



TEST REPORT: EPP-200-12

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

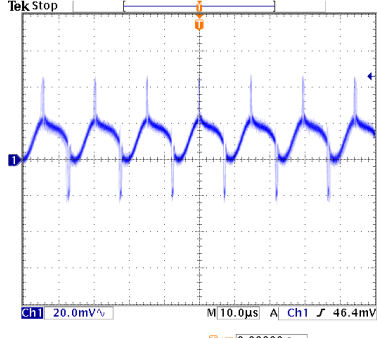
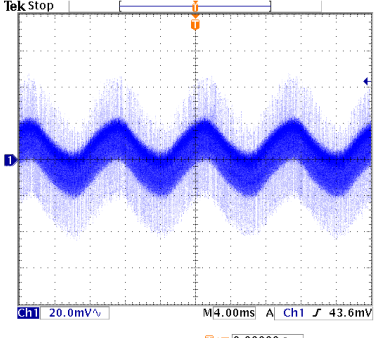
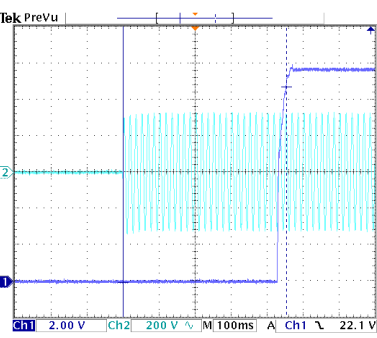
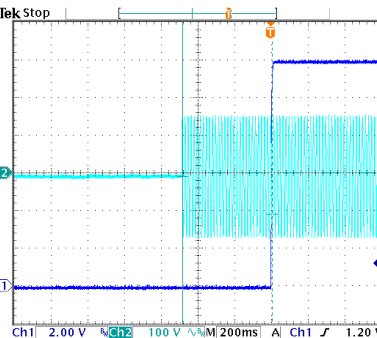
Safety Test

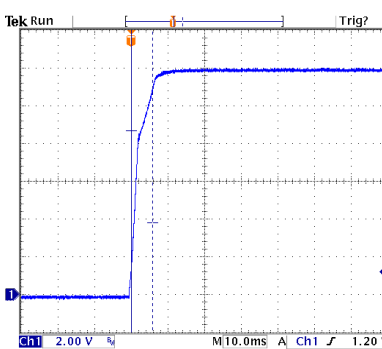
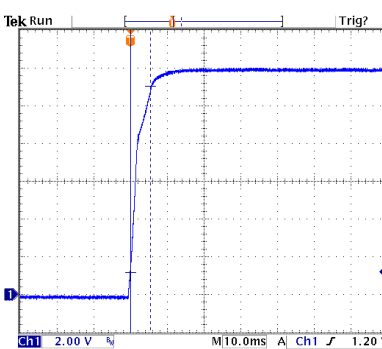
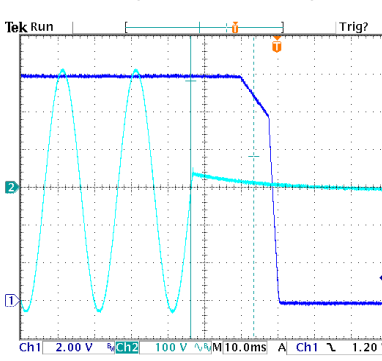
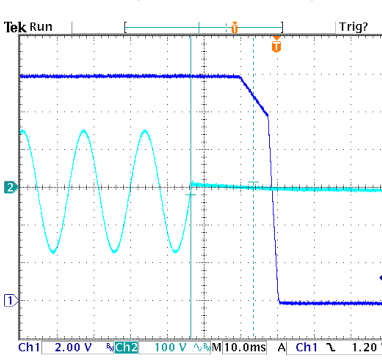
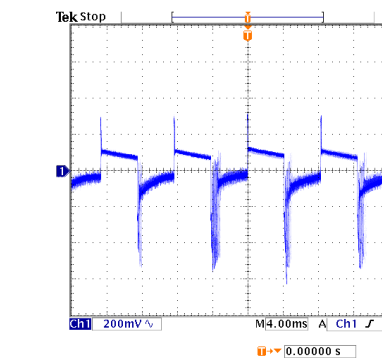
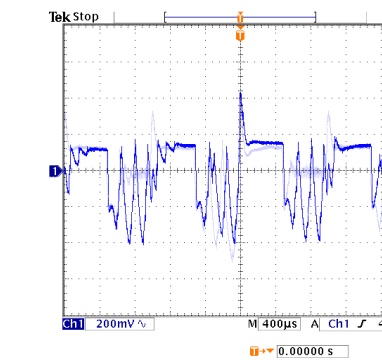
E.M.C. Test

