TEST REPORT: EPP-200-48

200W Single Output With PFC Function

■ DESIGN VERIFY TEST

- Output Function Test
- Input Function Test
- Protection Function Test
- Component Stress Test

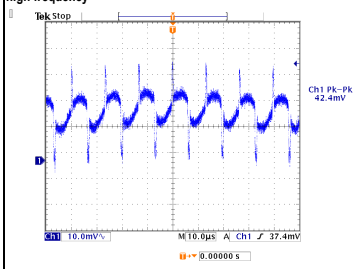
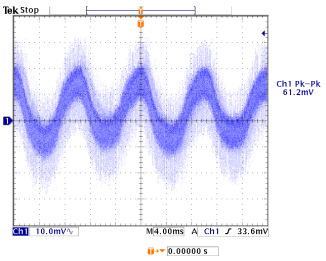
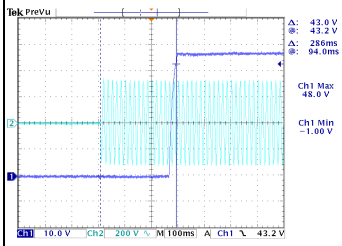
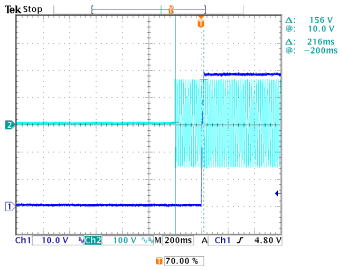
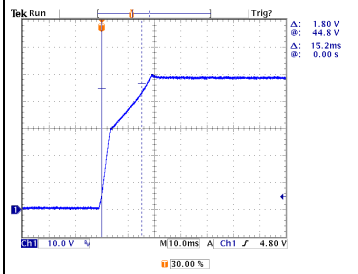
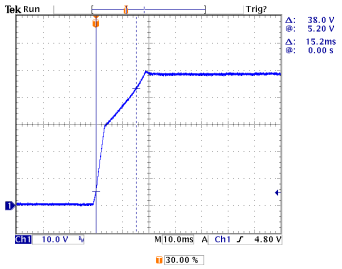
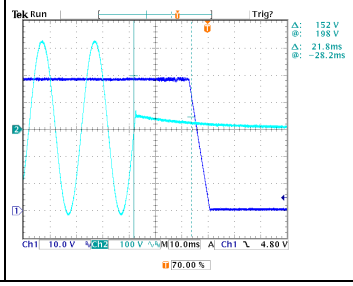
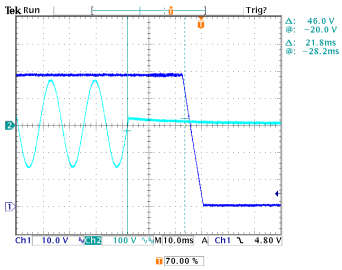
■ SAFETY & E.M.C. TEST

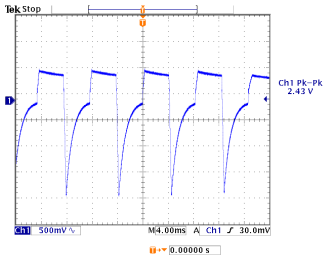
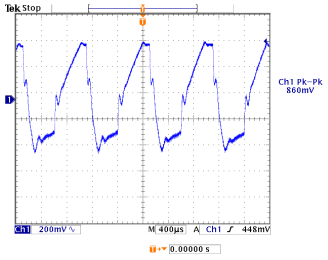
- Safety Test
- E.M.C. Test

