Test Report: DDR-120C-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

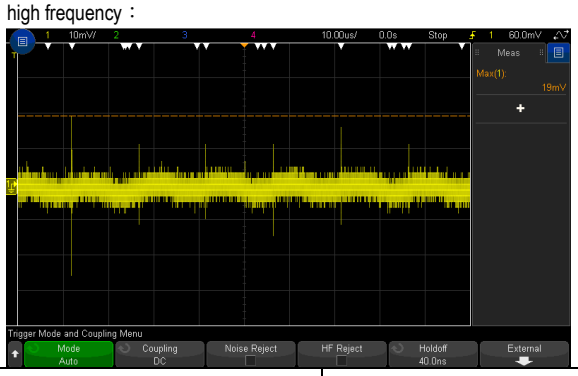
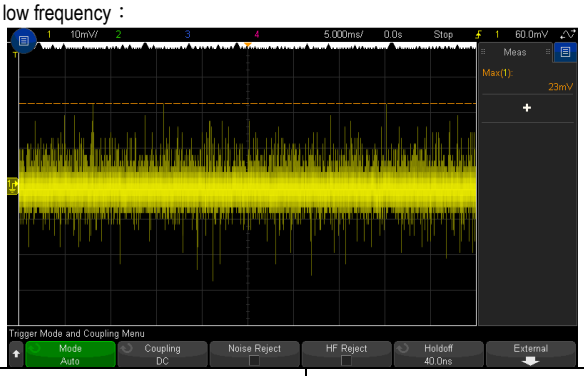
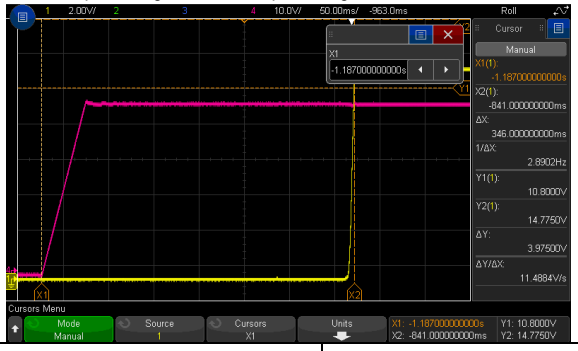
Safety Test
E.M.C. Test

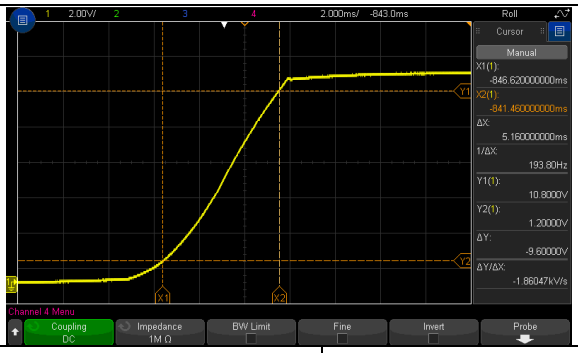
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

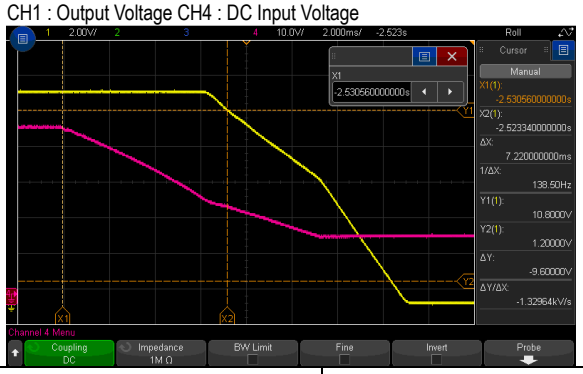
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1 %~1 %	I/P:33.6VDC /67.2VDC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.38%~ 0.39%
2	LINE REGULATION (Max)	V1: -0.5 %~0.5 %	I/P: 33.6VDC / 67.2 VDC O/P:FULL LOAD Ta:25℃	V1: -0.05%~0.025%
3	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P:48VDC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.38%~ 0.39%
4	OVER/UNDERSHOOT TEST	＜±5%	I/P: 48VDC O/P:FULL LOAD Ta:25℃	TEST: 1.01%
5	RIPPLE & NOISE (Max)	V1: 50mVp-p	I/P: 48VDC O/P:FULL LOAD Ta:25℃	V1: 23 mVp-p
	high frequency：  low frequency： 			
6	SET UP TIME (Max)	48VDC/ 500 ms	I/P: 48VDC O/P:FULL LOAD Ta:25℃	48VDC/ 346 ms
	INPUT=48VDC @ FULL LOAD CH1 : Output Voltage CH4 : DC Input Voltage 			
7	RISE TIME (Max)	48VDC/ 60 ms	I/P: 48 VDC O/P:FULL LOAD Ta:25℃	48VDC/ 5.16 ms
	INPUT=48VDC @ FULL LOAD			



