LCTECH

NVLAP TESTING
NVLAP LAB CODE 500080-0

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Total pages: 15

Test report of

IES LM-79-08

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

Rendered to:
Beyond LED Technology

For products:
Parking Garage Luminaires

Models No.:
CP02G-75L-CSM-3CCT-A

Test Date: Apr. 21, 2023 to Apr. 28, 2023

Test Lab.:

Template No.: LC-RT-PL-092 Rev.1.1
Test Note: *N/A*

Compiled by:		**Reviewed by:**	
Fish Tan	Fish Tan	**Lin Qiu**	Lin Qiu
Apr. 28, 2023		**Apr. 28, 2023**	

Table of Contents

1. General

1.1 Product Information

Brand Name	Beyond LED Technology
Category	Outdoor
General Application	Mid Output
Primary Use	Parking Garage Luminaires
Model Number	CP02G-75L-CSM-3CCT-A
Rated Inputs	AC120-347V, 50/60Hz
Rated Power	75W
Rated Light output	10125lm
Declared CCT	3000K-4000K-5000K
Power Supply	ZH-WP-80HG-130B
LED Package, Array or Module	Manufactured by: Lumileds Holding B.V.; Model:L128-3080RB35000G1, L128-5080RB35000G1
Dimming	Continuous Dimming
Integral Controls	Yes
Controls Controllability	Occupancy
Receipt Samples	1 unit
Sample Code of lab.	230418102002
Date of Receipt Samples	Apr. 18, 2023
Note	This is a color tunable product, 3000K, 4000K and 5000K are selected for test.

1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377- 2017	Specifications for the Chromaticity of Solid State Lighting Products
ANSI/IES TM-30-18[1]	IES Method for Evaluating Light Source Color Rendition
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

Note:

1, For reference only and not in the scope of NVLAP.

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2022-12-13	2023-12-12
AC Power supply	LC-I-989	APW-120N	2022-12-13	2023-12-12
Power analyzer	LC-I-PL-024	WT310E	2023-03-07	2024-03-06
Power analyzer	LC-I-954	WT210	2022-12-13	2023-12-12
Multimeter	LC-I-972	Fluke	2022-07-01	2023-06-30
Photometric colorimetric electric system[2] (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp[3]	LC-I-963	24V50W	2022-07-12	2023-07-11
Luminous Flux Lamp[4]	LC-I-PL-031	AC220V/200W	2022-07-21	2023-07-20
Goniophotometer(with mirror)	LC-I-902	GMS2000	2023-04-14	2024-04-13
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2022-12-15	2023-12-14
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2022-12-15	2023-12-14

Note:

2, Bandwidth of spectroradiometer is 1 nm.

3, Halogen lamp, 50W, omni-directional type, and its traceability to NIM.

4, Incandescent lamp, 200W, 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°C ± 1°C; the air flow around the sample(s) be ing 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 (60 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) ap plied to the device under test was regulated to within±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)-spe ctroradiometer 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 both sphere-spectroradiometer system and 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.

Spectral radiant flux was measured by a sphere (2 meter)-spe ctroradiometer system, and the total luminous flux was calculated from these by software automatically.

2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) w hich 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		
	3000K	4000K	5000K
Input Voltage & Frequency	119.90 V~60Hz	120.04 V ~60Hz	120.03 V ~60Hz
Input Current(A)	0.658	0.627	0.649
Total Power(W)	78.07	74.42	76.91
Power Factor	0.990	0.989	0.988
I-THD	5.31%	6.61%	5.43%
Off-state Power(W)	-	-	-

