



TEST REPORT: IRM-03-12

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

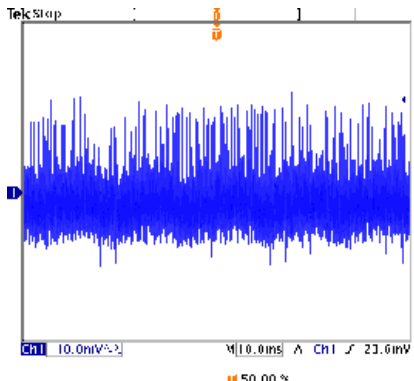
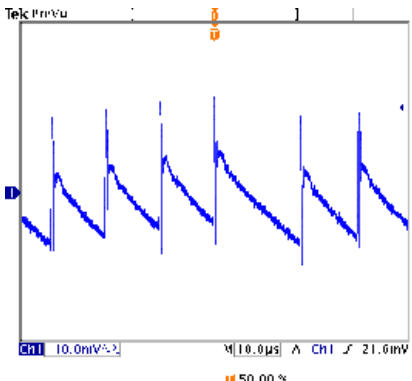
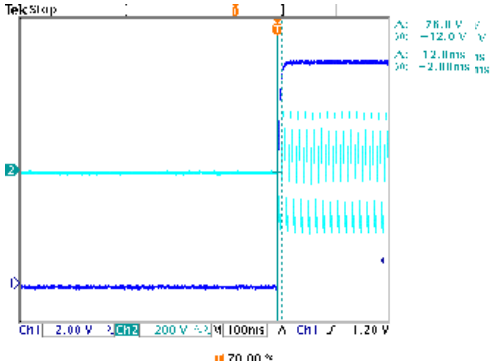
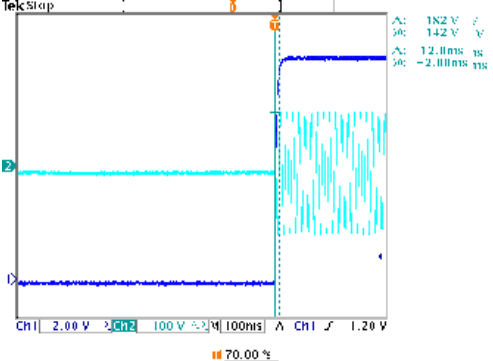
Safety Test

E.M.C. Test

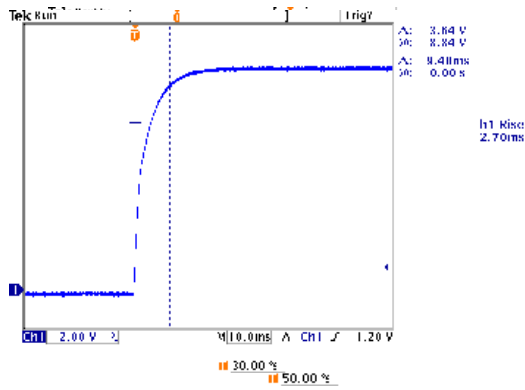
■ RELIABILITY TEST

ENVIRONMENT TEST

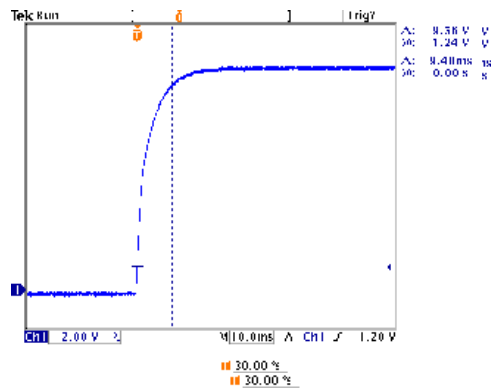
DESIGN VERIFY TEST OUTPUT FUNCTION

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: 11.96V ~ 11.96V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 305VAC O/P: FULL / MINLOAD TA= 25°C	V1: -0.33% ~ -0.42%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 305VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.08% ~ 0.00%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.342 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 45.2 mVp-p
		high frequency : 		
6	RIPPLE & NOISE(Max)		low frequency : 	
7	SET UP TIME (MAX.)	230VAC : 600ms 115VAC : 600ms	I/P : 230VAC I/P : 115VAC	230VAC : 12ms 115VAC : 12ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		
7	SET UP TIME (MAX.)		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
				
