

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

L-TECH CORPORATION

Shaogangtou District, Qiaotou Town Dongguan City, Guangdong, China

Test Model: LRKT488 5000K

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	RSZ160526518-10
Test Date:	2016-06-02 to 2016-06-03
Report Date:	2016-06-06
Reviewed By:	Jeanne Han/Safety Manager <i>Jeanne Han</i>
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Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	The NVLAP Lab Code is 200707-0.

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1. Product Description

General Information:

One sample was received on 2016-05-26 and used for testing.

Model Tested: LRKT488 5000K
 Manufacturer: L-TECH CORPORATION
 Brand Name: L-TECH CORP
 Product Designation: LED Downlight
 Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120V 60Hz
 Rated Power: 9 W
 Nominal CCT: 5000K
 Nominal Lumen Output: 600 lm

2. Standards Used

- IESNA LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2016-03-10	2017-03-09
DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2015-07-27	2016-07-26
Thermal Meter	Anymetre	JR900A	N/A	25°C	2016-01-12	2017-01-11
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
AC Power Supply	EVERFINE	DPS1010-YF	1011001T	30V/5A	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/ 300/600 V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N101 20001	1600mm,3000 W/10A	2016-03-10	2017-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C; -20°C~60°C	2016-03-21	2017-03-20
Standard Light Source	EVERFINE	D908	1012003	N/A	2015-09-08	2016-09-07

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$ during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is $U=2.1\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=32\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1$ ($K=2$), at the 95% confidence level.

The uncertainty of power meter AC current $U=0.19\%$ of rdg, AC Voltage $U=0.15\%$ of rdg, Power $U=0.20\%$ ($K=2$), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the luminous intensity is $U=1.6\%$ ($K=2$), at the 95% confidence level.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.07407	8.742	0.9836

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
701.9	2.396	80.29	5108	-0.000311

