IES TM-21 Lumen Maintenance Result Report

Report Number.....:	KEYS240522088002LD-01
Date of issue.....:	May 24, 2024
Total number of pages.....	9 pages
Tested by (name + signature)..... :	Sunny Li
Approved by (name + signature)...:	Jason Zhan

Testing Laboratory Name.....:	Guangdong KEYS Testing Technology Co., Ltd.
Address.....:	Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China
Applicant's name.....:	ZHONGSHAN Y-CHEN LIGHTING TECHNOLOGY CO.LTD
Address.....:	6F,01B,No.28, Kanglong N0.3Rd, Xinmao Industrial, Henglan Town, Zhongshan City
Manufacturer's name.....:	ZHONGSHAN Y-CHEN LIGHTING TECHNOLOGY CO.LTD
Address.....:	6F,01B,No.28, Kanglong N0.3Rd, Xinmao Industrial, Henglan Town, Zhongshan City
Test specification:	
Standard..... :	IES TM-21
Non-standard test method.....:	N/A

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Test item description.....:	LED STREET LIGHT
Trade Mark..... :	N/A
Model/type reference ……..	YC-S 028-50W S(small)
Manufacturer of LED driver…… :	TMX-50W 80-450V
LED driver surge protection……..	8KV
Model number of LED chip……..	PCT3030
LED Manufacturer ……. :	SHENZHEN LVMING PHOTOELECTRIC CO., LTD
Rating ……. :	AC85-375V, 50/60Hz, 50W

Summary of testing:
Tests performed (name of test and test clause): Test performed at 230Vac, 50Hz according to client requirement.
Testing location: **Guangdong KEYS Testing Technology Co., Ltd.** Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China
Copy of marking plate: **The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.**

Test item particulars ..... :	LED STREET LIGHT
Classification of installation and use ..... :	Class I
Supply Connection ..... :	Power supply cord
Possible test case verdicts:	
- test case does not apply to the test object ..... :	N/A
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement..... :	F (Fail)
Testing ..... :	
Date of receipt of test item ..... :	May 22, 2024
Date (s) of performance of tests ..... :	May 22, 2024, 2023 to May 24, 2024

General product information:

LED Module Information:

Model	Rated voltage	Rated Power	LED chip quantity(Pcs)	CRI (Ra)
YC-S 028 50W S (small)	AC85-375V, 50/60Hz	50W	60	80-85

LED specification:

Model	Manufacturer	If(mA)	Viewing angle
PCT3030	Shenzhen Mingtu Photoelectric Technology Co.,LTD	150	120°

ENERGY STAR® LM-80 Cover Sheet

Administrative Information

Tested subcomponent series:	N/A
Tested subcomponent model number:	PCT3030

DUT Identification

DUT manufacture's name:	Shenzhen Mingtu Photoelectric Technology Co., LTD
DUT identification,e.g., model number:	PCT3030
Description of DUT,including if the DUT is an LED package or module:	LED Package

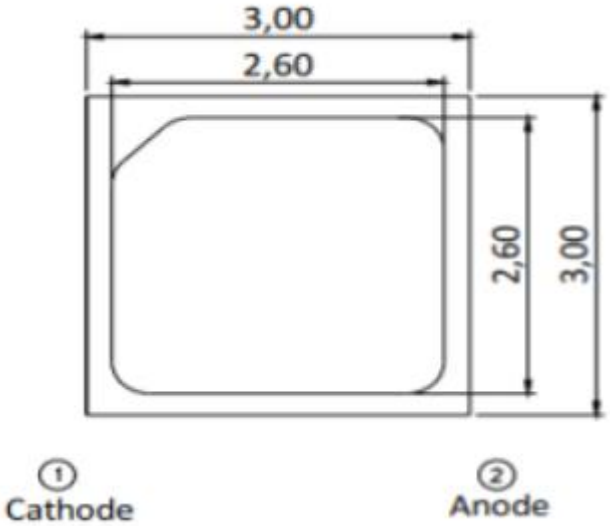
DUT Characteristics

Total input power(W):	1 W
Average current density per LED die(mA/mm^2):	302 mA/mm^2
Average power density per LED die(W/mm^2):	0.825 W/mm^2
Representative CRI(Ra) of the tested sample set: (Indicate whether the reported value is the mean or Median value of the sample set,or per unit)	80-85
Minimum die edge to die edge spacing:	0.15mm

