



# TEST REPORT: IRM-03-15

## 3W 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

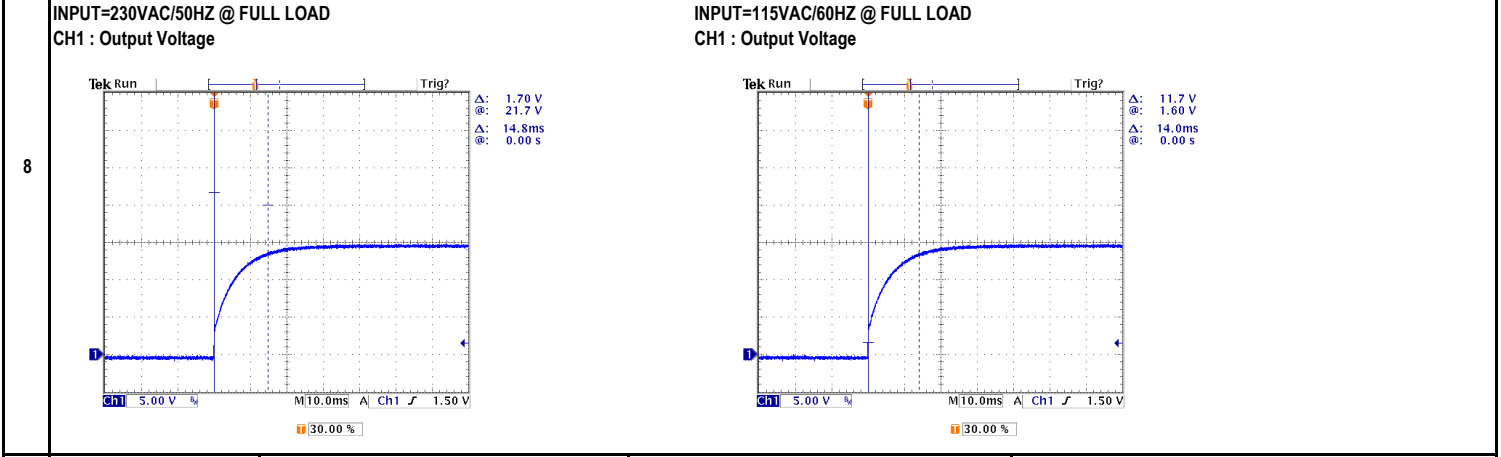
E.M.C. Test

### ■ RELIABILITY TEST

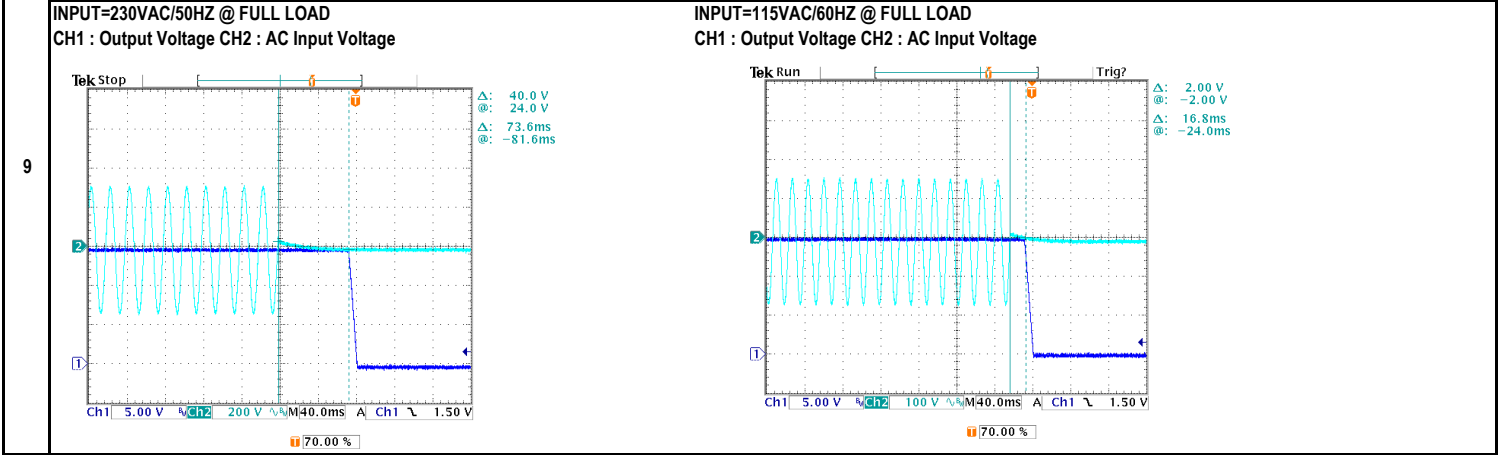
ENVIRONMENT TEST

DESIGN VERIFY TEST  
OUTPUT FUNCTION

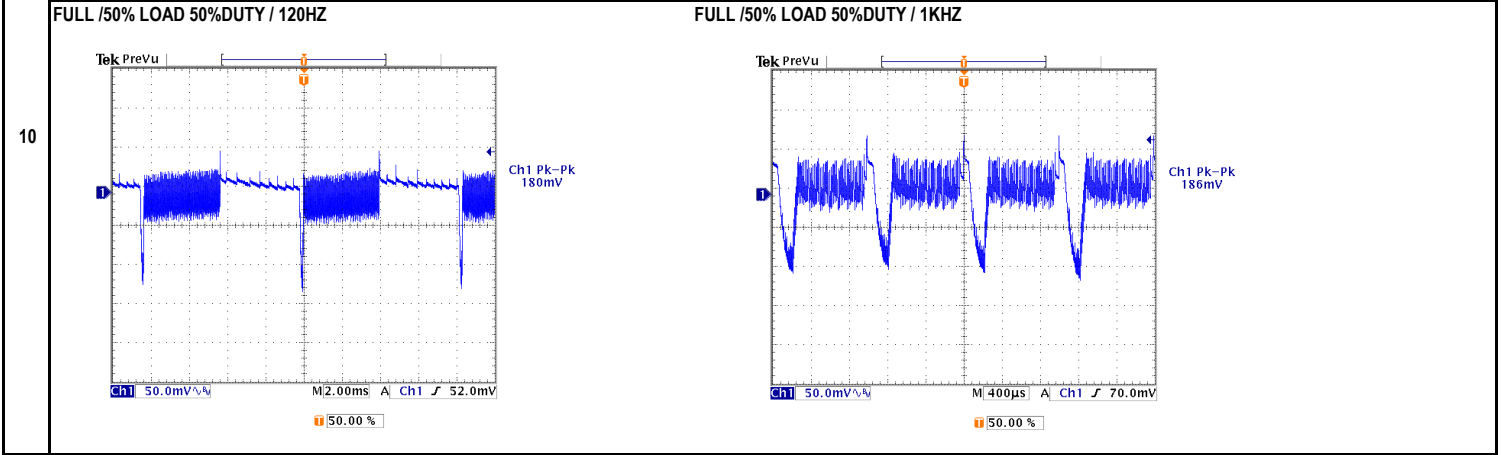
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 0.00V ~ 0.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 14.93V ~ 14.93V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 305VAC O/P: FULL / MINLOAD TA= 25°C	V1: -0.47% ~ -0.53%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 305VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ -0.07%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ -0.07%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.013 %