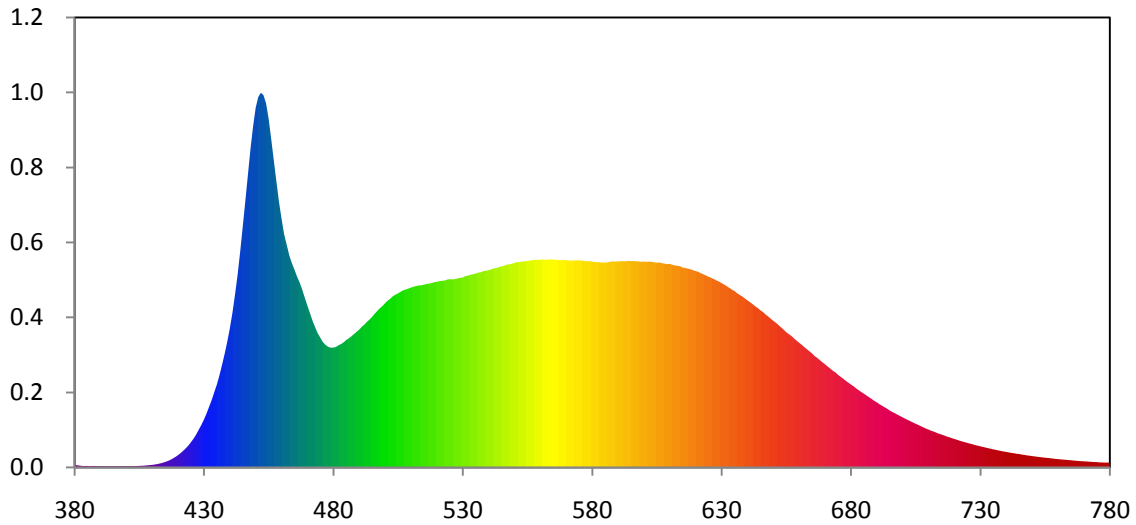
Chromaticity Coordinate

x	y	u	v	u'	v'
0.3421	0.3486	0.2106	0.3218	0.2106	0.4827

Color Rendering Index

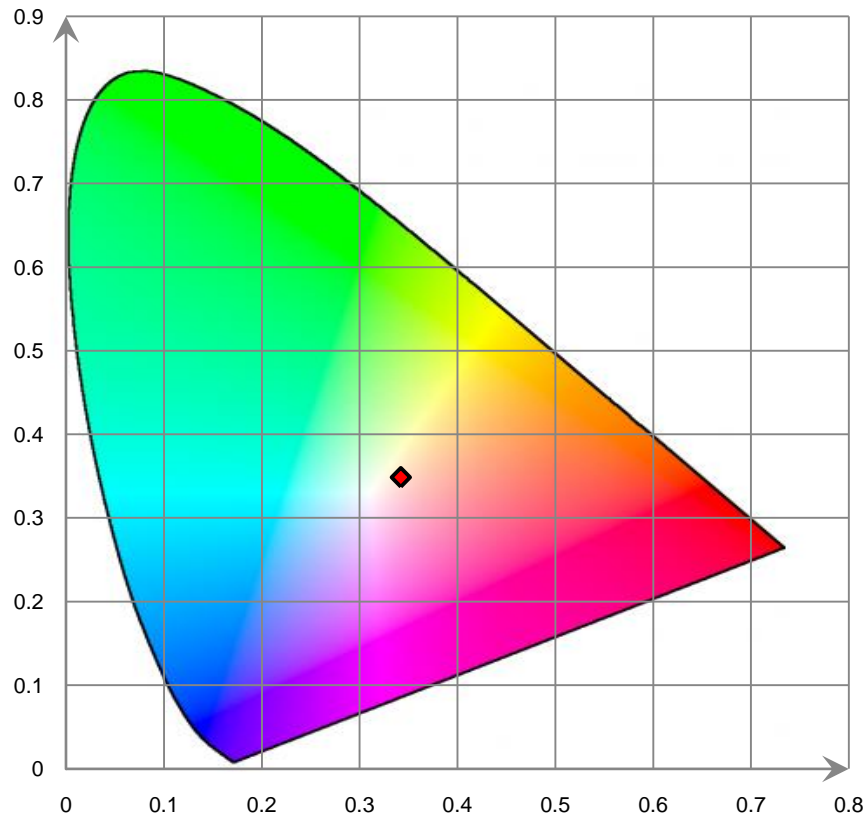
Ra			
92.5			
R1 93	R2 96	R3 96	R4 93
R5 93	R6 92	R7 93	R8 85
R9 61	R10 89	R11 93	R12 74
R13 94	R14 98	R15 91	

