



# TEST REPORT: EPS-120-15

## 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

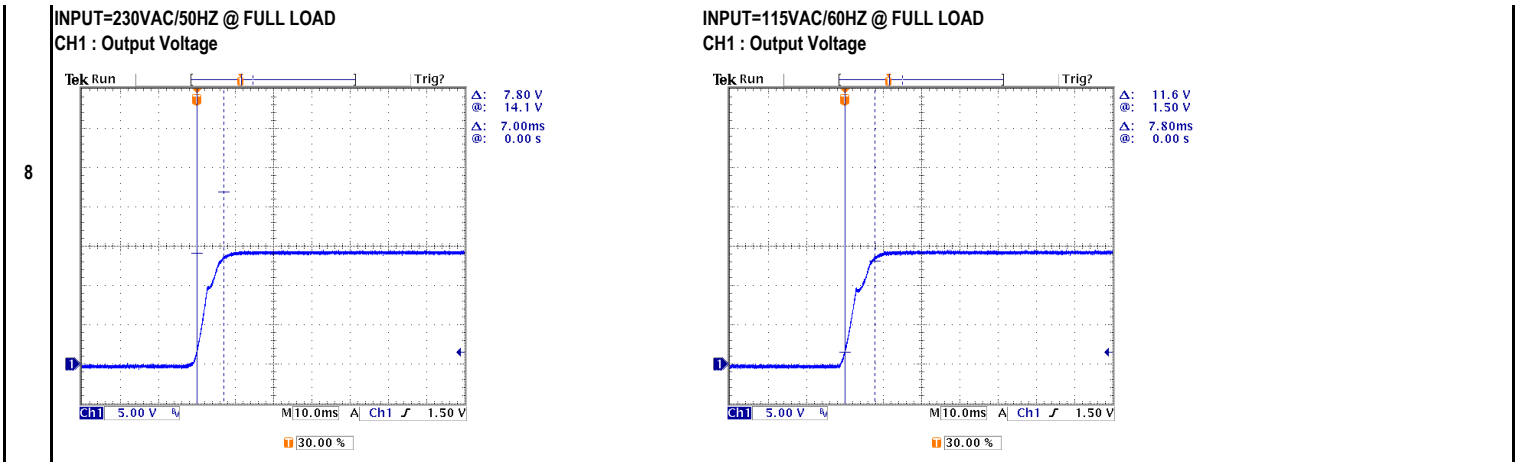
E.M.C. Test

### ■ RELIABILITY TEST

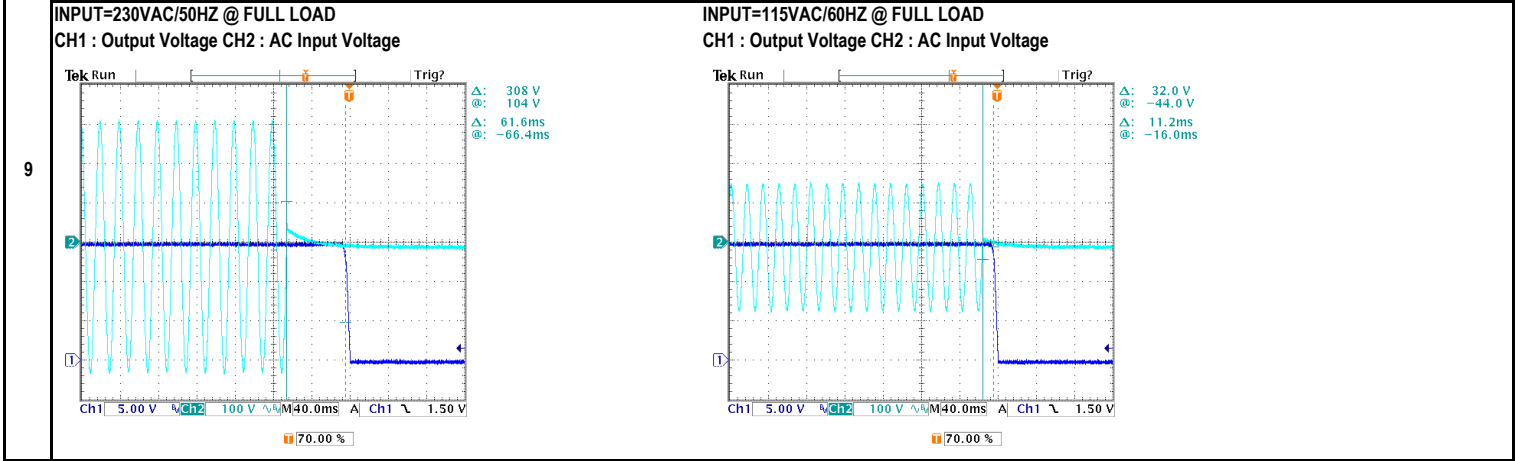
ENVIRONMENT TEST

DESIGN VERIFY TEST  
OUTPUT FUNCTION

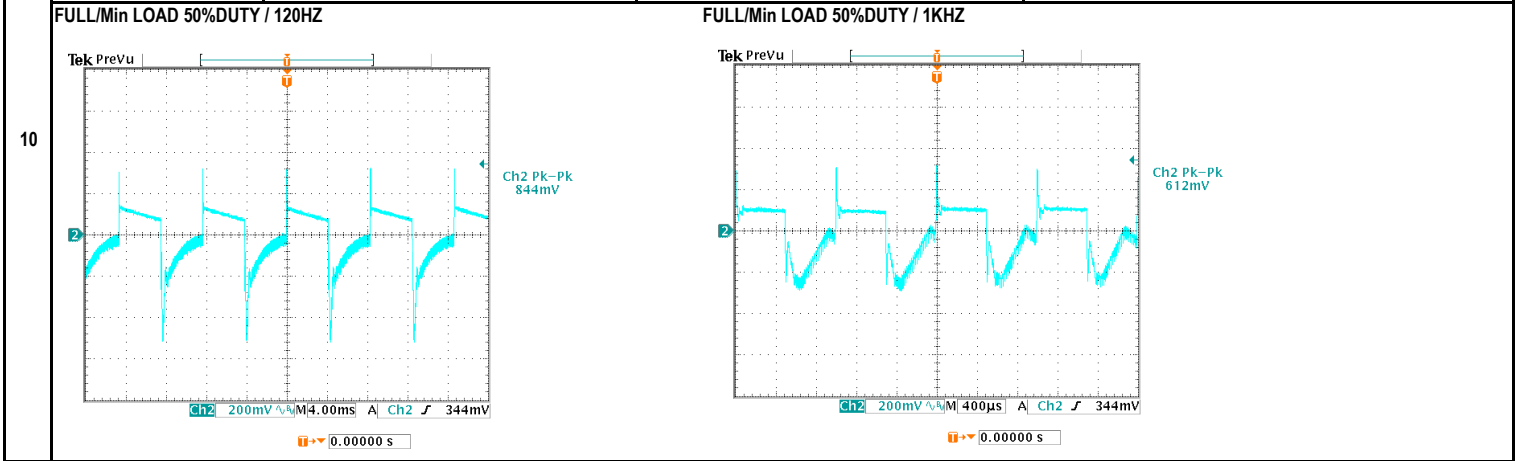
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 14.30V ~ 15.80V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 13.17V ~ 16.58V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.5% ~ -2.5%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.73% ~ -0.20%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.13% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.40% ~ -0.47%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.632 %
6	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 75 mVp-p
			<p>high frequency : 75.0</p>	<p>low frequency : 73.2</p>
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC : 148ms 115VAC : 100ms
		<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	
	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 7.0ms 115VAC : 7.8ms



