



TEST REPORT: EPS-45S-24

45W 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

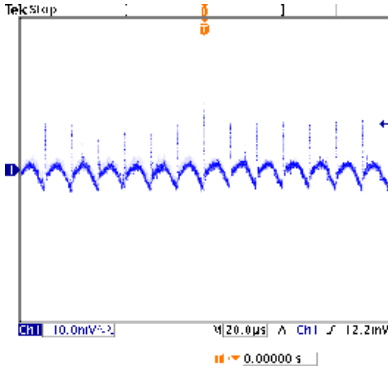
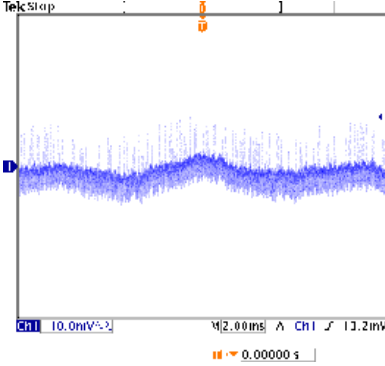
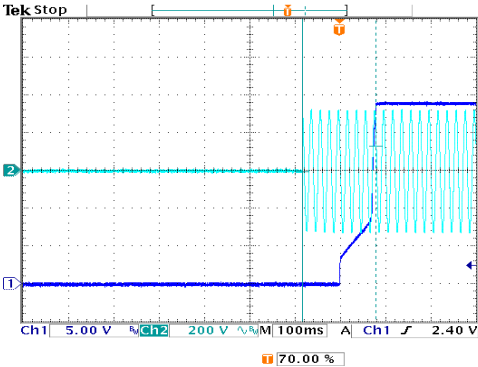
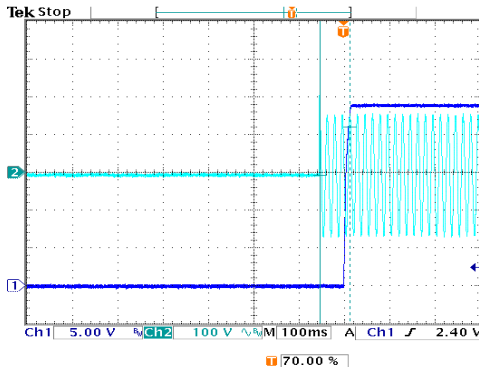
Safety Test

E.M.C. Test

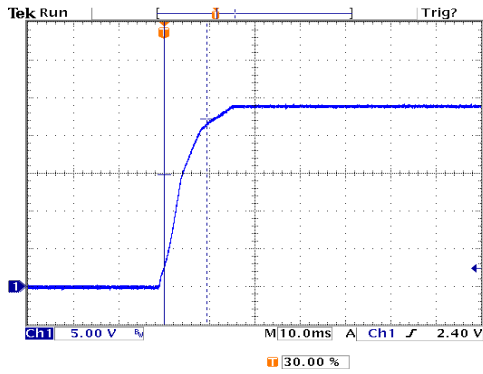
■ RELIABILITY TEST

ENVIRONMENT TEST

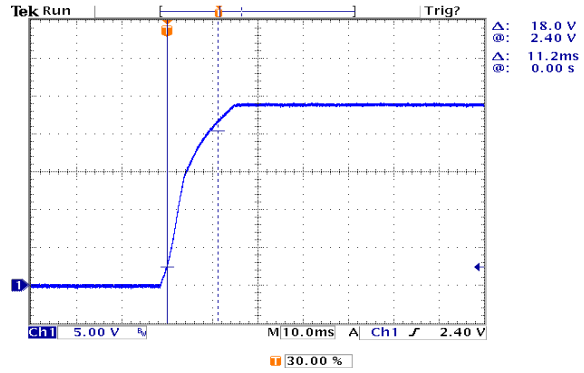
DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22.80V ~ 27.60V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 21.28V ~ 28.26V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.02% ~ -0.05%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.02% ~ -0.05%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ -0.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.238 %
6	RIPPLE & NOISE(Max)	V1 : 240 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 23.2 mVp-p
		high frequency :		low frequency :
				
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC : 162ms 115VAC : 66ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		
				
	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 9.4ms 115VAC : 11.2ms

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



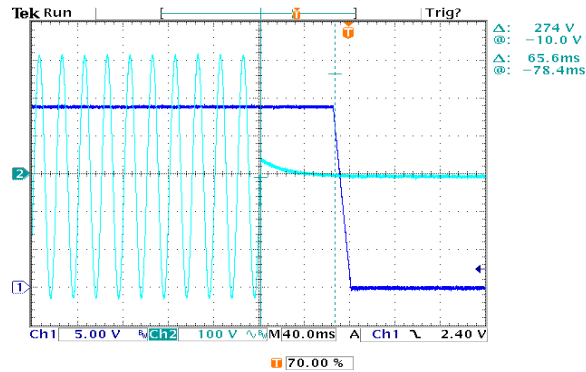
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



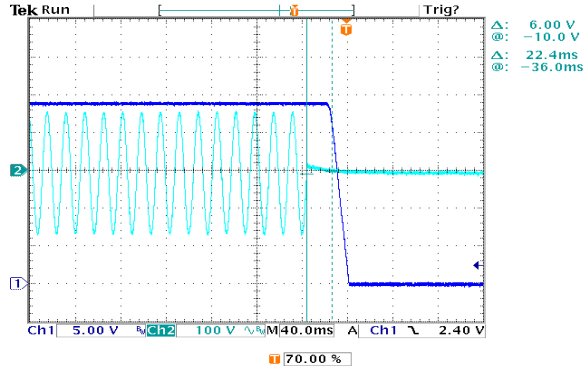
HOLD UP TIME (TYP.)