■ RELIABILITY TEST

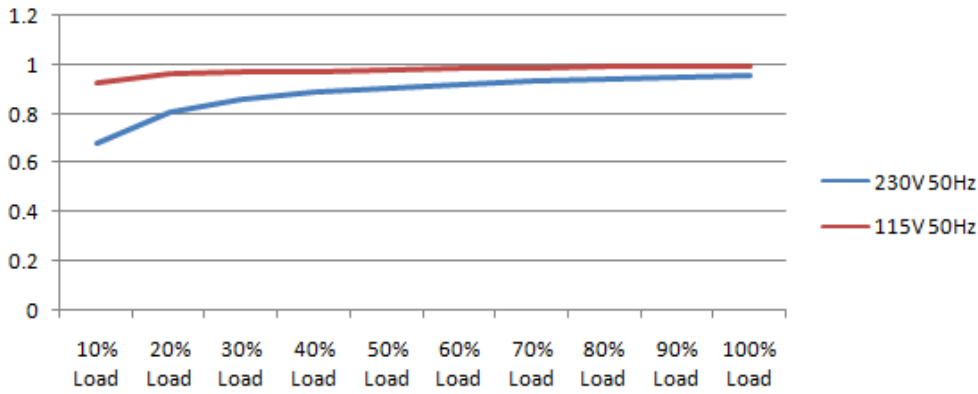
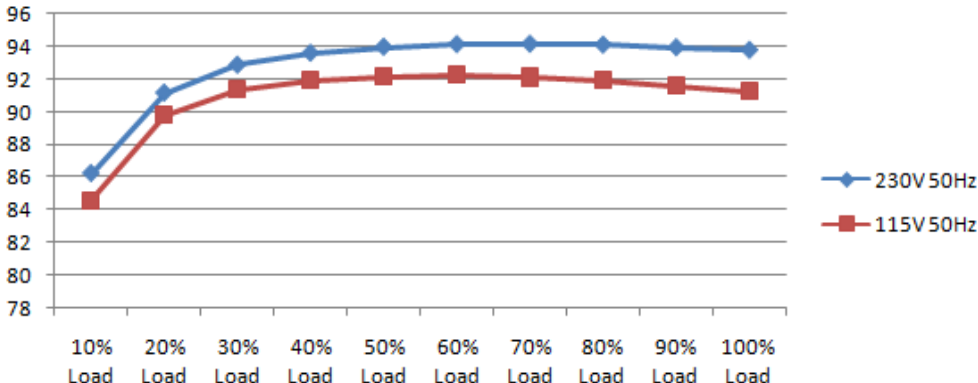
ENVIRONMENT TEST

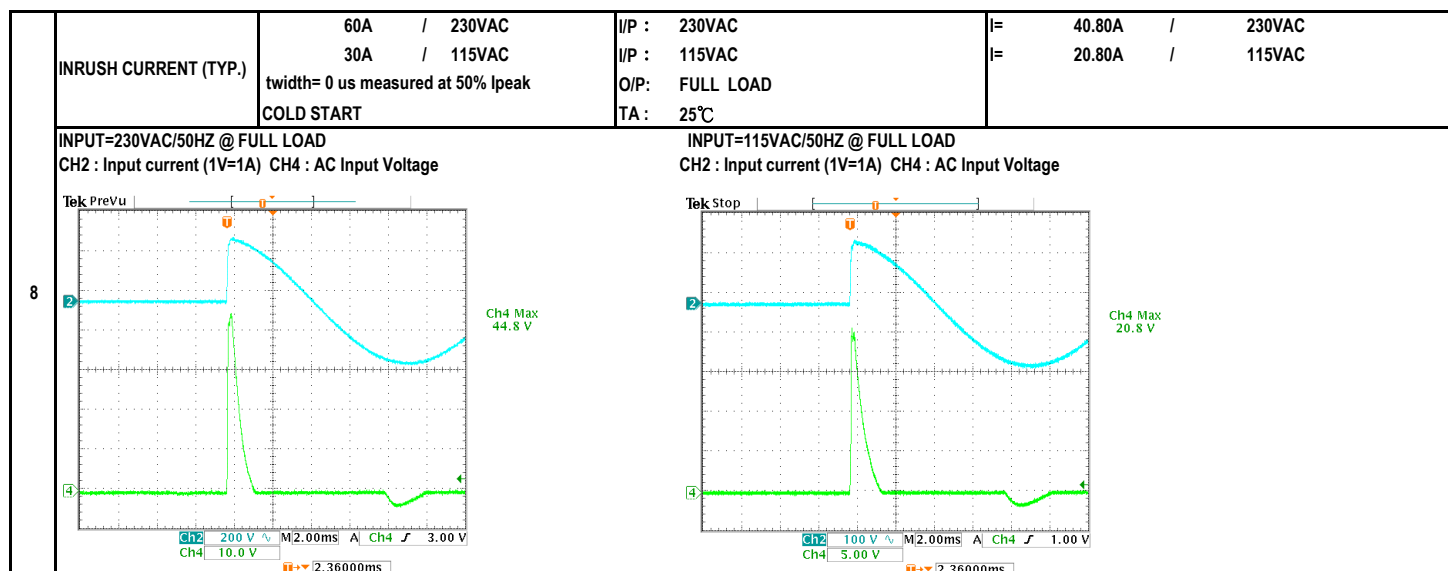
DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.40V ~ 12.60V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 11.04V ~ 12.93V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.67% ~ 0.42%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	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°C	V1: 0.17% ~ -0.08%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.333 %
6	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 91.6 mVp-p
		high frequency :  Ch1 Pk-Pk 69.2mV		
6	RIPPLE & NOISE(Max)		low frequency :  Ch1 Pk-Pk 91.6mV	
		SET UP TIME (MAX.) 230VAC : 500ms 115VAC : 500ms INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  Δ: 10.8 V @: -40.0mV Δ: 454ms @: -200ms Ch1 Max 12.0 V Ch1 Min -120mV		
7	SET UP TIME (MAX.)		I/P : 230VAC I/P : 115VAC INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  Δ: 100 V @: -10.0 V Δ: 488ms @: -484ms	230VAC 454ms 115VAC 488ms
		RISE TIME (MAX.) 230VAC : 30ms 115VAC : 30ms I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C		