Relative Spectral Power Distribution

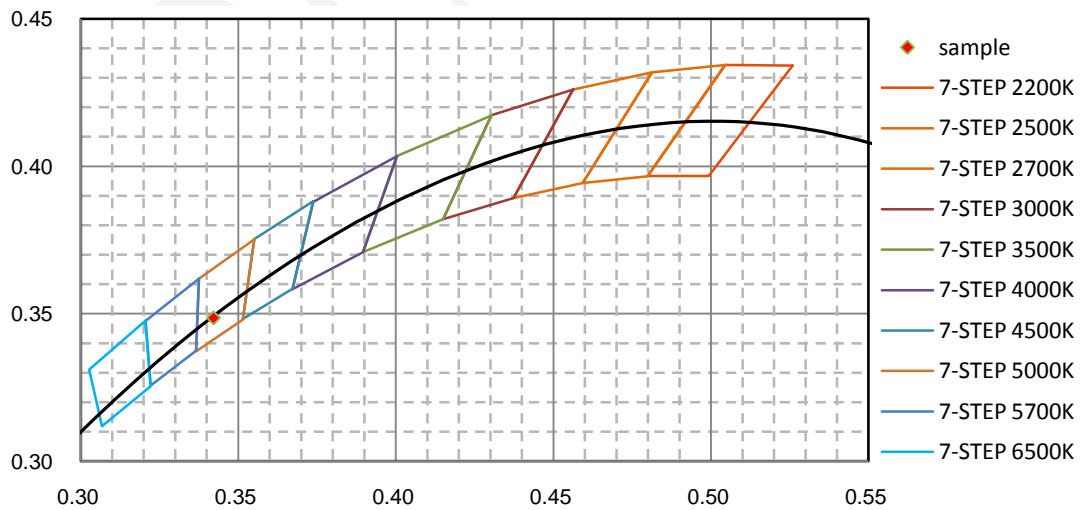


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.325E-01	465	9.783E+00	550	1.013E+01	635	8.730E+00	720	1.413E+00
385	7.620E-02	470	8.005E+00	555	1.022E+01	640	8.268E+00	725	1.218E+00
390	5.980E-02	475	6.417E+00	560	1.028E+01	645	7.781E+00	730	1.045E+00
395	5.398E-02	480	5.933E+00	565	1.029E+01	650	7.259E+00	735	8.957E-01
400	6.266E-02	485	6.308E+00	570	1.026E+01	655	6.694E+00	740	7.716E-01
405	7.903E-02	490	6.820E+00	575	1.024E+01	660	6.172E+00	745	6.656E-01
410	1.272E-01	495	7.456E+00	580	1.019E+01	665	5.640E+00	750	5.647E-01
415	2.719E-01	500	8.130E+00	585	1.014E+01	670	5.106E+00	755	4.819E-01
420	6.105E-01	505	8.617E+00	590	1.020E+01	675	4.586E+00	760	4.143E-01
425	1.255E+00	510	8.902E+00	595	1.021E+01	680	4.107E+00	765	3.577E-01
430	2.372E+00	515	9.045E+00	600	1.019E+01	685	3.652E+00	770	3.047E-01
435	4.105E+00	520	9.184E+00	605	1.013E+01	690	3.223E+00	775	2.654E-01
440	6.876E+00	525	9.318E+00	610	1.007E+01	695	2.818E+00	780	2.432E-01
445	1.192E+01	530	9.400E+00	615	9.889E+00	700	2.478E+00		
450	1.780E+01	535	9.593E+00	620	9.717E+00	705	2.165E+00		
455	1.726E+01	540	9.761E+00	625	9.438E+00	710	1.876E+00		
460	1.230E+01	545	9.953E+00	630	9.124E+00	715	1.630E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hour**

Test orientation: **Downward**

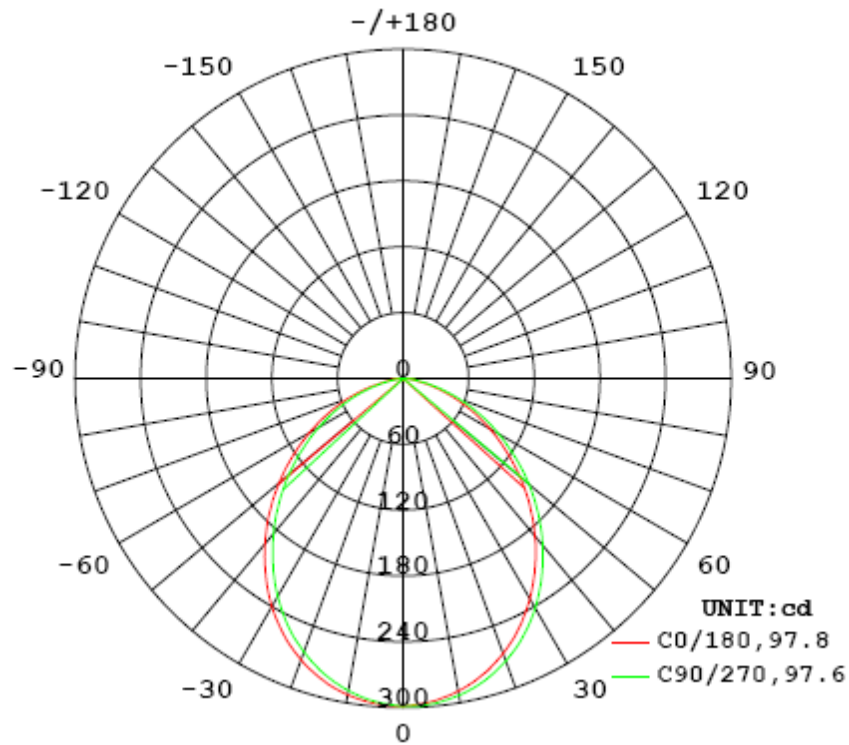
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.07	60	0.0738	8.71	0.9829

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
704.24	80.85	298.6	1.16	1.21

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	97.8	97.8	97.6	97.6	97.7
Field Angle (10% I _{max}):	150.1	150.0	149.9	150.0	150.0

