



TEST REPORT: IRM-01-9

1W Single Output Encapsulated Type

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

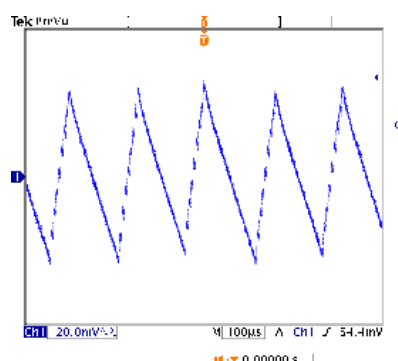
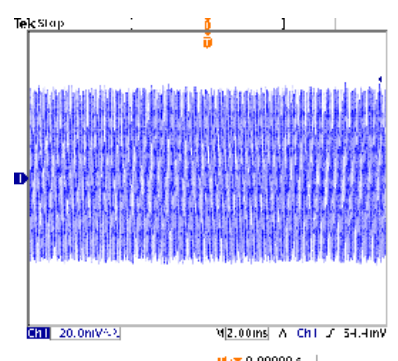
Safety Test

E.M.C. Test

■ RELIABILITY TEST

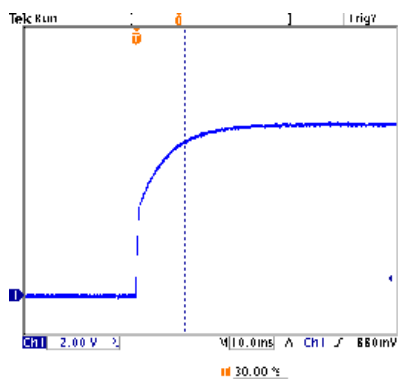
ENVIRONMENT TEST

DESIGN VERIFY TEST OUTPUT FUNCTION

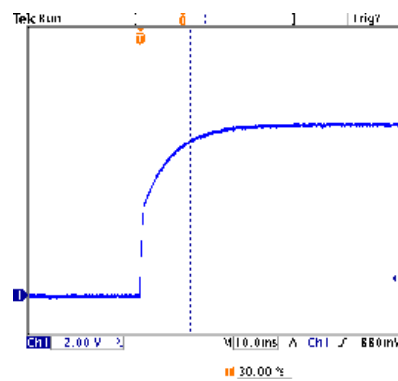
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 8.910V ~ 9.090V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 9.05V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.5% ~ -2.5%	I/P : 100VAC / 305VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.56% ~ 0.44%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	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: 0.11% ~ 0.00%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.22 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 100.00 mVp-p
		high frequency : 		low frequency : 
7	SET UP TIME (MAX.)	230VAC : 600ms 115VAC : 600ms	I/P : 230VAC I/P : 115VAC	230VAC : 18ms 115VAC : 16ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD 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 : 13.0ms 115VAC : 13.4ms

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



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



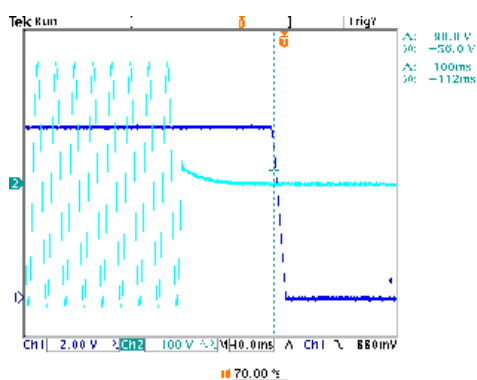
HOLD UP TIME (TYP.)

230VAC : 40ms
115VAC : 12ms

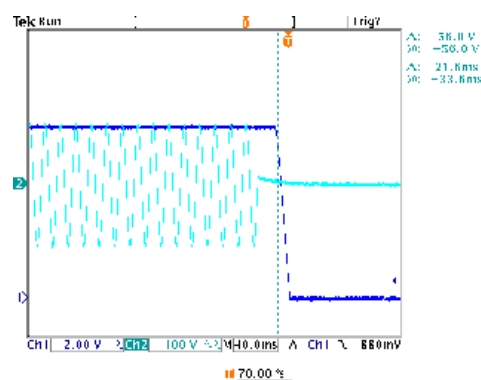
I/P : 230VAC
I/P : 115VAC
O/P: FULL LOAD
TA : 25°C