3.2 Photometric data

Criteria Item	Result		
	3000K	4000K	5000K
Total Lumens(lm)	10569.33	10592.94	10694.34
Luminaire Efficacy(lm/W)	135.38	142.34	139.05
Correlated Color Temperature (CCT)(K)	2943	3932	4973
Color Rendering Index (CRI)	82	84	82
R9	6	17	7
R_f	83	85	83
R_g	99	98	98
$R_{cs,h1}$	-11%	-11%	-12%
Chromaticity Coordinate (x,y)	0.4390, 0.4012	0.3821, 0.3737	0.3462, 0.3555
Chromaticity Coordinate (u',v')	0.2531, 0.5206	0.2274, 0.5005	0.2107, 0.4867
Duv	-0.0014	-0.0019	0.0015
Zone Lumens between 60-80º	28.2%	-	-
Zone Lumens between 70-80º	11.2%	-	-
BUG	B3-U3-G3	-	-

3.3 Electrical data on 347V

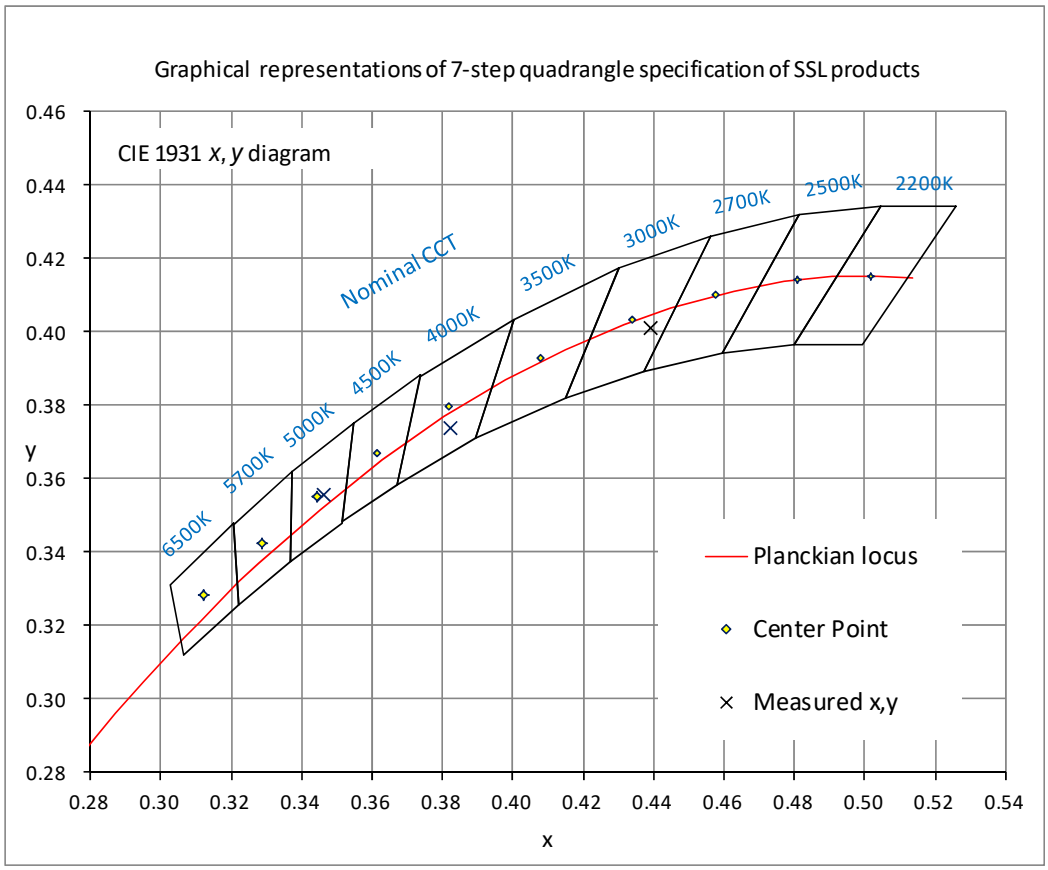
Criteria Item	Result		
	3000K	4000K	5000K
Input Voltage & Frequency	347.04 V~60Hz	347.05 V~60Hz	346.95 V~60Hz
Power Factor	0.890	0.881	0.887
I-THD	10.79 %	11.03 %	10.73 %

