



Technical Report No. 70.402.19.307.01-03 Rev. 00 Dated 2019-03-25

Client: NISKO ELECTRICITY & ELECTRONICS LTD. Client No.: 94812

Address: 41 HAMAAYAN ST. P.O.B. 371, 7171201, MODI'IN, Israel.

Contact person: Mr. Shani Haim

Manufacturer: Ningbo Skyzon Energy Co.,Ltd.

Client No.: 92974

Address: No.19, KeSan Road, Ninghai, 315600, Ningbo, Zhejiang, People's

Republic of China

Test subject: Product: LED Street light

Type: EL-SL18LA-160W

Test specification: IES TM-21-11

ANSI/UL 1598-2008 or IEC 60598-1:2014

According to the client's requirement, the test ambient temperature is 40C°.

Test result: See section 4 for details

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1 Description of the test subject

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\boxtimes	Manufacturer's specification for intended use: LED Street light for general lighting service.
	Manufacturer's specification for predictive misuse: No restrictions provided.

1.2 Consideration of the foreseeable misuse

\boxtimes	Not applicable
	Covered through the applied standard
	Covered by the following comment
	Covered by attached risk analysis

Technical Data 1.3

Rated Voltage:	100-240V AC
Rated Frequency:	50/60Hz
Rated power:	160W
Rated CCT:	2700K~6500K
Protect Class:	Class I

2 Order

2.1 **Date of Purchase Order, Customer's Reference**

2019-02-25

2.2 **Receipt of Test Sample, Location**

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2.3 **Date of Testing**

2019-03-13

2.4 **Location of Testing**

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Points of Non-compliance or Exceptions of the Test Procedure 2.5

None

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3 Test instruments and conditions

3.1 **Test instruments**

Equipment	Model	Manufacturer	Equipment ID	Calibration due date
Digital Power Meter	WT310E- C2-H	YOKOGAWA	S18091173-YQ	2019-11-08
Hybrid Recorder	34972A	AGILENT	S1410894-YQ	2019-05-18
Current Clamp Meter	LH41A	AMPROBE	S0712422-YQ	2019-05-18
Climate Chamber/Humidity Cabinet	MHW- 4WFSA	Terchy	S0712375-YQ	2019-05-18

3.2 General conditions for measurement

Ambient temperature(°C):	40±1°C
Maximum relative humidity:	55%
Maximum air speed(m/s):	0.1
Test voltage tolerance:	±0.2%
Test voltage and frequency	230V/50Hz

Test Results

4.1 **Projecting Long Term Lumen Maintenance**

4.1.1 Input current of LED

LED	
Measured LED working current (Max.) mA	
364	

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4.1.2 Test data from submitted LM-80 report and in-situ inputs and result Percentage of initial lumen to project to L90