8	HOLD UP TIME (TYP)	48VDC/ 6 ms @FULL LOAD 48VDC/ 10ms@60%LOAD	I/P: 48VDC O/P:F ULL LOAD Ta:25℃	48VDC/ 7.22ms@FULL LOAD 48VDC/ 10.6ms@60%LOAD

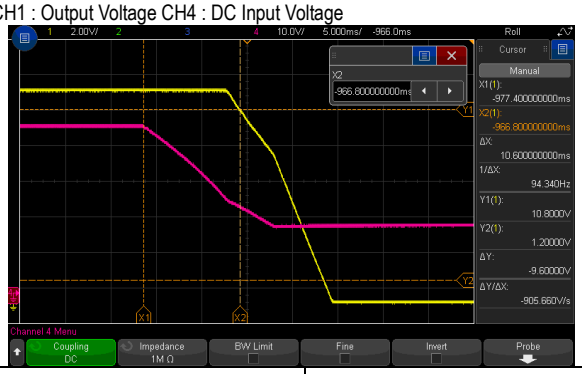
INPUT=48VDC @ FULL LOAD

CH1 : Output Voltage CH4 : DC Input Voltage



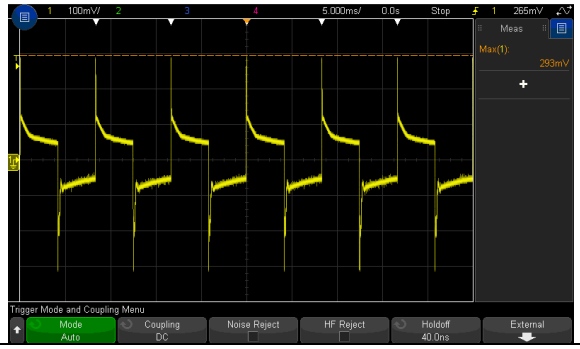
INPUT=48VDC @ 60% LOAD

CH1 : Output Voltage CH4 : DC Input Voltage

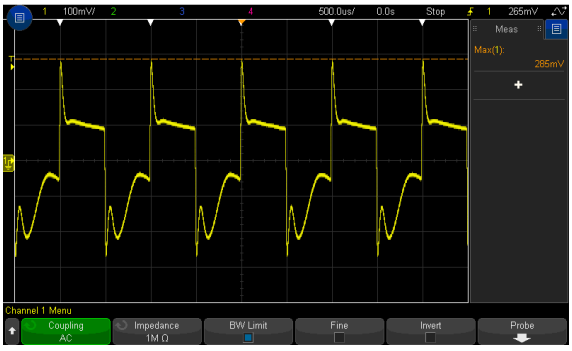


9	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 48VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25℃	 293mVp-p 285mVp-p

