



Test Report: DDR-240D-24

240W 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

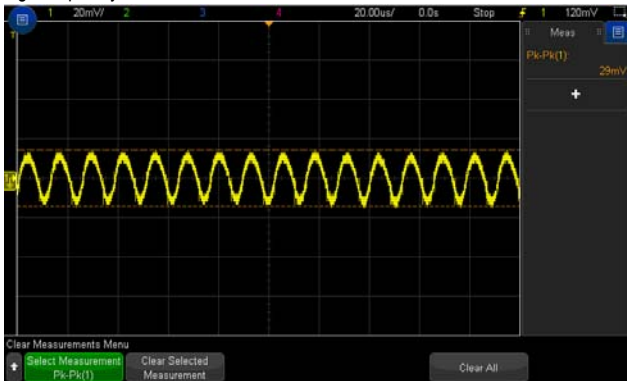
ENVIRONMENT TEST

DESIGN VERIFY TEST

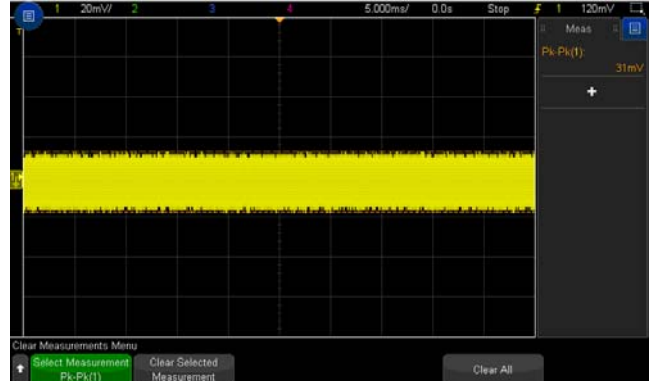
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:24V~ 28V	I/P:NORMAL VOLTAGE O/P:MIN LOAD Ta:25°C	CH1: 22.758V~28.814V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1%~1 %	I/P: 67.2VDC /154VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.2 %~ 0.2%
3	LINE REGULATION (Max)	V1: -0.5 %~ 0.5%	I/P: 67.2VDC /154VDC O/P:FULL LOAD Ta:25°C	V1: -0.001 %~0.001%
4	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P: 110VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.2 %~ 0.2%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 110VDC O/P:FULL LOAD Ta:25°C	TEST:1.3%
6	RIPPLE & NOISE (Max)	V1: 80 mVp-p	I/P:110VDC O/P:FULL LOAD Ta:25°C	V1: 32 mVp-p

high frequency :



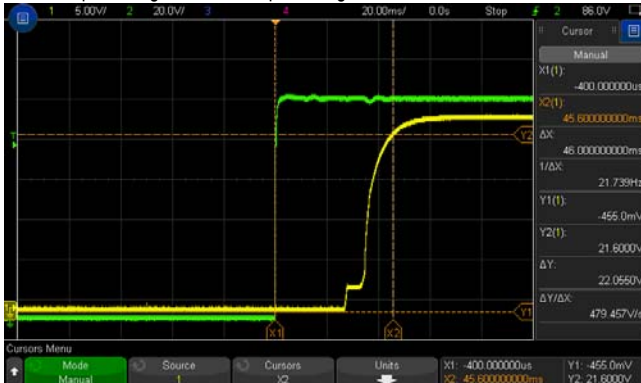
low frequency :

