Test Report: IRM-45-24

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: 200mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 88.8 mVp-p	P
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2.5%~ 2.5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.15%~ 0.31%	P
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~264VAC O/P:FULL LOAD Ta:25℃	V1: -0.15%~ 0.074%	P
4	LOAD REGULATION(Max)	V1: -0.5%~ 0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0%~ 0.31%	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/ 493.326ms 115VAC/ 460.143ms	P
6	RISE TIME (Max)	230VAC/30ms 115VAC/30ms	I/P ： 230 VAC I/P ： 115 VAC O/P ：FULL LOAD Ta ：25℃	230VAC/ 19.662ms 115VAC/ 19.181ms	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/ 76.101ms 115VAC/ 15.939ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	< ±5%	P
9	DYNAMIC LOAD	V1: 2400mVp-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℃	215mVp-p 153mVp-p 152mVp-p 211mVp-p	P
10	TRANSIENT RECOVERY TIME	V1: 2400mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	124mVp-p 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℃	75.737V~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)	89.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	91.1 %	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 =0.3846A/ 230VAC I =0.7334A/ 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 =41.375A/ 230VAC I =20.325A/ 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 : 0.011 mA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25℃	< 0.0296 W < 0.0569 W	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℃	143.16%/ 230VAC 139.47%/115VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH:25.2V~32.4V	I/P: 230VAC I/P: 115VAC O/P:MIN LOAD Ta:25℃	28.0V Other，shut off o/p 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 13A/650V	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)578V (2)530V (3)588V (4)580V (5)574V (6)588V (7)590V (1)346V (2)249V (3)358V (4)342V (5)342V (6)358V (7)354V	P
2	Diode Peak **Voltage**	D100 Rated 20A/150V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz	D100: (1) 116V (2)148V (3)108V (4)106V (5)110V	P

			(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℃	(6)109V (7)121V (8)97.6V	
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)364V (2)366V (3)366V	**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) 17.2V (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) 506 V (2) 514 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:1.660mA 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-45-24 1. ROOM AMBIENT BURN-IN： 1HRS I/P： 230VAC O/P： FULL LOAD Ta= 21.4℃ 2. HIGH AMBIENT BURN-IN： 1HRS I/P： 230VAC O/P： FULL LOAD Ta=53.1℃			P
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

NO	Position	ROOM AMBIENT Ta=21.4℃	HIGH AMBIENT Ta=53.1℃
1	**LF1**	46.7℃	76.3℃
2	**BD1**	46.7℃	78.3℃
3	**C5**	48.4℃	79.1℃
4	**D5**	51.0℃	82.8℃
5	**C40**	51.5℃	82.4℃
6	**Q1**	54.7℃	87.5℃
7	**T1**	55.8℃	86.2℃
8	**C105**	50.8℃	82.6℃
9	**D100**	63.8℃	93.9℃
10	**D43**	48.5℃	80.0℃
11	**U1**	49.0℃	79.8℃
12	**D40**	52.6℃	83.3℃
13	**CASE**	47.3℃	78.6℃

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	± 0.003%/℃ (0~50℃)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -40℃~ +85℃ 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) 410328HRS (2) 72078HRS (3) 79950HRS (4) 130749HRS	P
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE： 1212KHRS			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