

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

L-TECH CORPORATION

Shaogangtuo District, Qiaotou Town Dongguan City, Guangdong, China

Test Model: LRKT488 2700K

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	RSZ160526515-10
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 2700K
 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: 2700K
 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	0.07186	8.495	0.9854

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
601.27	2.081	70.78	2759	0.000939

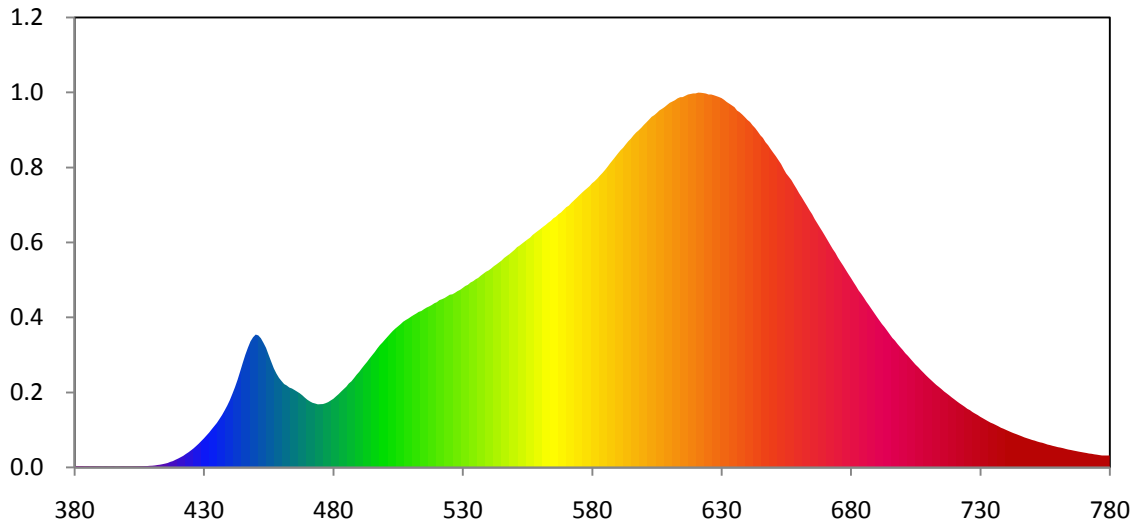
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4567	0.4124	0.2597	0.3517	0.2597	0.5276

Color Rendering Index

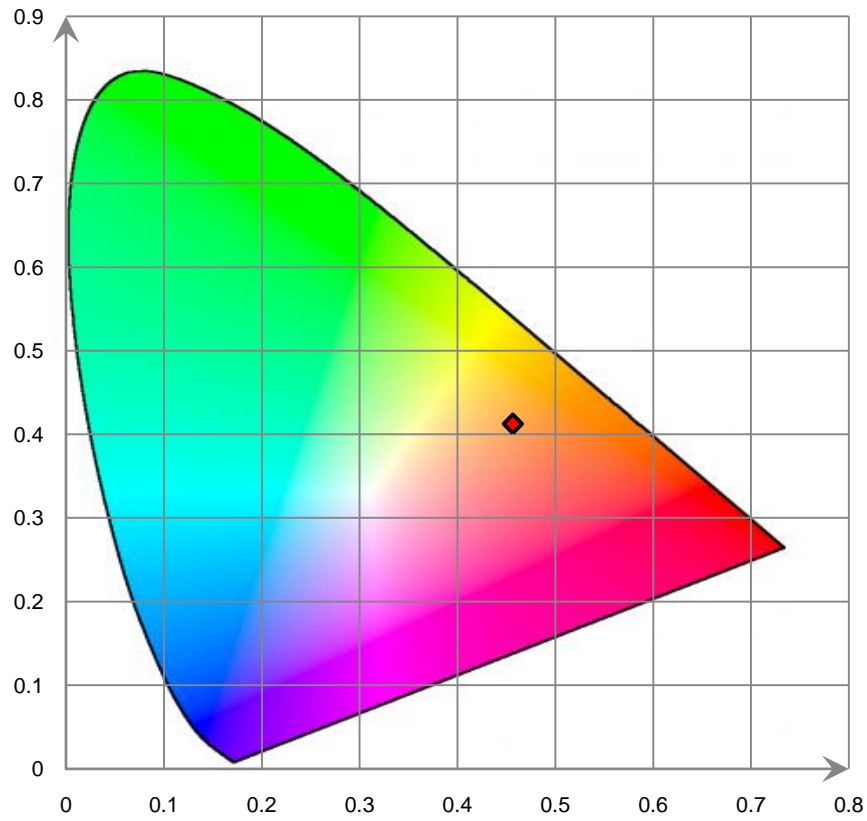
Ra			
92.2			
R1 92	R2 96	R3 99	R4 93
R5 92	R6 96	R7 91	R8 79
R9 54	R10 90	R11 94	R12 86
R13 93	R14 99	R15 87	

