



Test Report: HSP-250-5

250W 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 : 100 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 50 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 4.5 V ~ 5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.408 V ~ 5.910 V / 230 VAC 4.408 V ~ 5.910 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : -2 % ~ +2 % (Max)	I/P : VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : -0.36 % ~ -0.36 %	P
4	LINE REGULATION	V1 : -0.5 % ~ 0.5 % (Max)	I/P : VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.12 % ~ 0.12 %	P
5	LOAD REGULATION	V1 : -1 % ~ 1 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : -0.36 % ~ 0.36 %	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 / 1709 ms 115VAC / 1709 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 / 15 ms 115VAC / 17 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 / 27 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 : 1000 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). 346 mVp-p (2). 556 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)	70 V~264V TEST :	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) 0.98 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.967 / 230 VAC PF= 1 / 115 VAC	P
4	EFFICIENCY	87 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.08 %	P
5	INPUT CURRENT	230V/ 1.4 A (TYP) 115V/ 2.8 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 1.32 A/ 230 VAC I = 2.55 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 = 63 A/ 230 VAC I = 32 A/ 115 VAC	P
7	LEAKAGE CURRENT	< 1.2 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.42 mA N-FG : 0.42 mA	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	121 %/ 230 VAC 121 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 5.75V ~ 6.75 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	6.18 V/ 230 VAC 6.18 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 80± 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 Hiccup Mode	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	FAN ON/OFF CONTROL	RTH3 60±10 °C FAN ON 40±10 °C FAN OFF	I/P : 230 VAC O/P : FULL LOAD	53.4 °C FAN ON 32 °C FAN OFF	P
2	REMOTE SENSE	>0.3V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	➤ 0.3V	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 : IRFB20N50K 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) 424 V (2) 426 V (3) 416 V	P
2	Diode Peak Voltage	Q100 Rated : AP98T03GP 200A/30V	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) 12.9 V (2) 12 V (3) 13.1 V	P
3	Input Capacitor Voltage	C5 Rated : 120u/420V 5Kh 105°C CXW	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) 402 V (2) 386 V (3) 402 V	P
4	Control IC Voltage Test	U70 Rated : L6599AD 8.85V~16V	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) 12.85 V (2) 12.01 V (3) 12.05 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : STW25NM50N 22A/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) 438 V (2) 422 V (3) 406 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 : 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 : 3.66 mA I/P-FG : 3.64 mA O/P-FG : 3.68 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 : 10 GΩ I/P-FG : 10 GΩ O/P-FG : 10 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	14 mΩ	P
4	APPROVAL	TUV : Certificate NO : R50188280 UL : File NO : E183223			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P : 230 V/240V/220V/50HZ O/P : 100/75/50/25% LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ)/110V60HZ O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ)/110V60HZ O/P : FULL/50% 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.	THERMO TRACER TEST (ROOM AMBIENT)	MODEL: HSP-250-5 TEST CONDITION: 230 VAC FULL LOAD ROOM AMBIENT = 28.9 °C		<table border="1"> <thead> <tr> <th></th> <th>Position</th> <th>Temp</th> </tr> </thead> <tbody> <tr><td>p 1:</td><td>75x, 51y</td><td>63.9 °C</td></tr> <tr><td>p 2:</td><td>155x, 66y</td><td>76.3 °C</td></tr> <tr><td>p 3:</td><td>155x, 31y</td><td>80.2 °C</td></tr> <tr><td>p 4:</td><td>204x, 30y</td><td>68.4 °C</td></tr> <tr><td>p 5:</td><td>243x, 27y</td><td>66.6 °C</td></tr> <tr><td>p 6:</td><td>268x, 66y</td><td>57.3 °C</td></tr> <tr><td>p 7:</td><td>212x, 77y</td><td>74.5 °C</td></tr> <tr><td>p 8:</td><td>239x, 196y</td><td>60.5 °C</td></tr> <tr><td>p 9:</td><td>163x, 164y</td><td>128.1 °C</td></tr> <tr><td>p10:</td><td>153x, 138y</td><td>89.9 °C</td></tr> <tr><td>p11:</td><td>153x, 120y</td><td>73.4 °C</td></tr> <tr><td>p12:</td><td>107x, 