Test Report: GC220A48

220W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection 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	DC VOLTAGE (Typ.)	54.4V	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	53.98 V /230V 53.98 V /115V	P
2	CONTINUOS OUTPUT CURRENT (Typ.)	4A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	3.916 A /230V 3.916 A /115V	P
3	LED INDICATOR	Charging(CC) : RED Floating charging(CV) : GREEN	I/P： 230 VAC O/P：setting Ta：25℃	> 0.27 A,LED :RED < 0.24 A,LED :GREEN	P

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℃	75 V~264V	P
			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℃	TEST： OK	P
3	POWER FACTOR	0.90 / 230 VAC(TYP) 0.98 / 115 VAC(TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF= 0.918 / 230 VAC PF= 0.997 / 115 VAC	P
4	EFFICIENCY	93% (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	93.76 %	P
5	INPUT CURRENT	230V/ 2 A (TYP) 115V/ 4 A (TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I = 1.03 A/ 230 VAC I = 1.93 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 120 A (TYP) COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 110 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 1.5 mA / 240 VAC	I/P： 264 VAC O/P：Min LOAD Ta：25℃	L-FG： 0.34 mA N-FG： 0.28 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	90 %~ 110 %	I/P： 230 VAC I/P： 115 VAC O/P：TESTING Ta：25℃	97.8%/ 230 VAC 97.8%/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1： 57.12V ~ 73.44 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	64.2V/ 230 VAC 64.21V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC： TSW1： 95 ± 5℃ 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℃	NO DAMAGE Hiccup mode	P
5	NO LOAD POWER CONSUMPTION	＜1W	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	0.62W/ 230 VAC 0.66W/ 115 VAC	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 6 Rated： STF16NM50N 15A/550V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short (3)Full load continue Ta：25℃	(1) 430 V (2) 456 V (3) 422 V	P
2	Diode Peak Voltage	Q101 Rated： YA868C15RSC 30A/150V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2)Output Short (3)Full load continue Ta：25℃	(1) 124 V (2) 111 V (3) 119 V	P
3	Input Capacitor Voltage	C 5 Rated： 220u/450V 105℃ 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℃	(1) 402.8 V (2) 418.6 V (3) 418.6 V	P
4	Control IC Voltage Test	U 1 Rated： NCP1605DR2G : 10V~20V	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℃	(1) 13.471 V (2) 12.419 V (3) 12.418 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated： STF16NM50N 15A/550V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short (3)Full load continue Ta：25℃	(1) 448 V (2) 444 V (3) 436 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-O/P： 3.6 KVAC/min Ta：25℃	I/P-O/P： 10.66 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P：500VDC>100MΩ	I/P-O/P： 500 VDC Ta：25℃/70%RH	I/P-O/P： 29.6 GΩ NO DAMAGE	P
3	APPROVAL	TUV： Certificate NO ： UL： File NO ：E329126			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2,-3 CLASS A CLASS D	I/P：220 /230/240VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT： 1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N ：1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：GC220A24
1. ROOM AMBIENT　BURN-IN：14 HRS
I/P： 230VAC　O/P： FULL LOAD　Ta= 28.8 ℃
2. HIGH AMBIENT　BURN-IN：15.5 HRS
I/P： 230VAC　O/P： FULL LOAD　Ta=55.3 ℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta=28.8 ℃</th><th>HIGH AMBIENT Ta=55.3 ℃</th></tr>
<tr><td>1</td><td>LF2</td><td>TR890</td><td>64.0℃</td><td>84.4℃</td></tr>
<tr><td>2</td><td>BD1</td><td>BD 10A/800V　US10KB80R</td><td>65.4℃</td><td>85.8℃</td></tr>
<tr><td>3</td><td>L2</td><td>TR892</td><td>66.4℃</td><td>86.4℃</td></tr>
<tr><td>4</td><td>C11</td><td>225/450V 10% P=15 MMX</td><td>66.3℃</td><td>96.6℃</td></tr>
<tr><td>5</td><td>L1</td><td>TF1925</td><td>69.1℃</td><td>88.8℃</td></tr>
<tr><td>6</td><td>Q2</td><td>STF16NM50N 15A/550V</td><td>65.3℃</td><td>85.7℃</td></tr>
<tr><td>7</td><td>D2</td><td>BYT79X-600 15A/600V</td><td>66.5℃</td><td>86.6℃</td></tr>
<tr><td>8</td><td>C5</td><td>220u/450V 105℃ 30*30 HU</td><td>66.2℃</td><td>85.5℃</td></tr>
<tr><td>9</td><td>U1</td><td>PWM NCP1605DR2G</td><td>64.7℃</td><td>84.8℃</td></tr>
<tr><td>10</td><td>TSW1</td><td>ST-22W-R2 95℃</td><td>60.5℃</td><td>80.9℃</td></tr>
<tr><td>11</td><td>C902</td><td>220u/25V UL7Kh 8*11.5 KY</td><td>65.0℃</td><td>84.3℃</td></tr>
<tr><td>12</td><td>C906</td><td>330u/25V UL7Kh 10*12.5 KY</td><td>65.9℃</td><td>84.8℃</td></tr>
<tr><td>13</td><td>U900</td><td>L6599AD SO-16N</td><td>65.5℃</td><td>85.3℃</td></tr>
<tr><td>14</td><td>Q5</td><td>STF16NM50N 15A/550V</td><td>65.6℃</td><td>85.7℃</td></tr>
<tr><td>15</td><td>Q101</td><td>IRFB3607PBF 80A/75V TO220</td><td>67.1℃</td><td>86.3℃</td></tr>
<tr><td>16</td><td>C101</td><td>1000u/35V L10Kh 12.5*25 KY</td><td>66.6℃</td><td>85.0℃</td></tr>
<tr><td>17</td><td>LF101</td><td>TR891</td><td>68.1℃</td><td>87.1℃</td></tr>
<tr><td>18</td><td>C113</td><td>1000u/35V L10Kh KY</td><td>59.4℃</td><td>79.3℃</td></tr>
<tr><td>19</td><td>RTH2</td><td>NTC 330KΩ 1%</td><td>62.0℃</td><td>82.0℃</td></tr>
<tr><td>20</td><td>C202</td><td>100u/35V L5Kh 6.3*11 KY</td><td>67.0℃</td><td>85.3℃</td></tr>
<tr><td>21</td><td>T1</td><td>TF1977</td><td>68.2℃</td><td>85.7℃</td></tr>
<tr><td>22</td><td>case</td><td></td><td>47.5℃</td><td>73.8℃</td></tr>
</table></td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P：O/P SHORT TEST
Ta：25℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER　2　HOUR</td><td>I/P： 264VAC/100VAC
O/P：CV=26V
Ta= -15 ℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12　HOURS
IN CHAMBER ON
CONTROL　50 ℃
NO DAMAGE</td><td>I/P： 272 VAC
O/P：CV=26V
Ta= 50 ℃
HUMIDITY=　95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.01 %(0~50℃)</td><td>P</td></tr>
</table>

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / 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： -15℃~ +55℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10 CYCLE 5. Input/Output condition： 230VAC/Full Load	OK	P
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℃	TEST：OK	P
9	CAPACITOR LIFE CYCLE	GC220A24:SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta=25℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta=50℃ LIFE TIME	(1) 211377.6 HRS (2) 57040.2 HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE： 190K HRS		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/7/9	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/8/31	PRODUCT SAMPLE W0907E54	PASS	SANFORD SU	VINCENT TSENG
2009/12/15	PRODUCT SAMPLE W0911D19	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023