Test Report: DDR-15G-15

15W DIN Rail Type 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

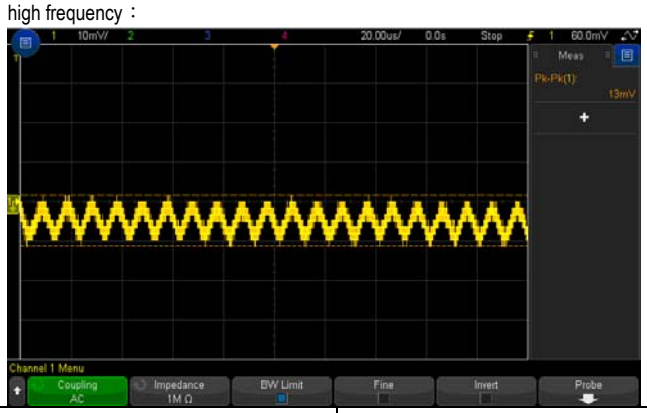
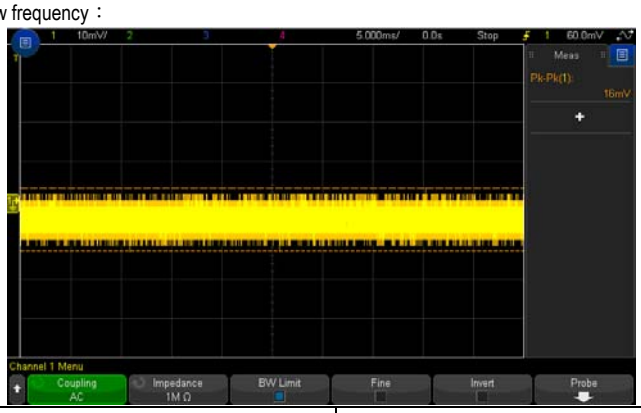
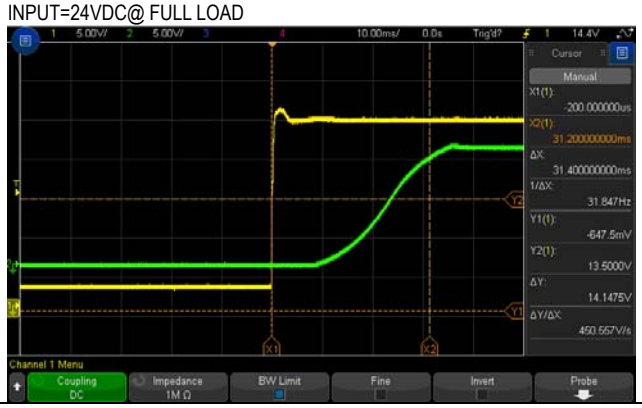
Safety Test
E.M.C. Test

