



## LM-79-08 Test Report

For

### Beyond LED Technology

(Brand Name: Beyond LED Technology )

1939 Parker Ct, Stone Mountain, GA 30087, USA

## Model name(s): BLT-FL2\*2-40-CC

**Report Type:** Testing and Report According to IES LM-79-2008  
**Type of Luminaire:** 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces  
**Report Date:** 2019-04-03  
Ningbo TengLi Testing Co., Ltd  
**Prepared By:** 2nd floor, Block B, Ningbo Testing and Certification Base,  
No. 66 Qingyi Road, Ningbo National Hi-Tech Zone,  
Ningbo, Zhejiang

Test & Report By:

*Xeon Ren*

Engineer: Xeon Ren

Review By:

*Johnson Sun*

Manager: Johnson Sun

Note: 1. The results contained in this report pertain only to the tested samples  
2. This report does not imply product certification, approval, or endorsement by A2LA, or any agency of the Federal Government.



<b>1.1 Product Information:</b>		
Model Number	ZS-FL2*2-40-CC	
Remark	“CC” can be any number, represents color temperature, 30=3000K,35=3500K,40=4000K.45=4500K,50=5000K	
Representative (Tested) Model	ZS-FL2*2-40-30 ZS-FL2*2-40-50	
Model Difference	All construction and rating are the same, except CCT	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces	
LED Manufacturer	DONGGUAN SINOWIN OPTO-ELECTRONIC CO.,LTD	
LED Model	ZT2835WOM1	
Dimming	Dimmable	
Sample Number	JBE190304-A1(3000K),A2(5000K)	
Date of Receipt	Apr.01,2019	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

<b>1.2 Rated Values:</b>	
Rated Voltage / Frequency	100-277Vac, 50/60Hz
Nominal Power	40W
Rated Initial Lamp Lumen	--
Declared CCT	3000K,3500K,4000K, 4500K,5000K



### 1.3 Test Specifications:

Test item	<ol style="list-style-type: none"> <li>1. Total Luminous Flux</li> <li>2. Luminous Distribution Intensity</li> <li>3. Luminous Efficacy</li> <li>4. Correlated Color Temperature</li> <li>5. Color Rendering Index</li> <li>6. Chromaticity Coordinate</li> <li>7. Electrical Parameters</li> </ol>
Reference Standard	<ol style="list-style-type: none"> <li>1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products</li> <li>2. ANSI C78.377-2015 Specifications for the Chromaticity of Solid State Lighting Products</li> <li>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources</li> <li>4. CIE 15-2004 Technical Report Colorimetry</li> <li>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source</li> <li>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems</li> </ol>
Reference Work Instruction	QD25

### 1.4 Test Methods

#### 1) Photometric and Light Distribution Measurement – Goniophotometer Method:

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  horizontal intervals.

#### 2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

#### 3) Electrical Measurements:

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.



**2.1 Summary of Test Result**

Criteria Item	Measured Value		Compliance	Requirement (DLC V4.4)	
Power (W)	3000K	120V	40.15	N/A	N/A
		277V	44.08		
	5000K	120V	39.84		
		277V	43.74		
Power Factor	3000K	120V	0.9940	Pass	≥ 0.9(-3%)
		277V	0.9200		
	5000K	120V	0.9953		
		277V	0.9207		
THD %	3000K	120V	19.97	Pass	≤ 20(+5)
		277V	17.98		
	5000K	120V	19.81		
		277V	17.86		
CRI	3000K	80.3		Pass	≥ 80(-2)
	5000K	80.6			
CCT (K)	3000K	2931		Pass	≤ 5000K
	5000K	4956			
Luminous Intensity Distribution	SC: 0-180°		1.25	Pass	1.0-2.0(±0.1)
	SC: 90-270°		1.26	Pass	1.0-2.0(±0.1)
	Zonal lumens in the 0-60°:		77.4	Pass	≥ 75(-3)
Total Luminous	3000K	120V	5997.1	Pass	≥ 2000(-10%)
		277V	6286.2		
	5000K	120V	6539		
		277V	6854		
Luminous Efficacy	3000K	120V	149.38	Pass	Standard: ≥ 100(-3%) Premium: ≥ 125(-3%)
		277V	142.60		
	5000K	120V	164.13		
		277V	156.70		