<b>HOLD UP TIME (TYP.)</b>	230VAC : 50ms 115VAC : 10ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 61.6ms 115VAC : 11.2ms
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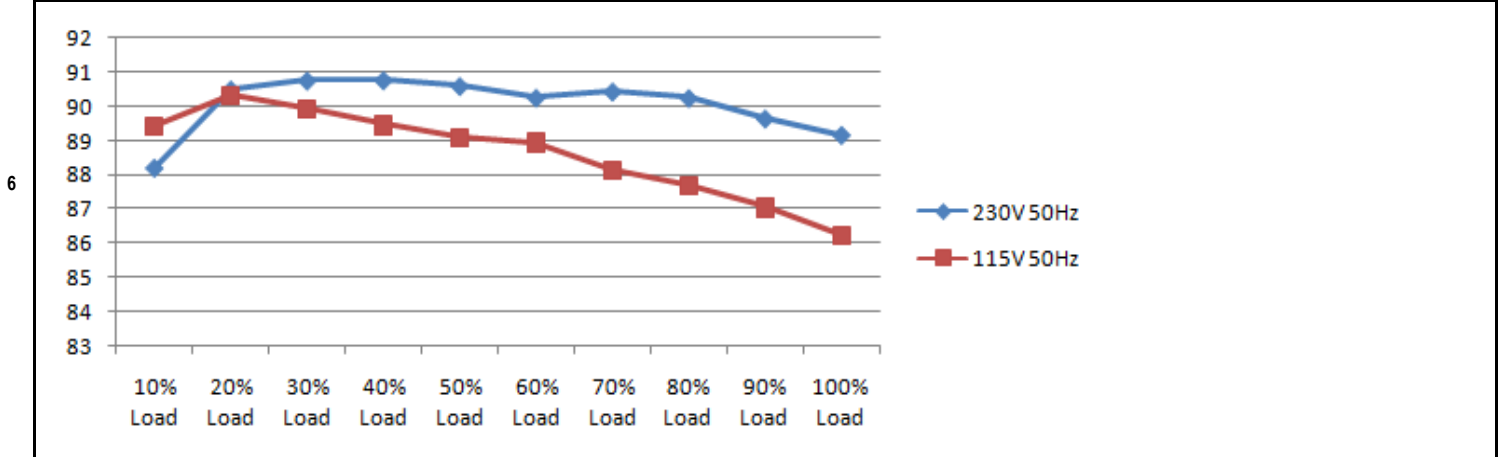
<b>DYNAMIC LOAD</b>	V1 : 1500 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50% duty/120HZ (2)Full/Min load 50% duty/1KHZ TA : 25°C	V1: (1). 844.0mv (2). 612.0mv unit:mVp-p
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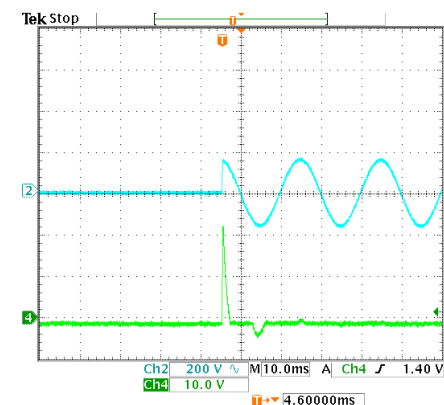
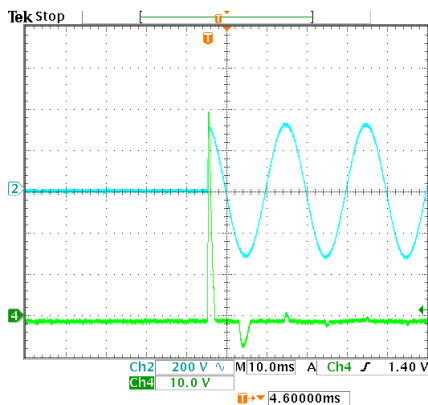


