



Test Report: DDR-30G-5

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

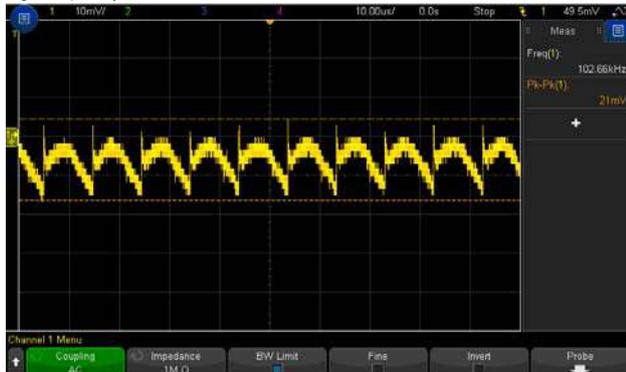
ENVIRONMENT TEST

DESIGN VERIFY TEST

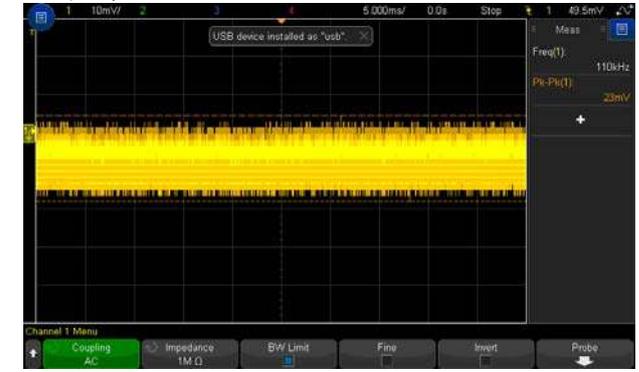
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:4.5V~5.5V	I/P : 24 VDC O/P : MIN LOAD Ta : 25°C	4.41V~5.69V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~ 2%	I/P:9 VDC / 36VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -1.4%~ 1.29 %
3	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 9VDC /36VDC O/P:FULL LOAD Ta:25°C	V1: -0.01 %~ 0.02 %
4	LOAD REGULATION (Max)	V1: -1.5%~ 1.5%	I/P: 24VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -1.4%~ 1.29 %
5	OVER/UNDERSHOOT TEST	< ±10%	I/P:24VDC O/P:FULL LOAD Ta:25°C	TEST: 4.1%
6	RIPPLE & NOISE (Max)	V1: 60 mVp-p	I/P: 24VDC O/P:FULL LOAD Ta:25°C	23mVp-p

high frequency :



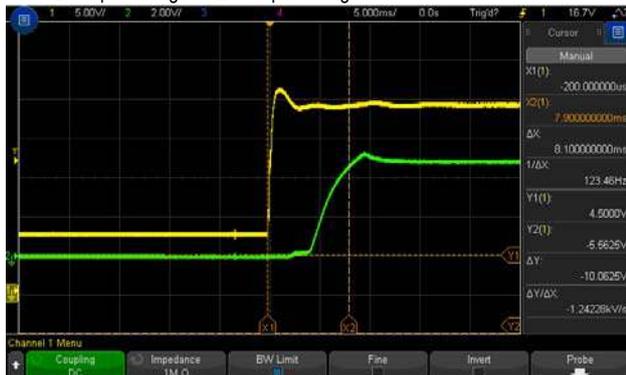
low frequency :

