



## Test Report: SPMC150-S12

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### ■ 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

## 一、设计验证试验 (DESIGN VERIFY TEST)

| NO | 测试项目 (TEST ITEM)                        | 规格 (SPECIFICATION)   | 测试条件 (TEST CONDITION)                                   | 测试结果 (RESULT) |      |             | VERDICT |
|----|-----------------------------------------|----------------------|---------------------------------------------------------|---------------|------|-------------|---------|
| 1  | 纹波与噪声<br>(RIPPLE & NOISE)               | V1: 100 mVp-p (Max)  | I/P: 230VAC<br>O/P: FULL LOAD<br>Ta: 25°C               | V1:           | 52   | mVp-p (Max) | P       |
| 2  | 输出可调范围<br>(OUTPUT VOLTAGE ADJUST RANGE) | CH1: /               | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P: MIN LOAD Ta: 25°C  |               | /    | V           | N/A     |
| 3  | 输出电压精度<br>(OUTPUT VOLTAGE TOLERANCE)    | V1: -1 %~ +1 % (Max) | I/P: 85 VAC /264 VAC<br>O/P: FULL/ MIN LOAD<br>Ta: 25°C |               | 1    | %           | P       |
| 4  | 线性调节率<br>(LINE REGULATION)              | V1: -1 %~ +1 % (Max) | 100VAC ~ 264 VAC@FULL LOAD<br>Ta: 25°C                  |               | 0.00 | %           | P       |
| 5  | 负载调节率<br>(LOAD REGULATION)              | V1: -1 %~ +1 % (Max) | I/P: 230 VAC@FULL ~MIN LOAD<br>Ta: 25°C                 |               | 0.92 | %           | P       |
| 6  | 启动时间<br>(SET UP TIME)                   | 230VAC:1000 ms (max) | 230 VAC@FULL LOAD Ta: 25°C                              | 230VAC        | 940  | ms          | P       |
|    |                                         | 115VAC:2000 ms(max)  | 115 VAC@FULL LOAD Ta: 25°C                              | 115VAC        | 1080 | ms          |         |
| 7  | 上升时间 (RISE TIME)                        | 230VAC:100 ms (max)  | 230 VAC@FULL LOAD Ta: 25°C                              | 230VAC        | 9    | ms          | P       |
|    |                                         | 115VAC:2000 ms(max)  | 115 VAC@FULL LOAD Ta: 25°C                              | 115VAC        | 9    | ms          |         |
| 8  | 输出保持时间<br>(HOLD UP TIME)                | 230VAC:60 ms (max)   | 230 VAC@FULL LOAD Ta: 25°C                              | 230VAC        | 50   | ms          | P       |
|    |                                         | 115VAC:60 ms(max)    | 115 VAC@FULL LOAD Ta: 25°C                              | 115VAC        | 50   | ms          |         |
| 9  | 过冲欠冲<br>OVER/UNDERSHOOT TEST            | < +5%Vo              | 230 VAC@ NO LOAD Ta: 25°C                               |               | 1.02 | %           | P       |
|    |                                         |                      | 230 VAC@FULL LOAD Ta: 25°C                              |               | 1.03 | %           |         |
| 10 | 动态测试<br>(DYNAMIC LOAD)                  | V1: 1000 mVp-p       | 230 AC@FULL /Min LOAD<br>Ta: 25°C                       | 90%DUTY/ 1KHZ | 44.8 | mV          | P       |
|    |                                         |                      |                                                         | 50%DUTY/120HZ | 51   | mV          |         |
| 11 | 瞬态恢复时间<br>(TRANSIENT RECOVERY TIME)     | 1000ms               | 230VAC@40% LOAD CHANGE<br>50%DUTY/120HZ 1.25A/us        |               | /    | ms          | N/A     |
| 12 | 容性负载测试<br>(Capacity load test)          | 3000uF               | 85-305VAC@FULL LOAD Ta: 25°C                            |               | 7000 | uF          | P       |

