



# Test Report: DDR-30G-15

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30W 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

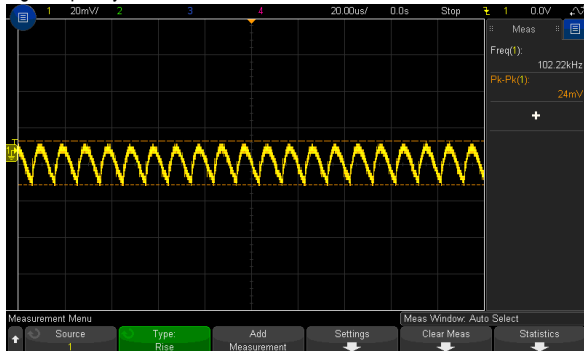
ENVIRONMENT TEST

## DESIGN VERIFY TEST

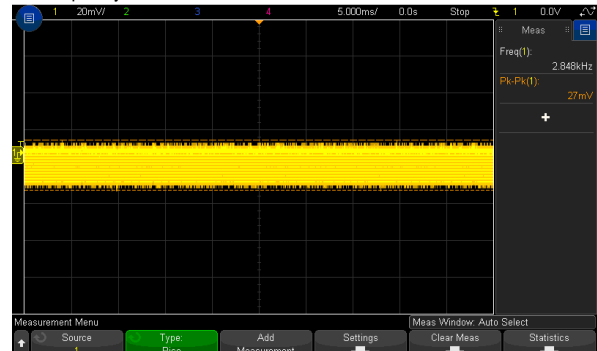
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~ 2%	I/P:9 VDC / 36VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.28 %~ 0.28 %
2	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 9VDC /36VDC O/P:FULL LOAD Ta:25°C	V1: -0.01%~ 0.01 %
3	LOAD REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 24VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.28 %~ 0.28 %
4	OVER/UNDERSHOOT TEST	< ±5%	I/P:24VDC O/P:FULL LOAD Ta:25°C	TEST: 2%
5	RIPPLE & NOISE (Max)	V1: 75 mVp-p	I/P: 24VDC O/P:FULL LOAD Ta:25°C	27mVp-p

high frequency :



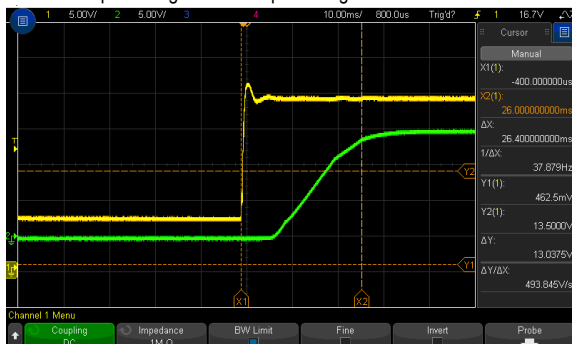
low frequency :



6	SET UP TIME (Max)	24VDC/120 ms	I/P:24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 26.4 ms
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INPUT=24VDC @ FULL LOAD

CH1 : DC Input Voltage CH2 : Output Voltage



7	RISE TIME (Max)	24VDC/ 85 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 15.38ms
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<p>INPUT=48VDC@ FULL LOAD</p>				
8	HOLD UP TIME (TYP)	24VDC/7ms	I/P: 24VDC O/P: FULL LOAD Ta:25°C	24VDC/7.5 ms
<p>INPUT=24VDC @ FULL LOAD CH1 : DC Input Voltage CH2 : Output Voltage</p>				
9	DYNAMIC LOAD	V1: 1500mVp-p	I/P: 24VDC O/P: (1)FULL /min LOAD 50%DUTY / 120HZ (2)FULL /min LOAD 50%DUTY / 1KHZ Ta:25°C	438mVp-p 334mVp-p
<p>FULL /MINLOAD 50%DUTY / 120HZ</p>		<p>FULL MIN LOAD 50%DUTY / 1KHZ</p>		

### 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	8.23V~ 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: OK
2	INPUT CURRENT(TYP)	24VDC/1.5A	I/P: 24VDC O/P:FULL LOAD Ta:25°C	I=1.37A/24VDC
3	EFFICIENCY(TYP)	87%	I/P: 24VDC O/P:FULL LOAD Ta:25°C	90.51 %
<p>EFFICIENCY vs LOAD</p>				
4	INRUSH CURRENT(TYP)	24VDC/ 15 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25°C	8.6A/ 24VDC
<p>INPUT=24VDC @ FULL LOAD</p>				

