Test Report: SD-100A-5

100W Single Output DC-DC Converter

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

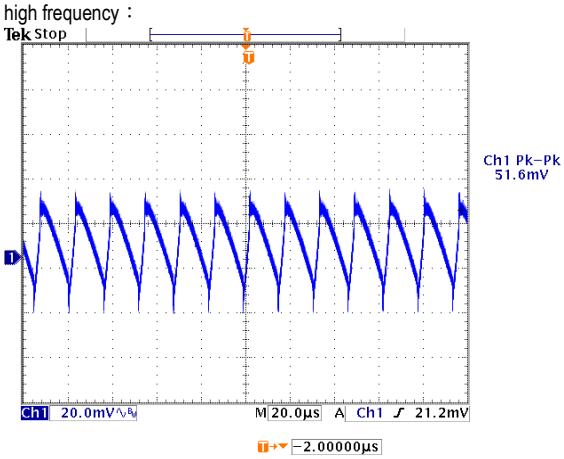
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

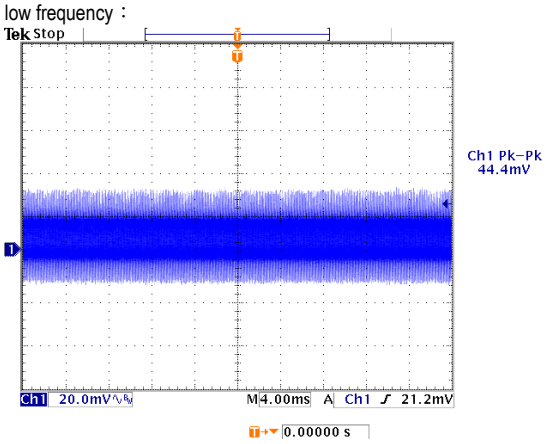
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: 2%~-2%	I/P: 9.5VDC /18 VDC O/P:FULL/ MIN. LOAD Ta:25℃	V1: 0.16%~-0.16%
2	LINE REGULATION (Max)	V1: 0.5%~ -0.5%	I/P: 9.5 VDC Z /18 VDC O/P:FULL LOAD Ta:25℃	V1: 0.1%~-0.1%
3	LOAD REGULATION (Max)	V1: 0.5%~-0.5%	I/P: 12VDC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0.16%~ -0.16%
4	OVER/UNDERSHOOT TEST	< ±10%	I/P: 12 VDC O/P:FULL LOAD Ta:25℃	TEST:2.4%
5	RIPPLE & NOISE (Max)	*V1: 100mVp-p*	I/P: 12 VDC O/P:FULL LOAD Ta:25℃	V1: 51.6 mVp-p

