



Test Report: RSD-300B-12

300W Railway Single Output DC-DC Converter

■ 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 : 24VDC O/P : FULL LOAD Ta : 25°C | V1 : 31.6 mVp-p (Max) | P |
| 2 | OUTPUT VOLTAGE TOLERANCE | V1 : 2%~ -2% (Max) | I/P : 14.4 VDC / 33.6VDC O/P : FULL/ MIN LOAD Ta : 25°C | V1 : 0.2 %~ -0.2 % | P |
| 3 | LINE REGULATION | V1 : 0.3%~ -0.3% (Max) | I/P : 14.4VDC ~ 33.6VDC O/P : FULL LOAD Ta : 25°C | V1 : 0.05 %~ -0.05 % | P |
| 4 | LOAD REGULATION | V1 : 1%~ -1% (Max) | I/P : 24VDC O/P : FULL ~MIN LOAD Ta : 25°C | V1 : 0.1 %~ -0.1 % | P |
| 5 | SET UP TIME | 24VDC : 800 ms (Max) | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | 24VDC/ 22 | P |
| 6 | RISE TIME | 24VDC : 50 ms (Max) | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | 24VDC/ 13 | P |
| 7 | HOLD UP TIME | 24VDC : 10 ms (TYP) | I/P : 24VDC O/P : 70% LOAD Ta : 25°C | 24VDC/ 14 ms | P |
| 8 | OVER/UNDERSHOOT TEST | < ±5% | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | TEST : <5 % | P |
| 9 | DYNAMIC LOAD | V1 : 1200 mVp-p | I/P : 24VDC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C | (1) 270 mVp-p (2) 624 mVp-p | P |

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---------------------|-------------------------------------|---|-----------------------------------|---------|
| 1 | INPUT VOLTAGE RANGE | 14.4VDC~33.6VDC | I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-14.2V HIGH-LINE=35.28 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (DC POWER ON/OFF NO DAMAGE) | 12.8 VDC~33.6VDC TEST : OK | P |
| 2 | EFFICIENCY | 89.5 % (TYP) | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | 90.12 % | P |
| 3 | INPUT CURRENT | 24VDC/ 14.6 A (TYP) | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | I = 12.24 A/ 24VDC | P |
| 4 | INRUSH CURRENT | 24VDC/ 45 A (TYP) COLD START | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | I = 24 A/ 24VDC | P |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-----------------------------|---|---|---|---------|
| 1 | OVER LOAD PROTECTION | 105 % ~ 135 % | I/P : 24VDC O/P : TESTING Ta : 25°C | 120.4 %/ 24VDC Constant Current Limiting | P |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 13.8 V ~16.2 V | I/P : 24VDC O/P : MIN LOAD Ta : 25°C | 14.848 V/ 24VDC Shut down Re- power on to recover | P |
| 3 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P : 33.6VDC O/P : FULL LOAD Ta : 25°C | NO DAMAGE Constant Current Limiting recover automatically after fault condition is removed | P |
| 4 | OVER TEMPERATURE PROTECTION | SPEC : TSW1 : 110± 5°C O.T.P. NO DAMAGE | I/P : 24 VDC O/P : FULL LOAD | O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down | 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 2 Rated : IRFB3607PBF 80A/75V | I/P : High-Line +5% =35.28V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) 70.4 V (2) 64.8 V (3) 68.4 V | P |
| 2 | Diode Peak Voltage | Q101 Rated : IRFB3607PBF 80A/75V Q105 Rated : IRFB3607PBF 80A/75V | I/P : High-Line +5% =35.28V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C | (1) 64.4 V (2) 54.8 V (3) 29.6 V (1) 74 V (2) 73 V (3) 74 V | P |
| 3 | Input Capacitor Voltage | C5 Rated : 1000u/50V UL10Kh ZLJ | I/P : High-Line +5% =35.28V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C | (1) 35.617 V (2) 36.177 V (3) 36.175 V | P |
| 4 | Control IC Voltage Test | U 1 Rated : PWM LM5026MT 7.3V~16V | I/P : High-Line +5% =35.28V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C | (1) 14.336 V (2) 13.951 V (3) 14.257 V | P |
| 5 | Input Power Transistor (D to S) or (C to E) Peak Voltage | Q4 Rated : IRFB3607PBF 80A/75V | I/P : High-Line +5% =35.28V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C | (1) 50.8 V (2) 42.8 mV (3) 46.8 mV | P |

SAFETY & E.M.C. TEST

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|----------------------|--|---|---|---------|
| 1 | WITHSTAND VOLTAGE | I/P-O/P : 4 KVDC/min I/P-FG : 2.5 KVDC/min O/P-FG : 2.5 KVDC/min | I/P-O/P : 4.4 KVDC/min I/P-FG : 3 KVDC/min O/P-FG : 3 KVDC/min Ta : 25°C | I/P-O/P : 0.002 mA I/P-FG : 0.002 mA O/P-FG : 0.002 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 : 30 GΩ I/P-FG : 21.1 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 / 70%RH | 5 mΩ | P |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---|--|---|-------------------------------|---------|
| 1 | RADIATION | EN55022 CLASS B | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | PASS Test by certified Lab | P |
| 2 | CONDUCTION | EN55022 CLASS A | I/P:24 VDC O/P:FULL LOAD Ta:25°C | PASS Test by certified Lab | P |
| 3 | E.S.D | EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | CRITERIA A | P |
| 4 | E.F.T | EN61000-4-4 LIGHT INDUSTRY INPUT : 0.5KV | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | CRITERIA A | P |
| 5 | SURGE | IEC61000-4-5 MEDICAL LIGHT INDUSTRY L-N : 1KV L,N-PE : 1KV | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | CRITERIA A | P |
| 6 | Test by certified Lab & Test Report Prepare | | | | |



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|----|-----------------------------|---|--|---|
| 7 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : -45°C~ +60°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 : 24VDC/Full Load DC 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 : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C | TEST : OK | P |
| 9 | CAPACITOR LIFE CYCLE | RSD-300B-12:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 24VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 24VDC O/P : FULL LOAD Ta= 55 °C LIFE TIME (3) I/P : 24VDC O/P : 75% LOAD Ta= 55 °C LIFE TIME (4) I/P : 24VDC O/P : 50% LOAD Ta= 55 °C LIFE TIME | (1) 95570 HRS (2) 14140 HRS (3) 38033 HRS (4) 77041 HRS | P |
| 10 | MTBF | MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 130.7 K HRS | | P |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ TA 55°C | | P |

| DATE | SAMPLE | TEST RESULT | TESTER | APPROVAL |
|-----------|----------------------------|-------------|------------|---------------|
| 2012/4/20 | RD SAMPLE | PASS | SANFORD SU | VINCENT TSENG |
| 2012/6/14 | PRODUCT SAMPLE W1206A18 | PASS | SANFORD SU | VINCENT TSENG |

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