



Test Report: DDR-15L-24

15W 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

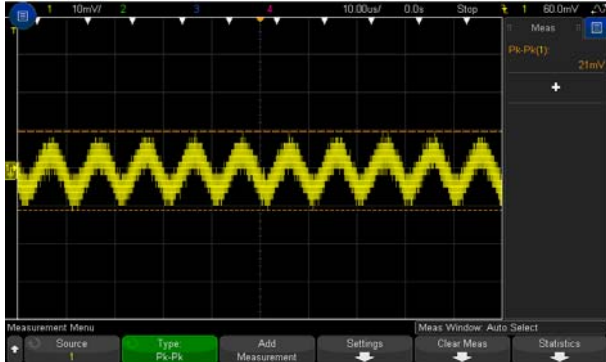
ENVIRONMENT TEST

DESIGN VERIFY TEST

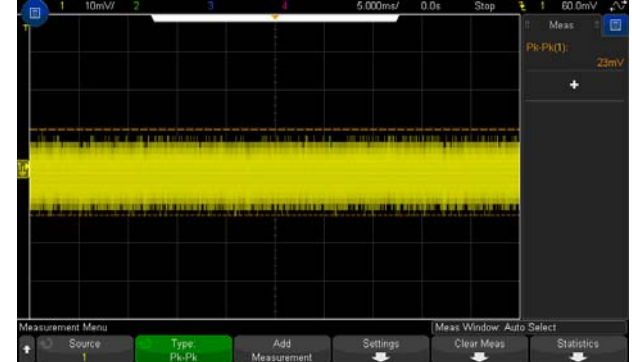
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:21.6 V~28 V	I/P : 48 VDC O/P : MIN LOAD Ta : 25°C	21.13V~28.63V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -2%~2%	I/P:18 VDC / 75VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.02 %~ 0.025 %
3	LINE REGULATION (Max)	V1:-0.5%~ 0.5%	I/P: 18 VDC / 75VDC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0 %
4	LOAD REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 48VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.02 %~ 0.025 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P:48VDC O/P:FULL LOAD Ta:25°C	TEST:2 .1%
6	RIPPLE & NOISE (Max)	V1: 100 mVp-p	I/P: 48VDC O/P:FULL LOAD Ta:25°C	V1: 23 mVp-p

high frequency :



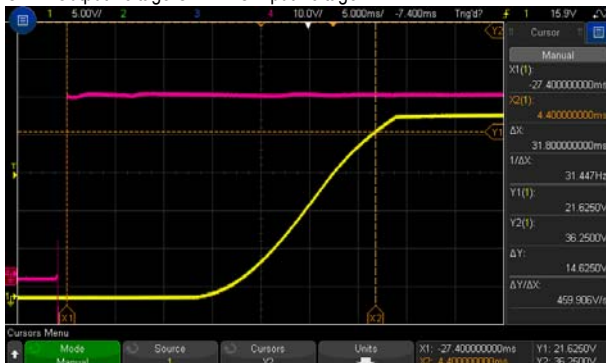
low frequency :

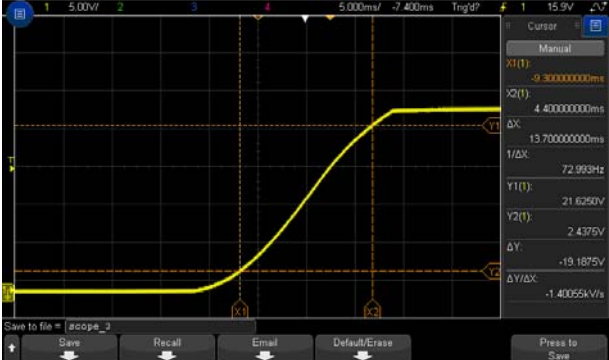


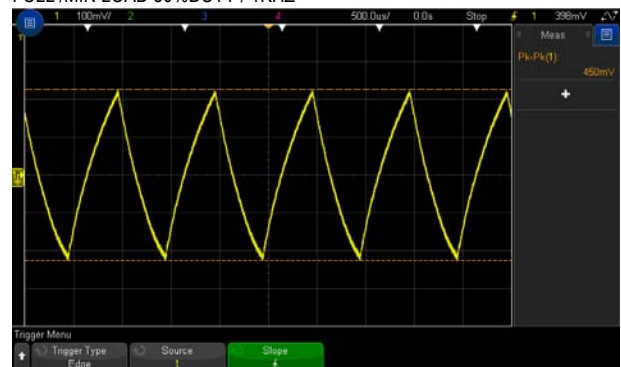


7	SET UP TIME (Max)	48VDC/120 ms	I/P:48 VDC O/P:FULL LOAD Ta:25°C	48VDC/ 31.8 ms
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INPUT=48VDC @ FULL LOAD

