Test Report: DDR-30L-12

30W 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

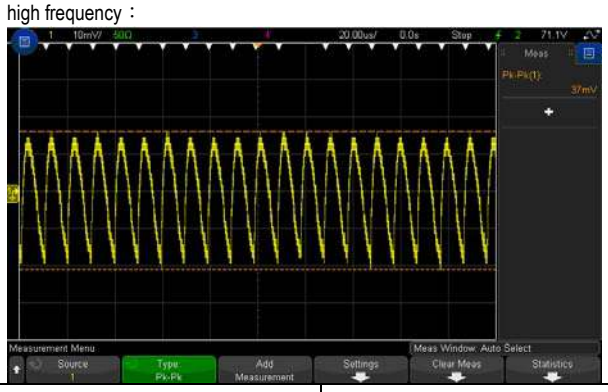
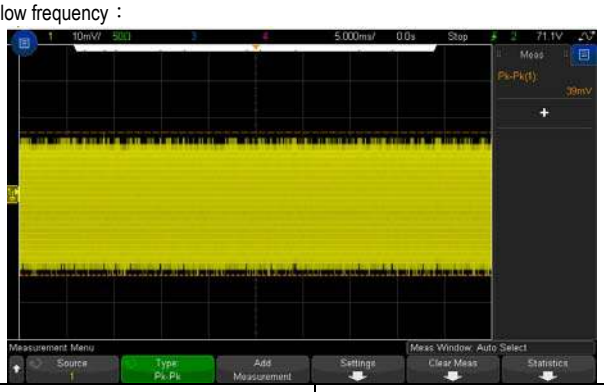
Safety Test
E.M.C. Test

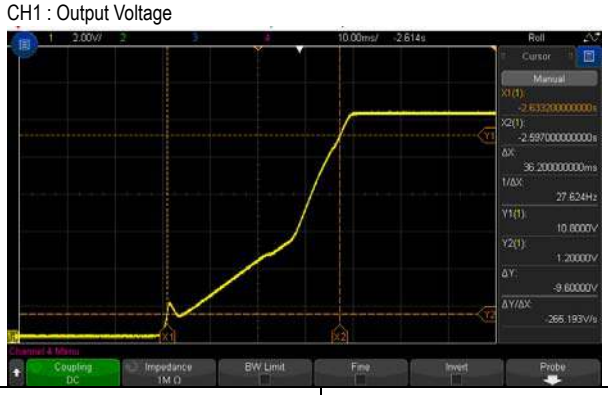
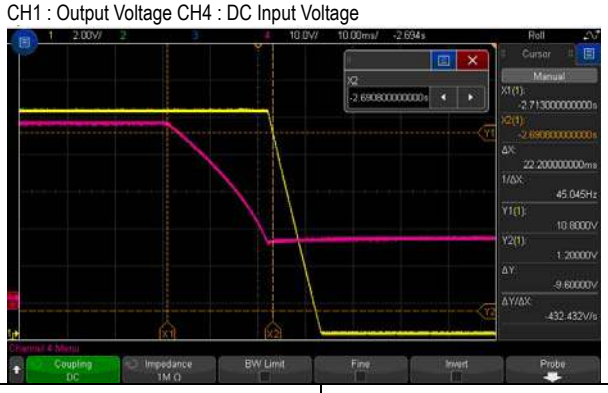
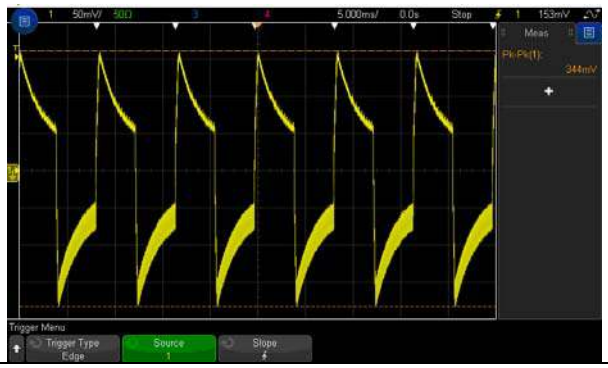
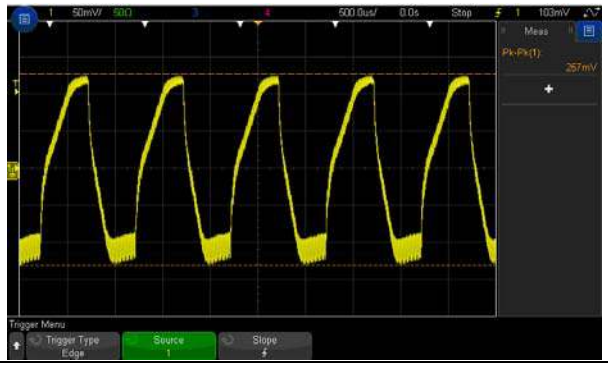
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

