Test Report: IRM-30-5

30W 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: 120 mVp-p (Max)	I/P:230VAC O/P:FULL LOAD Ta:25 ~	V1: 46.8 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1: 2.5 %~ -2.5 % (Max)	I/P: 85VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25 ~	V1: 0.119%~0.119%	P
3	LINE REGULATION	V1: 0.5 %~ -0.5 % (Max)	I/P: 100VAC~ 305VAC O/P:FULL LOAD Ta:25 ~	V1: 0 %~0 %	P
4	LOAD REGULATION	V1: 1%~ -1 % (Max)	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25 ~	V1: 0.119%~0.119%	P
5	SET UP TIME	230VAC/1000ms (Max) 115VAC/1500ms (Max)	I/P: 230VAC/115VAC O/P:FULL LOAD Ta:25 ~	230VAC/ 247.556 ms 115VAC/ 273.894 ms	P
6	RISE TIME	230VAC/30ms (Max) 115VAC/30ms (Max)	I/P: 230VAC/115VAC O/P:FULL LOAD Ta:25 ~	230VAC/12.003ms 115VAC/12.410ms	P
7	HOLD UP TIME	230VAC/40ms (Typ) 115VAC/12ms (Typ)	I/P: 230VAC/115VAC O/P:FULL LOAD Ta:25 ~	230VAC/71.763ms 115VAC/14.195ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25 ~	< 5%	P
9	DYNAMIC LOAD	V1: 1000 mVp-p	I/P: 230VAC O/P(1)FULL /Min LOAD 90%DUTY/1KHZ (2) (1)FULL /Min LOAD 90%DUTY/3KHZ (3)FULL /Min LOAD 90%DUTY/5KHZ (4)FULL /Min LOAD 50%DUTY/120HZ Ta:25 ~	462mVp-p 280mVp-p 182mVp-p 440mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~305VAC	I/P:TESTING O/P:FULL LOAD Ta:25 ~	63.92VAC~305VAC	P
			I/P: (1)LOW-LINE-3V=82 V HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST:OK	
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	83% (TYP)	I/P:230 VAC O/P:FULL LOAD Ta:25 ~	85.20%	P
4	INPUT CURRENT	230V/ 0.5 A (Typ) 115V/ 0.75A (Typ) 277V/ 0.375A (Typ)	I/P: 230 VAC/115VAC /277VAC O/P:FULL LOAD Ta:25 ~	I = 0.282A/ 230VAC I = 0.519A/ 115VAC I = 0.221A/ 277VAC	P
5	INRUSH CURRENT	230V/ 45A (Typ) 115V/ 25A (Typ) COLD START	I/P:230VAC/115VAC O/P:FULL LOAD Ta:25 ~	I =39.007A/ 230VAC I =16.429A/ 115VAC	P
6	NO LOAD CONSUMPTION	<0.1W	I/P: 240 VAC/115VAC O/P:NO LOAD Ta:25 ~	0.038W /240V 0.03W /115V	P
7	LEAKAGE CURRENT	<0.25 mA/ 277VAC	I/P 277 VAC O/P Min LOAD Ta 25 ~	L-FG:0.011mA N-FG:0.011mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105%~160% RATED OUTPUT POWER	I/P: 230VAC I/P: 115VAC O/P:TESTING Ta:25 ~	126.83/ 230VAC 129.67%/115VAC Hiccup Mode,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH:5.25V~6.75V(Typ)	I/P:230VAC O/P:MIN LOAD Ta:25 ~	6.33V Shut off o/p voltage, clamping by zener diode	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25 ~	NO DAMAGE Hiccup Mode	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated 8A/600V	I/P High-Line = 305 V O/P (1)Full Load Turn on (2)Output Short (3)Full load continue Ta 25 ~	(1) 564V (2)544V (3)562 V	P
2	Diode Peak **Voltage**	D100 Rated 30A/45V I	I/P High-Line = 305 V O/P (1)Full Load Turn on (2)Output Short (3)Full load continue Ta 25 ~	(1)37.6V (2)34.6V (3)33.2V	P
3	**Input Capacitor Voltage**	C5 Rated: : 56 、/400 V	I/P High-Line = 305 V O/P (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta 25 ~	(1)358V (2)358V (3)358V	P
4	**Control IC Voltage Test**	PWM IC U1 Rated 24V	I/P High-Line = 305 V O/P (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta 25 ~	(1) 17.3V (2) 14.5V (3) 17.3V	P