Luminous Intensity (cd) Distribution Data

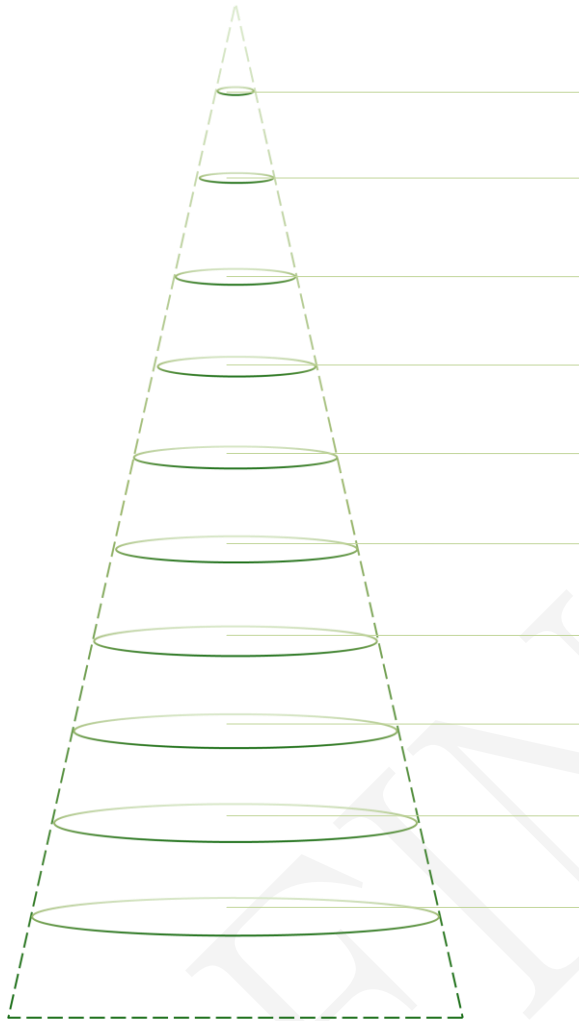
C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	298	298	298	298	298	298	298	298
5.0°	297	297	296	296	296	295	295	295
10.0°	293	292	291	290	289	288	288	288
15.0°	285	283	282	280	279	278	277	278
20.0°	273	271	269	267	265	264	264	265
25.0°	258	256	254	251	249	247	247	248
30.0°	240	238	235	232	229	228	227	228
35.0°	219	217	214	210	208	206	206	207
40.0°	197	194	191	188	184	183	183	184
45.0°	173	170	167	164	161	159	159	160
50.0°	148	146	143	139	136	135	135	136
55.0°	124	121	118	115	112	111	111	112
60.0°	99	97	94	92	89	88	87	88
65.0°	76	74	71	69	67	65	65	66
70.0°	54	52	49	47	45	44	44	44
75.0°	33	31	29	28	26	25	25	25
80.0°	15	14	13	12	11	10	10	10
85.0°	5	5	4	3	3	3	3	3
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	298	298	298	298	298	298	298	298
5.0°	296	296	296	297	298	298	298	298
10.0°	289	290	291	292	293	294	294	294
15.0°	280	281	283	284	286	286	287	286
20.0°	267	268	270	272	274	275	275	275
25.0°	251	253	255	257	259	261	261	261
30.0°	232	234	236	239	242	243	243	243
35.0°	210	213	215	218	221	222	223	223
40.0°	187	190	193	196	198	200	201	200
45.0°	164	166	169	172	175	177	177	177
50.0°	140	142	145	148	150	152	152	152
55.0°	115	117	119	122	125	127	127	127
60.0°	91	93	96	98	101	102	103	102
65.0°	69	70	72	75	77	79	79	79
70.0°	47	49	51	53	55	56	57	56
75.0°	27	29	30	32	34	35	36	35
80.0°	12	13	14	15	16	17	17	17
85.0°	3	3	4	4	5	5	5	5
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

