



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:

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Models No.:

BLT-BL22-S40-3050

Oct. 8, 2019 to Oct. 31, 2019

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Test Sites:

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Test Note:

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Nov. 1, 2019

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1. General

1.1 Product Information

Brand Name	Beyond LED Technology
Product Type	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces
Model Number	BLT-BL22-S40-3050
Rated Inputs	100-277VAC,60Hz
Rated Power	20W,30W,40W
Rated Light output	2500lm,3750lm,5000lm
Declared CCT	5000K
Power Supply	ZS-FT60-600
LED Package, Array or Module	Model: SMD2835, manufactured by Xiamen Dacol Photoelectronics Technology Co., Ltd.
Receipt Samples	1 unit
Sample Code of lab.	190930104001
Date of Receipt Samples	Sep. 30, 2019
Note	This product is color tunable, 5000K is selected for the test. Wattage can adjust 20W, 30W and 40W, 20W and 40W are selected for the test.

1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011 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	2019-03-12	2020-03-11
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	2019-08-01	2020-07-31
Luminous Flux Standard Lamp***	LC-PL-I-003	24V100W	2019-08-01	2020-07-31
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 (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) applied 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)-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	BLT-BL22-S40-3050 (20W,5000K)	BLT-BL22-S40-3050 (40W,5000K)
Input Voltage & Frequency	120.00V~60Hz	120.02V~60Hz
Input Current(A)	0.171	0.326
Total Power(W)	20.11	38.90
Power Factor	0.979	0.993
I-THD	4.19%	4.59%
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	BLT-BL22-S40-3050 (20W,5000K)	BLT-BL22-S40-3050 (40W,5000K)
Total Lumens(lm)	2860.16	4893.75
Luminaire Efficacy(lm/W)	142.23	125.80
Correlated Color Temperature (CCT)(K)	4877	4911
Color Rendering Index (CRI)	82.2	81.7
R9	9	7
Chromaticity Coordinate (x,y)	x = 0.3494 y = 0.3615	x = 0.3483 y = 0.3601
Chromaticity Coordinate (u,v)	u = 0.2105 v = 0.3267	u = 0.2103 v = 0.3261
Chromaticity Coordinate (u',v')	u' = 0.2105 v' = 0.4901	u' = 0.2103 v' = 0.4892
Duv	0.0032	0.0030
Zone Lumens between 0-60 °	89.20%	89.18%

3.3 Color Rendering Details

BLT-BL22-S40-3050(20W,5000K)

R1	R2	R3	R4	R5	R6	R7	R8
80	86	91	83	80	81	88	69
R9	R10	R11	R12	R13	R14	R15	-
9	67	81	56	82	95	75	-

BLT-BL22-S40-3050(40W,5000K)

R1	R2	R3	R4	R5	R6	R7	R8
80	85	90	82	80	80	88	68
R9	R10	R11	R12	R13	R14	R15	-
7	65	81	57	81	94	74	-



3.4 Electrical data on 277V

Criteria Item	BLT-BL22-S40-3050 (20W,5000K)	BLT-BL22-S40-3050 (40W,5000K)
Input Voltage & Frequency	277.02V~60Hz	277.00V~60Hz
Power Factor	0.911	0.974
I-THD	5.69%	4.63%

