



# TEST REPORT: IRM-02-24

## 2W Single Output Encapsulated Type

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection 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

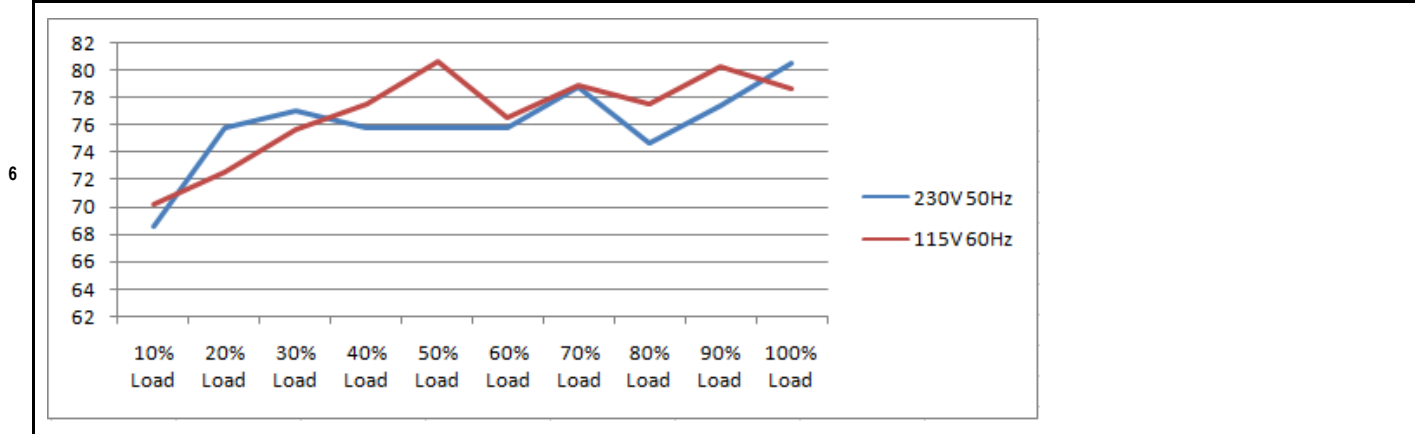
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 23.760V ~ 24.240V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 23.89V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.5% ~ -2.5%	I/P : 100VAC / 305VAC O/P: FULL / MINLOAD TA= 25°C	V1: -0.46% ~ -0.50%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 305VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.04%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.24 %
6	RIPPLE & NOISE(Max)	V1 : 200 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 101 mVp-p
7	SET UP TIME (MAX.)	230VAC : 600ms	I/P : 230VAC	230VAC : 18ms
		115VAC : 600ms	I/P : 115VAC	115VAC : 16ms
INPUT=230VAC/50HZ @ FULL LOAD		INPUT=115VAC/60HZ @ FULL LOAD		
CH1 : Output Voltage CH2 : AC Input Voltage		CH1 : Output Voltage CH2 : AC Input Voltage		
RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 13.8ms 115VAC : 13.8ms	

8	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>	
	<p>HOLD UP TIME (TYP.)</p> <p>230VAC : 40ms 115VAC : 12ms</p>		<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C</p> <p>230VAC : 116.0ms 115VAC : 26.4ms</p>	
9	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	
	<p>DYNAMIC LOAD</p> <p>V1 : 2400 mVp-p</p>		<p>I/P : 230VAC O/P: (1). (2). (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C</p> <p>V1: 148.0mv 120.0mv unit:mVp-p</p>	
10	<p>FULL /50% LOAD 50%DUTY / 120HZ</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>	



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC ~ 305VAC 120VDC ~ 430VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	45.0VAC ~ 305VAC 71VDC ~ 430VDC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 315VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 305VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.030A / 230VAC 0.045A / 115VAC 0.025A / 277VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.01817A / 230VAC I= 0.03200A / 115VAC I= 0.01750A / 277VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P : 277VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.0729 mA N-FG: 0.0729 mA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0355 W
	EFFICIENCY (TYP.)	77.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	80.6 %