3.4 Color Rendering Details

3000K														
R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80	89	97	81	81	87	83	59	6	76	81	73	82	98	73
4000K														
R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84	89	94	85	84	86	87	68	17	75	85	67	85	96	78
5000K														
R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80	86	91	83	81	81	87	68	7	67	82	59	82	95	75

4. Test Data

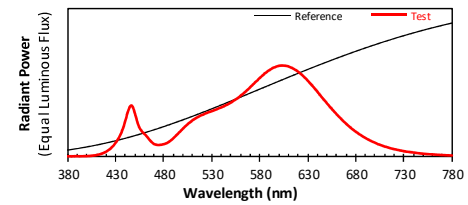
4.1 ANSI Chromaticity Quadrangles Diagram

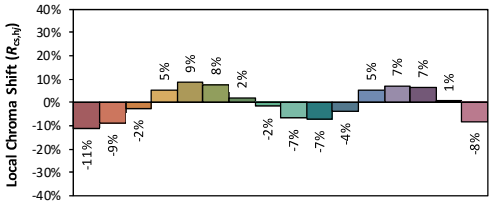


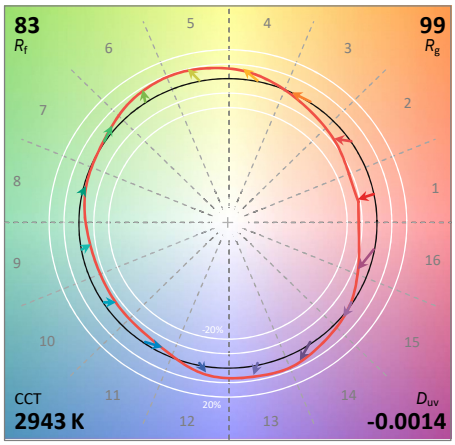
4.2 ANSI/IES TM-30-18 Color Rendition

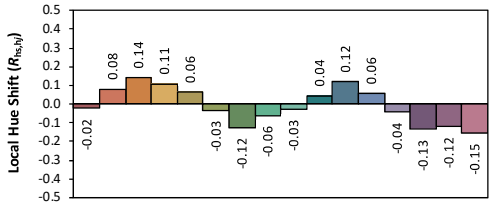
ANSI/IES TM-30-18 Color Rendition Report

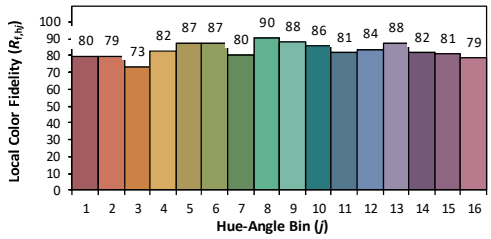
Source:	SPD	**Manufacturer:**	Beyond LED Technology
Date:	2023/04/28	**Model:**	CP02G-75L-CSM-3CCT-A

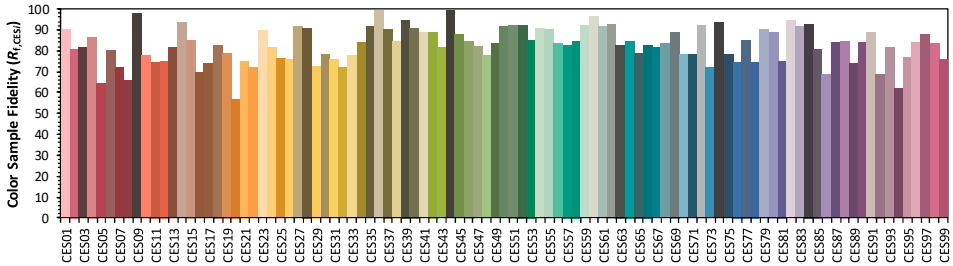












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4390
y	0.4012
u'	0.2531
v'	0.5206

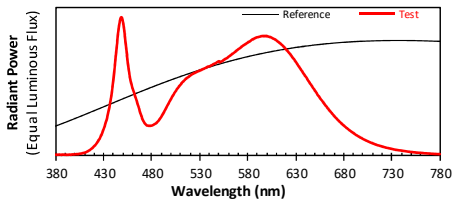
CIE 13.3-1995 (CRI)

