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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  
Suite 5, Valley Towers, Valley Road, Birkirkara BKR9022, Malta

For products:

LED DOWNLIGHT

Models No.:

BLU-GAIN-19-20W-8TW

**Test Date:** Aug. 14, 2019 to Aug. 15, 2019

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**Test Note:**

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## 1. General

### 1.1 Product Information

Brand Name	BLUi
Product Type	LED DOWNLIGHT
Model Number	BLU-GAIN-19-20W-8TW
Rated Inputs	100-240VAC, 50/60Hz
Rated Power	20W
Rated Light output	1700lm
Declared CCT	4000K
Power Supply	Integrated in luminaire
LED Package, Array or Module	N/A
Receipt Samples	1 unit
Sample Code of lab.	190927102001
Date of Receipt Samples	Sep. 27, 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 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	230.00 V~50Hz	230.02 V~50Hz
Input Current(A)	0.093	0.092
Total Power(W)	20.52	20.36
Power Factor	0.962	0.960
I-THD	-	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	2121.86
Luminaire Efficacy(Lm/W)	-	104.22
Correlated Color Temperature (CCT)(K)	4122	-
Color Rendering Index (CRI)	82.7	-
R9	11	-
Chromaticity Coordinate (x,y)	x = 0.3766 y = 0.3792	-
Chromaticity Coordinate (u,v)	u = 0.2217 v = 0.3347	-
Chromaticity Coordinate (u',v')	u' = 0.2217 v' = 0.5021	-
Duv	0.0023	-
Zone Lumens between 0-60 °	-	80.50%
Beam Angle(50%Imax)	-	C0/180=111.1° C90/270=111.3°

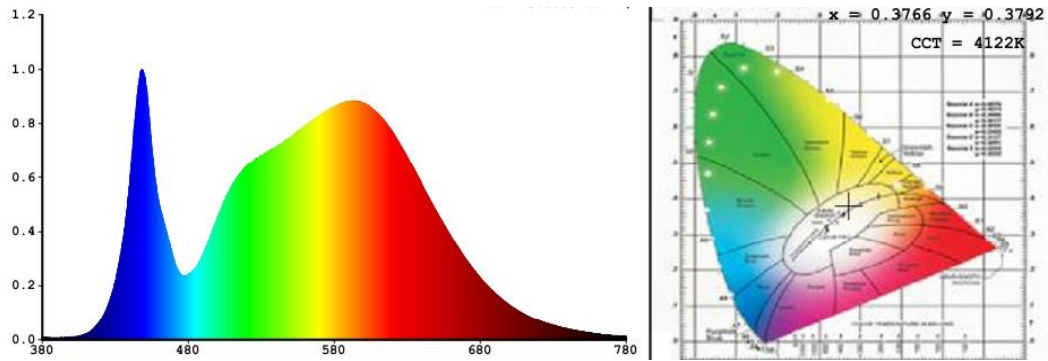
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
81	87	93	83	81	83	87	67
R9	R10	R11	R12	R13	R14	R15	-
11	70	82	62	82	96	75	-