■ RELIABILITY TEST

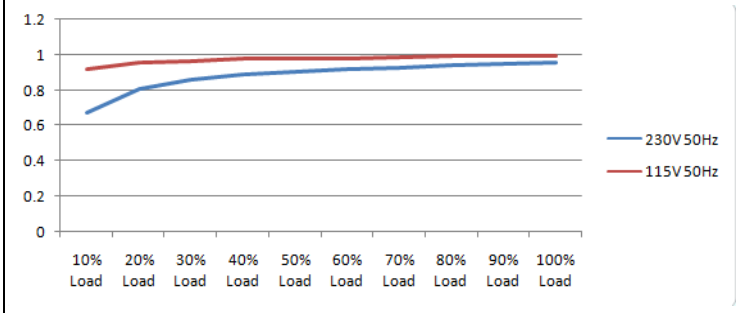
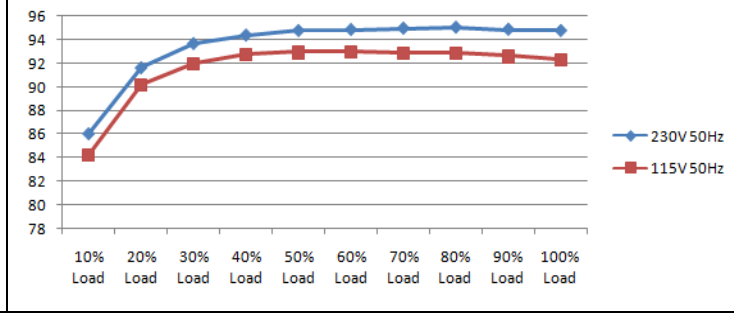
- ENVIRONMENT TEST

■ DESIGN VERIFY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 45.60V ~ 50.40V	I/P : 230VAC O/P: MIN LOAD TA : 25℃	CH1: 44.41V ~ 51.42V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25℃	V1: 0.42% ~ 0.37%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25℃	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25℃	V1: 0.00% ~ -0.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	TEST< 2.083 %
6	RIPPLE & NOISE(Max)	V1 : 200 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25℃	V1 : 61.2 mVp-p
	high frequency :  low frequency : 			
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC 286ms 115VAC 216ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 15.2ms 115VAC : 15.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (TYP.)	230VAC : 12ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 21.8ms 115VAC : 21.8ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			

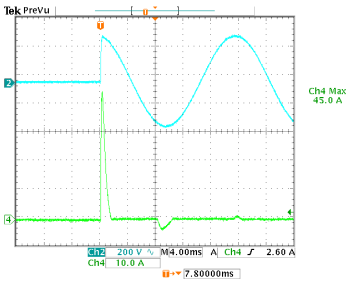
10	DYNAMIC LOAD	V1 : 4800 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25℃		(1).	(2).	unit:mVp-p	
				V1:	2430.0mv	860.0mv		
	FULL/Min LOAD 50%DUTY / 120HZ 			FULL/Min LOAD 50%DUTY / 1KHZ 				

INPUT FUNCTION TEST

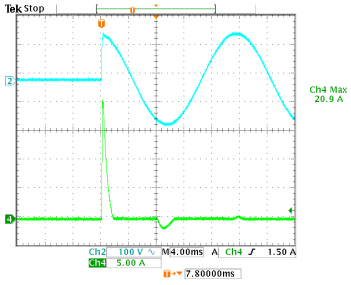
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC 113VDC ~ 370VDC	I/P : TESTING O/P : FULL LOAD Ta : 25℃	69.0VAC ~ 264VAC 100VDC ~ 370VDC
			I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL~MIN LOAD Ta : 25℃	TEST : OK
3	INPUT CURRENT (TYP.)	1 / 230VAC 1.8 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 0.969 / 230VAC I= 1.725 / 115VAC
4	LEAKAGE CURRENT	< 0.75mA	I/P : 240VAC O/P: MIN LOAD TA : 25℃	L-FG: 0.076 mA N-FG: 0.074 mA O/P-FG: 0.056 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P: MIN LOAD TA : 25℃	< 0.3922 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	PF= 0.954 / 230VAC PF= 0.993 / 115VAC
				