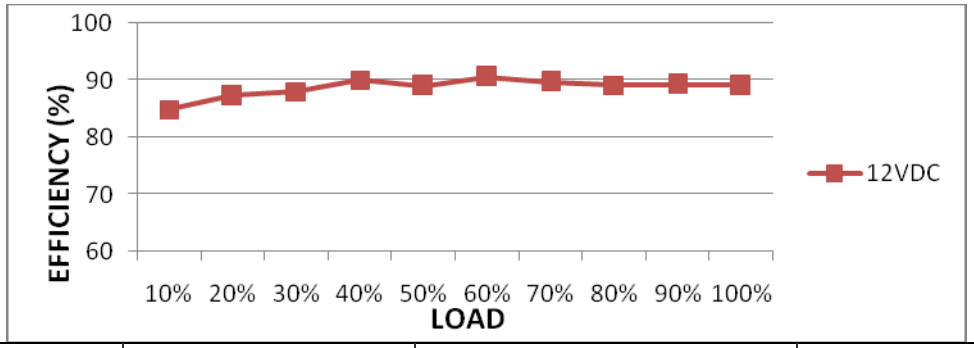
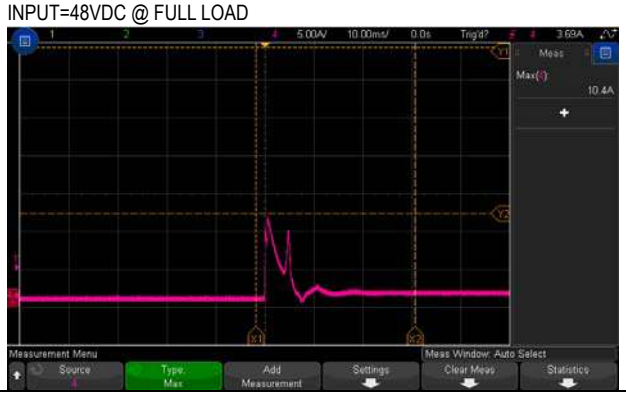
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:9.0 V~13.2 V	I/P： 48 VDC O/P：MIN LOAD Ta：25℃	8.79V~13.52V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~ 2%	I/P:18 VDC / 75VDC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.31 %~ 0.32 %
3	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 18 VDC / 75VDC O/P:FULL LOAD Ta:25℃	V1: -0 %~ 0%
4	LOAD REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 48VDC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.31 %~ 0.32 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P:48VDC O/P:FULL LOAD Ta:25℃	TEST: 1%
6	RIPPLE & NOISE (Max)	V1: 75 mVp-p	I/P: 48VDC O/P:FULL LOAD Ta:25℃	V1: 39 mVp-p
	high frequency： 		low frequency： 	
7	SET UP TIME (Max)	48VDC/120 ms	I/P:48 VDC O/P:FULL LOAD Ta:25℃	48VDC/ 58.8 ms
	INPUT=48VDC @ FULL LOAD CH1 : Output Voltage CH4 :DC Input Voltage 			

8	RISE TIME (Max)	48VDC/ 85 ms	I/P: 48 VDC O/P:FULL LOAD Ta:25℃	48VDC/ 36.2 ms
	INPUT=48VDC@ FULL LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (TYP)	48VDC/18ms	I/P: 48VDC O/P:F ULL LOAD Ta:25℃	48VDC/ 22.2 ms
	INPUT=48VDC @ FULL LOAD CH1 : Output Voltage CH4 : DC Input Voltage 			
10	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℃	344mVp-p 257mVp-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	18VDC~ 75 VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	17.665V~ 75V

			I/P: LOW-LINE-0.2=17.8V HIGH-LINE+3V=78V 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/0.8 A	I/P: 48VDC O/P:FULL LOAD Ta:25℃	I =0.705A/48VDC
3	EFFICIENCY(TYP)	89%	I/P: 48VDC O/P:FULL LOAD Ta:25℃	89.09%
	EFFICIENCY vs LOAD 			
4	INRUSH CURRENT(TYP)	48VDC/ 15 A COLD START	I/P: 48VDC O/P:FULL LOAD Ta:25℃	I =10.4A/ 48VDC
	INPUT=48VDC @ FULL LOAD 			