### 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	129.2%/ 36VDC 129.2%/ 24VDC 130.5%/9VDC PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH: 17.25V~ 20.25 V	I/P: 36VDC I/P: 24 VDC I/P: 9 VDC O/P:MIN LOAD Ta:25°C	18.9V/36VDC 18.9V/ 24VDC 18.9V/ 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 : Constant current limiting, recovers automatically after fault condition is removed
4	INPUT REVERSE	POWER OK	I/P:36VDC O/P: NO 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 : 80 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) 69.9V (2) 74.7V (3) 65.8V
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)77.9V (2)77.9V (3)77.1V
3	Input Capacitor Voltage	C5 Rated: : 820 $\mu$ / 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	C5: (1)41.5V (2)41.7V (3)41.5V (4)41.5V
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) 14.1V (2) 13.7V (3) 13.7V (4) 16.7V
5	Clamp Diode Peak Voltage	D4 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	D4: (1)40.8V (2)40.0V

## 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 $\mu$ A  NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$	I/P-O/P: 500 VDC  Ta:25°C	I/P-O/P: 9999M $\Omega$  NO DAMAGE



## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	<input checked="" type="checkbox"/> EN55032 <input type="checkbox"/> EN55011 <input type="checkbox"/> CLASS A <input checked="" type="checkbox"/> CLASS B	I/P:24VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL Test by certified Lab
2	CONDUCTION	<input checked="" type="checkbox"/> EN55032 <input type="checkbox"/> EN55011 <input type="checkbox"/> CLASS A <input checked="" type="checkbox"/> CLASS B	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL Test by certified Lab
3	E.S.D	EN61000-4-2 <input type="checkbox"/> Din rail Model; AIR: 8KV / Contact: 6KV	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
4	E.F.T	EN61000-4-4 <input type="checkbox"/> INDUSTRY INPUT: 2KV	I/P: 24VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
5	SURGE	IEC61000-4-5 <input type="checkbox"/> INDUSTRY line-line :1KV	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> 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-30G-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 24VDC O/P : FULL LOAD Ta= 25.6 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 24VDC O/P : FULL LOAD Ta= 62.5 °C																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25.6 °C</th> <th>HIGH AMBIENT Ta= 62.5 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C110</td><td>54.3°C</td><td>84.9°C</td></tr> <tr><td>2</td><td>LF1</td><td>43.2°C</td><td>78.4°C</td></tr> <tr><td>3</td><td>T1</td><td>61.7°C</td><td>92.3°C</td></tr> <tr><td>4</td><td>T2</td><td>61.8°C</td><td>94.8°C</td></tr> <tr><td>5</td><td>L100</td><td>56.4°C</td><td>73.7°C</td></tr> <tr><td>6</td><td>Q2</td><td>35.7°C</td><td>71.4°C</td></tr> <tr><td>7</td><td>Q3</td><td>68.8°C</td><td>105.0°C</td></tr> <tr><td>8</td><td>Q100</td><td>77.1°C</td><td>85.0°C</td></tr> <tr><td>9</td><td>D4</td><td>60.8°C</td><td>91.7°C</td></tr> <tr><td>10</td><td>C15</td><td>62.1°C</td><td>92.3°C</td></tr> <tr><td>11</td><td>R7</td><td>64.7°C</td><td>94.8°C</td></tr> <tr><td>12</td><td>U1</td><td>49.1°C</td><td>82.3°C</td></tr> <tr><td>13</td><td>C5</td><td>45.7°C</td><td>80.5°C</td></tr> <tr><td>14</td><td>C105</td><td>55.2°C</td><td>84.9°C</td></tr> <tr><td>15</td><td>C106</td><td>51.3°C</td><td>81.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 25.6 °C	HIGH AMBIENT Ta= 62.5 °C	1	C110	54.3°C	84.9°C	2	LF1	43.2°C	78.4°C	3	T1	61.7°C	92.3°C	4	T2	61.8°C	94.8°C	5	L100	56.4°C	73.7°C	6	Q2	35.7°C	71.4°C	7	Q3	68.8°C	105.0°C	8	Q100	77.1°C	85.0°C	9	D4	60.8°C	91.7°C	10	C15	62.1°C	92.3°C	11	R7	64.7°C	94.8°C	12	U1	49.1°C	82.3°C	13	C5	45.7°C	80.5°C	14	C105	55.2°C	84.9°C	15	C106	51.3°C	81.7°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 24 VDC O/P : 126 % LOAD Ta : 25°C	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°C)	I/P : 24 VDC O/P : FULL LOAD	±0.0034 %(0~60°C)												
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 : 10 CYCLE 5. Input/Output condition : STATIC		TEST : OK												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +65°C 2. Temperature change rate : 25°C / 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°C  2 Din Rail <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Displacement</th> <th>Acceleration</th> </tr> </thead> <tbody> <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> </tbody> </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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9	CAPACITOR LIFE CYCLE	SUPPOSE C105 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) 290178 HRS (2) 42247.8 HRS (3) 49804.4 HRS (4) 101279.9 HRS												
10	MTBF	Conducted by Parts Stress Analysis Prediction 2780.3K hrs min. Telcordia SR-332 (Bellcore) ; 483.8K 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