



# Test Report: DDR-120B-24

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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

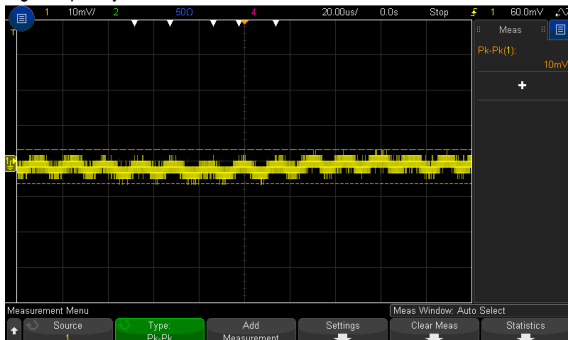
ENVIRONMENT TEST

## DESIGN VERIFY TEST

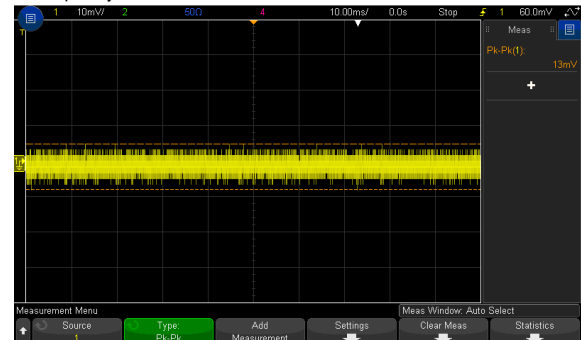
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1 %~1 %	I/P:16.8VDC /33.6VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.121%~ 0.125 %
2	LINE REGULATION (Max)	V1:-0.5 %~0.5 %	I/P: 16.8VDC / 33.6VDC O/P:FULL LOAD Ta:25°C	V1: -0.008 %~ 0.004%
3	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P:24VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.121%~ 0.125 %
4	OVER/UNDERSHOOT TEST	< <u>±</u> 5%	I/P: 24VDC O/P:FULL LOAD Ta:25°C	TEST: 2.1 %
5	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 24VDC O/P:FULL LOAD Ta:25°C	V1: 13 mVp-p

high frequency :



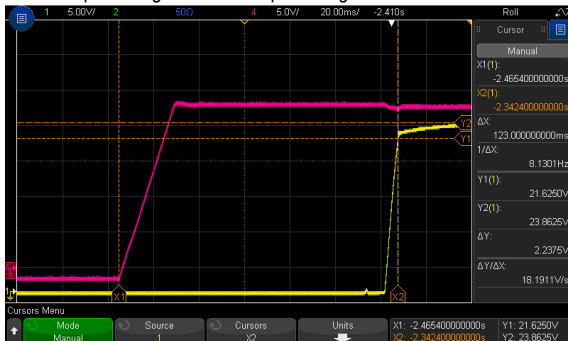
low frequency :



6	SET UP TIME (Max)	24VDC/ 500 ms	I/P: 24VDC O/P:FULL LOAD Ta:25°C	24VDC/ 123 ms
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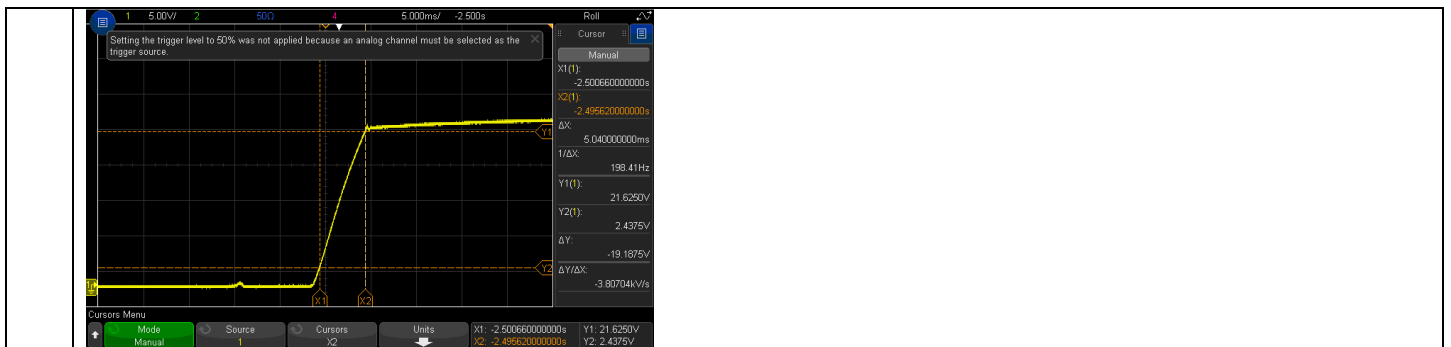
INPUT=24VDC @ FULL LOAD

