



Shenzhen Belling Efficiency Testing Lab Co., Ltd
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Project No.: BLTMT210713-14

Test report

LED Street Light

DR-ST120-DGXPM

(X represent CCT, can be W=3000K, N=4000K, D=5000K, C1=5700K, C2=6000K, C3=6500K)

Tested under

Luminaires - ANSI/UL 1598:2008 (Secs. 19.7, 19.10-16)
ANSI/IES LM-80-15
IES TM-21-11
IES LM-84-14

Applicant:

DUALRAYS LIGHTING Co.,LTD.

3rd Floor, Building A3 | Tianrui Industrial Park | #35, Fuyuan 1st Road, Fuyong Town, Bao'an Dist |
Shenzhen 518103, Guangdong Province, RPC

Prepared By:

Shenzhen Belling Efficiency Testing Lab Co.,Ltd
1 Floor, No. 1 Building, Meibaoh Industrial Park, Dalang Street, Longhua District,
Shenzhen, Guangdong Prov. 518101, China

Complied by: Jovan zhi

Review by: Jason zhou

Project Engineer

Technical Manager

Note 1: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or use in part without prior written consent from Shenzhen Belling Efficiency Testing Lab Co.,Ltd. This report must not be used by the customer to claim product certification, approval, or endorsement By NVLAP, NIST, or any agency of the U.S. Government.

Note 2: IES TM-21-11: this test method are not in NVLAP accreditation scope.



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Test description: Only conduct temperature for LED according to UL1598.

Test Lab:	Shenzhen Belling Efficiency Testing Lab Co.,Ltd
Address:	1 Floor, No. 1 Building, Meibaohe Industrial Park, Dalang Street, Longhua District, Shenzhen, Guangdong Prov. 518101, China.

Environment:	
Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3, 5.3.4)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Personnel:	
Lab Management shall authorize personnel to operate particular types of equipment used in testing. (ISO/IEC 17025 5.2.5)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Equipment:	
Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.5.1, 5.5.2, 5.5.4, 5.5.5, 5.5.8,)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Calibrations for testing equipment are traceable to SI Units. Refer to 00-OP-C0032 (Calibration Certificate Analysis). (ISO/IEC 17025 5.6.2.2)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Critical Consumables:	
Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Sample Identification:	
Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Summary:	
The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.	

Description:

Declaration: Revolution Lighting Technologies declare that their product with model DR-ST120-DGXPM are the same to the product in the report BLTMT210713-04 and is authorized by original applicant to use their test data.

Note: All the data in previous report BLTMT210713-04 is shared in report.



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TEST EQUIPMENT INFORMATION

	BELL #	Equipment Description	Model No.	Manufacturer	Serial No.	Last Cal	Cal Due	Cal Freq
1	BL802	Power meter	PF9811	Everfine	G185824 CM13711 40	2021-04-26	2022-04-25	1 year
2	BL804	Hybrid Recorder	34970A	AGILEN T	MY41027 391	2021-04-20	2022-04-19	1 year
3	BL883	Environment Measurer	8813	Deli	N/A	2021-04-22	2022-04-21	1 year
4	BL861	Hybrid Recorder	34970A	KEYSIG HT	MY44095 108	2021-04-20	2022-04-19	1 year
5	BL834- 1	Thermocouple K	Type K	OMEGA	23736-1	2021-04-22	2022-04-21	1 year
6	BL826	Stop watch	K610	KISLO	N/A	2021-04-23	2022-04-22	1 year



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TEST SAMPLE IDENTIFICATION:

The table below is provided to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Model No.	Test No.+	Sample No.	Ratings
DR-ST120-DGXPM	S1-S25	S1	AC 100-277V, 50/60Hz, 120W

