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Test report of

## **IES LM-79-08**

**Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products**

Rendered to:

Imminent Teknologies Limited  
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For products:

LED downlight

Models No.:

BLU-RETRO-A-9W-827-38

**Test Date:** Mar. 13, 2021 to Mar. 15, 2021

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**Test Note:** N/A

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## 1. General

### 1.1 Product Information

Brand Name	BLUi Lighting
Product Type	LED downlight
Model Number	BLU-RETRO-A-9W-827-38
Rated Inputs	220-240VAC, 50/60Hz
Rated Power	9W
Rated Light output	820lm
Declared CCT	2700K
Power Supply	Model: LC 10/250/40 fix C SR SNC2, Brand Name: TRIDONIC
LED Package, Array or Module	CREE CXA 1307
Receipt Samples	1 unit
Sample Code of lab.	210311103001
Date of Receipt Samples	Jan. 30, 2021
Note	-

**1.2 Standards or methods**

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011 or 2015 or 2017	Specifications for the Chromaticity of Solid State Lighting Products
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

**1.3 Equipment list**

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2020-12-23	2021-12-22
AC Power supply	LC-I-989	APW-120N	2020-12-23	2021-12-22
Power analyzer	LC-I-928	WT210	2020-12-25	2021-12-24
Power analyzer	LC-I-954	WT210	2020-12-25	2021-12-24
Multimeter	LC-I-972	Fluke 17B	2020-07-20	2021-07-19
Photometric colorimetric electric system* (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp**	LC-PL-I-011	D204C	2020-07-14	2021-07-13
Luminous Flux Standard Lamp***	LC-PL-I-003	24V100W	2020-07-14	2021-07-13
Goniophotometer(with mirror)	LC-I-902	GMS2000	2020-04-23	2021-04-22
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2020-12-24	2021-12-23
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2020-12-24	2021-12-23

Note:

\* Bandwidth of spectroradiometer is 1 nm.

\*\* halogen lamp, 100W, omni-directional type, and its traceability to NIM.

\*\*\* halogen lamp, 100W, omni-directional type, and its traceability to NIM.

## 2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

### 2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ; the air flow around the sample(s) being tested did not affect the performance.

### 2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (50 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within  $\pm 0.2$  percent under load.

### 2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

### 2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent (95 % confidence interval,  $k=2$ ).

### 2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

### 2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

### 2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

### 2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.

### 3. Test Result Summary

#### 3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	230.05 V~50Hz	230.00 V~50Hz
Input Current(A)	0.083	0.082
Total Power(W)	10.61	10.66
Power Factor	0.555	0.566
I-THD	-	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	756.01
Luminaire Efficacy(Lm/W)	-	70.92
Correlated Color Temperature (CCT)(K)	2689	-
Color Rendering Index (CRI)	82.4	-
R9	7	-
Chromaticity Coordinate (x,y)	x = 0.4606 y = 0.4105	-
Chromaticity Coordinate (u,v)	u = 0.2630 v = 0.3516	-
Chromaticity Coordinate (u',v')	u' = 0.2630 v' = 0.5274	-
Duv	-0.0001	-
Zone Lumens between 0-60 °	-	99.40%
Beam Angle(50%Imax)	-	C0/180=37.6° C90/270=37.8°

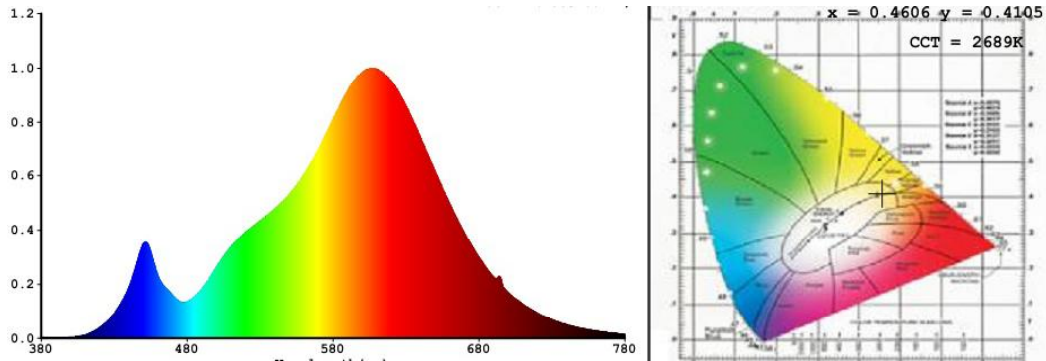
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
81	91	96	81	81	90	82	57
R9	R10	R11	R12	R13	R14	R15	-
7	80	81	76	83	99	73	-

