



# Test Report: DDR-120D-48

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120W DC-DC DIN Rail Power Supply

## ■ 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

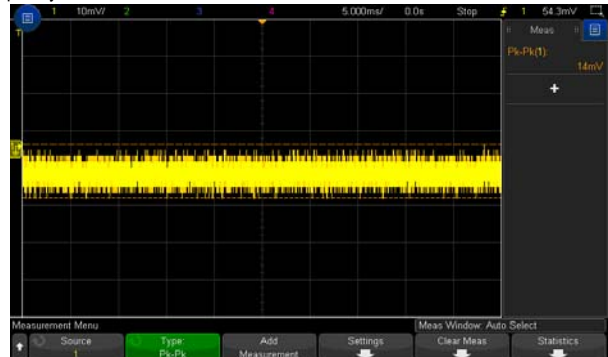
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:48 V~56 V	I/P : 110 VDC O/P : MIN LOAD Ta : 25°C	46.9V~57.4V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1 %~1 %	I/P:86.4VDC /154VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.15 %~ 0.25 %
3	LINE REGULATION (Max)	V1: -0.5 %~0.5 %	I/P: 86.4VDC / 154 VDC O/P:FULL LOAD Ta:25°C	V1: -0.12 %~0.09%
4	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P: 110VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.15 %~ 0.25 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	TEST: 1.2%
6	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	V1: 14mVp-p

high frequency :



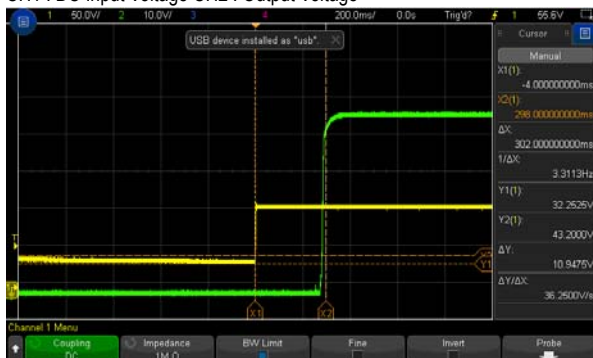
low frequency :


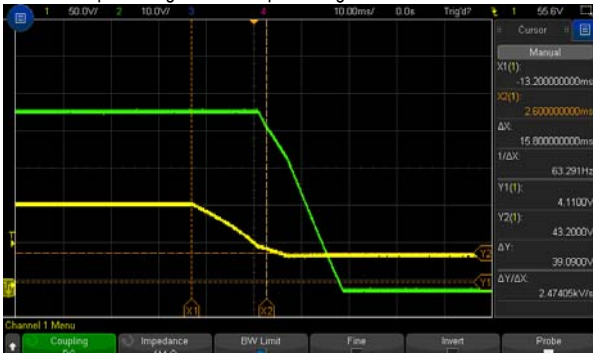
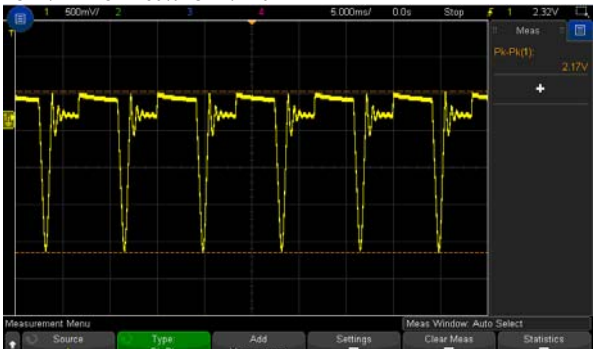
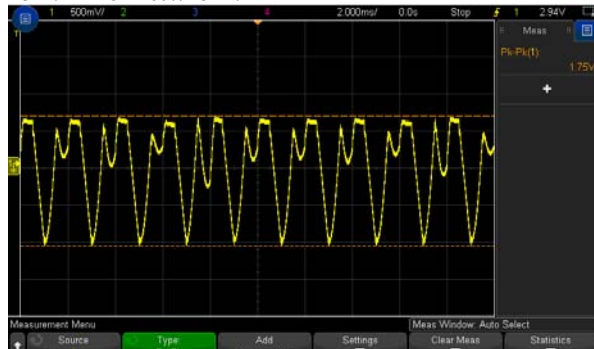