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~150%RATED OUTPUT POWER	I/P: 75VDC I/P: 48 VDC I/P: 18 VDC O/P:TESTING Ta:25℃	127.95%/ 75VDC 128%/ 48VDC 128.63%/ 18VDC PROTECTION TYPE： Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH: 13.8V~ 16.2 V	I/P: 75VDC I/P: 48 VDC I/P: 18 VDC O/P:MIN LOAD Ta:25℃	15.18V/75VDC 15.18V/ 48VDC 15.18V/ 18VDC PROTECTION TYPE： Shut down O/P voltage,re-power on to recover

3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 75 VDC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE： Constant current limiting, recovers automatically after fault condition is removed
4	INPUT REVERSE	POWER OK	I/P:75VDC 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 3 Rated: 150 V	I/P:High-Line +3V =78V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) full load continue Ta：25℃	VDS: (1)128.6V (2)105.3V (3)113.3V
2	Diode Peak Voltage	Q100 Rated: 100V	I/P:High-Line +3V =78 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3)full load continue Ta：25℃	VDS: (1)61.1V (2)47.8V (3)60.7V
3	Input Capacitor Voltage	C5 Rated: 560 μ / 80V	I/P:High-Line +3V =78 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)79.8V (2)79.6V (3)79.8V (4)79.8V
4	Control IC Voltage Test	PWM IC U1 Rated: -0.3V~30V	I/P:High-Line +3V =78 V DC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta：25℃	U1: (1) 15.4V (2) 9V (3) 15.2V (4) 18.2V
5	Clamp Diode Peak Voltage	D4 Rated： 400V	I/P：High-Line +3V = 78 V DC ON/OFF O/P： (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta：25℃	D4: (1)82.8V (2)82V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	EN 60950-1 I/P-O/P:4KVDC/min	I/P-O/P: 4.4KVDC/min Ta:25℃	I/P-O/P: 0 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25℃	I/P-O/P: 9999MΩ NO DAMAGE

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:48VDC 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 line-line :1KV	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
1	TEMPERATURE RISE TEST	MODEL： DDR-30L-24 1. ROOM AMBIENT BURN-IN：1 HRS I/P： 48VDC O/P： FULL LOAD Ta= 22.2 ℃ 2. HIGH AMBIENT BURN-IN：1 HRS I/P： 48VDC O/P： FULL LOAD Ta= 59.4 ℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P：48 VDC O/P：123 % LOAD Ta：25℃	TEST：OK

NO	Position	ROOM AMBIENT Ta= 22.2 ℃	HIGH AMBIENT Ta= 59.4 ℃
1	LF1	37.8℃	78.4℃
2	T1	59.4℃	96.1℃
3	T2	51.8℃	91.2℃
4	L100	40.8℃	76.5℃
5	Q2	33.9℃	72.2℃
6	Q3	62.7℃	109.1℃
7	Q100	68.9℃	107.2℃
8	D4	66.4℃	105.5℃
9	R7	67.2℃	105.9℃
10	C15	61.0℃	99.1℃
11	U1	52.7℃	95.7℃
12	C5	41.6℃	79.4℃
13	C105	55.8℃	90.0℃
14	C106	51.5℃	86.4℃
15	C40	51.9℃	87.3℃
16	C110	53.6℃	88.5℃

<table>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 24 VDC/ 75 VDC
O/P： 100 % LOAD
Ta= -45 ℃</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 60 ℃
NO DAMAGE</td><td>I/P： 78 VDC
O/P：FULL LOAD
Ta= 60 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0~60℃)</td><td>I/P：48 VDC
O/P：FULL LOAD</td><td>± 0.0022 %(0~60℃)</td></tr>
<tr><td>6</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">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</td><td>TEST：OK</td></tr>
<tr><td>7</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +65℃
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</td><td>TEST：OK</td></tr>
<tr><td>8</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set
(1) Waveform： Sine Wave
(2) Frequency：10~500Hz
(3) Sweep Time：10min/sweep cycle
(4) Acceleration：3G
(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 colspan="2">SUPPOSE C105 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= 60 ℃ LIFE TIME
(3) I/P： 48VDC O/P：75% LOAD Ta= 60 ℃ LIFE TIME
(4) I/P： 48VDC O/P：50% LOAD Ta= 60 ℃ LIFE TIME</td><td>(1) 219882.6 HRS
(2) 23902.2 HRS
(3) 37486.3 HRS
(4) 56997.7 HRS</td></tr>
<tr><td>10</td><td>MTBF</td><td colspan="3">Conducted by Parts Stress Analysis Prediction
483.3K hrs min. MIL-HDBK-217F (25℃)</td></tr>
<tr><td>11</td><td>DMTBF/Accelerated Life Test</td><td colspan="3">Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 60℃</td></tr>
</table>

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031