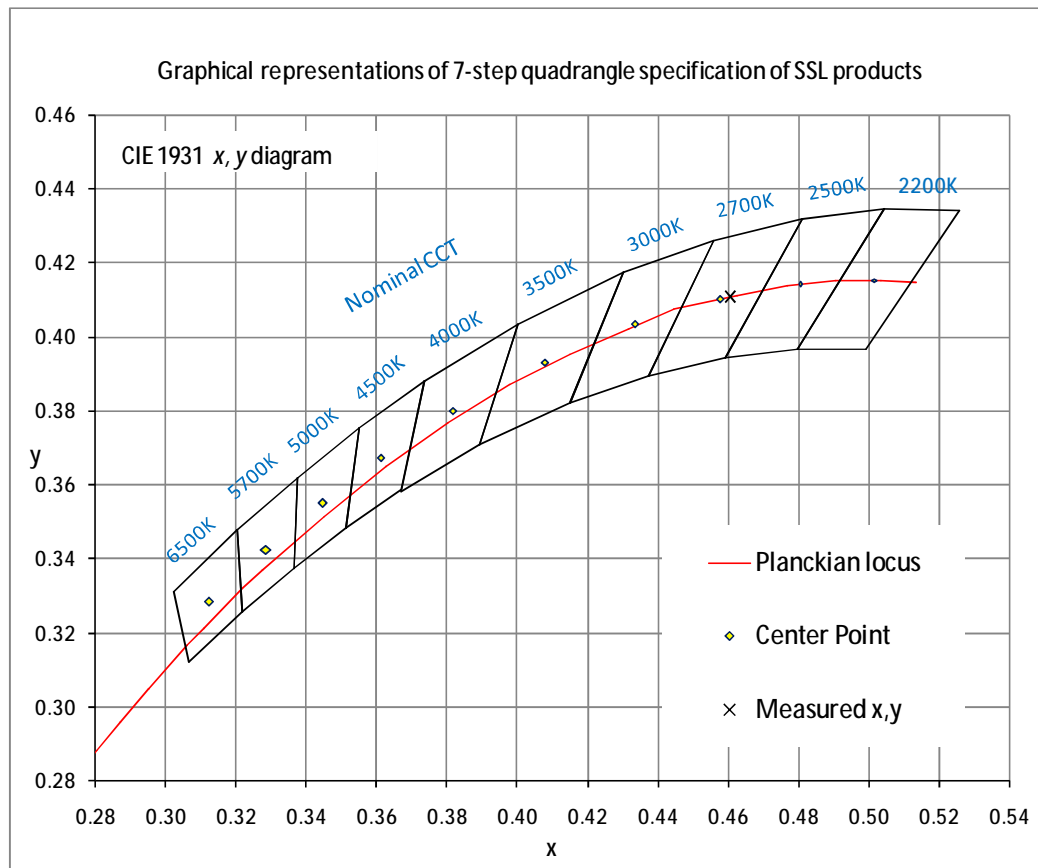
Note: N/A

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram



**4.3 Goniometry Test Data**

CIE Type	Direct	Basic Luminous Shape	Circular
Spacing Criteria (0-180)	0.62	Luminous Length	0.07 m (Diameter)
Spacing Criteria (90-270)	0.62	Luminous Width	0.07 m (Diameter)
Spacing Criteria (Diagonal)	0.64	Luminous Height	0.00 m
Test Distance	30.13 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	456.35	60.40	60.40
0-30	686.14	90.80	90.80
0-40	737.96	97.60	97.60
0-60	751.15	99.40	99.40
0-80	754.39	99.80	99.80
0-90	754.58	99.80	99.80
10-90	605.14	80.00	80.00
20-40	281.61	37.20	37.20
20-50	289.87	38.30	38.30
40-70	15.61	2.10	2.10
60-80	3.25	0.40	0.40
70-80	0.83	0.10	0.10
80-90	0.19	0.00	0.00
90-110	0.00	0.00	0.00
90-120	0.00	0.00	0.00
90-130	0.00	0.00	0.00
90-150	0.08	0.00	0.00
90-180	1.43	0.20	0.20
110-180	1.43	0.20	0.20
0-180	756.01	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