Applicant:	DUALRAYS LIGHTING Co.,LTD.
Applicant Address:	3rd Floor, Building A3 Tianrui Industrial Park #35, Fuyuan 1st Road, Fuyong Town, Bao'an Dist Shenzhen 518103, Guangdong Province, RPC
Brand Name:	 <i>Intelligent . Healthy . Efficient</i>
Manufacturer:	DUALRAYS LIGHTING Co.,LTD.
Manufacturer Address:	3rd Floor, Building A3 Tianrui Industrial Park #35, Fuyuan 1st Road, Fuyong Town, Bao'an Dist Shenzhen 518103, Guangdong Province, RPC
Product Description:	LED Street Light
Date Received:	2021-06-17
Date of Test:	2021-06-17 to 2021-06-28
Date of Issue:	2021-07-15



METHOD

GENERAL REQUIREMENTS PERTAINING TO SURFACE MOUNTED LUMINAIRES

Unless otherwise noted under METHOD, General requirements are applied.

The test was conducted in a draft-free room as specified in clause 19.10.3 or 19.11.3.

The rated wattage of any lamp used for the temperature test was the highest wattage rating marked on the luminaire.

INSTALLATION AND SUPPORT (Clause 19.1)

The luminaire was installed or supported to simulate intended usage, in accordance with the manufacturer's instructions. Where more than one installation methods are specified the luminaire was installed to result in the maximum operating temperatures.

A luminaire part designed to be adjustable by the user was positioned or adjusted to cause maximum heating of the luminaire, mounting surface, or both.

A luminaire part that was marked in accordance with Table 20.1.1, Item 2.31, was positioned for the temperature test in accordance with the marking.

TEMPERATURE TEST STABILIZATION (Clause 19.2)

Temperatures were measured after they stabilized, when:

The test was run for a minimum of 7.5 h. or the test was run for a minimum of 3 h, and then three successive readings taken at 15 min intervals were within 1°C of one another and not rising. (Temperature shall be measured **after** the test has been running for a minimum of 3 h)



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FREQUENCY (Clause 19.4)

Frequency-sensitive equipment was tested at rated frequency, and equipment marked with more than one frequency was tested at the frequency that produced the maximum temperature rise.

AMBIENT TEMPERATURE (Clause 19.5)

The tests were conducted in an ambient temperature of $25 \pm 5^\circ\text{C}$. Ambient temperature variations above or below 25°C were respectively subtracted from or added to temperatures recorded at points on the luminaire.

The ambient temperature was measured by means of a thermocouple or thermometer.

The thermocouple intended to measure ambient temperature was immersed in 0.5 oz (15 ml) of mineral oil in a glass container or attached to a metal mass of approximately 1 oz (30 g) that was within a cylindrical metal shield open at the top and bottom. The glass container or cylindrical metal shield was placed in the horizontal plane passing through the midpoint of the luminaire's vertical axis at a horizontal distance from the luminaire equal to at least 3 times the luminaire diameter.

[] Tests were conducted in an elevated ambient temperature with a source of heated air providing the elevated temperature for which the luminaire was marked. The maximum airflow past the luminaire was less than 9.1 m/min (30 ft/min). Maximum variations of 5°C from the intended ambient temperature was added to or subtracted from the observed temperature readings.

THERMOCOUPLES:

Reference Section 19.7 of UL 1598.

THERMOCOUPLES CONTACT:

Thermocouples were in contact with the TMP LED location described in LM-80 test report. In order to gain the maximum temperature, if appropriate, more than one thermocouple were contact in these locations. For details information, please refer to clause 3.3 for the photo of thermocouple contact.



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TEST RESULTS

Test Model No.:	DR-ST120-DGXPM
LED Driver Model No.:	HLG-120H-48A
LED Package/Module No.:	01.JT.81M5050W80N02
Rating of LED Package/Module:	200mA
Manufacturer of LED Package/ Module:	SHENZHEN JUFEI OPTOELECTRONICS CO.,LTD.

