



# Test Report: RSP-2000-24

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2000W Power Supply with Single Output

## ■ 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: 200 mVp-p (Max)	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	V1: 48.2 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 21 V~ 28 V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	20.292 V~ 28.860 V / 230 VAC 20.292 V~ 28.859 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 1%~ -1 % (Max)	I/P: 180VAC / 264 VAC O/P: FULL / MIN LOAD Ta: 25°C	V1: 0.15 %~ -0.15 %	P
4	LINE REGULATION	V1: 0.5 %~ -0.5% (Max)	I/P: 180 VAC ~ 264 VAC O/P: FULL LOAD Ta: 25°C	V1: 0.03 %~ -0.03 %	P
5	LOAD REGULATION	V1: 0.5 %~ -0.5 % (Max)	I/P: 230 VAC O/P: FULL ~ MIN LOAD Ta: 25°C	V1: 0.11 %~ -0.11 %	P
6	SET UP TIME	230VAC: 1500 ms (Max)	I/P: 230 VAC @ full load Ta: 25°C	230VAC / 1149 ms	P
7	RISE TIME	230VAC: 60 ms (Max)	I/P: 230 VAC @ full load Ta: 25°C	230VAC / 32 ms	P
8	HOLD UP TIME	230VAC: 10 ms (TYP) 230VAC: 16 ms (TYP)	I/P: 230 VAC @ full load I/P: 230 VAC @ 75% load Ta: 25°C	230VAC / 16 ms 230VAC / 19.7 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: 2400 mVp-p	I/P: 230 VAC O/P: FULL / MIN LOAD 90% DUTY / 1KHZ Ta: 25°C	644 mVp-p	P

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	132 V~264V	P
			I/P: LOW-LINE-3V= 177V 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	I/P: 180 VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK	P
3	POWER FACTOR	0.98 / 230 VAC(TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	PF= 0.9908 / 230 VAC	P
4	EFFICIENCY	90.5% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	90.69%	P
5	INPUT CURRENT	230V/ 10 A (TYP) 115V/ 16 A (TYP)	I/P: 230 VAC @ full load I/P: 115 VAC @ 80% load Ta:25°C	I = 9.35 A/ 230 VAC I = 15.37 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 42 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.75 mA N-FG 0.74 mA :	P

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 125 %	I/P: 230 VAC I/P: 115 VAC O/P:TESTING Ta:25°C	112 %/ 230 VAC 112 %/ 180 VAC Constant Current Limiting, unit will shut down o/p voltage after 5 sec ,re-power on to recover.	P
2	OVER VOLTAGE PROTECTION	CH1:29.5 V~ 35V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	31.579 V/ 230 VAC 31.589 V/ 115 VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC: 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, unit will shut down o/p voltage after 5 sec ,re-power on to recover.	P-

## CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																					
1	AUXILIARY POWER (AUX)	5V @ 0.3A (4.5V~ 5.5V) 12V @ 0.8A (10.6V~13.2V)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	5.321V 12.781V	P																					
2	REMOTE ON/OFF	ON/OFF/+5V-AUX SHORT : POWER OFF ON/OFF/+5V-AUX OPEN : POWER ON	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	SHORT : POWER OFF OPEN : POWER ON	P																					
3	REMOTE SENSE	Compensate voltage drop on the load wiring up to 0.5V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	> 0.5 V	P																					
4	DC OK Signal	HIGH:VOUT ≤ 80±6%Vout LOW:VOUT ≥ 80±6%Vout	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	HIGH: 5.331 V, VO ≤ 80.20 %Vout LOW: 0 V, VO ≥ 84.16 %Vout	P																					
5	OUTPUT VOLTAGE PROGRAMMABLE(PV)	DC<0.4V Vo/p=100%±3% DC=1V Vo/p=40%±3% DC=2V Vo/p=60%±3% DC=3V Vo/p=80%±3% DC=4V Vo/p=100%±3% DC=4.7V Vo/p=115%±3%	I/P: 230 VAC Ta:25°C	<table border="1"> <thead> <tr> <th>PV=</th> <th>&lt;0.4V</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>4.7V</th> </tr> </thead> <tbody> <tr> <td>Vout=</td> <td>100%</td> <td>41.3%</td> <td>58.9%</td> <td>78.5%</td> <td>100%</td> <td>116.2%</td> </tr> <tr> <td>LOAD</td> <td>0~100 % load</td> <td>0~100 % load</td> <td>0~100 % load</td> <td>0~100 % load</td> <td>0~100 % load</td> <td>0~85.7 % load</td> </tr> </tbody> </table>	PV=	<0.4V	1V	2V	3V	4V	4.7V	Vout=	100%	41.3%	58.9%	78.5%	100%	116.2%	LOAD	0~100 % load	0~100 % load	0~100 % load	0~100 % load	0~100 % load	0~85.7 % load	P
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LOAD	0~100 % load	0~100 % load	0~100 % load	0~100 % load	0~100 % load	0~85.7 % load																				
6	OVER TEMP WARNING	T-ALARM TSW1 & TSW2 short(0~0.5V) TSW1 or TSW2 open(4.5V~5.5V)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TSW1 & TSW2 short : 0V TSW1 or TSW2 open : 5.327V	P																					
7	FAN SPEED CONTROL	<table border="1"> <thead> <tr> <th>Fan Speed</th> <th>Load</th> <th>PWM Duty</th> </tr> </thead> <tbody> <tr> <td>LOW</td> <td>0%</td> <td>10%±5%</td> </tr> <tr> <td>HIGH</td> <td>100%</td> <td>90%±5%</td> </tr> </tbody> </table>	Fan Speed	Load	PWM Duty	LOW	0%	10%±5%	HIGH	100%	90%±5%	I/P: 230 VAC O/P:TESTING Ta:25°C	<table border="1"> <thead> <tr> <th>Fan Speed</th> <th>Load</th> <th>PWM Duty</th> </tr> </thead> <tbody> <tr> <td>LOW</td> <td>0%</td> <td>9.767%</td> </tr> <tr> <td>HIGH</td> <td>100%</td> <td>92.17%</td> </tr> </tbody> </table>	Fan Speed	Load	PWM Duty	LOW	0%	9.767%	HIGH	100%	92.17%	P			
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8	CURRENT SHARING	PSU1-PSU2 < 10%	I/P : 230 VAC O/P : 100%/50% LOAD Ta : 25°C	O/P : 100% LOAD PSU1 : 80A PSU2 : 79A PSU3 : 81A PSU4 : 79A  O/P : 50% LOAD PSU1 : 38.5A PSU2 : 40A PSU3 : 41A PSU4 : 38A	P																					



### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																																				
1	TEMPERATURE RISE TEST	MODEL : RSP-2000-24 1. ROOM AMBIENT BURN-IN : 3.5HRS I/P: 230VAC O/P: FULL LOAD Ta=33.3 °C 2. HIGH AMBIENT BURN-IN : 3HRS I/P: 230VAC O/P: FULL LOAD Ta=52.4 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 33.3°C</th> <th>HIGH AMBIENT Ta= 52.4°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>56.2°C</td><td>76.0°C</td></tr> <tr><td>2</td><td>Q603</td><td>45.1°C</td><td>62.3°C</td></tr> <tr><td>3</td><td>L1</td><td>41.5°C</td><td>58.5°C</td></tr> <tr><td>4</td><td>C5</td><td>42.9°C</td><td>61.2°C</td></tr> <tr><td>5</td><td>U1</td><td>43.8°C</td><td>63.0°C</td></tr> <tr><td>6</td><td>Q903</td><td>50.9°C</td><td>71.9°C</td></tr> <tr><td>7</td><td>T1</td><td>55.0°C</td><td>73.4°C</td></tr> <tr><td>8</td><td>T2</td><td>67.5°C</td><td>87.0°C</td></tr> <tr><td>9</td><td>U2</td><td>49.4°C</td><td>69.5°C</td></tr> <tr><td>10</td><td>Q101</td><td>52.4°C</td><td>71.5°C</td></tr> <tr><td>11</td><td>Q105</td><td>63.1°C</td><td>83.1°C</td></tr> <tr><td>12</td><td>D110</td><td>61.1°C</td><td>80.7°C</td></tr> <tr><td>13</td><td>Q533</td><td>58.2°C</td><td>78.4°C</td></tr> <tr><td>14</td><td>C73</td><td>44.7°C</td><td>63.6°C</td></tr> <tr><td>15</td><td>T3</td><td>48.8°C</td><td>71.7°C</td></tr> <tr><td>16</td><td>C320</td><td>48.0°C</td><td>67.0°C</td></tr> <tr><td>17</td><td>RG300</td><td>47.3°C</td><td>66.3°C</td></tr> <tr><td>18</td><td>C325</td><td>49.0°C</td><td>68.4°C</td></tr> <tr><td>19</td><td>C301</td><td>46.3°C</td><td>65.4°C</td></tr> <tr><td>0</td><td>L100</td><td>58.4°C</td><td>79.1°C</td></tr> <tr><td>21</td><td>C110</td><td>57.0°C</td><td>77.0°C</td></tr> <tr><td>22</td><td>C115</td><td>52.6°C</td><td>72.4°C</td></tr> <tr><td>23</td><td>TSW8</td><td>54.4°C</td><td>73.7°C</td></tr> <tr><td>24</td><td>TSW9</td><td>51.5°C</td><td>68.6°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 33.3°C	HIGH AMBIENT Ta= 52.4°C	1	BD1	56.2°C	76.0°C	2	Q603	45.1°C	62.3°C	3	L1	41.5°C	58.5°C	4	C5	42.9°C	61.2°C	5	U1	43.8°C	63.0°C	6	Q903	50.9°C	71.9°C	7	T1	55.0°C	73.4°C	8	T2	67.5°C	87.0°C	9	U2	49.4°C	69.5°C	10	Q101	52.4°C	71.5°C	11	Q105	63.1°C	83.1°C	12	D110	61.1°C	80.7°C	13	Q533	58.2°C	78.4°C	14	C73	44.7°C	63.6°C	15	T3	48.8°C	71.7°C	16	C320	48.0°C	67.0°C	17	RG300	47.3°C	66.3°C	18	C325	49.0°C	68.4°C	19	C301	46.3°C	65.4°C	0	L100	58.4°C	79.1°C	21	C110	57.0°C	77.0°C	22	C115	52.6°C	72.4°C	23	TSW8	54.4°C	73.7°C	24	TSW9	51.5°C	68.6°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P: 230 VAC O/P: 108 % 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= -35°C	TEST : OK	P																																																																																																				
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	P																																																																																																				
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P: 230 VAC O/P:FULL LOAD	± 0.003 %(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:2G (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: 10.07 mA I/P-FG: 7.86 mA O/P-FG: 11.38 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	I/P-O/P: 25.3 GΩ I/P-FG: 22.7 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	6 mΩ	P

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 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/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS A	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	RSP-2000-24 : SUPPOSE C110 IS THE MOST CRITICAL COMPONENT	I/P: 230VAC O/P:FULL LOAD Ta= 25 °C LIFE TIME= 595726 HRS I/P: 230VAC O/P:FULL LOAD Ta= 50 °C LIFE TIME=98887 HRS I/P: 230VAC O/P:75% LOAD Ta= 50 °C LIFE TIME= 173473 HRS I/P: 230VAC O/P:50% LOAD Ta= 50 °C LIFE TIME= 259367 HRS		P



2	MTBF	Conducted by Parts Stress Analysis Prediction 159K hrs min. Telcordia SR-332 (Bellcore) ; 46.3K hrs min. MIL-HDBK-217F (25°C)	P
3	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure : Above 50,000 hours @ TA 50°C	P

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) <b>Peak Voltage</b>	Q900 Rated 22A/600V	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) 418 V (2) 408 V (3) 408 V	P
2	Diode <b>Peak Voltage</b>	Q100 Rated 75A/100V	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) 78.4 V (2) 69.6 V (3) 76 V	P
		Q103 Rated 75A/100V	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) 74.8 V (2) 73.3 V (3) 74 V	P
3	<b>Input Capacitor Voltage</b>	C5 Rated 330u/400V	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) 398 V (2) 390 V (3) 398 V	P
4	<b>Control IC Voltage Test</b>	U2 Rated 8.4V~14.5V	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) 13.4 V (2) 13.2 V (3) 13.4 V	P
5	Power Transistor (D to S) or (C to E) <b>Peak Voltage</b>	Q603 Rated 22A/650V	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) 396 V (2) 394 V (3) 402 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2011/8/22	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2011/9/6	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2011/10/19	PRODUCT SAMPLE W1110B21	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023