7	SET UP TIME (MAX.)			
	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 9.4ms 115VAC : 9.4ms

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



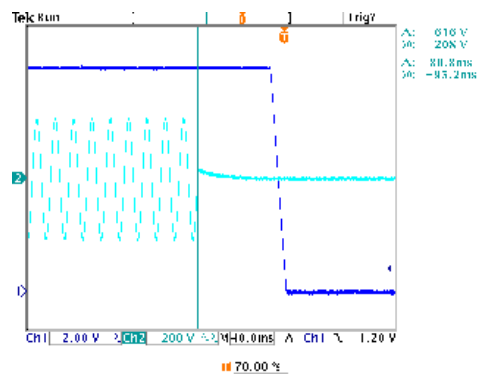
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



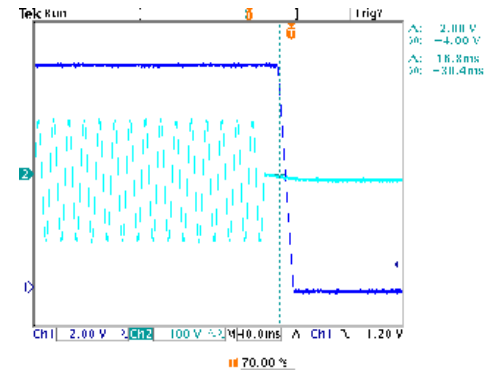
HOLD UP TIME (TYP.)

230VAC	: 40ms	I/P : 230VAC	230VAC	: 80.8ms
115VAC	: 8ms	I/P : 115VAC	115VAC	: 16.8ms
		O/P: FULL LOAD		
		TA : 25°C		

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

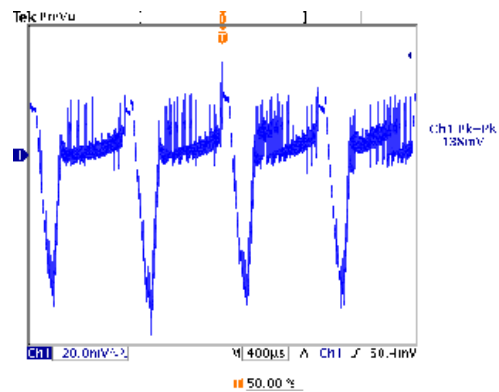
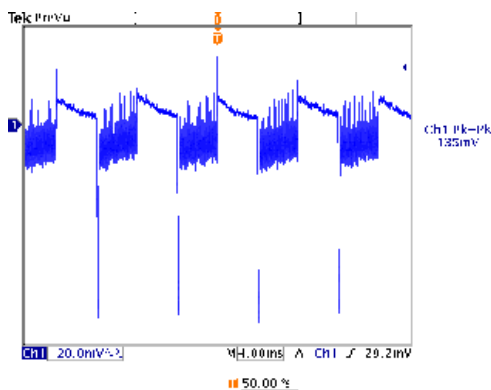


DYNAMIC LOAD

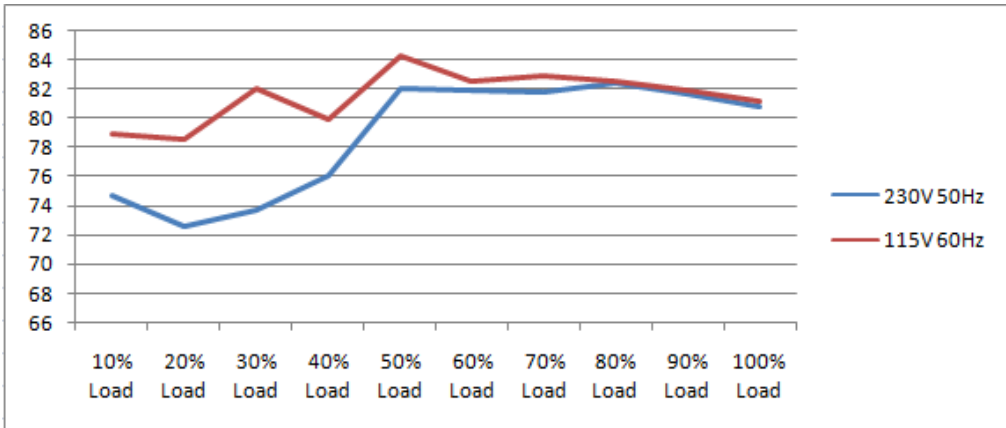
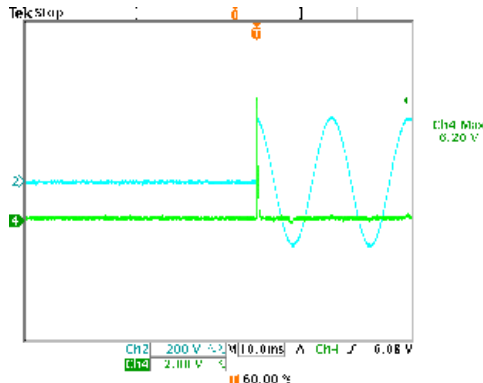
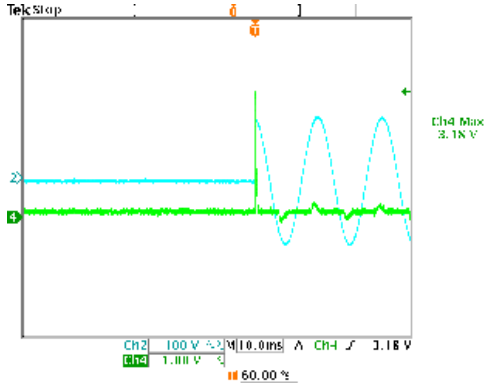
V1 : 1200 mVp-p	I/P : 230VAC	(1).	(2).	unit:mVp-p
	O/P:			
	(1)Full/Min load 50%duty/120HZ			
	(2)Full/Min load 50%duty/1KHZ			
	TA : 25°C	V1: 135.0mv	138.0mv	