Note: N/A



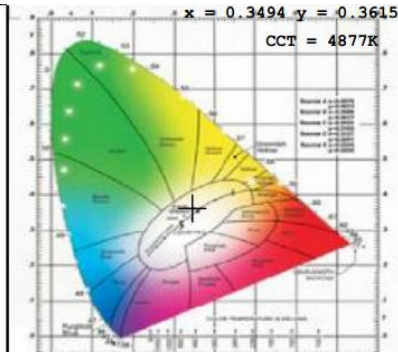
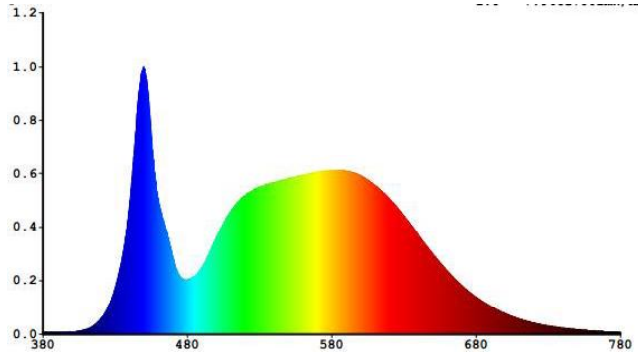
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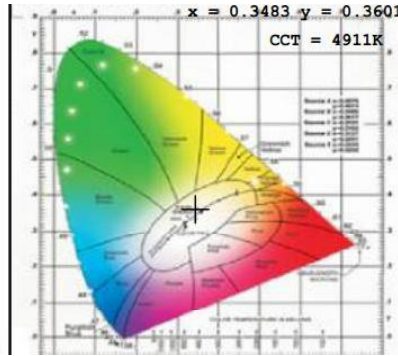
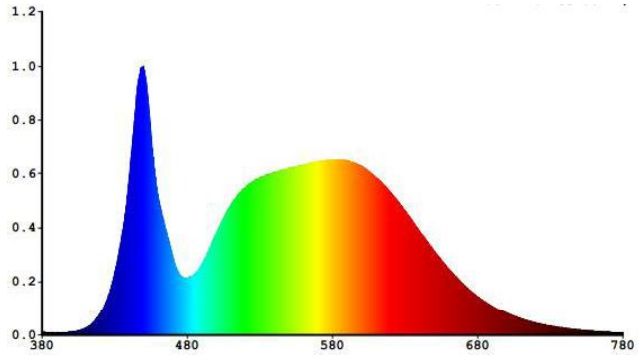
4. Test Data

4.1 Spectral Distribution

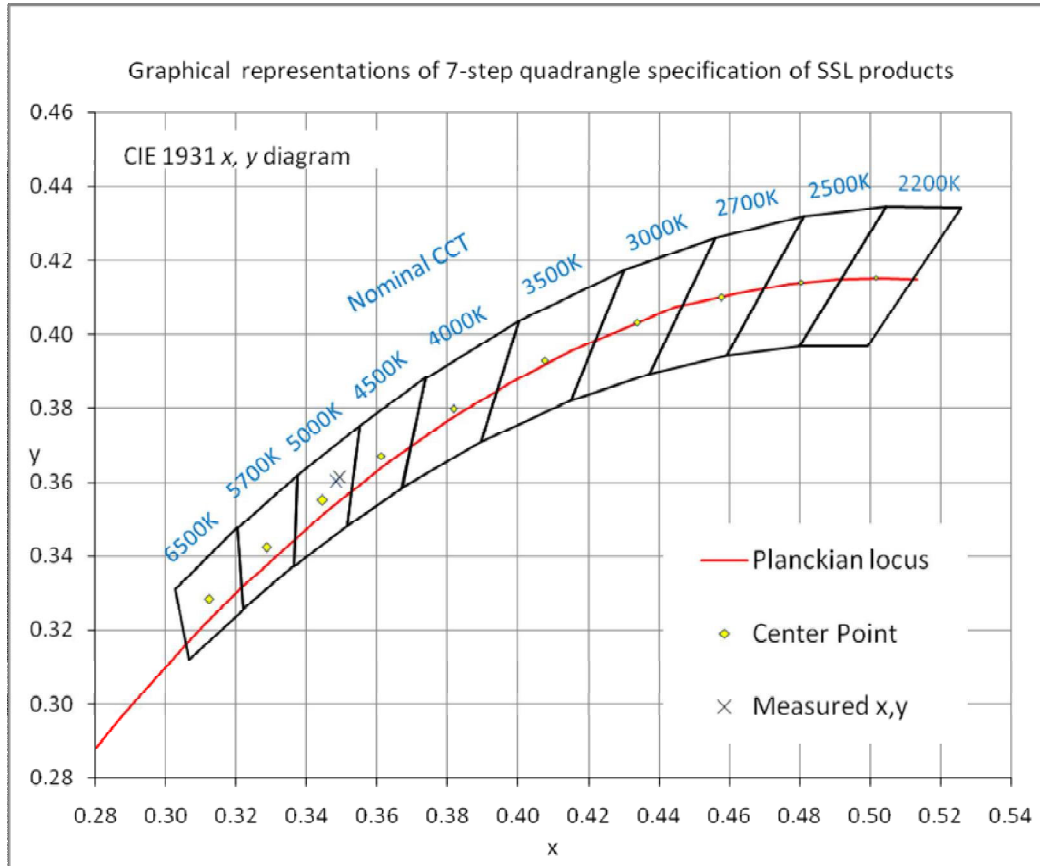
BLT-BL22-S40-3050(20W,5000K)



