80A/75V	40.1°C	59.5°C	18	C105	1800u/16V UL10Kh 10*23 ZLH	40.0°C	59.2°C	19	C106	1800u/16V UL10Kh 10*23 ZLH	41.1°C	60.7°C	20	C201	100u/25V UL10Kh 6.3*11 YXM	43.0°C	62.7°C	21	C107	470u/16V UL8Kh 8*11.5 ZLH	46.1°C	65.3°C	22	RTH2	NTC 100KΩ 3Φ TTC3A104F4193EY 1%	43.7°C	62.3°C	23	TSW2	BW-DCP-R0 115°C 40mm P	43.7°C	63.2°C	24	U1	PWM NCP1605DR2G	44.7°C	62.0°C	P
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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	± 0.004 %/°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-150-12: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) 2061248HRS (2) 347117HRS (3) 424442HRS (4) 477528HRS	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