



# Test Report: IRM-20-15

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20W Single Output Encapsulated Type

## ■ 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 : 46.8 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : -2.5 %~ +2.5 % (Max)	I/P : 115 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -0.04 %~ 0.086 %	P
3	LINE REGULATION	V1 : -0.3 %~ +0.3 % (Max)	I/P : 115VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0.04 %	P
4	LOAD REGULATION	V1 : -0.5 %~ +0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.04 %~ 0.04 %	P
5	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 1000 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 743 ms 115VAC/ 612 ms	P
6	RISE TIME	230VAC : 20 ms (Max) 115VAC : 20 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 10.2 ms 115VAC/ 11.2 ms	P
7	HOLD UP TIME	230VAC : 40 ms (TYP) 115VAC : 8 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 49.8 ms 115VAC/ 9.1 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) 245 mVp-p (2) 155 mVp-p (3) 146 mVp-p (4) 396 mVp-p	P

## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE-3V= 82 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	78.7 V~264V  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~440 HZ NO DAMAGE OSC	I/P : 85 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	EFFICIENCY	84% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	85.5 %	P
4	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.6 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.19 A/ 230 VAC I = 0.36 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 40 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 27.218 A/ 230 VAC	P
6	LEAKAGE CURRENT	< 0.25 mA/240 VAC	I/P : 240VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.015 mA N-FG : 0.015 mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.0862 W	P

## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115 % ~ 160 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	141.2 %/ 230 VAC 125.7 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 17.25 V ~ 20.25 V	O/P : MIN LOAD Ta : 25°C	18.16 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 <b>Peak Voltage</b>	U1 Rated: 800 V 1.5 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) 512 V (2) 486 V (3) 505 V	P
2	Diode Peak <b>Voltage</b>	D100 Rated: 30 A 120 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) 97.6 V (2) 87.5 V (3) 96.6 V	P
3	Clamp Diode Peak Voltage	D 2 Rated : 800 V 2 A	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 488 V (2) 476 V	P
4	Input Capacitor Voltage	C5 Rated: 27u/400V 105°C	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) 368 V (2) 368 V (3) 368 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) 17.0 V (2) 16.8 V (3) 16.9 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 : 0.502 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 B	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 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																																																		
1	TEMPERATURE RISE TEST	MODEL : IRM-20-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=21.6 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 51.3°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>PART NUMBER</th> <th>ROOM AMBIENT Ta= 21.6°C</th> <th>HIGH AMBIENT Ta= 51.3°C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>LF1</td> <td>LF LF512-R0 UU9.8 0.4A 35.84mH B</td> <td>52.2°C</td> <td>81.0°C</td> </tr> <tr> <td>2</td> <td>U1</td> <td>PWM ICE3AR2280CJZ</td> <td>63.6°C</td> <td>92.2°C</td> </tr> <tr> <td>3</td> <td>D2</td> <td>FRD 1A/1KV FR107 T-52mm</td> <td>60.5°C</td> <td>89.1°C</td> </tr> <tr> <td>4</td> <td>C5</td> <td>27u/400V 105°C 12.5*20 KXJ IIR</td> <td>52.8°C</td> <td>81.1°C</td> </tr> <tr> <td>5</td> <td>T1coil</td> <td>MT TF2539 RM6 IRM20-24 B</td> <td>57.4°C</td> <td>85.8°C</td> </tr> <tr> <td>6</td> <td>T1core</td> <td>MT TF2539 RM6 IRM20-24 B</td> <td>60.3°C</td> <td>88.0°C</td> </tr> <tr> <td>7</td> <td>C101</td> <td>C/E 330u/35V UL10Kh 10*12.5 ZLH</td> <td>52.5°C</td> <td>81.1°C</td> </tr> <tr> <td>8</td> <td>D100</td> <td>SFRD STTH2003CT 20A/300V TO220</td> <td>63.9°C</td> <td>91.7°C</td> </tr> <tr> <td>9</td> <td>BD1</td> <td>SMD BD 2A/800V TT208</td> <td>58.2°C</td> <td>86.7°C</td> </tr> </tbody> </table>	NO	Position	PART NUMBER	ROOM AMBIENT Ta= 21.6°C	HIGH AMBIENT Ta= 51.3°C	1	LF1	LF LF512-R0 UU9.8 0.4A 35.84mH B	52.2°C	81.0°C	2	U1	PWM ICE3AR2280CJZ	63.6°C	92.2°C	3	D2	FRD 1A/1KV FR107 T-52mm	60.5°C	89.1°C	4	C5	27u/400V 105°C 12.5*20 KXJ IIR	52.8°C	81.1°C	5	T1coil	MT TF2539 RM6 IRM20-24 B	57.4°C	85.8°C	6	T1core	MT TF2539 RM6 IRM20-24 B	60.3°C	88.0°C	7	C101	C/E 330u/35V UL10Kh 10*12.5 ZLH	52.5°C	81.1°C	8	D100	SFRD STTH2003CT 20A/300V TO220	63.9°C	91.7°C	9	BD1	SMD BD 2A/800V TT208	58.2°C	86.7°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 125 % LOAD Ta : 25°C	TEST : OK	P																																																		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/115VAC 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 : 272 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	± 0.007 %/°C (0~50°C)	P																																																		
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C~ +85°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		OK	P																																																		
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +70°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/Fu11 Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK	P																																																		



# 20W Single Output Encapsulated Type

# IRM-20 series

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-20-24 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) 334170 HRS (2) 67445 HRS (3) 77432 HRS (4) 128427 HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 970.3 KHRS		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
2013.3.23	RD SAMPLE	PASS	Shenym	Wangdz
2013.5.4	PRODUCT SAMPLE	PASS	Shenym	Wangdz
2013.7.11	PRODUCT SAMPLE (Y1306D068)	PASS	Shenym	Wangdz

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