

**COMMISSION REGULATION TM-21
On Behalf of**

Berdis Lighting (Zhong Shan)Co.,LTD.

For

LED Panel light

Model No.: B0401

Prepared for : Berdis Lighting (Zhong Shan)Co.,LTD.
6F,No.1, South 2nd Lane,HuaTai East Road,Caosan Industrial
Park,Guzhen Town,Zhongshan City,Guangdong Province,China

Prepared By : Shenzhen LCS Compliance Testing Laboratory Ltd.
B Area, 2F, Building B, Zhongyu Green High-tech Industrial
Park, Wenge Road, Heshuikou, Gongming Street, Guangming
New District, Shenzhen, Guangdong, China

Date of Test: April 11, 2016 – April 18, 2016

Date of Report: April 18, 2016

Report No.: LCS1604151208S

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Receive Product Date: April 11, 2016

Standard: TM-21

Testing laboratory: Shenzhen LCS Compliance Testing Laboratory Ltd.

Testing location: B Area, 2F, Building B, Zhongyu Green High-tech Industrial Park,
Wenge Road, Heshuikou, Gongming Street, Guangming New District,
Shenzhen, Guangdong, China

Application Name: Berdis Lighting (Zhong Shan)Co.,LTD.

Address of Application: 6F,No.1, South 2nd Lane,HuaTai East Road,Caosan Industrial
Park,Guzhen Town,Zhongshan City,Guangdong Province,China

Manufacturer Name: Berdis Lighting (Zhong Shan)Co.,LTD.

Address of Manufacturer: 6F,No.1, South 2nd Lane,HuaTai East Road,Caosan Industrial
Park,Guzhen Town,Zhongshan City,Guangdong Province,China

Contents: 6 pages

Product Name: LED Panel light

Model No. B0401

Trade mark BERDIS

Product information and Rated: AC: 220V~240V, 50/60Hz, 40W;DC: 42V~63V, 550mA

Reported by: Seth Cai

Approved by: Hart Qiu



Test Report:

1 TESTMETHODS

1.1 Lumen Maintenance Life Projection

The recommended method of lumen maintenance projection is to use a curve-fit to the collected data to extrapolate the lumen maintenance value to the time point where the luminous flux output decreases to the minimum acceptable level (for example, 70% of initial luminous flux). That time point is the lumen maintenance life. The same curve-fit of the collected data can also be used to determine the luminous flux output level at given future time points (i.e. 25000 hours, 35000 hours). This method is applied separately for each set of DUT test data collected at each operational (e.g., drive current) and environmental (e.g., case temperature) condition as specified in IES LM-80-08.

1.2 In-Situ Temperature Measurement Test (ISTMT)

LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Hybrid Recorder. The SSL sample was allowed to reach thermal equilibrium before measurements were taken. Source temperature measurements were measured at the TMPps or Ts point as indicated by the included diagram in accordance with manufacturers declared hot spot location. The maximum temperature was recorded for the Sample.

1.3 Arrhenius Interpolation of LM-80 Data at In-Situ Temperature Point

When in-situ DUT case temperature, $T_{s,i}$, is different from the temperatures used for LM-80-08 tests (e.g., 55°C, 85°C, and a third temperature provided by the DUT manufacturer), the following procedures should be used to predict lumen maintenance life of the DUTs corresponding to the in-situ case temperature with the same operational condition (e.g., drive current).

Calculations:

3

| | |
|---|------------|
| Minimum Case Temperature ($T_{s,1}$) for Extrapolation (K): | 328.15 |
| α_1 | 0.0000 |
| B_1 | 1.0184 |
| Maximum Case Temperature ($T_{s,2}$) for Extrapolation (K): | N/A |
| α_2 | N/A |
| B_2 | N/A |
| E_a/k_b | |
| k_b (eV/K) | 8.6173E-05 |
| E_a (eV) | |
| A | |
| B_0 | 1.0184 |
| In Situ Case Temperature ($T_{s,i}$) (K): | 327.35 |
| α_i | 0.0000 |
| Calculated L70 (hrs): | 51000 |
| Reported L70 (hrs): | 51000 |