**2.2 Electrical, Photometric and Chromaticity Measurements**

<b>Test date</b>	2019-04-02	<b>Test Ambient:</b>	25.2 ° C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	ZS-FL2*2-40-30		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190304-	120.0	60	0.3366	40.15	0.9940	19.97
A1	277.1	60	0.1729	44.08	0.9200	17.98

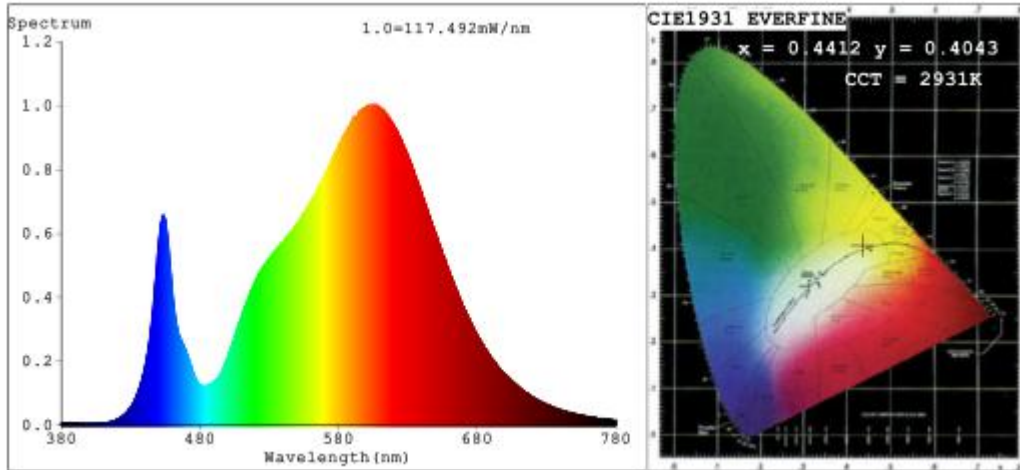
**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	79	R9	4
Frequency (Hz)	60	R2	88	R10	71
CCT (K)	2931	R3	95	R11	75
Duv	-0.0005	R4	78	R12	59
Chromaticity (x, y)	x=0.4412 y=0.4043	R5	78	R13	81
Chromaticity (u', v')	u'=0.2532 v'=0.5221	R6	84	R14	97
Color Rendering Index (CRI)	80.3	R7	83	R15	72
R9	4	R8	58	--	--

**Photometric Measurement – Goniophotometer Method:**

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	5997.1	6286.2
Luminous Efficacy (lm/W)	149.38	142.60
SC: 0-180° (if applicable)	1.25	--
SC: 90-270° (if applicable)	1.26	--
Zonal lumens in the 0-60°:	77.4	--
Beam Angle (°)	107.3	--
Center Beam Candle Power (cd)	2101	--

