



TEST REPORT: EPS-120-24

120W 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

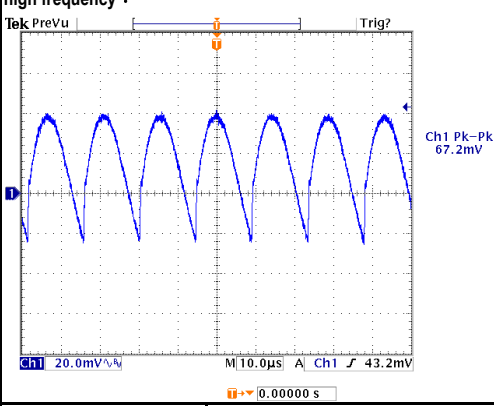
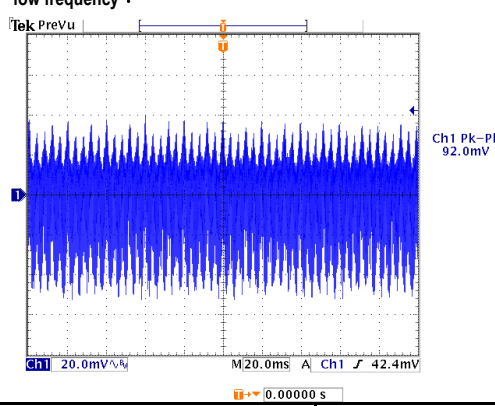
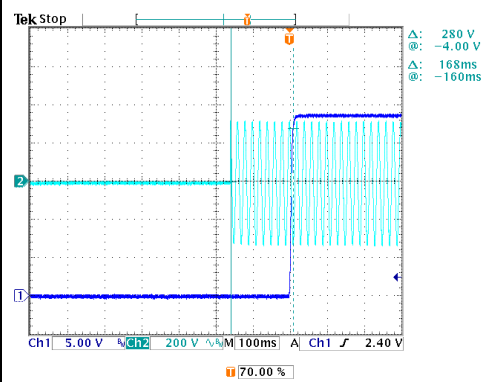
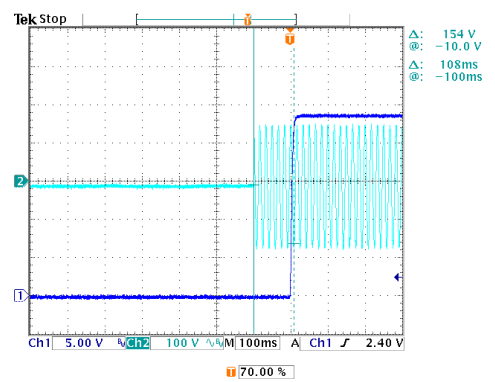
Safety Test

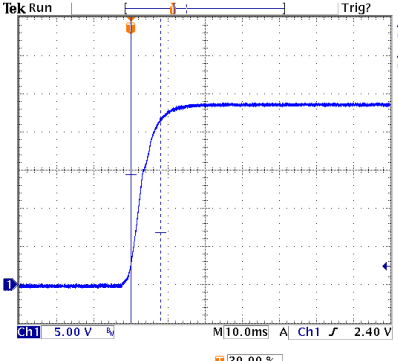
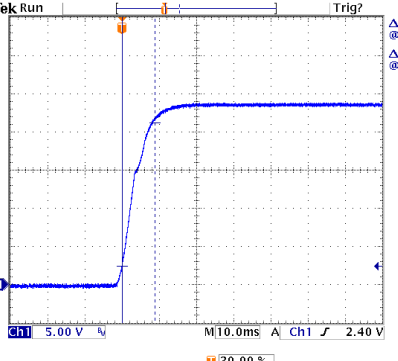
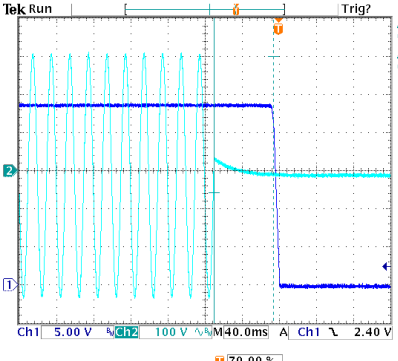
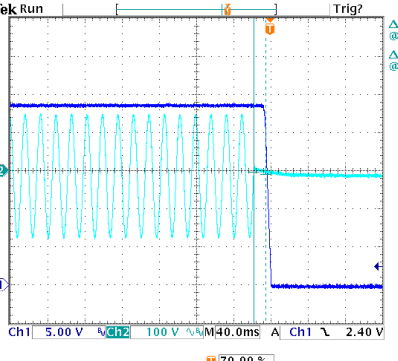
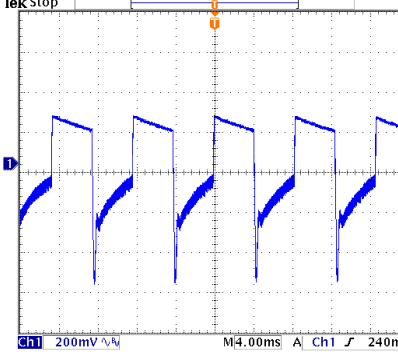
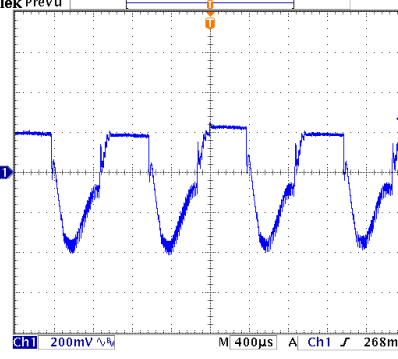
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

