



Test Report: HSP-150-2.5

150W Single Output Switching Power Supply

■ 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 : 80 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 45 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 2.35 V ~ 2.75 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	2.236 V ~ 2.848 V / 230 VAC 2.237 V ~ 2.848 V / 115 VAC	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -2 % ~ 2 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : -0.4 % ~ 0.4 %	PASS
4	LINE REGULATION	V1 : -0.5 % ~ 0.5 % (Max)	I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0 %	PASS
5	LOAD REGULATION	V1 : -1 % ~ 1 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : -0.2 % ~ 0.2 %	PASS
7	SET UP TIME	230VAC : 2000 ms (Max) 115VAC : 3000 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 881 ms 115VAC/ 1767 ms	PASS
8	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/ 6 ms 115VAC/ 6 ms	PASS
9	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/ 73 ms 115VAC/ 74 ms	PASS
10	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 10 %	PASS
11	DYNAMIC LOAD	V1 : 500 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). 265 mVp-p (2). 306 mVp-p	PASS

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	83 V~264V	PASS
			I/P : LOW-LINE-3V= 87 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 : 90 VAC ~ 264 VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK	PASS
3	POWER FACTOR	0.95 / 230 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.982 / 230 VAC	PASS
		0.98 / 115 VAC(TYP)		PF= 0.996 / 115 VAC	
4	EFFICIENCY	86% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.12 %	PASS
5	INPUT CURRENT	230V/ 0.4 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.389 A/ 230 VAC	PASS
		115V/ 0.8 A (TYP)		I = 0.773 A/ 115 VAC	
6	INRUSH CURRENT	230V/ 70 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 57.718 A/ 230 VAC	PASS
		COLD START			
7	LEAKAGE CURRENT	< 0.5 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.2141 mA N-FG : 0.2181 mA	PASS

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	140 %~ 180 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	159.5 %/ 230 VAC 159.4 %/ 115 VAC Hiccup Mode	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 3.2 V~ 3.7 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	3.40 V/ 230 VAC 3.39 V/ 115 VAC <input type="checkbox"/> Shut down Re- power ON	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 110 ± 5°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	108°C O.T.P. Active Hiccup Mode	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	PASS

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
7	REMOTE SENSE	>0.3V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	0.302V >	PASS

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 5 Rated : STF13NM60N : 600 V 11 A	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) 458 V (2) 466 V (3) 454 V	PASS
2	Diode Peak Voltage	Q101 Rated : SIR158DP : 30 V 60 A	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) 17.9 V (2) 17.3 V (3) 17.7 V	PASS
4	Input Capacitor Voltage	C 5 Rated : 120 u / 450V/ 105°C	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) 447 V (2) 446 V (3) 448 V	PASS
5	Control IC Voltage Test	U2 Rated : L6591 : 22 V	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) 15.5 V (2) 15.5 V (3) 15.5 V	PASS
6	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : STF22NM60N : 600 V 16 A	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) 460 V (2) 450 V (3) 448 V	PASS

■ 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 : 1.5 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 1.8 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 3.075 mA I/P-FG : 2.290 mA O/P-FG : 2.043 mA NO DAMAGE	PASS
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 : >9999 MΩ I/P-FG : >9999 MΩ O/P-FG : >9999 MΩ NO DAMAGE	PASS
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	8 mΩ	PASS

