



# Test Report: RSP-2000-12

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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: 150 mVp-p (Max)	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	V1: 40 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 10.5 V~ 14 V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	10.07 V~ 14.32 V / 230 VAC 10.07 V~ 14.32 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 2%~ -2 % (Max)	I/P: 180VAC / 264 VAC O/P: FULL / MIN LOAD Ta: 25°C	V1: 0.15 %~ -0.15 %	P
4	LINE REGULATION	V1: 1 %~ -1% (Max)	I/P: 180 VAC ~ 264 VAC O/P: FULL LOAD Ta: 25°C	V1: 0.05 %~ -0.05 %	P
5	LOAD REGULATION	V1: 1 %~ -1% (Max)	I/P: 230 VAC O/P: FULL ~ MIN LOAD Ta: 25°C	V1: 0.1 %~ -0.1 %	P
6	SET UP TIME	230VAC: 1500 ms (Max)	I/P: 230 VAC @ full load Ta: 25°C	230VAC/ 1118 ms	P
7	RISE TIME	230VAC: 60 ms (Max)	I/P: 230 VAC @ full load Ta: 25°C	230VAC/ 15 ms	P
8	HOLD UP TIME	230VAC: 10 ms (TYP) 230VAC: 16 ms (TYP)	I/P: 230 VAC @ full load I/P: 230VAC @ 75% load Ta: 25°C	230VAC/ 21 ms 230VAC/ 31 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: 1200 mVp-p	I/P: 230 VAC O/P: FULL / Min LOAD 90% DUTY / 1KHZ Ta: 25°C	622 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	96 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	0.97 / 230 VAC(TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	PF= 0.985 / 230 VAC	P
4	EFFICIENCY	87 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	87.6 %	P
5	INPUT CURRENT	230V/ 7 A (TYP) 115V/ 13 A (TYP)	I/P: 230 VAC @ full load I/P: 115 VAC @95% load Ta:25°C	I = 6.013 A/ 230 VAC I = 11.76 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: 0.77 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	115 %/ 230 VAC 115 %/ 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: 14.7 V~ 17.5V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	15.802 V/ 230 VAC 15.763 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	5.018 V 11.282V	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: $V_{OUT} \leq 80 \pm 6\% V_{out}$ LOW: $V_{OUT} \geq 80 \pm 6\% V_{out}$	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	HIGH : 5.332 V , $V_O \leq 80.33\% V_{out}$ LOW: 0 V, $V_O \geq 84.16\% V_{out}$	P																					
5	OUTPUT VOLTAGE PROGRAMMABLE (PV)	DC<0.4V $V_o/p=100\% \pm 3\%$ DC=1V $V_o/p=60\% \pm 3\%$ DC=2V $V_o/p=60\% \pm 3\%$ DC=3V $V_o/p=80\% \pm 3\%$ DC=4V $V_o/p=100\% \pm 3\%$ DC=4.7V $V_o/p=115\% \pm 3\%$	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>101%</td> <td>58.45%</td> <td>59.48%</td> <td>77.76%</td> <td>100%</td> <td>115.05%</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=	101%	58.45%	59.48%	77.76%	100%	115.05%	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 : 0 V TSW1 or TSW2 open : 5.343 V	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% <math>\pm</math> 5%</td> </tr> <tr> <td>HIGH</td> <td>100%</td> <td>90% <math>\pm</math> 5%</td> </tr> </tbody> </table>	Fan Speed	Load	PWM Duty	LOW	0%	10% $\pm$ 5%	HIGH	100%	90% $\pm$ 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>10.50%</td> </tr> <tr> <td>HIGH</td> <td>100%</td> <td>91.75%</td> </tr> </tbody> </table>	Fan Speed	Load	PWM Duty	LOW	0%	10.50%	HIGH	100%	91.75%	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 : 100A PSU2 : 97A PSU3 : 103A PSU4 : 99.8A <hr/> O/P : 50% LOAD PSU1 : 50.5A PSU2 : 48A PSU3 : 52.5A PSU4 : 48.5A	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: 10.94 mA I/P-FG: 8.54 mA O/P-FG: 11.61 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: 19.1 GΩ I/P-FG: 17.1 GΩ O/P-FG: 24 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= 173473HRS I/P: 230VAC O/P:50% LOAD Ta= 50 °C LIFE TIME= 259367HRS			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) 434 V (2) 438 V (3) 432 V	P
2	Diode <b>Peak Voltage</b>	Q100 Rated 120A/75V	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) 47.2 V (2) 33.2 V (3) 42 V	P;
		Q103 Rated 120A/75V	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) 43.4 V (2) 39.6 V (3) 39 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) 378.89 V (2) 380.99 V (3) 384.73 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) 13.163 V (2) 11.941 V (3) 13.266 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) 422 V (2) 414 V (3) 416 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

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