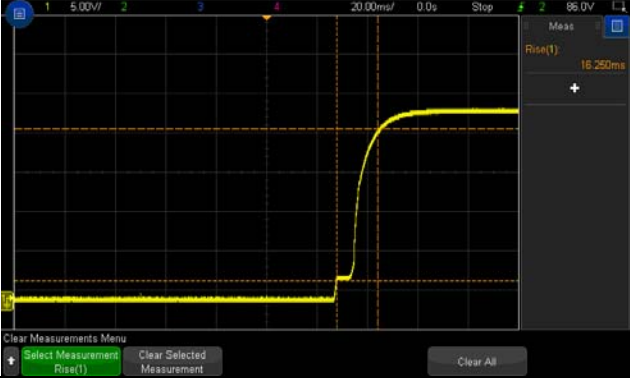

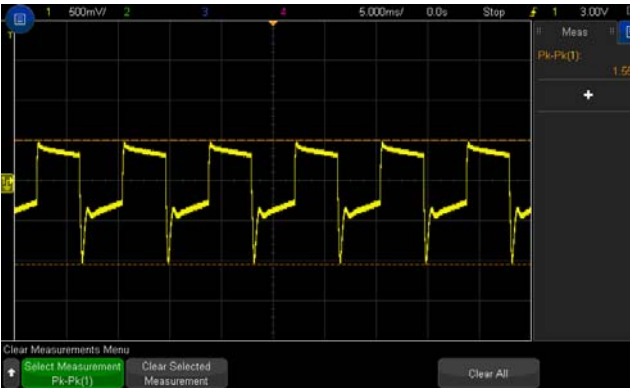
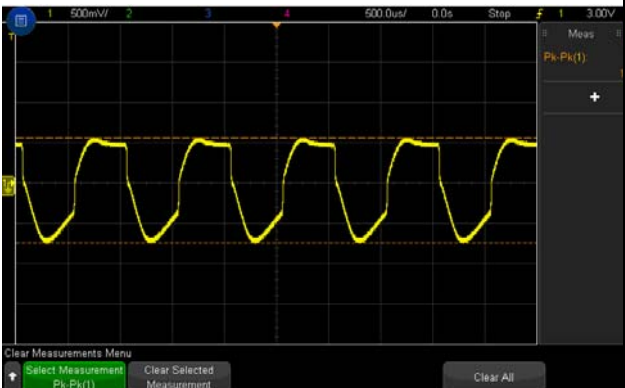


7	SET UP TIME (Max)	110VDC/ 500 ms	I/P:110VDC O/P:FULL LOAD Ta:25°C	110VDC/ 46 ms
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INPUT=110VDC @ FULL LOAD

CH1 : Output Voltage CH2 : DC Input Voltage

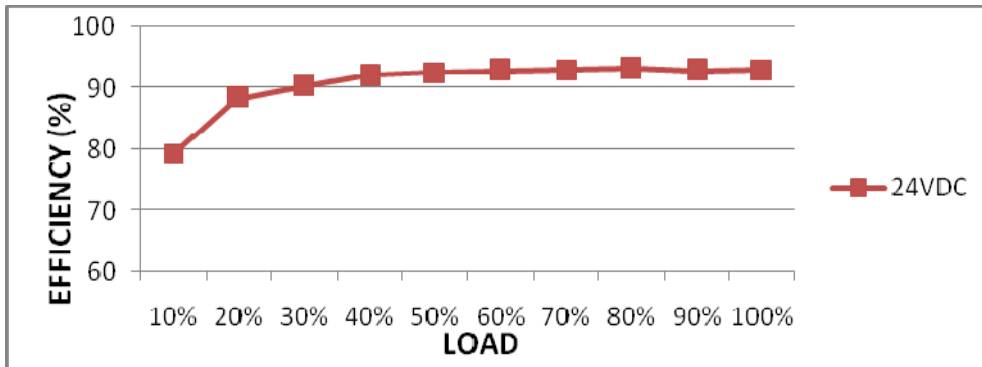


8	RISE TIME (Max)	110VDC/ 60ms	I/P: 110VDC O/P: FULL LOAD Ta: 25°C	110VDC/16.25 ms
<p>INPUT=24VDC @ FULL LOAD</p> 				
9	HOLD UP TIME (TYP)	110VDC/11ms	I/P: 110VDC O/P: FULL LOAD Ta: 25°C	110VDC/ 12.4 ms
<p>INPUT=110VDC @ FULL LOAD CH1 : Output Voltage CH2 : DC Input Voltage</p> 				
10	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 110VDC O/P: (1) FULL / MIN LOAD 50% DUTY / 120HZ (2) FULL / MIN LOAD 50% DUTY / 1KHZ Ta: 25°C	1550mVp-p 1310 mVp-p
<p>FULL / MIN LOAD 50% DUTY / 120HZ</p> 		<p>FULL / MIN LOAD 50% DUTY / 1KHZ</p> 		