Average Area Illumination Figure

Angle:97.7°. Flux out:475.9lm



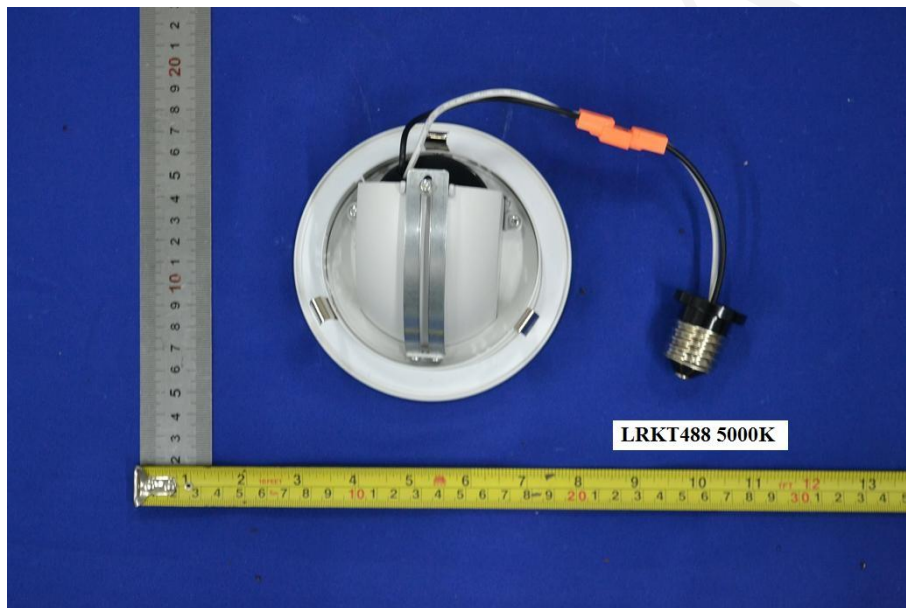
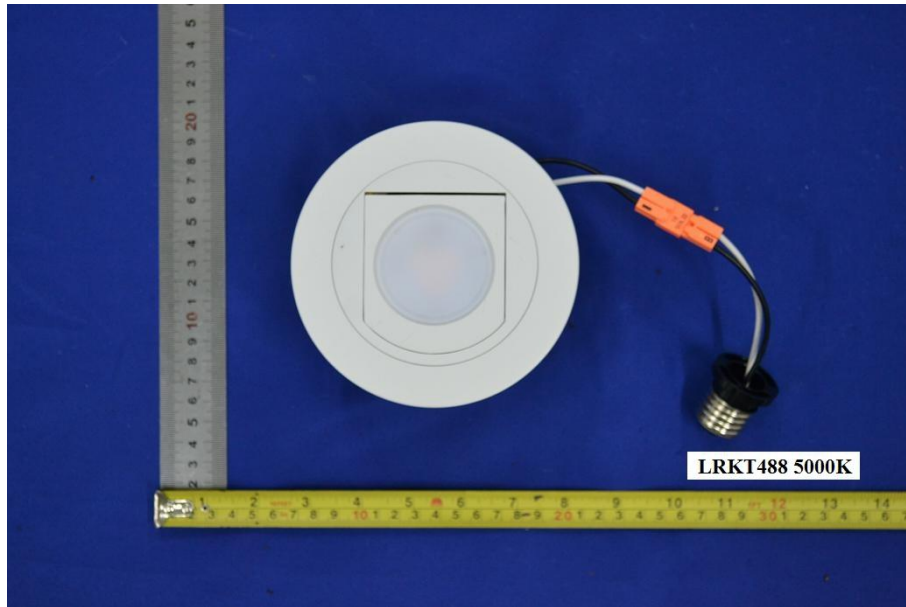
Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	114.43	457.9	1202.0
1.0	228.86	114.5	300.6
1.5	343.29	50.9	133.6
2.0	457.72	28.6	75.2
2.5	572.15	18.3	48.1
3.0	686.58	12.7	33.4
3.5	801.01	9.3	24.5
4.0	915.44	7.2	18.8
4.5	1029.87	5.7	14.8
5.0	1144.30	4.6	12.0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	7.1	1.01
5-10	21.0	2.98
10-15	34.0	4.83
15-20	45.5	6.46
20-25	55.0	7.81
25-30	62.0	8.80
30-35	66.3	9.41
35-40	67.7	9.62
40-45	66.6	9.45
45-50	62.9	8.94
50-55	57.0	8.10
55-60	49.4	7.01
60-65	40.5	5.76
65-70	30.9	4.38
70-75	20.8	2.95
75-80	11.4	1.63
80-85	4.4	0.63
85-90	1.0	0.14
90-95	0.0	0.00
95-100	0.0	0.01
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.01
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.01
130-135	0.0	0.01
135-140	0.1	0.00
140-145	0.1	0.01
145-150	0.1	0.01
150-155	0.1	0.01
155-160	0.1	0.01
160-165	0.0	0.00
165-170	0.0	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	7.1	1.01
0-10	28.1	3.99
0-15	62.1	8.82
0-20	107.6	15.28
0-25	162.6	23.09
0-30	224.6	31.89
0-35	290.8	41.30
0-40	358.6	50.92
0-45	425.2	60.37
0-50	488.1	69.31
0-55	545.1	77.41
0-60	594.5	84.42
0-65	635.1	90.18
0-70	665.9	94.56
0-75	686.7	97.51
0-80	698.2	99.14
0-85	702.6	99.77
0-90	703.6	99.91
0-95	703.6	99.91
0-100	703.6	99.92
0-105	703.7	99.92
0-110	703.7	99.92
0-115	703.7	99.93
0-120	703.7	99.93
0-125	703.8	99.93
0-130	703.8	99.94
0-135	703.9	99.95
0-140	703.9	99.95
0-145	704.0	99.96
0-150	704.0	99.97
0-155	704.1	99.98
0-160	704.1	99.99
0-165	704.2	99.99
0-170	704.2	100.00
0-175	704.2	100.00
0-180	704.2	100.00

6. Product Photo



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