Test Report: DDR-120D-24

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

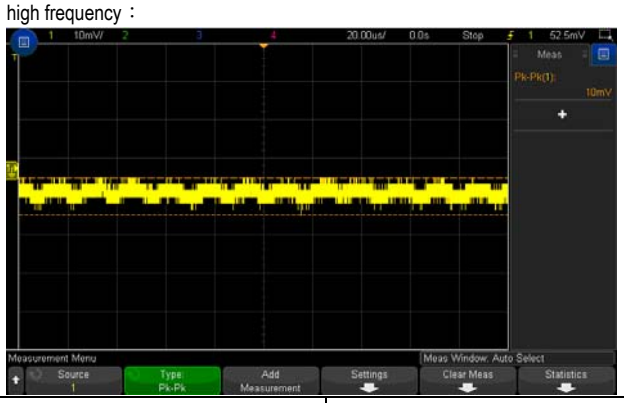
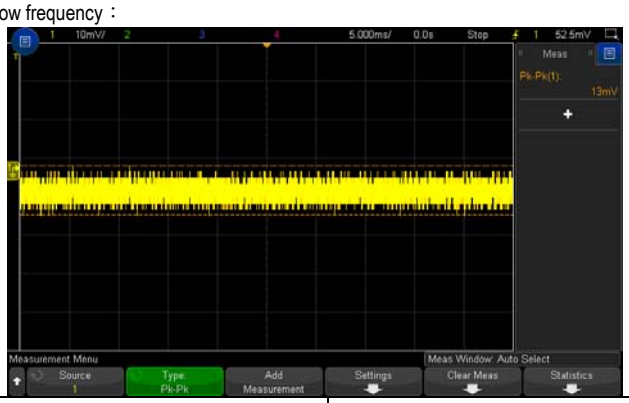
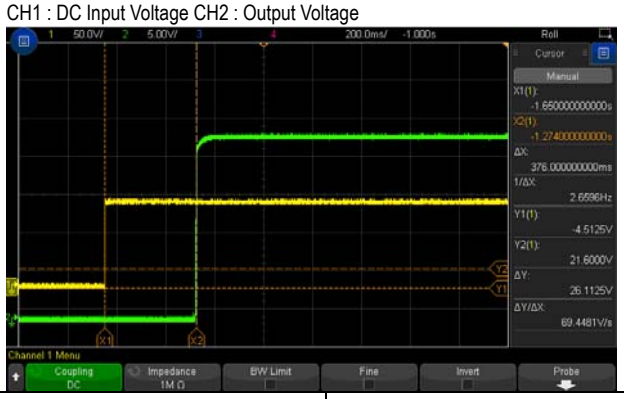
Safety Test
E.M.C. Test

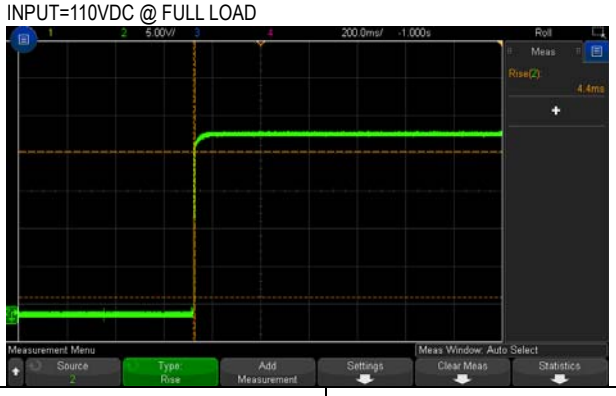
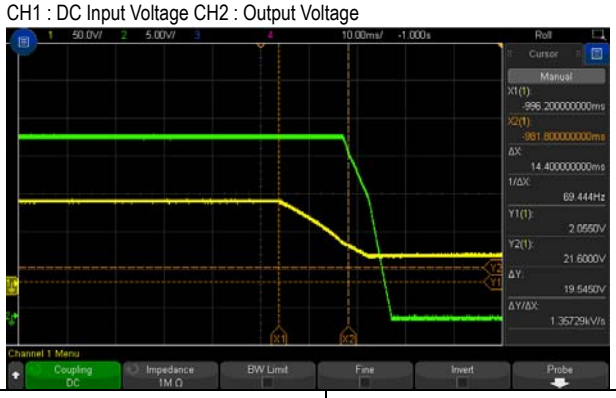
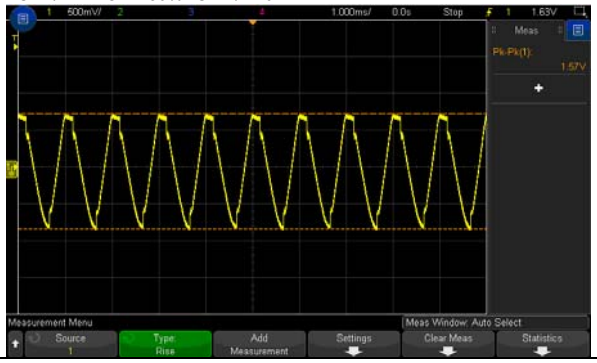
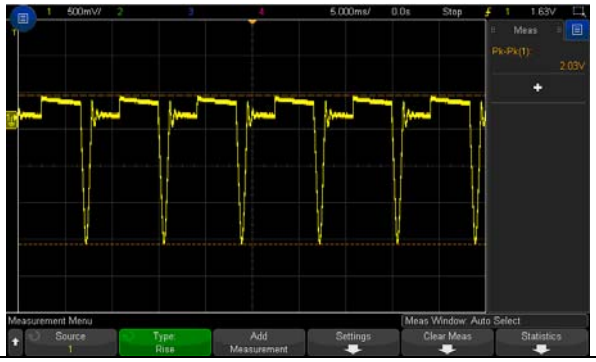
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

