

MODEL : HRP-150-3.3

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 80 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 10 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 2.8 V ~ 3.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	2.641 V~ 4.03 V/ 230 VAC 2.641 V~ 4.03 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 2.5 % ~ -2.5 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : 1.2 % ~ -1.2 %	P
4	LINE REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0 %	P
5	LOAD REGULATION	V1 : 1 % ~ -1 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : 0.55 % ~ -0.55 %	P
6	SET UP TIME	230VAC : 3000 ms (Max) 115VAC : 3000 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1348 ms 115VAC/ 1348 ms	P
7	RISE TIME	230VAC : 50 ms (Max) 115VAC : 50 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 5 ms 115VAC/ 10 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/ 28 ms 115VAC/ 26 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 : 660 mVp-p	I/P : 230 VAC O/P : FULL /Min LOAD 90%DUTY/1KHZ Ta : 25°C	546 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	65 V~264V	P
			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)	TEST : OK	
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= 0.964 / 230 VAC PF= 1 / 115 VAC	P
4	EFFICIENCY	78.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	79 %	P
5	INPUT CURRENT	230V/ 1.3 A (TYP) 115V/ 2.3 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.576 A/ 230 VAC I = 1.128 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 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.11 mA N-FG : 0.35 mA	P
8	NO LOAD POWER CONSUMPTION	<0.5W	I/P : 240 VAC O/P : NO LOAD RC+/RC- SHORT Ta : 25°C	0.26 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	119 %/ 230 VAC 119 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 3.96V~ 4.62 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.3 V/ 230 VAC 4.3 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 95 ± 5°C O.T.P. TSW2 : 105 ± 5°C O.T.P. NO DAMAGE	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	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE CONTROL	Rc+ / Rc- SHORT : POWER OFF OPEN : POWER ON	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	OK	P
2	REMOTE SENSE	>0.3V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	>0.3V	P
3	AUX POWER	4.6V~5.25V/0.3A RIPPLE=50mV	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	5VSB : 4.923 V RIPPLE : 11 mV	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																																														
1	TEMPERATURE RISE TEST	MODEL : HRP-150-5 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 31.8 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 47.9 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 31.8 °C</th><th>HIGH AMBIENT Ta= 47.9 °C</th></tr><tr><td>1</td><td>LF2</td><td>TR-781</td><td>63.7°C</td><td>80.3°C</td></tr><tr><td>2</td><td>BD1</td><td>4A/600V GLASS D3SB60</td><td>71.5°C</td><td>87.1°C</td></tr><tr><td>3</td><td>L3</td><td>TF-1592</td><td>61.1°C</td><td>76.6°C</td></tr><tr><td>4</td><td>Q1</td><td>IRFP460A 20A/500V TO247</td><td>60.1°C</td><td>75.3°C</td></tr><tr><td>5</td><td>D1</td><td>BYC8-600 8A/600V TO220</td><td>66.7°C</td><td>82.2°C</td></tr><tr><td>6</td><td>C5</td><td>100u/400V 105°C 18*25 KMG</td><td>74.5°C</td><td>91.1°C</td></tr><tr><td>7</td><td>CN2</td><td>TSW1 ST 95°C</td><td>63.8°C</td><td>80.0°C</td></tr><tr><td>8</td><td>C61</td><td>470u/16V 105°C KY</td><td>81.5°C</td><td>103.4°C</td></tr><tr><td>9</td><td>T2</td><td>TR435-R3</td><td>78.9°C</td><td>96.4°C</td></tr><tr><td>10</td><td>Q3</td><td>2SK4106 12A/500V</td><td>88.8°C</td><td>106.8°C</td></tr><tr><td>11</td><td>U1</td><td>FAN4801</td><td>85.1°C</td><td>106.0°C</td></tr><tr><td>12</td><td>T1</td><td>TF1585</td><td>93.8°C</td><td>111.3°C</td></tr><tr><td>13</td><td>Q101</td><td>STP80NF03L-04 80A/30V</td><td>83.6°C</td><td>100.4°C</td></tr><tr><td>14</td><td>Q103</td><td>IRL3103PbF 64A/30V</td><td>87.0°C</td><td>103.7°C</td></tr><tr><td>15</td><td>L100</td><td>TR-820</td><td>94.7°C</td><td>112.2°C</td></tr><tr><td>16</td><td>C105</td><td>3900uf/10V 10Kh ZLH</td><td>74.4°C</td><td>92.2°C</td></tr><tr><td>17</td><td>CN101</td><td>TSW2 ST 105°C</td><td>78.1°C</td><td>95.9°C</td></tr><tr><td>18</td><td>U900</td><td>TNY275</td><td>86.5°C</td><td>109.9°C</td></tr><tr><td>19</td><td>D900</td><td>SBYV26C 1A/600V</td><td>86.7°C</td><td>109.3°C</td></tr><tr><td>20</td><td>T900</td><td>TF1593</td><td>85.3°C</td><td>113.6°C</td></tr><tr><td>21</td><td>C955</td><td>220u/35V 8Kh ZLH</td><td>85.3°C</td><td>102.4°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 31.8 °C	HIGH AMBIENT Ta= 47.9 °C	1	LF2	TR-781	63.7°C	80.3°C	2	BD1	4A/600V GLASS D3SB60	71.5°C	87.1°C	3	L3	TF-1592	61.1°C	76.6°C	4	Q1	IRFP460A 20A/500V TO247	60.1°C	75.3°C	5	D1	BYC8-600 8A/600V TO220	66.7°C	82.2°C	6	C5	100u/400V 105°C 18*25 KMG	74.5°C	91.1°C	7	CN2	TSW1 ST 95°C	63.8°C	80.0°C	8	C61	470u/16V 105°C KY	81.5°C	103.4°C	9	T2	TR435-R3	78.9°C	96.4°C	10	Q3	2SK4106 12A/500V	88.8°C	106.8°C	11	U1	FAN4801	85.1°C	106.0°C	12	T1	TF1585	93.8°C	111.3°C	13	Q101	STP80NF03L-04 80A/30V	83.6°C	100.4°C	14	Q103	IRL3103PbF 64A/30V	87.0°C	103.7°C	15	L100	TR-820	94.7°C	112.2°C	16	C105	3900uf/10V 10Kh ZLH	74.4°C	92.2°C	17	CN101	TSW2 ST 105°C	78.1°C	95.9°C	18	U900	TNY275	86.5°C	109.9°C	19	D900	SBYV26C 1A/600V	86.7°C	109.3°C	20	T900	TF1593	85.3°C	113.6°C	21	C955	220u/35V 8Kh ZLH	85.3°C	102.4°C	P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 110 % LOAD Ta : 25°C	TEST : OK	P																																																																																																														
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230 VAC 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 40 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																																														
5	TEMPERATURE COEFFICIENT	± 0.04 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.014 % (0~50°C)	P																																																																																																														
6	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 : 1 hour in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK	P																																																																																																														