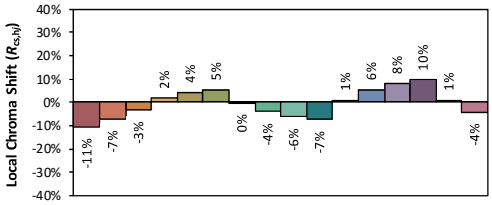
R_a	82
R_9	6

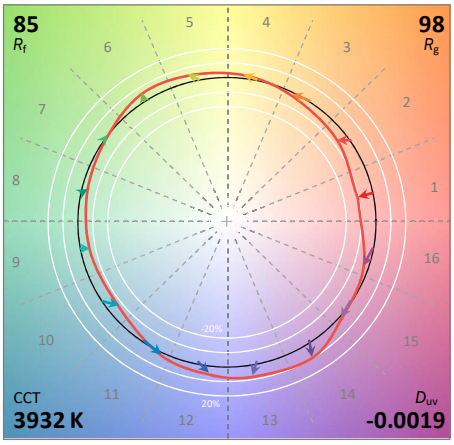
Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

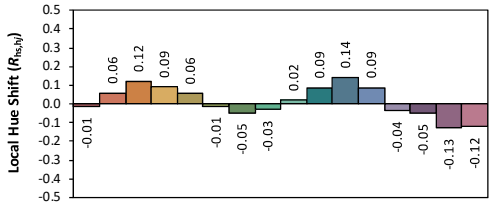
ANSI/IES TM-30-18 Color Rendition Report

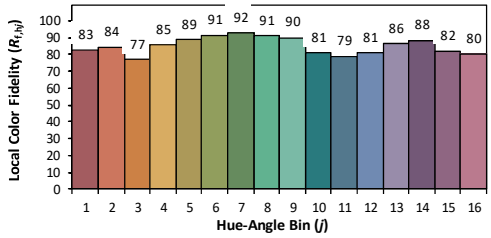
Source:	SPD	**Manufacturer:**	Beyond LED Technology
Date:	2023/04/28	**Model:**	CP02G-75L-CSM-3CCT-A

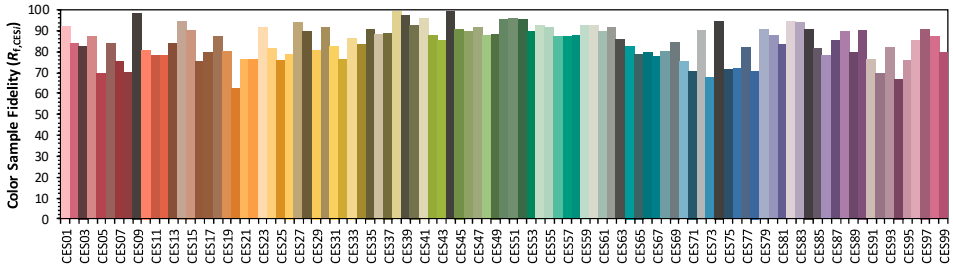












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3821
y	0.3737
u'	0.2274
v'	0.5005

CIE 13.3-1995 (CRI)

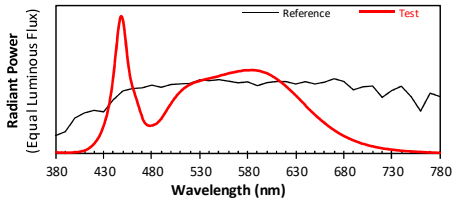
R_a	84
R_9	17

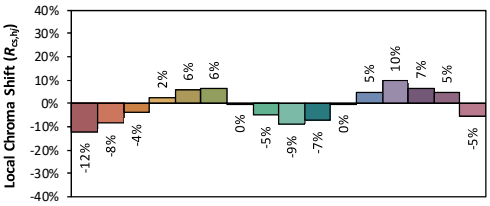
Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

