



# Test Report: RSD-100D-24

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100W 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 : 58 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : 2%~ -2% (Max)	I/P : 57.6VDC / 154VDC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.3%~ -0.3%	P
3	LINE REGULATION	V1 : 0.2%~ -0.2% (Max)	I/P : 57.6VDC - 154VDC O/P : FULL LOAD Ta : 25°C	V1 : 0%~ 0%	P
4	LOAD REGULATION	V1 : 1%~ -1% (Max)	I/P : 110VDC O/P : FULL -MIN LOAD Ta : 25°C	V1 : 0.03%~ -0.03%	P
5	SET UP TIME	110VDC : 800 ms (Max)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	110VDC/ 573 ms	P
6	RISE TIME	110VDC : 50 ms (Max)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	110VDC/ 8.1 ms	P
7	HOLD UP TIME	110VDC : 10 ms (Typ.)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	110VDC/ 25.6 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)384 mVp-p (2)1772 mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	57.6VDC~154VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	53.3 VDC~154VDC	P
			I/P : LOW-LINE=57.4V HIGH-LINE=161.7 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( DC POWER ON/OFF NO DAMAGE )	TEST : OK	
2	EFFICIENCY	90 % (TYP)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	91.07 %	P
3	INPUT CURRENT	110VDC/ 1.2 A (TYP)	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	I = 1 A/ 110VDC	P
4	INRUSH CURRENT	110VDC/ 30 A (TYP) COLD START	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	I = 13 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 %/ 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	28.8 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

### 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 12A/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) 248 V (2) 248 V (3) 215 V	P
2	Diode Peak Voltage	Q104 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 Ta : 25°C	(1) 171 V (2) 167 V (3) 163 V	P
3	Input Capacitor Voltage	C5 Rated : 220u/200V 105°C 18*25 TXW	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) 157.95 V (2) 158.08 V (3) 158.08 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) 14.584 V (2) 14.406 V (3) 14.435 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 : 30 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	14 mΩ	P
4	APPROVAL	TUV : Certificate NO : UL : File NO :			N/A

**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	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
3	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 0.5KV	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
4	SURGE	IEC61000-4-5 MEDICAL LIGHT INDUSTRY L-N : 0.5KV L,N-PE : 0.5KV	I/P : 110VDC O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	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-100D-24 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 110VDC O/P : FULL LOAD Ta= 28.7°C 2. HIGH AMBIENT BURN-IN : 16HRS I/P : 110VDC O/P : FULL LOAD Ta=50.9°C																																																																																			
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 28.7 °C</th> <th>HIGH AMBIENT Ta= 50.9°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>TR968</td><td>54.0°C</td><td>73.9°C</td></tr> <tr><td>2</td><td>Q8</td><td>SM2A01NF 65A/200V</td><td>57.2°C</td><td>76.6°C</td></tr> <tr><td>3</td><td>LF2</td><td>TR969</td><td>57.2°C</td><td>77.3°C</td></tr> <tr><td>4</td><td>C12</td><td>47u/200V 105°C 12.5*20 KMX</td><td>55.3°C</td><td>75.7°C</td></tr> <tr><td>5</td><td>Q1</td><td>2SK2508 12A/250V</td><td>66.6°C</td><td>84.5°C</td></tr> <tr><td>6</td><td>C45</td><td>47u/50V L5Kh 6.3*11 YXF</td><td>57.6°C</td><td>80.5°C</td></tr> <tr><td>7</td><td>C60</td><td>47u/50V L5Kh 6.3*11 YXF</td><td>56.0°C</td><td>78.6°C</td></tr> <tr><td>8</td><td>C201</td><td>47u/50V L5Kh 6.3*11 YXF</td><td>58.8°C</td><td>80.9°C</td></tr> <tr><td>9</td><td>T1</td><td>TF2193</td><td>69.8°C</td><td>90.9°C</td></tr> <tr><td>10</td><td>Q101</td><td>FME-220B 20A/150V</td><td>63.4°C</td><td>86.4°C</td></tr> <tr><td>11</td><td>C105</td><td>220u/35V L7Kh 8*16 YXG</td><td>58.0°C</td><td>81.7°C</td></tr> <tr><td>12</td><td>L100</td><td>TR972</td><td>65.6°C</td><td>95.8°C</td></tr> <tr><td>13</td><td>c110</td><td>220u/35V L7Kh 8*16 P=3.5 YXG</td><td>58.1°C</td><td>83.1°C</td></tr> <tr><td>14</td><td>U1</td><td>LM5026MT</td><td>56.8°C</td><td>80.4°C</td></tr> <tr><td>15</td><td>C5</td><td>220u/200V 105°C 18*25 TXW</td><td>55.1°C</td><td>77.0°C</td></tr> </tbody> </table>	NO	Position	P/N	ROOM AMBIENT Ta= 28.7 °C	HIGH AMBIENT Ta= 50.9°C	1	LF1	TR968	54.0°C	73.9°C	2	Q8	SM2A01NF 65A/200V	57.2°C	76.6°C	3	LF2	TR969	57.2°C	77.3°C	4	C12	47u/200V 105°C 12.5*20 KMX	55.3°C	75.7°C	5	Q1	2SK2508 12A/250V	66.6°C	84.5°C	6	C45	47u/50V L5Kh 6.3*11 YXF	57.6°C	80.5°C	7	C60	47u/50V L5Kh 6.3*11 YXF	56.0°C	78.6°C	8	C201	47u/50V L5Kh 6.3*11 YXF	58.8°C	80.9°C	9	T1	TF2193	69.8°C	90.9°C	10	Q101	FME-220B 20A/150V	63.4°C	86.4°C	11	C105	220u/35V L7Kh 8*16 YXG	58.0°C	81.7°C	12	L100	TR972	65.6°C	95.8°C	13	c110	220u/35V L7Kh 8*16 P=3.5 YXG	58.1°C	83.1°C	14	U1	LM5026MT	56.8°C	80.4°C	15	C5	220u/200V 105°C 18*25 TXW	55.1°C	77.0°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 110VDC O/P : 118 % 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= -40 °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 % (0-50°C)	I/P : 110VDC O/P : FULL LOAD	± 0.007 % (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~ +55°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 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 : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	RSD-100D-24: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) 287799HRS (2) 32387HRS (3) 47112HRS (4) 73941HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 254.1K 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
2011/2/9	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2011/4/6	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023