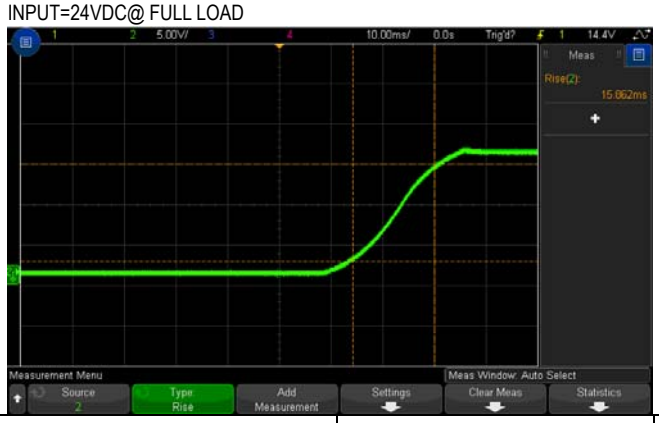
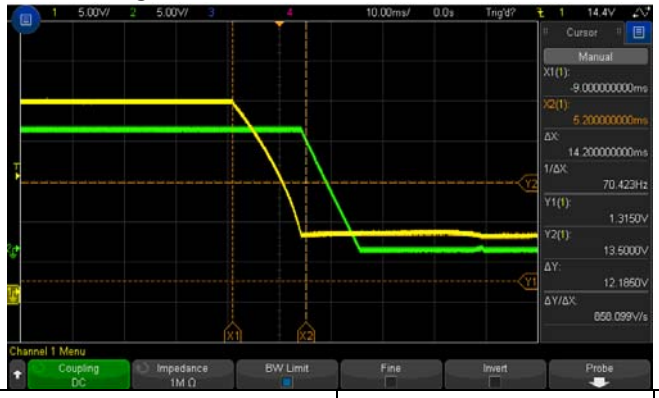
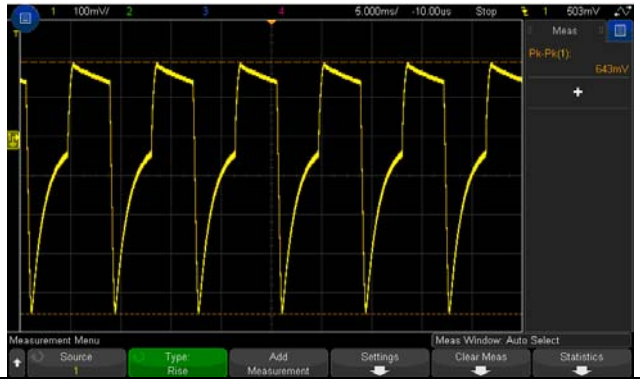
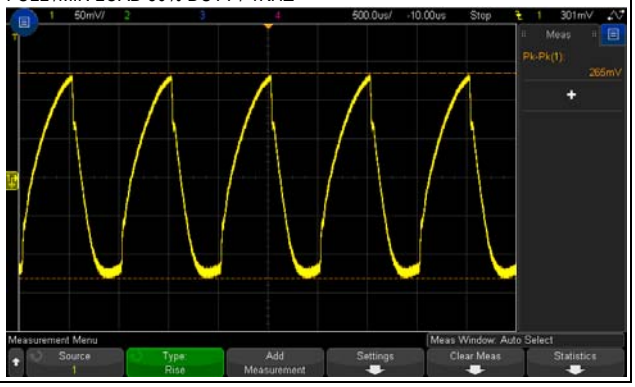
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

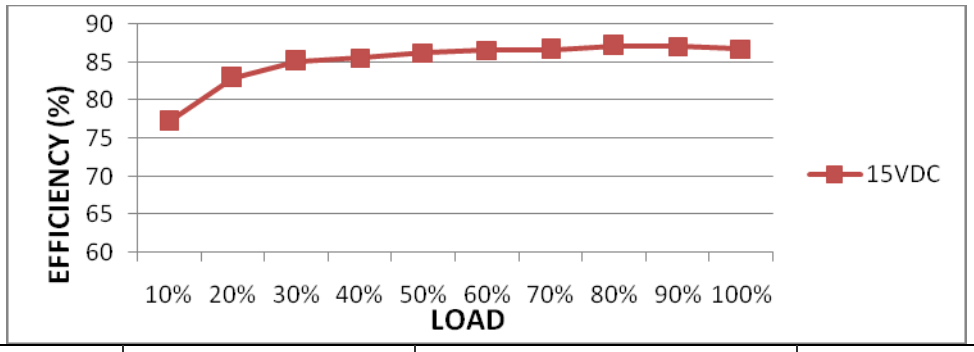
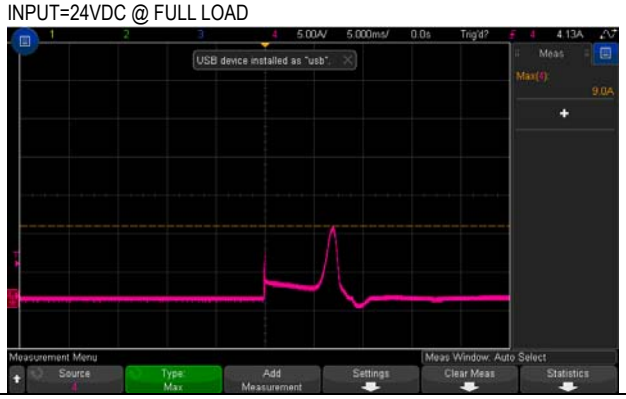
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:13.5 V~16.5 V	I/P： 24 VDC O/P：MIN LOAD Ta：25℃	13.19V~16.88V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~ 2%	I/P:9 VDC / 36VDC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.06 %~ 0.05%
3	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 9VDC /36VDC O/P:FULL LOAD Ta:25℃	V1: -0.00 %~ 0.00 %
4	LOAD REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 24VDC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.06 %~ 0.05%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P:24VDC O/P:FULL LOAD Ta:25℃	TEST:1.3%
6	RIPPLE & NOISE (Max)	*V1: 75mVp-p*	I/P: 24VDC O/P:FULL LOAD Ta:25℃	V1: 16 mVp-p
	high frequency： 		low frequency： 	
7	SET UP TIME (Max)	24VDC/120 ms	I/P:24 VDC O/P:FULL LOAD Ta:25℃	24VDC/31.4 ms
	INPUT=24VDC@ FULL LOAD 			