230VAC : 100.0ms
115VAC : 21.6ms

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 : 1800 mVp-p

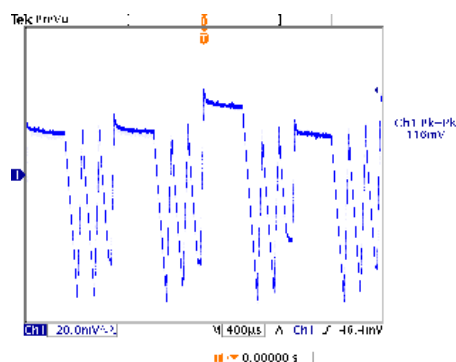
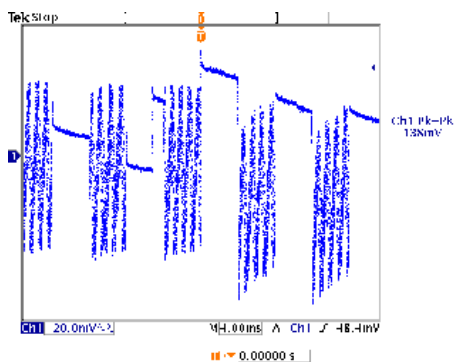
I/P : 230VAC
O/P:
(1)Full/Min load 50%duty/120HZ
(2)Full/Min load 50%duty/1KHZ
TA : 25°C

V1: (1). 138.0mv (2). 116.0mv unit:mVp-p

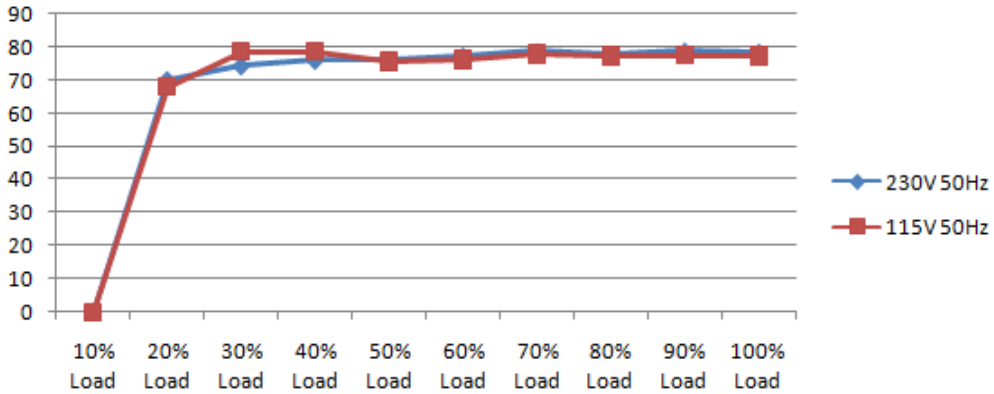
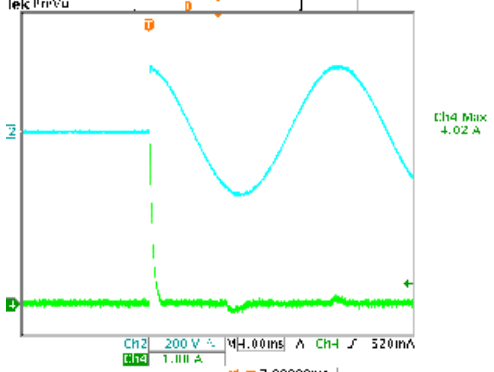
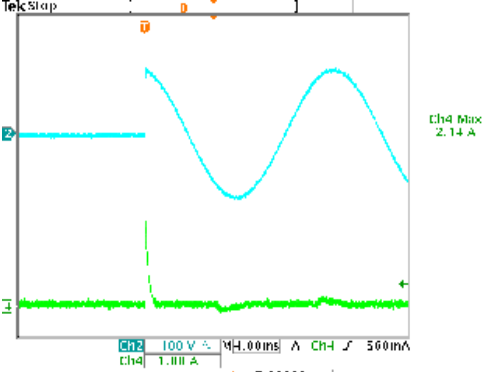
FULL /Min LOAD 50%DUTY / 120HZ

