



Test Report: NHDD-40-100

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

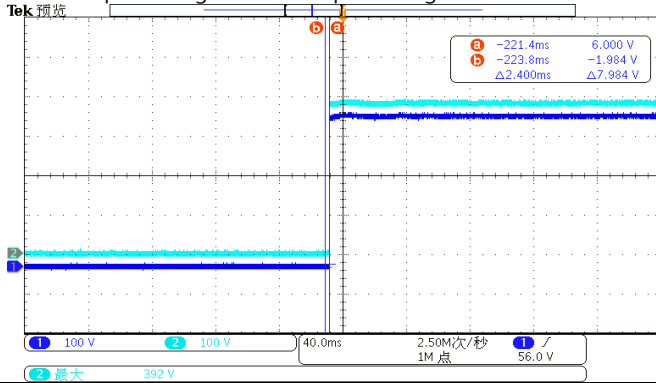
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	V1: -15%~15 %	I/P: 360/380/400VDC O/P: LED max/ LED min Ta:25°C	V1: -4.5%~ 2.8%
2	CURRENT RIPPLE	V1: 40 % @rate current	I/P: 360/380/400VDC O/P: LED min~ LED max Ta:25°C	V1: 21.4% V2: 22.6% V3: 20.3%
3	VOLTAGE RANGE	280V~320V@360VDC 320V~360V@400VDC	I/P: 360/400VDC O/P:FULL LOAD Ta:25°C	TEST: 270V~320V@360VDC 310V~360V@400VDC
4	SETUP TIME	500ms max	I/P: 390VDC O/P:FULL LOAD Ta:25°C	2.4ms

INPUT=390VDC @ FULL LOAD

CH1 : Output Voltage CH2 :DC Input Voltage



5 DIMMING OPERATION

■ PWM Dimming Control

◎ Short circuit PWM PIN can realize dimming turn off.

◎ During PWM dimming operation, the output current will change to PWM style.

◎ Standard Application for PWM

PWM Dimming

H: >2.5~5VDC or open circuit
L: <0.8VDC or short

ON/OFF Control

Switch open: DIM ON(100%)
Switch close: DIM OFF

		I/P : 380 VDC O/P : DIMMING TEST												
		PWM	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
		Output Current (100Hz)	0	0.009A	0.02A	0.031A	0.0403A	0.0501A	0.0592A	0.0708A	0.0799A	0.09A	0.102A	0.104A
		%	0%	8.9%	19.6%	31%	40.3%	50.1%	59.2%	70.8%	79.9%	90%	100.2%	100.4%
		TEST RESULT : OK												

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	360VDC~ 400VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C I/P: LOW-LINE-0.2= 359.8V HIGH-LINE +3V=403V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	357V~ 403V TEST(1) <u>OK</u> (2) <u>OK</u> (3) <u>OK</u>
2	INPUT CURRENT(TYP)	380VDC/ 0.1A	I/P:380 VDC O/P:FULL LOAD/NO LOAD Ta:25°C	I =0.087A/VDC(FULL LOAD) I =0.003A/VDC(NO LOAD)
3	EFFICIENCY(TYP)	95 %	I/P: 380VDC O/P:FULL LOAD Ta:25°C	V1: 95.19%

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 380VDC O/P:FULL LOAD	O.T.P Active PROTECTION TYPE : Shut down, recovers automatically after temperature goes down
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 360/380/400 O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

N O	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q4 Rated 7A/650V	DC ON/OFF I/P:High-Line +3V = 403V 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 -0.2V =359.8 V 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: (1) 426V (2) 422V (3) 436V (4) 418V (5) 422V (6) 414V VDS: (1) 382V (2) 378V (3) 382V (4) 382V (5) 382V (6) 366V
2	Input Capacitor Voltage	C4Rated: 3.3μ /420V	I/P:High-Line +3V =403V 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	(1)412V (2)412V (3)412V (4) 412V
3	Control IC Voltage Test	U1 Rated -0.3 V~11V U2 Rated -0.3V~18V	DC ON/OFF I/P:High-Line +3V =403 V O/P: (1) CV max (2) CV max continue (3) CV min (4)Output Short (5)NO LOAD(continue) (6)DIM off(continue) Ta:25°C	U1 (1) 9.84V (2) 9.84V (3) 10V (4) 9.92V (5) 9.92V (6) 9.92V U2 (1) 17.6V (2) 16.5V (3) 17.3V (4) 16.5V (5) 16.5V (6) 16.5V