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	69.0VAC ~ 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°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= 0.67 / 230VAC I= 1.21 / 115VAC
4	LEAKAGE CURRENT	< 0.19mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.0475 mA N-FG: 0.0481 mA O/P-FG: 0.0693 mA
5	NO LOAD POWER CONSUMPTION	< 0.30W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.2107 W
	EFFICIENCY (TYP.)	88.5%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	89.08 %



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= 49.40A / 230VAC I= 22.20A / 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	133.8% 264VAC 136.5% 230VAC 130.6% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	16.50V ~ 19.50V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA: 25°C	18.00V 264VAC 18.10V 230VAC 18.10V 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	11.892 V/ 0.5 A ripple & noise: * mv Tolerance: -0.9 %

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). 554.00V (2). 520.00V (3). 552.00V
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). 376.00V (2). 378.00V (3). 376.00V
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). 16.20V (2). 12.30V (3). 15.20V (4). 16.60V (5). 12.20V
4	O/P Diode (MOSFET)	Q101 Rated : 120V 75.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 84.00V (2). 81.90V (3). 82.60V
5	Clamp Diode	D5 Rated : 600V 3.0A	I/P : 267VAC O/P : (1)Full load continue Ta : 25°C	(1). 440.00V



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: 2.37mA O/P-FG: 1.10mA 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-120-12 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 23.5°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 45.0°C	<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT 23.5°C</th> <th>HIGH AMBIENT Ta: 45.0°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>42.1°C</td><td>53.2°C</td></tr> <tr><td>2</td><td>LF2</td><td>59.8°C</td><td>70.8°C</td></tr> <tr><td>3</td><td>BD1</td><td>66.5°C</td><td>77.1°C</td></tr> <tr><td>4</td><td>Q1</td><td>69.5°C</td><td>79.8°C</td></tr> <tr><td>5</td><td>C5</td><td>64.2°C</td><td>74.6°C</td></tr> <tr><td>6</td><td>D5</td><td>64.2°C</td><td>74.9°C</td></tr> <tr><td>7</td><td>T1</td><td>78.4°C</td><td>90.1°C</td></tr> <tr><td>8</td><td>C105</td><td>76.1°C</td><td>96.5°C</td></tr> <tr><td>9</td><td>C106</td><td>66.0°C</td><td>86.5°C</td></tr> <tr><td>10</td><td>L100</td><td>74.5°C</td><td>86.3°C</td></tr> <tr><td>11</td><td>Q101</td><td>83.1°C</td><td>96.7°C</td></tr> <tr><td>12</td><td>U1</td><td>68.5°C</td><td>78.8°C</td></tr> <tr><td>13</td><td>RTH3</td><td>66.8°C</td><td>77.2°C</td></tr> </tbody> </table>	NO.	Position	ROOM AMBIENT 23.5°C	HIGH AMBIENT Ta: 45.0°C	1	LF1	42.1°C	53.2°C	2	LF2	59.8°C	70.8°C	3	BD1	66.5°C	77.1°C	4	Q1	69.5°C	79.8°C	5	C5	64.2°C	74.6°C	6	D5	64.2°C	74.9°C	7	T1	78.4°C	90.1°C	8	C105	76.1°C	96.5°C	9	C106	66.0°C	86.5°C	10	L100	74.5°C	86.3°C	11	Q101	83.1°C	96.7°C	12	U1	68.5°C	78.8°C	13	RTH3	66.8°C	77.2°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 127% LOAD Ta : 25°C	TEST : OK																																																								
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK																																																								



4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 45°C HUMIDITY= 95.0% RH	TEST : OK
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0038% /(0°C~50°C)
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°C 2. Temperature change rate : 25°C / 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°C ~ +50°C 2. Temperature change rate : 25°C / 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°C		TEST : OK
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= 45.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 45.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 45.0°C LIFE TIME		(1). 140948.4 HRS (2). 14103.6 HRS (3). 28119.6 HRS (4). 158118 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 653.5 KHRS		
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 45°C		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

12.10.30 A50-F031