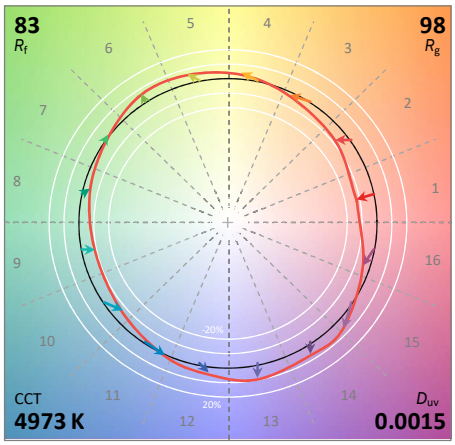
ANSI/IES TM-30-18 Color Rendition Report

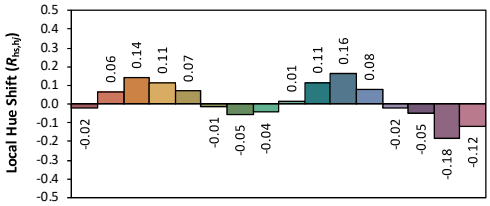
Source: SPD **Manufacturer:** Beyond LED Technology

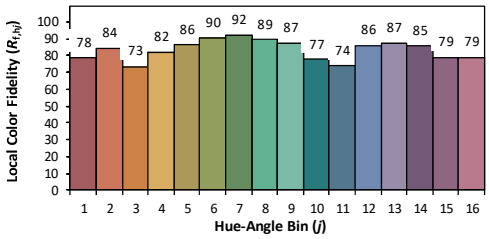
Date: 2023/04/28 **Model:** CP02G-75L-CSM-3CCT-A

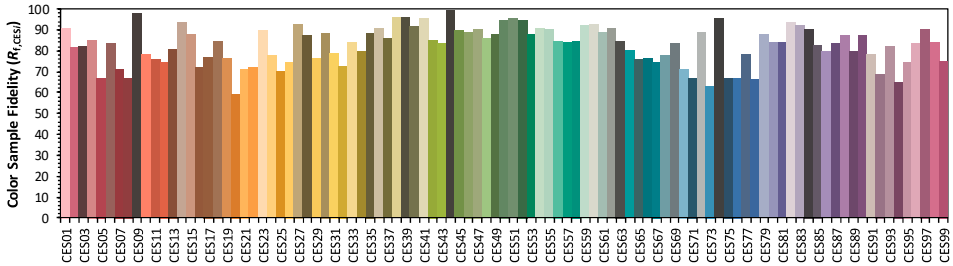












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3462
y	0.3555
u'	0.2107
v'	0.4867

CIE 13.3-1995 (CRI)

R_a	82
R_9	7

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

4.3 Goniometry Test Data of 3000K

CIE Type	Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.52	Luminous Length	0.24 m
Spacing Criteria (90-270)	1.52	Luminous Width	0.24 m
Spacing Criteria (Diagonal)	1.68	Luminous Height	0.01 m
Test Distance	29.97 m		

