Test Report: DDR-120B-12

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

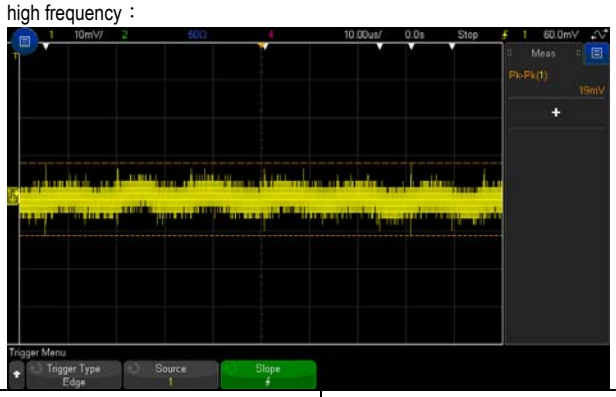
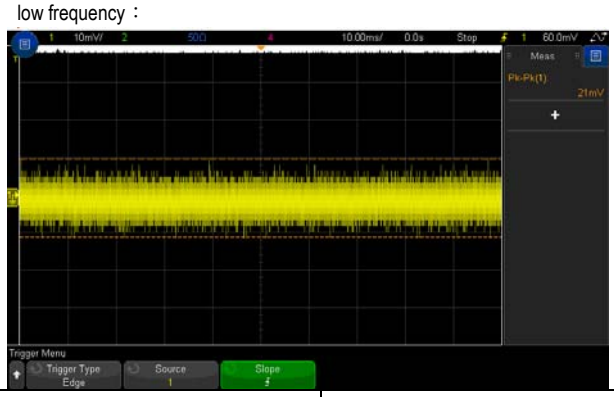
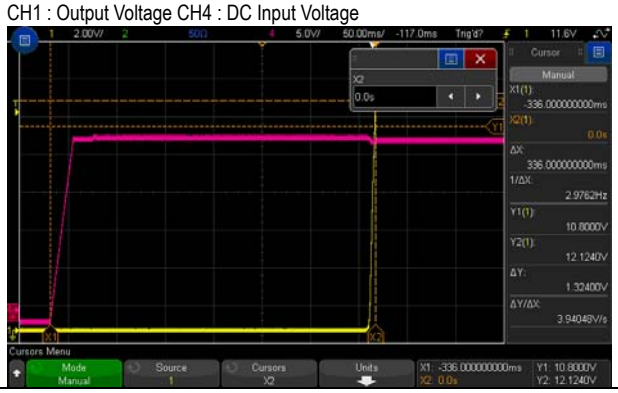
Safety Test
E.M.C. Test

