



Technical Report No. 70.402.19.307.03-03

Rev. 00

Dated 2019-07-29

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-SL18MA-80W

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 35C°.

Test result: See section 4 for details



1 Description of the test subject

1.1 Function

- ☒ 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

- ☒ Not applicable
- ☐ Covered through the applied standard
- ☐ Covered by the following comment
- ☐ Covered by attached risk analysis

1.3 Technical Data

Rated Voltage:	220-240V AC
Rated Frequency:	50/60Hz
Rated power:	80W
Rated CCT:	2700K~6500K
Protect Class:	Class II

2 Order

2.1 Date of Purchase Order, Customer's Reference

2019-02-25

2.2 Receipt of Test Sample, Location

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

2.3 Date of Testing

2019-07-26

2.4 Location of Testing

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

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

None

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	2020-05-16
Hybrid Recorder	34972A	AGILENT	S1410894-YQ	2020-05-16
Current Clamp Meter	LH41A	AMPROBE	S0712422-YQ	2020-05-16
Climate Chamber/Humidity Cabinet	MHW-4WFSA	Terchy	S0712375-YQ	2020-05-14

3.2 General conditions for measurement

Ambient temperature(°C):	35±1°C
Maximum relative humidity:	55%
Maximum air speed(m/s):	0.1
Test voltage tolerance:	±0.2%
Test voltage and frequency	230V/50Hz

4 Test Results

4.1 Projecting Long Term Lumen Maintenance

4.1.1 Input current of LED

LED
Measured LED working current (Max.) mA
339

4.1.2 Test data from submitted LM-80 report and in-situ inputs and result

Percentage of initial lumen to project to L90

Instructions	Description of LED Light Source Tested (manufacturer, model, catalog number)	LM-80 Test Inputs			
		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature	
		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
<p>Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.</p> <p>First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature T". For only two case temperature data sets, complete 1 and 2.</p> <p>Next, further to the right, in the corresponding boxes for each 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.</p> <p>Enter drive current, <i>in-situ</i> temperature data and the percentage of initial lumens to project to in the fields labeled "<i>in-Situ</i> Inputs".</p> <p>Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".</p>	<p>Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)</p>	0	100.00%	0	100.00%
		1000	100.21%	1000	99.86%
		2000	99.99%	2000	99.60%
		3000	99.75%	3000	99.33%
		4000	99.51%	4000	99.02%
		5000	99.29%	5000	98.76%
		6000	99.03%	6000	98.51%
		7000	98.82%	7000	98.23%
		8000	98.57%	8000	97.92%
		9000	98.28%	9000	97.58%
		10000	97.97%	10000	97.25%
		<p>LM-80 Testing Details</p> <p>Total number of units tested per case temperature: 20</p> <p>Number of failures: 0</p> <p>Number of units measured: 20</p> <p>Test duration (hours): 10000</p> <p>Tested drive current (mA): 400</p> <p>Tested case temperature 1 (T_c, °C): 85</p> <p>Tested case temperature 2 (T_c, °C): 105</p> <p>Tested case temperature 3 (T_c, °C):</p>			
<p>In-Situ Inputs</p> <p>Drive current for each LED package/array/module (mA): 339</p> <p><i>in-situ</i> case temperature (T_c, °C): 66.1</p> <p>Percentage of initial lumens to project to (e.g. for L₇₀, enter 70): 90</p>					
<p>Results</p> <p>Time (t) at which to estimate lumen maintenance (hours): 42,350</p> <p>Lumen maintenance at time (t) (%): 90.00%</p> <p>Reported L90 (hours): 42,000</p>					