INPUT FUNCTION TEST

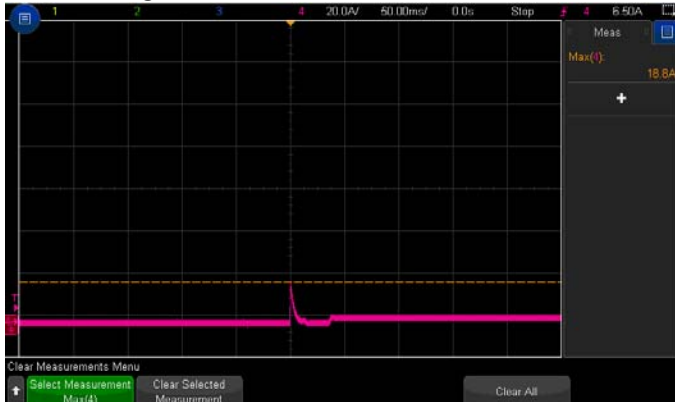
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	67.2VDC~154VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	62.54V~ 154V
			I/P: LOW-LINE-0.2=67V HIGH-LINE+3V=157V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT CURRENT(TYP)	110VDC/2.5A	I/P:110VDC O/P:FULL LOAD Ta:25°C	I=2.34A/110VDC
3	EFFICIENCY(TYP)	92%	I/P: 110VDC O/P:FULL LOAD Ta:25°C	93.06%

EFFICIENCY vs LOAD



4	INRUSH CURRENT(TYP)	110VDC/30 A COLD START	I/P:110VDC O/P:FULL LOAD Ta:25°C	I=18.8A/ 110VDC
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INPUT=110VDC @ FULL LOAD



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105 %~135 %RATED OUTPUT POWER	I/P:154VDC I/P: 110VDC I/P: 67.2VDC O/P:TESTING Ta:25°C	124.9%/ 154VDC 124.8%/ 110VDC 124.8%/ 67.2VDC PROTECTION TYPE : Normally works within 150% rated output power for more than 3 seconds and then constant current protection 105~135% rated output power with auto-recovery
2	OVER VOLTAGE PROTECTION	CH: 28.8V~33.6V	I/P:154VDC I/P: 110VDC I/P: 67.2VDC O/P:MIN LOAD Ta:25°C	32.1V/154VDC 32.1V/ 110VDC 32.3V/67.2VDC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P:154VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : constant current protection 105~135% rated output power with auto-recovery
4	INPUT REVERSE	POWER OK	I/P: 154VDC 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	Q11 Rated : 400V	I/P:High-Line +3V =157V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)FULL LOAD CONTINUE Ta:25°C	VDS: (1)243V (2)191V (3)213V
2	Clamp MOSFET (D to S) or (C to E) Peak Voltage	Q 6 Rated : 400V	I/P:High-Line +3V =157V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) FULL LOAD CONTINUE Ta:25°C	VDS: (1) 243V (2) 167V (3) 205V
3	Diode Peak Voltage	D100 Rated :200 V D102 Rated : 200 V	I/P:High-Line +3V =157V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) FULL LOAD CONTINUE Ta:25°C	D100: VDS: (1)163V (2) 31.2V (3) 38.3V D102: VDS: (1)179V (2)183V (3)157V
4	Input Capacitor Voltage	C7 Rated: : 150 μ / 160 V	I/P:High-Line +3V =157V 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	(1)159V (2)1158V (3)159V (4)158V



5	Control IC Voltage Test	PWM IC U1 Rated -0.3V~16V	I/P:High-Line +3V =157V DC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR 下限.LOW LINE Ta:25°C	(1) 14.8V (2) 14.7V (3) 15.1V (4) 14.6V (5) 9.3V
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SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	EN 60950-1 I/P-O/P:4KVDC/min I/P-FG:2.5 KVDC/min O/P-FG:0.71KVDC/min	I/P-O/P: 4.4KVDC/min I/P-FG: 3 KVDC/min O/P-FG:0.85KVDC/min Ta:25°C	I/P-O/P:0mA I/P-FG: 0 mA O/P-FG:0 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:9999MΩ I/P-FG:9999MΩ O/P-FG:9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	EN 60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	10mΩ