TM-21 Inputs

			LM-8	0 Test Inputs		
Instructions	Description of LED Light Source Te (manufacturer, model, catalog num		Data for 85°C Case Temperature	Test Data for 105°C Case Temperature		
Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated	Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700 2780502400000)	K (L150-	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
based on user entries.	2760302400000)		0	100.00%	0	100.00%
based on user entries.			1000	100.21%	1000	99.86%
First, enter a description of the LED			2000	99.99%	2000	99.60%
light source tested. Then complete			3000	99.75%	3000	99.33%
the fields labeled "LM-80 Testing			4000	99.51%	4000	99.02%
Details". Test duration must be at	LM-80 Testing Details		5000	99.29%	5000	98.76%
least 6,000 hours. If only one case	Total number of units tested per case temperatu	re 20	6000	99.03%	6000	98.51%
temperature data set is to be used	Number of failures:	0	7000	98.82%	7000	98.23%
(no interpolation), complete only	Number of units measured:	20	8000	98.57%	8000	97.92%
"Tested case temperature 1". For	Test duration (hours):	10000	9000	98.28%	9000	97.58%
only two case temperature data	Tested drive current (mA):	400	10000	97.97%	10000	97.25%
sets, complete 1 and 2.		85	10000	31.31/4	10000	31.23/•
sets, complete randz.	Tested case temperature 1(T _s , °C):					
Next, further to the right, in the	Tested case temperature 2 (T _s , °C):	105				
corresponding box(es) for each	Tested case temperature 3 (T _c , °C):					
tested case temperature, enter the						
test data along with the time (in						
hours) at which each measurement						
was taken. Data entered must be						
normalized then averaged						
measured data (per TM-21 sections						
5.2.1 and 5.2.2). If case						
temperatures have different test						
durations, enter data up to the						
lowest of the test durations for all of						
the case temperatures.						
the case temperatures.	In-Situ Inputs					
Enter drive current, in-situ	Drive current for each	364				
temperature data and the	LED package/array/module (mA):	004				
percentage of initial lumens to	/n-situ case temperature (T _s , °C):	75.6				
project to in the fields labeled "/n-	Percentage of initial lumens to project to (e.g. for					
Situ Inputs".	L ₇₀ , enter 70):	90				
	-100 -11111 -1210					
Results can be tailored to estimate						
lumen maintenance at a specific						
time by entering a value (t) in the	Results					
yellow field. A complete TM-21 report						
will appear on the next tab labeled	Time (t) at which to estimate lumen maintenance					
"Report".	(hours):	42,350				
	3	00.001				
j l	Lumen maintenance at time (t) (%):	90.00%				
j	Reported L90 (hours):	42,000				
1						

* Remark: Test data extract from LM-80 test Report of Lumileds LCC. (IESNA LM-80 Test report of LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)/Generated on 2018-07-09/Report number S5aa issued to wei.qu@lumileds.com.cn on 2018-08-22).

The above values are generated from the Energy Star TM-21 Calculator rev. 06.18.18

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Percentage of initial lumen to project to L80

TM-21 Inputs

				30 Test Inputs			
Instructions	Description of LED Light Source Test (manufacturer, model, catalog numb		Test [Data for 85°C Case Temperature	Test Data for 105°C Case Temperature		
ellow fields are completed by the	Manufacturer: Lumileds LLC.			Lumen Maintenance			
ser. Fields not used should be left	Model: LUXEON 5050 with nominal CCT of 2700K I	L150-	Time		Time	Lumen Maintenano	
ank. Cyan fields are calculated	2780502400000)		(hours)	(%)	(hours)	(%)	
ased on user entries.			0	100.00%	0	100.00%	
			1000	100.21%	1000	99.86%	
rst, enter a description of the LED			2000	99.99%	2000	99.60%	
ht source tested. Then complete			3000	99.75%	3000	99.33%	
e fields labeled "LM-80 Testing			4000	99.51%	4000	99.02%	
etails". Test duration must be at	LM-80 Testing Details		5000	99.29%	5000	98.76%	
ast 6,000 hours. If only one case	Total number of units tested per case temperature	20	6000	99.03%	6000	98.51%	
mperature data set is to be used	Number of failures:	0	7000	98.82%	7000	98.23%	
o interpolation), complete only	Number of units measured:	20	8000	98.57%	8000	97.92%	
ested case temperature 1". For	Test duration (hours):	10000	9000	98.28%	9000	97.58%	
nly two case temperature data	Tested drive current (mA):	400	10000	97.97%	10000	97.25%	
ts, complete 1 and 2.	Tested case temperature 1(T _s , °C):	85					
· '	Tested case temperature 2 (T _e , °C):	105					
ext, further to the right, in the	Tested case temperature 3 (T _e , °C):	100					
prresponding box(es) for each	rested case temperature 3 (1 ₂ , 10):						
sted case temperature, enter the							
st data along with the time (in							
ours) at which each measurement							
as taken. Data entered must be							
ormalized then averaged							
easured data (per TM-21 sections							
2.1 and 5.2.2). If case							
mperatures have different test							
arations, enter data up to the							
west of the test durations for all of							
e case temperatures.	In-Situ Inputs						
nter drive current. in-situ	Drive current for each						
mperature data and the	LED package/array/module (mA):	364					
ercentage of initial lumens to		75.6					
oiect to in the fields labeled "/n-	In-situ case temperature (T _c ,°C):	75.6					
oject to in the rielas labelea <i>in-</i> itu Inputs".	Percentage of initial lumens to project to (e.g. for	80					
«W Inputs .	L ₇₀ , enter 70):	00					
esults can be tailored to estimate							
men maintenance at a specific							
ne by entering a value (t) in the	Results						
llow field. A complete TM-21 report	Tresuits						
ll appear on the next tab labeled	To the last of the						
Report".	Time (t) at which to estimate lumen maintenance	87,050					
· .	(hours):	·					
I	Lumen maintenance at time (t) (%):	80.00%					
	Reported L80 (hours):	>60000					
	Heportea Lou (nours):						