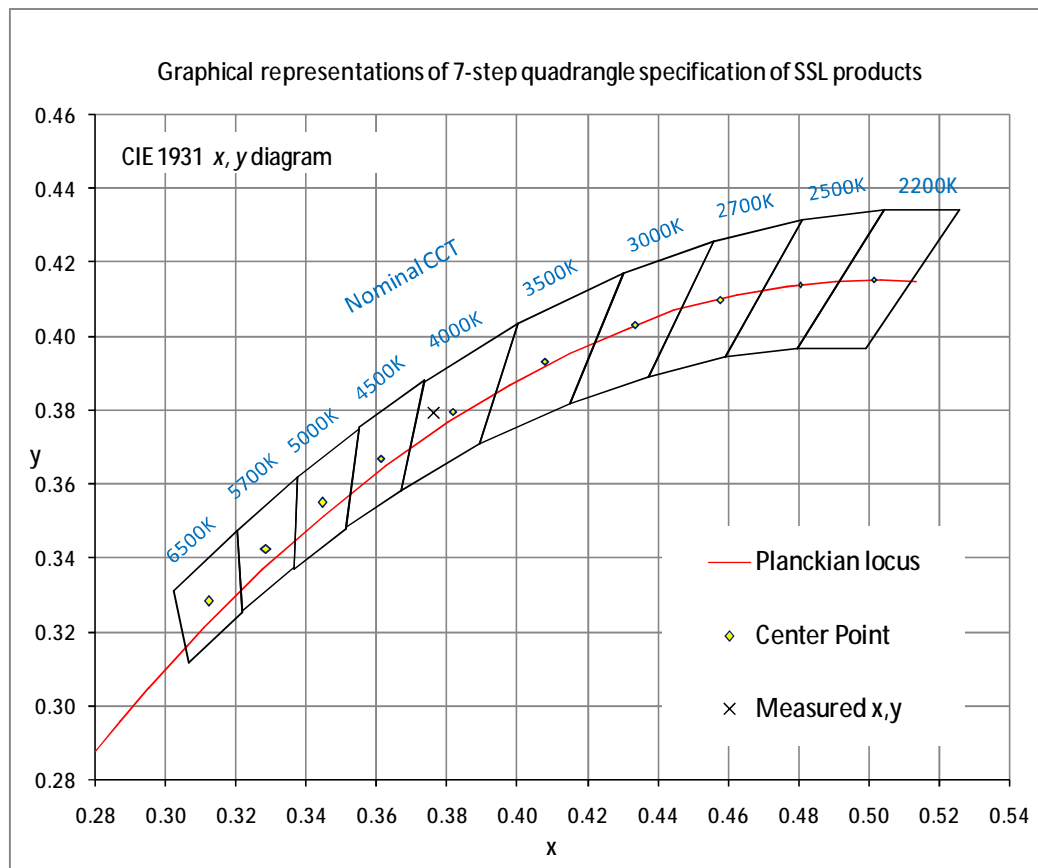
Note: N/A

## 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)	1.26	Luminous Length	0.18 m (Diameter)
Spacing Criteria (90-270)	1.26	Luminous Width	0.18 m (Diameter)
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.00 m
Test Distance	30.00 m		

#### 4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	280.45	13.20	13.20
0-30	595.26	28.10	28.10
0-40	973.79	45.90	45.90
0-60	1708.38	80.50	80.50
0-80	2088.48	98.40	98.40
0-90	2114.49	99.70	99.70
10-90	2041.89	96.20	96.20
20-40	693.34	32.70	32.70
20-50	1082.83	51.00	51.00
40-70	986.27	46.50	46.50
60-80	380.09	17.90	17.90
70-80	128.42	6.10	6.10
80-90	26.02	1.20	1.20
90-110	2.10	0.10	0.10
90-120	2.95	0.10	0.10
90-130	3.76	0.20	0.20
90-150	5.29	0.20	0.20
90-180	7.36	0.30	0.30
110-180	5.26	0.20	0.20
0-180	2121.86	100.00	100.00