Input Voltage (V):	120
Input Power (W):	121.1
LED Board Input Current (mA):	2534
Single LED Input Current (mA):	63.35

Sample No.:	S1	S2	S3	S4	S5
LED Ts/°C (Temperature at soldering board):	60.84	60.76	59.60	62.31	63.05
Sample No.:	S6	S7	S8	S9	S10
LED Ts/°C (Temperature at soldering board):	60.53	58.57	57.74	58.29	61.15
Sample No.:	S11	S12	S13	S14	S15
LED Ts/°C (Temperature at soldering board):	61.80	60.11	60.13	61.23	61.04
Sample No.:	S16	S17	S18	S19	S20
LED Ts/°C (Temperature at soldering board):	59.10	63.79	63.93	58.20	64.19
Sample No.:	S21	S22	S23	S24	S25
LED Ts/°C (Temperature at soldering board):	58.78	61.48	61.12	59.95	63.41
LED Driver/°C (Temperature at Tc):	43.34				
Total operated period(hours):	4				
Ambient °C :	25.00				
Test Ambient:	25.36				

Lumen Maintenance Projection(IESNA TM-21-11 Method)

50000hrs at which to estimate lumen maintenance:	91.04%
Forward current on each LED light source:	63.35mA
Reported L ₇₀ lumen maintenance life:	>60000hours
Reported L ₉₀ lumen maintenance life:	56000hours

Note: Please refer to appendix B and C for details of TM-21 inputs and report.



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Temperature Interpolation

Test data from LM-80 report issued by BEST Test Service Shenzhen Co., Ltd. was referenced to calculate the lumen maintenance life according to IES TM-21-11.

Sample No.	50000hrs at which to estimate lumen maintenance	Reported L ₇₀ lumen maintenance life	Reported L ₈₀ lumen maintenance life	Reported L ₉₀ lumen maintenance life
S1	91.04%	>60000	>60000	56000
S2	91.04%	>60000	>60000	56000
S3	91.06%	>60000	>60000	57000
S4	91.02%	>60000	>60000	56000
S5	91.01%	>60000	>60000	56000
S6	91.05%	>60000	>60000	56000
S7	91.08%	>60000	>60000	57000
S8	91.09%	>60000	>60000	57000
S9	91.08%	>60000	>60000	57000
S10	91.04%	>60000	>60000	56000
S11	91.03%	>60000	>60000	56000
S12	91.05%	>60000	>60000	57000
S13	91.05%	>60000	>60000	57000
S14	91.03%	>60000	>60000	56000
S15	91.04%	>60000	>60000	56000
S16	91.07%	>60000	>60000	57000
S17	90.99%	>60000	>60000	56000
S18	90.99%	>60000	>60000	56000
S19	91.08%	>60000	>60000	57000
S20	90.99%	>60000	>60000	56000
S21	91.07%	>60000	>60000	57000
S22	91.03%	>60000	>60000	56000
S23	91.04%	>60000	>60000	56000
S24	91.05%	>60000	>60000	57000
S25	91.00%	>60000	>60000	56000

