



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

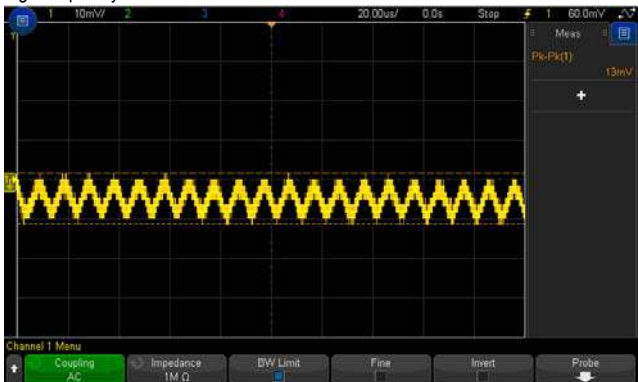
E.M.C. Test

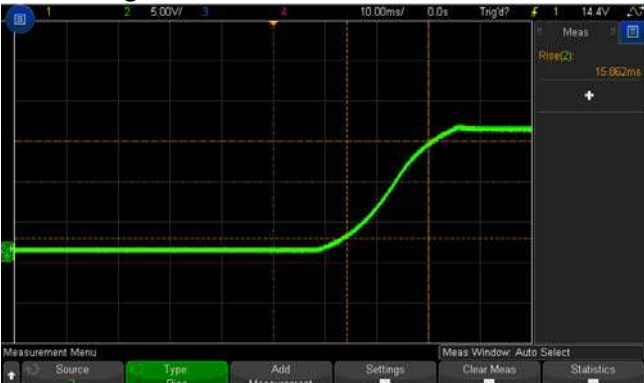
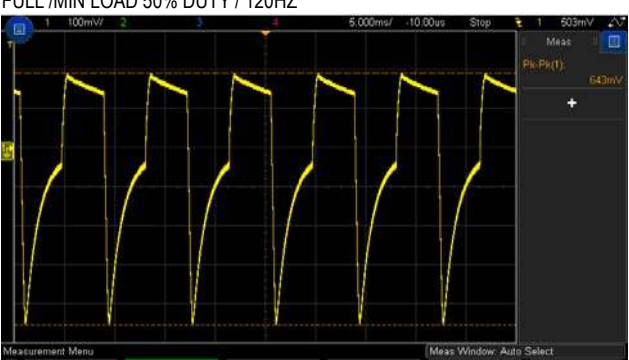
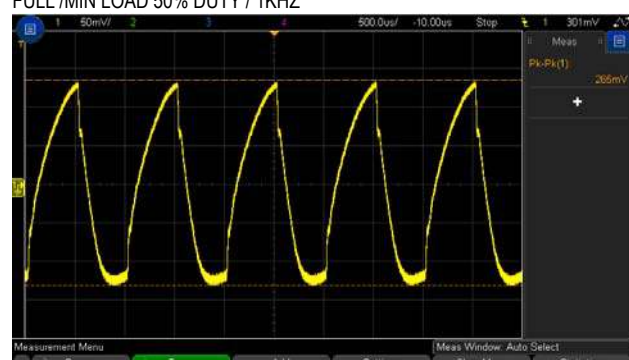
■ RELIABILITY TEST

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 : 			
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 			

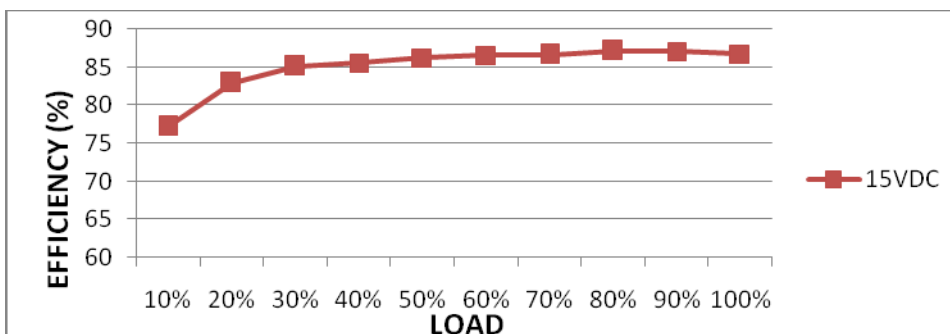
8	RISE TIME (Max)	24VDC/ 85 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 15.86ms
	INPUT=24VDC@ FULL LOAD 			
9	HOLD UP TIME (TYP)	24VDC/8ms	I/P: 24VDC O/P:FULL LOAD Ta:25°C	24VDC/ 14.2 ms
	INPUT=24VDC @ FULL LOAD 			
10	DYNAMIC LOAD	V1: 1500 mVp-p	I/P: 24VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C	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
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1	INPUT VOLTAGE RANGE	9VDC~ 36VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	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) <u>OK</u> (2) <u>OK</u> (3) <u>OK</u>
2	INPUT CURRENT(TYP)	24VDC/0.8 A	I/P: 24VDC O/P:FULL LOAD Ta:25°C	I =0.72A/24VDC
3	EFFICIENCY(TYP)	85%	I/P: 24VDC O/P:FULL LOAD Ta:25°C	86.24%

EFFICIENCY vs LOAD



4	INRUSH CURRENT(TYP)	24VDC/ 15 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25°C	I =9.0A/ 24VDC
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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°C	137.69%/ 36VDC 123.09%/ 24VDC 124.69%/9VDC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed

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°C	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°C	NO DAMAGE PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
4	INPUT REVERSE	POWER OK	I/P: 36VDC O/P: FULL LOAD Ta:25°C	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°C	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°C	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°C	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°C	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°C	D3: (1)49.6V (2)49.6V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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15W DIN Rail Type DC-DC Converter

DDR-15G series

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/P:24VDC 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 °C	HIGH AMBIENT Ta= 60.8 °C											
			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 °C		TEST : OK												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 39 VDC O/P : FULL LOAD Ta= 60 °C 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 <table><tr><td></td><td>Displacement</td><td>Acceleration</td></tr><tr><td>2 (+3/-0) Hz up to 15Hz</td><td>±2.5mm</td><td>-----</td></tr><tr><td>15Hz up to 50Hz</td><td>-----</td><td>2.3g</td></tr><tr><td>Sweep rate</td><td colspan="2">Max 1 Octave/minute</td></tr></table>				Displacement	Acceleration	2 (+3/-0) Hz up to 15Hz	±2.5mm	-----	15Hz up to 50Hz	-----	2.3g	Sweep rate	Max 1 Octave/minute		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																



15W DIN Rail Type DC-DC Converter

DDR-15G series

9	CAPACITOR LIFE CYCLE	SUPPOSE C101 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= 60 °C LIFE TIME (3) I/P : 24VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 24VDC O/P : 50% LOAD Ta= 60 °C 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°C)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 60°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031