



# Test Report: NLDD-1400H

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DC-DC Constant Current Step-Down LED driver

## ■ 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

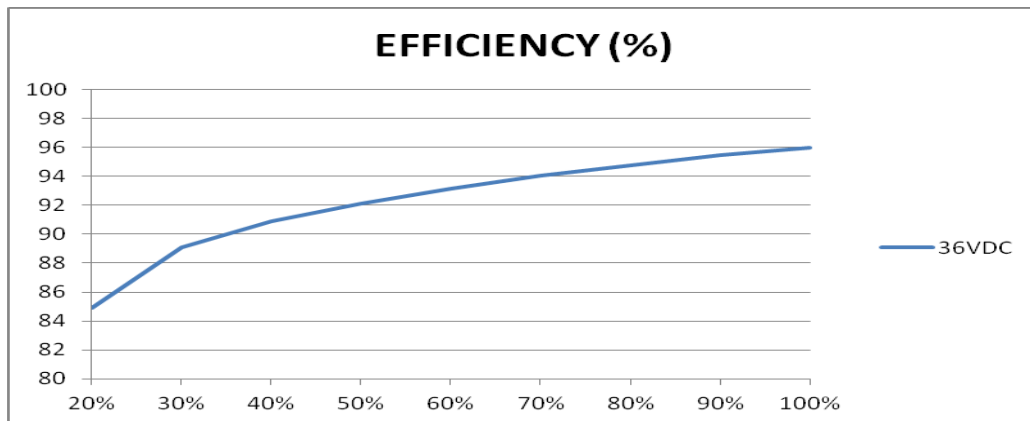
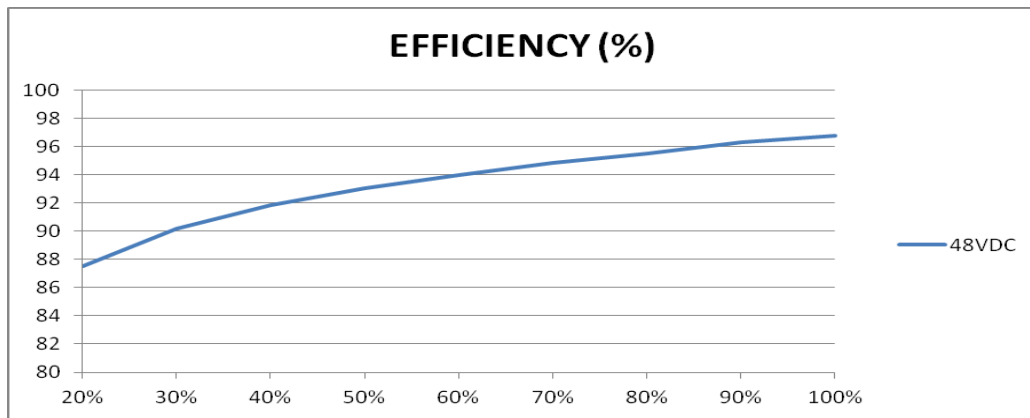
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT ACCURACY	-5%~+5%	I/P: 48VDC O/P: LED max/ LED min Ta:25°C	-0.93%~ 2.21%/48VDC
2	CURRENT RIPPLE	-5%~ +5%	I/P: 48VDC O/P: LED min~ LED max Ta:25°C	5%~ 1.69%/48VDC
3	SUGRE CURRENT	< +10%	I/P: 48VDC O/P: LED max/ LED min Ta:25°C	10%~ 10%/48VDC
4	VOLTAGE RANGE	6~46VDC	I/P: 10- 56VDC O/P:TEST Ta:25°C	6~46VDC

5	DIMMING OPERATION	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <h4 style="background-color: #cccccc; padding: 2px;">PWM Dimming Control</h4> </div> <div style="width: 45%;"> <ul style="list-style-type: none"> <li>⊙ Short circuit PWM PIN can realize dimming turn off.</li> <li>⊙ During PWM dimming operation, the output current will change to PWM style.</li> </ul> </div> </div>																																								
		<p>I/P : 48 VDC O/P : DIMMING TEST</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>PWM</th> <th>0%</th> <th>10%</th> <th>20%</th> <th>30%</th> <th>40%</th> <th>50%</th> <th>60%</th> <th>70%</th> <th>80%</th> <th>90%</th> <th>100%</th> <th>OPEN</th> </tr> </thead> <tbody> <tr> <td>Output Current (100Hz)</td> <td>0</td> <td>0.139</td> <td>0.279</td> <td>0.419</td> <td>0.558</td> <td>0.698</td> <td>0.837</td> <td>0.977</td> <td>1.117</td> <td>1.257</td> <td>1.396</td> <td>1.402</td> </tr> <tr> <td>%</td> <td>0</td> <td>9.93</td> <td>19.93</td> <td>29.93</td> <td>39.86</td> <td>49.86</td> <td>59.79</td> <td>69.79</td> <td>79.79</td> <td>89.79</td> <td>99.71</td> <td>100.14</td> </tr> </tbody> </table>		PWM	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN	Output Current (100Hz)	0	0.139	0.279	0.419	0.558	0.698	0.837	0.977	1.117	1.257	1.396	1.402	%	0	9.93	19.93	29.93	39.86	49.86	59.79	69.79	79.79	89.79	99.71	100.14
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<p>TEST RESULT : OK</p>																																										