CH1 : Output Voltage CH4 : DC Input Voltage



8	RISE TIME (Max)	48VDC/ 85 ms	I/P: 48 VDC O/P: FULL LOAD Ta:25°C	48VDC/ 13.7 ms
<p>INPUT=48VDC@ FULL LOAD</p> 				
9	HOLD UP TIME (TYP)	48VDC/16ms	I/P: 48VDC O/P: FULL LOAD Ta:25°C	48VDC/ 17.6 ms
<p>INPUT=48VDC @ FULL LOAD</p> <p>CH1 : Output Voltage CH4 : DC Input Voltage</p> 				
10	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 48VDC O/P: (1) FULL / MIN LOAD 50% DUTY / 120HZ (2) FULL / MIN LOAD 50% DUTY / 1KHZ Ta:25°C	880mVp-p 450mVp-p
<p>FULL / MIN LOAD 50% DUTY / 120HZ</p>  <p>FULL / MIN LOAD 50% DUTY / 1KHZ</p> 				

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°C	17.52V~ 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/0.4 A	I/P: 48VDC O/P:FULL LOAD Ta:25°C	I =0.358A/48VDC																						
3	EFFICIENCY(TYP)	87 %	I/P: 48VDC O/P:FULL LOAD Ta:25°C	87.74%																						
<p>EFFICIENCY vs LOAD</p> <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>80.0</td></tr> <tr><td>20%</td><td>84.0</td></tr> <tr><td>30%</td><td>85.0</td></tr> <tr><td>40%</td><td>85.5</td></tr> <tr><td>50%</td><td>86.0</td></tr> <tr><td>60%</td><td>86.5</td></tr> <tr><td>70%</td><td>86.8</td></tr> <tr><td>80%</td><td>87.0</td></tr> <tr><td>90%</td><td>87.2</td></tr> <tr><td>100%</td><td>87.74</td></tr> </tbody> </table>					LOAD (%)	EFFICIENCY (%)	10%	80.0	20%	84.0	30%	85.0	40%	85.5	50%	86.0	60%	86.5	70%	86.8	80%	87.0	90%	87.2	100%	87.74
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90%	87.2																									
100%	87.74																									
4	INRUSH CURRENT(TYP)	48VDC/ 15 A COLD START	I/P: 48VDC O/P:FULL LOAD Ta:25°C	I =4.57A/ 48VDC																						
<p>INPUT=48VDC @ FULL LOAD</p>																										

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°C	128.57%/ 75VDC 122.22%/ 48VDC 134.92%/ 18VDC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH: 28.8 V~ 32.4 V	I/P: 75VDC I/P: 48 VDC I/P: 18 VDC O/P:MIN LOAD Ta:25°C	30.5V/75VDC 30.5V/ 48VDC 30.3V/ 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°C	NO DAMAGE PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
4	INPUT REVERSE	POWER OK	I/P: 75VDC O/P: FULL 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	Q3 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°C	VDS: (1)124V (2)107.9V (3)120V
2	Diode Peak Voltage	Q100 Rated : 200V	I/P:High-Line +3V =78 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3)full load continue Ta : 25°C	VDS: (1)128.9V (2)90.3V (3)128.9V
3	Input Capacitor Voltage	C4 Rated: : 100 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°C	C4: (1)79.6V (2)79.6V (3)79.2V (4)79.2V
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°C	U1: (1) 20.7V (2) 10.4V (3) 20.9V (4) 24.7V
5	Clamp Diode Peak Voltage	D3 Rated : 400V	I/P : High-Line +3V = 78 V AC ON/OFF O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	D3: (1)95.9V (2)95.9V

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°C	I/P-O/P: 0 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω	I/P-O/P: 500 VDC Ta:25°C	I/P-O/P: 9999 M Ω NO DAMAGE



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:48VDC 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:48VDC 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:48VDC 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:48VDC 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 line-line :1KV	I/P:48VDC 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																																																												
2	TEMPERATURE RISE TEST	MODEL : DDR-15L-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 36VDC O/P : FULL LOAD Ta= 20.6 °C 2. HIGH AMBIENT BURN-IN: 1 HRS I/P : 36VDC O/P : FULL LOAD Ta= 60.5 °C																																																														
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3	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 48 VDC O/P : 146% LOAD Ta : 25°C	TEST : OK																																																												
4	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 24 VDC/ 75 VDC O/P : 100 % LOAD Ta= -45 °C	TEST : OK																																																												



15W DIN Rail type DC-DC Converter

DDR-15L series

5	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 78 VDC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK												
6	TEMPERATURE COEFFICIENT	± 0.03 %(0~60°C)	I/P : 48 VDC O/P : FULL LOAD	± 0.0031 %(0~60°C)												
7	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												
8.	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +65°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 : 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 : 3G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C 2 Din Rail <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Displacement</th> <th>Acceleration</th> </tr> </thead> <tbody> <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> </tbody> </table>			Displacement	Acceleration	2 (+3/-0) Hz up to 15Hz	± 2.5mm	-----	15Hz up to 50Hz	-----	2.3g	Sweep rate	Max 1 Octave/minute		TEST : OK
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10	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 48VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 48VDC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 48VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 48VDC O/P : 50% LOAD Ta= 60 °C LIFE TIME		(1) 450113.8 HRS (2) 61585.9 HRS (3) 83613.6 HRS (4) 111812.4 HRS												
11	MTBF	Conducted by Parts Stress Analysis Prediction 907K hrs min. MIL-HDBK-217F (25°C)														
12	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 60°C														

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

12.10.30 A50-F031