



# Test Report: DDR-30L-24

---

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

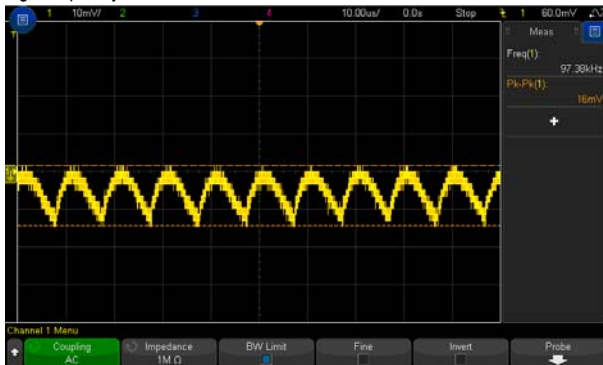
ENVIRONMENT TEST

## DESIGN VERIFY TEST

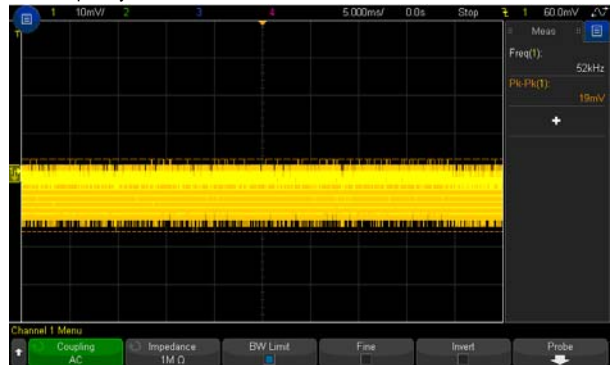
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~2%	I/P:18 VDC / 75VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.14%~ 0.14 %
2	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 18 VDC / 75VDC O/P:FULL LOAD Ta:25°C	V1: 0.01 %~ 0.01%
3	LOAD REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 48VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.14%~ 0.14 %
4	OVER/UNDERSHOOT TEST	< ±5%	I/P:48VDC O/P:FULL LOAD Ta:25°C	TEST:1.2%
5	RIPPLE & NOISE (Max)	V1: 100 mVp-p	I/P: 48VDC O/P:FULL LOAD Ta:25°C	V1: 14 mVp-p /High frequency 21 mVp-p /High frequency

high frequency :



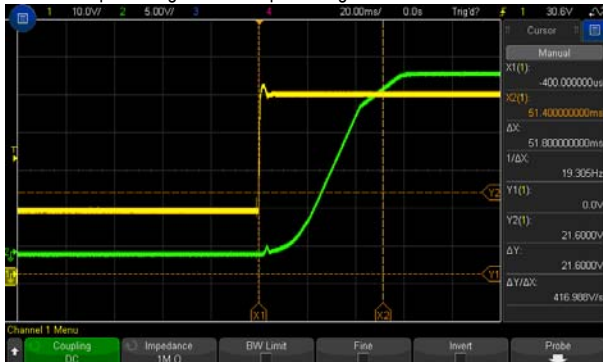
low frequency :



6	SET UP TIME (Max)	48VDC/120 ms	I/P:48 VDC O/P:FULL LOAD Ta:25°C	48VDC/ 51.8 ms
---	-------------------	--------------	--	----------------

INPUT=48VDC @ FULL LOAD

CH1 : DC Input Voltage CH2 : Output Voltage



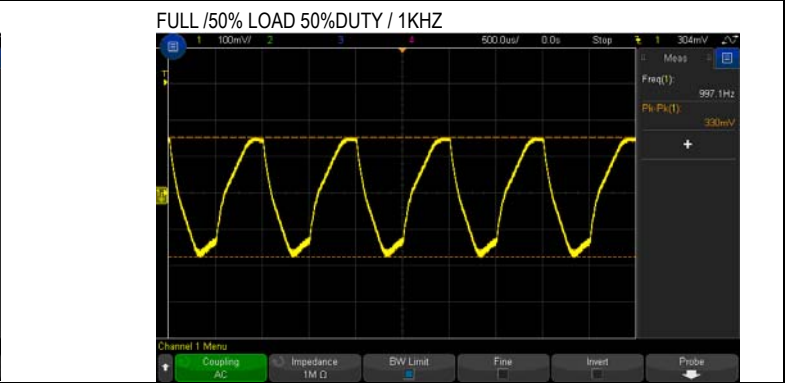
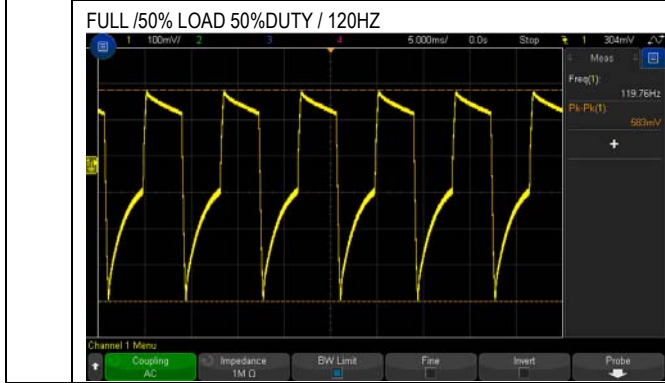
7	RISE TIME (Max)	48VDC/ 85 ms	I/P: 48 VDC O/P:FULL LOAD Ta:25°C	48VDC/ 32.13 ms
---	-----------------	--------------	---	-----------------



