TEST REPORT: EPP-200-27

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

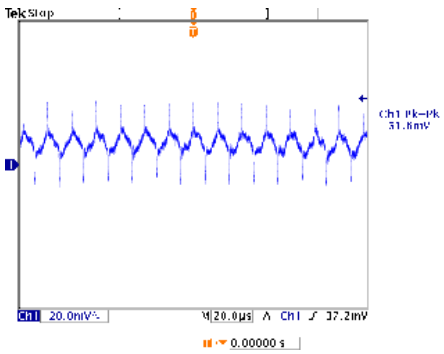
- ENVIRONMENT TEST

■ DESIGN VERIFY TEST

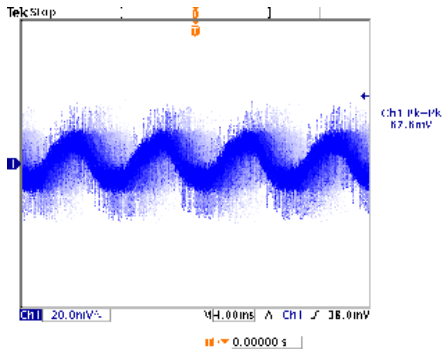
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 25.60V ~ 28.40V	I/P : 230VAC O/P: MIN LOAD TA : 25℃	CH1: 24.36V ~ 29.12V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25℃	V1: 0.70% ~ 0.63%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25℃	V1: 0.04% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25℃	V1: 0.04% ~ -0.04%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	TEST< 3.704 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25℃	V1 : 67.6 mVp-p

high frequency :



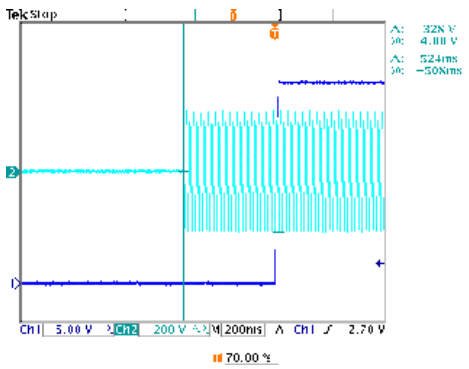
low frequency :