### Spectral Power Distribution & Chromaticity Diagram



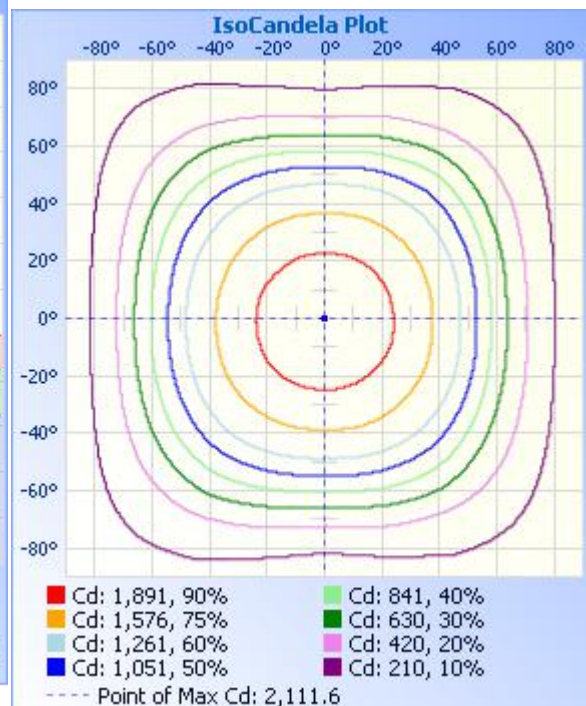
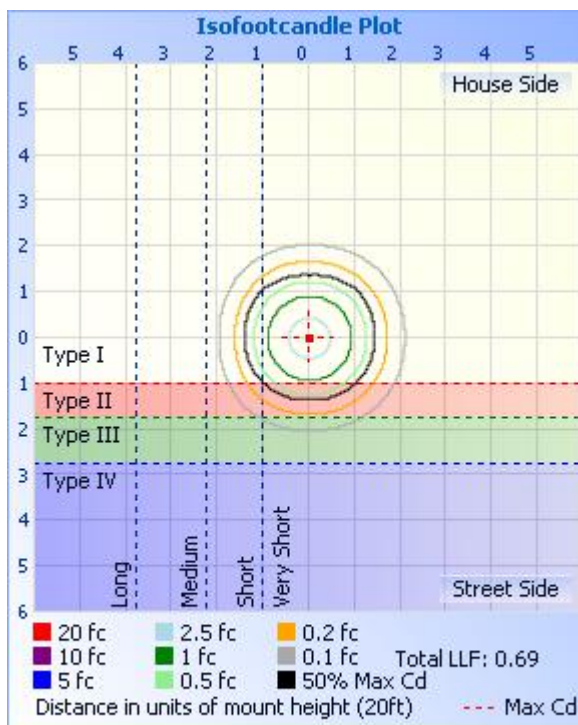
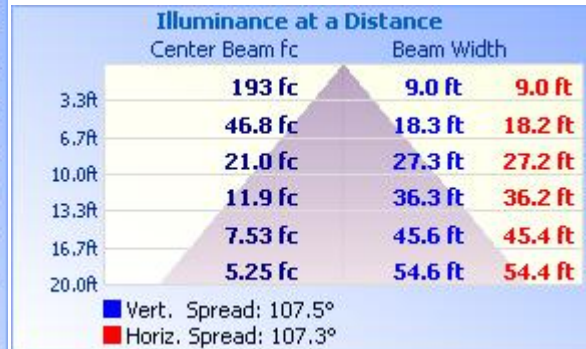
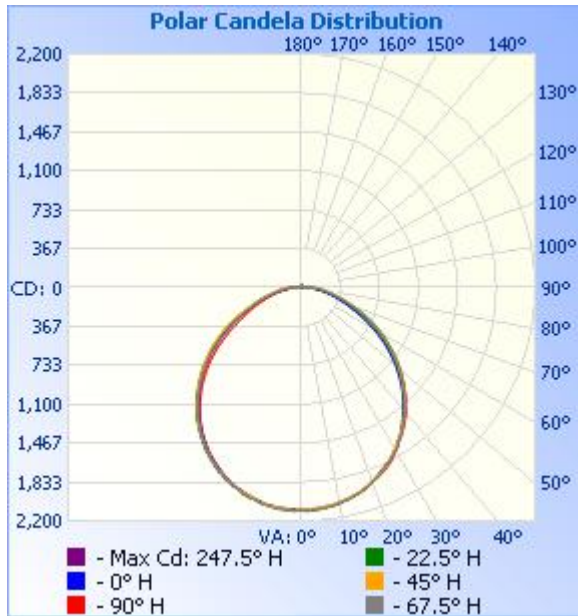
### Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,631.0	27.2%
0-40	2,664.7	44.4%
0-60	4,638.6	77.4%
60-90	1,235.4	20.6%
70-100	622.5	10.4%
90-120	89.4	1.5%
0-90	5,874.0	98%
90-180	122.5	2%
0-180	5,996.5	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	198.7	3.3%	90-100	45.8	0.8%
10-20	569.5	9.5%	100-110	28.1	0.5%
20-30	862.7	14.4%	110-120	15.5	0.3%
30-40	1,033.8	17.2%	120-130	9.3	0.2%
40-50	1,054.6	17.6%	130-140	7.8	0.1%
50-60	919.3	15.3%	140-150	6.5	0.1%
60-70	658.6	11.0%	150-160	5.0	0.1%
70-80	386.1	6.4%	160-170	3.1	0.1%
80-90	190.6	3.2%	170-180	1.4	0%