8	RISE TIME (Max)	24VDC/ 85 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25℃	24VDC/ 15.86ms
	INPUT=24VDC@ FULL LOAD 			
9	HOLD UP TIME (TYP)	24VDC/8ms	I/P: 24VDC O/P:F ULL LOAD Ta:25℃	24VDC/ 14.2 ms
	INPUT=24VDC @ FULL LOAD 			
10	DYNAMIC LOAD	V1: 1500 mVp-p	I/P: 24VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25℃	 643 mVp-p 265 mVp-p
	FULL /MIN LOAD 50% DUTY / 120HZ 		FULL /MIN LOAD 50% DUTY / 1KHZ 	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT

1	INPUT VOLTAGE RANGE	9VDC~ 36VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	8.32V~ 36V
			I/P: LOW-LINE-0.2=8.8V HIGH-LINE+3V=39V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST(1)___OK___ (2)___OK___ (3)___OK___
2	INPUT CURRENT(TYP)	24VDC/0.8 A	I/P: 24VDC O/P:FULL LOAD Ta:25℃	I =0.72A/24VDC
3	EFFICIENCY(TYP)	85%	I/P: 24VDC O/P:FULL LOAD Ta:25℃	86.24%
	EFFICIENCY vs LOAD 			
4	INRUSH CURRENT(TYP)	24VDC/ 15 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25℃	I =9.0A/ 24VDC
	INPUT=24VDC @ FULL LOAD 			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~150%RATED OUTPUT POWER	I/P: 36VDC I/P: 24 VDC I/P: 9 VDC O/P:TESTING Ta:25℃	137.69%/ 36VDC 123.09%/ 24VDC 124.69%/9VDC PROTECTION TYPE： Hiccup mode ,recovers automatically after fault condition is removerd

2	OVER VOLTAGE PROTECTION	CH:17.25V~20.25V	I/P: 36VDC I/P: 24 VDC I/P: 9 VDC O/P:MIN LOAD Ta:25℃	19.1V/36VDC 19.1V/ 24VDC 19.1V/ 9VDC PROTECTION TYPE： Shut down O/P voltage,re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 36VDC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE： Hiccup mode ,recovers automatically after fault condition is removerd
4	INPUT REVERSE	POWER OK	I/P: 36VDC O/P: FULL LOAD Ta:25℃	NO DAMAGE

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q 3 Rated ： 50 A/100 V	I/P:High-Line +3V =39V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)full load continue Ta:25℃	VDS: (1)74.0V (2)72.4V (3)70.8V
2	Diode Peak Voltage	Q100 Rated ： 100V	I/P:High-Line +3V =39 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) full load continue Ta:25℃	VDS: (1)75.5V (2)55.4V (3)75.5V
3	Input Capacitor Voltage	C4 Rated: ： 330 μ / 50V	I/P:High-Line +3V =39 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℃	C4： (1)41.5V (2)41.1V (3)39.9V (4)39.9V
4	Control IC Voltage Test	PWM IC U1 Rated -0.3V~30V	I/P:High-Line +3V =39 V DC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25℃	U1： (1) 18.6V (2) 10.1V (3) 18.5V (4) 21.0V
5	Clamp Diode Peak Voltage	D3 Rated： 400V	I/P：High-Line +3V =39 V DC ON/OFF O/P： (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta：25℃	D3： (1)49.6V (2)49.6V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT

