



# TEST REPORT: EPP-200-24

## 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

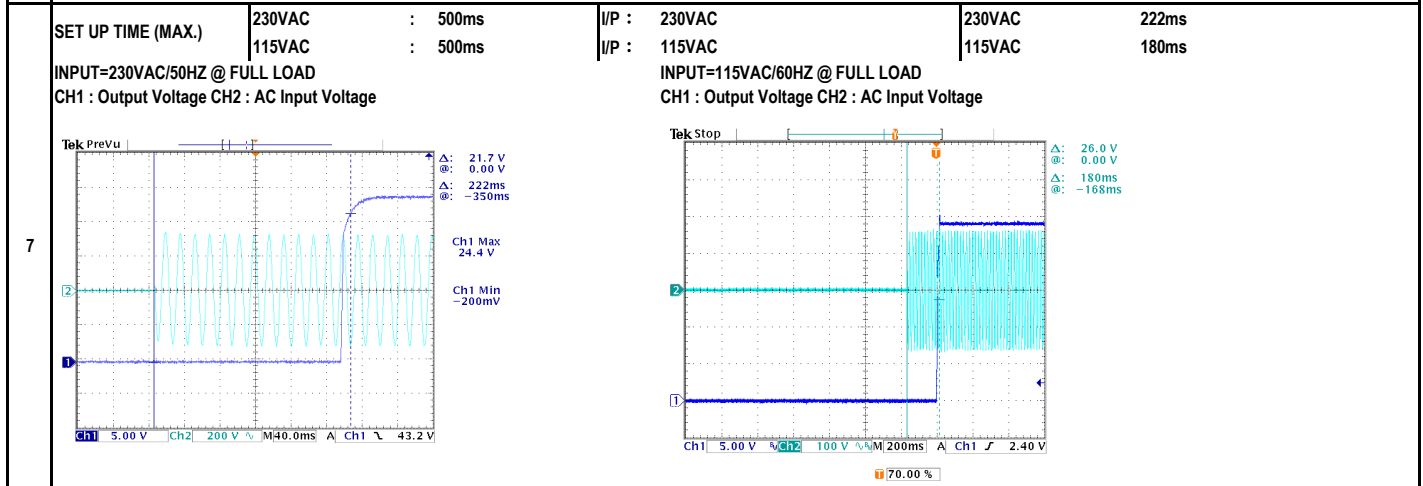
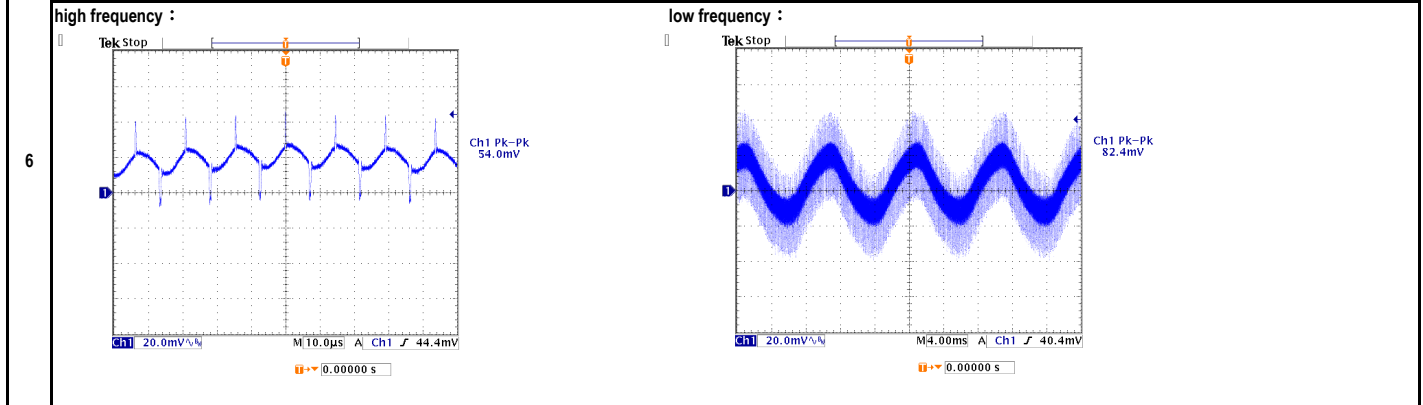
E.M.C. Test