high frequency：



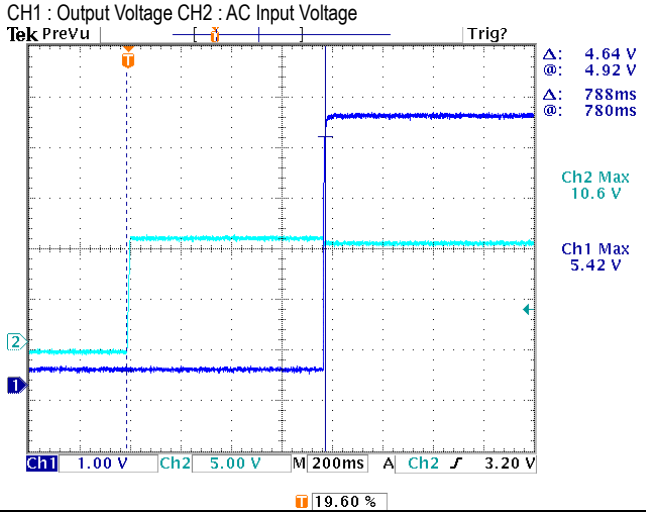
low frequency：

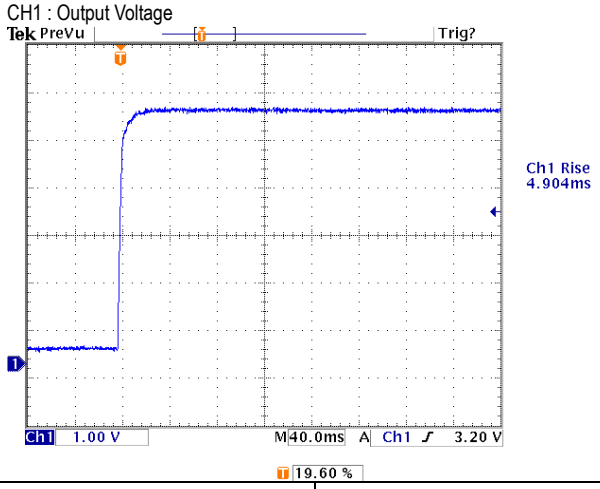
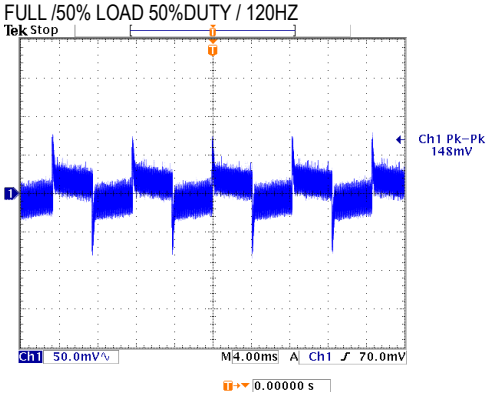
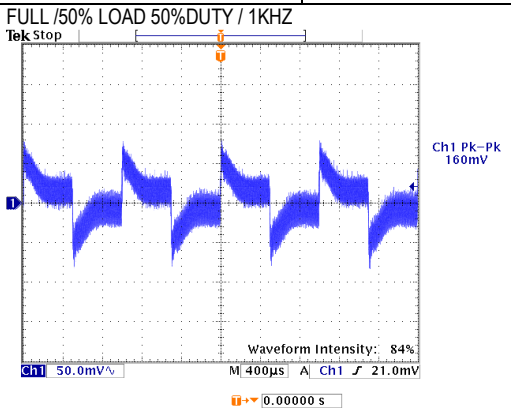


6	SET UP TIME (Max)	12VDC/2000 ms	I/P: 12VDC O/P:FULL LOAD Ta:25℃	788ms

INPUT=12VDC @ FULL LOAD

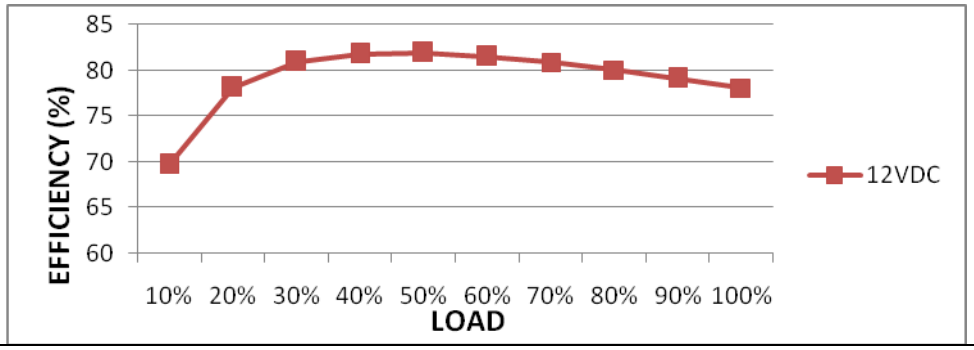
CH1 : Output Voltage CH2 : AC Input Voltage



7	RISE TIME (Max)	12VDC/ 50ms	I/P: 12 VDC O/P:FULL LOAD Ta:25℃	4.9 ms
	INPUT=12VDC @ FULL LOAD CH1 : Output Voltage 			
8	DYNAMIC LOAD	V1:1000mVp-p	I/P: 12VDC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 148mVp-p 160mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	9.5VDC~18 VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	8.71V~ > 21V
			I/P: LOW-LINE-0.2=9.3 V HIGH-LINE+3V= 21 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST :OK
2	INPUT CURRENT(TYP)	12VDC/ 9.7A	I/P: 12VDC O/P:FULL LOAD Ta:25℃	I =9.44A

3	EFFICIENCY(TYP)	78%	I/P: 12VDC O/P:FULL LOAD Ta:25℃	79.7 %
	EFFICIENCY vs LOAD			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 135%RATED OUTPUT POWER	I/P: 10VDC I/P: 12VDC I/P: 18VDC O/P:TESTING Ta:25℃	126% 124.5% 120.1% PROTECTION TYPE： Hiccup mode
2	OVER VOLTAGE PROTECTION	CH:5.75V~6.75V	I/P: 9.5VDC I/P: 12VDC I/P: 18 VDC O/P:10% LOAD Ta:25℃	6.644V 6.68V 6.60V PROTECTION TYPE： Hiccup mode
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P:21VDC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE： Hiccup mode

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 97A/ 100 V VGS :± 20 V	I/P:High-Line +3V =21V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	21V VDS: (1)64.8V (2)65.2V (3)63.6V VGS: (1)13.9V (2)9.2V (3)13.9V
2	Diode Peak Voltage	Q101 Rated : 95 A/ 60 V Q102 Rated : 30 A/ 45 V	I/P:High-Line +3V =21 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	Q101: VDS: (1) 39.4V (2) 36.2V (3) 39.4V (4) 35V Q102: VDS: (1) 35.6V (2) 35.2V (3) 36V (4) 38.6V
3	Input Capacitor Voltage	C5 Rated: : 3300μ/ 25 V	I/P:High-Line +3V =21 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta:25℃	(1) 22.5V (2) 21.8V (3) 22.5V (4) 22.7V