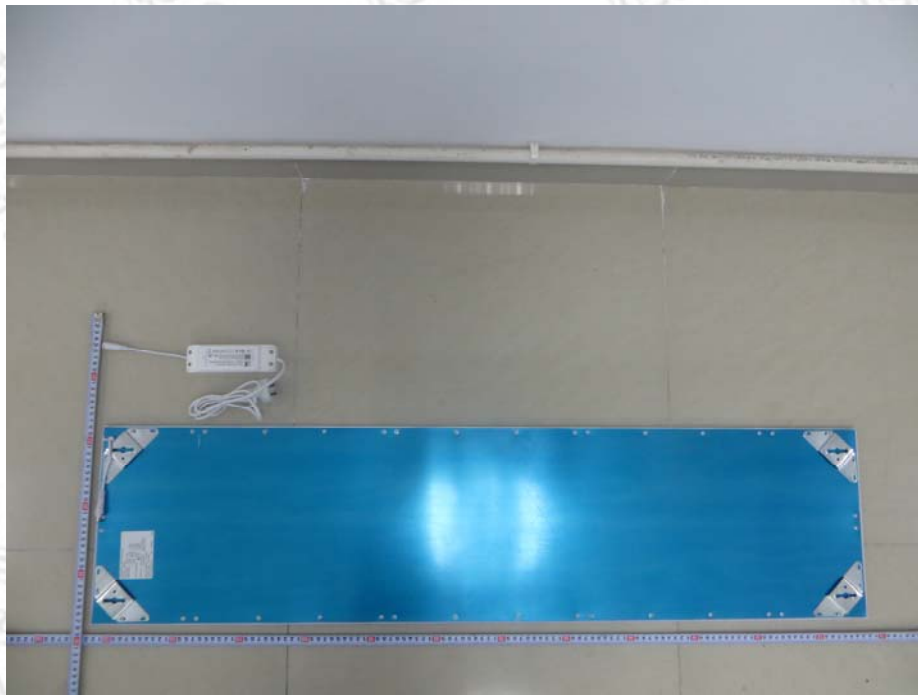
Table 1: Report at each LM-80 Test Condition

| Case Temperature 1 | | Case Temperature 2 | | Case Temperature 3 | |
|-----------------------|----------|-----------------------|----------|-----------------------|----------|
| Temperature (°C): | 55 | Temperature (°C): | 85 | Temperature (°C): | 105 |
| Temperature (°K): | 328.15 | Temperature (°K): | 358.15 | Temperature (°K): | 378.15 |
| α : | 7.34E-06 | α : | 1.14E-05 | α : | 8.14E-06 |
| B: | 1.02 | B: | 1.03 | B: | 0.98 |
| Calculated L70 (hrs): | 51000 | Calculated L70 (hrs): | 34000 | Calculated L70 (hrs): | 42000 |
| Reported L70 (hrs): | 51000 | Reported L70 (hrs): | 34000 | Reported L70 (hrs): | 42000 |

Table 2: Report for Interpolation (based on in-situ temperature)

| | |
|----------------|------------|
| $T_{s,1}$ (°C) | 55.00 |
| $T_{s,1}$ (K) | 328.15 |
| α_1 | 7.3410E-06 |
| B_1 | 1.0184 |
| $T_{s,2}$ (°C) | |
| $T_{s,2}$ (K) | N/A |
| α_2 | N/A |
| B_2 | N/A |
| E_a/k_b | |
| A | |
| B_0 | 1.0184 |
| $T_{s,i}$ (°C) | 54.2 |
| $T_{s,i}$ (K) | 327.35 |
| α_i | 7.3410E-06 |

ATTACHMENT: Photos of the sample





TM-21 Inputs

Instructions

Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.

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 1". For only two case temperature data sets, complete 1 and 2.

Next, further to the right, in the corresponding box(es) 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.

Enter drive current, *in-situ* temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".

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".