### ■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST  
OUTPUT FUNCTION

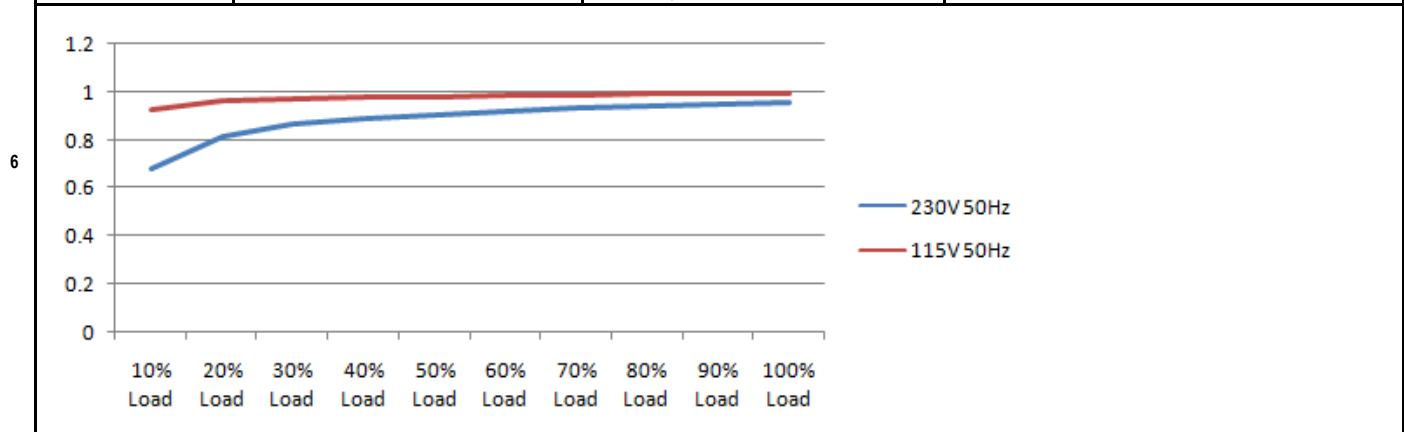
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22.80V ~ 25.20V	I/P : 230VAC O/P: MIN LOAD TA: 25°C	CH1: 22.08V ~ 25.77V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.58% ~ 0.50%
3	LINE REGULATION (MAX.)	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: 0.04% ~ -0.04%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA: 25°C	TEST< 2.905 %
	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA: 25°C	V1 : 82.4 mVp-p



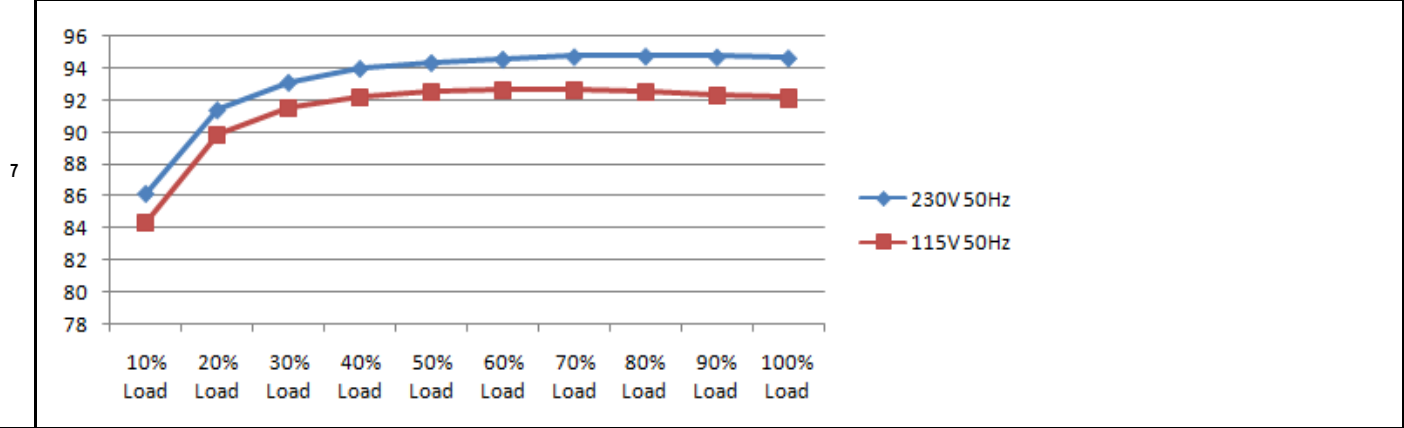
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 12.8ms 115VAC : 12.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
9	HOLD UP TIME (TYP.)	230VAC : 12ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 20.2ms 115VAC : 20.2ms
	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 : 2400 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). 920.0mv (2). 586.0mv unit:mVp-p
	FULL/Min LOAD 50%DUTY / 120HZ		FULL/Min LOAD 50%DUTY / 1KHZ	

