



Test Report: EPS-15-24

15W Single Output Switching Power Supply

■ 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 : 49 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 21.6 V ~ 27 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	20.19 V ~ 28.14 V/ 230 VAC 20.19 V ~ 28.14 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : -1 %~ +1 % (Max)	I/P : 85 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0 %~ 0.0246 %	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 : -0.5 %~ +0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.0248 %~ 0.0248 %	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/ 677 ms 115VAC/ 1586 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/ 10.8 ms 115VAC/ 10.5 ms	P
8	HOLD UP TIME	230VAC : 50 ms (TYP) 115VAC : 16 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 93.8 ms 115VAC/ 20.5 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : 1.66 %	P
10	DYNAMIC LOAD	V1 : 2400 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) 215 mVp-p (2) 125 mVp-p (3) 108 mVp-p (4) 468 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 82 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	57.8 V~264V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 85 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	EFFICIENCY	83 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	85.4 %	P
4	INPUT CURRENT	230V/ 0.2 A (TYP) 115V/ 0.4 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.14 A/ 230 VAC I = 0.26 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 45 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 43.4 A/ 230 VAC	P
6	LEAKAGE CURRENT	< 1 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.24 mA N-FG : 0.22 mA	P
7	NO LOAD CONSUMPTION	< 0.3 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.194 W	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115 % ~ 150 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	134.4 %/ 230 VAC 134.8 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 27.6 V ~33 V	O/P : MIN LOAD Ta : 25°C	30.9 V shut down clamping by zener diode	P
3	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	PEAK LOAD	16.56W@10SEC	I/P: 230VAC/115VAC O/P:PEAK LOAD Ta:25°C	16.56W@10SEC /230V 16.56W@10SEC /115V	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 600 V 4 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25℃	(1) 528 V (2) 536 V (3) 525 V	P
2	Diode Peak Voltage	Q101 Rated : 200 V 10 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25℃	(1) 123 V (2) 121 V (3) 125 V	P
3	Clamp Diode Peak Voltage	D 1 Rated : 800 V 2 A	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25℃	(1) 484 V (2) 480 V	P
4	Input Capacitor Voltage	C5 Rated : 33 u /400V/105℃	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℃	(1) 376 V (2) 376 V (3) 376 V	P
5	Control IC Voltage Test	U1 Rated : 28 V	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℃	(1) 17.8 V (2) 16.3 V (3) 16.8 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 : 1.29 mA I/P-FG : 0.73 mA O/P-FG : 0.26 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 : 9999 MΩ I/P-FG : 9999 MΩ O/P-FG : 9999 MΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	3 mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	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	MODEL : EPS-15-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=13.3 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=49.8°C <table><thead><tr><th>NO</th><th>Position</th><th>PART NUMBER</th><th>ROOM AMBIENT Ta= 13.3°C</th><th>HIGH AMBIENT Ta= 49.8°C</th></tr></thead><tbody><tr><td>1</td><td>BD1</td><td>BD 2A/800V GLASS KBP208G</td><td>38.7°C</td><td>74.1°C</td></tr><tr><td>2</td><td>LF1</td><td>LF LF510-R2 UU9.8 0.4A 27mH B</td><td>39.1°C</td><td>74.7°C</td></tr><tr><td>3</td><td>C5</td><td>C/E 33u/400V 105°C 12.5*20 KMG</td><td>32.7°C</td><td>68.1°C</td></tr><tr><td>4</td><td>Q1</td><td>FET NDF04N60ZG 4A/600V TO220F</td><td>62.0°C</td><td>95.9°C</td></tr><tr><td>5</td><td>T1(COIL)</td><td>MT TF5170-R0 EI-22 EPS-15-24 B</td><td>49.7°C</td><td>85.4°C</td></tr><tr><td>6</td><td>D100</td><td>SFRD FMX-12SL 10A/200V TO220F</td><td>58.6°C</td><td>90.8°C</td></tr><tr><td>7</td><td>C45</td><td>C/E 10u/50V UL10Kh 5*11 YXM</td><td>38.5°C</td><td>74.8°C</td></tr><tr><td>8</td><td>C102</td><td>C/E 100u/35V UL7Kh 8*11.5 YXF</td><td>37.0°C</td><td>70.3°C</td></tr><tr><td>9</td><td>C101</td><td>C/E 220u/35V UL7Kh 8*16 YXG-LLC</td><td>42.1°C</td><td>75.5°C</td></tr><tr><td>10</td><td>U1</td><td>PWM NCP1250BSN65T1G TOSP-6</td><td>39.0°C</td><td>74.5°C</td></tr></tbody></table>			NO	Position	PART NUMBER	ROOM AMBIENT Ta= 13.3°C	HIGH AMBIENT Ta= 49.8°C	1	BD1	BD 2A/800V GLASS KBP208G	38.7°C	74.1°C	2	LF1	LF LF510-R2 UU9.8 0.4A 27mH B	39.1°C	74.7°C	3	C5	C/E 33u/400V 105°C 12.5*20 KMG	32.7°C	68.1°C	4	Q1	FET NDF04N60ZG 4A/600V TO220F	62.0°C	95.9°C	5	T1(COIL)	MT TF5170-R0 EI-22 EPS-15-24 B	49.7°C	85.4°C	6	D100	SFRD FMX-12SL 10A/200V TO220F	58.6°C	90.8°C	7	C45	C/E 10u/50V UL10Kh 5*11 YXM	38.5°C	74.8°C	8	C102	C/E 100u/35V UL7Kh 8*11.5 YXF	37.0°C	70.3°C	9	C101	C/E 220u/35V UL7Kh 8*16 YXG-LLC	42.1°C	75.5°C	10	U1	PWM NCP1250BSN65T1G TOSP-6	39.0°C	74.5°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 133 % 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= -30 °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	± 0.002 %/°C (0~50°C)	P																																																							
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C~ +85°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 : -30°C~ +70°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/Fu1l 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℃	TEST : OK	P
9	CAPACITOR LIFE CYCLE	EPS-15-24 SUPPOSE C 102 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) 526196 HRS (2) 87699 HRS (3) 108750 HRS (4) 135773 HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 824.6 KHRS		
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50℃		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2012.9.18	RD SAMPLE	PASS	Shenym	Wangdz
2012.11.21	PRODUCT SAMPLE (Y1211B624)	PASS	Shenym	Wangdz

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