



# Test Report:RSP-500-15

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500W 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 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 45 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 13.5 V ~ 18 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	13.38 V ~ 19.15 V / 230 VAC 13.38 V ~ 19.15 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : -1 % ~ +1 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : 0 % ~ 0.04 %	P
4	LINE REGULATION	V1 : -0.3 % ~ +0.3 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0.04 %	P
5	LOAD REGULATION	V1 : -0.5 % ~ +0.5 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : 0 % ~ 0 %	P
6	SET UP TIME	230VAC : 1500 ms (Max) 115VAC : 3000 ms (Max)	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 689 ms 115VAC/ 2219 ms	P
7	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 23.9 ms 115VAC/ 24.3 ms	P
8	HOLD UP TIME	230VAC : 18 ms (Max) 115VAC : 14 ms (Max)	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 26.7 ms 115VAC/ 20.8 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 : 1500 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 470 mVp-p (2) 300 mVp-p (3) 286 mVp-p (4) 706 mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE-3V= 82 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	63 V~264V  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 85 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= 0.971 / 230 VAC PF= 0.991 / 115 VAC	P
4	EFFICIENCY	88 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.32 %	P
5	INPUT CURRENT	230V/ 2.65 A (TYP) 115V/ 5.3 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 2.58 A/ 230 VAC I = 5.31 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 40 A (TYP) 115V/ 20 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 35.3 A/ 230VAC I = 15.6 A/115VAC	P
7	LEAKAGE CURRENT	< 2 mA / 240VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.68 mA N-FG : 0.68 mA	P

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~130 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	107.8 %/230VAC 110.5 %/115VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 18.8 V ~ 21.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	20.6 V/230VAC 20.6 V/115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : Shut down o/p voltage , recovers automatically after temperature goes down	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	P

**CONTROL FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE CONTROL	CN100 POWER ON : < 0-0.8V" POWEROFF : 4-10V"	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	POWER ON : 0-1.1 V POWER OFF : 1.2-10 V	P
2	FAN ON/OFF CONTROL	RTH2 ≥ 50°C ±10°C FAN ON RTH2 ≤ 40°C ±10°C FAN OFF	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	FAN ON: 45.3 °C FAN OFF: 43.4 °C	P
3	FAN LOCK CONTROL	FAN LOCK	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	OK	P
4	REMOTE SENSE	S+ / S- >0.3V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	0.35	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 4 Rated : 650V 16A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4) Dynamic Load 90%Duty/1KHz (5) Dynamic Load 50%Duty/120Hz  Ta : 25°C	(1) 396 V (2) 396 V (3) 392 V (4) 396 V (5) 394 V	P
2	Diode Peak Voltage	Q103 Rated : 100V 30A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue (4)NO LOAD TURN ON (5) Dynamic Load 90%Duty/1KHz (6) Dynamic Load 50%Duty/120Hz  Ta : 25°C	(1) 77 V (2) 72 V (3) 75 V (4) 69 V (5) 76 V (6) 76 V	P
3	Input Capacitor Voltage	C 5 Rated : 180u /400V/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) 380 V (2) 374 V (3) 392 V	P
4	Control IC Voltage Test	U 1 Rated : 30 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) 16.3 V (2) 15.4 V (3) 16.2 V	P
5	PFC Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 600 V 20 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) 404 V (2) 388 V (3) 404 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 : 2KVAC/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 : 3.08 mA I/P-FG : 3.17 mA O/P-FG : 3.06 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 : 9999 MΩ I/P-FG : 9999 MΩ O/P-FG : 9999 MΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	5 mΩ	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 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 B	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				

