



Test Report: SD-15A-12

15W DC-DC 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 | RIPPLE & NOISE | V1 : 120 mVp-p (Max) | I/P : 12VDC O/P : FULL LOAD Ta : 25°C | V1 : 17 mVp-p (Max) | P |
| 2 | OUTPUT VOLTAGE ADJUST RANGE | CH1 : 10.8 V ~ 13.2 V | I/P : 12 VDC O/P : MIN LOAD Ta : 25°C | 10.35 V ~ 13.89 V / 12 VDC | P |
| 3 | OUTPUT VOLTAGE TOLERANCE | V1 : 1 % ~ -1 % (Max) | I/P : 11 VDC ~ 18 VDC O/P : FULL / MIN LOAD Ta : 25°C | V1 : 0.21 % ~ -0.11 % | P |
| 4 | LINE REGULATION | V1 : 0.3 % ~ -0.3 % (Max) | I/P : 11 VDC ~ 18 VDC O/P : FULL LOAD Ta : 25°C | V1 : 0.05 % ~ 0 % | P |
| 5 | LOAD REGULATION | V1 : 0.3 % ~ -0.3 % (Max) | I/P : 12 VDC O/P : FULL ~ MIN LOAD Ta : 25°C | V1 : 0.15 % ~ -0.15 % | P |
| 6 | SET UP TIME | 12VDC : 2500 ms (Max) | I/P : 12 VDC O/P : FULL LOAD Ta : 25°C | 12VDC / 1663 ms | P |
| 7 | RISE TIME | 12VDC : 25 ms (Max) | I/P : 12 VDC O/P : FULL LOAD Ta : 25°C | 12VDC / 6 ms | P |
| 8 | OVER/UNDERSHOOT TEST | < ± 5 % | I/P : 12 VDC O/P : FULL LOAD Ta : 25°C | TEST : < 5 % | P |
| 9 | DYNAMIC LOAD | V1 : 1200 mVp-p | I/P : 12 VDC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C | (1) 155 mVp-p (2) 715 mVp-p | P |

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------|
| 1 | INPUT VOLTAGE RANGE | 9.2VDC-18VDC | I/P : TESTING O/P : FULL LOAD Ta : 25°C | 9 V-18V TEST : OK | P |
| | | | I/P : LOW-LINE-0.2V=9 V HIGH-LINE+ 5%=18.9 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE) | | |
| 2 | EFFICIENCY | 72 % (TYP) | I/P : 12 VDC O/P : FULL LOAD Ta : 25°C | 73.20 % | P |
| 3 | INPUT CURRENT | 12VDC/ 1.9 A (TYP) | I/P : 12 VDC O/P : FULL LOAD Ta : 25°C | I = 1.846 A/ 12 VDC | P |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-------------------------|----------------------------------------|----------------------------------------------|----------------------------------------------------------------------|---------|
| 1 | OVER LOAD PROTECTION | 105 % ~ 160 % | I/P : 12 VDC O/P : TESTING Ta : 25°C | 117.65 %/ 12 VDC Hiccup Mode | P |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 13.8 V ~ 16.2 V | I/P : 12 VDC O/P : 10% LOAD Ta : 25°C | 14.95 V/ 12 VDC Shut off o/p voltage, clamping by zener diode | P |
| 3 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P : 18 VDC O/P : FULL LOAD Ta : 25°C | NO DAMAGE Hiccup Mode | P |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------|
| 1 | Power Transistor (D to S) or (C to E) Peak Voltage | Q1 Rated : IRF540N : 100 V/ 33 A | I/P : High-Line +3V = 21 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) 46.6 V (2) 63.8 V (3) 44.4 V | P |
| 2 | Diode Peak Voltage | D10 Rated : BYQ28X-200 :200V/ 10 A | I/P : High-Line +3V = 21 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C | (1) 128 V (2) 118 V (3) 125 V | P |
| 3 | Input Capacitor Voltage | C5 Rated : 220u/63V 105°C 10*20 GL | I/P : High-Line +3V = 21 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) 21.5 V (2) 21.4 V (3) 21.4 V | P |
| 4 | Control IC Voltage Test | U 1 Rated : TL3845P: 30V (MAX) | I/P : High-Line +3V = 21 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) 13.5 V (2) 13.2 V (3) 13.4 V | P |

SAFETY & E.M.C. TEST

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|----------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------|
| 1 | WITHSTAND VOLTAGE | I/P-FG: 1.5 KVAC/min I/P-O/P: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min EN 60950 | I/P-FG: 1.8 KVAC/min I/P-O/P: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25°C | I/P-FG : 3.18 mA I/P-O/P : 0.67 mA O/P-FG : 0.25 mA NO DAMAGE | P |
| 2 | ISOLATION RESISTANCE | I/P-FG: 500VDC>100MΩ I/P-O/P:500VDC>100MΩ O/P-FG:500VDC>100MΩ | I/P-FG: 500 VDC I/P-O/P: 500 VDC O/P-FG: 500 VDC Ta : 25°C /70%RH | I/P-FG : >9999 MΩ I/P-O/P : >9999 MΩ O/P-FG : >9999 MΩ NO DAMAGE | P |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 mΩ EN 60950 | 25A / 1min Ta:25°C | 5 mΩ | P |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---------------------------------------------|--------------------------------------------------------|------------------------------------------|-------------------------------|---------|
| 3 | RADIATION | EN55022 CLASSB | I/P: 12 VDC O/P: FULL LOAD Ta:25°C | PASS Test by certified Lab | P |
| 4 | E.S.D | EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV | I/P: 12 VDC O/P:FULL LOAD Ta:25°C | CRITERIA A | P |
| 5 | E.F.T | EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV | I/P: 12 VDC 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 : SD-15A-5 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 12VDC O/P : FULL LOAD Ta=25.0 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 12VDC O/P : FULL LOAD Ta=40.5 °C | | | P |
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| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 12 VDC O/P : 117.23 % LOAD Ta : 25°C | TEST : OK | P |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 18VDC/9.2VDC O/P : FULL LOAD Ta= -5°C | TEST : OK | P |
| 4 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE | I/P : 18 VDC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H | TEST : OK | P |

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| 5 | TEMPERATURE COEFFICIENT | ± 0.05 % (0-50°C) | I/P : 12VDC O/P : FULL LOAD | ± 0.012 % (0-50°C) | P |
| 6 | STORAGE TEMPERATURE TEST | 1. Thermal shock Temperature : -25°C ~ +90°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 : -5°C ~ +45°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 : 12VDC/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 : 72min in each axis (X.Y.Z) (6) Ta : 25°C | | TEST : OK | P |
| 9 | CAPACITOR LIFE CYCLE | SD-15A-5 : SUPPOSE C11 IS THE MOST CRITICAL COMPONENT (1) I/P : 12VDC O/P : FULL LOAD Ta=25 °C LIFE TIME (2) I/P : 12VDC O/P : FULL LOAD Ta=40 °C LIFE TIME (3) I/P : 12VDC O/P : 75% LOAD Ta=40 °C LIFE TIME | | (1) 126727.3 HRS (2) 29572.1 HRS (3) 45715.7 HRS | P |
| 10 | MTBF | MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 644.2KHRS | | | P |

| DATE | SAMPLE | TEST RESULT | TESTER | APPROVAL |
|------------|----------------|-------------|--------|----------|
| 2005/09/03 | PRODUCT SAMPLE | PASS | LIUWY | WANGDZ |

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