



Ref. No.: LCZF19080130

Version: 1.0

Date of issue: Aug. 20, 2019

Total pages: 11



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 MODULE

Models No.:

BLU-IS-2M-12W-827-38

**Test Date:** Aug. 15, 2019 to Aug. 19, 2019

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**Template No.:** LC-RT-PL-001 Rev.1.2

**Test Note:**

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## 1. General

### 1.1 Product Information

Brand Name	BLUi
Product Type	LED MODULE
Model Number	BLU-IS-2M-12W-827-38
Rated Inputs	36VDC
Rated Power	12W
Rated Light output	1100lm
Declared CCT	2700K
Power Supply	Integrated in luminaire
LED Package, Array or Module	CREE
Receipt Samples	1 unit
Sample Code of lab.	190812105015
Date of Receipt Samples	Aug. 12, 2019
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	2019-01-08	2020-01-07
AC Power supply	LC-I-989	APW-120N	2019-01-08	2020-01-07
Power analyzer	LC-I-928	WT210	2019-01-02	2020-01-01
Power analyzer	LC-I-954	WT210	2019-01-08	2020-01-07
Multimeter	LC-I-972	Fluke 17B	2019-07-29	2020-07-28
Photometric colorimetric electric system* (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp**	LC-PL-I-011	D204C	2018-11-21	2019-11-20
Luminous Flux Standard Lamp***	LC-PL-I-003	24V100W	2018-11-21	2019-11-20
Goniophotometer(with mirror)	LC-I-902	GMS2000	2019-05-06	2020-05-05
Wireless temperature transmitter	LC-I-978	DWRF-B	2019-01-07	2020-01-06
Wireless temperature transmitter	LC-I-979	DWRF-B	2019-01-07	2020-01-06

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 voltage of DC power supply (instantaneous 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 DC voltage and current were less than 0.1 percent.

### 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	36.41 V	36.83 V
Input Current(A)	0.300	0.300
Total Power(W)	10.92	11.04
Power Factor	1.000	1.000
I-THD	-	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	1205.27
Luminaire Efficacy(Lm/W)	-	109.17
Correlated Color Temperature (CCT)(K)	2707	-
Color Rendering Index (CRI)	83.4	-
R9	11	-
Chromaticity Coordinate (x,y)	x = 0.4599 y = 0.4116	-
Chromaticity Coordinate (u,v)	u = 0.2621 v = 0.3485	-
Chromaticity Coordinate (u',v')	u' = 0.2621 v' = 0.5277	-
Duv	0.0004	-
Zone Lumens between 0-60 °	-	98.50%
Beam Angle(50%Imax)	-	C0/180=39.8° C90/270=39.3°

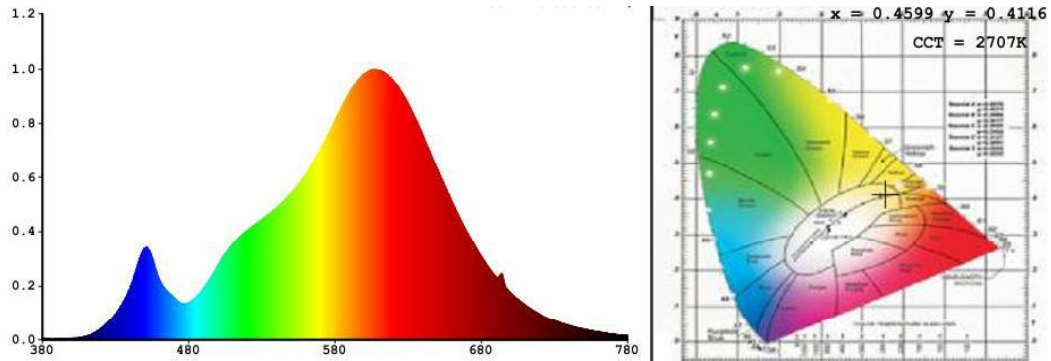
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
82	91	97	82	82	91	83	59
R9	R10	R11	R12	R13	R14	R15	-
11	81	82	77	84	99	74	-