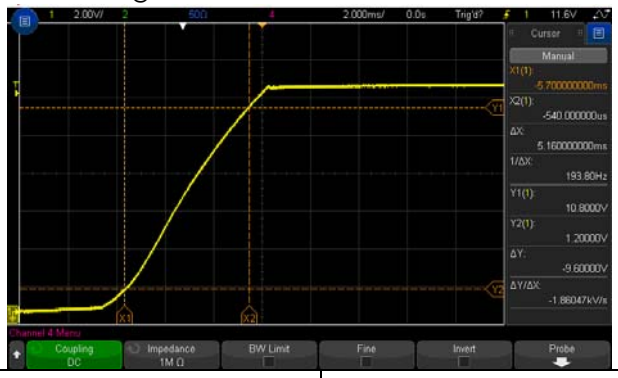
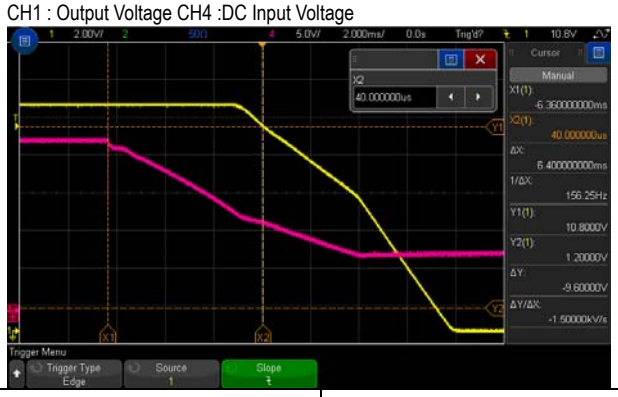
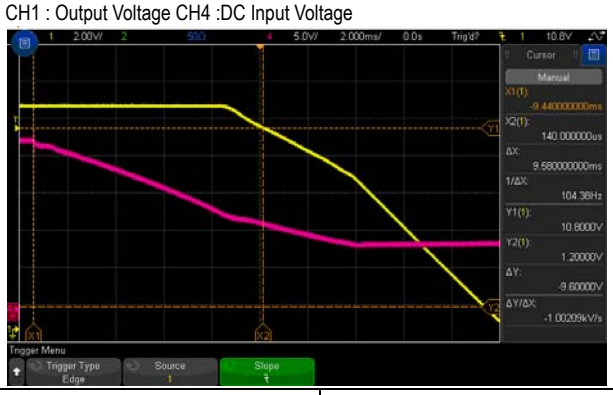
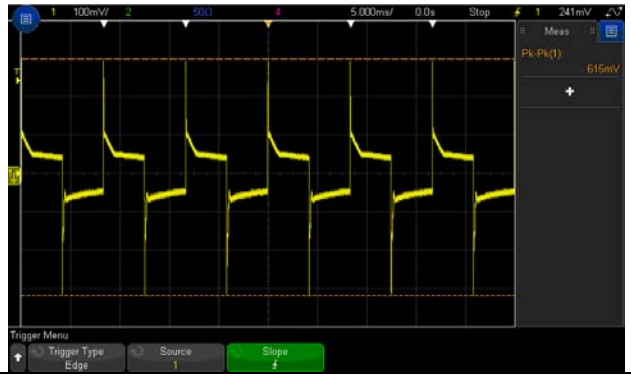
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

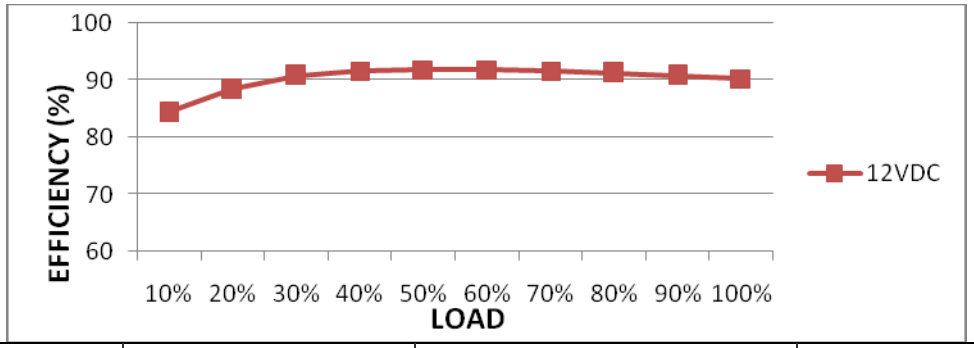
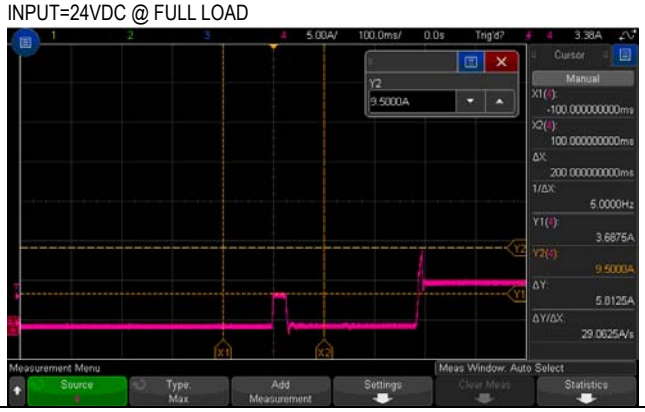
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:9 V~14 V	I/P： 24 VDC O/P：MIN LOAD Ta：25℃	8.84V~14.22V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1 %~1 %	I/P:16.8VDC /33.6VDC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.357 %~ 0.365 %
3	LINE REGULATION (Max)	V1: -0.5 %~0.5 %	I/P: 16.8VDC / 33.6VDC O/P:FULL LOAD Ta:25℃	V1: -0.017 %~ 0.008%
4	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P:24VDC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.357 %~ 0.365 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 24VDC O/P:FULL LOAD Ta:25℃	TEST: 1.01 %
6	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 24VDC O/P:FULL LOAD Ta:25℃	V1: 21 mVp-p
	high frequency：  low frequency： 			
7	SET UP TIME (Max)	24VDC/ 500 ms	I/P: 24VDC O/P:FULL LOAD Ta:25℃	24VDC/ 336 ms
	INPUT=24VDC @ FULL LOAD CH1 : Output Voltage CH4 : DC Input Voltage 			