ZS-BL2*2-S40-CCDD(40W,5000K)



4.2 ANSI Chromaticity Quadrangles Diagram





4.3 Goniometry Test Data

BLT-BL22-S40-3050(20W,5000K)

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180)	1.98	Luminous Length	0.55m
Spacing Criteria (90-270)	1.98	Luminous Width	0.55m
Spacing Criteria (Diagonal)	1.72	Luminous Height	0.00m
Test Distance	30.002 m		

4.4 Zonal Lumen Summary

BLT-BL22-S40-3050(20W,5000K)

Zone	Lumens	%Lamp	%Fixt
0-20	303.74	10.60	10.60
0-30	758.38	26.50	26.50
0-40	1407.97	49.20	49.20
0-60	2551.28	89.20	89.20
0-80	2841.11	99.30	99.30
0-90	2853.97	99.80	99.80
10-90	2785.58	97.40	97.40
20-40	1104.23	38.60	38.60
20-50	1790.03	62.60	62.60
40-70	1363.21	47.70	47.70
60-80	289.83	10.10	10.10
70-80	69.93	2.40	2.40
80-90	12.86	0.40	0.40
90-110	1.30	0.00	0.00
90-120	1.88	0.10	0.10
90-130	2.69	0.10	0.10
90-150	4.33	0.20	0.20
90-180	6.19	0.20	0.20
110-180	4.89	0.20	0.20
0-180	2860.16	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

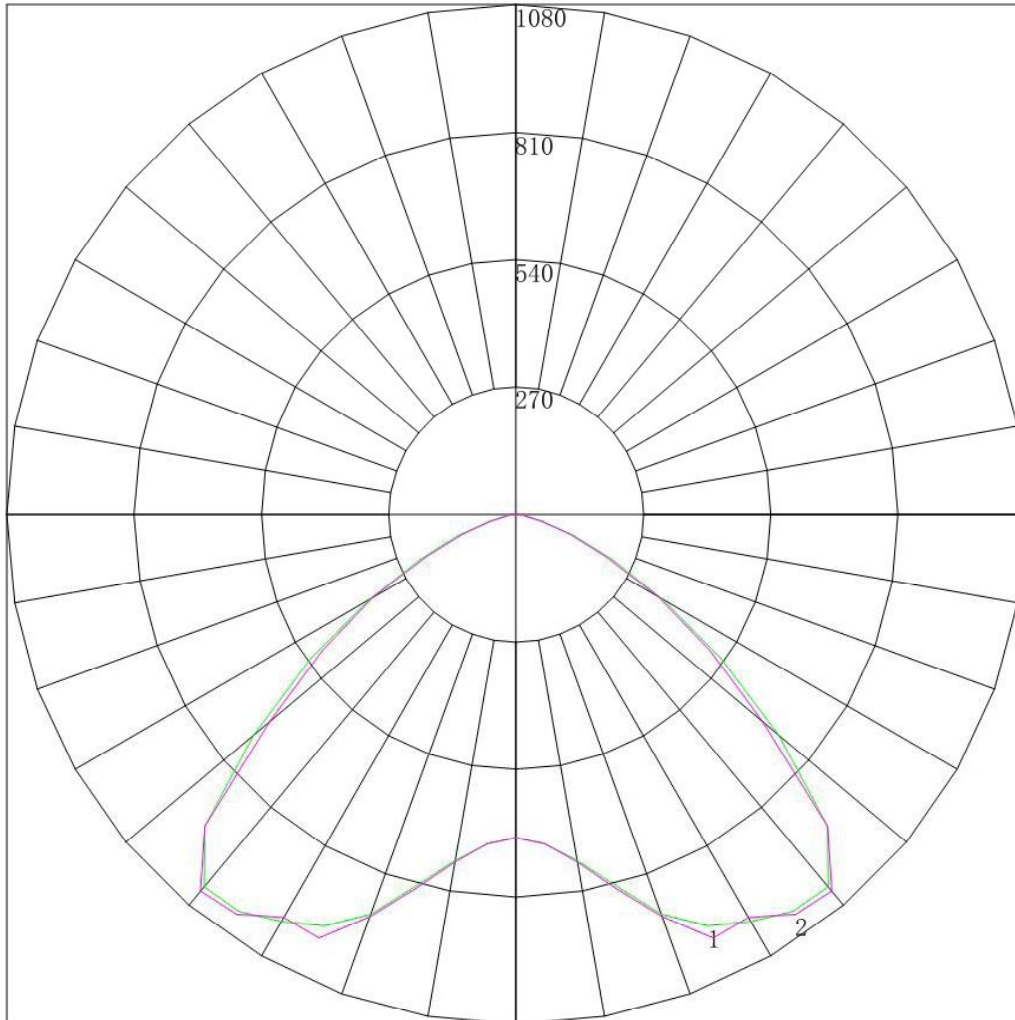
Zone	Lumens
0-10	68.39
10-20	235.35
20-30	454.63
30-40	649.59
40-50	685.80
50-60	457.51
60-70	219.90
70-80	69.93
80-90	12.86
90-100	0.73
100-110	0.57
110-120	0.57
120-130	0.82
130-140	0.79
140-150	0.85
150-160	0.87
160-170	0.73
170-180	0.27