FULL /MIN LOAD 50%DUTY / 120HZ

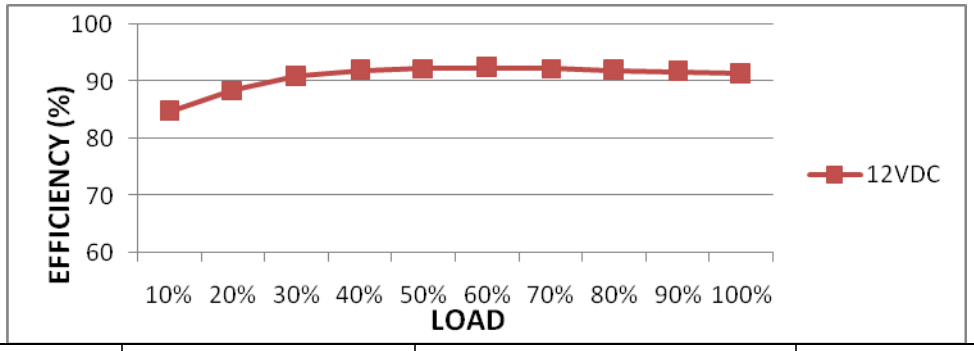
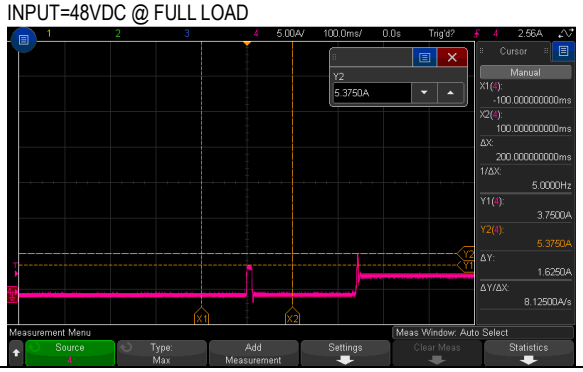


FULL /MIN LOAD 50%DUTY / 1KHZ



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	33.6VDC~ 67.2VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	28.705V~67.2 V
			I/P: LOW-LINE-0.2= 33.4 V HIGH-LINE+3V= 70.2 V 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)	48VDC/ 2.8 A	I/P: 48VDC O/P:FULL LOAD Ta:25℃	I = 2.702A/ 48VDC
3	EFFICIENCY(TYP)	89.5 %	I/P: 48VDC O/P:FULL LOAD Ta:25℃	91.34 %
	EFFICIENCY vs LOAD 			
4	INRUSH CURRENT(TYP)	48VDC/ 5A COLD START	I/P: 48VDC O/P:FULL LOAD Ta:25℃	I = 3.75A/48 VDC
	INPUT=48VDC @ FULL LOAD 			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~135%RATED OUTPUT POWER	I/P: 67.2VDC I/P: 48VDC I/P: 33.6VDC O/P:TESTING Ta:25℃	124.84%/ 67.2VDC 126.11%/48VDC 127.16%/ 33.6VDC 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: 14.4 V~ 16.8 V	I/P: 67.2VDC I/P: 48VDC I/P: 33.6VDC O/P:MIN LOAD Ta:25℃	15.85V/67.2VDC 15.85V/48 VDC 15.85V/ 33.6 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: 67.2 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:67.2 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 : 200 V Q 6 Rated : 200V	I/P:High-Line +3V =70.2V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Full Load Continue Ta:25℃	Q5 Q6 VDS: VDS: (1) 107.5V (1) 106.7V (2) 88.2V (2) 81V (3) 105.9V (3)100.3V
2	Diode Peak Voltage	Q100 Rated : 56 A/ 120V Q101 Rated : 73 A/ 100V	I/P:High-Line +3V =70.2 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3)Full Load Continue Ta:25℃	Q100: Q101 VDS: VDS: (1) 50.1V (1) 73.9V (2) 22.8V (2) 82.7V (3) 21.6V (3) 71.1V
3	Input Capacitor Voltage	C5 Rated: : 330μ / 80 V ℃/ Series	I/P:High-Line +3V =70.2 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) 71.3V (2) 72.1V (3) 71.3V (4) 71.3V
4	Control IC Voltage Test	PWM IC U1 Rated :-0.3V~16V U102 Rated : 16V	I/P:High-Line +3V =70.2 V DC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25℃	U1: U102: (1) 14.8 V (1) 12.69V (2) 15 V (2) 9.79V (3) 15 V (3) 11.81V (4) 15V (4) 15.58V