* 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

Percentage of initial lumen to project to L80

Instructions	Description of LED Light Source Tested (manufacturer, model, catalog number)	LM-80 Test Inputs			
		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature	
		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
<p>Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.</p> <p>First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature T". For only two case temperature data sets, complete 1 and 2.</p> <p>Next, further to the right, in the corresponding boxes for each 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.</p> <p>Enter drive current, <i>in-situ</i> temperature data and the percentage of initial lumens to project to in the fields labeled "<i>in-situ</i> Inputs".</p> <p>Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".</p>	<p>Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)</p>	0	100.00%	0	100.00%
		1000	100.21%	1000	99.86%
		2000	99.99%	2000	99.60%
		3000	99.75%	3000	99.33%
		4000	99.51%	4000	99.02%
		5000	99.29%	5000	98.76%
		6000	99.03%	6000	98.51%
		7000	98.82%	7000	98.23%
		8000	98.57%	8000	97.92%
		9000	98.28%	9000	97.58%
		10000	97.97%	10000	97.25%
		<p>LM-80 Testing Details</p>	Total number of units tested per case temperature	20	
Number of failures:	0				
Number of units measured:	20				
Test duration (hours):	10000				
<p><i>in-situ</i> Inputs</p>	Tested drive current (mA):	400			
	Tested case temperature 1 (T _{case} , °C):	85			
	Tested case temperature 2 (T _{case} , °C):	105			
	Tested case temperature 3 (T _{case} , °C):				
<p>Results</p>	Drive current for each LED package/array/module (mA):	339			
	<i>in-situ</i> case temperature (T _{case} , °C):	66.1			
	Percentage of initial lumens to project to (e.g. for L70, enter 70):	80			
<p>Results</p>	Time (t) at which to estimate lumen maintenance (hours):	87,050			
	Lumen maintenance at time (t) (%):	80.00%			
	Reported L80 (hours):	>60000			

* 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



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-SL18MA-80W-4000K 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

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

Engineer:   Technical Report checked: 
Mr. Kaishuang LI
Project Handler
Mr. Tianchen ZHANG
Designated Reviewer

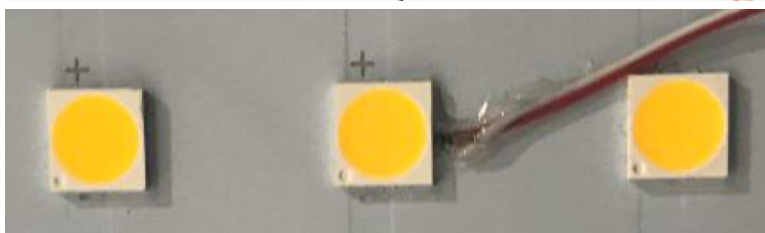
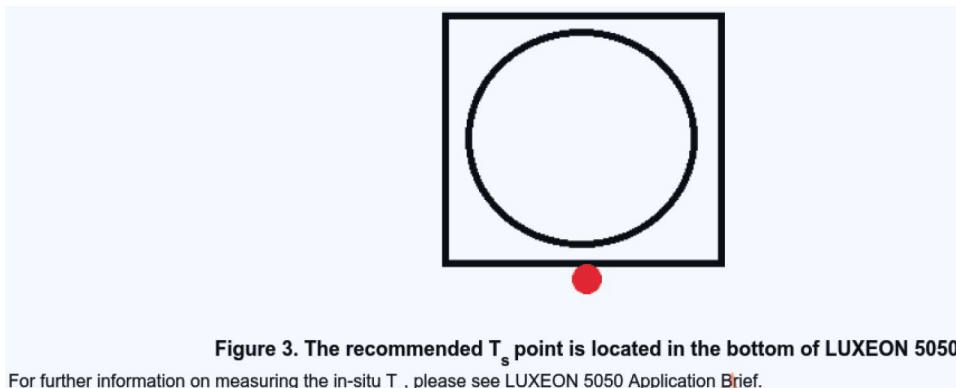
Annex 1: Photo document

