



Test Report: RSD-300E-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 : 36VDC O/P : FULL LOAD Ta : 25°C	V1 : 7.6 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : 2%~ -2% (Max)	I/P : 21.6VDC / 50.4VDC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.6%~ -0.6%	P
3	LINE REGULATION	V1 : 0.3%~ -0.3% (Max)	I/P : 21.6VDC ~ 50.4VDC O/P : FULL LOAD Ta : 25°C	V1 : 0%~ 0%	P
4	LOAD REGULATION	V1 : 1%~ -1% (Max)	I/P : 36VDC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.6%~ -0.6%	P
5	SET UP TIME	36VDC : 800 ms (Max)	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	36VDC/ 28 ms	P
6	RISE TIME	36VDC : 50 ms (Max)	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	36VDC/ 10.9 ms	P
7	HOLD UP TIME	36VDC : 10 ms (TYP)	I/P : 36VDC O/P : 70% LOAD Ta : 25°C	36VDC/ 13.5 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	TEST : <5%	P
9	DYNAMIC LOAD	V1 : 1200 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1)318 mVp-p (2)199 mVp-p (3)196 mVp-p (4)956 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	21.6VDC~50.4VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE=21.4V HIGH-LINE=52.92 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (DC POWER ON/OFF NO DAMAGE)	19.3 VDC~50.4VDC TEST : OK	P
2	EFFICIENCY	90% (TYP)	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	92 %	P
3	INPUT CURRENT	36VDC/ 9.2 A (TYP)	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	I = 9.05 A/ 36VDC	P
4	INRUSH CURRENT	36VDC/ 45 A (TYP) COLD START	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	I = 22 A/ 36VDC	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~ 135 %	I/P : 36VDC O/P : TESTING Ta : 25°C	115.8 %/ 36VDC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 13.8V ~16.2 V	I/P : 36VDC O/P : MIN LOAD Ta : 25°C	14.969 V/ 36VDC Shut down Re- power on to recover	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 50.4VDC 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°C±5°C O.T.P. NO DAMAGE	I/P : 36 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 : STP40NF12 40A/120V	I/P : High-Line +5% =52.92V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 94 V (2) 93.6 V (3) 79.2 V	P
2	Diode Peak Voltage	Q101 Rated : IRFB3607PBF 80A/75V Q105 Rated : IRFB3607PBF 80A/75V	I/P : High-Line +5% =52.92V 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) 76.9 V (2) 77.2 V (3) 76.8 V (1) 61.2 V (2) 58 V (3) 37.2 V	P
3	Input Capacitor Voltage	C5 Rated : 1000u/50V UL10Kh 16*25 ZLJ	I/P : High-Line +5% =52.92V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 54 V (2) 54.4 V (3) 54.4 V	P
4	Control IC Voltage Test	U 1 Rated : PWM LM5026MT 7.3V~16V	I/P : High-Line +5% =52.92V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 15.2 V (2) 14.1 V (3) 15 V	P
5	Input Power Transistor (D to S) or (C to E) Peak Voltage	Q4 Rated : STP40NF10L 40A/100V	I/P : High-Line +5% =52.92V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 73.6 V (2) 56.8 mV (3) 60.4 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 : 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	5 mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RADIATION	EN55022 CLASS B	I/P : 36VDC O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
2	CONDUCTION	EN55022 CLASS A	I/P: 36 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 : 36VDC O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 0.5KV	I/P : 36VDC 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 : 36VDC 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-300E-12 1. ROOM AMBIENT BURN-IN : 0.5 HRS I/P : 36VDC O/P : FULL LOAD Ta= 35.2 °C 2. HIGH AMBIENT BURN-IN : 20 HRS I/P : 36VDC O/P : FULL LOAD Ta= 48.1 °C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 36VDC O/P : 114 % LOAD Ta : 25°C	TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 50.4VDC/21.6VDC 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 : 50.4 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 : 36VDC 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~ +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 : 36VDC/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-300E-12:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 36VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 36VDC O/P : FULL LOAD Ta= 55 °C LIFE TIME (3) I/P : 36VDC O/P : 75% LOAD Ta= 55 °C LIFE TIME (4) I/P : 36VDC O/P : 50% LOAD Ta= 55 °C LIFE TIME	(1) 136040 HRS (2) 24501 HRS (3) 44249 HRS (4) 82038 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

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