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:110VDC 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:110VDC 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:110VDC 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: 110VDC 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 L-N :1KV L,N-FG:2KV	I/P: 110VDC 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-240D-48 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 110VDC O/P : FULL LOAD Ta= 28.1℃ 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 110VDC O/P : FULL LOAD Ta= 50.0℃																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 28.1℃</th> <th>HIGH AMBIENT Ta= 50.0℃</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>61.6℃</td><td>84.3℃</td></tr> <tr><td>2</td><td>Q3</td><td>61.1℃</td><td>84.2℃</td></tr> <tr><td>3</td><td>LF100</td><td>69.3℃</td><td>92.9℃</td></tr> <tr><td>4</td><td>LF2</td><td>54.9℃</td><td>77.8℃</td></tr> <tr><td>5</td><td>T1</td><td>80.3℃</td><td>106.3℃</td></tr> <tr><td>6</td><td>L100</td><td>78.6℃</td><td>103.0℃</td></tr> <tr><td>7</td><td>D100</td><td>85.4℃</td><td>109.2℃</td></tr> <tr><td>8</td><td>D105</td><td>84.4℃</td><td>108.1℃</td></tr> <tr><td>9</td><td>C103</td><td>69.7℃</td><td>93.6℃</td></tr> <tr><td>10</td><td>C104</td><td>66.0℃</td><td>89.8℃</td></tr> <tr><td>11</td><td>C106</td><td>66.6℃</td><td>89.6℃</td></tr> <tr><td>12</td><td>Q12</td><td>63.3℃</td><td>87.9℃</td></tr> <tr><td>13</td><td>U1</td><td>28.5℃</td><td>50.1℃</td></tr> <tr><td>14</td><td>TSW1</td><td>71.9℃</td><td>95.8℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 28.1℃	HIGH AMBIENT Ta= 50.0℃	1	LF1	61.6℃	84.3℃	2	Q3	61.1℃	84.2℃	3	LF100	69.3℃	92.9℃	4	LF2	54.9℃	77.8℃	5	T1	80.3℃	106.3℃	6	L100	78.6℃	103.0℃	7	D100	85.4℃	109.2℃	8	D105	84.4℃	108.1℃	9	C103	69.7℃	93.6℃	10	C104	66.0℃	89.8℃	11	C106	66.6℃	89.6℃	12	Q12	63.3℃	87.9℃	13	U1	28.5℃	50.1℃	14	TSW1	71.9℃	95.8℃
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 110 VDC O/P : 124% LOAD Ta : 25℃	TEST : OK																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 86.4 VDC/ 154VDC O/P : 100 % LOAD Ta= -43℃	TEST : OK																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 157 VDC O/P : FULL LOAD Ta= 50℃ HUMIDITY= 95 %R.H	TEST : OK																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 % (0~55℃)	I/P : 110 VDC O/P : FULL LOAD	± 0.0038% (0~50℃)																																																												
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℃~ +55℃ 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 : 110VDC/Full Load DC ON/OFF TEST turn on 3sec : turn off 1sec@15cycle\ 110VDC/Full Load DC ON@1cycle		TEST : OK																																																												



8	VIBRATION TEST	<p>1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C</p> <p>2 Din Rail</p> <table border="1" data-bbox="470 510 1157 645"> <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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2 (+3/-0) Hz up to 15Hz	±2.5mm	-----													
15Hz up to 50Hz	-----	2.3g													
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9	CAPACITOR LIFE CYCLE	<p>SUPPOSE C103 IS THE MOST CRITICAL COMPONENT</p> <p>(1) I/P : 110VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 110VDC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 110VDC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 110VDC O/P : 50% LOAD Ta= 50 °C LIFE TIME</p>	<p>(1) 578411.4 HRS (2) 89035.8 HRS (3) 156633.4 HRS (4) 252276.5 HRS</p>												
10	MTBF	<p>Conducted by Parts Stress Analysis Prediction 484.9K hrs min. Telcordia SR-332 (Bellcore) ; 189.9K hrs min. MIL-HDBK-217F (25°C)</p>													
11	DMTBF/Accelerated Life Test	<p>Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C</p>													

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031