4	Control IC Voltage Test	PWM IC U1 Rated 30V (1).IC VCC 具有自动重启功能时，需确认空载时 IC VCC 电压波形是否抖动 N	I/P:High-Line +3V =21 V DC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR 下限.LOW LINE Ta:25℃	(1) 15.2V (2) 9.6V (3) 15.2V (4) 15.1V (5) 8.3V
5	Clamp Diode Peak Voltage	D6 Rated： 200 V 2 A	I/P：High-Line +3V = 21 V DC ON/OFF O/P： (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta：25℃	(1)46.4V (2)46.0V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	EN 60950-1 I/P-O/P:3KVDC/min I/P-FG:2 KVDC/min O/P-FG:0.5KVDC/min	I/P-O/P: 3.6KVDC/min I/P-FG: 2.4 KVDC/min O/P-FG:0.6KVDC/min Ta:25℃	I/P-O/P: 0.720 mA I/P-FG: 1.723 mA O/P-FG: 1.322 mA NO DAMAGE
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℃	I/P-O/P: 5038MΩ I/P-FG: :9999MΩ O/P-FG:5674MΩ NO DAMAGE
3	GROUNDING CONTINUITY	EN 60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	10mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	■EN55022 □EN55011 □CLASS A ■CLASS B	I/P: VDC O/P:FULL LOAD Ta:25℃	■PASS □FAIL Test by certified Lab
3	E.S.D	EN61000-4-2 □MEDICAL AIR：15KV / Contact：8KV ■LIGHT INDUSTRY AIR：8KV / Contact：4KV □INDUSTRY AIR：8KV / Contact：4KV □Din rail Model : AIR：15KV / Contact：8KV	I/P: VDC O/P:FULL LOAD Ta:25℃	■CRITERIA A □CRITERIA B
4	E.F.T	EN61000-4-4 ■LIGHT INDUSTRY INPUT: 0.5KV □MEDICAL □INDUSTRY INPUT: 1KV	I/P: VDC O/P:FULL LOAD Ta:25℃	■CRITERIA A □CRITERIA B
5	SURGE	IEC61000-4-5 □MEDICAL ■LIGHT INDUSTRY L-N :0.5KV L,N-PE:0.5KV	I/P: VDC O/P:FULL LOAD Ta:25℃	■CRITERIA A □CRITERIA B

		□INDUSTRY L-N :1KV L,N-PE:1KV		
6	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL： SD-100A-5 1. ROOM AMBIENT BURN-IN：1 HRS I/P： 12VDC O/P： FULL LOAD Ta= 25.5 ℃ 2. HIGH AMBIENT BURN-IN： 1 HRS I/P： 12VDC O/P： FULL LOAD Ta= 41.0 ℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P：12 VDC O/P：>105 % LOAD Ta：25℃	TEST：OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 12 VDC/ 10 VDC O/P：100 % LOAD Ta= -20 ℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P： 21 VDC O/P：FULL LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50℃)	I/P： 12 VDC O/P：FULL LOAD	± 0.0129 %(0~50℃)

NO	Position	ROOM AMBIENT Ta= 25.5 ℃	HIGH AMBIENT Ta=41.0 ℃
1	U1	70.0℃	85.3℃
2	D55	63.0℃	79.7℃
3	Q101	76.5℃	94.0℃
4	Q102	108.5℃	111.4℃
5	T1	80.5℃	96.1℃
6	C7	74.0℃	89.7℃
7	L100	87.1℃	103.8℃
8	Q2	86.6℃	104.7℃
9	Q1	88.9℃	108.6℃
10	T2	78.7℃	96.5℃
11	C6	59.3℃	76.1℃
12	C12	74.7℃	91.1℃
13	D7	83.9℃	98.5℃
14	C11	50.3℃	67.4℃
15	D6	75.5℃	91.0℃
16	C50	52.0℃	69.4℃
17	R6	59.9℃	76.6℃
18	C105	62.4℃	80.0℃
19	C108	64.7℃	82.0℃
20	LF1	52.4℃	69.5℃
21	D1	50.4℃	67.2℃

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：5 CYCLE 5. Input/Output condition： STATIC	OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -5℃~ +45℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10 CYCLE 5. Input/Output condition： 12VDC/Full Load DC ON/OFF TEST turn on 58sec；turn off 2sec	OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：3G (5) Test Time：60min in each axis (X.Y.Z) (6) Ta：25℃	TEST：OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 12VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 12VDC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME (3) I/P： 12VDC O/P：75% LOAD Ta= 40℃ LIFE TIME (4) I/P： 12VDC O/P：50% LOAD Ta= 40℃ LIFE TIME	(1) 288076HRS (2) 87991HRS (3) 171785HRS (4) 301160HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 399.9K hrs min. MIL-HDBK-217F (25℃)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 20,000 hours @ TA 50℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTIANTONG		WANGDZ

12.10.30 A50-F031