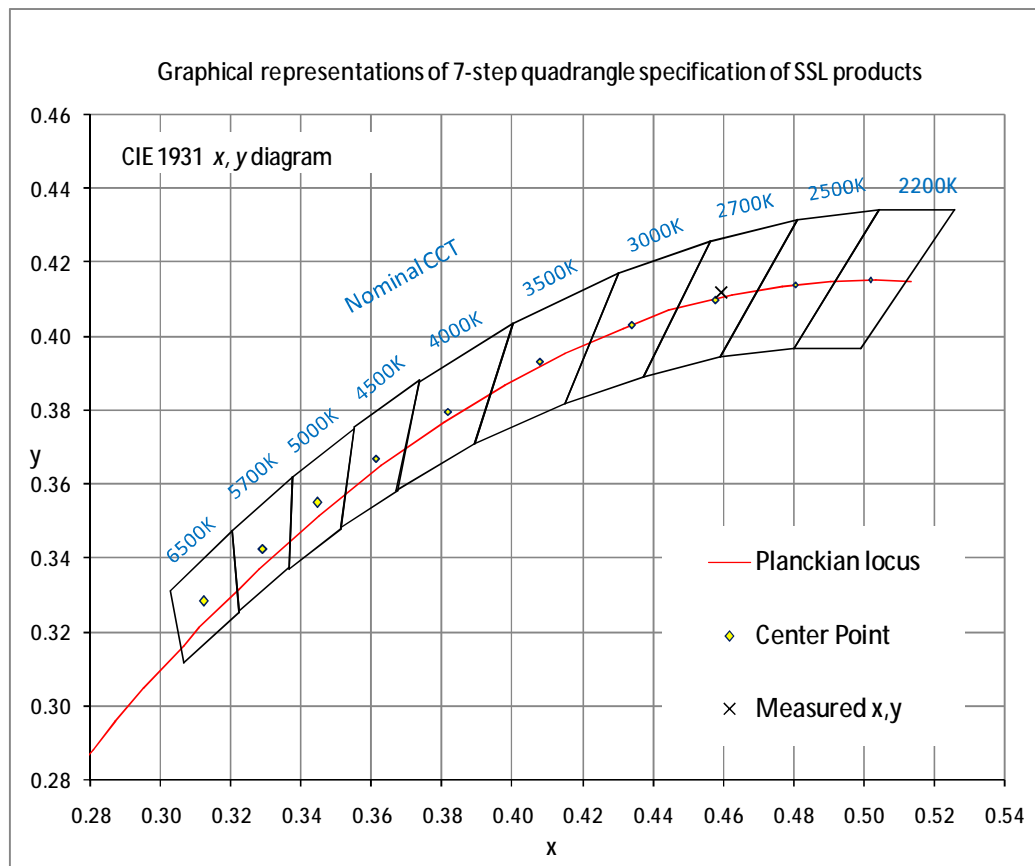
Note: N/A

## 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)	0.66	Luminous Length	0.04 m (Diameter)
Spacing Criteria (90-270)	0.66	Luminous Width	0.04 m (Diameter)
Spacing Criteria (Diagonal)	0.62	Luminous Height	0.00 m
Test Distance	30.00 m		

#### 4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	736.00	61.10	61.10
0-30	1051.55	87.20	87.20
0-40	1133.54	94.00	94.00
0-60	1186.88	98.50	98.50
0-80	1202.7	99.80	99.80
0-90	1203.64	99.90	99.90
10-90	969.46	80.40	80.40
20-40	397.54	33.00	33.00
20-50	431.08	35.80	35.80
40-70	64.33	5.30	5.30
60-80	15.81	1.30	1.30
70-80	4.83	0.40	0.40
80-90	0.94	0.10	0.10
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	0.11	0.00	0.00
90-180	1.64	0.10	0.10
110-180	1.64	0.10	0.10
0-180	1205.27	100.00	100.00