NO							
7	SET UP TIME (MAX.)	230VAC : 700ms 115VAC : 700ms		I/P : 230VAC I/P : 115VAC		230VAC 524ms 115VAC 184ms	

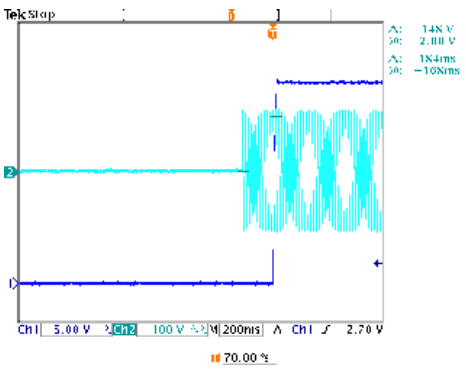
INPUT=230VAC/50HZ @ FULL LOAD

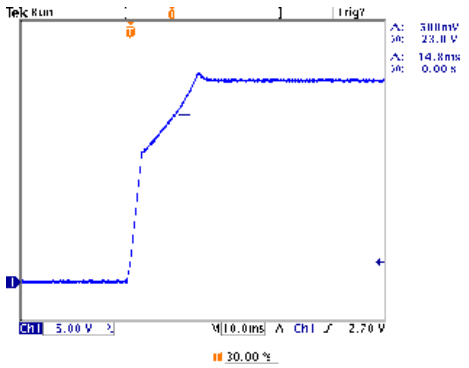
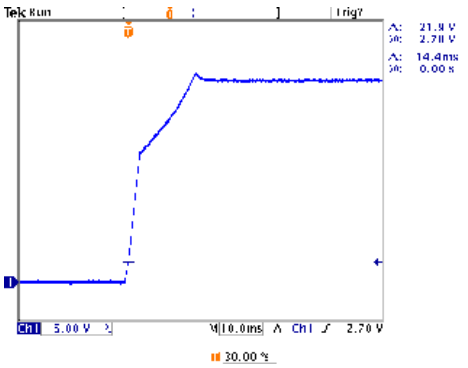
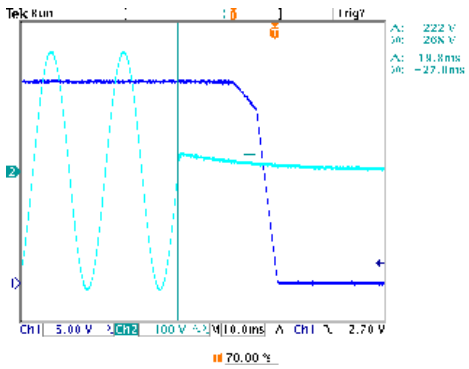
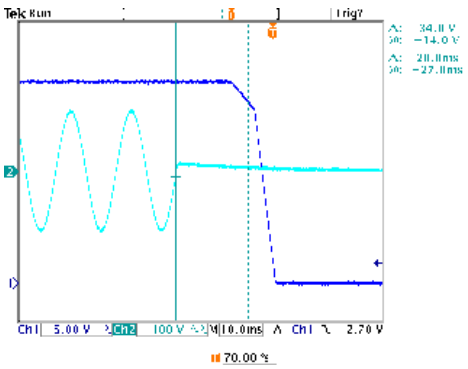
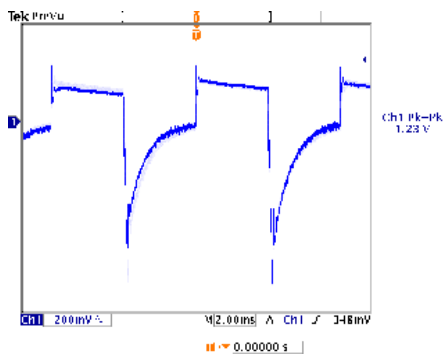
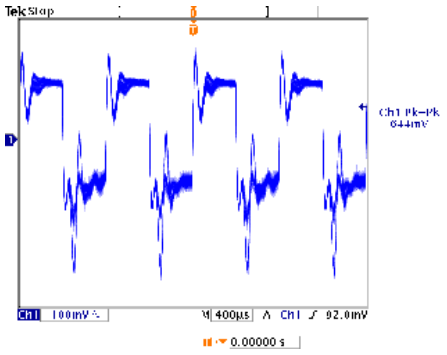
CH1 : Output Voltage CH2 : AC Input Voltage



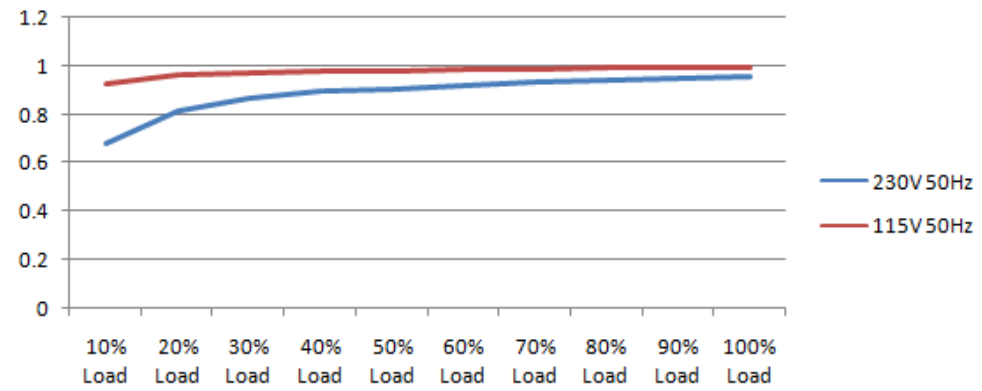
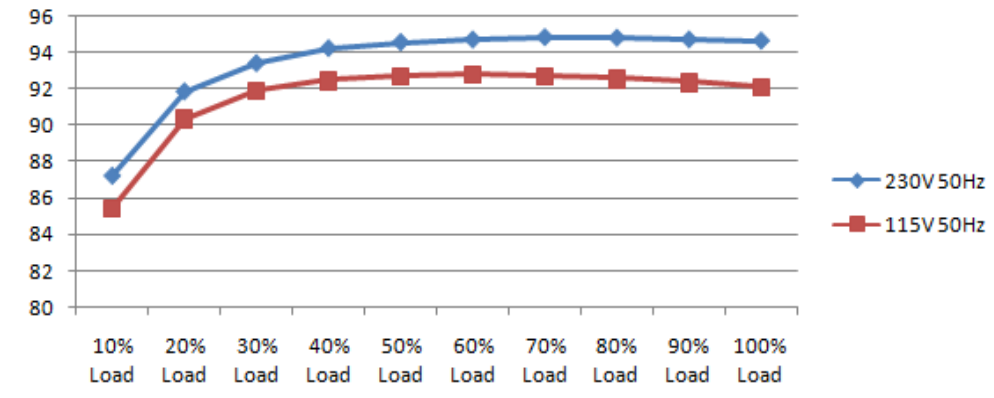
INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



