



TEST REPORT: IRM-03-9

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

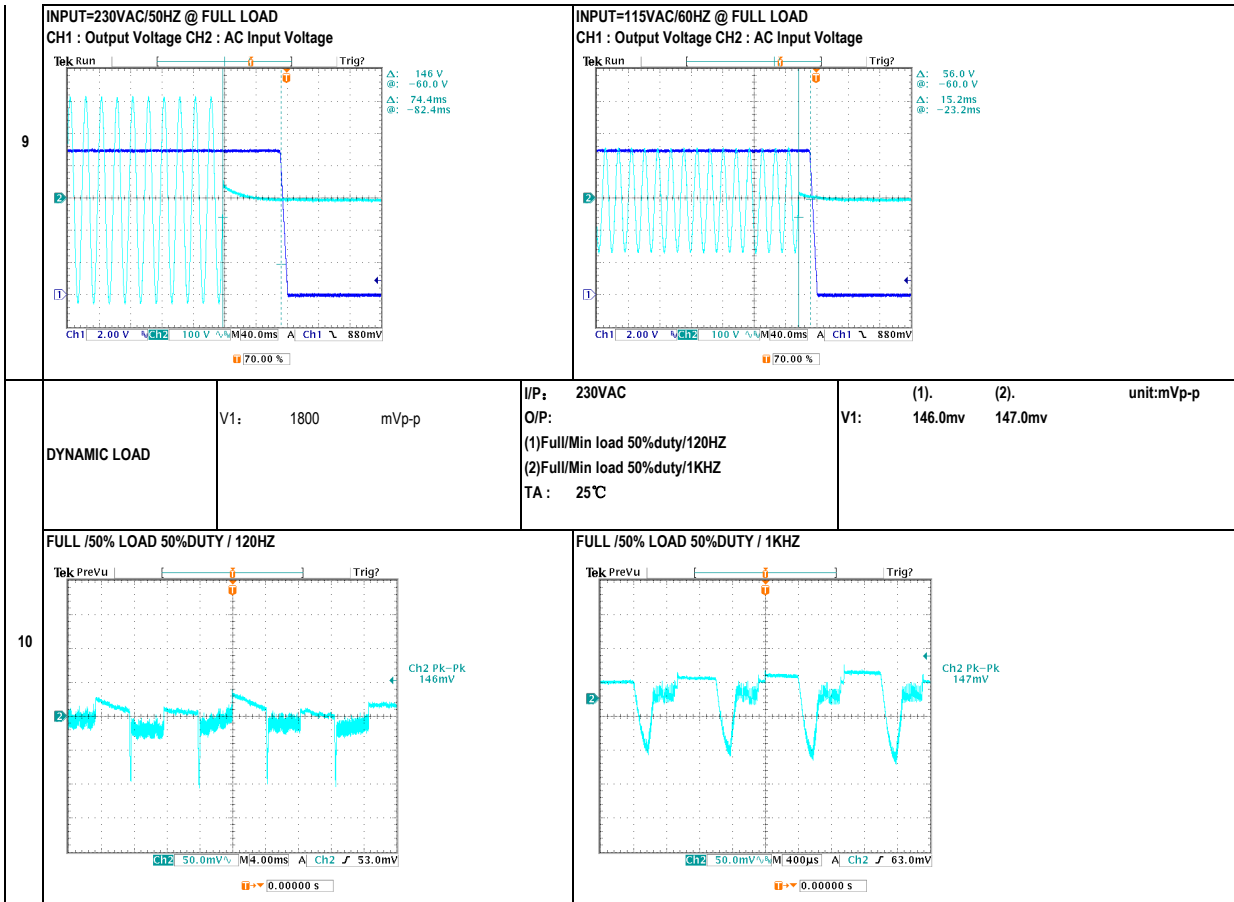
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 8.820V ~ 9.180V	I/P: 230VAC O/P: MIN LOAD TA: 25°C	CH1: 9.03V ~ 9.03V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: 2.5% ~ -2.5%	I/P: 100VAC / 305VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.33% ~ 0.22%
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: 0.00% ~ 0.00%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P: FULL LOAD TA: 25°C	TEST< 1.327 %
	RIPPLE & NOISE(Max)	V1: 100 mVp-p	I/P: 230VAC O/P: FULL LOAD TA: 25°C	V1: 51.4 mVp-p
6	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>high frequency :</p> </div> <div style="text-align: center;"> <p>low frequency:</p> </div> </div>			
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	
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 13.8ms 115VAC : 14.0ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
	HOLD UP TIME (TYP.)	230VAC : 40ms 115VAC : 8ms	I/P: 230VAC I/P: 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 74.4ms 115VAC : 15.2ms