**Photometric Data**





Certificate#4703.02

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Table--1

UNIT: cd

C (DEG) Y (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101			
5	2093	2086	2092	2096	2086	2086	2080	2096	2089	2090	2090	2097	2088	2088	2084	2101			
10	2065	2061	2066	2066	2060	2060	2047	2064	2063	2065	2066	2071	2065	2066	2058	2071			
15	2020	2019	2017	2011	2016	2016	2004	2015	2016	2025	2028	2026	2014	2026	2016	2031			
20	1958	1954	1948	1952	1942	1947	1942	1951	1949	1964	1959	1963	1958	1959	1955	1965			
25	1865	1865	1865	1862	1855	1862	1861	1870	1881	1887	1890	1885	1888	1879	1877	1879			
30	1769	1760	1766	1759	1757	1757	1757	1772	1775	1784	1788	1793	1776	1790	1776	1780			
35	1641	1636	1643	1640	1633	1637	1638	1652	1655	1671	1678	1672	1666	1670	1660	1658			
40	1491	1499	1505	1505	1489	1502	1505	1518	1530	1544	1551	1540	1527	1541	1532	1522			
45	1333	1346	1360	1356	1337	1352	1362	1372	1378	1399	1407	1397	1375	1390	1383	1365			
50	1149	1168	1196	1193	1167	1183	1205	1216	1216	1238	1255	1235	1207	1230	1227	1195			
55	951	988	1033	1016	980	1012	1040	1050	1045	1073	1089	1057	1024	1055	1059	1011			
60	746	788	852	829	786	826	870	878	867	900	922	878	831	869	879	815			
65	566	602	664	639	597	644	702	708	686	723	748	694	641	683	697	621			
70	425	456	481	477	441	480	534	527	498	538	573	524	474	511	508	469			
75	306	333	352	347	313	351	382	385	367	395	410	388	347	378	372	351			
80	205	235	260	246	211	247	281	272	251	280	301	276	236	265	274	245			
85	125	159	186	171	128	166	199	188	156	192	215	189	148	184	198	170			
90	42.6	57.2	66.8	57.1	40.6	54.9	73.8	74.5	82.5	112	133	116	86.1	108	108	73.7			
95	64.1	53.2	52.0	23.5	25.9	23.1	48.3	57.0	55.3	52.9	39.3	4.03	1.34	9.24	41.3	52.8			
100	47.8	40.0	31.4	41.0	45.4	43.3	35.7	31.2	45.9	37.1	36.6	46.0	48.3	43.9	36.3	43.6			
105	20.9	21.0	23.2	22.3	27.6	24.7	25.2	23.9	24.7	25.3	26.5	27.9	33.7	26.2	23.8	21.4			
110	18.5	18.3	20.0	17.7	18.6	18.0	21.7	20.9	21.5	21.9	22.5	20.1	19.7	18.8	19.8	18.6			
115	16.4	16.4	9.88	13.6	13.8	12.7	10.6	18.6	19.2	19.2	11.0	14.0	10.6	14.7	11.1	16.5			
120	15.2	13.0	12.8	12.6	12.3	11.8	11.3	10.3	17.6	16.5	13.9	12.2	15.0	12.6	12.7	14.6			
125	4.96	11.7	11.1	9.82	12.7	9.91	7.34	10.1	5.61	10.9	12.9	11.8	8.44	11.8	11.9	8.45			
130	12.6	11.1	6.73	11.2	9.02	10.9	7.78	11.4	12.7	11.6	7.84	12.8	13.3	12.3	7.86	11.1			
135	12.7	10.8	8.81	9.49	11.2	7.82	9.37	6.31	10.7	6.44	9.94	12.5	13.5	12.6	9.93	10.8			
140	8.12	8.30	8.28	9.17	11.7	8.60	9.26	10.5	6.99	9.67	9.57	9.01	13.1	9.40	9.48	9.42			
145	12.7	8.55	8.32	8.31	12.7	11.1	9.46	9.48	11.6	11.1	11.5	7.74	11.7	11.1	9.81	10.8			
150	13.0	9.61	8.40	9.98	13.4	11.2	9.67	9.74	12.4	12.6	11.5	10.4	10.5	10.3	11.4	11.4			
155	14.0	10.4	5.84	9.96	13.0	10.2	6.17	10.3	12.9	13.6	10.1	11.3	11.8	12.4	9.24	11.4			
160	12.7	9.39	7.07	10.0	11.2	9.33	7.70	9.29	10.8	11.1	10.4	10.8	10.3	11.4	11.2	8.91			
165	13.9	12.7	9.84	10.5	10.7	9.97	9.34	11.4	11.2	11.5	11.7	10.4	10.9	9.09	10.6	11.3			
170	16.5	14.7	13.4	13.7	14.7	13.2	12.8	14.1	14.9	15.1	14.4	13.8	13.0	13.1	12.6	14.0			
175	16.7	15.7	14.7	15.2	16.3	14.6	14.3	14.9	15.9	15.8	16.0	15.4	15.6	15.5	15.1	15.0			
180	16.5	15.9	15.3	15.9	15.9	15.0	14.3	15.5	16.6	16.6	16.0	15.2	15.7	16.0	15.0	14.6			