^{*} Remark: Test data extract from LM-80 test Report of Lumileds LCC. (IESNA LM-80 Test report of LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)/Generated on 2018-07-09/Report number S5aa issued to wei.gu@lumileds.com.cn on 2018-08-22).

The above values are generated from the Energy Star TM-21 Calculator rev. 06.18.18

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Percentage of initial lumen to project to L70



TM-21 Inputs

	LM-80 Test Inputs						
Instructions	Description of LED Light Source Tests (manufacturer, model, catalog numbe			Data for 85°C Case Temperature	Test Data for 105°C Case Temperature		
Yellow fields are completed by the user. Fields not used should be left blank. Cvan fields are calculated	Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (2780502400000)	L150-	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	
biank. Cyan rields are calculated based on user entries.	2780302400000)		0	100.00%	0	100.00%	
based of fuser entitles.			1000	100.21%	1000	99.86%	
First, enter a description of the LED			2000	99.99%	2000	99.60%	
light source tested. Then complete			3000	99.75%	3000	99.33%	
the fields labeled "LM-80 Testing			4000	99.51%	4000	99.02%	
Details". Test duration must be at	LM-80 Testing Details		5000	99.29%	5000	98.76%	
least 6,000 hours. If only one case	Total number of units tested per case temperature	20	6000	99.03%	6000	98.51%	
temperature data set is to be used	Number of failures:	0	7000	98.82%	7000	98.23%	
(no interpolation), complete only	Number of units measured:	20	8000	98.57%	8000	97.92%	
"Tested case temperature 1". For	Test duration (hours):	10000	9000	98.28%	9000	97.58%	
only two case temperature data	Tested drive current (mA):	400	10000	97.97%	10000	97.25%	
sets, complete 1 and 2.	Tested case temperature 1(T _e , °C):	85					
	Tested case temperature 2 (T _x , °C):	105					
Next, further to the right, in the	Tested case temperature 3 (T _s , °C):						
corresponding box(es) for each	reside descriptional de (15, 10).						
tested case temperature, enter the							
test data along with the time (in							
hours) at which each measurement							
was taken. Data entered must be							
normalized then averaged							
measured data (per TM-21 sections							
5.2.1 and 5.2.2). If case							
temperatures have different test							
durations, enter data up to the							
lowest of the test durations for all of							
the case temperatures.	In-Situ Inputs						
Enter drive current, in-situ	Drive current for each LED package/array/module (mA):	364					
temperature data and the							
percentage of initial lumens to	ות-situ case temperature (T _e , °C):	75.6					
project to in the fields labeled "//7-	Percentage of initial lumens to project to (e.g. for	70					
Situ Inputs".	L ₇₀ , enter 70):	10					
Results can be tailored to estimate							
lumen maintenance at a specific							
time by entering a value (t) in the	Results				•••••		
yellow field. A complete TM-21 report	Results						
will appear on the next tab labeled							
"Report".	Time (t) at which to estimate lumen maintenance	137,700					
	(hours):	•					
	Lumen maintenance at time (t) (%):	70.00%					
	Reported L70 (hours):	>60000					
[] []	r repended to (notic).	700000					

 * Remark: Test data extract from LM-80 test Report of Lumileds LCC. (IESNA LM-80 Test report of LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)/Generated on 2018-07-09/Report number S5aa issued to wei.gu@lumileds.com.cn on 2018-08-22).