Details of: Overview and Partial view



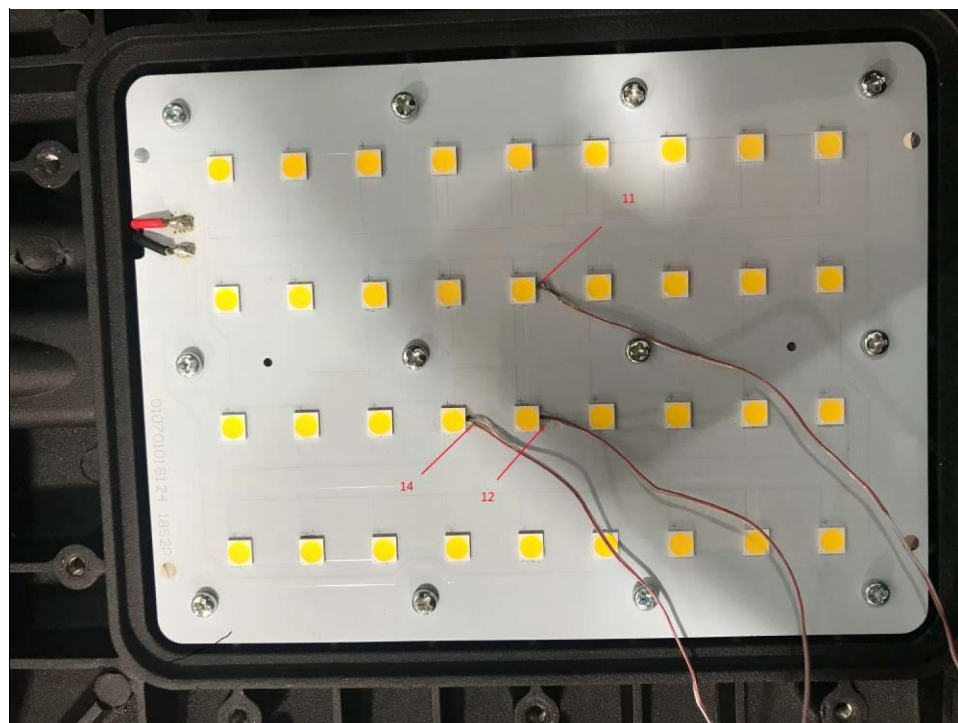
Annex 2: In-situ temperature measurements test (ISTMT)

Thermocouple Location on Temperature Measurement Point (TMP)



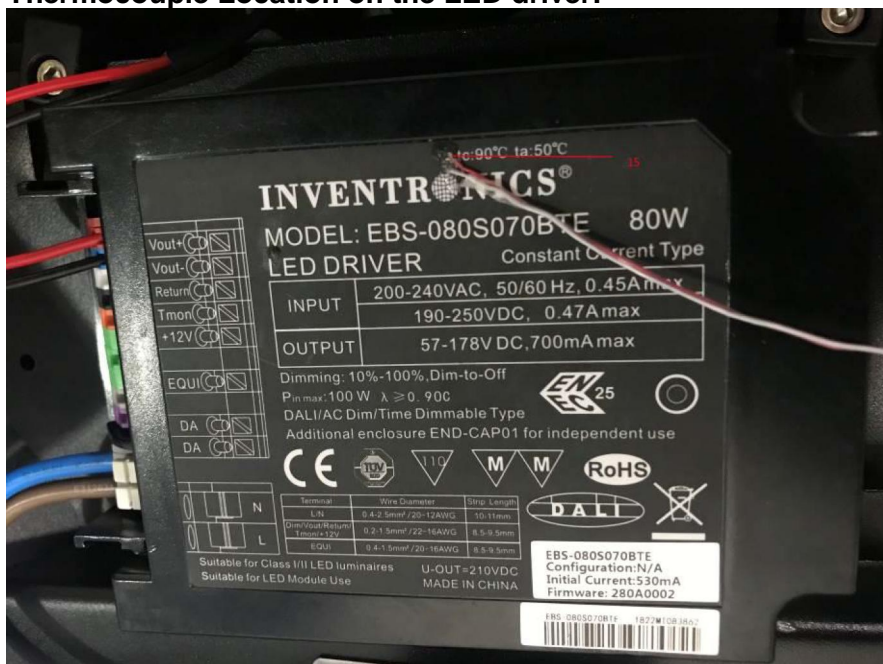
The temperature measurement point measured according to the LM-80 Test Report of Lumileds LCC. (IESNA LM-80 Test report of LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)/Generated on 2018-07-09/Report number S5aa issued to wei.gu@lumileds.com.cn on 2018-08-22 and LUXEON 5050 application brief).

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.