**2.3 Electrical, Photometric and Chromaticity Measurements**

<b>Test date</b>	2019-04-02	<b>Test Ambient:</b>	25.2 ° C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	ZS-FL2*2-40-50		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JBE190304-	120.0	60	0.3336	39.84	0.9953	19.81
A2	277.0	60	0.1715	43.74	0.9207	17.86

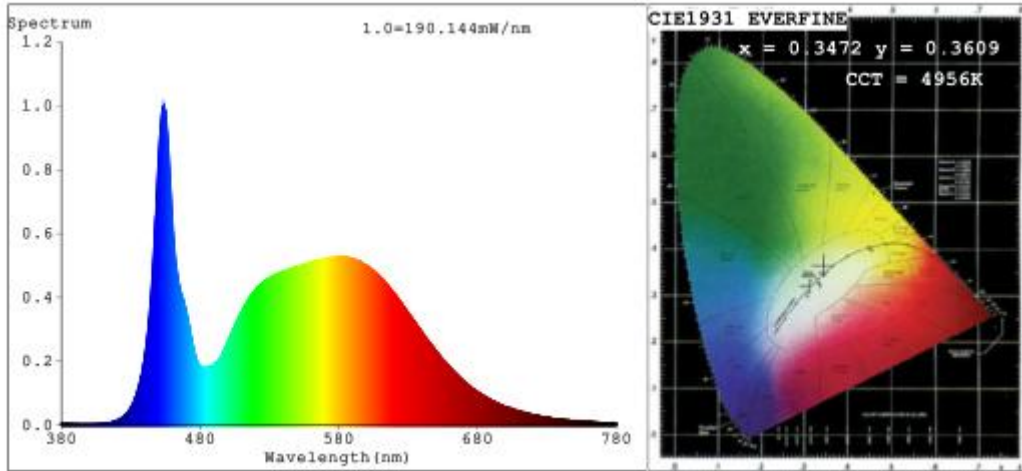
**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	78	R9	0
Frequency (Hz)	60	R2	87	R10	68
CCT (K)	4956	R3	92	R11	75
Duv	0.0038	R4	78	R12	47
Chromaticity (x, y)	x=0.3472 y=0.3609	R5	77	R13	81
Chromaticity (u', v')	u'=0.2092 v'=0.4895	R6	80	R14	96
Color Rendering Index (CRI)	80.6	R7	87	R15	73
R9	0	R8	64	--	--