OUTPUT FUNCTION

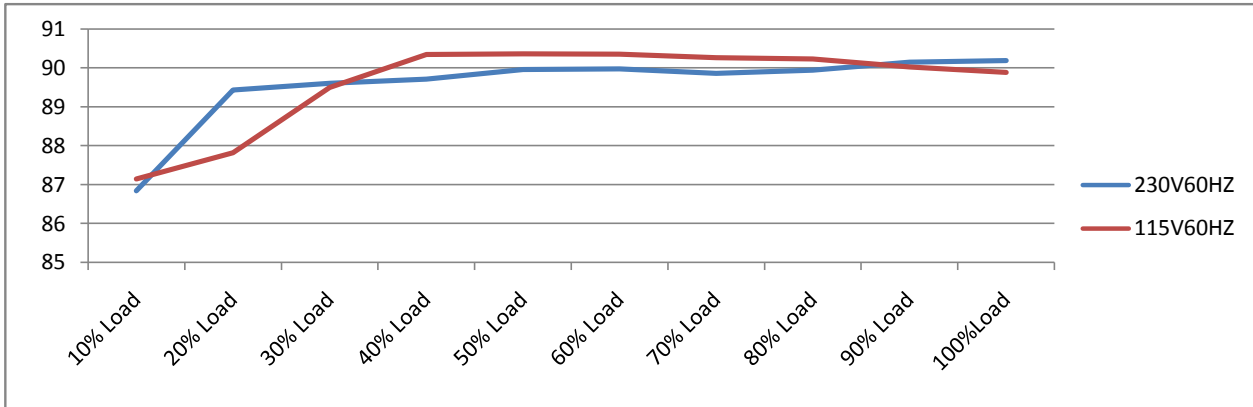
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22.80V ~ 25.20V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 21.81V ~ 26.35V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.46% ~ 0.13%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.08%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.12% ~ -0.12%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.653 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 92 mVp-p
		<div>high frequency : </div> <div>low frequency : </div>		
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC : 168ms 115VAC : 108ms
		<div>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage </div> <div>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage </div>		
	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 8.0ms 115VAC : 8.8ms

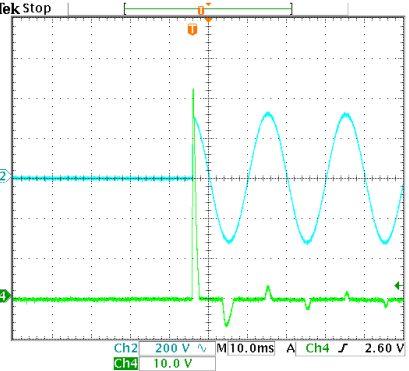
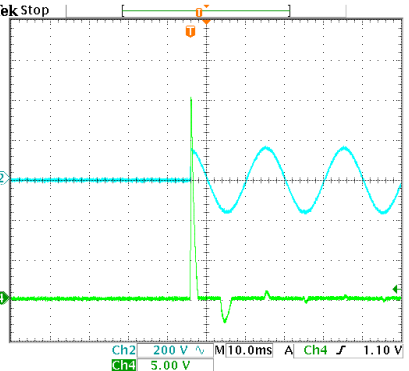
8	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
				
9	HOLD UP TIME (TYP.) 230VAC : 50ms 115VAC : 10ms		I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
10				
	DYNAMIC LOAD V1 : 2400 mVp-p		I/P : 230VAC O/P: (1)Full/Min load 50% duty/120HZ (2)Full/Min load 50% duty/1KHZ TA : 25°C	
	FULL/Min LOAD 50%DUTY / 120HZ		FULL/Min LOAD 50%DUTY / 1KHZ	
				

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
----	-----------	---------------	----------------	--------

