



Test Report: DDR-15G-3.3

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

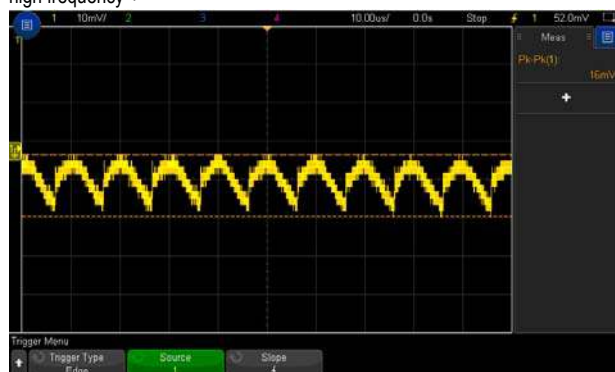
ENVIRONMENT TEST

DESIGN VERIFY TEST

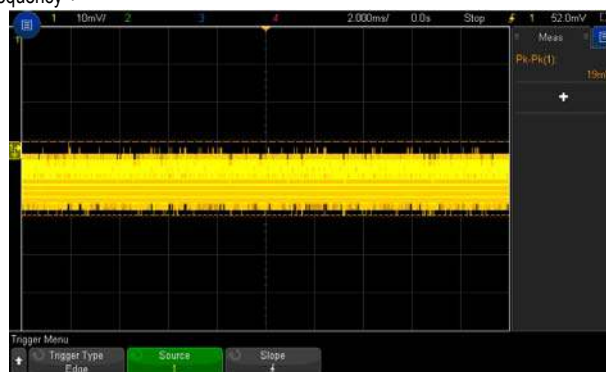
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:3.0 V~3.6 V	I/P : 24 VDC O/P : MIN LOAD Ta : 25°C	2.91V~3.73V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~ 2%	I/P:9 VDC / 36VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -1.03 %~0.98%
3	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 9VDC /36VDC O/P:FULL LOAD Ta:25°C	V1: -0.04 %~ 0.07%
4	LOAD REGULATION (Max)	V1: -1.5%~ 1.5%	I/P: 24VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -1.03 %~0.98%
5	OVER/UNDERSHOOT TEST	< ±15%	I/P:24VDC O/P:FULL LOAD Ta:25°C	TEST:4.4%
6	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 24VDC O/P:FULL LOAD Ta:25°C	V1: 19 mVp-p

high frequency :



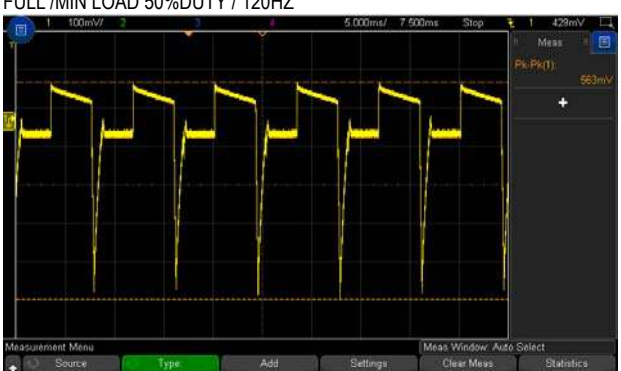
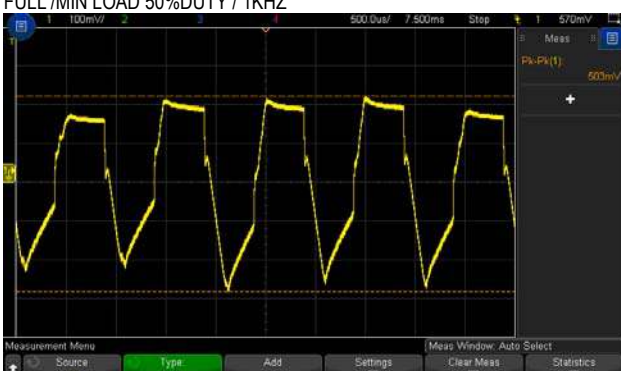
low frequency :