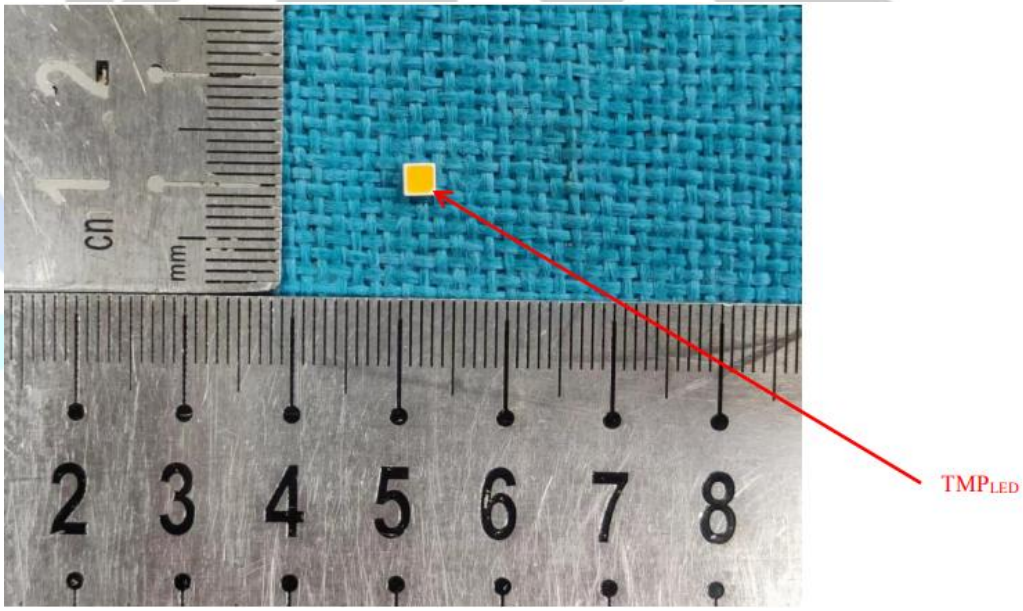
1. Test result:

In-situ case temperature measurements test location

The location of the Ts measurement point is shown below (According to LM-80 test report for Guangdong Meide Testing Technology Co., Ltd.).



The recommended Ts point is located in the bottom of PCT3030



Ts measurement

Tc measurement in LED Modules (downward)	
Model No. YC-S 028 50W S (small)	Test voltage
	AC230V
Tc measured in luminaire with relevant LED module	Temperature
1# to 3#	85°C, 95°C, 105°C
The highest in-situ temperature	105°C

Input current of LED measurement

If of LED, measurement in LED Modules	
Model No. PCT3030	Test voltage
	/
IF measured in luminaire with relevant LED	DC150mA

2. Lumen maintenance projection according to TM-21

LM-80 testing details

LM-80 Testing Details	
Total number of units tested per case temperature:	25
Number of failures:	0
Number of units measured:	25
Test duration (hours):	9000
Tested drive current (mA):	150
Tested case temperature 1 (T_c, ^{0}C):	85
Tested case temperature 2 (T_c, ^{0}C):	95
Tested case temperature 3 (T_c, ^{0}C):	105

Test data for 85°C; 95°C; 105°C case temperature

LM-80 Test Inputs

Test Data for 85°C Case Temperature		Test Data for 95°C Case Temperature		Test Data for 105°C Case Temperature	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
1000	100.16%	1000	100.07%	1000	99.98%
2000	99.96%	2000	99.80%	2000	99.67%
3000	99.75%	3000	99.56%	3000	99.38%
4000	99.54%	4000	99.34%	4000	99.09%
5000	99.33%	5000	99.11%	5000	98.83%
6000	99.11%	6000	98.92%	6000	98.54%
7000	98.91%	7000	98.68%	7000	98.30%
8000	98.70%	8000	98.43%	8000	98.12%
9000	98.49%	9000	98.21%	9000	97.91%

In-situ inputs

***In-Situ* Inputs**

Drive current for each LED package/array/module (mA):	150
In-situ case temperature (T_c, ^{0}C):	103
Percentage of initial lumens to project to (e.g. for L_{70}, enter 70):	90

Calculated of L70

Results

Time (t) at which to estimate lumen maintenance (hours):	9,000
Lumen maintenance at time (t) (%):	98.02%
Reported L90 (hours):	45,000

3. Conclusion

According to the method of IES TM-21-11, the rated lumen maintenance of product may 98.02% at 9000 hours.

