



Test Report: HRPG-450-48

450W Single Output With PFC Function

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control 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	V1 : 240 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 125 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 40.8V ~ 55.2 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	38.66 V~ 58.37 V/ 230 VAC 38.63 V~ 58.36 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1%~ -1% (Max)	I/P : 100 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.1 %~ -0.1 %	P
4	LINE REGULATION	V1 : 0.2%~ -0.2% (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.02 %~ -0.02 %	P
5	LOAD REGULATION	V1 : 0.5 %~ -0.5% (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.1 %~ -0.1 %	P
6	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 2500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 87 ms 115VAC/ 180 ms	P
7	RISE TIME	230VAC : 100 ms (Max) 115VAC : 100 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 14 ms 115VAC/ 14 ms	P
8	HOLD UP TIME	230VAC : 16 ms (TYP) 115VAC : 16 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 25 ms 115VAC/ 19 ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	P
10	DYNAMIC LOAD	V1 : 4800 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1).618 mVp-p (2).137 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 97 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	72 V~264V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 100 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP) 0.99 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.979 / 230 VAC PF= 0.995 / 115 VAC	P
4	EFFICIENCY	89.5% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.35 %	P
5	INPUT CURRENT	230V/ 2.4 A (TYP) 115V/ 5 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 2.30 A/ 230 VAC I= 4.64 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 70 A (TYP) 115V/ 35 A (TYP) COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 60 A/ 230 VAC I= 30 A/ 115 VAC	P
7	LEAKAGE CURRENT	< 1.5 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 1.2 mA N-FG : 0.5 mA	P
8	No load power consumption	< 0.5 W	I/P : 230 VAC O/P : NO LOAD RC+&RC- SHORT Ta : 25°C	0.22 W	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105% ~ 135 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	120%/ 230 VAC 120 %/ 115 VAC Constant current limiting, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH1 : 57.6V ~ 67.2 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	62.90 V/ 230 VAC 62.91 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : Shut down o/p voltage , recovers automatically after temperature goes down	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	DC OK SIGNAL	PSU turn on : 3.3 ~ 5.6V ; PSU turn off : 0 ~ 1V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	PSU turn on : 4.998 V PSU turn off : 0 V	P
2	REMOTE CONTROL	Rc+ / Rc- 4 ~ 10V or open = power on 0 ~ 0.8V or short = power off	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	3.6V ~ 10 V POWER ON 0V ~ 3.5 V POWER OFF	P
3	REMOTE SENSE	>0.5V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	> 0.5 V	P
4	AUX POWER	4.75V~5.25V / 0.3A Ripple : 50mV	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	4.943V / 0.3A Ripple : 7mv	P
5	FAN ON/OFF control test	1、FAN ON : 20%± 10%	I/P : 230 VAC O/P : TESTING Ta : 25°C	> 22.1%LOAD FAN ON < 15.7 %LOAD FAN OFF	P
		2、RTH2≥ 50°C	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	>52.1 °C FAN ON	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q3 Rated : IRFP460A 20A/500V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 428 V (2) 406 V (3) 378 V	P
2	Diode Peak Voltage	Q 101 Rated : FME-220B 20A/150V Q 103 Rated : SF20LC30 20A/300V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 149 V (2) 149 V (3) 148 V (1) 272 V (2) 270 V (3) 257 V	P
3	Input Capacitor Voltage	C5 Rated : 330u/400V 105°C 30*30 HU	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 371.2 V (2) 374.5 V (3) 374.4 V	P
4	Control IC Voltage Test	U1 Rated : FAN4801NY 9.3V~30V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 15.847 V (2) 15.095 V (3) 15.117 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : IRFP460A 20A/500V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 472 V (2) 390 V (3) 408 V	P

■ SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 6.36 mA I/P-FG : 5.33 mA O/P-FG : 3.51 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C /70%RH	I/P-O/P : 2.96 GΩ I/P-FG : 7.57 GΩ O/P-FG : 10.9 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	9mΩ	P
4	APPROVAL	TUV : Certificate NO : R50181079 UL : File NO : E183223			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2,-3 CLASS A	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT			
1	TEMPERATURE RISE TEST	MODEL : HRPG-450-24			P			
		1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.1 °C						
		2. HIGH AMBIENT BURN-IN : 4.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C						
				NO		Position	ROOM AMBIENT Ta= 27.1 °C	HIGH AMBIENT Ta= 50 °C
				1		LF2	44.4°C	64.4°C
				2		U1	41.7°C	61.2°C
				3		L3	53.0°C	73.7°C
				4		C5	39.8°C	59.6°C
				5		D1	52.1°C	71.2°C
				6		Q1	48.6°C	68.3°C
				7		Q4	41.0°C	60.9°C
				8		T1	50.8°C	71.0°C
				9		BD1	49.9°C	69.4°C
				10		TSW1	45.2°C	64.7°C
				11		C18	41.5°C	61.2°C
				12		C61	42.1°C	61.4°C
				13		C105	34.6°C	53.4°C
				14		Q101	59.5°C	78.2°C
				15		Q104	49.4°C	68.4°C
				16		L100	41.2°C	61.1°C
				17		TSW2	40.9°C	60.4°C
				18		C19	48.6°C	68.4°C
				19		D900	44.1°C	62.4°C
		20	U900	40.5°C	60.3°C			
		21	T900	39.3°C	58.2°C			
		22	C955	32.7°C	52.2°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 123 % LOAD Ta : 25°C	TEST : OK	P			
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -40 °C	TEST : OK	P			
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P			
5	TEMPERATURE COEFFICIENT	± 0.03 % (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.01 % (0-50°C)	P			

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°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	OK	P
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -40°C~ +55°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	OK	P
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	HRPG-450-24:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME	(1) 1849473HRS (2) 434362.5HRS (3) 502524HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 130.5K HRS		P

TEST RESULT	TESTER	APPROVAL
PASS	SANFORD SU	VINCENT TSENG

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