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INRUSH CURRENT (TYP.) 20A / 230VAC 10A / 115VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 3.76A / 230VAC I= 1.85A / 115VAC

Ch2: 200 V/V M4.00ms A Ch4: 3.68 V  
Ch4 Max 3.76 V

Ch2: 100 V/V M4.00ms A Ch4: 1.80 V  
Ch4 Max 1.85 V

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	> 110%	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA: 25°C	376% 305VAC 325% 230VAC 240% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	25.20V ~ 32.40V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD TA: 25°C	30.20V 305VAC 30.20V 230VAC 30.20V 85VAC Shut off o/p voltage, clamping by zener diode
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 85VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 700V 0.4A	I/P : 315VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 315VAC VDS: (1). 634.00V (2). 684.00V (3). 630.00V
2	Input Capacitor	C6 Rated : 5uf 450V	I/P : 315VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 442.00V (2). 446.00V (3). 446.00V
3	Control IC	U1 Rated : 9.00V (max) -0.3V (min)	I/P : 315VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)Low Line No Load Vo(min) Ta : 25°C	U1 (1). 6.58V (2). 6.30V (3). 6.30V (4). 6.54V
5	O/P Diode	D100 Rated : 200V 2.0A	I/P : 315VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 148.00V (2). 123.00V (3). 147.00V
6	Clamp Diode	D1 Rated : 1000V 1.0A	I/P : 315VAC (1)Full load continue Ta : 25°C	(1). 594.00V

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

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min	I/P-O/P: 3.300KVAC /min Ta : 25°C	I/P-O/P: 0.05mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ NO DAMAGE

**E.M.C. TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N: 1KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

**RELIABILITY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	TEMPERATURE RISE TEST	MODEL : IRM-02-12 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 18.9°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 73.0°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT 18.9°C</th> <th>HIGH AMBIENT Ta: 73.0°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C101</td><td>30.1°C</td><td>81.4°C</td></tr> <tr><td>2</td><td>T1</td><td>33.8°C</td><td>84.4°C</td></tr> <tr><td>3</td><td>C6</td><td>31.4°C</td><td>81.4°C</td></tr> <tr><td>4</td><td>BD1</td><td>32.6°C</td><td>82.3°C</td></tr> <tr><td>5</td><td>R2</td><td>31.0°C</td><td>80.8°C</td></tr> <tr><td>6</td><td>L1</td><td>31.9°C</td><td>81.6°C</td></tr> <tr><td>7</td><td>U1</td><td>35.9°C</td><td>85.2°C</td></tr> <tr><td>8</td><td>D100</td><td>31.9°C</td><td>83.4°C</td></tr> <tr><td>9</td><td>D1</td><td>33.6°C</td><td>83.2°C</td></tr> <tr><td>10</td><td>CASE</td><td>31.3°C</td><td>81.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT 18.9°C	HIGH AMBIENT Ta: 73.0°C	1	C101	30.1°C	81.4°C	2	T1	33.8°C	84.4°C	3	C6	31.4°C	81.4°C	4	BD1	32.6°C	82.3°C	5	R2	31.0°C	80.8°C	6	L1	31.9°C	81.6°C	7	U1	35.9°C	85.2°C	8	D100	31.9°C	83.4°C	9	D1	33.6°C	83.2°C	10	CASE	31.3°C	81.4°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 269.46% LOAD Ta : 25°C	TEST : OK																																												
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 305VAC / 100VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 75°C NO DAMAGE	I/P : 315VAC O/P : FULL LOAD Ta : 75°C HUMIDITY= 95.0% RH	TEST : OK																																												
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~75°C)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0°C~75°C)																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +100°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		TEST : OK																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +80°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		TEST : OK																																												



8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 5G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 75.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 75.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 75.0°C LIFE TIME	(1). 158118 HRS (2). 56064 HRS (3). 62984.4 HRS (4). 70605.6 HRS
10	MTBF	MIL-HDBK-217F 1960K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 75°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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