7	SET UP TIME (Max)	110VDC/ 500 ms	I/P: 110VDC O/P:FULL LOAD Ta:25°C	110VDC/302 ms
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INPUT=110VDC @ FULL LOAD

CH1 : DC Input Voltage CH2 : Output Voltage



8	RISE TIME (Max)	110VDC/ 60 ms	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	110VDC/ 13.47ms
<p>INPUT=110VDC @ FULL LOAD</p> 				
9	HOLD UP TIME (TYP)	110VDC/ 10 ms	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	110VDC/ 15.8ms
<p>INPUT=110VDC @ FULL LOAD CH1 : DC Input Voltage CH2 : Output Voltage</p> 				
10	DYNAMIC LOAD	V1: 4800 mVp-p	I/P: 110VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C	2170mVp-p 1750mVp-p
<div style="display: flex; justify-content: space-around;"> <div data-bbox="151 1458 746 1827"> <p>FULL /MIN LOAD 50%DUTY / 120HZ</p>  </div> <div data-bbox="847 1458 1442 1827"> <p>FULL /MIN LOAD 50%DUTY / 1KHZ</p>  </div> </div>				

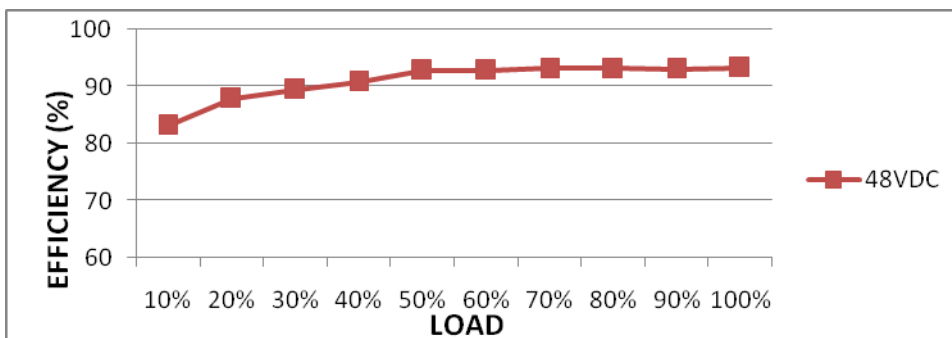
### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	67.2 VDC~ 154 VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	59.9V~ 154 V



			I/P: LOW-LINE-0.2= 67 V HIGH-LINE+3V= 157 V 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)	110VDC/ 1.3 A	I/P: 110VDC O/P:FULL LOAD Ta:25°C	I=1.17A/110VDC
3	EFFICIENCY(TYP)	91.5 %	I/P: 110VDC O/P:FULL LOAD Ta:25°C	92.25%

EFFICIENCY vs LOAD



4	INRUSH CURRENT(TYP)	110VDC/ 20 A COLD START	I/P: 110VDC O/P:FULL LOAD Ta:25°C	I=4.02A/110 VDC
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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: 67.2 VDC I/P: 110 VDC I/P: 154 VDC O/P:TESTING Ta:25°C	120.4%/ 154VDC 120%/110VDC 119.6%/ 67.2VDC PROTECTION TYPE : Normally works within 105~150% rated output power for more than 3 seconds and then constant current protection with auto-recovery >150% rated power ,constant current limiting with auto-recovery



