



Test Report: DDR-120A-12

120W 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

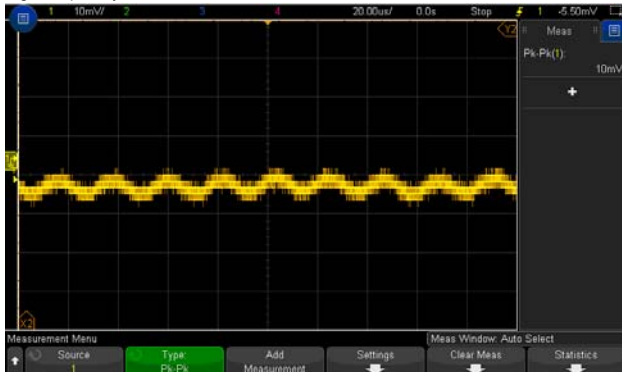
ENVIRONMENT TEST

DESIGN VERIFY TEST

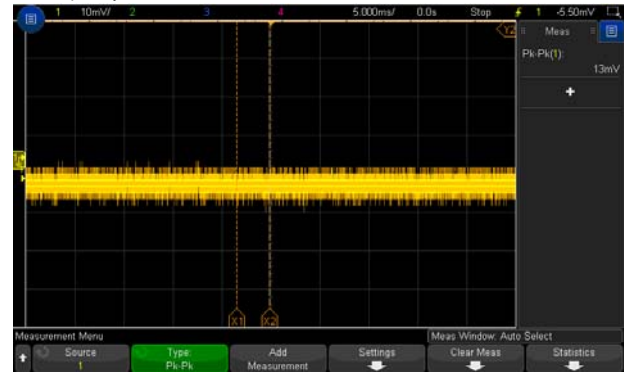
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:9 V~14 V	I/P : 12 VDC O/P : MIN LOAD Ta : 25°C	8.83V~14.28V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1 %~1 %	I/P:9VDC /18VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.30 %~0.29%
3	LINE REGULATION (Max)	V1: -0.5 %~0.5 %	I/P: 9VDC / 18 VDC O/P:FULL LOAD Ta:25°C	V1: -0.008%~0.016 %
4	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P:12VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.30 %~ 0.29%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 12VDC O/P:FULL LOAD Ta:25°C	TEST: 4.2 %
6	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 12VDC O/P:FULL LOAD Ta:25°C	V1: 13 mVp-p

high frequency :



low frequency :

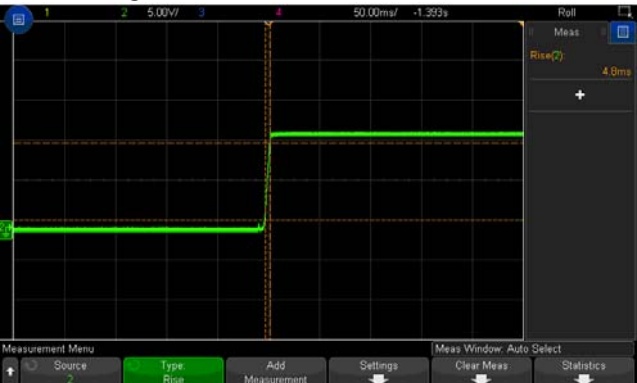
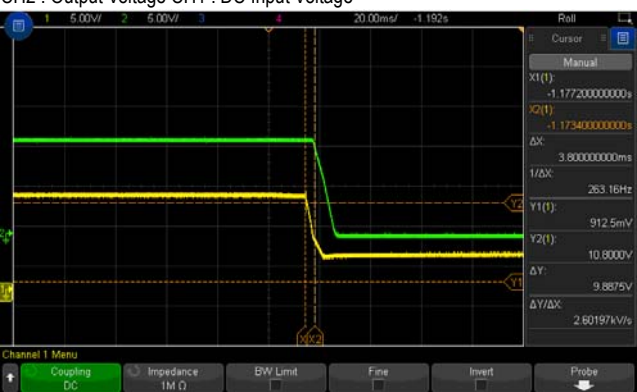

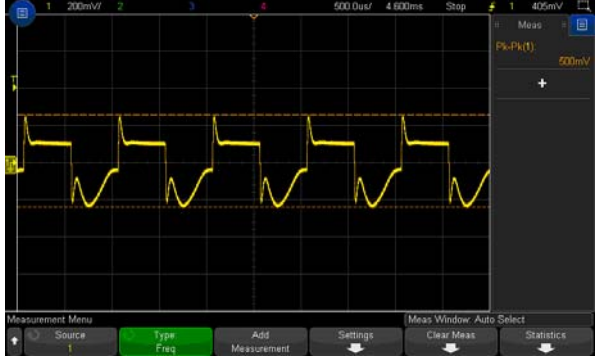


7	SET UP TIME (Max)	12VDC/ 500 ms	I/P: 12VDC O/P:FULL LOAD Ta:25°C	12VDC/ 82.0 ms
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INPUT=12VDC @ FULL LOAD



8	RISE TIME (Max)	12VDC/ 60 ms	I/P: 12 VDC O/P:FULL LOAD Ta:25°C	12VDC/ 4.8 ms
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	<p>INPUT=12VDC @ FULL LOAD</p> 			
9	HOLD UP TIME (TYP)	12VDC / 3 ms	I/P: 12VDC O/P: FULL LOAD Ta:25°C	12VDC / 3.8ms
	<p>INPUT=12VDC @ FULL LOAD CH2 : Output Voltage CH1 : DC Input Voltage</p> 			
10	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 12VDC O/P: (1) FULL / MIN LOAD 50%DUTY / 120HZ (2) FULL / MIN LOAD 50%DUTY / 1KHZ Ta:25°C	610 mVp-p 500 mVp-p
	<p>FULL /50% LOAD 50%DUTY / 120HZ</p> 		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p> 	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	9VDC~ 18VDC	I/P: TESTING O/P: FULL LOAD Ta:25°C	8.4V~18V