4.4 Zonal Lumen Summary of 3000K

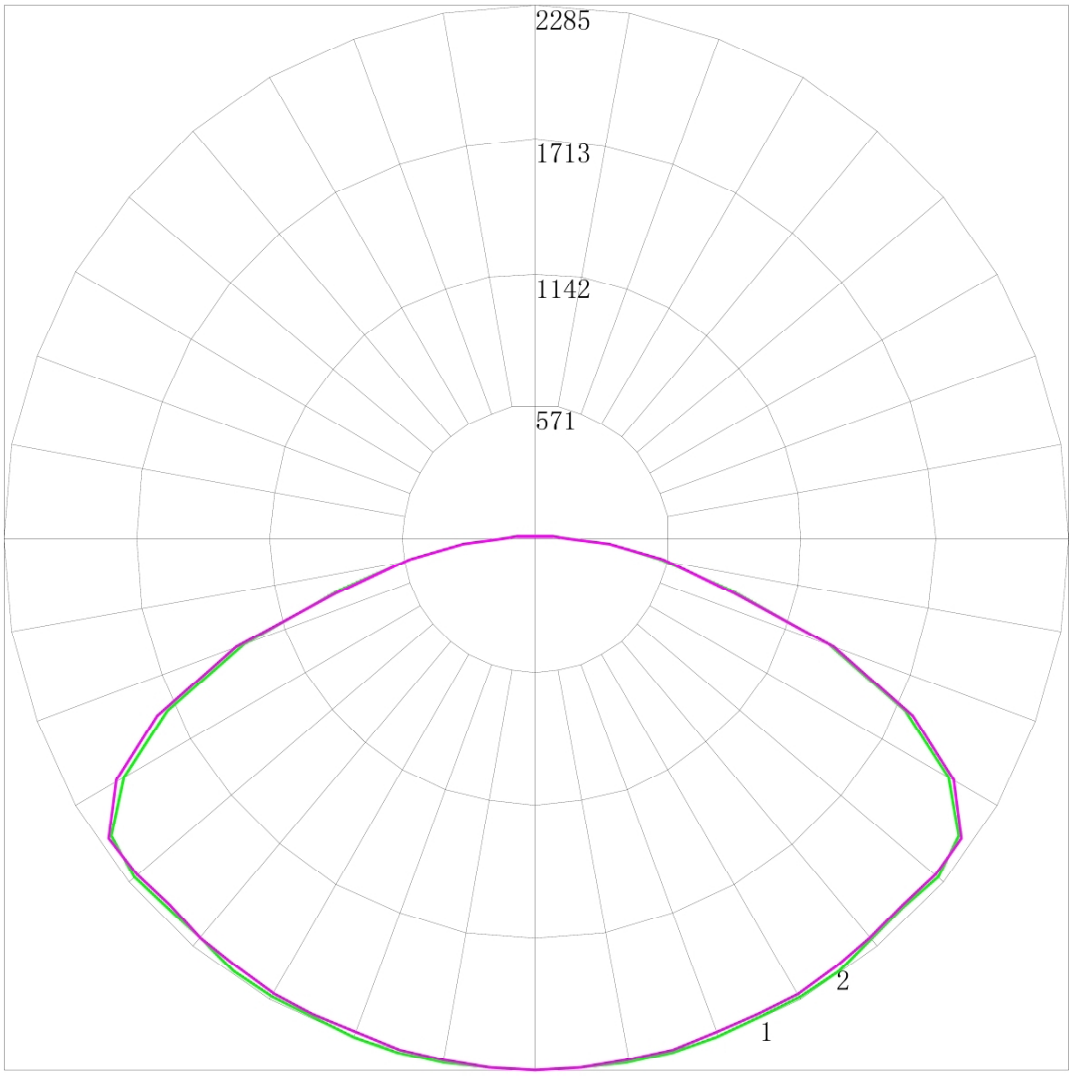
Zone	Lumens	%Lamp	%Fixt
0-20	862.61	8.20	8.20
0-30	1907.47	18.00	18.00
0-40	3307.38	31.30	31.30
0-60	6911.34	65.40	65.40
0-80	9890.94	93.60	93.60
0-90	10363.69	98.10	98.10
10-90	10145.93	96.00	96.00
20-40	2444.76	23.10	23.10
20-50	4136.16	39.10	39.10
40-70	5404.26	51.10	51.10
60-80	2979.6	28.20	28.20
70-80	1179.3	11.20	11.20
80-90	472.75	4.50	4.50
90-110	166.72	1.60	1.60
90-120	186.24	1.80	1.80
90-130	192.98	1.80	1.80
90-150	199.32	1.90	1.90
90-180	205.65	1.90	1.90
110-180	38.93	0.40	0.40
0-180	10569.33	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	217.76
10-20	644.85
20-30	1044.86
30-40	1399.9
40-50	1691.4
50-60	1912.56
60-70	1800.3
70-80	1179.3
80-90	472.75
90-100	118.53
100-110	48.19
110-120	19.53
120-130	6.74
130-140	3.29
140-150	3.05
150-160	3.03
160-170	2.43
170-180	0.87