LM-80 Test Inputs

| Description of LED Light Source Tested (manufacturer, model, catalog number) | |
|--|--|
| Berdis Lighting (Zhong Shan)Co.,LTD. , B0401 | |

| LM-80 Testing Details | |
|--|-------|
| Total number of units tested per case temperature: | 20 |
| Number of failures: | 0 |
| Number of units measured: | 20 |
| Test duration (hours): | 10000 |
| Tested drive current (mA): | 60 |
| Tested case temperature 1 (T _{cr} , ° C): | 55 |
| Tested case temperature 2 (T _{cr} , ° C): | 85 |
| Tested case temperature 3 (T _{cr} , ° C): | 105 |

| Test Data for 55° C Case Temperature | | Test Data for 85° C Case Temperature | | Test Data for 105° C Case Temperature | |
|--------------------------------------|-----------------------|--------------------------------------|-----------------------|---------------------------------------|-----------------------|
| Time (hours) | Lumen Maintenance (%) | Time (hours) | Lumen Maintenance (%) | Time (hours) | Lumen Maintenance (%) |
| 1000 | 100.08% | 1000 | 99.87% | 1000 | 99.50% |
| 2000 | 99.59% | 2000 | 98.80% | 2000 | 97.82% |
| 3000 | 98.82% | 3000 | 98.24% | 3000 | 95.74% |
| 4000 | 98.28% | 4000 | 97.84% | 4000 | 94.72% |
| 5000 | 97.85% | 5000 | 97.40% | 5000 | 94.30% |
| 6000 | 97.42% | 6000 | 96.68% | 6000 | 93.71% |
| 7000 | 97.02% | 7000 | 95.73% | 7000 | 92.71% |
| 8000 | 96.43% | 8000 | 94.71% | 8000 | 92.24% |
| 9000 | 95.45% | 9000 | 93.69% | 9000 | 91.39% |
| 10000 | 94.21% | 10000 | 91.83% | 10000 | 90.52% |

In-Situ Inputs

| | |
|---|------|
| Drive current for each LED package/array/module (mA): | 60 |
| In-situ case temperature (T _{cr} , ° C): | 54.2 |
| Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70): | 70 |

Results

| | |
|--|--------|
| Time (t) at which to estimate lumen maintenance (hours): | 10,000 |
| Lumen maintenance at time (t) (%): | 94.64% |
| Reported L70 (hours): | 51,000 |



TM-21 Report

Table 1: Report at each LM-80 Test Condition

| Description of LED Light Source Tested (manufacturer, model, catalog number) | | Berdis Lighting (Zhong Shan)Co.,LTD. , B0401 | | | |
|---|----------------|--|----------------|--|----------------|
| Test Condition 1 - 55° C Case Temp | | Test Condition 2 - 85° C Case Temp | | Test Condition 3 - 105° C Case Temp | |
| Sample size | 20 | Sample size | 20 | Sample size | 20 |
| Number of failures | 0 | Number of failures | 0 | Number of failures | 0 |
| DUT drive current used in the test (mA) | 60 | DUT drive current used in the test (mA) | 60 | DUT drive current used in the test (mA) | 60 |
| Test duration (hours) | 10,000 | Test duration (hours) | 10,000 | Test duration (hours) | 10,000 |
| 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) | 5,000 - 10,000 |
| Tested case temperature (° C) | 55 | Tested case temperature (° C) | 85 | Tested case temperature (° C) | 105 |
| α | 7.341E-06 | α | 1.141E-05 | α | 8.138E-06 |
| B | 1.018 | B | 1.035 | B | 0.983 |
| Reported L70(10k) (hours) | 51,000 | Reported L70(10k) (hours) | 34,000 | Reported L70(10k) (hours) | 42,000 |

**Table 2: Interpolation Report
(projection based on *in-situ* temperature entered)**

| | |
|--------------------------------------|-----------|
| $T_{s,1}$ (° C) | 55.00 |
| $T_{s,1}$ (K) | 328.15 |
| α_1 | 7.341E-06 |
| B_1 | 1.018 |
| $T_{s,2}$ (° C) | - |
| $T_{s,2}$ (K) | - |
| α_2 | - |
| B_2 | - |
| E_a/k_b | - |
| A | - |
| B_0 | 1.018 |
| $T_{s,i}$ (° C) | 54.20 |
| $T_{s,i}$ (K) | 327.35 |
| α_i | 7.341E-06 |
| Reported L70(10k) at 54.2° C (hours) | 51,000 |

| | |
|--|--|
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| | |