7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	94.684 %
				

8	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℃	I= 45.00A / 230VAC I= 20.90A / 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	110% ~ 140%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING TA : 25℃	123.33% 264VAC 123.33% 230VAC 123.33% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	52.80V ~ 62.40V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25℃	57.60V 264VAC 57.60V 230VAC 57.60V 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℃	NO DAMAGE Hiccup Mode
4	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down Re- power ON

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~15 %	I/P: 230VAC O/P: FULL LOAD TA : 25℃	11.54 V/ 0.4993 A ripple & noise: * mv Tolerance: -3.833 %

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 500V 13.0A Q6 Rated : 500V 13.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta : 25℃	Q5 Q6 (1). 492.00V 490.00V (2). 488.00V 488.00V (3). 440.00V 450.00V
2	Input Capacitor	C5 Rated : 100uf 420V	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℃	(1). 418.00V (2). 413.00V (3). 418.00V
3	Control IC	U1 Rated : 38.0V (max) 13.0V (min) U101 Rated : 24V (max) 6V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25℃	U1 U101 (1). 26.50V 12.50V (2). 20.10V 1.97V (3). 20.10V 1.97V (4). 28.40V 13.60V (5). 21.40V 10.30V
4	O/P Diode (MOSFET)	Q101 Rated : 150V 18A Q102 Rated : 150V 18A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta : 25℃	Q101 Q102 (1). 108.00V 108.00V (2). 10.20V 11.90V (3). 106.00V 206.00V
5	PFC Power Transistor	Q1 Rated : 600V 20.2A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta : 25℃	(1). 552.00V (2). 552.00V (3). 502.00V
6	PFC Diode	D1 Rated : 600V 5.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25℃	(1). 508.00V (2). 458.00V (3). 518.00V (4). 528.00V

■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-FG : 2.000KVAC /min O/P-FG : 0.600KVAC /min	I/P-O/P: 3.600KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25℃	I/P-O/P: 1.01mA I/P-FG: 1.38mA O/P-FG: 0.58mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ	I/P-O/P: 500VDC I/P-FG: 500VDC Ta : 25℃/70%RH	I/P-O/P: 9999MΩ I/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℃	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25℃	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT：2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25℃	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℃	CRITERIA A

■RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : EPP-200-24 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 24.3℃ 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 50.6℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 119.00% 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	±0.0000% /(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

NO.	Positio	ROOM AMBIENT Ta 24.3℃	HIGH AMBIENT Ta: 50.6℃
1	LF1	54.3℃	78.2℃
2	LF2	50.3℃	75.0℃
3	L2	63.3℃	88.8℃
4	BD1	69.3℃	94.0℃
5	Q1	71.9℃	98.0℃
6	C5	60.4℃	85.3℃
7	C81	53.9℃	80.8℃
8	L1	69.2℃	95.9℃
9	T1	77.5℃	106.6℃
10	C105	61.4℃	99.4℃
11	L100	56.6℃	91.8℃
12	Q5	85.7℃	114.6℃
13	Q6	86.7℃	112.1℃
14	R4	66.7℃	91.3℃
15	R5	68.4℃	93.7℃
16	U1	78.3℃	74.3℃
17	D151	64.6℃	95.7℃
18	Q101	64.5℃	97.0℃
19	Q102	67.0℃	102.4℃
20	R100	68.5℃	101.4℃
21	U101	64.0℃	98.4℃
22	D1	79.5℃	106.7℃

8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (4) Acceleration： 2G (5) Test Time： 60 min in each axis (X.Y.Z) (6) Ta：25℃	TEST：OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25.0℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 50.0℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50.0℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50.0℃ LIFE TIME	(1). 437778 HRS (2). 80132 HRS (3). 179640 HRS (4). 297469.9 HRS
10	MTBF	2672.7K hrs min. Telcordia SR-332 (Bellcore) ; 500.3K hrs min. MIL-HDBK-217F (25℃)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50℃ O/P： FULL LOAD	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014