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4.5 Polar Curves

BLT-BL22-S40-3050(20W,5000K)



Maximum Candela = 1079.861 Located At Horizontal Angle = 45, Vertical Angle = 30
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



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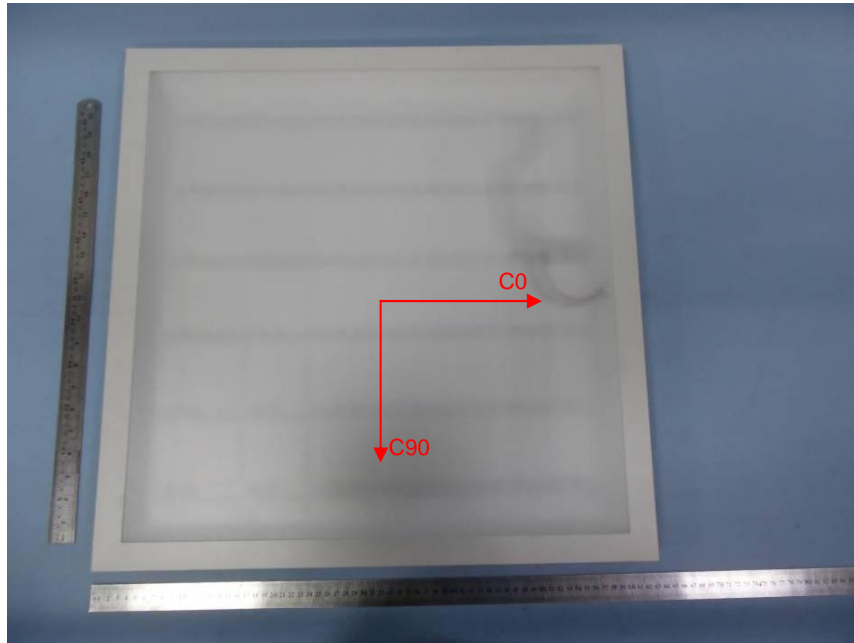