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P 4 KVAC/min	I/P-O/P 4.4 KVAC/min Ta 25 ~	I/P-O/P 2.25 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 ~	PASS	P
2	CONDUCTION	BS EN/EN55032(CISPR32) CNS13438 CLASS B	I/P 230 VAC (50HZ) O/P FULL/50% LOAD Ta 25 ~	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 ~	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL IRM-30-5
1. ROOM AMBIENT BURN-IN 1 HRS
I/P 230VAC O/P FULL LOAD Ta= 29.2 ~
2. HIGH AMBIENT BURN-IN 1 HRS
I/P 230VAC O/P FULL LOAD Ta=51.5 ~
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 29.2 ~</th><th>HIGH AMBIENT Ta= 51.5 ~</th></tr>
<tr><td>1</td><td>C5</td><td>74.2℃</td><td>92.2℃</td></tr>
<tr><td>2</td><td>D40</td><td>73.9℃</td><td>92.2℃</td></tr>
<tr><td>3</td><td>D100</td><td>82.8℃</td><td>101.5℃</td></tr>
<tr><td>4</td><td>T1</td><td>82.4℃</td><td>100.9℃</td></tr>
<tr><td>5</td><td>C106</td><td>68.7℃</td><td>87.4℃</td></tr>
<tr><td>6</td><td>D5</td><td>79.0℃</td><td>97.5℃</td></tr>
<tr><td>7</td><td>Q1</td><td>80.1℃</td><td>98.4℃</td></tr>
<tr><td>8</td><td>C105</td><td>78.6℃</td><td>97.5℃</td></tr>
<tr><td>9</td><td>C40</td><td>74.1℃</td><td>92.2℃</td></tr>
<tr><td>10</td><td>BD1</td><td>75.1℃</td><td>93.0℃</td></tr>
<tr><td>11</td><td>L100</td><td>71.3℃</td><td>90.1℃</td></tr>
<tr><td>12</td><td>U1</td><td>72.0℃</td><td>90.5℃</td></tr>
<tr><td>13</td><td>LF2</td><td>68.7℃</td><td>86.8℃</td></tr>
<tr><td>14</td><td>LF1</td><td>67.0℃</td><td>84.5℃</td></tr>
<tr><td>15</td><td>CASE</td><td>68.8℃</td><td>87.0℃</td></tr>
</table></td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P 230 VAC
O/P 127 LOAD
Ta 25 ~</td><td>TEST OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P 305VAC/100VAC
O/P 100 LOAD
Ta= -30 ~</td><td>TEST OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL50 ~
NO DAMAGE</td><td>I/P 305VAC
O/P FULL LOAD
Ta=50 ~
HUMIDITY= 95 %R.H</td><td>TEST OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>±0.03%/ ~(0~50 ~)</td><td>I/P 230 VAC
O/P FULL LOAD</td><td>0%/ ~(0~50 ~)</td><td>P</td></tr>
<tr><td>6</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">1. Thermal shock Temperature: -45℃~ +90℃
2. Temperature change rate :25℃ / MIN
3. Dwell time low and high temperature : 30 MIN/EACH
4. Total test cycle:5 CYCLE
5. Input/Output condition: STATIC</td><td>OK</td><td>P</td></tr>
<tr><td>7</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature: -30℃~ +70℃
2. Temperature change rate :25℃ / 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</td><td>OK</td><td>P</td></tr>
</table>

8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform Sine Wave (2) Frequency 10~500Hz (3) Sweep Time 10min/sweep cycle (4) Acceleration 2G（Blank）/5G（ST） (5) Test Time 60min in each axis (X.Y.Z) (6) Ta 25 ~	TEST OK	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 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=45 ~ LIFE TIME (3) I/P 230VAC O/P 75% LOAD Ta=45 ~ LIFE TIME (4) I/P 230VAC O/P 50% LOAD Ta=45 ~ LIFE TIME	(1) 158118HRS (2) 25053HRS (3) 79278HRS (4) 2811296HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE 593.3K HRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 45 ~		P

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SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	FRANK	WANGDZ