CH1 : Output Voltage CH4 : DC Input Voltage



7	RISE TIME (Max)	24VDC/ 60 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25°C	24VDC/ 5.04 ms
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INPUT=24VDC @ FULL LOAD



8	HOLD UP TIME (TYP)	24VDC/ 6 ms @FULL LOAD	I/P: 24VDC O/P:F ULL LOAD Ta:25°C	24VDC/6.9 ms@full load
		24VDC/ 10 ms @70% LOAD		24VDC/ 10.3 ms @70%LOAD

INPUT=24VDC @ FULL LOAD

CH1 : Output Voltage CH4 :DC Input Voltage



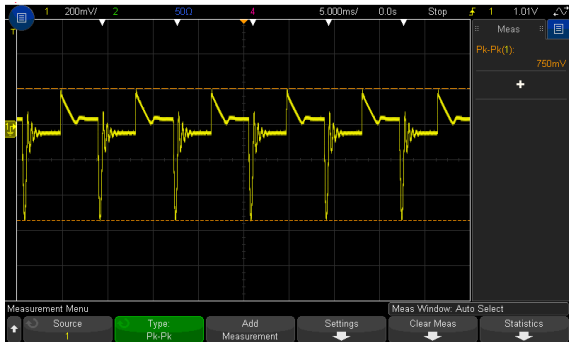
INPUT=24VDC @ 70% LOAD

CH1 : Output Voltage CH4 :DC Input Voltage



9	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 24VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C	750mVp-p
				1520mVp-p

FULL /MIN LOAD 50%DUTY / 120HZ



FULL /MIN LOAD 50%DUTY / 1KHZ



### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	16.8VDC~ 33.6VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	16.4V~ 33.6V
			I/P: LOW-LINE-0.2= 16.6 V HIGH-LINE+3V= 36.6V 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/5.6 A	I/P:24VDC O/P:FULL LOAD Ta:25°C	I = 5.544/ 24VDC																						
3	EFFICIENCY(TYP)	89.5 %	I/P: 24VDC O/P:FULL LOAD Ta:25°C	90.66%																						
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>EFFICIENCY (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>81</td></tr> <tr><td>20%</td><td>88</td></tr> <tr><td>30%</td><td>90</td></tr> <tr><td>40%</td><td>91</td></tr> <tr><td>50%</td><td>91</td></tr> <tr><td>60%</td><td>91</td></tr> <tr><td>70%</td><td>91</td></tr> <tr><td>80%</td><td>91</td></tr> <tr><td>90%</td><td>92</td></tr> <tr><td>100%</td><td>91</td></tr> </tbody> </table>					LOAD (%)	EFFICIENCY (%)	10%	81	20%	88	30%	90	40%	91	50%	91	60%	91	70%	91	80%	91	90%	92	100%	91
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4	INRUSH CURRENT(TYP)	24VDC/5 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25°C	I = 3.68 A/24 VDC																						
<p>INPUT=24VDC @ FULL LOAD</p>																										

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~135%RATED OUTPUT POWER	I/P: 33.6VDC I/P: 24VDC I/P: 16.8VDC O/P:TESTING Ta:25°C	125.21%/ 33.6VDC 126.75%/24VDC 127.91%/ 16.8VDC 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: 28.8V~ 33.6V	I/P: 33.6VDC I/P:24VDC I/P: 16.8VDC O/P:MIN LOAD Ta:25°C	31.5V/33.6VDC 31.5V/24 VDC 31.1V/ 16.8VDC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 33.6 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:33.6 VDC O/P: NO LOAD Ta:25°C	NO DAMAGE
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**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q5 Rated : 100 V  Q6 Rated : 100 V	I/P:High-Line +3V =36.6V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25°C	Q5 VDS: (1) 81.3V (2)54.7V (3) 70.8V  Q6 VDS: (1) 66 V (2) 45.9 V (3) 58 V
4	Diode Peak Voltage	Q100 Rated : 200V  Q101 Rated : 150V	I/P:High-Line +3V =36.6V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25°C	Q100: VDS: (1) 123.6 V (2) 36.2 V (3) 42.7 V  Q101 VDS (1)134.1 V (2) 133.3 V (3) 130 V
5	Input Capacitor Voltage	C5 Rated: : 1200 $\mu$ / 35 V	I/P:High-Line +3V =33.6 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) 34.5 V (2) 34.1 V (3) 34.5 V (4) 33.7 V
6	Control IC Voltage Test	PWM IC U1 Rated -0.3V~16V	I/P:High-Line +3V =36.6 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) 14.69 V (2) 14.37 V (3) 14.77 V (4) 14.53 V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P:4KVDC/min I/P-FG:2.5 KVDC/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>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 9999M $\Omega$ I/P-FG: 9999 M $\Omega$ O/P-FG:9999 M $\Omega$ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m $\Omega$	40A / 2min Ta:25°C	10m $\Omega$