8	HOLD UP TIME (TYP)	48VDC/18ms	I/P: 48VDC O/P: FULL LOAD Ta:25°C	48VDC/ 23.2 ms
---	--------------------	------------	---	----------------



9	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 48VDC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	583mVp-p 330mVp-p
---	--------------	---------------	--	----------------------



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	18VDC~ 75 VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	17.44V~ 75V

			I/P: LOW-LINE-0.2=17.8V HIGH-LINE+3V=78V 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)	48VDC/0.8 A	I/P: 48VDC O/P:FULL LOAD Ta:25°C	I =0.677A/48VDC																						
3	EFFICIENCY(TYP)	91%	I/P: 48VDC O/P:FULL LOAD Ta:25°C	91.02 %																						
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data (24VDC)</caption> <thead> <tr> <th>LOAD (%)</th> <th>EFFICIENCY (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>83</td></tr> <tr><td>20%</td><td>88</td></tr> <tr><td>30%</td><td>87</td></tr> <tr><td>40%</td><td>92</td></tr> <tr><td>50%</td><td>90</td></tr> <tr><td>60%</td><td>92</td></tr> <tr><td>70%</td><td>92</td></tr> <tr><td>80%</td><td>91</td></tr> <tr><td>90%</td><td>91</td></tr> <tr><td>100%</td><td>92</td></tr> </tbody> </table>					LOAD (%)	EFFICIENCY (%)	10%	83	20%	88	30%	87	40%	92	50%	90	60%	92	70%	92	80%	91	90%	91	100%	92
LOAD (%)	EFFICIENCY (%)																									
10%	83																									
20%	88																									
30%	87																									
40%	92																									
50%	90																									
60%	92																									
70%	92																									
80%	91																									
90%	91																									
100%	92																									
4	INRUSH CURRENT(TYP)	48VDC/ 15 A COLD START	I/P: 48VDC O/P:FULL LOAD Ta:25°C	I =10.4A/ 48VDC																						
<p>INPUT=48VDC @ FULL LOAD</p>																										

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~150%RATED OUTPUT POWER	I/P: 75VDC I/P: 48 VDC I/P: 18 VDC O/P:TESTING Ta:25°C	125.7%/ 75VDC 125.8%/ 48VDC 126.4%/ 18VDC PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH: 28.8 V~ 34 V	I/P: 75VDC I/P: 48 VDC I/P: 18 VDC O/P:MIN LOAD Ta:25°C	30.6V/75VDC 30.6V/ 48VDC 30.6V/ 18VDC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover



3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 75 VDC 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:75VDC 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: 150 V	I/P:High-Line +3V =78V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) full load continue Ta:25°C	VDS: (1)106.8V (2)107.4V (3)105.8V
2	Diode Peak Voltage	Q100 Rated : 150V	I/P:High-Line +3V =78 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3)full load continue  Ta:25°C	VDS: (1)118.7V (2)118.7V (3)118.7V
3	Input Capacitor Voltage	C5 Rated: 680 $\mu$ / 80V	I/P:High-Line +3V =78 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)79.9V (2)79.1V (3)79.9V (4)79.9V
4	Control IC Voltage Test	PWM IC U1 Rated: -0.3V~30V	I/P:High-Line +3V =78 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) 13.9V (3) 13.9V (4) 17.3V
5	Clamp Diode Peak Voltage	D4 Rated : 400V	I/P : High-Line +3V = 78 V DC ON/OFF O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	D4: (1)80.7V (2) 79.9V