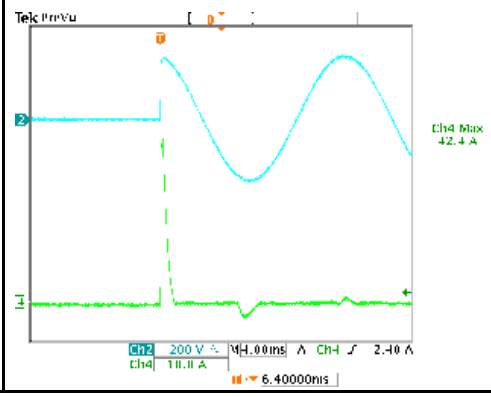
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 14.8ms 115VAC : 14.4ms	
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
					
9	HOLD UP TIME (TYP.)	230VAC : 12ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	230VAC : 19.8ms 115VAC : 20.0ms	
	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 : 2700 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: 1230.0mv 644.0mv	
	FULL/Min LOAD 50%DUTY / 120HZ		FULL/Min LOAD 50%DUTY / 1KHZ		
					

INPUT FUNCTION TEST

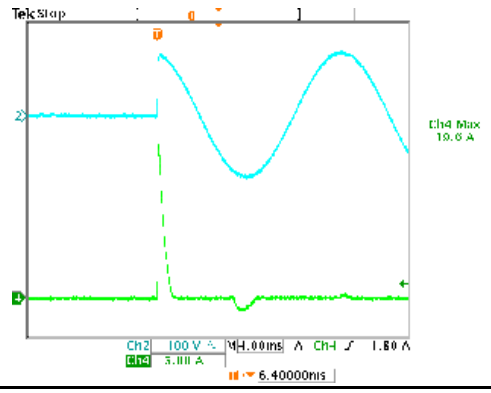
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25℃	68.0VAC ~ 264VAC
			I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL~MIN LOAD Ta : 25℃	TEST : OK
3	INPUT CURRENT (TYP.)	1 / 230VAC 2 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 0.982 / 230VAC I= 1.947 / 115VAC
4	LEAKAGE CURRENT	< 0.19mA	I/P : 264VAC O/P: MIN LOAD TA : 25℃	L-FG: 0.013 mA N-FG: 0.015 mA O/P-FG: 0.055 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P: MIN LOAD TA : 25℃	< 0.3495 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	PF= 0.956 / 230VAC PF= 0.993 / 115VAC
				
7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	94.492 %
				

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= 42.40A / 230VAC I= 19.60A / 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℃	122.40% 264VAC 121.73% 230VAC 121.73% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	29.70V ~ 35.00V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25℃	31.70V 264VAC 31.70V 230VAC 31.70V 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℃	11.493 V/ 0.4993 A ripple & noise: * mv Tolerance: -4.225 %

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). 496.00V 496.00V (2). 496.00V 494.00V (3). 446.00V 460.00V
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). 417.00V (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 (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25℃	U1 U101 (1). 28.10V 12.20V (2). 20.10V 1.58V (3). 20.10V 1.58V (4). 28.90V 12.80V (5). 22.50V 10.50V

4	O/P Diode (MOSFET)	Q101 Rated： 150V 50A Q102 Rated： 150V 50A	I/P： 267VAC O/P： (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta： 25℃			Q101	Q102
					(1).	62.80V	64.60V
					(2).	13.00V	13.40V
					(3).	61.40V	62.40V
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).	554.00V	
					(2).	556.00V	
					(3).	508.00V	
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).	542.00V	
					(2).	490.00V	
					(3).	522.00V	
					(4).	518.00V	

■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： 0.500KVAC /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: 1.39mA O/P-FG: 0.59mA 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= 18.5℃ 2. HIGH AMBIENT BURN-IN： 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 49.3℃		

NO.	Position	ROOM AMBIENT 18.5℃	HIGH AMBIENT Ta： 49.3℃
1	RTH1	64.1℃	82.3℃
2	LF1	28.2℃	57.0℃
3	LF2	29.2℃	59.7℃
4	L2	31.0℃	61.3℃
5	BD1	39.3℃	69.1℃
6	C5	30.2℃	59.8℃
7	Q1	44.5℃	74.9℃
8	C81	23.0℃	53.0℃
9	RTH2	24.8℃	54.5℃
10	T1 COIL	47.7℃	78.2℃
11	T1 BOB	43.6℃	73.0℃
12	L100	37.6℃	69.4℃
13	C105	38.2℃	68.5℃
14	L1	46.1℃	77.3℃
15	U1	39.3℃	69.0℃

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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
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	MIL-HDBK-217F TOTAL FAILURE RATE： 500.2 KHRS		
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50℃		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014