8	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>  <p>Δ: 4.88 V @: 5.80ms @: 0.00 s</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>  <p>Δ: 9.88 V @: 5.40ms @: 0.00 s</p>	
<p>HOLD UP TIME (TYP.)</p>		<p>230VAC : 12ms 115VAC : 12ms</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 17.2ms 115VAC : 17.0ms</p>
9	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 200 V @: 282 V Δ: 17.2ms @: -23.8ms</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 34.0 V @: -20.0 V Δ: 17.0ms @: -23.6ms</p>	
<p>DYNAMIC LOAD</p>		<p>V1 : 1200 mVp-p</p>	<p>I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C</p>	<p>(1). (2). unit:mVp-p V1: 844.0mv 844.0mv</p>
10	<p>FULL/Min LOAD 50%DUTY / 120HZ</p>  <p>Ch1 Pk-Pk 844mV</p>		<p>FULL/Min LOAD 50%DUTY / 1KHZ</p>  <p>Ch1 Pk-Pk 844mV</p>	

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°C	68.0VAC ~ 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°C	TEST : OK
3	INPUT CURRENT (TYP.)	1 / 230VAC 1.8 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.986 / 230VAC I= 1.748 / 115VAC
4	LEAKAGE CURRENT	< 0.75mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.079 mA N-FG: 0.078 mA O/P-FG: 0.055 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.3442 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9566 / 230VAC PF= 0.993 / 115VAC
				
7	EFFICIENCY (TYP.)	93.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	93.693 %
				



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°C	125.2% 264VAC 125.2% 230VAC 125.0% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	13.20V ~ 15.60V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	14.50V 264VAC 14.60V 230VAC 14.50V 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
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°C	11.505 V/ 0.4997 A ripple & noise: * mv Tolerance: -4.125 %

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)Full load continue Ta : 25°C	Q5 Q6 (1). 498.00V 492.00V (2). 486.00V 490.00V (3). 446.00V 446.00V
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°C	(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°C	U1 28.10V U101 12.50V (1). (2). 20.10V 3.02V (3). 20.10V 3.08V (4). 29.40V 14.20V (5). 24.10V 11.40V
4	O/P Diode (MOSFET)	Q101 Rated : 40V 100A	Q102 Rated : 40V 100A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 30.40V Q102 31.40V (1). (2). 7.20V 9.16V (3). 29.60V 30.20V
5	PFC Power Transistor	Q1 Rated : 600V 20.2A		I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 550.00V (2). 550.00V (3). 550.00V
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°C	(1). 514.00V (2). 462.00V (3). 504.00V (4). 502.00V

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°C	I/P-O/P: 1.00mA I/P-FG: 1.39mA 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°C/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°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 : EPP-200-12		
		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 66.8℃ 84.9℃	
			2 LF1 46.5℃ 70.3℃	
			3 LF2 40.3℃ 62.2℃	
			4 L2 52.1℃ 73.4℃	
			5 BD1 56.2℃ 81.0℃	
			6 Q1 58.4℃ 83.5℃	
			7 C5 53.4℃ 73.4℃	
			8 C81 42.6℃ 69.3℃	
			9 RTH2 50.6℃ 75.2℃	
			10 T1 COIL 75.1℃ 96.8℃	
			11 T1 BOB 62.4℃ 81.9℃	
			12 L1 64.7℃ 84.7℃	
			13 C105 55.2℃ 79.9℃	
			14 L100 57.7℃ 84.1℃	
			15 U1 57.8℃ 81.6℃	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 142.70% 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	±0.0054% /(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). 42029.9 HRS (2). 11348.7 HRS (3). 68992 HRS (4). 151383.7 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

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