1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	74.0VAC ~ 264VAC
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	1.2 / 230VAC 2.1 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.904 / 230VAC I= 1.806 / 115VAC
4	LEAKAGE CURRENT	< 0.19mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.0431 mA N-FG: 0.0438 mA O/P-FG: 0.0671 mA
5	NO LOAD POWER CONSUMPTION	< 0.30W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1918 W
6	EFFICIENCY (TYP.)	90.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	90.187 %



7	INRUSH CURRENT (TYP.)	60A / 230VAC 30A / 115VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 51.80A / 230VAC I= 25.10A / 115VAC
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage</p>  <p>Ch2 200 V ~ M 10.0ms A Ch4 2.60 V Ch4 10.0 V</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage</p>  <p>Ch2 200 V ~ M 10.0ms A Ch4 1.10 V Ch4 5.00 V</p> </div> </div>				

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
			I/P: 264VAC	131.0% 264VAC



1	OVER LOAD PROTECTION	115% ~ 150%	I/P: 230VAC I/P: 115VAC O/P: TESTING Ta: 25°C	134.0% 230VAC 130.4% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	26.40V ~ 31.20V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD Ta: 25°C	29.60V 264VAC 29.60V 230VAC 29.60V 80VAC Shut down Re- power ON
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~10 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	11.96 V/ 0.5 A ripple & noise: * mv Tolerance: -0.3 %

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 600V 16.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 267VAC VDS: (1). 598.00V (2). 570.00V (3). 598.00V
2	Input Capacitor	C5 Rated : 180uf 400V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 388.00V (2). 390.00V (3). 390.00V
3	Control IC	U1 Rated : 26.0V (max) 9.0V (min)	I/P : 267VAC 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	U1 (1). 21.40V (2). 12.30V (3). 19.70V (4). 23.70V (5). 17.40V
4	O/P Diode (MOSFET)	Q101 Rated : 150V 20.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 107.00V (2). 81.20V (3). 106.00V
5	Clamp Diode	D5 Rated : 600V 3.0A	I/P : 267VAC O/P : (1)Full load continue Ta : 25°C	(1). 488.00V



■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 1.500KVAC /min	I/P-O/P: 4.400KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 1.800KVAC /min Ta : 25°C	I/P-O/P: 1.90mA I/P-FG: 2.24mA O/P-FG: 1.08mA 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: 500VDC I/P-FG: 500VDC O/P-FG: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE

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 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N: 2KV;L/N-PE: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : EPS-120-24		
		1. ROOM AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 23.5℃		
		2. HIGH AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 45.0℃		
			NO. Position ROOM AMBIENT 23.5℃ HIGH AMBIENT Ta: 45.0℃	
			1 LF1 37.9℃ 58.6℃	
			2 LF2 38.2℃ 58.7℃	
			3 BD1 38.0℃ 58.6℃	
			4 Q1 37.5℃ 59.4℃	
			5 C5 34.4℃ 55.1℃	
			6 D5 35.2℃ 56.8℃	
			7 T1 48.6℃ 69.0℃	
			8 C105 62.0℃ 83.0℃	
2	OVER LOAD BURN-IN TEST	NO DAMAGE	I/P : 230VAC	TEST : OK
		1 HOUR (MIN)	O/P : 128% LOAD Ta : 25℃	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE	I/P : 264VAC / 115VAC	TEST : OK
		1 HOUR (MIN)	O/P : FULL LOAD Ta : -30.0℃	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃	I/P : 272VAC	TEST : OK
		NO DAMAGE	O/P : FULL LOAD Ta : 50℃ HUMIDITY= 95.0% RH	
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~50℃)	I/P : 230VAC	±0.0000% /(0℃~50℃)
			O/P : FULL LOAD	
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +85℃		TEST : OK
		2. Temperature change rate : 25℃ / MIN		
7	THERMAL SHOCK TEST	3. Dwell time low and high temperature : 30 MIN/EACH		TEST : OK
		4. Total test cycle : 5 CYCLE		
8	VIBRATION TEST	5. Input/Output condition : STATIC		TEST : OK
		1 Carton & 1 Set		
9	CAPACITOR LIFE CYCLE	(1) Waveform : Sine Wave		
		(2) Frequency : 10~500Hz		
10	MTBF	(4) Acceleration : 2G		
		(5) Test Time : 60 min in each axis (X.Y.Z)		
11	DMTBF / Accelerated Life test	(6) Ta : 25℃		
		:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT		
12		(1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0℃ LIFE TIME	(1). 108630 HRS	
		(2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0℃ LIFE TIME	(2). 19890 HRS	
13		(3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0℃ LIFE TIME	(3). 90625.5 HRS	
		(4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0℃ LIFE TIME	(4). 214493.4 HRS	
14		MIL-HDBK-217F		
		TOTAL FAILURE RATE : 653.5 KHRS		
15		Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS	@ TA 50℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