4. " TM-21 Calculator"-Table 1: Report From at LM-80 Test Condition

Table 1: Report at each LM-80 Test Condition	
Description of LED Light Source Tested (manufacturer, model, catalog number)	ZHONGSHAN Y-CHEN LIGHTING TECHNOLOGY CO.LTD Model:YC-S 028 50W S (small)

Test Condition 1 - 85°C Case Temp	
Sample size	25
Number of failures	0
DUT drive current used in the test (mA)	150
Test duration (hours)	9,000
Test duration used for projection (hour to hour)	4,000 - 9,000
Tested case temperature (°C)	85
α	2.118E-06
B	1.004
Reported L90(9k) (hours)	52,000

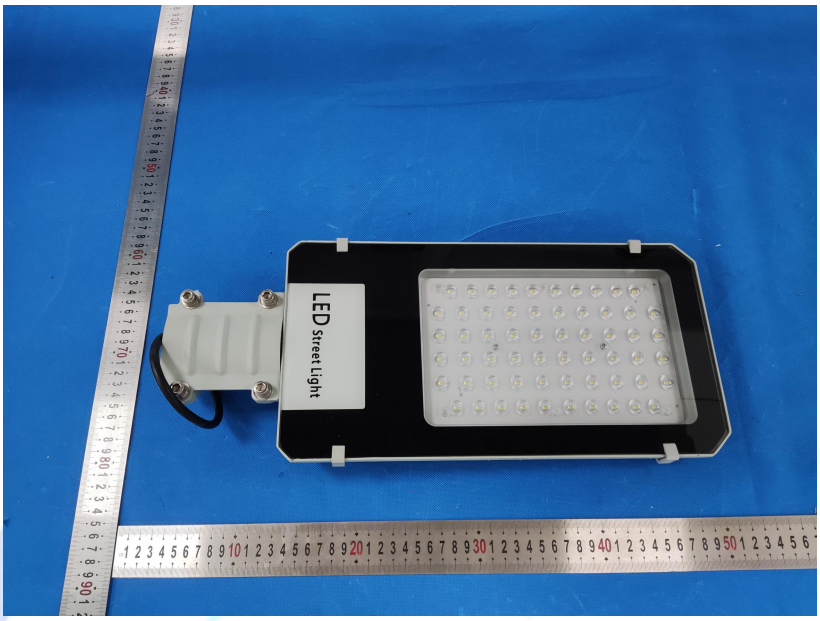
Test Condition 2 - 95°C Case Temp	
Sample size	25
Number of failures	0
DUT drive current used in the test (mA)	150
Test duration (hours)	9,000
Test duration used for projection (hour to hour)	4,000 - 9,000
Tested case temperature (°C)	95
α	2.294E-06
B	1.003
Reported L90(9k) (hours)	47,000

Test Condition 3 - 105°C Case Temp	
Sample size	25
Number of failures	0
DUT drive current used in the test (mA)	150
Test duration (hours)	9,000
Test duration used for projection (hour to hour)	4,000 - 9,000
Tested case temperature (°C)	105
α	2.399E-06
B	1.000
Reported L90(9k) (hours)	44,000

5. " TM-21 Calculator"-Table 2: Interpolation Report (projection based on in-situ temperature entered .

Table 2: Interpolation Report (projection based on *in-situ* temperature entered)	
$T_{s,1}$ (^{0}C)	95.00
$T_{s,1}$ (K)	368.15
α_1	2.294E-06
B_1	1.003
$T_{s,2}$ (^{0}C)	105.00
$T_{s,2}$ (K)	378.15
α_2	2.399E-06
B_2	1.000
E_a/k_b	6.24E+02
A	1.251E-05
B_0	1.001
$T_{s,i}$ (^{0}C)	103.00
$T_{s,i}$ (K)	376.15
α_i	2.378E-06
Reported L90(9k) at 103^{0}C (hours)	45,000

Product photo



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