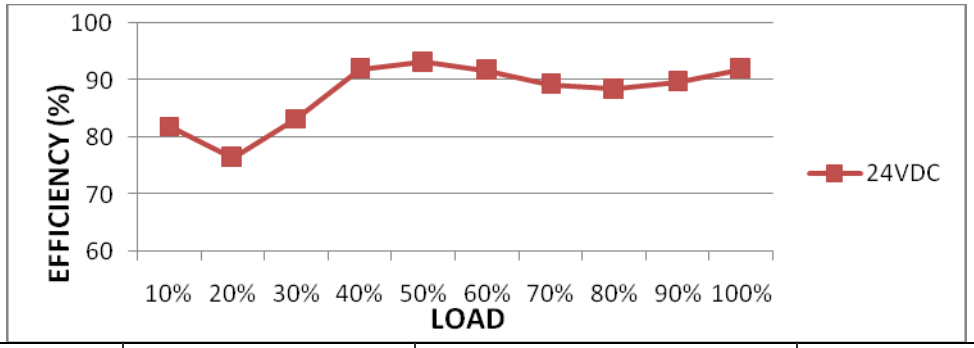
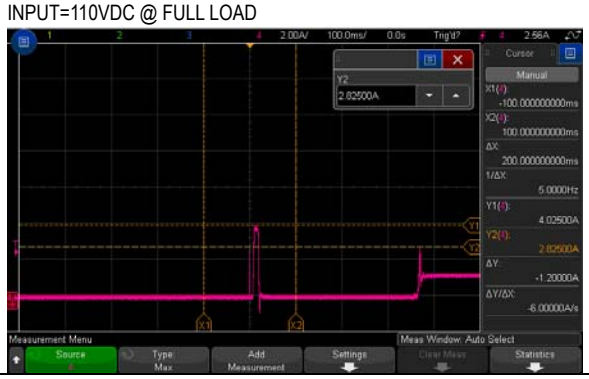
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1 %~1 %	I/P:86.4VDC /154VDC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.13 %~ 0.19 %
2	LINE REGULATION (Max)	V1: -0.5 %~0.5 %	I/P: 86.4VDC / 154 VDC O/P:FULL LOAD Ta:25℃	V1: -0.06 %~0.03 %
3	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P: 110VDC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.13 %~ 0.19 %
4	OVER/UNDERSHOOT TEST	< ±5%	I/P: 110 VDC O/P:FULL LOAD Ta:25℃	TEST: 2.1%
5	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 110 VDC O/P:FULL LOAD Ta:25℃	V1: 13 mVp-p
	high frequency： 		low frequency： 	
6	SET UP TIME (Max)	110VDC/ 500 ms	I/P: 110VDC O/P:FULL LOAD Ta:25℃	110VDC/376 ms
	INPUT=110VDC @ FULL LOAD CH1 : DC Input Voltage CH2 : Output Voltage 			
7	RISE TIME (Max)	110VDC/ 60 ms	I/P: 110 VDC O/P:FULL LOAD Ta:25℃	110VDC/4.4 ms