Thermocouple Location on the LED driver:



Result:

Input voltage:	230.1V	Input current:	344mA	Input wattage:	77.73W
PF	0.982	Test time:	220mins	Temperature stabilization time:	160mins
No.	Temperature (°C)		No.	Temperature (°C)	
	Measured	Corrected at 35°C		Measured	Corrected at 35°C
11	64.3	64.9	13	34.4	35.0
12	65.5	66.1	15	74.3	74.9
14	64.4	65.0	-	-	-

The highest in-situ measured temperature LED is 66.1 °C.

Remark:

- 1):11,12,14#: for the LED temperature measurement point;
- 2):15#: for tc of LED driver point;
- 2):13#: 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.

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

1. Percentage of initial lumens to project to L90



TM-21 Report

Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Description of LED Light Source Tested (manufacturer, model, catalog number)		Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)				$T_{s,1}$ (°C)	85.00
Test Condition 1 - 85°C Case Temp		Test Condition 2 - 105°C Case Temp				$T_{s,1}$ (K)	358.15
Sample size	20	Sample size	20	Sample size	-	α_1	2.636E-06
Number of failures	0	Number of failures	0	Number of failures	-	B_1	1.006
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)	-	$T_{s,2}$ (°C)	-
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	-	$T_{s,2}$ (K)	-
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)	-	α_2	-
Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	-	B_2	-
α	2.636E-06	α	3.104E-06	α	-	E_{θ}/k_{θ}	-
B	1.006	B	1.003	B	-	A	-
Reported L90(10k) (hours)	42,000	Reported L90(10k) (hours)	35,000	Reported L90(10k) (hours)	-	B_0	1.006
						$T_{s,i}$ (°C)	66.10
						$T_{s,i}$ (K)	339.25
						α_i	2.636E-06
						Reported L90(10k) at	42,000

2. Percentage of initial lumens to project to L80



TM-21 Report

Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Description of LED Light Source Tested (manufacturer, model, catalog number)		Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)				$T_{s,1}$ (°C)	85.00
Test Condition 1 - 85°C Case Temp		Test Condition 2 - 105°C Case Temp				$T_{s,1}$ (K)	358.15
Sample size	20	Sample size	20	Sample size	-	α_1	2.636E-06
Number of failures	0	Number of failures	0	Number of failures	-	B_1	1.006
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)	-	$T_{s,2}$ (°C)	-
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	-	$T_{s,2}$ (K)	-
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)	-	α_2	-
Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	-	B_2	-
α	2.636E-06	α	3.104E-06	α	-	E_{θ}/k_{θ}	-
B	1.006	B	1.003	B	-	A	-
Reported L80(10k) (hours)	>60000	Reported L80(10k) (hours)	>60000	Reported L80(10k) (hours)	-	B_0	1.006
						$T_{s,i}$ (°C)	66.10
						$T_{s,i}$ (K)	339.25
						α_i	2.636E-06
						Reported L80(10k) at	>60000

3. Percentage of initial lumens to project to L70



TM-21 Report

Table 1: Report at each LM-80 Test Condition						Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Description of LED Light Source Tested (manufacturer, model, catalog number)		Manufacturer: Lumileds LLC. Model: LUXEON 5050 with nominal CCT of 2700K (L150-2780502400000)				$T_{s,1}$ (°C)	85.00
						$T_{s,1}$ (K)	358.15
Test Condition 1 - 85°C Case Temp		Test Condition 2 - 105°C Case Temp				α_1	2.636E-06
Sample size	20	Sample size	20	Sample size	-	B_1	1.006
Number of failures	0	Number of failures	0	Number of failures	-	$T_{s,2}$ (°C)	-
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)	-	$T_{s,2}$ (K)	-
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	-	α_2	-
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)	-	B_2	-
Tested case temperature (°C)	85	Tested case temperature (°C)	105	Tested case temperature (°C)	-	E_a/k_b	-
α	2.636E-06	α	3.104E-06	α	-	A	-
B	1.006	B	1.003	B	-	B_0	1.006
Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	-	$T_{s,i}$ (°C)	66.10
						$T_{s,i}$ (K)	339.25
						α_i	2.636E-06
						Reported L70(10k) at	>60000

--- End of Report ---