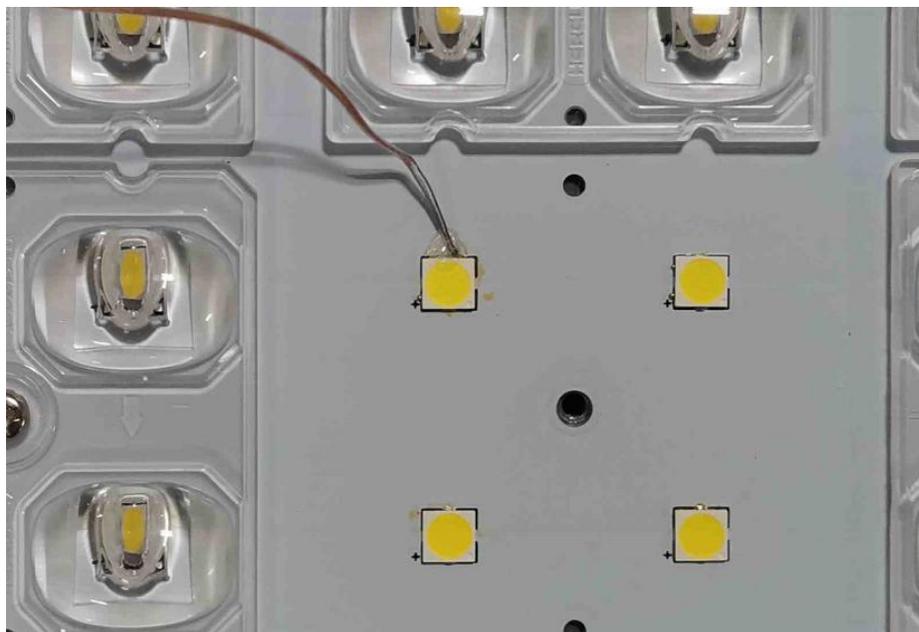
Projected from Reported:

$$L_{90}B_{50} \geq 56000\text{hrs}$$



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Test Photos for LEDs:





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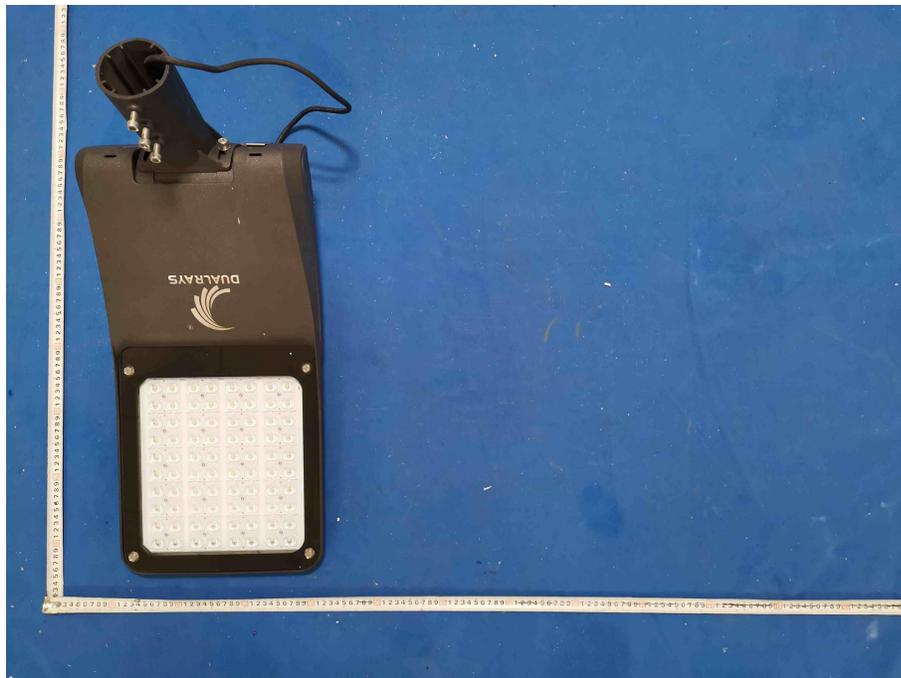
Test Photos for LED Drivers:





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EUT Photos:

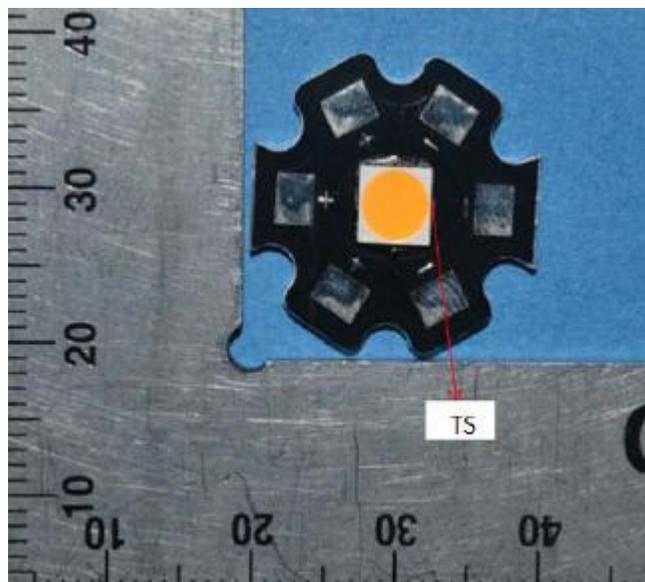




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Appendix A: LM-80 report summary

Report originated by:	BEST Test Service Shenzhen Co., Ltd.		
Manufactured by:	SHENZHEN JUFEI OPTOELECTRONICS CO.,LTD.		
LM-80 report No.:	BTR66.181.18.0011.20		
LED Model:	01.JT.81M5050W80N02		
Number of LED light source tested:	25 units		
Drive Current:	200mA		
Case temperature:	55°C	85°C	105°C
10000 hours lumen maintenance:	97.98%	97.47%	97.19%
10000 hours color maintenance($\Delta u'v'$):	0.0030	0.0039	0.0042





Appendix B: TM-21 Input

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".

Description of LED Light Source Tested (manufacturer, model, catalog number)		LM-80 Test Inputs					
		Test Data for 55° C Case Temperature		Test Data for 65° C Case Temperature		Test Data for 105° C Case Temperature	
		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
Jufei 01_JT.81M5050W80N02		1000	99.29%	1000	98.85%	1000	98.79%
		2000	99.21%	2000	98.76%	2000	98.69%
		3000	99.11%	3000	98.65%	3000	98.56%
		4000	98.99%	4000	98.53%	4000	98.41%
		5000	98.86%	5000	98.39%	5000	98.25%
		6000	98.72%	6000	98.24%	6000	98.07%
		7000	98.55%	7000	98.08%	7000	97.86%
		8000	98.39%	8000	97.90%	8000	97.65%
		9000	98.21%	9000	97.70%	9000	97.42%
		10000	97.98%	10000	97.47%	10000	97.19%

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):	10000
Tested drive current (mA):	200
Tested case temperature 1 (T _c ° C):	55
Tested case temperature 2 (T _c ° C):	85
Tested case temperature 3 (T _c ° C):	105

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	63.35
In-situ case temperature (T _c ° C):	60.84
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):	50,000
Lumen maintenance at time (t) (%):	91.04%
Recorded L ₇₀ (hours):	≈80000



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Appendix C: TM-21 Report

Description of LED Light Source Tested (manufacturer, model, catalog number)		Test Condition 2 - 85° C Case Temp		Test Condition 3 - 105° C Case Temp	
Sample size		Sample size	25	Sample size	25
Number of failures		Number of failures	0	Number of failures	0
DUT drive current used in the test (mA)		DUT drive current used in the test (mA)	200	DUT drive current used in the test (mA)	200
Test duration (hours)		Test duration (hours)	10,000	Test duration (hours)	10,000
Test duration used for projection (hour to hour)		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)		Tested case temperature (° C)	85	Tested case temperature (° C)	105
α		α	1.867E-06	α	2.181E-06
B		B	0.993	B	0.994
Reported L70(10k) (hours)		Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	>60000

Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
T _{s,1} (° C)	55.00
T _{s,1} (K)	328.15
α ₁	1.768E-06
B ₁	0.998
T _{s,2} (° C)	85.00
T _{s,2} (K)	358.15
α ₂	1.867E-06
B ₂	0.993
E _s /k _s	2.14E+02
A	3.394E-06
B ₀	0.996
T _{s,i} (° C)	60.84
T _{s,i} (K)	333.99
α _i	1.788E-06
Reported L70(10k) at 60.84° C (hours)	>60000

End of Report