4.5 Polar Curves of 3000K



Maximum Candela = 2284.574 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

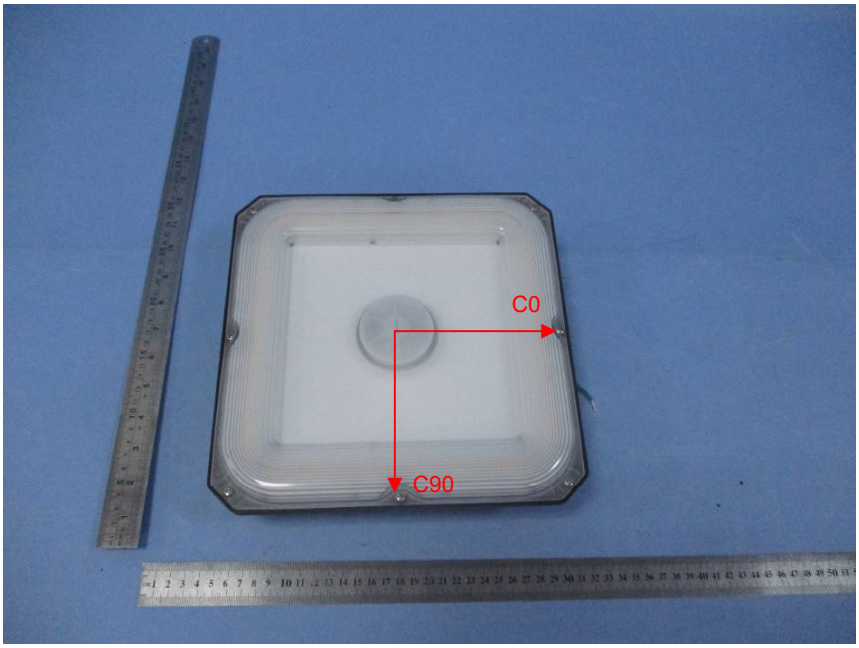
4.6 BUG of 3000K

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	953.7	9.0	9.0
FM - Front-Medium (30-60)	2501.9	23.7	23.7
FH - Front-High (60-80)	1489.8	14.1	14.1
FVH - Front-Very High (80-90)	236.4	2.2	2.2
BL - Back-Low (0-30)	953.7	9.0	9.0
BM - Back-Medium (30-60)	2501.9	23.7	23.7
BH - Back-High (60-80)	1489.8	14.1	14.1
BVH - Back-Very High (80-90)	236.4	2.2	2.2
UL - Uplight-Low (90-100)	118.5	1.1	1.1
UH - Uplight-High (100-180)	87.1	0.8	0.8
Total	10569.2	99.9	100.0
BUG Rating	B3-U3-G3		