6	RIPPLE & NOISE(Max)	V1 : 200 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 72.8 mVp-p
7	SET UP TIME (MAX.)	230VAC : 600ms	I/P : 230VAC	230VAC : 20ms
		115VAC : 600ms	I/P : 115VAC	115VAC : 18ms
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 : 14.8ms 115VAC : 14.0ms



<b>HOLD UP TIME (TYP.)</b>	230VAC : 40ms 115VAC : 8ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 73.6ms 115VAC : 16.8ms
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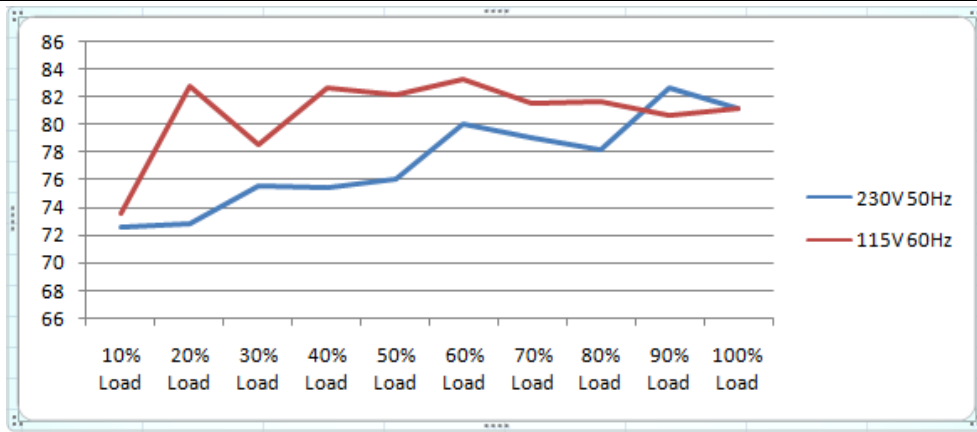


<b>DYNAMIC LOAD</b>	V1 : 1500 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50% duty/120HZ (2)Full/Min load 50% duty/1KHZ TA : 25°C	V1: (1). 180.0mv (2). 186.0mv unit:mVp-p
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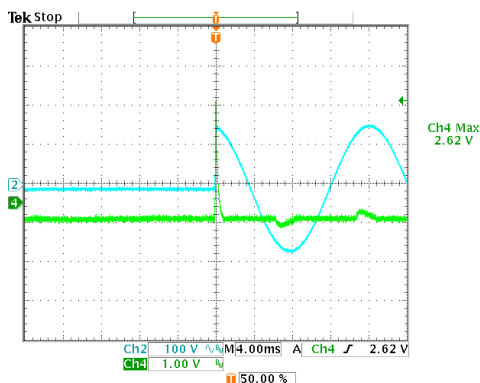
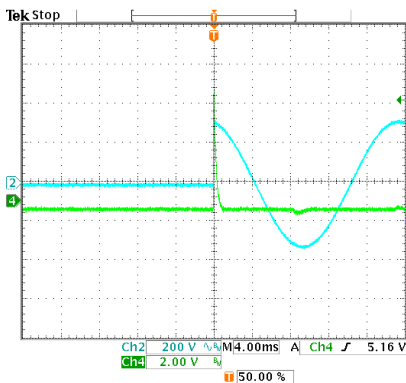