			I/P: LOW-LINE-0.2=8.8 V HIGH-LINE+3V= 21V 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)	12VDC/ 11.2 A	I/P:12VDC O/P:FULL LOAD Ta:25°C	I = 9.24A/ 12VDC																						
3	EFFICIENCY(TYP)	88.5 %	I/P:12VDC O/P:FULL LOAD Ta:25°C	89.85%																						
EFFICIENCY vs LOAD <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>86.5</td></tr> <tr><td>20%</td><td>91.0</td></tr> <tr><td>30%</td><td>91.0</td></tr> <tr><td>40%</td><td>90.5</td></tr> <tr><td>50%</td><td>90.5</td></tr> <tr><td>60%</td><td>89.5</td></tr> <tr><td>70%</td><td>89.5</td></tr> <tr><td>80%</td><td>89.0</td></tr> <tr><td>90%</td><td>88.5</td></tr> <tr><td>100%</td><td>90.0</td></tr> </tbody> </table>					LOAD (%)	EFFICIENCY (%)	10%	86.5	20%	91.0	30%	91.0	40%	90.5	50%	90.5	60%	89.5	70%	89.5	80%	89.0	90%	88.5	100%	90.0
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60%	89.5																									
70%	89.5																									
80%	89.0																									
90%	88.5																									
100%	90.0																									
4	INRUSH CURRENT(TYP)	12VDC/ 5 A COLD START	I/P: 12VDC O/P:FULL LOAD Ta:25°C	I =3.68 A/12 VDC																						
INPUT=12VDC @ FULL LOAD 																										

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~135%RATED OUTPUT POWER	I/P: 18VDC I/P: 12VDC I/P: 9VDC O/P:TESTING Ta:25°C	128.9%/ 18VDC 128.9%/12VDC 129.2%/ 9VDC 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: 14.4V~ 16.8 V	I/P: 18VDC I/P: 12VDC I/P: 9VDC O/P:MIN LOAD Ta:25°C	15.7V/18VDC 15.7V/12 VDC 15.5V/ 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: 18VDC 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:18VDC 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 5 Rated: 60 V Q 6 Rated: -100V	I/P:High-Line +3V =21V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q5 VDS: (1)40.6 V (2) 41.8V (3) 37.0V Q6 VDS: (1)- 34.2V (2) -25.8V (3) -28.6V
2	Diode Peak Voltage	Q100 Rated: 150V Q101 Rated: 100V	I/P:High-Line +3V =21 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q100 VDS: (1)64.0V (2) 41.2V (3) 43.2 V Q101 VDS (1) 71.2V (2) 85.7V (3) 68.8V
3	Input Capacitor Voltage	C5 Rated: 1500 μ / 35 V	I/P:High-Line +3V =21V 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)23.1V (2)23.1 V (3) 21.5V (4) 20.7V
4	Control IC Voltage Test	PWM IC U1 Rated: -0.3V~16V U102 Rated :27V	I/P:High-Line +3V =21V DC ON/OFF O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C	U1 (1) 14.4V (2) 14.2V (3) 14.6V (4) 14.4V U102 (1) 13.0V (2) 12.4V (3) 13.6V (4) 15.8V

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: 12VDC 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: 12VDC 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:12VDC 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: 12VDC 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: 12VDC 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-120A-12 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 12VDC O/P : FULL LOAD Ta=24.0 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 12VDC O/P : FULL LOAD Ta=56.1 °C		



		NO	Position	ROOM AMBIENT Ta=24.0°C	HIGH AMBIENT Ta=56.1°C
		1	LF1	84.1°C	107.3°C
		2	LF2	71.0°C	102.6°C
		3	LF100	66.5°C	99.3°C
		4	T1	76.0°C	110.6°C
		5	T2	77.2°C	111.2°C
		6	Q1	75.4°C	91.1°C
		7	Q5	71.6°C	90.6°C
		8	Q100	64.4°C	93.8°C
		9	Q101	62.6°C	92.8°C
		10	L100	78.1°C	96.5°C
		11	C1	72.3°C	96.5°C
		12	C5	67.6°C	93.0°C
		13	C6	67.6°C	92.2°C
		14	C7	71.2°C	93.4°C
		15	C8	72.6°C	97.0°C
		16	C101	68.0°C	93.9°C
		17	C102	69.2°C	94.7°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)		I/P : 12 VDC O/P : 116 % LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 10.8 VDC/ 18 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 : 21VDC O/P : FULL LOAD Ta= 55 °C HUMIDITY= 95 %R.H	TEST: OK
5	TEMPERATURE COEFFICIENT	± 0.03 % (0~55°C)		I/P : 12 VDC O/P : FULL LOAD	± 0.0061% (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 : 12VDC/Full Load DC ON/OFF TEST turn on 3sec ; turn off 1sec@15cycle\ 12VDC/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			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 C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 12VDC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 12VDC O/P : FULL LOAD Ta= 55°C LIFE TIME (3) I/P : 12VDC O/P : 75% LOAD Ta= 55°C LIFE TIME (4) I/P : 12VDC O/P : 50% LOAD Ta= 55°C LIFE TIME	(1) 112716 HRS (2) 22220 HRS (3) 42748.3 HRS (4) 100850.1 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 214.6K 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
PASS	LIUTT		WANGDZ

12.10.30 A50-F031