230VAC	: 30ms	I/P : 230VAC	230VAC	: 65.6ms
115VAC	: 12ms	I/P : 115VAC	115VAC	: 22.4ms
		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

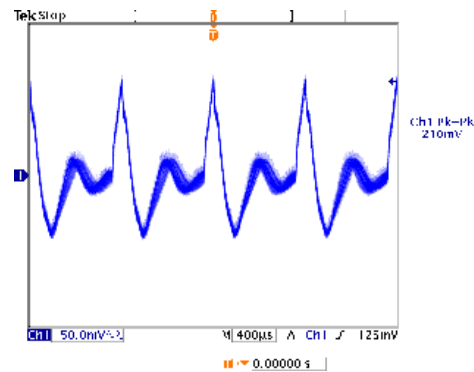
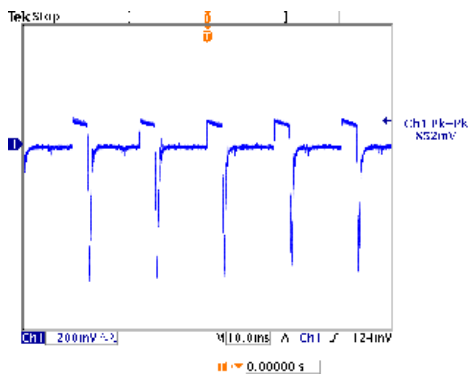


DYNAMIC LOAD

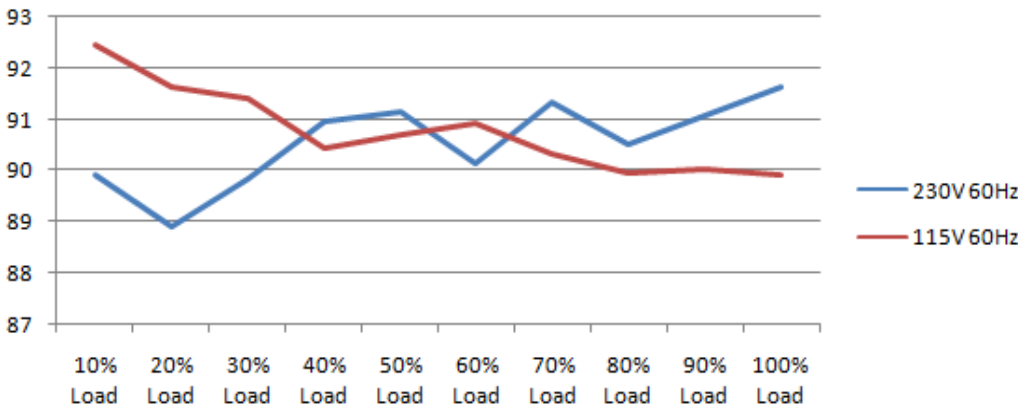
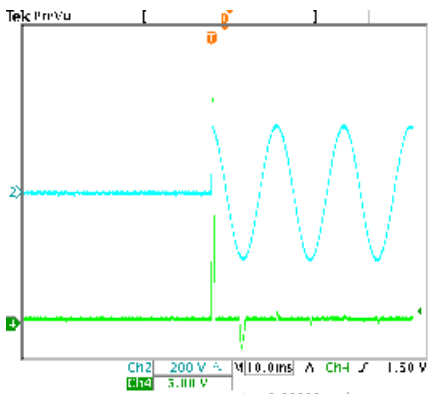
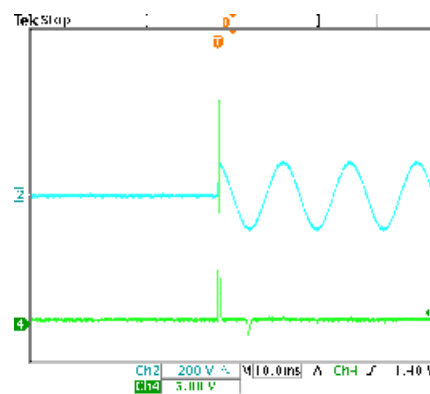
V1 : 2400 mVp-p	I/P : 230VAC	(1).	(2).	unit:mVp-p
	O/P:	V1: 852.0mv	210.0mv	
	(1)Full/Min load 50%duty/120HZ			
	(2)Full/Min load 50%duty/1KHZ			
	TA : 25°C			

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	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	72.6VAC ~ 264VAC TEST : OK
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 / 230VAC 1.2 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.408 / 230VAC I= 0.712 / 115VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.085 mA N-FG: 0.085 mA
5	NO LOAD POWER CONSUMPTION	< 0.10W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.071 W
6	EFFICIENCY (TYP.)	90.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	91.73 %
				