**Photometric Measurement – Sphere-Spectroradiometer Method:**

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	6539	6854
Luminous Efficacy (lm/W)	164.13	156.70

**Spectral Power Distribution & Chromaticity Diagram**





**2.4 Performance Assessment:**

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
ZS-FL2*2-40-30	3000K	5997.1	40.15	149.37
ZS-FL2*2-40-35	3500K	6133 <sup>*1</sup>	40.00 <sup>*2</sup>	153.33 <sup>*3</sup>
ZS-FL2*2-40-40	4000K	6268 <sup>*1</sup>	40.00 <sup>*2</sup>	156.70 <sup>*3</sup>
ZS-FL2*2-40-45	4500K	6404 <sup>*1</sup>	40.00 <sup>*2</sup>	160.10 <sup>*3</sup>
ZS-FL2*2-40-50	5000K	6539	39.84	164.13

\*1: This value is calculated and the calculation formula is as below:

$$6133 = (6539 - 5997.1) / 4 * 1 + 5997.1$$

$$6268 = (6539 - 5997.1) / 4 * 2 + 5997.1$$

$$6404 = (6539 - 5997.1) / 4 * 3 + 5997.1$$

\*2: This value is calculated and the calculation formula is as below:

$$40.00 = (40.15 + 39.84) / 2$$

\*3: This value is calculated and the calculation formula is as below:

$$153.33 = 6133 / 40.00$$

$$156.70 = 6268 / 40.00$$

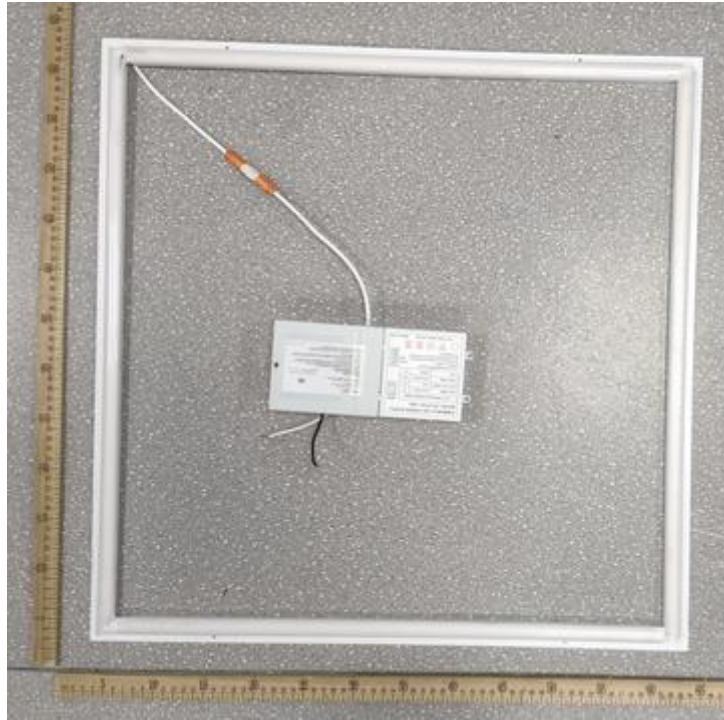
$$160.10 = 6404 / 40.00$$



### 3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-702	2 meter Integrating Sphere	Verified by D204 standard lamp	
ST-R-701	Spectral analysis system HAAS-2000	Verified by D204 standard lamp	
ST-R-705	Standard Lamp	2019-02-07	2020-02-06
ST-R-704	Power Meter for Integrating Sphere	2019-01-06	2020-01-05
ST-R-714	Goniophotometer system	Verified by D908S standard lamp	
ST-R-710	Standard Lamp	2019-02-12	2020-02-11
ST-R-711	Power Meter for Goniophotometer	2019-01-06	2020-01-05
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

#### 4. Product Photo



\*\*\*\*\* END OF REPORT \*\*\*\*\*