4	Clamp Diode Peak Voltage	D 7	Rated: 600V /2A	DC ON/OFF I/P:High-Line +3V = 403V VDS: O/P: (1) CV max (2) CV max continue (3) CV min (4)Output Short (5)NO LOAD (6)DIM off	(1)424V (2)420V (3)424V (4)424V (5)424V (6)420V
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E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EN55015 CLASS A	I/P: 380VDC O/P:FULL LOAD Ta:25°C	PASS
2	RADIATION	EN55015 CLASS A	I/P: 380VDC O/P:FULL LOAD Ta:25°C	PASS
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P: 380VDC O/P:FULL LOAD Ta:25°C	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 0.5KV	I/P: 380VDC O/P:FULL LOAD Ta:25°C	CRITERIA A
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 : NHDD-40-100 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 380VDC O/P : FULL LOAD Ta=26.9 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 380VDC O/P : FULL LOAD Ta=46.9 °C																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=26.9 °C</th> <th>HIGH AMBIENT Ta=46.9 °C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>C4</td> <td>57.8°C</td> <td>78.3°C</td> </tr> <tr> <td>2</td> <td>C5</td> <td>57.8°C</td> <td>77.6°C</td> </tr> <tr> <td>3</td> <td>L1</td> <td>61.9°C</td> <td>82.2°C</td> </tr> <tr> <td>4</td> <td>U1</td> <td>63.4°C</td> <td>84.3°C</td> </tr> <tr> <td>5</td> <td>U2</td> <td>71.3°C</td> <td>92.1°C</td> </tr> <tr> <td>6</td> <td>D7</td> <td>60.3°C</td> <td>80.8°C</td> </tr> <tr> <td>7</td> <td>Q4</td> <td>58.8°C</td> <td>79.2°C</td> </tr> <tr> <td>8</td> <td>TC</td> <td>60.7°C</td> <td>81.2°C</td> </tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=26.9 °C	HIGH AMBIENT Ta=46.9 °C	1	C4	57.8°C	78.3°C	2	C5	57.8°C	77.6°C	3	L1	61.9°C	82.2°C	4	U1	63.4°C	84.3°C	5	U2	71.3°C	92.1°C	6	D7	60.3°C	80.8°C	7	Q4	58.8°C	79.2°C	8	TC	60.7°C	81.2°C
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 380VDC O/P : 100 * LOAD Ta= -35 °C	TEST : OK																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C/95 %R.H NO DAMAGE	I/P : 403 VDC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK																																				
4	TEMPERATURE COEFFICIENT	+ 0.03 %/°C(0~50°C)	I/P : 380 VDC O/P : FULL LOAD	+ 0.0002 %/°C(0~50°C)																																				
5	STORAGE TEMPERATURE TEST	-40~80°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																																					
6	THERMAL SHOCK TEST	-30~40°C	1. Thermal shock Temperature : -35°C~ +45°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: VDC / FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle: VDC / FULL LOAD Burn In Test																																					



7	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
8	CAPACITOR LIFE CYCLE	SUPPOSE C4 IS THE MOST CRITICAL COMPONENT (1) I/P : 380VDC O/P : FULL LOAD Ta=25 °C LIFE TIME (2) I/P : 380VDC O/P : FULL LOAD Ta=40 °C LIFE TIME (3) I/P : 380VDC O/P : 75% LOAD Ta=40 °C LIFE TIME (4) I/P : 380VDC O/P : 50% LOAD Ta=40 °C LIFE TIME	(1) 133713HRS (2) 45664HRS (3) 69758HRS (4) 97357HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 15362K hrs min. Telcordia SR-332 (Bellcore); 2779.1K hrs min. MIL-HDBK-217F (25°C)	
10	Ongoing Reliability Test	I/P : 380VDC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	WUWQ/HUANGMK	WENF	LINKX

2018.4.30

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