127y</td><td>81.6 °C</td></tr> <tr><td>p13:</td><td>73x, 126y</td><td>96.1 °C</td></tr> <tr><td>p14:</td><td>57x, 204y</td><td>75.9 °C</td></tr> <tr><td>p15:</td><td>85x, 172y</td><td>84.8 °C</td></tr> </tbody> </table> <p> 9D130001. IRI (定點測溫) 座標: 9, 31 原資料溫度: 49.2 °C (EO.94) 放射率: 0.94 補正後溫度: 49.2 °C (EO.94) 高溫: 155.0 °C 低溫: -10.3 °C 環境溫度: 28.9 °C 最高溫(H): 144.0 °C 座標: 170, 182 最低溫(L): 22.1 °C 座標: 300, 51 全域放射率: 0.940 日期: 2009/12/13 時間: 20:29:39 </p>		Position	Temp	p 1:	75x, 51y	63.9 °C	p 2:	155x, 66y	76.3 °C	p 3:	155x, 31y	80.2 °C	p 4:	204x, 30y	68.4 °C	p 5:	243x, 27y	66.6 °C	p 6:	268x, 66y	57.3 °C	p 7:	212x, 77y	74.5 °C	p 8:	239x, 196y	60.5 °C	p 9:	163x, 164y	128.1 °C	p10:	153x, 138y	89.9 °C	p11:	153x, 120y	73.4 °C	p12:	107x, 127y	81.6 °C	p13:	73x, 126y	96.1 °C	p14:	57x, 204y	75.9 °C	p15:	85x, 172y	84.8 °C	P																																
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2	TEMPERATURE RISE TEST	MODEL : HSP-250-5 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 28.4 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 52 °C		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 28.4 °C</th> <th>HIGH AMBIENT Ta= 52 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>10A/800V US10KB80R</td><td>42.7 °C</td><td>64.1 °C</td></tr> <tr><td>2</td><td>Q1</td><td>STW25NM50N 22A/500V</td><td>41.0 °C</td><td>62.5 °C</td></tr> <tr><td>3</td><td>C6</td><td>120u/420V 5Kh 105 °C CXW</td><td>38.8 °C</td><td>60.5 °C</td></tr> <tr><td>4</td><td>C35</td><td>330u/50V UL7Kh 10*20 KY</td><td>50.3 °C</td><td>72.3 °C</td></tr> <tr><td>5</td><td>C201</td><td>100u/50V UL7Kh 8*11.5 KY</td><td>54.0 °C</td><td>76.0 °C</td></tr> <tr><td>6</td><td>C202</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>57.4 °C</td><td>78.0 °C</td></tr> <tr><td>7</td><td>RTH3</td><td>NTC 5KΩ TTC3A502F39HEY 1%</td><td>58.0 °C</td><td>78.6 °C</td></tr> <tr><td>8</td><td>Q3</td><td>IRFB20N50K 20A/500V TO220</td><td>41.4 °C</td><td>63.1 °C</td></tr> <tr><td>9</td><td>U70</td><td>L6599AD SO-16N</td><td>50.5 °C</td><td>72.7 °C</td></tr> <tr><td>10</td><td>Q100</td><td>AP98T03GP 200A/30V TO220</td><td>51.9 °C</td><td>74.3 °C</td></tr> <tr><td>11</td><td>C105</td><td>4700u/10V UL10Kh ZLH</td><td>54.7 °C</td><td>77.0 °C</td></tr> <tr><td>12</td><td>T1</td><td>TF2181</td><td>60.5 °C</td><td>82.0 °C</td></tr> <tr><td>13</td><td>TSW1</td><td>ST-22W-R0 80 °C 130mm</td><td>50.9 °C</td><td>73.6 °C</td></tr> <tr><td>14</td><td>TSW2</td><td>ST-22W-R2 80 °C 90mm H</td><td>40.6 °C</td><td>62.6 °C</td></tr> <tr><td>15</td><td>C37</td><td>220u/35V UL7Kh 8*15 KY</td><td>49.6 °C</td><td>71.3 °C</td></tr> </tbody> </table>	NO	Position	P/N	ROOM AMBIENT Ta= 28.4 °C	HIGH AMBIENT Ta= 52 °C	1	BD1	10A/800V US10KB80R	42.7 °C	64.1 °C	2	Q1	STW25NM50N 22A/500V	41.0 °C	62.5 °C	3	C6	120u/420V 5Kh 105 °C CXW	38.8 °C	60.5 °C	4	C35	330u/50V UL7Kh 10*20 KY	50.3 °C	72.3 °C	5	C201	100u/50V UL7Kh 8*11.5 KY	54.0 °C	76.0 °C	6	C202	47u/50V UL10Kh 6.3*11 YXM	57.4 °C	78.0 °C	7	RTH3	NTC 5KΩ TTC3A502F39HEY 1%	58.0 °C	78.6 °C	8	Q3	IRFB20N50K 20A/500V TO220	41.4 °C	63.1 °C	9	U70	L6599AD SO-16N	50.5 °C	72.7 °C	10	Q100	AP98T03GP 200A/30V TO220	51.9 °C	74.3 °C	11	C105	4700u/10V UL10Kh ZLH	54.7 °C	77.0 °C	12	T1	TF2181	60.5 °C	82.0 °C	13	TSW1	ST-22W-R0 80 °C 130mm	50.9 °C	73.6 °C	14	TSW2	ST-22W-R2 80 °C 90mm H	40.6 °C	62.6 °C	15	C37	220u/35V UL7Kh 8*15 KY	49.6 °C	71.3 °C	P
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3	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 104 % LOAD Ta : 25 °C	TEST : OK	P																																																																																
4	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 230VAC/100VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	P																																																																																

5	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
6	TEMPERATURE COEFFICIENT	± 0.03 % (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0 % (0-50°C)	P
7	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
8.	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	P
9	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	P
10	CAPACITOR LIFE CYCLE	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) 502937.6 HRS (2) 97280 HRS (3) 174131.2 HRS	P
11	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 179.7 KHRS			P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/7/1	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/8/9	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023