1	WITHSTAND VOLTAGE	EN 60950-1 I/P-O/P:4KVDC/min	I/P-O/P: 4.4KVDC/min Ta:25℃	I/P-O/P: 0mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25℃	I/P-O/P: 9999MΩ NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	☑EN55032 ☐EN55011 ☐CLASS A ☑CLASS B	I/P24VDC O/P:FULL LOAD Ta:25℃	☑PASS ☐FAIL Test by certified Lab
2	CONDUCTION	☑EN55032 ☐EN55011 ☐CLASS A ☑CLASS B	I/P:24VDC O/P:FULL LOAD Ta:25℃	☑PASS ☐FAIL Test by certified Lab
3	E.S.D	EN61000-4-2 □Din rail Model : AIR：8KV / Contact：6KV	I/P: 24VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
4	E.F.T	EN61000-4-4 ☐INDUSTRY INPUT: 2KV	I/P:24VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
5	SURGE	IEC61000-4-5 ☐INDUSTRY line-line :1KV	I/P:24VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
6	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL：DDR-15G-24 1. ROOM AMBIENT BURN-IN：1 HRS I/P： 24VDC O/P： FULL LOAD Ta= 22.2 ℃ 2. HIGH AMBIENT BURN-IN：1 HRS I/P： 24VDC O/P： FULL LOAD Ta= 60.8 ℃		

			NO	Position	ROOM AMBIENT Ta= 22.2 ℃ / HIGH AMBIENT Ta= 60.8 ℃
			1	LF1	45.5℃ / 82.3℃
			2	LF100	53.8℃ / 86.5℃
			3	T1	62.7℃ / 95.4℃
			4	Q2	34.8℃ / 72.3℃
			5	Q100	64.3℃ / 96.1℃
			6	Q3	66.7℃ / 100.6℃
			7	D3	62.7℃ / 96.8℃
			8	U1	49.6℃ / 85.0℃
			9	C2	43.3℃ / 80.4℃
			10	C3	56.6℃ / 91.7℃
			11	C31	53.8℃ / 88.3℃
			12	C101	53.6℃ / 86.3℃
			13	C104	40.2℃ / 75.4℃
			14	C5	64.3℃ / 97.7℃
			15	R12	63.9℃ / 96.8℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P：24 VDC O/P：133 % LOAD Ta：25℃	TEST：OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P：12 VDC/ 36 VDC O/P： 100 % LOAD Ta= -45 ℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 ℃ NO DAMAGE	I/P：39 VDC O/P：FULL LOAD Ta= 60 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~60℃)	I/P：24 VDC O/P：FULL LOAD	± 0.00312 %(0~60℃)
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：10 CYCLE 5. Input/Output condition： STATIC		TEST：OK
7.	THERMAL SHOCK TEST	1. Thermal shock Temperature： -45℃~ +65℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：16 CYCLE 5. Input/Output condition：24VDC/Full Load DC ON/OFF TEST turn on 3sec；turn off 1sec@15cycle\ 24VDC/Full Load DC ON@1cycle		TEST：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℃ 2 Din Rail		TEST：OK

	Displacement	Acceleration
2（+3/-0）Hz up to 15Hz	±2.5mm	————
15Hz up to 50Hz	————	2.3g
Sweep rate	Max 1 Octave/minute	

9	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P： 24VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 24VDC O/P：FULL LOAD Ta= 60 ℃ LIFE TIME (3) I/P： 24VDC O/P：75% LOAD Ta= 60 ℃ LIFE TIME (4) I/P： 24VDC O/P：50% LOAD Ta= 60 ℃ LIFE TIME	(1) 338722.6 HRS (2) 45023 HRS (3) 64680 HRS (4) 88266.7 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 907K hrs min. MIL-HDBK-217F (25℃)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 60℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031