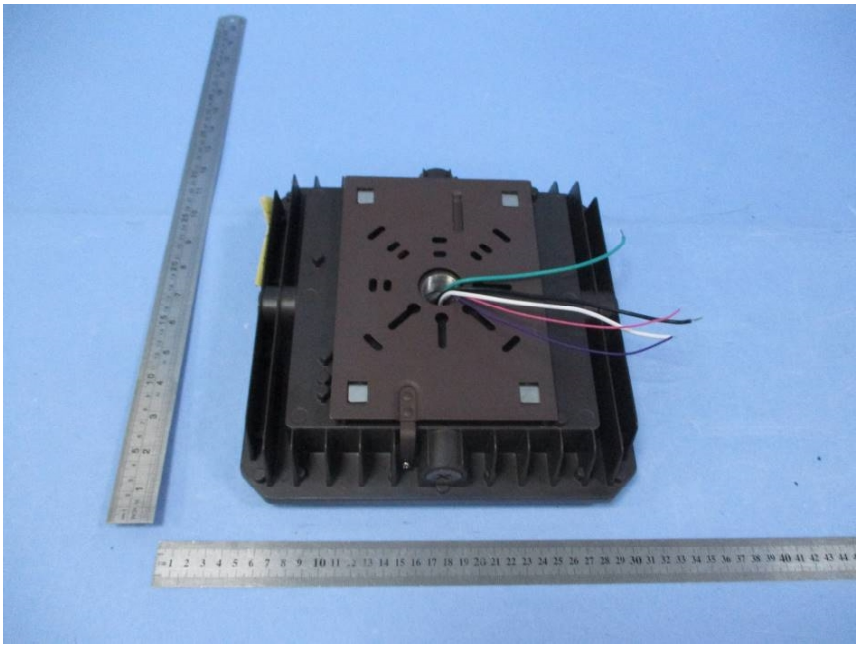
4.7 Candela Tabulation of 3000K

	0	15	30	45	60	75	90
0	2284.574	2284.574	2284.574	2284.574	2284.574	2284.574	2284.574
5	2282.313	2281.414	2281.196	2280.528	2281.652	2283.000	2284.137
10	2281.408	2281.186	2279.616	2277.378	2277.825	2279.885	2279.765
15	2282.313	2280.961	2280.288	2276.027	2272.219	2272.276	2272.334
20	2277.339	2273.732	2273.980	2270.177	2263.912	2261.756	2261.405
25	2269.199	2263.342	2261.353	2254.885	2252.245	2253.910	2254.848
30	2268.747	2259.728	2244.434	2234.204	2236.098	2245.624	2252.662
35	2260.607	2251.594	2225.928	2201.555	2215.896	2238.268	2246.542
40	2242.970	2229.234	2196.836	2168.238	2188.537	2222.618	2232.116
45	2235.283	2209.581	2161.198	2129.540	2156.447	2202.214	2220.749
50	2252.467	2210.477	2132.992	2092.407	2126.603	2202.752	2236.050
55	2223.978	2196.478	2108.623	2064.279	2109.744	2205.386	2233.864
60	2042.189	2058.960	2065.855	2016.780	2062.319	2083.968	2076.051
65	1747.799	1792.933	1872.410	1907.425	1893.854	1818.731	1791.463
70	1333.120	1420.091	1595.808	1692.996	1613.950	1465.214	1364.799
75	874.125	1013.911	1205.565	1370.451	1222.601	986.600	883.928
80	547.176	604.594	796.777	953.756	801.788	610.500	551.690
85	313.835	348.480	458.733	561.132	455.175	355.947	314.752
90	150.134	157.642	202.972	238.511	201.593	160.252	141.638
95	77.328	84.016	101.478	110.251	101.035	83.837	76.065
100	56.979	58.494	68.330	72.676	68.479	58.286	56.393
105	42.056	42.906	45.103	49.052	45.577	41.258	41.967
110	29.846	29.133	28.638	30.374	28.741	29.376	29.727
115	21.254	20.099	17.134	16.424	17.296	20.405	20.983
120	13.566	13.098	11.042	7.650	10.331	13.008	13.989
125	9.044	8.356	5.860	4.500	5.390	8.302	8.743
130	5.879	4.968	4.283	4.273	4.264	4.485	4.809
135	4.070	4.065	4.059	4.273	4.043	4.037	4.372
140	4.070	4.065	4.059	4.050	4.043	4.257	4.372
145	4.974	4.968	4.961	4.950	4.941	4.934	4.809
150	5.879	5.419	5.409	5.850	5.384	5.374	5.683
155	6.331	6.323	6.314	6.300	6.510	6.500	7.432
160	7.688	7.904	7.891	7.873	7.858	7.845	8.306
165	8.592	8.582	8.569	8.550	8.534	8.743	8.743
170	9.496	9.485	9.471	9.450	9.433	9.419	9.180
175	9.949	9.937	9.922	9.900	9.882	9.868	9.617
180	4.996	4.996	4.996	4.996	4.996	4.996	4.996

Appendix A Product Photo



Picture 1



Picture 2

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