**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: 9999 $\Omega$  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:48 VDC 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: 48 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:48VDC 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:48 VDC 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:48 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-30L-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 48VDC O/P : FULL LOAD Ta= 22.2 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 48VDC O/P : FULL LOAD Ta= 59.4 °C																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 22.2 °C</th> <th>HIGH AMBIENT Ta= 59.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>37.8°C</td><td>78.4°C</td></tr> <tr><td>2</td><td>T1</td><td>59.4°C</td><td>96.1°C</td></tr> <tr><td>3</td><td>T2</td><td>51.8°C</td><td>91.2°C</td></tr> <tr><td>4</td><td>L100</td><td>40.8°C</td><td>76.5°C</td></tr> <tr><td>5</td><td>Q2</td><td>33.9°C</td><td>72.2°C</td></tr> <tr><td>6</td><td>Q3</td><td>62.7°C</td><td>109.1°C</td></tr> <tr><td>7</td><td>Q100</td><td>68.9°C</td><td>107.2°C</td></tr> <tr><td>8</td><td>D4</td><td>66.4°C</td><td>105.5°C</td></tr> <tr><td>9</td><td>R7</td><td>67.2°C</td><td>105.9°C</td></tr> <tr><td>10</td><td>C15</td><td>61.0°C</td><td>99.1°C</td></tr> <tr><td>11</td><td>U1</td><td>52.7°C</td><td>95.7°C</td></tr> <tr><td>12</td><td>C5</td><td>41.6°C</td><td>79.4°C</td></tr> <tr><td>13</td><td>C105</td><td>55.8°C</td><td>90.0°C</td></tr> <tr><td>14</td><td>C106</td><td>51.5°C</td><td>86.4°C</td></tr> <tr><td>15</td><td>C40</td><td>51.9°C</td><td>87.3°C</td></tr> <tr><td>16</td><td>C110</td><td>53.6°C</td><td>88.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 22.2 °C	HIGH AMBIENT Ta= 59.4 °C	1	LF1	37.8°C	78.4°C	2	T1	59.4°C	96.1°C	3	T2	51.8°C	91.2°C	4	L100	40.8°C	76.5°C	5	Q2	33.9°C	72.2°C	6	Q3	62.7°C	109.1°C	7	Q100	68.9°C	107.2°C	8	D4	66.4°C	105.5°C	9	R7	67.2°C	105.9°C	10	C15	61.0°C	99.1°C	11	U1	52.7°C	95.7°C	12	C5	41.6°C	79.4°C	13	C105	55.8°C	90.0°C	14	C106	51.5°C	86.4°C	15	C40	51.9°C	87.3°C	16	C110	53.6°C	88.5°C
NO	Position	ROOM AMBIENT Ta= 22.2 °C	HIGH AMBIENT Ta= 59.4 °C																																																																					
1	LF1	37.8°C	78.4°C																																																																					
2	T1	59.4°C	96.1°C																																																																					
3	T2	51.8°C	91.2°C																																																																					
4	L100	40.8°C	76.5°C																																																																					
5	Q2	33.9°C	72.2°C																																																																					
6	Q3	62.7°C	109.1°C																																																																					
7	Q100	68.9°C	107.2°C																																																																					
8	D4	66.4°C	105.5°C																																																																					
9	R7	67.2°C	105.9°C																																																																					
10	C15	61.0°C	99.1°C																																																																					
11	U1	52.7°C	95.7°C																																																																					
12	C5	41.6°C	79.4°C																																																																					
13	C105	55.8°C	90.0°C																																																																					
14	C106	51.5°C	86.4°C																																																																					
15	C40	51.9°C	87.3°C																																																																					
16	C110	53.6°C	88.5°C																																																																					



2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 48 VDC O/P : 123 % LOAD Ta : 25°C	TEST : OK												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 24 VDC/ 75 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 : 78 VDC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK												
5	TEMPERATURE COEFFICIENT	± 0.03 % (0~60°C)	I/P : 48 VDC O/P : FULL LOAD	± 0.0022 % (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 : 48VDC/Full Load DC ON/OFF TEST turn on 3sec ; turn off 1sec@15cycle\ 48VDC/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
	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 C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 48VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 48VDC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 48VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 48VDC O/P : 50% LOAD Ta= 60 °C LIFE TIME		(1) 219882.6 HRS (2) 23902.2 HRS (3) 37486.3 HRS (4) 56997.7 HRS												
10	MTBF	Conducted by Parts Stress Analysis Prediction 483.3K 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