	INPUT=110VDC @ FULL LOAD 			
8	HOLD UP TIME (TYP)	110VDC/ 10 ms	I/P: 110 VDC O/P:F ULL LOAD Ta:25℃	110VDC/14.4ms
	INPUT=110VDC @ FULL LOAD CH1 : DC Input Voltage CH2 : Output Voltage 			
9	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 110VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25℃	 1570mVp-p 2030mVp-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	67.2 VDC~ 154 VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	62.8V~ 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) OK (2) OK (3) OK
2	INPUT CURRENT(TYP)	110VDC/ 1.3 A	I/P: 110VDC O/P:FULL LOAD Ta:25℃	I =1.18A/110VDC
3	EFFICIENCY(TYP)	91 %	I/P: 110VDC O/P:FULL LOAD Ta:25℃	91.96%
	EFFICIENCY vs LOAD 			
4	INRUSH CURRENT(TYP)	110VDC/ 20 A COLD START	I/P: 110VDC O/P:FULL LOAD Ta:25℃	I =4.02 A/110 VDC
	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℃	125.9%/ 154VDC 125.9%/110VDC 126.2%/ 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: 28.8 V~ 32.4 V	I/P: 154 VDC I/P: 110 VDC I/P: 67.2 VDC O/P:MIN LOAD Ta:25℃	30.7V/154VDC 30.7V/ 110 VDC 30.9V/ 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℃	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
3	INPUT REVERSE	POWER OK	I/P:154 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	Q 5 Rated : 26 A/ 400 V Q 6 Rated : -2A/ -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℃	Q5 Q6 VDS: VDS: (1) 246V (1) -276V (2) 178V (2)- 176V (3) 224V (3) -214V
2	Diode Peak Voltage	Q100 Rated :200V Q101 Rated : 150V	I/P:High-Line +3V =157 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	Q100: (1) 101V (2) 17.6V (3) 40.1V Q101: (1) 139V (2) 141V (3) 131V
3	Input Capacitor Voltage	C5 Rated: : 120μ / 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℃	C5: (1)162V (2) 160V (3) 158V (4)158 V
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℃	U1: (1) 14.2V (2) 14.2V (3) 14.4V (4) 14.2V

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℃	I/P-O/P: 1.2 μ A 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: 110 VDC O/P:FULL LOAD Ta:25℃	☑PASS ☐FAIL Test by certified Lab
2	CONDUCTION	☑EN55032 ☐EN55011 ☐CLASS A ☐CLASS B	I/P: 110 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: 110 VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
4	E.F.T	EN61000-4-4 ☐INDUSTRY INPUT: 2KV	I/P: 110 VDC 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: 110VDC 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-120D-48 1. ROOM AMBIENT BURN-IN：1 HRS I/P： 110VDC O/P： FULL LOAD Ta= 23.1 ℃ 2. HIGH AMBIENT BURN-IN：1 HRS I/P： 110VDC O/P： FULL LOAD Ta= 50.8 ℃		

			NO	Position	ROOM AMBIENT Ta= 23.1 ℃ / HIGH AMBIENT Ta= 50.8 ℃
			1	LF1	47.2℃ / 77.6℃
			2	LF2	41.6℃ / 72.6℃
			3	LF100	45.9℃ / 75.2℃
			4	T1	62.3℃ / 91.8℃
			5	T2	48.6℃ / 78.2℃
			6	Q1	45.9℃ / 76.5℃
			7	Q2	46.6℃ / 76.9℃
			8	Q5	51.7℃ / 82.1℃
			9	Q6	45.7℃ / 76.4℃
			10	Q100	55.5℃ / 84.7℃
			11	Q101	58.6℃ / 87.7℃
			12	L100	71.6℃ / 101.6℃
			13	C1	48.3℃ / 78.6℃
			14	C5	44.6℃ / 75.4℃
			15	C6	42.9℃ / 72.6℃
			16	C7	45.3℃ / 75.4℃
			17	C8	53.8℃ / 83.5℃
			18	C101	50.4℃ / 79.7℃
			19	C102	43.3℃ / 71.9℃
			20	C104	50.1℃ / 79.5℃
			21	C106	55.4℃ / 85.5℃
			22	ZNR1	41.3℃ / 71.5℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P：110 VDC O/P：120 % LOAD Ta：25℃	TEST：OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P：86.4 VDC/ 154 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：157 VDC O/P：FULL LOAD Ta= 55 ℃ HUMIDITY= 95 %R.H	TEST：OK	
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~55℃)	I/P：110 VDC O/P：FULL LOAD	± 0.009 %(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：110VDC/Full Load DC ON/OFF TEST turn on 3sec；turn off 1sec@15cycle\ 110VDC/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： 110VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME
(2) I/P： 110VDC O/P：FULL LOAD Ta= 60 ℃ LIFE TIME
(3) I/P： 110VDC O/P：75% LOAD Ta= 60 ℃ LIFE TIME
(4) I/P： 110VDC O/P：50% LOAD Ta= 60 ℃ LIFE TIME</td><td>(1) 598693.2 HRS
(2) 70283.9 HRS
(3) 98741.2 HRS
(4) 127646.1 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