FULL /50% LOAD 50%DUTY / 120HZ

FULL /50% LOAD 50%DUTY / 1KHZ



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℃	42.0VAC ~ 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℃	TEST : OK
3	INPUT CURRENT (TYP.)	0.04 / 230VAC 0.07 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 0.03A / 230VAC I= 0.05A / 115VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P : 277VAC O/P: MIN LOAD TA : 25℃	L-FG: 0.0721 mA N-FG: 0.0722 mA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P : 230VAC O/P: MIN LOAD TA : 25℃	< 0.037 W
6	EFFICIENCY (TYP.)	78.0%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	80.8 %
				
7	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℃	I= 6.20A / 230VAC I= 3.18A / 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	224% 305VAC 215% 230VAC 203% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	12.60V ~ 16.20V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C	15.00V 305VAC 15.00V 230VAC 15.00V 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). 644.00V (2). 530.00V (3). 644.00V
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). 434.00V (2). 436.00V (3). 436.00V
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). 6.64V (2). 6.20V (3). 6.20V (4). 6.64V
4	O/P Diode	D100 Rated : 60V 3.0A	I/P : 308VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 55.60V (2). 42.40V (3). 55.20V
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: 0.49mA 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-03-12		
		1. ROOM AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 21.9℃		
		2. HIGH AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 68.2℃		
			NO. Position ROOM AMBIENT 21.9℃ HIGH AMBIENT Ta: 68.2℃	
			1 C6 37.8℃ 83.6℃	
			2 R5 35.8℃ 81.8℃	
			3 R2 37.0℃ 82.9℃	
			4 T1 38.9℃ 84.4℃	
			5 C101 35.2℃ 80.6℃	
			6 D100 38.2℃ 83.9℃	
2	OVER LOAD BURN-IN TEST	NO DAMAGE	I/P : 230VAC	TEST : OK
		1 HOUR (MIN)	O/P : 136% LOAD	
			Ta : 25℃	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305VAC / 100VAC O/P : FULL LOAD Ta : -30.0℃	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 70℃ NO DAMAGE	I/P : 315VAC O/P : FULL LOAD Ta : 70℃ HUMIDITY= 95.0% RH	TEST : OK
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~50℃)	I/P : 230VAC O/P : FULL LOAD	±0.0036% /(0℃~50℃)
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +100℃		TEST : OK
		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		
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35℃ ~ +75℃		TEST : OK
		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		
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)		TEST : OK



3W Single Output Encapsulated Type

IRM-03
series

		(6) Ta : 25℃	
		:SUPPOSE C101 IS THE MOST CRITICAL COMPONENT	
9	CAPACITOR LIFE CYCLE	(1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0℃ LIFE TIME	(1). 158118 HRS
		(2) I/P : 230VAC O/P : FULL LOAD Ta= 70.0℃ LIFE TIME	(2). 70605.6 HRS
		(3) I/P : 230VAC O/P : 75% LOAD Ta= 70.0℃ LIFE TIME	(3). 88914 HRS
		(4) I/P : 230VAC O/P : 50% LOAD Ta= 70.0℃ LIFE TIME	(4). 125618.4 HRS
10	MTBF	MIL-HDBK-217F	
		TOTAL FAILURE RATE : 2137.6 KHR	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 70℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014