8	RISE TIME (Max)	24VDC/ 60 ms	I/P: 24 VDC O/P:FULL LOAD Ta:25℃	24VDC/ 5.16 ms
	INPUT=24VDC @ FULL LOAD 			
9	HOLD UP TIME (TYP)	24VDC/ 6 ms @FULL LOAD 24VDC/ 10 ms @70% LOAD	I/P: 24VDC O/P:F ULL LOAD Ta:25℃	24VDC/6.4 ms@FULL LOAD 24VDC/ 9.58 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 	
10	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 24VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25℃	615mVp-p 575mVp-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℃	15.89V~ 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℃	I = 5.525 A/ 24VDC
3	EFFICIENCY(TYP)	89 %	I/P: 24VDC O/P:FULL LOAD Ta:25℃	90.31%
	EFFICIENCY vs LOAD 			
4	INRUSH CURRENT(TYP)	24VDC/ 5 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25℃	I = 3.68 A/24 VDC
	INPUT=24VDC @ FULL LOAD 			

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℃	127.37%/ 33.6VDC 128.31/24VDC 129%/ 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: 14.4V~ 16.8 V	I/P: 33.6VDC I/P:24VDC I/P: 16.8VDC O/P:MIN LOAD Ta:25℃	15.88V/33.6VDC 15.88V/24 VDC 15.8V/ 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℃	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℃	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 : 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℃	Q5 VDS: (1) 83.7V (2) 66.8V (3) 77.2V Q6 VDS: (1)62.7 V (2) 52.3V (3) 61.5V
4	Diode Peak Voltage	Q100 Rated : 120V Q101 Rated : 100V	I/P:High-Line +3V =36.6V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load continue Ta:25℃	Q100: VDS: (1) 53.5V (2) 27.8V (3) 31V Q101 VDS: (1) 78..8V (2) 86.9V (3) 76.4V
5	Input Capacitor Voltage	C5 Rated: :1200 μ / 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℃	C5: (1) 34.5V (2) 34.5V (3) 34.3V (4) 33.9V
6	Control IC Voltage Test	PWM IC U1 Rated -0.3V~16V U102 Rated :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℃	U1: (1) 14.67 V (2) 14.67V (3) 14.91 V (4) 14.75V U102: (1) 11.7V (2) 10.17V (3) 11.78V (4) 15.32V