Total Luminaire Efficiency = 100.00%

#### ZONAL LUMEN SUMMARY

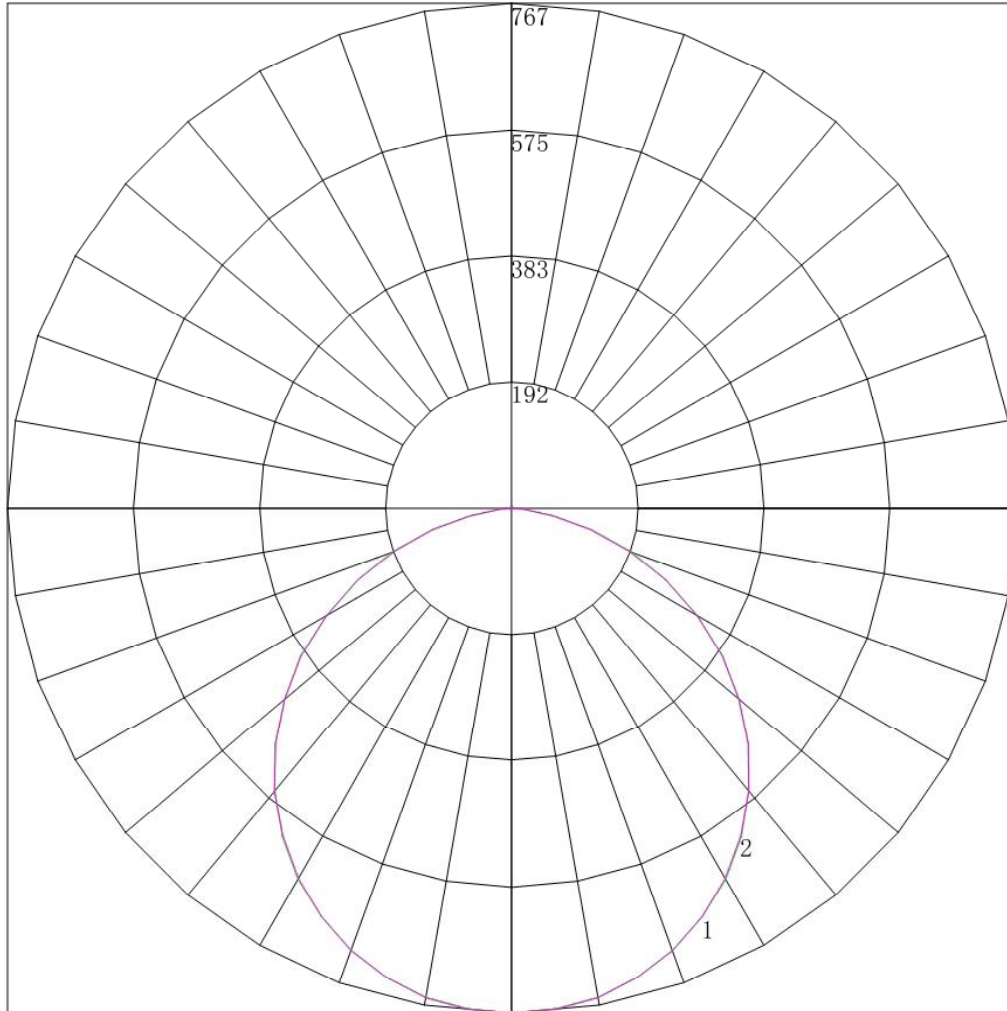
Zone	Lumens
0-10	72.60
10-20	207.84
20-30	314.81
30-40	378.53
40-50	389.49
50-60	345.11
60-70	251.68
70-80	128.42
80-90	26.02
90-100	1.20
100-110	0.91
110-120	0.84
120-130	0.81
130-140	0.74
140-150	0.80
150-160	0.93
160-170	0.80
170-180	0.33