Relative Spectral Power Distribution

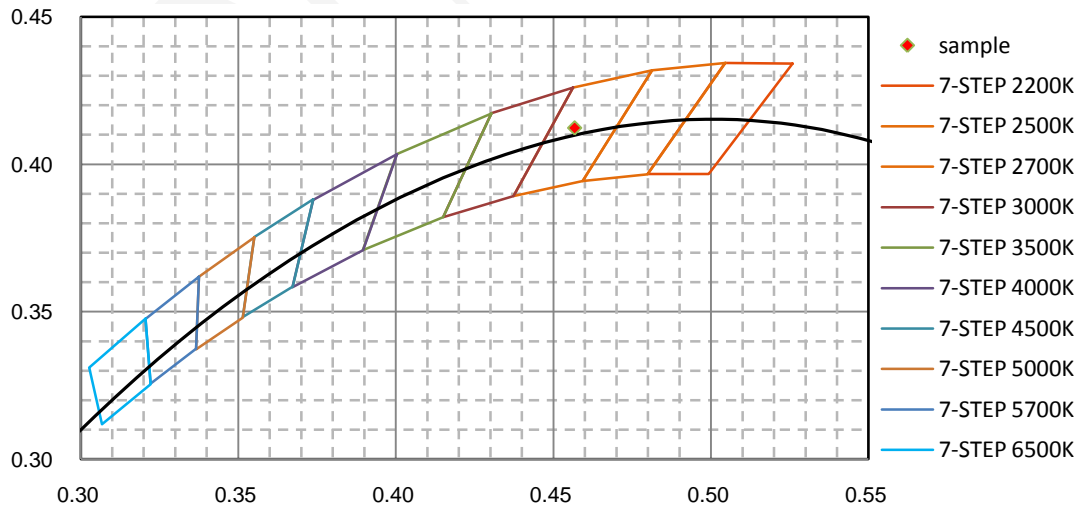


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.034E-02	465	2.649E+00	550	7.440E+00	635	1.232E+01	720	2.326E+00
385	4.468E-02	470	2.314E+00	555	7.794E+00	640	1.188E+01	725	2.006E+00
390	3.274E-02	475	2.164E+00	560	8.150E+00	645	1.136E+01	730	1.732E+00
395	3.189E-02	480	2.347E+00	565	8.517E+00	650	1.076E+01	735	1.495E+00
400	3.074E-02	485	2.760E+00	570	8.897E+00	655	1.005E+01	740	1.282E+00
405	3.689E-02	490	3.269E+00	575	9.302E+00	660	9.372E+00	745	1.101E+00
410	6.211E-02	495	3.837E+00	580	9.718E+00	665	8.660E+00	750	9.409E-01
415	1.323E-01	500	4.377E+00	585	1.017E+01	670	7.916E+00	755	8.143E-01
420	3.035E-01	505	4.825E+00	590	1.074E+01	675	7.174E+00	760	6.932E-01
425	5.846E-01	510	5.154E+00	595	1.125E+01	680	6.479E+00	765	5.979E-01
430	9.955E-01	515	5.410E+00	600	1.171E+01	685	5.804E+00	770	5.106E-01
435	1.523E+00	520	5.651E+00	605	1.212E+01	690	5.153E+00	775	4.383E-01
440	2.300E+00	525	5.906E+00	610	1.247E+01	695	4.553E+00	780	4.099E-01
445	3.574E+00	530	6.138E+00	615	1.266E+01	700	4.019E+00		
450	4.544E+00	535	6.435E+00	620	1.279E+01	705	3.513E+00		
455	3.848E+00	540	6.736E+00	625	1.275E+01	710	3.066E+00		
460	2.954E+00	545	7.074E+00	630	1.263E+01	715	2.679E+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**