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℃	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℃	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℃	10mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	☑EN55032 ☐EN55011 ☐CLASS A ☑CLASS B	I/P: VDC O/P:FULL LOAD Ta:25℃	☑PASS ☐FAIL Test by certified Lab
2	CONDUCTION	☑EN55032 ☐EN55011 ☐CLASS A ☑CLASS B	I/P: VDC O/P:FULL LOAD Ta:25℃	☑PASS ☐FAIL Test by certified Lab
3	E.S.D	EN61000-4-2 □Din rail Model : AIR：8KV / Contact：6KV	I/P: 24 VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
4	E.F.T	EN61000-4-4 ☐INDUSTRY INPUT: 2KV	I/P: 24VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
5	SURGE	IEC61000-4-5 ☐INDUSTRY L-N :1KV L,N-FG:2KV	I/P: 24 VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐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 ℃ 2. HIGH AMBIENT BURN-IN：1 HRS I/P： 24VDC O/P： FULL LOAD Ta= 51.2 ℃		

			NO	Position	ROOM AMBIENT Ta= 24.0 ℃ / HIGH AMBIENT Ta= 51.2 ℃
			1	C104	50.5℃ / 79.4℃
			2	C106	62.3℃ / 92.8℃
			3	ZNR1	51.7℃ / 82.9℃
			4	LF1	63.6℃ / 94.8℃
			5	LF2	64.1℃ / 96.1℃
			6	T1	67.7℃ / 96.9℃
			7	T2	63.9℃ / 94.0℃
			8	Q1	57.3℃ / 88.8℃
			9	Q2	57.5℃ / 89.0℃
			10	Q5	62.1℃ / 91.7℃
			11	Q6	65.9℃ / 96.2℃
			12	Q100	65.4℃ / 94.1℃
			13	Q101	67.5℃ / 95.8℃
			14	L100	79.5℃ / 108.8℃
			15	C1	58.2℃ / 88.7℃
			16	C5	58.0℃ / 89.4℃
			17	C6	50.7℃ / 81.1℃
			18	C7	55.1℃ / 85.1℃
			19	C8	67.3℃ / 96.6℃
			20	C101	58.1℃ / 86.8℃
			21	C102	58.3℃ / 87.3℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P：24 VDC O/P：120 % LOAD Ta：25℃	TEST：OK	
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 ℃	TEST：OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 55 ℃ NO DAMAGE	I/P：36.6 VDC O/P：FULL LOAD Ta= 55 ℃ HUMIDITY= 95 %R.H	TEST：OK	
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~55℃)	I/P：24 VDC O/P：FULL LOAD	± 0.0046 %(0~55℃)	
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℃~ +60℃ 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：24VDC/Full Load DC ON/OFF TEST turn on 3sec；turn off 1sec@15cycle\ 24VDC/Full Load DC ON@1cycle		TEST：OK	

<table>
<tr><td>8</td><td>VIBRATION TEST</td><td>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℃
2 Din Rail
<table><tr><td></td><td>Displacement</td><td>Acceleration</td></tr><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></table></td><td>TEST：OK</td></tr>
<tr><td>9</td><td>CAPACITOR
LIFE CYCLE</td><td>SUPPOSE C102 IS THE MOST CRITICAL COMPONENT
(1) I/P： 24VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME
(2) I/P： 24VDC O/P：FULL LOAD Ta= 55 ℃ LIFE TIME
(3) I/P： 24VDC O/P：75% LOAD Ta= 55 ℃ LIFE TIME
(4) I/P： 24VDC O/P：50% LOAD Ta= 55 ℃ LIFE TIME</td><td>(1) 189691.3 HRS
(2) 29631.8 HRS
(3) 70144.5 HRS
(4) 117739.2 HRS</td></tr>
<tr><td>10</td><td>MTBF</td><td colspan="2">Conducted by Parts Stress Analysis Prediction
214.6K hrs min. MIL-HDBK-217F (25℃)</td></tr>
<tr><td>11</td><td>DMTBF/Accelerated Life Test</td><td colspan="2">Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 55℃</td></tr>
</table>

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031