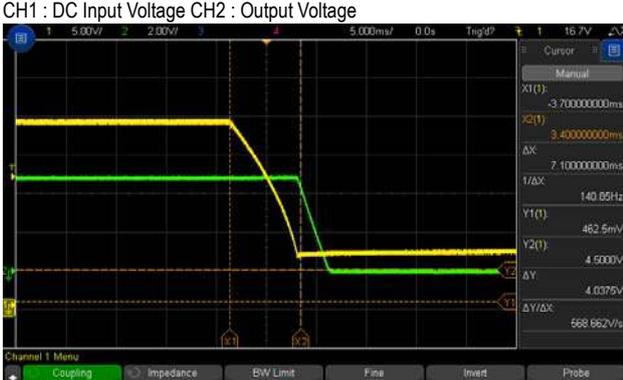
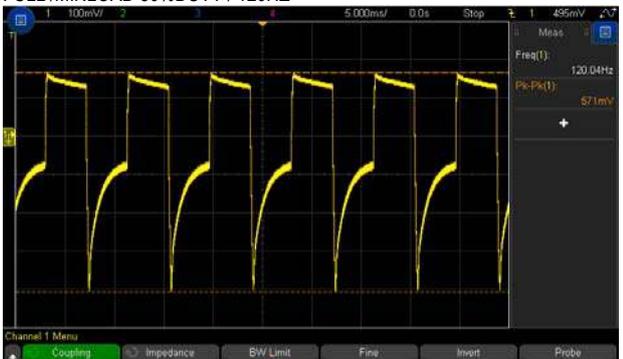
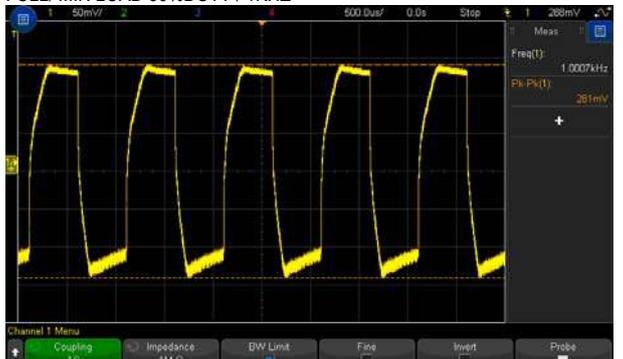


7	SET UP TIME (Max)	24VDC/120 ms	I/P:24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 8.1 ms
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INPUT=24VDC @ FULL LOAD

CH1 : DC Input Voltage CH2 : Output Voltage



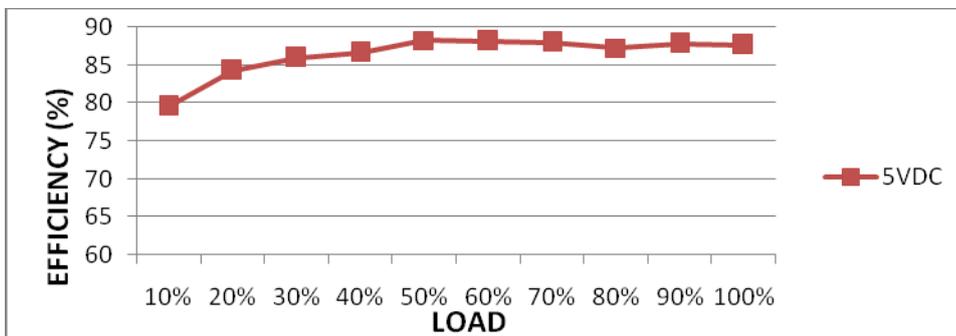
8	RISE TIME (Max)	24VDC/ 85 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 3.05 ms
<p>INPUT=24VDC@ FULL LOAD</p> 				
9	HOLD UP TIME (TYP)	24VDC/7ms	I/P: 24VDC O/P:FULL LOAD Ta:25°C	24VDC/ 7.1ms
<p>INPUT=24VDC @ FULL LOAD</p> <p>CH1 : DC Input Voltage CH2 : Output Voltage</p> 				
10	DYNAMIC LOAD	V1: 1000 mVp-p	I/P: 24VDC O/P: (1)FULL /min LOAD 50%DUTY / 120HZ (2)FULL /min LOAD 50%DUTY / 1KHZ Ta:25°C	571mVp-p 281mVp-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	8.01V~ 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 = 1.386A/24VDC
3	EFFICIENCY(TYP)	85%	I/P: 24VDC O/P:FULL LOAD Ta:25°C	87.67%