## 二、输入测试 (INPUT FUNCTION TEST)

| NO | 测试项目 (TEST ITEM)                 | 规格 (SPECIFICATION)           | 测试条件 (TEST CONDITION)                                                                                            |                                            | 测试结果 (RESULT)   |   | VERDICT |     |
|----|----------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------|---|---------|-----|
| 1  | 输入电压测试 (INPUT VOLTAGE RANGE)     | 85VAC~264 VAC                | I/P : TESTING<br>O/P : FULL LOAD<br>Ta : 25°C ON : 30 Sec.<br>OFF : 30 Sec<br>10MIN (AC POWER ON/OFF NO DAMAGE ) | LOW-LINE-3V= 82 V<br><br>HIGH-LINE+3V=267V | 低压参考技术手册降额至 60% |   | P       |     |
| 2  | INPUT FREQUENCY RANGE            | 47HZ ~63 HZ<br>NO DAMAGE OSC | 85 VAC ~ 267 VAC@FULL~MIN LOAD<br>Ta : 25°C                                                                      |                                            | OK              |   | P       |     |
| 3  | EFFICIENCY                       | 87 % (TYP)                   | 230 VAC@FULL LOAD<br>Ta : 25°C                                                                                   |                                            | 87.83           | % | P       |     |
| 4  | 输入电流 (INPUT CURRENT)             | 230Vac 1.2 A(TYP)            | 230 VAC@FULL LOAD Ta: 25°C                                                                                       |                                            | 0.762           | A | P       |     |
|    |                                  | 115Vad 2.1 (TYP)             | 115 VAC@FULL LOAD Ta: 25°C                                                                                       |                                            | 1.539           | A |         |     |
| 5  | 冲击电流 INRUSH CURRENT (COLD START) | 115VAC@FULL LOAD: 30 A (TYP) | 115VAC@FULL LOAD Ta : 25°C                                                                                       |                                            | 10.2            | A | P       |     |
|    |                                  | 230VAC@FULL LOAD: 56 A (TYP) | 230 VAC@FULL LOAD Ta : 25°C                                                                                      |                                            | 37.2            | A |         |     |
| 6  | 漏电流 LEAKAGE CURRENT              | < 1 mA/240 VAC               | 264 VAC@Min LOAD Ta : 25°C                                                                                       |                                            | L-FG            | / | mA      | N/A |
|    |                                  |                              |                                                                                                                  |                                            | N-FG            | / | mA      |     |
| 7  | 空载功耗 NO LOAD CONSUMPTIO          | < 0.1 W                      | I/P : 240VAC O/P : NO LOAD Ta : 25°C                                                                             |                                            | 0.15            | W | P       |     |

### 三、保护功能测试 (PROTECTION FUNCTION TEST)

| NO | 测试项目 (TEST ITEM)                    | 规格 (SPECIFICATION)                     | 测试条件 (TEST CONDITION)           | 测试结果 (RESULT)            |      | VERDICT |
|----|-------------------------------------|----------------------------------------|---------------------------------|--------------------------|------|---------|
| 1  | 过载保护<br>(OVER LOAD PROTECTION)      | 110%~ 150%                             | 230VAC@out shoot,10s,Ta : 25℃   | Hiccup Mode              | 130% | P       |
|    |                                     |                                        | 115VAC@out shoot,10s,Ta : 25℃   | Hiccup Mode              | 130% |         |
| 2  | 输出过压保护<br>(OVER VOLTAGE PROTECTION) | 18V                                    | O/P: 230VAC MIN LOAD<br>Ta: 25℃ | 16.2V                    |      | P       |
| 3  | 短路保护<br>(SHORT PROTECTION)          | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | 267VAC@FULL LOAD<br>Ta : 25℃    | NO DAMAGE<br>Hiccup Mode |      | P       |