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC ~ 305VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	56.0VAC ~ 305VAC
			I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC 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.)	0.04 / 230VAC 0.07 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	I= 0.03A / 230VAC I= 0.05A / 115VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P : 277VAC O/P: MIN LOAD TA : 25°C	L-FG: 0.0721 mA N-FG: 0.0722 mA
5	NO LOAD POWER CONSUMPTION	< 0.08W	I/P : 230VAC O/P: MIN LOAD TA : 25°C	< 0.038 W
	EFFICIENCY (TYP.)	78.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	81.2 %



6	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= 5.72A / 230VAC I= 2.62A / 115VAC
		INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage	INPUT=115VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage	



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105% ~ 260%	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA: 25°C	223% 305VAC 223% 230VAC 205% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	15.75V ~ 20.30V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD TA: 25°C	17.50V 305VAC 17.50V 230VAC 17.50V 85VAC Shut down Re- power ON
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 : 725V 0.4A	I/P : 308VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 308VAC VDS: (1). 642.00V (2). 532.00V (3). 642.00V
2	Input Capacitor	C5 Rated : 3uf 450V	I/P : 308VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 432.00V (2). 432.00V (3). 432.00V
3	Control IC	U1 Rated : 9.0V (max) -0.3V (min)	I/P : 308VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)Low Line No Load Vo(min) Ta : 25°C	(1). 6.56V (2). 6.12V (3). 6.12V (4). 6.56V
4	O/P Diode	D100 Rated : 80V 2.0A	I/P : 308VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 72.40V (2). 53.60V (3). 71.20V
5	Clamp Diode	D1 Rated : 1000V 1.0A	I/P : 308VAC O/P : (1)Full load continue Ta : 25°C	(1). 614.00V

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: 0.38mA 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



# 3W Single Output Encapsulated Type

# IRM-03 series

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-03-12 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC      O/P: 100% LOAD      TA= 21.9°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC      O/P: 100% LOAD      TA= 68.2°C	<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT 21.9°C</th> <th>HIGH AMBIENT Ta: 68.2°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C6</td><td>37.8°C</td><td>83.6°C</td></tr> <tr><td>2</td><td>R5</td><td>35.8°C</td><td>81.8°C</td></tr> <tr><td>3</td><td>R2</td><td>37.0°C</td><td>82.9°C</td></tr> <tr><td>4</td><td>T1</td><td>38.9°C</td><td>84.4°C</td></tr> <tr><td>5</td><td>C101</td><td>35.2°C</td><td>80.6°C</td></tr> <tr><td>6</td><td>D100</td><td>38.2°C</td><td>83.9°C</td></tr> <tr><td>7</td><td>U1</td><td>40.6°C</td><td>86.2°C</td></tr> <tr><td>8</td><td>D1</td><td>39.2°C</td><td>84.8°C</td></tr> <tr><td>9</td><td>BD1</td><td>38.2°C</td><td>83.8°C</td></tr> <tr><td>10</td><td>CASE</td><td>37.1°C</td><td>82.1°C</td></tr> </tbody> </table>	NO.	Position	ROOM AMBIENT 21.9°C	HIGH AMBIENT Ta: 68.2°C	1	C6	37.8°C	83.6°C	2	R5	35.8°C	81.8°C	3	R2	37.0°C	82.9°C	4	T1	38.9°C	84.4°C	5	C101	35.2°C	80.6°C	6	D100	38.2°C	83.9°C	7	U1	40.6°C	86.2°C	8	D1	39.2°C	84.8°C	9	BD1	38.2°C	83.8°C	10	CASE	37.1°C	82.1°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 136% 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 70°C NO DAMAGE	I/P : 315VAC O/P : FULL LOAD Ta : 70°C HUMIDITY= 95.0% RH	TEST : OK																																												
5	TEMPERATURE COEFFICIENT	±0.03% / (0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0036% / (0°C~50°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 ~ +75°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																																												



3W Single Output Encapsulated Type

IRM-03  
series

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	(1).	158118 HRS
		(2) I/P : 230VAC	O/P : FULL LOAD	Ta= 70.0°C	LIFE TIME	(2).	70605.6 HRS
		(3) I/P : 230VAC	O/P : 75% LOAD	Ta= 70.0°C	LIFE TIME	(3).	88914 HRS
		(4) I/P : 230VAC	O/P : 50% LOAD	Ta= 70.0°C	LIFE TIME	(4).	125618.4 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 2137.6 KHRS					
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 70°C					

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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