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4.5 Polar Curves



Maximum Candela = 766.981 Located At Horizontal Angle = 0, Vertical Angle = 0

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

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



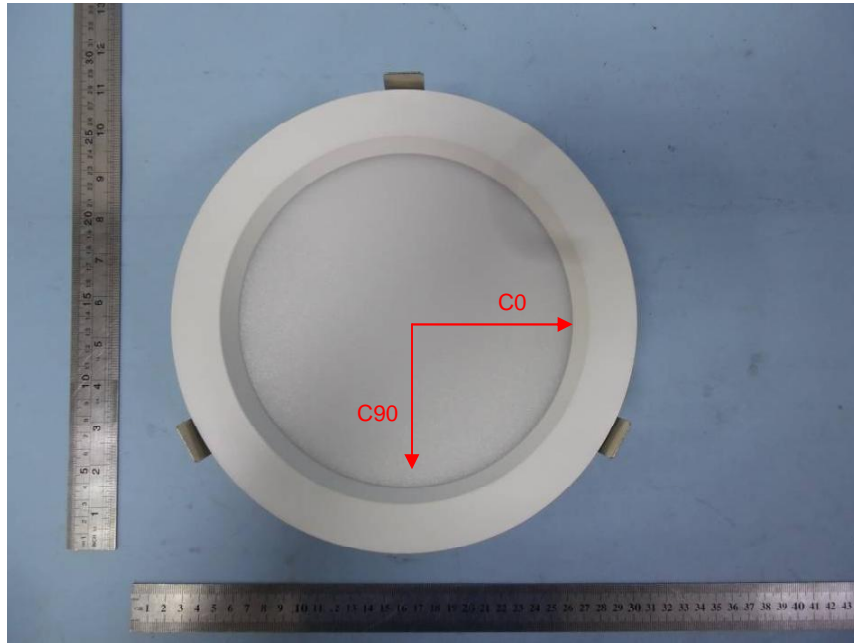
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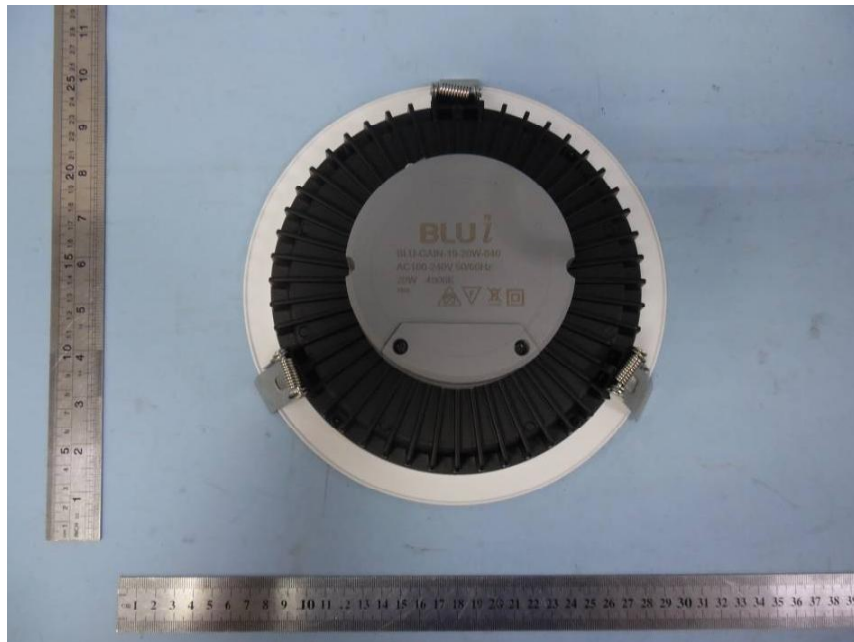
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	766.981	766.981	766.981	766.981	766.981	766.981	766.981
<b>5</b>	763.332	763.494	763.494	764.394	764.211	764.211	764.060
<b>10</b>	754.368	753.434	753.434	753.957	754.128	754.128	755.611
<b>15</b>	737.565	736.192	736.192	736.949	735.783	735.783	737.371
<b>20</b>	713.870	712.311	712.311	713.778	711.992	711.992	714.907
<b>25</b>	685.220	683.049	683.049	684.263	681.472	681.472	685.034
<b>30</b>	650.443	648.318	648.318	649.821	644.875	644.875	649.364
<b>35</b>	609.360	605.731	605.731	606.809	602.292	602.292	607.322
<b>40</b>	560.528	557.560	557.560	560.332	555.163	555.163	561.369
<b>45</b>	509.759	506.104	506.104	508.096	502.115	502.115	508.504
<b>50</b>	450.702	447.713	447.713	450.843	443.913	443.913	451.009
<b>55</b>	391.824	387.412	387.412	389.744	382.244	382.244	390.864
<b>60</b>	325.965	321.818	321.818	325.248	317.359	317.359	325.603
<b>65</b>	258.754	254.649	254.649	258.120	250.020	250.020	258.232
<b>70</b>	193.209	188.311	188.311	190.360	181.107	181.107	189.200
<b>75</b>	126.179	121.366	121.366	123.187	114.355	114.355	122.909
<b>80</b>	64.238	61.037	61.037	63.955	56.697	56.697	63.678
<b>85</b>	19.821	17.384	17.384	18.309	13.808	13.808	16.993
<b>90</b>	2.613	2.094	2.094	2.092	1.799	1.799	1.794
<b>95</b>	0.766	0.743	0.743	0.697	0.878	0.878	0.720
<b>100</b>	0.766	0.765	0.765	0.765	0.923	0.923	0.675
<b>105</b>	0.811	0.833	0.833	0.810	0.968	0.968	0.765
<b>110</b>	0.811	0.833	0.833	0.810	1.013	1.013	0.765
<b>115</b>	0.766	0.788	0.788	0.765	0.946	0.946	0.720
<b>120</b>	0.811	0.833	0.833	0.787	0.945	0.945	0.809
<b>125</b>	0.946	0.923	0.923	0.877	0.968	0.968	0.899
<b>130</b>	0.946	0.900	0.900	0.877	0.945	0.945	0.899
<b>135</b>	0.946	0.945	0.945	0.945	0.923	0.923	0.943
<b>140</b>	1.081	1.058	1.058	1.035	0.968	0.968	1.033
<b>145</b>	1.261	1.283	1.283	1.305	1.193	1.193	1.257
<b>150</b>	1.622	1.576	1.576	1.575	1.530	1.530	1.616
<b>155</b>	2.027	2.071	2.071	2.070	2.003	2.003	2.066
<b>160</b>	2.523	2.521	2.521	2.520	2.476	2.476	2.515
<b>165</b>	2.928	2.881	2.881	2.835	2.813	2.813	2.874
<b>170</b>	3.243	3.264	3.264	3.262	3.196	3.196	3.278
<b>175</b>	3.559	3.579	3.579	3.577	3.578	3.578	3.548
<b>180</b>	3.716	3.716	3.716	3.716	3.716	3.716	3.716

**Appendix A Product Photo**



Picture 1



Picture 2

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