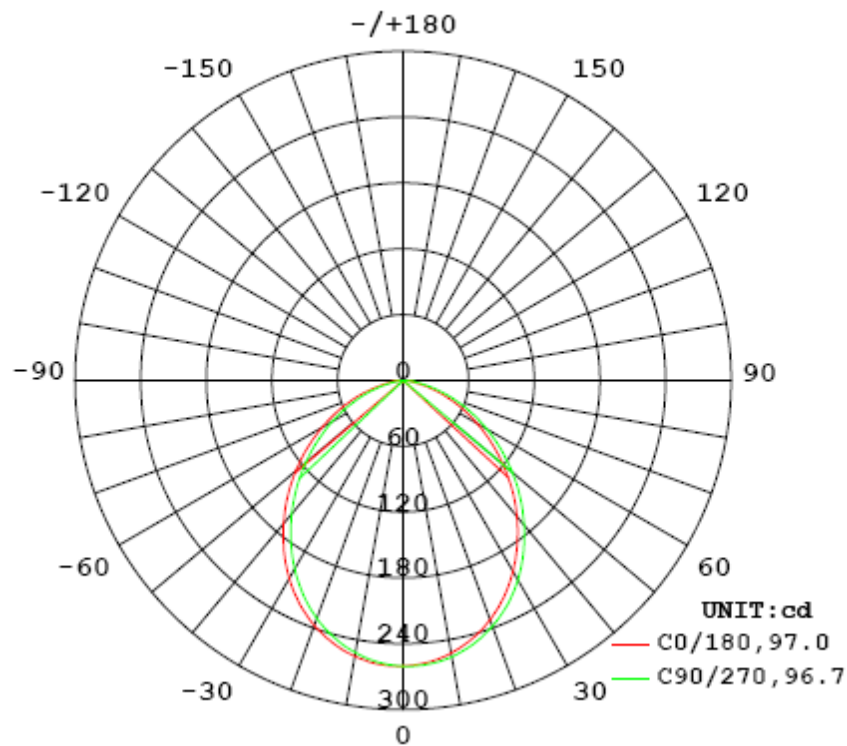
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.06	60	0.0722	8.53	0.9841

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
609.309	71.43	260.8	1.16	1.20

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	97.0	96.8	96.7	96.9	96.9
Field Angle (10% I _{max}):	149.9	149.8	149.8	149.8	149.8

Luminous Intensity (cd) Distribution Data

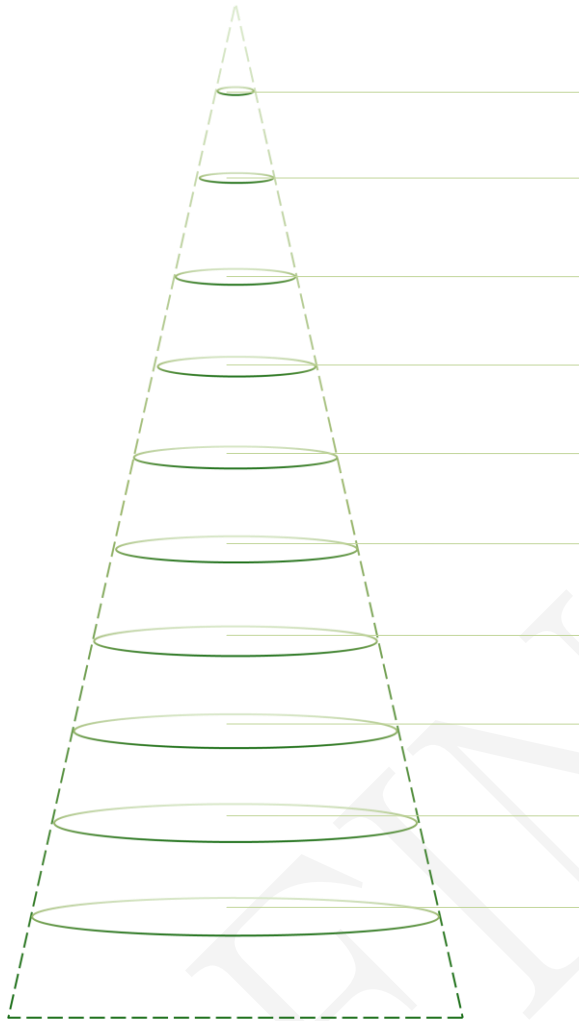
C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	260	260	260	260	260	260	260	260
5.0°	259	259	259	258	258	257	258	258
10.0°	255	255	254	253	252	251	251	252
15.0°	248	247	246	244	243	242	242	242
20.0°	238	236	234	232	231	230	230	230
25.0°	224	223	220	218	216	215	215	215
30.0°	209	206	203	201	198	197	197	198
35.0°	190	188	184	181	179	178	178	178
40.0°	170	168	164	161	159	157	157	158
45.0°	150	147	143	140	138	136	136	137
50.0°	128	125	122	119	116	115	115	116
55.0°	107	104	101	98	95	94	94	95
60.0°	86	83	80	77	75	74	73	74
65.0°	66	63	60	58	55	54	54	55
70.0°	46	44	41	39	37	36	36	37
75.0°	29	27	24	22	21	20	20	20
80.0°	14	12	10	9	8	8	8	8
85.0°	4	3	3	2	2	2	2	2
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°	260	260	260	260	260	260	260	260
5.0°	258	259	259	259	260	260	260	260
10.0°	252	253	254	255	256	256	256	256
15.0°	244	245	246	247	249	249	250	250
20.0°	232	234	235	237	238	240	240	240
25.0°	218	220	222	224	226	227	228	227
30.0°	201	203	205	208	210	211	212	212
35.0°	182	184	187	189	192	193	194	194
40.0°	162	164	167	170	172	174	175	174
45.0°	141	144	146	149	152	153	154	154
50.0°	119	122	125	127	130	131	133	132
55.0°	98	101	104	106	109	111	111	111
60.0°	78	81	83	86	88	90	90	90
65.0°	58	61	63	66	68	70	70	70
70.0°	40	42	45	47	49	50	51	50
75.0°	23	25	27	29	31	32	33	32
80.0°	10	11	13	14	16	16	17	16
85.0°	3	3	4	4	5	5	5	5
90.0°	0	0	0	0	0	0	1	1
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:96.9°. Flux out:412.7lm