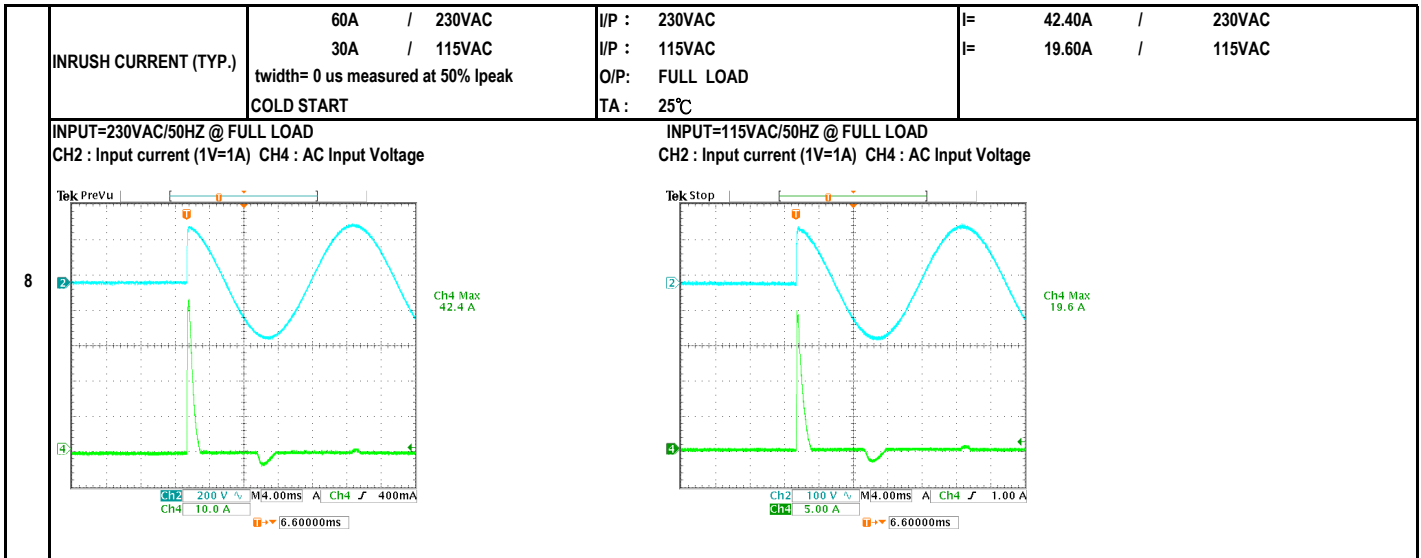
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC 113VDC ~ 370VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°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= 0.972 / 230VAC I= 1.692 / 115VAC
4	LEAKAGE CURRENT	< 0.75mA	I/P : 240VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.073 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°C	< 0.3496 W
	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC	PF= 0.957 / 230VAC
			I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.99 / 115VAC



7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	94.66 %
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**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	120.90% 264VAC 120.90% 230VAC 120.90% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	26.40V ~ 31.20V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	29.30V 264VAC 29.40V 230VAC 29.30V 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	11.475 V/ 0.4997 A ripple & noise: * mv Tolerance: -4.38% %

**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). 490.00V 494.00V (2). 482.00V 490.00V (3). 442.00V 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°C	(1). 419.00V (2). 417.00V (3). 419.00V

3	Control IC	U1	Rated :	38.0V	(max)	I/P :	267VAC	U1	U101	
				13.0V	(min)	O/P :	(1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min)			(1).
4	O/P Diode (MOSFET)	Q101	Rated :	60V	76A	I/P :	267VAC	Q101	Q102	
						O/P :	(1)Full Load Turn on (2) Output Short (3)Full load continue	(1).	57.20V	58.00V
5	PFC Power Transistor	Q102	Rated :	60V	76A	Ta :	25°C	(2).	7.90V	8.80V
		Q1	Rated :	600V	20.2A	I/P :	267VAC	(3).	55.20V	56.80V
6	PFC Diode		Rated :	600V	5.0A	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	(1).	550.00V	
						Ta :	25°C	(2).	546.00V	
								(3).	502.00V	
								(4).	495.00V	
									478.00V	
									476.00V	
									460.00V	

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: 1.01mA I/P-FG: 1.41mA O/P-FG: 0.60mA 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-200-24			
		1. ROOM AMBIENT BURN-IN : 1.0hrs			
		IP: 230VAC O/P: 100% LOAD TA= 18.5°C			
		2. HIGH AMBIENT BURN-IN : 1.0hrs			
		IP: 230VAC O/P: 100% LOAD TA= 49.3°C			
			NO. Position ROOM AMBIENT 18.5°C HIGH AMBIENT Ta: 49.3°C		
			1 RTH1 64.1°C 82.3°C		
			2 LF1 28.2°C 57.0°C		
			3 LF2 29.2°C 59.7°C		
			4 L2 31.0°C 61.3°C		
			5 BD1 39.3°C 69.1°C		
			6 C5 30.2°C 59.8°C		
			7 Q1 44.5°C 74.9°C		
			8 C81 23.0°C 53.0°C		
			9 RTH2 24.8°C 54.5°C		
	10 T1 COIL 47.7°C 78.2°C				
	11 T1 BOB 43.6°C 73.0°C				
	12 L100 37.6°C 69.4°C				
	13 C105 38.2°C 68.5°C				
	14 L1 46.1°C 77.3°C				
	15 U1 39.3°C 69.0°C				
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 119.00% 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 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK	
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(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 ~ +55°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= 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). 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°C)			
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above	30000HRS @ TA 50°C		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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