The above values are generated from the Energy Star TM-21 Calculator rev. 06.18.18

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- 5 Remarks
- 5.1 Annex 1 - photo document.

Annex 2 - In-situ temperature measurements test (ISTMT).

Annex 3 - Table 1 & 2 of TM-21 report.

- 5.2 Test according to the test specification and for the following items:
 - 1) Lumen maintenance projection according to TM-21.
 - 2) EL-SL18LA-160W-3000K was chosen as the typical test model.
- 5.3 The used LED specification as below:

Model:	Manufacturer	Vf (V)	If (mA)	Viewing angle (°)	CCT(K)
LUXEON 5050	LUMILEDS	6.1 Typ.	800	116	2700~6500

6 **Summary**

See section 4 for details

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Engineer:

Project Handle

Technical Report checkeds

Ms. Lucy LU **Designated Reviewer**

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Annex 1: Photo document

Details of: Overview and Partial view



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Annex 2: In-situ temperature measurements test (ISTMT) Thermocouple Location on Temperature Measurement Point (TMP)

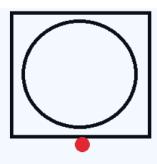
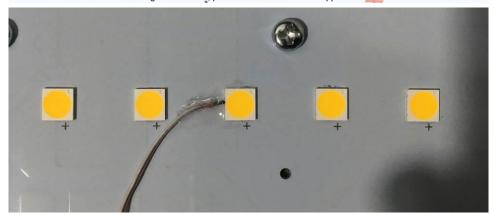


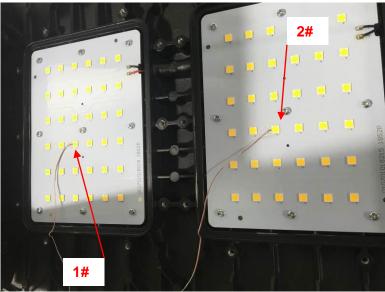
Figure 3. The recommended $T_{\rm s}$ point is located in the bottom of LUXEON 5050.

For further information on measuring the in-situ $T_{_{\rm q}}$, please see LUXEON 5050 Application Brief.



The temperature measurement point measured according to the LM-80 Test Report of Lumileds LCC. (IESNA LM-80 Test report of LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)/Generated on 2018-07-09/Report number S5aa issued to wei.gu@lumileds.com.cn on 2018-08-22 and LUXEON 5050 application brief).

Thermocouple Location on the LED



Remark: The ISTMT was performed with the lens installed on the LED package and the luminaire was installed according to actual use of the installation status.

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Result:

Input voltage:		230.1V		Input current:	t: 698.2mA		Input wattage:		158.5W		
PF		0.987		Test time:	220mins		Temperature stabilization time:		110mins		
No.		Temperatu		(°C)	No.		Temperature (°C)		C)		
	Me	Measured		rrected at 40°C		Measured		Corrected at 40°			
1		71.58		71.40	4	4	40.18		40.18 40.0		40.0
2		75.78		75.60	-	-		-		-	
3		61.35		61.17	-	-			-		

The highest in-situ measured temperature LED is 75.60 °C.

Remark:

1):1~2#: for the LED temperature measurement point;

2):3#: for tc of LED driver point;

2):4#: for the ambient temperature;

3): The ISTMT was performed with the lens installed on the LED package and the luminaire was installed according to actual use of the installation status.

