



# Test Report: IRM-15-12

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15W AC-DC PCB-Mount Green Power Module

## ■ DESIGN VERIFY TEST

- Output Function Test
- Input Function Test
- Protection Function Test
- Control 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 TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 200 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 42.5 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : -2.5 %~ +2.5 % (Max)	I/P : 115 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -0.05 %~ 0.16 %	P
3	LINE REGULATION	V1 : -0.3 %~ +0.3 % (Max)	I/P : 115VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0.05 %	P
4	LOAD REGULATION	V1 : -0.5 %~ +0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.05 %~ 0.1 %	P
5	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 1000 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 721 ms 115VAC/ 653 ms	P
6	RISE TIME	230VAC : 20 ms (Max) 115VAC : 20 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 9.5 ms 115VAC/ 10.1 ms	P
7	HOLD UP TIME	230VAC : 40 ms (TYP) 115VAC : 10 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 76.5 ms 115VAC/ 14.7 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
9	DYNAMIC LOAD	V1 : 1200 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 212 mVp-p (2) 145 mVp-p (3) 138 mVp-p (4) 325 mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~305 VAC 120VDC~430VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE-3V=82 V HIGH-LINE=305 V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	74.8 VAC~305VAC 108VDC~430VDC  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~440 HZ NO DAMAGE OSC	I/P : 85 VAC ~ 305 VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK	P
3	EFFICIENCY	82% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	82.9 %	P
4	INPUT CURRENT	230V/ 0.2 A (TYP) 115V/ 0.35 A (TYP) 277V/ 0.17 A (TYP)	I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.15 A/ 230 VAC I = 0.26 A/ 115 VAC I = 0.13 A/ 277VAC	P
5	INRUSH CURRENT	230V/ 40 A (TYP) 115V/ 20 A (TYP) COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 26.1 A/ 230 VAC I = 13.5 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA/277 VAC	I/P : 277VAC O/P : Min LOAD Ta : 25°C	0.017 mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0872 W	P

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115 % ~ 190 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	140.8 %/ 230 VAC 130.5 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 13.8 V ~ 16.2 V	O/P : MIN LOAD Ta : 25°C	15.367 V shut down clamping by zener diode	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	P

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor DRAIN TO GND Peak Voltage	U1 Rated: 800V/1.5A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 508 V (2) 465 V (3) 500 V	P
2	Diode Peak Voltage	D100 Rated: 20A/100V	I/P : High-Line +3V =308 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 73.5 V (2) 60.8 V (3) 72.5 V	P
3	Clamp Diode Peak Voltage	D 2 Rated : 800 V 2 A	I/P : High-Line +3V = 308 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 492 V (2) 480 V	P
4	Input Capacitor Voltage	C5 Rated: 27u/400V	I/P : High-Line +3V =308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 372 V (2) 376 V (3) 378 V	P
5	Control IC Voltage Test	U1 Rated : 27 V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 17.8 V (2) 16.8 V (3) 17.8 V	P

**SAFETY & E.M.C. TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min	I/P-O/P : 3.6 KVAC/min Ta : 25°C	I/P-O/P : 0.532 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70% RH	I/P-O/P : 9999 MΩ NO DAMAGE	P

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	BS EN/EN55032(CISPR32) CNS13438 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	BS EN/EN55032(CISPR32) CNS13438	I/P : 230 VAC (50HZ) O/P : FULL LOAD	PASS Test by certified Lab	P

		CLASS B	Ta : 25°C		
4	E.S.D	BS EN/EN61000-4-2 AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	BS EN/EN61000-4-4 INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	BS EN/EN61000-4-5 L-N : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : IRM-15-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=23.3°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 49.1°C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 127 % LOAD Ta : 25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/85VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	P

4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.006 %/°C (0~50°C)	P
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		OK	P
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +70°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		OK	P
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK	P
9	CAPACITOR LIFE CYCLE	IRM-15-24 SUPPOSE C 101 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME		(1) 438126.5 HRS (2) 82390 HRS (3) 123255.4 HRS (4) 158188.8 HRS	P
10	MTBF	10656.2K hrs min. Telcordia SR-332 (Bellcore) ; 970.3K hrs min. MIL-HDBK-217F (25°C)			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C			P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2013.3.26	RD SAMPLE	PASS	Shenym	Wangdz
2013.5.4	PRODUCT SAMPLE	PASS	Shenym	Wangdz
2013.7.11	PRODUCT SAMPLE (Y1306D062)	PASS	Shenym	Wangdz

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