2	OVER VOLTAGE PROTECTION	CH: 57.6 V~ 67.2 V	I/P: 154 VDC I/P: 110 VDC I/P: 67.2 VDC O/P:MIN LOAD Ta:25°C	61.1V/154VDC 61.1V/ 110 VDC 61.1V/ 67.2 VDC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 154 VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Normally works within 105~150% rated output power for more than 3 seconds and then constant current protection with auto-recovery >150% rated power ,constant current limiting with auto-recovery
4	INPUT REVERSE	POWER OK	I/P:154 VDC 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	Q5 Rated : /400 V  Q6 Rated : -400 V	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	Q5 VDS: (1) 236V (2) 180V (3) 218V  Q6 VDS: (1) -234V (2) -178V (3) -222V
2	Diode Peak Voltage	Q101 Rated : 400V  Q100 Rated : 400V	I/P:High-Line +3V =157 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q100: VDS: (1) 213V (2) 109V (3) 77V  Q101: VDS: (1) 346V (2) 366V (3) 338V
3	Input Capacitor Voltage	C5 Rated: : 120 μ / 160 V	I/P:High-Line +3V =157 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)163V (2) 161V (3) 159V (4) 159V
4	Control IC Voltage Test	PWM IC U1 Rated -0.3V~16V	I/P:High-Line +3V =157 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) 14.1 V (2) 13.9V (3) 14.3 V (4) 14.1V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P:4KVDC/min I/P-FG:2 .5KVDC/min O/P-FG:2.5KVDC/min	I/P-O/P: 4.4KVDC/min I/P-FG: 3 KVDC/min O/P-FG:3KVDC/min Ta:25°C	I/P-O/P: 0 mA 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: 9999 MΩ O/P-FG:9999 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	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: 110 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: 110 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: 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
2	TEMPERATURE RISE TEST	MODEL : DDR-120D-48 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 110 VDC O/P : FULL LOAD Ta= 23.1 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 110 VDC O/P : FULL LOAD Ta= 50.8 °C		



				ROOM AMBIENT Ta= 23.1 °C	HIGH AMBIENT Ta= 50.8 °C
		NO	Position		
		1	LF1	47.2°C	77.6°C
		2	LF2	41.6°C	72.6°C
		3	LF100	45.9°C	75.2°C
		4	T1	62.3°C	91.8°C
		5	T2	48.6°C	78.2°C
		6	Q1	45.9°C	76.5°C
		7	Q2	46.6°C	76.9°C
		8	Q5	51.7°C	82.1°C
		9	Q6	45.7°C	76.4°C
		10	Q100	55.5°C	84.7°C
		11	Q101	58.6°C	87.7°C
		12	L100	71.6°C	101.6°C
		13	C1	48.3°C	78.6°C
		14	C5	44.6°C	75.4°C
		15	C6	42.9°C	72.6°C
		16	C7	45.3°C	75.4°C
		17	C8	53.8°C	83.5°C
		18	C101	50.4°C	79.7°C
		19	C102	43.3°C	71.9°C
		20	C104	50.1°C	79.5°C
		21	C106	55.4°C	85.5°C
		22	ZNR1	41.3°C	71.5°C
3	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )		I/P : 110 VDC O/P : 120 % LOAD Ta : 25°C	TEST : OK
4	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 86.4 VDC/ 154 VDC O/P : 100 % LOAD Ta= -45 °C	TEST : OK
5	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 55 °C NO DAMAGE		I/P : 157 VDC O/P : FULL LOAD Ta= 55 °C HUMIDITY= 95 %R.H	TEST : OK
6	TEMPERATURE COEFFICIENT	± 0.03 %(0~55°C)		I/P : 110 VDC O/P : FULL LOAD	± 0.009 %(0~55°C)
7	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
8.	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +60°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 : 110VDC/Full Load DC ON/OFF TEST turn on 3sec ; turn off 1sec@15cycle\ 110VDC/Full Load DC ON@1cycle			TEST : OK



9	VIBRATION TEST	<p>1 Carton &amp; 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
	Displacement	Acceleration													
2 (+3/-0) Hz up to 15Hz	±2.5mm	-----													
15Hz up to 50Hz	-----	2.3g													
Sweep rate	Max 1 Octave/minute														
10	CAPACITOR LIFE CYCLE	<p>SUPPOSE C102 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= 55 °C LIFE TIME            (3) I/P : 110VDC O/P : 75% LOAD Ta= 55 °C LIFE TIME            (4) I/P : 110VDC O/P : 50% LOAD Ta= 55 °C LIFE TIME</p>	<p>(1) 598693.2 HRS            (2) 70283.9 HRS            (3) 98741.2 HRS            (4) 127646.1 HRS</p>												
11	MTBF	<p>Conducted by Parts Stress Analysis Prediction            214.6K hrs min. MIL-HDBK-217F (25°C)</p>													
12	DMTBF/Accelerated Life Test	<p>Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 55°C</p>													

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031