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Annex 3: Table 1 & 2 of TM-21 report

Percentage of initial lumens to project to L90



TM-21 Report

Description of LED Light Source Tested (manufacturer, model, catalog number) Test Condition 1 - 85°C Case Temp		ble 1: Report at each LM-80 Test Condition Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)			
		Test Condition 2 - 105°C Case Temp			
Sample size	20	Sample size	20	Sample size	-
Number of failures	0	Number of failures	0	Number of failures	-
DUT drive current used in the test (mA)	400	DUT drive current used in the test (mA)	400	DUT drive current used in the test (mA)	-
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	-
Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	-
Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	-
α	2.636E-06	α	3.104E-06	α	-
В	1.006	В	1.003	В	-
Reported L90(10k) hours)	42,000	Reported L90(10k) (hours)	35,000	Reported L90(10k) (hours)	-

Table	2: Interpolation Report
	d on <i>in-situ</i> temperature entered)
T _{s,1} (⁰ C)	85.00
T _{s,1} (K)	358.15
α1	2.636E-06
B ₁	1.006
T _{s,2} (°C)	-
T _{s,2} (K)	-
α ₂	-
B ₂	-
E _a /k _b	-
A	-
B ₀	1.006
T _{s,i} (°C)	75.60
T _{s,i} (K)	348.75
αi	2.636E-06
Reported L90(10k) at	42,000

Percentage of initial lumens to project to L80



TM-21 Report

Description of LED Light Source Tested (manufacturer, model, catalog number)		Manufacturer: Lumileds L Model: LUXEON 5050 wit		of 2700K (L150-27805024000	00)
Test Condition 1 - 85°C	Case Temp	Test Condition 2 - 105°	C Case Temp		
Sample size	20	Sample size	20	Sample size	-
Number of failures	0	Number of failures	0	Number of failures	-
DUT drive current used in the test (mA)	400	DUT drive current used in the test (mA)	400	DUT drive current used in the test (mA)	-
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	-
Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	-
Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	-
α	2.636E-06	α	3.104E-06	α	-
В	1.006	В	1.003	В	-
Reported L80(10k) (hours)	>60000	Reported L80(10k) (hours)	>60000	Reported L80(10k) (hours)	-

Table 2: Interpolation Report			
(projection based of	n <i>in-situ</i> temperature entered)		
T _{s,1} (⁰ C)	85.00		
T _{s,1} (K)	358.15		
α1	2.636E-06		
B ₁	1.006		
T _{s,2} (°C)	-		
T _{s,2} (K)	-		
α2	-		
B ₂	-		
E _a /k _b	-		
A	-		
B ₀	1.006		
T _{s,i} (⁰ C)	75.60		
T _{s,i} (K)	348.75		
α_{i}	2.636E-06		
Reported L80(10k) at	>60000		

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3. Percentage of initial lumens to project to L70



TM-21 Report

Description of LED Light Source Tested (manufacturer, model, catalog number)		Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)			
Test Condition 1 - 85°C	Case Temp	Test Condition 2 - 105°	C Case Temp		
Sample size	20	Sample size	20	Sample size	-
Number of failures	0	Number of failures	0	Number of failures	-
DUT drive current used in the test (mA)	400	DUT drive current used in the test (mA)	400	DUT drive current used in the test (mA)	-
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	-
Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	-
Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	-
α	2.636E-06	α	3.104E-06	α	-
В	1.006	В	1.003	В	-
Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	-

Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)		
T _{s,1} (°C)	85.00	
T _{s,1} (K)	358.15	
α ₁	2.636E-06	
B ₁	1.006	
T _{s,2} (°C)	-	
T _{s,2} (K)	-	
α ₂	-	
B ₂	-	
E _a /k _b	-	
A	-	
B ₀	1.006	
T _{s,i} (°C)	75.60	
T _{s,i} (K)	348.75	
αί	2.636E-06	
Reported L70(10k) at	>60000	

--- End of Report ---

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http://www.tuv-sud.cn

TUV SUD Certification and Testing (China) Co., Ltd. Shanghai Branch. TÜV SÜD Group