



Test Report: IRM-05-15

5W 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 : 32.5 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : -2.5 %~ +2.5 % (Max)	I/P : 85 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0 %~ 0.04 %	P
3	LINE REGULATION	V1 : -0.3 %~ +0.3 % (Max)	I/P : 100VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0 %	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 %	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/ 378 ms 115VAC/ 412 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/ 16.6 ms 115VAC/ 16.7 ms	P
7	HOLD UP TIME	230VAC : 80 ms (TYP) 115VAC : 15 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 138.5 ms 115VAC/ 32.3 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 : 1500 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) 98.6 mVp-p (2) 55.6 mVp-p (3) 49.8 mVp-p (4) 196 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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1	INPUT VOLTAGE RANGE	85VAC~305 VAC 120VDC~430VDC	(1) I/P: TESTING O/P: FULL LOAD (2) I/P: DC TESTING (L:+ N:-) O/P: FULL / 50% LOAD (3) I/P: DC TESTING (L:- N:+) O/P: FULL / 50% LOAD Ta : 25°C	(1) 42.8 V~305V (2) 106.1Vdc~430Vdc/FULL LOAD 105.9Vdc~430Vdc/50% LOAD (3) 106.1Vdc~430Vdc/FULL LOAD 105.8Vdc~430Vdc/50% LOAD	P
			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)	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°C	TEST : OK	P
3	EFFICIENCY	75% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	78.6 %	P
4	INPUT CURRENT	230V/ 0.08 A (TYP) 115V/ 0.12 A (TYP) 277V/ 0.06 A (TYP)	I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.0565 A/ 230 VAC I = 0.0985 A/ 115 VAC I = 0.0469 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 = 36.5 A/ 230 VAC I = 18.2 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA /277 VAC	I/P : 277VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.018 mA N-FG : 0.018 mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.0869 W	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115 % ~ 260 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	164.5 %/ 230 VAC 150.3 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 17.25 V ~ 20.25 V	O/P : MIN LOAD Ta : 25°C	18.154V 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
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COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor DRAIN TO GND Peak Voltage	U1 Rated: 800 V 0.45 A	I/P : High-Line = 305 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 498 V (2) 446 V (3) 500 V	P
2	Diode Peak Voltage	D100 Rated: 2 A 100 V	I/P : High-Line = 305 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 87.6 V (2) 70.8 V (3) 85.6 V	P
3	Clamp Diode Peak Voltage	D 2 Rated : 1000 V 1 A	I/P : High-Line = 305 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 485 V (2) 478 V	P
4	Input Capacitor Voltage	C5 Rated: 10u/400V 105°C	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°C	(1) 374 V (2) 374 V (3) 372 V	P
5	Control IC Voltage Test	U1 Rated : 27 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°C	(1) 18.1 V (2) 16.6 V (3) 18.1 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	I/P-O/P : 0.986 mA	P

			Ta : 25°C	NO DAMAGE	
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 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 INDUSTRY 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 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY 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
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1	TEMPERATURE RISE TEST	<p>MODEL : IRM-05-24</p> <p>1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=23.3 °C</p> <p>2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=59.7°C</p> <table border="1" data-bbox="502 425 1340 1160"> <thead> <tr> <th>NO</th> <th>Position</th> <th>PART NUMBER</th> <th>ROOM AMBIENT Ta= 23.3°C</th> <th>HIGH AMBIENT Ta= 59.7°C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>BD1</td> <td>SMD BD 1A/800V TD10KN</td> <td>41.1°C</td> <td>75.7°C</td> </tr> <tr> <td>2</td> <td>C4</td> <td>4.7u/400V 105°C 10*12.5 KMG IIR NCC</td> <td>40.5°C</td> <td>75.0°C</td> </tr> <tr> <td>3</td> <td>L1</td> <td>INDUCTOR 33uH 10% REF:9*3.2ΦT-52mm</td> <td>42.9°C</td> <td>77.5°C</td> </tr> <tr> <td>4</td> <td>U1</td> <td>PWM ICE3AR10080JZ</td> <td>48.6°C</td> <td>83.5°C</td> </tr> <tr> <td>5</td> <td>C5</td> <td>10u/400V 105°C 10*16 KXJ NCC</td> <td>45.1°C</td> <td>79.4°C</td> </tr> <tr> <td>6</td> <td>D2</td> <td>FRD 1A/1KV FR107 T-52mm</td> <td>48.6°C</td> <td>83.2°C</td> </tr> <tr> <td>7</td> <td>T1</td> <td>MT TF2609-R0 RM5 IRM10-24 B JSI</td> <td>47.1°C</td> <td>81.4°C</td> </tr> <tr> <td>8</td> <td>C101</td> <td>C/E 220u/35V UL8Kh 8*11.5 ZLH RUB</td> <td>41.5°C</td> <td>75.4°C</td> </tr> <tr> <td>9</td> <td>C37</td> <td>C/E 22u/50V L5Kh 5*11 P=2.5 YXG RUB</td> <td>40.2°C</td> <td>74.9°C</td> </tr> <tr> <td>10</td> <td>D3</td> <td>SMD SFRD FM4007M-TG 1A/1KV</td> <td>43.9°C</td> <td>79.7°C</td> </tr> <tr> <td>11</td> <td>D100</td> <td>SMD SFRD EFM205 2A/300V SMB</td> <td>48.1°C</td> <td>81.8°C</td> </tr> </tbody> </table>			NO	Position	PART NUMBER	ROOM AMBIENT Ta= 23.3°C	HIGH AMBIENT Ta= 59.7°C	1	BD1	SMD BD 1A/800V TD10KN	41.1°C	75.7°C	2	C4	4.7u/400V 105°C 10*12.5 KMG IIR NCC	40.5°C	75.0°C	3	L1	INDUCTOR 33uH 10% REF:9*3.2ΦT-52mm	42.9°C	77.5°C	4	U1	PWM ICE3AR10080JZ	48.6°C	83.5°C	5	C5	10u/400V 105°C 10*16 KXJ NCC	45.1°C	79.4°C	6	D2	FRD 1A/1KV FR107 T-52mm	48.6°C	83.2°C	7	T1	MT TF2609-R0 RM5 IRM10-24 B JSI	47.1°C	81.4°C	8	C101	C/E 220u/35V UL8Kh 8*11.5 ZLH RUB	41.5°C	75.4°C	9	C37	C/E 22u/50V L5Kh 5*11 P=2.5 YXG RUB	40.2°C	74.9°C	10	D3	SMD SFRD FM4007M-TG 1A/1KV	43.9°C	79.7°C	11	D100	SMD SFRD EFM205 2A/300V SMB	48.1°C	81.8°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 122 % LOAD Ta : 25°C	TEST : OK	P																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305 VAC/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	± 0.003 %/°C (0~50°C)	P																																																												
6	STORAGE TEMPERATURE TEST	<p>1. Thermal shock Temperature : -40°C~ +85°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 5 CYCLE</p> <p>5. Input/Output condition : STATIC</p>			OK	P																																																											
7	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature : -30°C~ +70°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 10 CYCLE</p> <p>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</p>			OK	P																																																											



8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/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-05-24 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) 709920 HRS (2) 149230 HRS (3) 163330 HRS (4) 185364 HRS	P
10	MTBF	9083.9K hrs min. Telcordia SR-332 (Bellcore) ; 1495.8K hrs min. MIL-HDBK-217F (25)		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
2013.5.31	RD SAMPLE	PASS	Shenym	Wangdz
2013.7.30	PRODUCT SAMPLE (Y1307D063)	PASS	Shenym	Wangdz

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