### 四、关键元件测试 (COMPONENT STRESS TEST)

| NO | 测试项目 (TEST ITEM)                                       | 规格 (SPECIFICATION)               | 测试条件 (TEST CONDITION)                | 测试结果 (RESULT)              |           | VERDICT |
|----|--------------------------------------------------------|----------------------------------|--------------------------------------|----------------------------|-----------|---------|
| 1  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | Q21<br>Rated : 650V/ 15 A        | High-Line<br>+3V=267V,<br>Ta : 25℃   | Full Load Turn on          | 624 V     | P       |
|    |                                                        |                                  |                                      | OutputShort                | 496 V     |         |
|    |                                                        |                                  |                                      | Full load continue         | 614 V     |         |
| 2  | Diode Peak Voltage                                     | D30<br>Rated: 100V /5A           | High-Line<br>+3V=267V,<br>Ta : 25℃   | Full Load Turn on          | 68        | P       |
|    |                                                        |                                  |                                      | OutputShort                | 174 V     |         |
|    |                                                        |                                  |                                      | Full load continue         | 66        |         |
| 3  | Input Capacitor Voltage                                | C1/C5<br>Rated: 100uF /400V/105℃ | High-Line<br>+3V=267V,<br>Ta: 25℃    | Full Load Turn on /Off     | 395 V     | P       |
|    |                                                        |                                  |                                      | Min load Turn on /Off      | 376 V     |         |
|    |                                                        |                                  |                                      | Full Load /Min load Change | 395 V     |         |
| 4  | PWM控制芯片供电电压测试<br>(Control IC Voltage Test)             | U21<br>Rated: 0-18.5V            | High-Line<br>+3V = 267V ,<br>Ta: 25℃ | (1)Full Load Turn on /Off  | 16 V      | P       |
|    |                                                        |                                  |                                      | (2) Min load Turn on /Off  | 10.8-13 V |         |
|    |                                                        |                                  |                                      | Full Load /Minoad Change   | 16 V      |         |

### 五、安全与电磁兼容测试 (SAFETY & E.M.C. TEST)

| NO | 测试项目 (TEST ITEM)             | 规格 (SPECIFICATION)                     | 测试条件 (TEST CONDITION)                                                    | 测试结果 (RESULT)  |    | VERDICT |
|----|------------------------------|----------------------------------------|--------------------------------------------------------------------------|----------------|----|---------|
| 1  | 耐压测试<br>WITHSTAND VOLTAGE    | I/P-O/P : 3 KVAC/min 5mA               | I/P-O/P : 3 KVAC/min Ta : 25℃                                            | I/P-O/P : 2.22 | mA | P       |
|    |                              | I/P-FG : 1.5KVAC/min 5mA               |                                                                          | I/P-FG : 1.81  | mA |         |
|    |                              | O/P-FG : 0.5 KVAC/min 5mA              |                                                                          | O/P-FG : 1.83  | mA |         |
| 2  | 绝缘电阻<br>ISOLATION RESISTANCE | I/P-O/P : 500VDC>100MΩ                 | I/P-O/P : 500 VDC<br>I/P-FG : 500 VDC<br>O/P-FG : 500 VDC Ta : 25℃/70%RH | 1011           | MΩ | P       |
|    |                              | I/P-FG : - - - - -                     |                                                                          | 1999           | MΩ |         |
|    |                              | O/P-FG : - - - - -                     |                                                                          | 1999           | MΩ |         |
| 3  | 接地GROUNDING CONTINUITY       | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ | 40 A /2min<br>Ta : 25℃ /70%RH                                            | NC             |    | N/A     |

### 六、M.C TEST

| NO | 测试项目 (TEST ITEM) | 规格 (SPECIFICATION)     | 测试条件 (TEST CONDITION)              | 测试结果 (RESULT)                 | VERDICT |
|----|------------------|------------------------|------------------------------------|-------------------------------|---------|
| 1  | HARMONIC         | EN61000-3-2<br>CLASS A | 230 VAC/50HZ@FULL LOAD<br>Ta : 25℃ | PASS<br>Test by certified Lab | P       |
| 2  | CONDUCTION       | EN55022<br>CLASS B     | 230 VAC/50HZ@FULL LOAD<br>Ta : 25℃ | PASS<br>Test by certified Lab | P       |

|   |                                           |                                                       |                                                      |                               |     |
|---|-------------------------------------------|-------------------------------------------------------|------------------------------------------------------|-------------------------------|-----|
| 3 | RADIATION                                 | EN55022<br>CLASS B                                    | I/P : 230 VAC (50HZ)<br>O/P : FULL LOAD<br>Ta : 25°C | PASS<br>Test by certified Lab | N/A |
| 4 | E. S.D                                    | EN61000-4-2<br>INDUSTRY<br>AIR : 8KV /Contact : 4KV   | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C   | CRITERIA A                    | N/A |
| 5 | E.F.T<br>脉冲                               | EN61000-4-4<br>INDUSTRY<br>INPUT : 2KV                | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C   | CRITERIA A                    | P   |
| 6 | SURGE<br>浪涌                               | IEC61000-4-5<br>INDUSTRY<br>L-N : 2KV<br>L,N-PE : 3KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C   | CRITERIA A                    | P   |
| 7 | Test by certified Lab & TestReportPrepare |                                                       |                                                      |                               |     |

