



# Test Report: IRM-10-05

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10W 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 : 78 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : -2.5 %~ +2.5 % (Max)	I/P : 85 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0 %~ 0.119 %	P
3	LINE REGULATION	V1 : -0.3 %~ +0.3 % (Max)	I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0.119 %	P
4	LOAD REGULATION	V1 : -0.5 %~ +0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0 %~ 0.238 %	P
5	SET UP TIME	230VAC : 600 ms (Max) 115VAC : 600 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 339 ms 115VAC/ 378 ms	P
6	RISE TIME	230VAC : 30 ms (Max) 115VAC : 30 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 7.5 ms 115VAC/ 8.1 ms	P
7	HOLD UP TIME	230VAC : 30 ms (TYP) 115VAC : 8 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 61.3 ms 115VAC/ 11.4 ms	P
8	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
9	DYNAMIC LOAD	V1 : 1000 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) 366 mVp-p (2) 218 mVp-p (3) 165 mVp-p (4) 516 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 )	62.7 VAC~305VAC 110VDC~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	77% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	77.6 %	P
4	INPUT CURRENT	230V/ 0.15 A (TYP) 115V/ 0.25 A (TYP) 277V/ 0.125 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.112 A/ 230 VAC I = 0.193 A/ 115 VAC I = 0.090 A/ 277 VAC	P
5	INRUSH CURRENT	230V/ 40 A (TYP) 115V/ 20 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 36 A/ 230 VAC I = 17.6 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA/277 VAC	I/P : 277VAC O/P : Min LOAD Ta : 25°C	0.018 mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.0425 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	150.7 %/ 230 VAC 143.5 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 5.75 V ~ 6.75 V	O/P : MIN LOAD Ta : 25°C	6.234 V shut down clamping by zener diode	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 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: 800 V 0.95 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 556 V (2) 540 V (3) 555 V	P
2	Diode Peak Voltage	D100 Rated: 10 A 45 V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 31.6 V (2) 26.5 V (3) 31.5 V	P
3	Clamp Diode Peak Voltage	D 2 Rated : 1000 V 1 A	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 526 V (2) 508 V	P
4	Input Capacitor Voltage	C5 Rated:10u/400V	I/P : High-Line +3V = 267 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) 376 V (2) 378 V (3) 378 V	P
5	Control IC Voltage Test	U1 Rated : 27 V	I/P : High-Line +3V = 267 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) 20.4 V (2) 16.7 V (3) 20.5 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 : 0.976 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	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P

4	E.S.D	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	EN61000-4-4 INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 L-N : 1KV	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-10-05 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=31.9°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 57.2°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 31.9°C</th> <th>HIGH AMBIENT Ta= 57.2°C</th> </tr> </thead> <tr><td>1</td><td>C4</td><td>62.3°C</td><td>85.6°C</td></tr> <tr><td>2</td><td>C5</td><td>71.5°C</td><td>95.7°C</td></tr> <tr><td>3</td><td>U1</td><td>80.7°C</td><td>105.7°C</td></tr> <tr><td>4</td><td>C37</td><td>66.3°C</td><td>90.0°C</td></tr> <tr><td>5</td><td>T1</td><td>80.0°C</td><td>105.8°C</td></tr> <tr><td>6</td><td>D100</td><td>96.1°C</td><td>120.0°C</td></tr> <tr><td>7</td><td>C101</td><td>69.1°C</td><td>93.8°C</td></tr> <tr><td>8</td><td>D2</td><td>80.0°C</td><td>105.1°C</td></tr> <tr><td>9</td><td>BD1</td><td>63.6°C</td><td>87.0°C</td></tr> <tr><td>10</td><td>D3</td><td>74.5°C</td><td>98.4°C</td></tr> </table>	NO	Position	ROOM AMBIENT Ta= 31.9°C	HIGH AMBIENT Ta= 57.2°C	1	C4	62.3°C	85.6°C	2	C5	71.5°C	95.7°C	3	U1	80.7°C	105.7°C	4	C37	66.3°C	90.0°C	5	T1	80.0°C	105.8°C	6	D100	96.1°C	120.0°C	7	C101	69.1°C	93.8°C	8	D2	80.0°C	105.1°C	9	BD1	63.6°C	87.0°C	10	D3	74.5°C	98.4°C		P
NO	Position	ROOM AMBIENT Ta= 31.9°C	HIGH AMBIENT Ta= 57.2°C																																														
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5	T1	80.0°C	105.8°C																																														
6	D100	96.1°C	120.0°C																																														
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8	D2	80.0°C	105.1°C																																														
9	BD1	63.6°C	87.0°C																																														
10	D3	74.5°C	98.4°C																																														
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 115 % LOAD Ta : 25°C	TEST : OK	P																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC 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 : 305 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	± 0.0061 %/°C (0~50°C)	P																																												

6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> <li>1. Thermal shock Temperature : -40°C~ +85°C</li> <li>2. Temperature change rate : 25°C / MIN</li> <li>3. Dwell time low and high temperature : 30 MIN/EACH</li> <li>4. Total test cycle : 5 CYCLE</li> <li>5. Input/Output condition : STATIC</li> </ol>	OK	P
7	THERMAL SHOCK TEST	<ol style="list-style-type: none"> <li>1. Thermal shock Temperature : -30°C~ +70°C</li> <li>2. Temperature change rate : 25°C / MIN</li> <li>3. Dwell time low and high temperature : 30 MIN/EACH</li> <li>4. Total test cycle : 10 CYCLE</li> <li>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</li> </ol>	OK	P
8	VIBRATION TEST	<p>1 Carton &amp; 1 Set</p> <ol style="list-style-type: none"> <li>(1) Waveform : Sine Wave</li> <li>(2) Frequency : 10~500Hz</li> <li>(3) Sweep Time : 10min/sweep cycle</li> <li>(4) Acceleration : 5G</li> <li>(5) Test Time : 60min in each axis (X.Y.Z)</li> <li>(6) Ta : 25°C</li> </ol>	TEST : OK	P
9	CAPACITOR LIFE CYCLE	<p>SUPPOSE C 101 IS THE MOST CRITICAL COMPONENT</p> <ol style="list-style-type: none"> <li>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME</li> <li>(2) I/P : 230VAC O/P : FULL LOAD Ta=50 °C LIFE TIME</li> <li>(3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME</li> <li>(4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME</li> </ol>	<ol style="list-style-type: none"> <li>(1) 690192 HRS</li> <li>(2) 41588 HRS</li> <li>(3) 136135 HRS</li> <li>(4) 268516 HRS</li> </ol>	P
10	MTBF	<p>9094.9K hrs min. Telcordia SR-332 (Bellcore) ;</p> <p>1495.8K hrs min. MIL-HDBK-217F (25°C)</p>		P
11	DMTBF/Accelerated Life Test	<p>Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C</p>		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2013.5.31	RD SAMPLE	PASS	Shenym	Wangdz
2013.7.30	PRODUCT SAMPLE (Y1307D066)	PASS	Shenym	WangdZ

2007/3/20 A50-S014