Total Luminaire Efficiency = 100.00%

#### ZONAL LUMEN SUMMARY

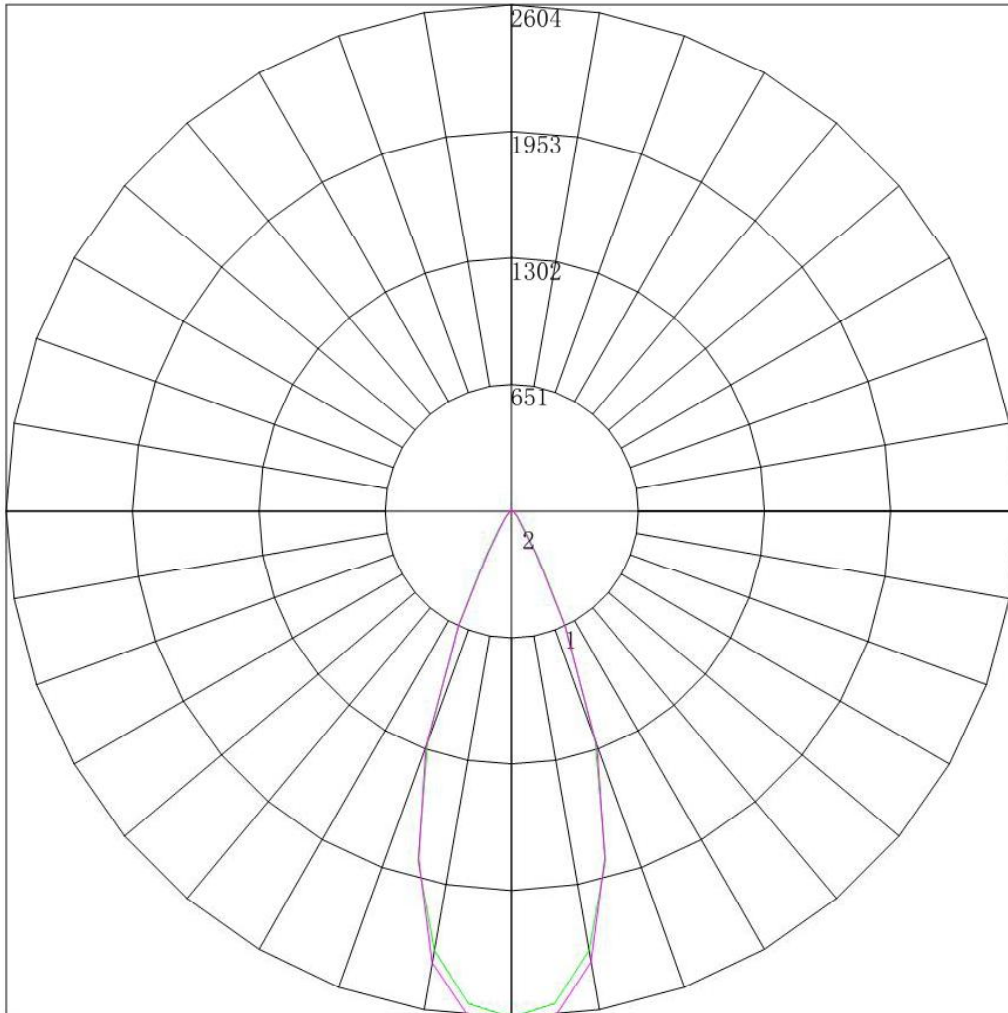
Zone	Lumens
0-10	234.17
10-20	501.82
20-30	315.55
30-40	81.99
40-50	33.54
50-60	19.81
60-70	10.98
70-80	4.83
80-90	0.94
90-100	0.00
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.11
150-160	0.50
160-170	0.71
170-180	0.32





