



# Test Report: RSD-300D-24

---

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 : 150 mVp-p (Max)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	V1 : 15.6 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : 2%~ -2% (Max)	I/P : 57.6 VDC /154VDC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.05 %~ -0.05 %	P
3	LINE REGULATION	V1 : 0.2%~ -0.2% (Max)	I/P : 57.6 VDC /154VDC O/P : FULL LOAD Ta : 25°C	V1 : 0.03 %~ -0.03 %	P
4	LOAD REGULATION	V1 : 1%~ -1% (Max)	I/P : 110VDC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.05 %~ -0.05 %	P
5	SET UP TIME	110VDC : 800 ms (Max)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	110VDC/ 572	P
6	RISE TIME	110VDC : 50 ms (Max)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	110VDC/ 17	P
7	HOLD UP TIME	110VDC : 10 ms (TYP)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	110VDC/ 16 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
9	DYNAMIC LOAD	V1 : 2400 mVp-p	I/P : 110VDC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 346 mVp-p (2) 1130 mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	57.6 VDC /154VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE=57.4V HIGH-LINE=157V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( DC POWER ON/OFF NO DAMAGE )	53.7VDC~154VDC  TEST : OK	P
2	EFFICIENCY	91.5 % (TYP)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	92.32 %	P
3	INPUT CURRENT	110VDC/ 3.1 A (TYP)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	I = 2.95 A/ 110VDC	P
4	INRUSH CURRENT	110VDC/ 45 A (TYP)  COLD START	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	I = 21 A/ 110VDC	P

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~ 135 %	I/P : 110VDC O/P : TESTING Ta : 25°C	120.8 %/ 110VDC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 27.6 V ~32.4 V	I/P : 110VDC O/P : MIN LOAD Ta : 25°C	30.063 V/ 110VDC Shut down Re- power on to recover	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 154VDC 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 : 115± 5°C O.T.P. NO DAMAGE	I/P : 110 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 : 2SK2508 13A/250V	I/P : High-Line +3V =157V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 238 V (2) 199 V (3) 213 V	P
2	Diode Peak Voltage	Q101 Rated : FCH20A15 20A/150V  Q105 Rated : FMX-12SL 10A/200V	I/P : High-Line +3V =157V 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) 125 V (2) 36 V (3) 84 V  (1) 185 V (2) 182 V (3) 183 V	P
3	Input Capacitor Voltage	C5 Rated : 180u/200V 105°C 18*20 BXF	I/P : High-Line +3V =157V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 156.64 V (2) 157.03 V (3) 157.04 V	P
4	Control IC Voltage Test	U 1 Rated : PWM LM5026MT 7.3V~16V	I/P : High-Line +3V =157V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 14.061 V (2) 13.756 V (3) 13.926 V	P
5	Input Power Transistor (D to S) or (C to E) Peak Voltage	Q4 Rated : 2SK2508 13A/250V	I/P : High-Line +3V =157V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 211 V (2) 168 V (3) 205 V	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 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 : 110VDC O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
2	CONDUCTION	EN55022 CLASS A	I/P:110 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 : 110VDC O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 0.5KV	I/P : 110VDC 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 : 110VDC O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : RSD-300D-24 1. ROOM AMBIENT BURN-IN : 4 HRS I/P : 110VDC O/P : FULL LOAD Ta=25.7 °C 2. HIGH AMBIENT BURN-IN : 12 HRS I/P : 110VDC O/P : FULL LOAD Ta=54.2 °C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 110 VDC O/P : 120 % LOAD Ta : 25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 154VDC/57.6VDC O/P : 100 % LOAD Ta= -43 °C	TEST : OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 55 °C NO DAMAGE	I/P : 154 VDC O/P : FULL LOAD Ta= 55°C HUMIDITY= 95%R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 % (0~55°C)	I/P : 110VDC O/P : FULL LOAD	± 0.006 % (0~50°C)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°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 : -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 : 110VDC/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-300D-24:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 110VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 110VDC O/P : FULL LOAD Ta= 55 °C LIFE TIME (3) I/P : 110VDC O/P : 75% LOAD Ta= 55 °C LIFE TIME (4) I/P : 110VDC O/P : 50% LOAD Ta= 55 °C LIFE TIME	(1) 401187 HRS (2) 24068 HRS (3) 43102 HRS (4) 72943 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
2012/9/24	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2012/11/23	PRODUCT SAMPLE W1211B24	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023