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	PASS
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	PASS
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	PASS
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	PASS
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 : HSP-150-2.5 1. ROOM AMBIENT BURN-IN : HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.1 °C 2. HIGH AMBIENT BURN-IN : HRS I/P : 230VAC O/P : FULL LOAD Ta= 51.6 °C			PASS																																																																																																									
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 27.1 °C</th> <th>HIGH AMBIENT Ta= 51.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>TR-689</td><td>30.1°C</td><td>55.6°C</td></tr> <tr><td>2</td><td>BD1</td><td>GBU408</td><td>36.7°C</td><td>62.2°C</td></tr> <tr><td>3</td><td>L1</td><td>TR-654</td><td>34.8°C</td><td>60.6°C</td></tr> <tr><td>4</td><td>L2</td><td>TF-6322</td><td>36.5°C</td><td>62.3°C</td></tr> <tr><td>5</td><td>Q1</td><td>STF22NM60N</td><td>39.6°C</td><td>64.3°C</td></tr> <tr><td>6</td><td>D2</td><td>YG971S6R</td><td>40.8°C</td><td>66.5°C</td></tr> <tr><td>7</td><td>C5</td><td>120u/450V CXW</td><td>39.3°C</td><td>63.9°C</td></tr> <tr><td>8</td><td>Q6</td><td>STF13NM60N</td><td>42.4°C</td><td>68.8°C</td></tr> <tr><td>9</td><td>C38</td><td>100u/25V YXM</td><td>37.5°C</td><td>63.4°C</td></tr> <tr><td>10</td><td>C81</td><td>47uF/50V YXM</td><td>40.9°C</td><td>66.5°C</td></tr> <tr><td>11</td><td>T1</td><td>TF-6326</td><td>59.9°C</td><td>85.8°C</td></tr> <tr><td>12</td><td>L101</td><td>TR-6101</td><td>65.2°C</td><td>92.1°C</td></tr> <tr><td>13</td><td>L102</td><td>TR-6100</td><td>65.0°C</td><td>91.6°C</td></tr> <tr><td>14</td><td>C108</td><td>2200uF/6.3V ZLH</td><td>62.0°C</td><td>88.8°C</td></tr> <tr><td>15</td><td>Q101</td><td>SIR158</td><td>66.3°C</td><td>94.1°C</td></tr> <tr><td>16</td><td>Q102</td><td>SIR159</td><td>59.2°C</td><td>86.0°C</td></tr> <tr><td>17</td><td>U1</td><td>NCP1608B</td><td>37.3°C</td><td>63.1°C</td></tr> <tr><td>18</td><td>U2</td><td>L6591</td><td>41.6°C</td><td>67.3°C</td></tr> <tr><td>19</td><td>C61</td><td>104/400V</td><td>42.0°C</td><td>67.8°C</td></tr> <tr><td>20</td><td>TSW1</td><td>110°C ±5°C</td><td>59.6°C</td><td>86.6°C</td></tr> </tbody> </table>	NO	Position		P/N	ROOM AMBIENT Ta= 27.1 °C	HIGH AMBIENT Ta= 51.6 °C	1	LF2	TR-689	30.1°C	55.6°C	2	BD1	GBU408	36.7°C	62.2°C	3	L1	TR-654	34.8°C	60.6°C	4	L2	TF-6322	36.5°C	62.3°C	5	Q1	STF22NM60N	39.6°C	64.3°C	6	D2	YG971S6R	40.8°C	66.5°C	7	C5	120u/450V CXW	39.3°C	63.9°C	8	Q6	STF13NM60N	42.4°C	68.8°C	9	C38	100u/25V YXM	37.5°C	63.4°C	10	C81	47uF/50V YXM	40.9°C	66.5°C	11	T1	TF-6326	59.9°C	85.8°C	12	L101	TR-6101	65.2°C	92.1°C	13	L102	TR-6100	65.0°C	91.6°C	14	C108	2200uF/6.3V ZLH	62.0°C	88.8°C	15	Q101	SIR158	66.3°C	94.1°C	16	Q102	SIR159	59.2°C	86.0°C	17	U1	NCP1608B	37.3°C	63.1°C	18	U2	L6591	41.6°C	67.3°C	19	C61	104/400V	42.0°C	67.8°C	20	TSW1	110°C ±5°C	59.6°C	86.6°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 155 % LOAD Ta : 25°C	TEST : OK	PASS																																																																																																									
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	PASS																																																																																																									
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	PASS																																																																																																									
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~60°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.003 %(0~60°C)	PASS																																																																																																									
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	PASS																																																																																																									

7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°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	PASS
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
9	CAPACITOR LIFE CYCLE	SUPPOSE C108 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) 254680 HRS (2) 38347 HRS (3) 109340 HRS	PASS
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 263.2 K HRS		PASS
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C		PASS

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2011/08/22	RD SAMPLE	PASS	ZOULF	HOWAY
2011/11/16	W1111C221	PASS	ZOULF	HOWAY

2009/08/04 A50-F023