Test Report: IRM-45-5

45W 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	VERDICT
1	RIPPLE & NOISE(Max)	V1: 80mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 32.1mVp-p	P
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2.5%~ 2.5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.497%~ 0.616%	P
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: -0.12%~ 0.24%	P
4	LOAD REGULATION(Max)	V1: -1%~ 1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.497%~ 0.616%	P
5	SET UP TIME(Max)	230VAC/1000ms 115VAC/2000ms	I/P ： 230 VAC I/P ： 115 VAC O/P ：FULL LOAD Ta ：25℃	230VAC/ 386.869ms 115VAC/ 486.113ms	P
6	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P ： 230 VAC I/P ： 115 VAC O/P ：FULL LOAD Ta ：25℃	230VAC/ 8.749ms 115VAC/ 9.174ms	P
7	HOLD UP TIME(Typ)	230VAC/50ms 115VAC/12ms	I/P ： 230 VAC I/P ： 115 VAC O/P ：FULL LOAD Ta ：25℃	230VAC/ 79.565ms 115VAC/ 15.871ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	< ±5%	P
9	DYNAMIC LOAD	V1: 1000mVp-p	I/P: 230VAC O/P(1)FULL /Min LOAD 90%DUTY / 1KHZ (2) (1)FULL /Min LOAD 90%DUTY / 3KHZ (3)FULL /Min LOAD 90%DUTY / 5KHZ (4)FULL /Min LOAD 50%DUTY / 120HZ Ta:25℃	266mVp-p(1) 292mVp-p(2) 274mVp-p(3) 292mVp-p(4)	P
10	TRANSIENT RECOVERY TIME	V1: 1000mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	138 mVp-p(5) 0 us	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	71.787V~264V	P
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST:OK	
2	INPUT FREQUENCY RANGE	47HZ ~440 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK	P
3	EFFICIENCY(TYP)	83.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	85.02 %	P
4	INPUT CURRENT (Typ)	230V/ 0.75A 115V/ 1.5A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	I =0.354A/ 230VAC I =0.6663A/ 115VAC	P
5	INRUSH CURRENT(Typ)	230V/50A 115V/30A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	I =40.343A/ 230VAC I =27.803A/ 115VAC	P
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25℃	L-FG : 0.011mA N-FG : 0.011mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25℃	< 0.039W < 0.0544W	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115%~ 160%	I/P: 230VAC I/P: 115VAC O/P:TESTING Ta:25℃	145.375%/ 230VAC 141.75%/115VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH:5.25V~6.75V	I/P: 230VAC I/P: 115VAC O/P:MIN LOAD Ta:25℃	6.2V Other，shut off o/voltage, clamping by zener diode	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE Hiccup Mode	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	PWM Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated 10A/ 600V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. I/P:Low-Line -3V = 97V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25℃	(1)544V (2)550V (3)544V (4)548V (5)546V (6)542V (7)562V (1)312V (2)331V (3)329V (4)321V (5)316V (6)334V (7)343V	P
2	Diode Peak **Voltage**	D100 Rated 30A/80V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/	D100: (1)38.1V (2)37.4V (3)37.8V (4)38.2V	P

			Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD Ta:25℃	(5)38V (6)37.2V (7)38.6V (8)35.6V	
3	**Input Capacitor Voltage**	C5 Rated: : 120μ/400 V 105℃/ VZ Series	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25℃	(1)366V (2)366V (3)368V	**P**
4	**Control IC Voltage Test**	PWM IC U1 Rated :10V~27V	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P Ta:25℃	(1) 17.3V (2) 17.4V (3) 17.3V	**P**
5	Clamp Diode Peak Voltage	D 5 Rated： RD 2A/800V	I/P：High-Line +3V = 267 V AC ON/OFF O/P： (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta：25℃	(1) 456 V (2) 458 V	**P**

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min	I/P-O/P: 3.6 KVAC/min Ta:25℃	I/P-O/P: 1.702mA NO DAMAGE	**P**
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25℃	I/P-O/P: 9999MΩ NO DAMAGE	**P**

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100%,75%,50%LOAD Ta:25℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab	P
3	E.S.D	EN61000-4-2 INDUSTRY AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
4	E.F.T	EN61000-4-4 NDUSTRY NPUT： 1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
5	SURGE	IEC61000-4-5 INDUSTRY L-N ：1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
6	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-45-5 1. ROOM AMBIENT BURN-IN： 1HRS I/P： 230VAC O/P： FULL LOAD Ta= 21.7℃ 2. HIGH AMBIENT BURN-IN： 1HRS I/P： 230VAC O/P： FULL LOAD Ta=53℃			P

NO	Position	ROOM AMBIENT Ta=21.7℃	HIGH AMBIENT Ta=53℃
1	LF1	59.7℃	89.6℃
2	LF2	59.6℃	89.9℃
3	BD1	63.1℃	93.8℃
4	C5	63.5℃	93.8℃
5	D5	68.9℃	99.7℃
6	C40	66.6℃	97.0℃
7	Q1	69.4℃	100.5℃
8	T1	69.1℃	99.3℃
9	C105	61.9℃	92.4℃
10	D100	72.3℃	102.5℃
11	D101	72.0℃	102.4℃
12	L100	63.7℃	94.3℃
13	U1	62.1℃	92.5℃
14	D40	69.6℃	99.8℃
15	D43	60.6℃	91.0℃
16	CASE	55.9℃	87.9℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P：144 % LOAD Ta：25℃	TEST：OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/100VAC O/P： 100 % LOAD Ta= -30 ℃	TEST：OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta=50℃ HUMIDITY= 95 %R.H	TEST：OK	P
5	TEMPERATURE COEFFICIENT	±0.03%/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	±0%/℃(0~50℃)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -40℃~ +80℃ 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		OK	P
7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -30℃~ +70℃ 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		OK	P
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℃		TEST：OK	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta=25℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta=50℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta=50℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta=50℃ LIFE TIME		(1) 97047HRS (2) 18142HRS (3) 30688HRS (4) 63591HRS	P
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE： 1212 KHRS			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50℃			P

TEST RESULT	TESTER	APPROVAL
PASS	Frank	Wangdz

2007/3/20 A50-S014