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:2.5 KVDC/min	I/P-O/P: 4.25KVDC/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: 48 VDC O/P:FULL LOAD Ta:25℃	☑PASS ☐FAIL Test by certified Lab

2	CONDUCTION	☑EN55032 ☐EN55011 ☐CLASS A ☑CLASS B	I/P:48 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: 48 VDC O/P:FULL LOAD Ta:25℃	☑CRITERIA A ☐CRITERIA B
4	E.F.T	EN61000-4-4 ☐INDUSTRY INPUT: 2KV	I/P:48 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:48 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
2	TEMPERATURE RISE TEST	MODEL： DDR-120C-12 1. ROOM AMBIENT BURN-IN：1 HRS I/P： 48VDC O/P： FULL LOAD Ta= 23.1 ℃ 2. HIGH AMBIENT BURN-IN：1 HRS I/P： 48VDC O/P： FULL LOAD Ta= 50.8 ℃		
3	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P：48 VDC O/P：119 % LOAD Ta：25℃	TEST：OK

NO	Position	ROOM AMBIENT Ta= 23.1 ℃	HIGH AMBIENT Ta= 50.8 ℃
1	LF1	50.5℃	81.6℃
2	LF2	46.6℃	77.3℃
3	LF100	60.5℃	90.7℃
4	T1	58.2℃	88.4℃
5	T2	53.2℃	83.5℃
6	Q1	48.1℃	79.3℃
7	Q2	48.3℃	79.5℃
8	Q5	56.3℃	88.7℃
9	Q6	54.6℃	85.3℃
10	Q100	61.4℃	94.1℃
11	Q101	63.6℃	95.9℃
12	L100	64.8℃	96.0℃
13	C1	49.7℃	80.7℃
14	C5	47.2℃	78.6℃
15	C6	48.3℃	78.4℃
16	C7	51.6℃	81.6℃
17	C101	61.6℃	91.7℃
18	C102	61.1℃	91.7℃
19	C104	56.3℃	85.8℃
20	C106	56.0℃	87.3℃
21	ZNR1	44.0℃	74.6℃

4	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P：43.2 VDC/ 67.2 VDC O/P： 100 % LOAD Ta= -45 ℃	TEST：OK
5	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 55 ℃ NO DAMAGE	I/P：70.2 VDC O/P：FULL LOAD Ta= 55 ℃ HUMIDITY= 95 %R.H	TEST：OK
6	TEMPERATURE COEFFICIENT	± 0.03 %(0~55℃)	I/P：48 VDC O/P：FULL LOAD	± 0.003 %(0~55℃)
7	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
8.	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：48VDC/Full Load DC ON/OFF TEST turn on 3sec；turn off 1sec@15cycle\ 48VDC/Full Load DC ON@1cycle		TEST：OK
9	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℃ 2 Din Rail		TEST：OK
10	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P： 48VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 48VDC O/P：FULL LOAD Ta= 55 ℃ LIFE TIME (3) I/P： 48VDC O/P：75% LOAD Ta= 55 ℃ LIFE TIME (4) I/P： 48VDC O/P：50% LOAD Ta= 55 ℃ LIFE TIME		(1) 150348.4 HRS (2) 21758.8 HRS (3) 50933.8 HRS (4) 120805 HRS
11	MTBF	Conducted by Parts Stress Analysis Prediction 1769.5K hrs min. Telcordia SR-332 (Bellcore) ; 214.5K hrs min. MIL-HDBK-217F (25℃)		
12	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 55℃		

	Displacement	Acceleration
2 （+3/-0） Hz up to 15Hz	±2.5mm	————
15Hz up to 50Hz	————	2.3g
Sweep rate	Max 1 Octave/minute	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031