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 : 3.59 mA I/P-FG : 2.294 mA O/P-FG : 1.58 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 : 30 GΩ I/P-FG : 24.2 GΩ O/P-FG : 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	2 mΩ	P
4	APPROVAL	TUV : Certificate NO : R50147701 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 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				

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	HRPG-150-5 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME= 157781 HRS I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME= 49602 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 213.4K HRS			P
3	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure : Above 50,000 hours @ TA 40°C			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 3 Rated 2SK4106 12A/500V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short Ta : 25°C	(1) 442 V (2) 424 V	P
2	Diode Peak Voltage	Q101 Rated IPP09N03LA 50A/25V Q103 Rated IRL3103PbF 64A/30V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short O/P : (1)Full Load Turn on (2)Output Short Ta : 25°C	(1) 20.8 V (2) 18 V (1) 17.7 V (2) 15.2 V	P
3	PFC Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : IRFP460A 20A/500V	I/P : High-Line +3V = 267 V O/P : (1)Full Load (2) Dynamic Load 90%Duty/1KHz Ta : 25°C	(1) 438 V (2) 436 V	P
4	Input Capacitor Voltage	C5 Rated 100u/400V 105°C KMG	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) 376.8 V (2) 378.4 V (3) 378.5 V	P
5	Control IC Voltage Test	U 2 Rated FAN4801 : 12V~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) 16.1 V (2) 16.1 V (3) 16.1 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2008/12/1	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/3/25	PRODUCT SAMPLE W0812D43	PASS	SANFORD SU	VINCENT TSENG
2009/6/16	PRODUCT SAMPLE W0905A31	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023