**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: 24 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: 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 L-N : 1KV L,N-FG: 2KV	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-120B-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 24VDC O/P : FULL LOAD Ta= 24.0 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 24VDC O/P : FULL LOAD Ta= 51.2 °C																																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.0 °C</th> <th>HIGH AMBIENT Ta= 51.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C104</td><td>50.5°C</td><td>79.4°C</td></tr> <tr><td>2</td><td>C106</td><td>62.3°C</td><td>92.8°C</td></tr> <tr><td>3</td><td>ZNR1</td><td>51.7°C</td><td>82.9°C</td></tr> <tr><td>4</td><td>LF1</td><td>63.6°C</td><td>94.8°C</td></tr> <tr><td>5</td><td>LF2</td><td>64.1°C</td><td>96.1°C</td></tr> <tr><td>6</td><td>T1</td><td>67.7°C</td><td>96.9°C</td></tr> <tr><td>7</td><td>T2</td><td>63.9°C</td><td>94.0°C</td></tr> <tr><td>8</td><td>Q1</td><td>57.3°C</td><td>88.8°C</td></tr> <tr><td>9</td><td>Q2</td><td>57.5°C</td><td>89.0°C</td></tr> <tr><td>10</td><td>Q5</td><td>62.1°C</td><td>91.7°C</td></tr> <tr><td>11</td><td>Q6</td><td>65.9°C</td><td>96.2°C</td></tr> <tr><td>12</td><td>Q100</td><td>65.4°C</td><td>94.1°C</td></tr> <tr><td>13</td><td>Q101</td><td>67.5°C</td><td>95.8°C</td></tr> <tr><td>14</td><td>L100</td><td>79.5°C</td><td>108.8°C</td></tr> <tr><td>15</td><td>C1</td><td>58.2°C</td><td>88.7°C</td></tr> <tr><td>16</td><td>C5</td><td>58.0°C</td><td>89.4°C</td></tr> <tr><td>17</td><td>C6</td><td>50.7°C</td><td>81.1°C</td></tr> <tr><td>18</td><td>C7</td><td>55.1°C</td><td>85.1°C</td></tr> <tr><td>19</td><td>C8</td><td>67.3°C</td><td>96.6°C</td></tr> <tr><td>20</td><td>C101</td><td>58.1°C</td><td>86.8°C</td></tr> <tr><td>21</td><td>C102</td><td>58.3°C</td><td>87.3°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 24.0 °C	HIGH AMBIENT Ta= 51.2 °C	1	C104	50.5°C	79.4°C	2	C106	62.3°C	92.8°C	3	ZNR1	51.7°C	82.9°C	4	LF1	63.6°C	94.8°C	5	LF2	64.1°C	96.1°C	6	T1	67.7°C	96.9°C	7	T2	63.9°C	94.0°C	8	Q1	57.3°C	88.8°C	9	Q2	57.5°C	89.0°C	10	Q5	62.1°C	91.7°C	11	Q6	65.9°C	96.2°C	12	Q100	65.4°C	94.1°C	13	Q101	67.5°C	95.8°C	14	L100	79.5°C	108.8°C	15	C1	58.2°C	88.7°C	16	C5	58.0°C	89.4°C	17	C6	50.7°C	81.1°C	18	C7	55.1°C	85.1°C	19	C8	67.3°C	96.6°C	20	C101	58.1°C	86.8°C	21	C102	58.3°C	87.3°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 24 VDC O/P : 120 % LOAD Ta : 25°C	TEST : OK																																																																																								



# 120W DC-DC DIN Rail Power Supply

# DDR-120B series

3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 16.8 VDC/ 33.6 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 55 °C NO DAMAGE	I/P : 36.6 VDC O/P : FULL LOAD Ta= 55 °C HUMIDITY= 95 %R.H	TEST : OK												
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~55°C)	I/P : 24 VDC O/P : FULL LOAD	± 0.0046 %(0~55°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~ +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 : 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 : 5G (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 C102 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= 55 °C LIFE TIME (3) I/P : 24VDC O/P : 75% LOAD Ta= 55 °C LIFE TIME (4) I/P : 24VDC O/P : 50% LOAD Ta= 55 °C LIFE TIME		(1) 189691.3 HRS (2) 29631.8 HRS (3) 70144.5 HRS (4) 117739.2 HRS												
10	MTBF	Conducted by Parts Stress Analysis Prediction 1769.5K hrs min. Telcordia SR-332 (Bellcore) ; 214.5K hrs min. MIL-HDBK-217F (25°C)														
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 55°C														

TEST RESULT	TESTER	REVIEW	APPROVAL
<b>PASS</b>	<b>LIUTT</b>		<b>WANGDZ</b>

**12.10.30 A50-F031**