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4.5 Polar Curves



Maximum Candela = 2604.077 Located At Horizontal Angle = 90, Vertical Angle = 5

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

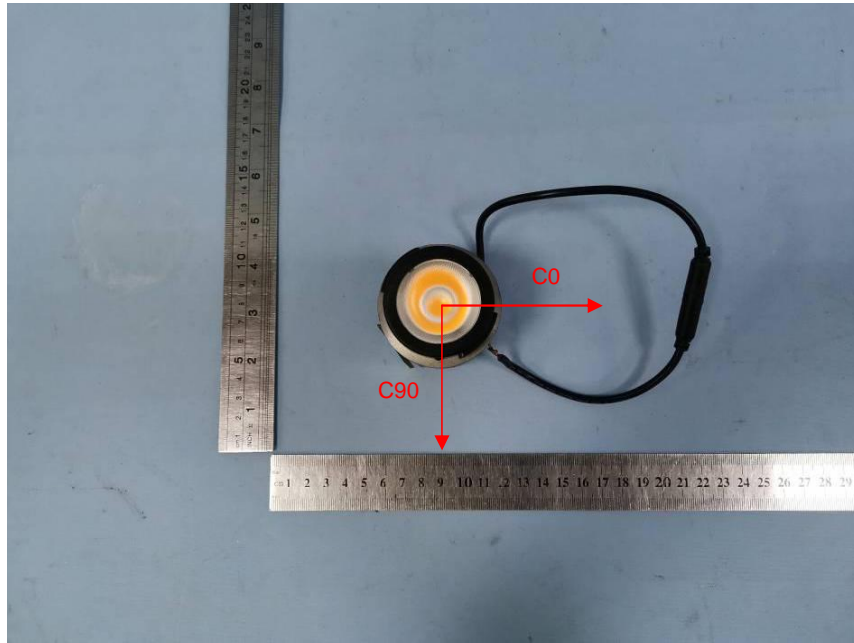
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



**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>	2603.560	2603.560	2603.560	2603.560	2603.560	2603.560	2603.560
<b>5</b>	2542.589	2525.752	2527.157	2531.047	2530.336	2522.452	2604.077
<b>10</b>	2295.519	2285.358	2286.710	2293.348	2286.619	2285.657	2355.091
<b>15</b>	1863.351	1841.996	1858.976	1856.969	1841.786	1840.792	1852.375
<b>20</b>	1261.876	1249.274	1251.925	1258.125	1254.529	1252.380	1288.257
<b>25</b>	653.119	655.736	651.002	652.206	649.049	650.970	648.085
<b>30</b>	273.324	265.386	264.706	260.232	258.517	251.357	248.842
<b>35</b>	113.752	111.008	109.187	107.419	105.132	101.229	98.646
<b>40</b>	64.566	63.235	61.540	61.128	59.717	57.951	58.662
<b>45</b>	43.453	42.903	42.261	41.913	41.059	40.409	41.994
<b>50</b>	30.759	30.576	30.171	29.838	29.545	29.223	30.038
<b>55</b>	22.159	22.005	21.876	21.602	21.373	21.186	21.870
<b>60</b>	15.743	15.628	15.639	15.327	15.245	15.205	15.655
<b>65</b>	11.102	10.946	10.893	10.789	10.688	10.650	10.956
<b>70</b>	7.371	7.463	7.323	7.268	7.163	7.167	7.320
<b>75</b>	4.550	4.478	4.430	4.469	4.423	4.421	4.569
<b>80</b>	2.139	2.171	2.147	2.077	2.110	2.100	2.130
<b>85</b>	0.910	0.679	0.657	0.680	0.656	0.632	0.398
<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>	0.091	0.136	0.135	0.090	0.134	0.133	0.132
<b>150</b>	0.455	0.498	0.452	0.451	0.472	0.401	0.438
<b>155</b>	1.092	1.086	1.085	1.038	1.100	1.094	1.059
<b>160</b>	1.866	1.855	1.876	1.851	1.841	1.787	1.898
<b>165</b>	2.594	2.601	2.622	2.641	2.604	2.613	2.651
<b>170</b>	3.185	3.166	3.142	3.138	3.189	3.127	3.187
<b>175</b>	3.458	3.415	3.481	3.409	3.481	3.417	3.590
<b>180</b>	3.697	3.697	3.697	3.697	3.697	3.697	3.697

## Appendix A Product Photo



Picture 1



Picture 2

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