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																																																												
1	TEMPERATURE RISE TEST	MODEL : RSP-500-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=24.2°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=49.5°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=24.2°C</th> <th>HIGH AMBIENT Ta= 49.5°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>D5</td><td>38.2°C</td><td>65.1°C</td></tr> <tr><td>2</td><td>U202</td><td>38.2°C</td><td>64.4°C</td></tr> <tr><td>3</td><td>ZNR1</td><td>26.4°C</td><td>53.2°C</td></tr> <tr><td>4</td><td>LF1</td><td>27.6°C</td><td>54.7°C</td></tr> <tr><td>5</td><td>BD1</td><td>40.9°C</td><td>66.9°C</td></tr> <tr><td>6</td><td>LF2</td><td>30.8°C</td><td>57.9°C</td></tr> <tr><td>7</td><td>R15</td><td>34.4°C</td><td>61.5°C</td></tr> <tr><td>8</td><td>L1</td><td>33.3°C</td><td>61.3°C</td></tr> <tr><td>9</td><td>Q1</td><td>44.8°C</td><td>71.9°C</td></tr> <tr><td>10</td><td>Q2</td><td>45.1°C</td><td>71.9°C</td></tr> <tr><td>11</td><td>D10</td><td>52.4°C</td><td>77.1°C</td></tr> <tr><td>12</td><td>C5</td><td>32.9°C</td><td>59.4°C</td></tr> <tr><td>13</td><td>C6</td><td>33.4°C</td><td>59.8°C</td></tr> <tr><td>14</td><td>U1</td><td>40.4°C</td><td>67.3°C</td></tr> <tr><td>15</td><td>C61</td><td>34.6°C</td><td>61.5°C</td></tr> <tr><td>16</td><td>T2</td><td>49.8°C</td><td>77.2°C</td></tr> <tr><td>17</td><td>Q3</td><td>53.8°C</td><td>82.6°C</td></tr> <tr><td>18</td><td>Q4</td><td>58.5°C</td><td>86.7°C</td></tr> <tr><td>19</td><td>T1coil</td><td>63.6°C</td><td>90.3°C</td></tr> <tr><td>20</td><td>T1core</td><td>55.6°C</td><td>82.2°C</td></tr> <tr><td>21</td><td>Q101</td><td>45.0°C</td><td>71.1°C</td></tr> <tr><td>22</td><td>Q102</td><td>40.7°C</td><td>67.2°C</td></tr> <tr><td>23</td><td>TSW2</td><td>33.5°C</td><td>59.4°C</td></tr> <tr><td>24</td><td>Q103</td><td>37.7°C</td><td>64.4°C</td></tr> <tr><td>25</td><td>Q105</td><td>45.8°C</td><td>71.8°C</td></tr> <tr><td>26</td><td>L100</td><td>56.6°C</td><td>84.9°C</td></tr> <tr><td>27</td><td>C105</td><td>36.6°C</td><td>63.2°C</td></tr> <tr><td>28</td><td>RG1</td><td>46.9°C</td><td>73.7°C</td></tr> <tr><td>29</td><td>RTH2</td><td>50.1°C</td><td>77.6°C</td></tr> <tr><td>30</td><td>TSW1</td><td>35.7°C</td><td>63.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=24.2°C	HIGH AMBIENT Ta= 49.5°C	1	D5	38.2°C	65.1°C	2	U202	38.2°C	64.4°C	3	ZNR1	26.4°C	53.2°C	4	LF1	27.6°C	54.7°C	5	BD1	40.9°C	66.9°C	6	LF2	30.8°C	57.9°C	7	R15	34.4°C	61.5°C	8	L1	33.3°C	61.3°C	9	Q1	44.8°C	71.9°C	10	Q2	45.1°C	71.9°C	11	D10	52.4°C	77.1°C	12	C5	32.9°C	59.4°C	13	C6	33.4°C	59.8°C	14	U1	40.4°C	67.3°C	15	C61	34.6°C	61.5°C	16	T2	49.8°C	77.2°C	17	Q3	53.8°C	82.6°C	18	Q4	58.5°C	86.7°C	19	T1coil	63.6°C	90.3°C	20	T1core	55.6°C	82.2°C	21	Q101	45.0°C	71.1°C	22	Q102	40.7°C	67.2°C	23	TSW2	33.5°C	59.4°C	24	Q103	37.7°C	64.4°C	25	Q105	45.8°C	71.8°C	26	L100	56.6°C	84.9°C	27	C105	36.6°C	63.2°C	28	RG1	46.9°C	73.7°C	29	RTH2	50.1°C	77.6°C	30	TSW1	35.7°C	63.1°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 114 % LOAD Ta : 25°C	TEST : OK	P																																																																																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC 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=50.1°C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																																																												

5	TEMPERATURE COEFFICIENT	$\pm 0.05\%/^{\circ}\text{C}$ (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	$\pm 0\%/^{\circ}\text{C}$ (0-50°C)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C ~ +70°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
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	P
9	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 (4) I/P : 230VAC O/P : 50% LOAD Ta= 50°C LIFE TIME		(1) 1307062 HRS (2) 220095 HRS (3) 211170 HRS (4) 269179 HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 187.7 KHRS			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C			P

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	Shenym	Wangdz

2007/3/20 A50-S014