



# Test Report: HSP-150-3.8

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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 : 100 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 40 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 3.4 V ~ 4.2 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	3.233 V~ 4.336 V/ 230 VAC 3.233 V~ 4.336 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 : -0.211 %~ 0.447 %	PASS
4	LINE REGULATION	V1 : -0.5 %~ 0.5 % (Max)	I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.026 %~ 0 % ~	PASS
5	LOAD REGULATION	V1 : -1 %~ 1 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.211 %~ 0.237 %	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/ 861 ms 115VAC/ 1794 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/ 9 ms 115VAC/ 8 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/ 54 ms 115VAC/ 54 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 : 760 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). 308 mVp-p (2). 522 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	PF= 0.972 / 230 VAC	PASS
		0.98 / 115 VAC(TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.996 / 115 VAC	
4	EFFICIENCY	88% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	89.61 %	PASS
5	INPUT CURRENT	230V/ 0.4 A (TYP)	I/P : 230 VAC	I= 0.579 A/ 230 VAC	PASS
		115V/ 0.8 A (TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 1.146 A/ 115 VAC	
6	INRUSH CURRENT	230V/ 70 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I= 60.515 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 : 0.2222 mA N-FG : 0.2178 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 : 4.7 V~ 5.7 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	5.17 V/ 230 VAC 5.17 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	109°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	0.39V >	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) 452 V (2) 440 V (3) 450 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) 28.9 V (2) 28.8 V (3) 28.5 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) 446 V (2) 446 V (3) 447 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) 15.8 V (2) 15.3 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) 462 V (2) 454 V (3) 450 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 : 3.071 mA I/P-FG : 2.285 mA O/P-FG : 2.037 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	10 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-150-3.8 1. ROOM AMBIENT BURN-IN : HRS I/P : 230VAC O/P : FULL LOAD Ta= 34.3 °C 2. HIGH AMBIENT BURN-IN : HRS I/P : 230VAC O/P : FULL LOAD Ta= 50.3 °C			PASS																																																																																																									
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 34.3 °C</th> <th>HIGH AMBIENT Ta= 50.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>TR-689</td><td>39.4 °C</td><td>56.0 °C</td></tr> <tr><td>2</td><td>BD1</td><td>GBU408</td><td>48.4 °C</td><td>64.5 °C</td></tr> <tr><td>3</td><td>L1</td><td>TR-654</td><td>44.1 °C</td><td>61.0 °C</td></tr> <tr><td>4</td><td>L2</td><td>TF-6322</td><td>45.8 °C</td><td>61.5 °C</td></tr> <tr><td>5</td><td>Q1</td><td>STF22NM60N</td><td>50.9 °C</td><td>67.3 °C</td></tr> <tr><td>6</td><td>D2</td><td>YG971S6R</td><td>56.1 °C</td><td>71.1 °C</td></tr> <tr><td>7</td><td>C5</td><td>120u/450V CXW</td><td>55.2 °C</td><td>70.3 °C</td></tr> <tr><td>8</td><td>Q6</td><td>STF13NM60N</td><td>59.2 °C</td><td>73.4 °C</td></tr> <tr><td>9</td><td>C38</td><td>100u/25V YXM</td><td>49.5 °C</td><td>63.9 °C</td></tr> <tr><td>10</td><td>C81</td><td>47uF/50V YXM</td><td>56.2 °C</td><td>72.7 °C</td></tr> <tr><td>11</td><td>T1</td><td>TF-6326</td><td>90.0 °C</td><td>106.8 °C</td></tr> <tr><td>12</td><td>L101</td><td>TR-6101</td><td>96.9 °C</td><td>114.8 °C</td></tr> <tr><td>13</td><td>L102</td><td>TR-6100</td><td>88.3 °C</td><td>106.1 °C</td></tr> <tr><td>14</td><td>C107</td><td>2200uF/6.3V ZLH</td><td>73.0 °C</td><td>89.3 °C</td></tr> <tr><td>15</td><td>Q101</td><td>SIR158</td><td>88.0 °C</td><td>107.2 °C</td></tr> <tr><td>16</td><td>Q103</td><td>SIR159</td><td>87.7 °C</td><td>104.9 °C</td></tr> <tr><td>17</td><td>U1</td><td>NCP1608B</td><td>48.0 °C</td><td>63.7 °C</td></tr> <tr><td>18</td><td>U2</td><td>L6591</td><td>54.3 °C</td><td>70.6 °C</td></tr> <tr><td>19</td><td>C61</td><td>104/400V</td><td>64.5 °C</td><td>78.2 °C</td></tr> <tr><td>20</td><td>TSW1</td><td>110 °C ±5 °C</td><td>53.0 °C</td><td>71.5 °C</td></tr> </tbody> </table>	NO	Position		P/N	ROOM AMBIENT Ta= 34.3 °C	HIGH AMBIENT Ta= 50.3 °C	1	LF2	TR-689	39.4 °C	56.0 °C	2	BD1	GBU408	48.4 °C	64.5 °C	3	L1	TR-654	44.1 °C	61.0 °C	4	L2	TF-6322	45.8 °C	61.5 °C	5	Q1	STF22NM60N	50.9 °C	67.3 °C	6	D2	YG971S6R	56.1 °C	71.1 °C	7	C5	120u/450V CXW	55.2 °C	70.3 °C	8	Q6	STF13NM60N	59.2 °C	73.4 °C	9	C38	100u/25V YXM	49.5 °C	63.9 °C	10	C81	47uF/50V YXM	56.2 °C	72.7 °C	11	T1	TF-6326	90.0 °C	106.8 °C	12	L101	TR-6101	96.9 °C	114.8 °C	13	L102	TR-6100	88.3 °C	106.1 °C	14	C107	2200uF/6.3V ZLH	73.0 °C	89.3 °C	15	Q101	SIR158	88.0 °C	107.2 °C	16	Q103	SIR159	87.7 °C	104.9 °C	17	U1	NCP1608B	48.0 °C	63.7 °C	18	U2	L6591	54.3 °C	70.6 °C	19	C61	104/400V	64.5 °C	78.2 °C	20	TSW1	110 °C ±5 °C	53.0 °C	71.5 °C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 157 % 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	± 0.021 %(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 C107 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) 195761 HRS (2) 33875 HRS (3) 97825 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	W1111C222	PASS	ZOULF	HOWAY

2009/08/04 A50-F023