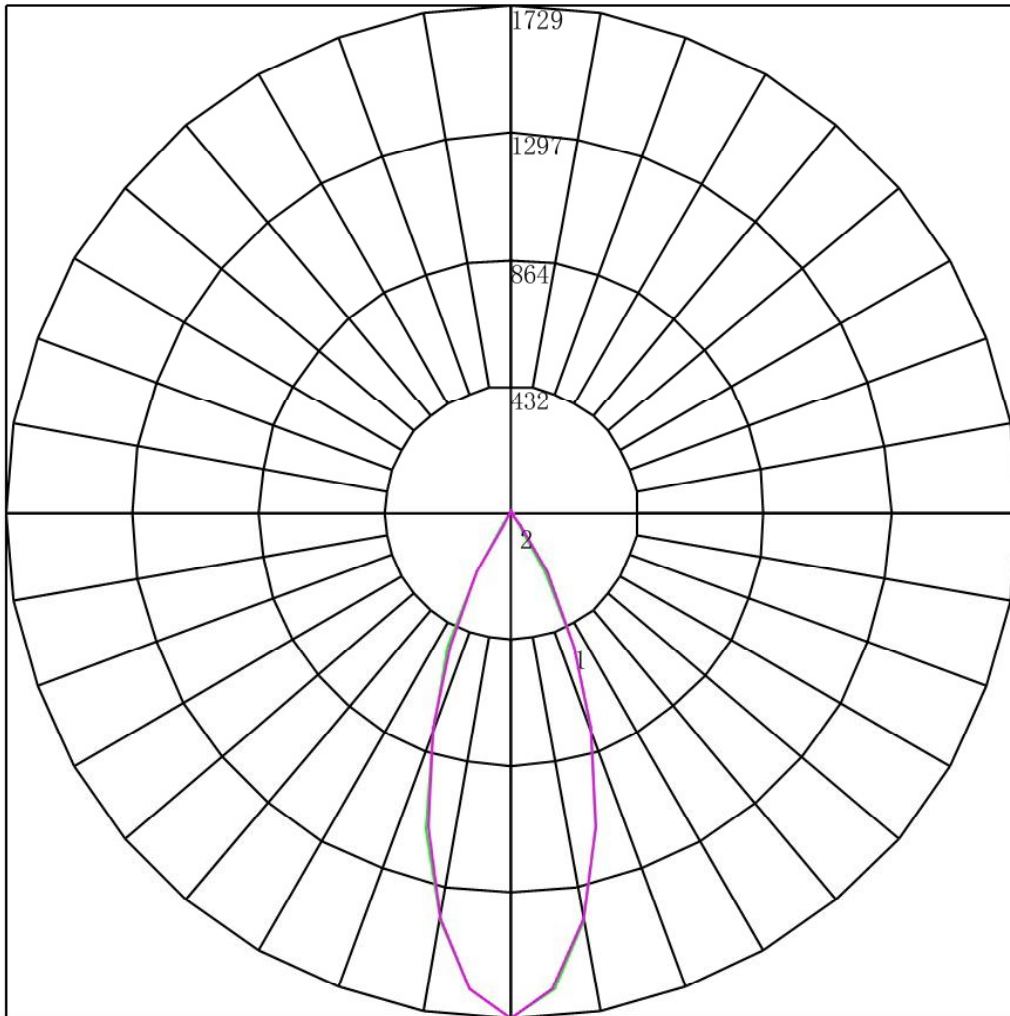
Zone	Lumens
0-10	149.44
10-20	306.90
20-30	229.79
30-40	51.82
40-50	8.26
50-60	4.93
60-70	2.42
70-80	0.83
80-90	0.19
90-100	0.00
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.08
150-160	0.45
160-170	0.64
170-180	0.27