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= 27.20A / 230VAC I= 27.20A / 115VAC
INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage  INPUT=115VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage 				



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	115% ~ 150%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING Ta: 25°C	127.9% 264VAC 127.4% 230VAC 134.3% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	28.40V ~ 32.40V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD Ta: 25°C	29.36V 264VAC 29.37V 230VAC 29.36V 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

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 600V 9.0A	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). 500.00V (2). 438.00V (3). 500.00V
2	Input Capacitor	C5 Rated : 100uf 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). 350.00V (2). 352.00V (3). 354.00V
3	Control IC	U1 Rated : 28.0V (max) -0.3V (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). 19.60V (2). 11.90V (3). 19.00V (4). 21.80V (5). 16.60V
4	O/P Diode	D100 Rated : 200V 20.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 120.00V (2). 94.00V (3). 119.00V
5	Clamp Diode	D5 Rated : 800V 2.0A	I/P : 267VAC O/P : (1)Full load continue Ta : 25°C	(1). 462.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min	I/P-O/P: 3.300KVAC /min Ta : 25°C	I/P-O/P: 1.55mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 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-45S-7.5																																																										
		1. ROOM AMBIENT BURN-IN : 1.0hrs																																																										
		IP: 230VAC O/P: 100% LOAD TA= 31.3℃																																																										
		2. HIGH AMBIENT BURN-IN : 1.0hrs																																																										
		IP: 230VAC O/P: 100% LOAD TA= 44.6℃																																																										
		<table><tr><td>NO.</td><td>Position</td><td>ROOM AMBIENT 31.3℃</td><td>HIGH AMBIENT Ta: 44.6℃</td></tr><tr><td>1</td><td>LF1</td><td>47.1℃</td><td>61.5℃</td></tr><tr><td>2</td><td>LF2</td><td>46.4℃</td><td>59.4℃</td></tr><tr><td>3</td><td>BD1</td><td>70.2℃</td><td>83.4℃</td></tr><tr><td>4</td><td>Q1</td><td>76.3℃</td><td>89.5℃</td></tr><tr><td>5</td><td>C5</td><td>56.0℃</td><td>69.6℃</td></tr><tr><td>6</td><td>C40</td><td>65.4℃</td><td>79.4℃</td></tr><tr><td>7</td><td>T1</td><td>68.1℃</td><td>79.5℃</td></tr><tr><td>8</td><td>D100</td><td>90.6℃</td><td>103.7℃</td></tr><tr><td>9</td><td>C105</td><td>70.0℃</td><td>82.3℃</td></tr><tr><td>10</td><td>C106</td><td>63.6℃</td><td>75.0℃</td></tr><tr><td>11</td><td>C107</td><td>51.2℃</td><td>62.2℃</td></tr><tr><td>12</td><td>L100</td><td>53.2℃</td><td>64.7℃</td></tr><tr><td>13</td><td>U1</td><td>59.2℃</td><td>73.0℃</td></tr></table>			NO.	Position	ROOM AMBIENT 31.3℃	HIGH AMBIENT Ta: 44.6℃	1	LF1	47.1℃	61.5℃	2	LF2	46.4℃	59.4℃	3	BD1	70.2℃	83.4℃	4	Q1	76.3℃	89.5℃	5	C5	56.0℃	69.6℃	6	C40	65.4℃	79.4℃	7	T1	68.1℃	79.5℃	8	D100	90.6℃	103.7℃	9	C105	70.0℃	82.3℃	10	C106	63.6℃	75.0℃	11	C107	51.2℃	62.2℃	12	L100	53.2℃	64.7℃	13	U1	59.2℃	73.0℃
		NO.	Position	ROOM AMBIENT 31.3℃	HIGH AMBIENT Ta: 44.6℃																																																							
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		8	D100	90.6℃	103.7℃																																																							
9	C105	70.0℃	82.3℃																																																									
10	C106	63.6℃	75.0℃																																																									
11	C107	51.2℃	62.2℃																																																									
12	L100	53.2℃	64.7℃																																																									
13	U1	59.2℃	73.0℃																																																									
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 132% LOAD Ta : 25℃	TEST : OK																																																								
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0℃	TEST : OK																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50℃ HUMIDITY= 95.0% RH	TEST : OK																																																								
5	TEMPERATURE COEFFICIENT	±0.03% /℃(0~50℃)	I/P : 230VAC O/P : FULL LOAD	±0.0100% /℃(0~50℃)																																																								
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +85℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		TEST : OK																																																								
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35℃ ~ +55℃ 2. Temperature change rate : 25℃ / 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		TEST : OK																																																								
		1 Carton & 1 Set (1) Waveform : Sine Wave		TEST : OK																																																								



8	VIBRATION TEST	(2) Frequency : 10~500Hz (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0°C LIFE TIME	(1). 104779.8 HRS (2). 19866.9 HRS (3). 51275.1 HRS (4). 97762.8 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 726.2 KHRS	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 50000HRS @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014