



# Test Report: IRM-20-24

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20W 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 ~	V1 68.5 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 %~ 0.295 %	P
3	LINE REGULATION	V1 -0.3 %~ +0.3 % (Max)	I/P 115VAC ~ 305 VAC O/P FULL LOAD Ta 25 ~	V1 -0.025 %~ 0 %	P
4	LOAD REGULATION	V1 -0.5 %~ +0.5 % (Max)	I/P 230 VAC O/P FULL ~MIN LOAD Ta 25 ~	V1 -0.025 %~ 0.26 %	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 ~	230VAC/ 733 ms 115VAC/ 618 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 ~	230VAC/ 11.7 ms 115VAC/ 13.3 ms	P
7	HOLD UP TIME	230VAC 40 ms (TYP) 115VAC 8 ms (TYP)	I/P 230 VAC I/P 115 VAC O/P FULL LOAD Ta 25 ~	230VAC/ 49.1 ms 115VAC/ 9.1 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P 230 VAC O/P FULL LOAD Ta 25 ~	TEST <5 %	P
9	DYNAMIC LOAD	V1 2400 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 ~	(1) 328 mVp-p (2) 168 mVp-p (3) 135 mVp-p (4) 488 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 ~  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 )	82.7 VAC~305VAC 117VDC~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 ~	TEST OK	P
3	EFFICIENCY	85% (TYP)	I/P 230 VAC O/P FULL LOAD Ta 25 ~	87.2 %	P
4	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.6 A (TYP) 277V/ 0.3 A (TYP)	I/P 230 VAC I/P 115 VAC I/P 277 VAC O/P FULL LOAD Ta 25°C	I = 0.19 A/ 230 VAC I = 0.36 A/ 115 VAC I = 0.16 A/ 277 VAC	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 = 12.9 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA/277 VAC	I/P 277VAC O/P Min LOAD Ta 25 ~	0.015 mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P 230VAC O/P NO LOAD Ta 25 ~	< 0.0867 W	P

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115 % ~ 160 %	I/P 230 VAC I/P 115 VAC O/P TESTING Ta 25 ~	145.8 %/ 230 VAC 126.6 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 27.6 V ~ 32.4 V	O/P MIN LOAD Ta 25 ~	29.87V 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 <b>Peak Voltage</b>	U1 Rated: 800 V 1.5 A	I/P High-Line +3V = 308 V O/P (1)Full Load Turn on (2) Output Short (3)Full load continue Ta 25 ~	(1) 532 V (2) 536 V (3) 528 V	P
2	Diode <b>Peak Voltage</b>	D100 Rated: 20 A 300 V	I/P High-Line +3V =308 V O/P (1)Full Load Turn on (2)Output Short (3)Full load continue Ta 25 ~	(1) 219 V (2) 221 V (3) 155 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 ~	(1) 500 V (2) 488 V	P
4	Input Capacitor Voltage	C5 Rated: 27u/400V 105 ~	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 ~	(1) 372 V (2) 372 V (3) 372 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 ~	(1) 18.2 V (2) 16.8 V (3) 18.2 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 ~	I/P-O/P 0.512 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P 500VDC>100MΩ	I/P-O/P 500 VDC Ta 25 ~/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	BS EN/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 CLASS B	I/P 230 VAC (50HZ) O/P FULL LOAD Ta 25°C	PASS Test by certified Lab	P

4	E.S.D	BS EN/EN61000-4-2 AIR 8KV / Contact 4KV	I/P 230 VAC/50HZ O/P FULL LOAD Ta 25 ~	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 ~	CRITERIA A	P
6	SURGE	BS EN/EN61000-4-5 L-N 2KV	I/P 230 VAC/50HZ O/P FULL LOAD Ta 25 ~	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-20-24 1. ROOM AMBIENT BURN-IN 2 HRS I/P 230VAC O/P FULL LOAD Ta=21.6 °C 2. HIGH AMBIENT BURN-IN 2 HRS I/P 230VAC O/P FULL LOAD Ta= 51.3°C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P 230 VAC O/P 125 LOAD Ta 25 ~	TEST OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P 264VAC/115VAC O/P 100 LOAD Ta= -30 ~	TEST OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ~ NO DAMAGE	I/P 315 VAC O/P FULL LOAD Ta= 50 ~ HUMIDITY= 95 %R.H	TEST OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %/ -(0~50 ~)	I/P 230 VAC O/P FULL LOAD	± 0.007 %/ -(0~50 ~)	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 2G (5) Test Time 60min in each axis (X.Y.Z) (6) Ta 25 ~	TEST OK	P
9	CAPACITOR LIFE CYCLE	IRM-20-24 SUPPOSE C 101 IS THE MOST CRITICAL COMPONENT (1) I/P 230VAC O/P FULL LOAD Ta= 25 ~ LIFE TIME (2) I/P 230VAC O/P FULL LOAD Ta=50 ~ LIFE TIME (3) I/P 230VAC O/P 75% LOAD Ta= 50 ~ LIFE TIME (4) I/P 230VAC O/P 50% LOAD Ta= 50 ~ LIFE TIME	(1) 334170 HRS (2) 67445 HRS (3) 77432 HRS (4) 128427 HRS	P
10	MTBF	MIL-HDBK-217F 25 ~ TOTAL FAILURE RATE 970.3 KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50 ~		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2013.3.23	RD SAMPLE	PASS	Shenym	Wangdz
2013.5.4	PRODUCT SAMPLE	PASS	Shenym	Wangdz
2013.7.11	PRODUCT SAMPLE (Y1306D069)	PASS	Shenym	Wangdz

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