EFFICIENCY vs LOAD



4	INRUSH CURRENT(TYP)	24VDC/ 15 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25°C	8.6A/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	125.8%/ 36VDC 125.3%/ 24VDC 125.8%/9VDC PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH: 5.75V~ 7V	I/P: 36VDC I/P: 24 VDC I/P: 9 VDC O/P:MIN LOAD Ta:25°C	6.6V/36VDC 6.6V/ 24VDC 6.6V/ 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 : 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) 80.3V (2) 89.2V (3) 80.3V
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) 26.5V (2) 30.5V (3) 26.1V
3	Input Capacitor Voltage	C5 Rated: : 820 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	C5: (1) 42.0V (2) 40.4V (3) 41.6V (4) 41.6V
4	Control IC Voltage Test	PWM IC U1 Rated -0.3V~30V U100 Rated -0.3V~27V	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) 21.4V (2) 21V (3) 21.4V (4) 18V U100: (1) 19.4V (2) 19.2V (3) 19.4V (4) 17.4V
5	Clamp Diode Peak Voltage	D7 Rated : 100V D8 Rated : 100V	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	D7: (1) 66.2V (2) 65.4V D8: (1) 63.2V (2) 63.2V

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 μ A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC > 100M Ω	I/P-O/P: 500 VDC Ta: 25°C	I/P-O/P: 9999M Ω 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-5 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>LF1</td><td>46.4°C</td><td>84.1°C</td></tr> <tr><td>2</td><td>T1</td><td>69.0°C</td><td>101.7°C</td></tr> <tr><td>3</td><td>T2</td><td>61.0°C</td><td>96.2°C</td></tr> <tr><td>4</td><td>L100</td><td>59.5°C</td><td>95.7°C</td></tr> <tr><td>5</td><td>Q2</td><td>36.1°C</td><td>75.4°C</td></tr> <tr><td>6</td><td>Q3</td><td>69.4°C</td><td>106.1°C</td></tr> <tr><td>7</td><td>Q100</td><td>81.2°C</td><td>113.7°C</td></tr> <tr><td>8</td><td>C18</td><td>66.2°C</td><td>101.7°C</td></tr> <tr><td>9</td><td>D7</td><td>70.4°C</td><td>100.5°C</td></tr> <tr><td>10</td><td>D8</td><td>70.9°C</td><td>100.2°C</td></tr> <tr><td>11</td><td>U1</td><td>57.8°C</td><td>89.2°C</td></tr> <tr><td>12</td><td>L1</td><td>68.5°C</td><td>97.2°C</td></tr> <tr><td>13</td><td>C5</td><td>47.9°C</td><td>84.0°C</td></tr> <tr><td>14</td><td>C105</td><td>77.8°C</td><td>108.6°C</td></tr> <tr><td>15</td><td>C106</td><td>78.9°C</td><td>106.2°C</td></tr> <tr><td>16</td><td>C40</td><td>54.5°C</td><td>91.3°C</td></tr> <tr><td>17</td><td>C110</td><td>69.7°C</td><td>94.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 25.6 °C	HIGH AMBIENT Ta= 62.5 °C	1	LF1	46.4°C	84.1°C	2	T1	69.0°C	101.7°C	3	T2	61.0°C	96.2°C	4	L100	59.5°C	95.7°C	5	Q2	36.1°C	75.4°C	6	Q3	69.4°C	106.1°C	7	Q100	81.2°C	113.7°C	8	C18	66.2°C	101.7°C	9	D7	70.4°C	100.5°C	10	D8	70.9°C	100.2°C	11	U1	57.8°C	89.2°C	12	L1	68.5°C	97.2°C	13	C5	47.9°C	84.0°C	14	C105	77.8°C	108.6°C	15	C106	78.9°C	106.2°C	16	C40	54.5°C	91.3°C	17	C110	69.7°C	94.1°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 24 VDC O/P : 125 % 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	± 0.0108 %(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) 502386.0 HRS (2) 35565.6 HRS (3) 56326.8 HRS (4) 316936.8 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