FULL /Min LOAD 50%DUTY / 1KHZ

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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	48.0VAC ~ 305VAC 84VDC ~ 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.)	0.018A / 230VAC 0.025A / 115VAC 0.016A / 277VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.01133A / 230VAC I= 0.01750A / 115VAC I= 0.00980A / 277VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P : 277VAC O/P : MIN LOAD TA : 25°C	L-O/P: 0.0112 mA N-O/P: 0.011 mA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0332 W
6	EFFICIENCY (TYP.)	72.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	79.3 %
				
7	INRUSH CURRENT (TYP.)	10A / 230VAC 5A / 115VAC COLD START twidth= 0 us measured at 50% Ipeak	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 4.02A / 230VAC I= 2.14A / 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	> 110%	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	750% 305VAC 632% 230VAC 474% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	10.30V ~ 12.20V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C	10.90V 305VAC 10.90V 230VAC 10.90V 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). 628.00V (2). 668.00V (3). 628.00V
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). 448.00V (2). 448.00V (3). 448.00V
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). 6.60V (2). 6.36V (3). 6.36V (4). 6.60V
5	O/P Diode	D100 Rated : 60V 3.0A	I/P : 315VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 56.40V (2). 47.20V (3). 56.40V
6	Clamp Diode	D1 Rated : 1000V 1.0A	I/P : 315VAC O/P : (1)Full load continue Ta : 25°C	(1). 596.00V

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-01-3.3																																															
		1. ROOM AMBIENT BURN-IN : 1.0hrs																																															
		IP: 230VAC O/P: 100% LOAD TA= 15.9℃																																															
		2. HIGH AMBIENT BURN-IN : 1.0hrs																																															
		IP: 230VAC O/P: 100% LOAD TA= 75.0℃																																															
		<table><tr><th>NO.</th><th>Position</th><th>ROOM AMBIENT 15.9℃</th><th>HIGH AMBIENT Ta: 75.0℃</th></tr><tr><td>1</td><td>C101</td><td>27.1℃</td><td>86.3℃</td></tr><tr><td>2</td><td>T1</td><td>28.9℃</td><td>88.5℃</td></tr><tr><td>3</td><td>C6</td><td>24.9℃</td><td>84.5℃</td></tr><tr><td>4</td><td>BD1</td><td>26.1℃</td><td>85.8℃</td></tr><tr><td>5</td><td>R2</td><td>24.6℃</td><td>84.1℃</td></tr><tr><td>6</td><td>L1</td><td>25.6℃</td><td>85.0℃</td></tr><tr><td>7</td><td>U1</td><td>28.2℃</td><td>88.0℃</td></tr><tr><td>8</td><td>D100</td><td>31.5℃</td><td>90.6℃</td></tr><tr><td>9</td><td>D1</td><td>27.9℃</td><td>87.7℃</td></tr><tr><td>10</td><td>CASE</td><td>26.4℃</td><td>85.9℃</td></tr></table>			NO.	Position	ROOM AMBIENT 15.9℃	HIGH AMBIENT Ta: 75.0℃	1	C101	27.1℃	86.3℃	2	T1	28.9℃	88.5℃	3	C6	24.9℃	84.5℃	4	BD1	26.1℃	85.8℃	5	R2	24.6℃	84.1℃	6	L1	25.6℃	85.0℃	7	U1	28.2℃	88.0℃	8	D100	31.5℃	90.6℃	9	D1	27.9℃	87.7℃	10	CASE	26.4℃	85.9℃	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE	I/P : 230VAC	TEST : OK																																													
		1 HOUR (MIN)	O/P : 550.00% 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 75℃ NO DAMAGE	I/P : 315VAC O/P : FULL LOAD Ta : 75℃ HUMIDITY= 95.0% RH	TEST : OK																																													
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~75℃)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0℃~75℃)																																													
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℃ ~ +80℃ 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		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). 17782.8 HRS (3). 28119.6 HRS (4). 70605.6 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 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

2007/3/20 A50-S014