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 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)	54.0VAC ~ 305VAC 76.3VDC ~ 430VDC 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.)	0.04A / 230VAC 0.07A / 115VAC 0.035A / 277VAC	I/P: 230VAC I/P: 115VAC I/P: 277VAC O/P: FULL LOAD TA: 25°C	I= 0.02600A / 230VAC I= 0.04300A / 115VAC I= 0.02158A / 277VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P: 277VAC O/P: MIN LOAD TA: 25°C	L-FG: 0.066 mA N-FG: 0.0658 mA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P: 230VAC O/P: MIN LOAD TA: 25°C	< 0.039 W
	EFFICIENCY (TYP.)	77.0%	I/P: 230VAC O/P: FULL LOAD TA: 25°C	79.8 %
6				
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°C	I= 5.28A / 230VAC I= 2.68A / 115VAC
	<p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage</p>		<p>INPUT=115VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage</p>	

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	212.0% 305VAC 212.0% 230VAC 200.0% 100VAC Hiccup mode, recovers automatically after fault condition is removed
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: 725V 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). 642.00V (2). 552.00V (3). 642.00V
2	Input Capacitor	C5 Rated: 2uf 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). 424.00V (2). 424.00V (3). 424.00V
3	Control IC	U1 Rated: 6.85V (max) 6.0V (min)	I/P: 315VAC (1)Full Load O/P: (2)Output Short Change (4)Low Line No Load Vo(min) Ta: 25°C	(1). 6.56V (2). 6.08V (3). 6.52V (4). 6.52V
4	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). 44.60V (2). 34.20V (3). 44.20V
5	Clamp Diode	D1 Rated: 1000V 1.0A	I/P: 315VAC O/P: (1)Full load continue Ta: 25°C	(1). 602.00V

■ 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: 0.48mA 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-03-3.3 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	ROOM AMBIENT Ta: 21.9°C HIGH AMBIENT Ta: 68.2°C																																													
			<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT Ta</th> <th>HIGH AMBIENT Ta</th> </tr> </thead> <tbody> <tr><td>1</td><td>C6</td><td>43.6°C</td><td>89.3°C</td></tr> <tr><td>2</td><td>R5</td><td>41.7°C</td><td>87.6°C</td></tr> <tr><td>3</td><td>R2</td><td>41.5°C</td><td>87.4°C</td></tr> <tr><td>4</td><td>T1</td><td>48.7°C</td><td>94.4°C</td></tr> <tr><td>5</td><td>C101</td><td>47.5°C</td><td>92.4°C</td></tr> <tr><td>6</td><td>D100</td><td>52.8°C</td><td>97.1°C</td></tr> <tr><td>7</td><td>U1</td><td>46.7°C</td><td>93.1°C</td></tr> <tr><td>8</td><td>D1</td><td>45.7°C</td><td>91.5°C</td></tr> <tr><td>9</td><td>BD1</td><td>43.4°C</td><td>89.1°C</td></tr> <tr><td>10</td><td>CASE</td><td>43.4°C</td><td>88.4°C</td></tr> </tbody> </table>	NO.	Position	ROOM AMBIENT Ta	HIGH AMBIENT Ta	1	C6	43.6°C	89.3°C	2	R5	41.7°C	87.6°C	3	R2	41.5°C	87.4°C	4	T1	48.7°C	94.4°C	5	C101	47.5°C	92.4°C	6	D100	52.8°C	97.1°C	7	U1	46.7°C	93.1°C	8	D1	45.7°C	91.5°C	9	BD1	43.4°C	89.1°C	10	CASE	43.4°C	88.4°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230VAC O/P: 134% 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	±0.0000% /(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																																												



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).	17782.8	HRS
		(3) I/P: 230VAC	O/P : 75% LOAD	Ta= 70.0°C	LIFE TIME	(3).	35390.4	HRS
		(4) I/P: 230VAC	O/P : 50% LOAD	Ta= 70.0°C	LIFE TIME	(4).	62984.4	HRS
10	MTBF	10762.8K hrs min. Telcordia SR-332 (Belcore) ; 2137.6K hrs min. MIL-HDBK-217F (25°C)						
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 70°C O/P: FULL LOAD						

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