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	10VDC~ 56VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	9.8~ 59 VDC
			I/P: LOW-LINE-0.2VDC= 9.8 VDC HIGH-LINE+3VDC= 59VDC O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST(1) <u>OK</u> (2) <u>OK</u> (3) <u>OK</u>
2	INPUT CURRENT(TYP)	1360mA @48VDC*FULL LOAD 5mA @48VDC*NO LOAD	I/P:48 VDC O/P:FULL LOAD/NO LOAD Ta:25°C	I =1320mA (FULL LOAD) I =1.46mA (NO LOAD)
3	EFFICIENCY(TYP)	95%	I/P: 36/48VDC O/P:FULL LOAD Ta:25°C	96.80%/48VDC 95.97%/36VDC

EFFICIENCY vs LOAD



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 48VDC O/P:FULL LOAD	PROTECTION TYPE : Shut down, recovers Automatically after temperature goes down
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 10VDC/48VDC/56VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE OK PROTECTION TYPE : Can be continued , recovers automatically after fault condition is removed

**CONTROL FUNCTION TEST**

1	REMOTE CONTROL	1. Power ON with dimming: DIM ~ -Vin >2.5 ~ 6VDC or open circuit 2. Power OFF : DIM ~ -Vin < 0.8VDC or short	I/P: 10VDC/24VDC/56VDC O/P:FULL LOAD	IP:10VDC 1、 Power OFF: <1.68VDC Power ON: >1.99VDC IP:24VDC 2、 Power OFF: <1.74VDC Power ON: >1.99VDC IP:56VDC 3、 Power OFF: <1.76VDC Power ON: >1.97VDC
2	QUIESCENT INPUT CURRENT IN SHUTDOWN MODE(max.)	2mA at PWM dimming OFF and 24VDC input	I/P: 24 VDC O/P:FULL LOAD	1.23mA

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	U1 Rated MBI6662 2A/ 75V	DC ON/OFF  I/P:High-Line +3VDC =59 VDC VDS: O/P: (1) CV max (2) CV max continue (3) CV min (4)Output Short (5)NO LOAD (6)DIM off  I/P:Low-Line -0.2VDC =9.8 VDC O/P: (1) CV max (2) CV max continue (3) CV min (4)Output Short (5)NO LOAD (6)DIM off Ta:25°C	VDS: 59V  (1) 62.5V (2) 62.1V (3) 62.1V (4) 61.7V (5) 60.5V (6) 58.3V  VDS: 9.8V (1) 11.99V (2) 11.66V (3) 11.99V (4) 12.39V (5) 8.050V (6) 10.09V

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	EN55015 CLASS A	I/P: 56VDC O/P:FULL LOAD Ta:25°C	PASS
2	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P: 56VDC O/P:FULL LOAD Ta:25°C	CRITERIA A
3	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 0.5KV	I/P: 56VDC O/P:FULL LOAD Ta:25°C	CRITERIA A
4	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

**■ RELIABILITY TEST**
**ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																								
1	TEMPERATURE RISE TEST	MODEL : NLDD-1200HW 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 48VDC O/P : FULL LOAD Ta= 26.1°C 2. HIGH AMBIENT BURN-IN : HRS I/P : 56VDC O/P : FULL LOAD Ta= 45 °C																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=26.1 °C</th> <th>HIGH AMBIENT Ta=45 °C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>U1</td> <td>54.1°C</td> <td>110.9°C</td> </tr> <tr> <td>2</td> <td>C1</td> <td>47.0°C</td> <td>93.3°C</td> </tr> <tr> <td>3</td> <td>D2</td> <td>48.3°C</td> <td>96.5°C</td> </tr> <tr> <td>4</td> <td>L1</td> <td>46.6°C</td> <td>90.9°C</td> </tr> <tr> <td>5</td> <td>TC</td> <td>40.4°C</td> <td>89.3°C</td> </tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=26.1 °C	HIGH AMBIENT Ta=45 °C	1	U1	54.1°C	110.9°C	2	C1	47.0°C	93.3°C	3	D2	48.3°C	96.5°C	4	L1	46.6°C	90.9°C	5	TC	40.4°C	89.3°C
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5	TC	40.4°C	89.3°C																									
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 10VDC / 56VDC O/P : FULL LOAD Ta= -45 °C	TEST : OK																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C/95 %R.H NO DAMAGE	I/P : 56VDC O/P : FULL LOAD Ta= 50°C HUMIDITY= 95 %R.H	TEST : OK																								
4	TEMPERATURE COEFFICIENT	+ 0.03%/°C(0~50°C)	I/P : 56VDC O/P : FULL LOAD	+ 0.004 %/°C(0~50°C)																								

6	STORAGE TEMPERATURE TEST	-40~85°C	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
7	THERMAL SHOCK TEST	-40~45°C	1. Thermal shock Temperature : -45°C~ +50°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 : 15cycle: 56VDC / FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle: 56VDC / FULL LOAD Burn In Test
8	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C1 IS THE MOST CRITICAL COMPONENT (1) I/P : 48VDC O/P : FULL LOAD Ta=25 °C LIFE TIME (2) I/P : 56VDC O/P : FULL LOAD Ta=45 °C LIFE TIME (3) I/P : 56VDC O/P : 75% LOAD Ta=45 °C LIFE TIME (4) I/P : 56VDC O/P : 50% LOAD Ta=45 °C LIFE TIME	(1) 448244HRS (2) 27061HRS (3) 22155HRS (4) 31032HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 29984.3K hrs min. Telcordia SR-332 (Bellcore); 2881.6K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 56VDC O/P : FULL LOAD TA=45°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/HUANGMK	WENF	LINKX