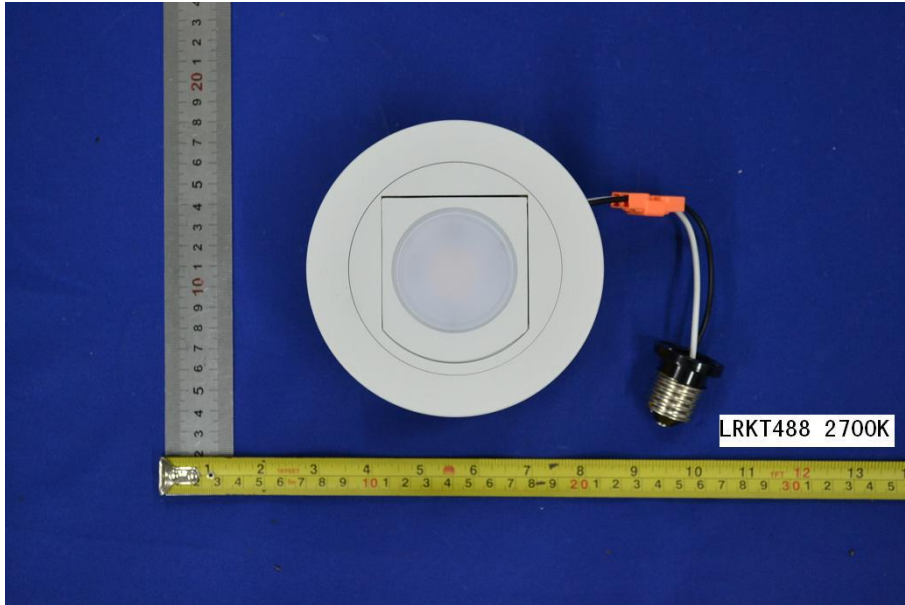
Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	112.83	397.1	1050.0
1.0	225.66	99.3	262.5
1.5	338.49	44.1	116.7
2.0	451.32	24.8	65.6
2.5	564.15	15.9	42.0
3.0	676.99	11.0	29.2
3.5	789.82	8.1	21.4
4.0	902.65	6.2	16.4
4.5	1015.48	4.9	13.0
5.0	1128.31	4.0	10.5

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	6.2	1.02
5-10	18.3	3.01
10-15	29.6	4.86
15-20	39.6	6.50
20-25	47.8	7.85
25-30	53.8	8.84
30-35	57.4	9.42
35-40	58.6	9.62
40-45	57.5	9.44
45-50	54.2	8.90
50-55	49.1	8.05
55-60	42.5	6.97
60-65	34.9	5.73
65-70	26.5	4.35
70-75	17.9	2.95
75-80	9.9	1.62
80-85	3.9	0.64
85-90	0.9	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	0.0	0.00
140-145	0.0	0.01
145-150	0.1	0.01
150-155	0.1	0.01
155-160	0.0	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	6.2	1.02
0-10	24.5	4.03
0-15	54.2	8.89
0-20	93.8	15.39
0-25	141.6	23.24
0-30	195.4	32.08
0-35	252.9	41.50
0-40	311.5	51.12
0-45	369.0	60.56
0-50	423.2	69.46
0-55	472.3	77.51
0-60	514.8	84.48
0-65	549.7	90.21
0-70	576.2	94.56
0-75	594.1	97.51
0-80	604.0	99.13
0-85	607.9	99.77
0-90	608.8	99.91
0-95	608.8	99.91
0-100	608.8	99.92
0-105	608.8	99.92
0-110	608.8	99.92
0-115	608.9	99.93
0-120	608.9	99.93
0-125	608.9	99.93
0-130	608.9	99.94
0-135	609.0	99.95
0-140	609.0	99.95
0-145	609.1	99.96
0-150	609.1	99.97
0-155	609.2	99.98
0-160	609.2	99.99
0-165	609.3	99.99
0-170	609.3	100.00
0-175	609.3	100.00
0-180	609.3	100.00

6. Product Photo



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