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4.5 Polar Curves



Maximum Candela = 1728.907 Located At Horizontal Angle = 0, Vertical Angle = 0

# 1 - Vertical Plane Through Horizontal Angles (0 - 180)

# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



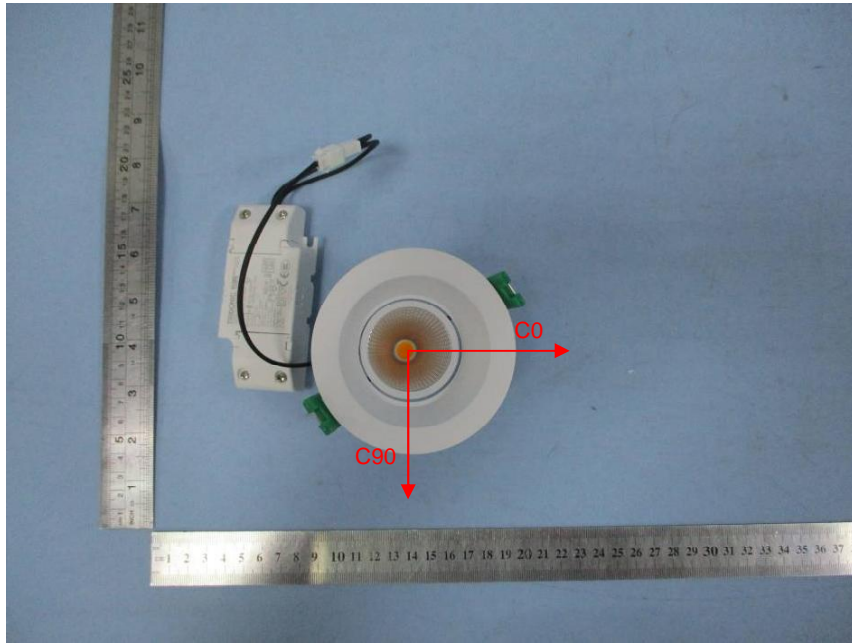
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4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	1728.907	1728.907	1728.907	1728.907	1728.907	1728.907	1728.907
<b>5</b>	1639.548	1640.380	1640.858	1638.507	1636.715	1634.967	1634.537
<b>10</b>	1416.564	1417.436	1417.256	1415.291	1413.567	1408.869	1409.226
<b>15</b>	1122.742	1121.026	1121.280	1120.069	1116.331	1115.027	1112.612
<b>20</b>	790.598	782.487	781.697	785.227	780.628	777.335	782.538
<b>25</b>	508.895	509.844	509.915	507.567	507.227	503.840	503.333
<b>30</b>	230.347	233.990	234.804	231.924	266.115	236.566	236.757
<b>35</b>	44.405	44.419	44.012	44.105	43.108	45.959	52.798
<b>40</b>	14.268	14.343	14.376	14.355	14.446	14.620	14.690
<b>45</b>	10.289	10.362	10.262	10.643	10.266	10.267	10.305
<b>50</b>	7.866	7.846	7.794	7.816	7.791	7.717	7.762
<b>55</b>	5.305	5.330	5.349	5.332	5.361	5.347	5.306
<b>60</b>	3.613	3.637	3.795	3.646	3.612	3.587	3.596
<b>65</b>	2.469	2.493	2.560	2.529	2.521	2.506	2.456
<b>70</b>	1.052	1.098	1.097	1.116	1.112	1.172	1.272
<b>75</b>	0.777	0.824	0.754	0.752	0.795	0.767	0.789
<b>80</b>	0.503	0.480	0.411	0.456	0.409	0.474	0.439
<b>85</b>	0.091	0.069	0.114	0.114	0.136	0.135	0.175
<b>90</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>95</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>100</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>105</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>110</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>115</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>120</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>125</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>130</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>135</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>140</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>145</b>	0.046	0.069	0.046	0.068	0.091	0.067	0.044
<b>150</b>	0.412	0.435	0.411	0.410	0.363	0.428	0.439
<b>155</b>	0.960	0.961	0.960	0.934	0.977	0.970	0.965
<b>160</b>	1.646	1.670	1.691	1.618	1.659	1.648	1.666
<b>165</b>	2.378	2.356	2.331	2.370	2.362	2.281	2.368
<b>170</b>	2.835	2.791	2.811	2.825	2.816	2.844	2.807
<b>175</b>	3.064	3.065	3.017	3.076	3.021	3.046	3.026
<b>180</b>	1.602	1.602	1.602	1.602	1.602	1.602	1.602

### Appendix A Product Photo



Picture 1



Picture 2

\*\*\*\*End of test report\*\*\*\*