## 七、可靠性测试 (RELIABILITY TEST)

### ENVIRONMENT TEST

| NO | 测试项目<br>(TEST ITEM)                                                  | 规格(SPECIFICATION)                                                                                                                                           | 测试条件<br>(TEST CONDITION)                                                                                                                                        | 测试结果(RESULT) | VERDICT |
|----|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------|
| 1  | TEMPERATURE<br>RISE TEST                                             | MODEL: /<br>1. HIGH AMBIENT BURN-IN: 2 HRS<br>2. HIGH AMBIENT BURN-IN: 2 HRS<br>3. HIGH AMBIENT BURN-IN: 2 HRS<br>4. HIGH AMBIENT BURN-IN: 2 HRS<br><br>N/A | I/P: 90VAC O/P: FULL LOAD Ta=50.55°C<br>I/P: 115VAC O/P: FULL LOAD Ta=50.13°C<br>I/P: 230VAC O/P: FULL LOAD Ta=50.93°C<br>I/P: 264VAC O/P: FULL LOAD Ta=50.52°C |              |         |
| 2  | OVER LOAD<br>BURN-IN TEST                                            | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                 | I/P: 230 VAC<br>O/P: 133 %LOAD<br>Ta: 25°C                                                                                                                      | /            | N/A     |
| 3  | 低温启动<br>(LOW<br>TEMPERATURE<br>TURN ON TEST)                         | TURN ON AFTER 2 HOUR                                                                                                                                        | I/P: 264VAC/100VAC<br>O/P: 100 %LOAD<br>Ta= -40 °C                                                                                                              | TEST: OK     | P       |
| 4  | HIGH HUMIDITY<br>HIGH<br>TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 2 HOURS<br>IN CHAMBER ON<br>CONTROL 50 °C<br>NO DAMAGE                                                                                                | I/P: 264VAC<br>O/P: FULL LOAD<br>Ta= 50 °C<br>HUMIDITY= 95 %R.H                                                                                                 | OK           | P       |

# ZOEYGO<sup>®</sup> 150W Single Output Switching Power Supply SPMC150-SXX series

|    |                             |                                                                                                                                                                                                                                                                             |                                |          |     |
|----|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------|-----|
| 5  | TEMPERATURE COEFFICIENT     | + 0.03 %/°C(0~50°C)                                                                                                                                                                                                                                                         | I/P: 230 VAC<br>O/P: FULL LOAD | TEST: OK | P   |
| 6  | STORAGE TEMPERATURE TEST    | 1. Thermal shock Temperature: -40°C~ +85°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle: 5 CYCLE<br>5. Input/Output condition: STATIC                                                          |                                | TEST: OK | P   |
| 7  | THERMAL SHOCK TEST          | 1. Thermal shock Temperature: -30°C~ +70°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle: 10 CYCLE<br>5. Input/Output condition: 230VAC/Full Load AC ON/OFF TEST turn on 58sec; turn off 2sec   |                                | TEST: OK | P   |
| 8  | VIBRATION TEST              | 1 Carton & 1 Set<br>(1) Waveform: Sine Wave<br>(2) Frequency: 10~500Hz<br>(3) Sweep Time: 12min/sweep cycle<br>(4) Acceleration: 2G<br>(5) Test Time: 60min in each axis (X.Y.Z)<br>(6) Ta: 25°C                                                                            |                                | TEST: OK | P   |
| 9  | CAPACITOR LIFE CYCLE        | EPS-15-24 SUPPOSE C 102 IS THE MOST CRITICAL COMPONENT<br>(1) I/P: 230VAC O/P: FULL LOAD Ta= 25 °C LIFE TIME<br>(2) I/P: 230VAC O/P: FULL LOAD Ta=50 °C LIFE TIME<br>(3) I/P: 230VAC O/P: 75% LOAD Ta= 50 °C LIFE TIME<br>(4) I/P: 230VAC O/P: 50% LOAD Ta= 50 °C LIFE TIME |                                | TEST: OK | P   |
| 10 | MTBF                        | MIL-HDBK-217F NOTICE S2 PARTS COUNT<br>TOTAL FAILURE RATE: 220----- KHRS                                                                                                                                                                                                    |                                |          | P   |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C                                                                                                                                                                                       |                                |          | N/A |