7	SET UP TIME (Max)	24VDC/120 ms	I/P:24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 25.8 ms
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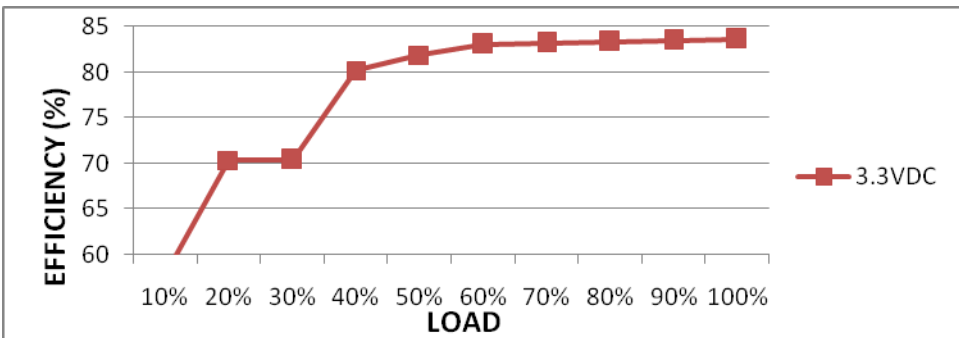
INPUT=24VDC@ FULL LOAD



8	RISE TIME (Max)	24VDC/ 85 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	24VDC/8.754 ms
	INPUT=24VDC@ FULL LOAD 			
9	HOLD UP TIME (TYP)	24VDC/8ms	I/P: 24VDC O/P:FULL LOAD Ta:25°C	24VDC/17.4 ms
	INPUT=24VDC @ FULL LOAD 			
10	DYNAMIC LOAD	V1: 990 mVp-p	I/P: 24VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C	563mVp-p 503 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°C	7.63V~ 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 =0.56A/24VDC																						
3	EFFICIENCY(TYP)	84%	I/P: 24VDC O/P:FULL LOAD Ta:25°C	84.13%																						
EFFICIENCY vs LOAD																										
 <table><caption>Efficiency vs Load Data (3.3VDC)</caption><thead><tr><th>LOAD</th><th>EFFICIENCY (%)</th></tr></thead><tbody><tr><td>10%</td><td>60</td></tr><tr><td>20%</td><td>70</td></tr><tr><td>30%</td><td>70</td></tr><tr><td>40%</td><td>80</td></tr><tr><td>50%</td><td>81</td></tr><tr><td>60%</td><td>82</td></tr><tr><td>70%</td><td>83</td></tr><tr><td>80%</td><td>83</td></tr><tr><td>90%</td><td>83</td></tr><tr><td>100%</td><td>84</td></tr></tbody></table>					LOAD	EFFICIENCY (%)	10%	60	20%	70	30%	70	40%	80	50%	81	60%	82	70%	83	80%	83	90%	83	100%	84
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90%	83																									
100%	84																									
4	INRUSH CURRENT(TYP)	24VDC/ 15 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25°C	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°C	131.4%/36VDC 133.1%/24VDC 131.4%/9VDC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH: 3.8 V~4.7V	I/P: 36VDC I/P: 24 VDC I/P: 9 VDC O/P:MIN LOAD Ta:25°C	4.04V/36VDC 4.04V/ 24VDC 4.04V/ 9VDC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover



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DDR-15G series

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 : 100V	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)81.3V (2)78.9V (3) 85.3V
2	Diode Peak Voltage	Q100 Rated : 60V	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)16.5V (2)15.3V (3)16.5V
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)41.4V (2)40.2V (3)40.2V (4)40.2V
4	Control IC Voltage Test	PWM IC U1 Rated -0.3V~30V U100 Rated -0.3V~38V	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) 18.1V (2) 9.7V (3) 18.1V (4) 10.5V U100 (1)15.3V (2)12.1V (3)15.3V (4)15.7V
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)55.4V (2)55.4V

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°C	I/P-O/P: 0 mA NO DAMAGE





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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 24 VDC O/P : 140 % 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	± 0.01%(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
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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) 632472.0HRS (2) 50194.8HRS (3) 70956.0HRS (4) 632472.0HRS												
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