4.6 Candela Tabulation

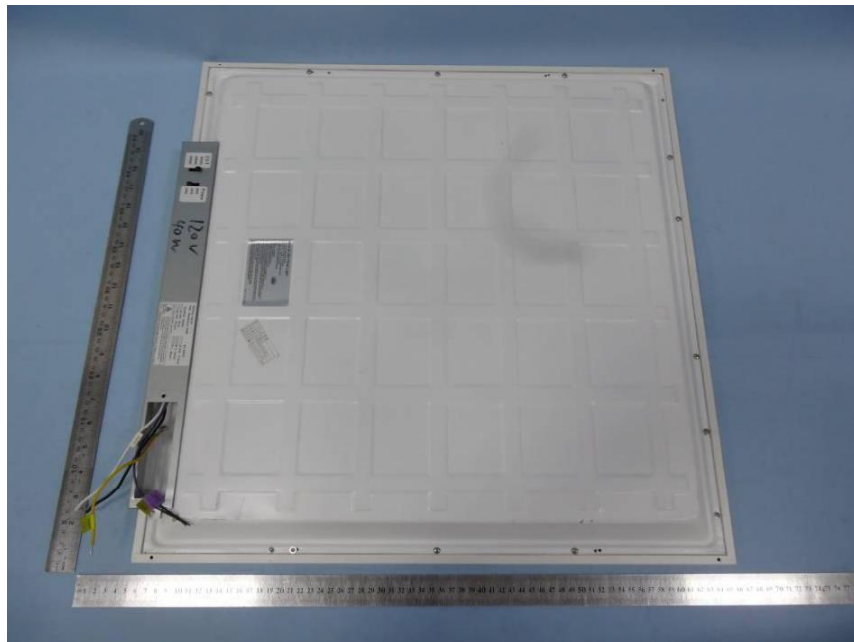
BLT-BL22-S40-3050(20W,5000K)

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	684.991	684.991	684.991	684.991	684.991	684.991	684.991
5	699.766	700.224	700.487	701.396	701.438	701.026	700.001
10	744.536	746.368	749.448	749.489	748.328	747.795	748.148
15	813.931	818.496	821.543	820.731	822.276	819.649	820.371
20	900.338	902.495	908.010	910.851	910.205	907.983	907.148
25	961.226	968.127	991.557	1007.490	1004.685	992.282	989.832
30	996.148	1011.135	1049.275	1079.861	1050.518	999.946	985.293
35	1025.696	1035.327	1059.384	1071.140	1035.370	1029.312	1032.987
40	1029.278	1031.744	1031.553	964.135	1020.271	1037.226	1040.750
45	933.916	947.746	909.642	847.709	914.561	934.912	933.621
50	726.628	743.012	691.992	687.707	706.262	705.814	680.597
55	530.085	532.452	487.596	507.476	471.294	497.047	500.640
60	359.956	359.749	331.278	323.416	326.506	349.959	348.470
65	225.196	220.422	213.144	203.167	213.105	211.452	209.894
70	131.178	127.458	120.836	122.491	121.102	123.581	119.056
75	58.650	58.912	61.091	62.704	59.764	56.936	53.641
80	21.042	22.176	24.480	26.294	24.581	22.592	22.263
85	10.745	11.424	11.454	11.237	10.825	11.069	10.913
90	1.343	1.568	1.348	1.348	1.127	1.354	0.908
95	0.448	0.448	0.449	0.449	0.451	0.452	0.452
100	0.448	0.448	0.449	0.449	0.451	0.452	0.452
105	0.448	0.672	0.449	0.675	0.675	0.677	0.452
110	0.895	0.448	0.673	0.449	0.451	0.452	0.452
115	0.448	0.448	0.449	0.449	0.451	0.452	0.452
120	0.895	0.896	0.898	0.899	0.902	0.904	0.908
125	0.895	0.896	0.898	0.899	0.902	0.904	0.908
130	1.343	0.896	0.898	0.899	0.902	0.904	0.908
135	1.343	0.896	0.898	0.899	0.902	0.904	0.908
140	1.343	1.344	1.348	1.348	1.353	1.129	0.908
145	1.343	1.344	1.348	1.348	1.353	1.356	1.365
150	1.343	1.568	1.348	1.348	1.353	1.581	1.365
155	2.239	2.016	2.246	1.798	1.804	1.807	1.817
160	2.239	2.240	2.246	2.247	2.255	2.259	2.273
165	2.686	2.688	2.695	2.697	2.706	2.711	2.725
170	2.686	2.688	2.695	2.697	2.706	2.711	2.725
175	2.686	2.912	2.695	2.921	2.706	2.711	2.725
180	3.088	3.088	3.088	3.088	3.088	3.088	3.088

Appendix A Product Photo



Picture 1



Picture 2

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