



# Report of Test LLI-18077-5

Leotek Electronics - Cobra head roadway luminaire. Product ID: GCJ0-15H-MV-27-2R-XX-300  
Grey painted cast aluminum housing with plastic driver door. Fixture extends ~ 9.5" x 18.25" x 4.5"  
15 LEDs in 3 x 5 array with clear plastic sheet of individual lenses.  
One Philips Advance Xitanium driver. Model: XI075C070V105CNY2 set to 300ma.  
Operating at 120 VAC and 60 Hz.



## Performance Summary

Total Light Output	1869 lm	Min Power Factor	0.76 @ 277 V
Luminaire Power	15.6 W	Max THD(i)*	16.0 % @ 120 V
Luminous Efficacy	119.8 lm/W	0-90° Zonal Flux %	100.0 %
CCT	2740 K	80-90° Zonal Flux %	0.7 %
CIE(x,y) 1931	(0.458, 0.414)	BUG Rating*	B1-U0-G1
CRI	74	Street Classification*	Type II Medium

**PREPARED FOR : Leotek Electronics USA Corp, San Jose CA 95131.**



**LightLab**  
INTERNATIONAL

LightLab International, LLC  
Phoenix AZ 85085



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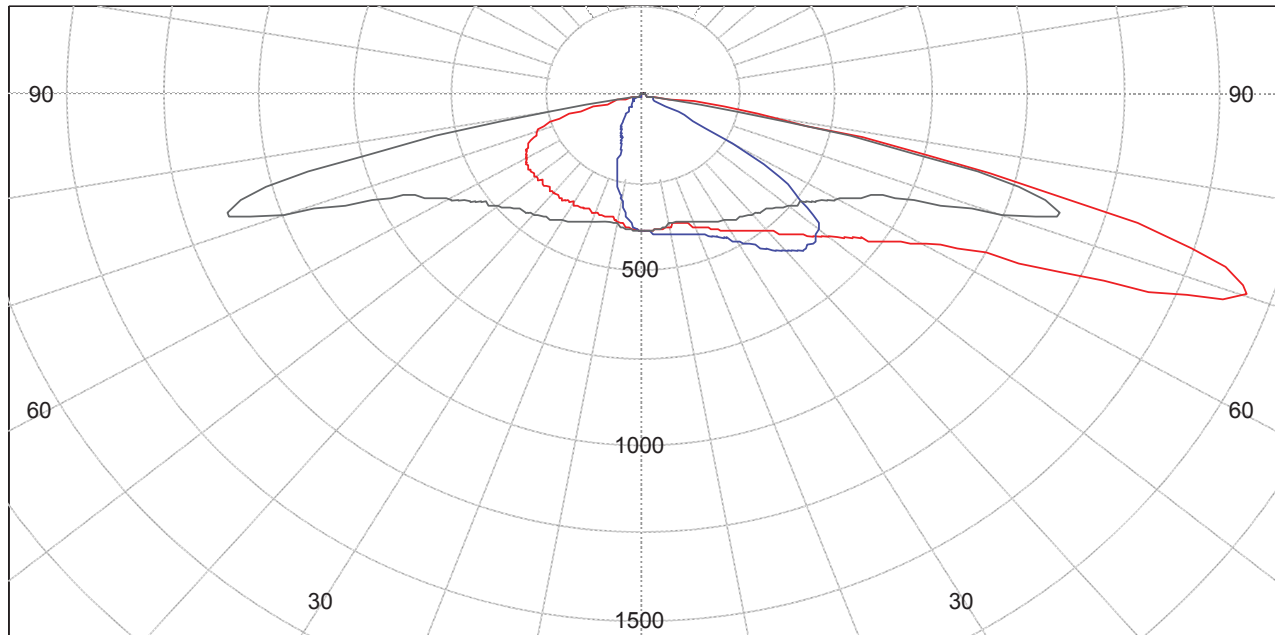




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### Polar Light Distribution Curves



House side / L270

L90 / 270 - Black, Plane of maximum - Red, L0 / 180 - Blue (cd)


Street side / L90

#### Percentage Outputs

	Upward	Downward	Total
Street Side	0.0 %	78.4 %	78.4 %
House Side	0.0 %	21.6 %	21.6 %
	0.0 %	100.0 %	100.0 %

Report data based on absolute values as measured.

Signed:

  
Ryder Tunney  
Authorized Signatory

Date of test  
Date of report

22-Mar-2018  
23-Mar-2018



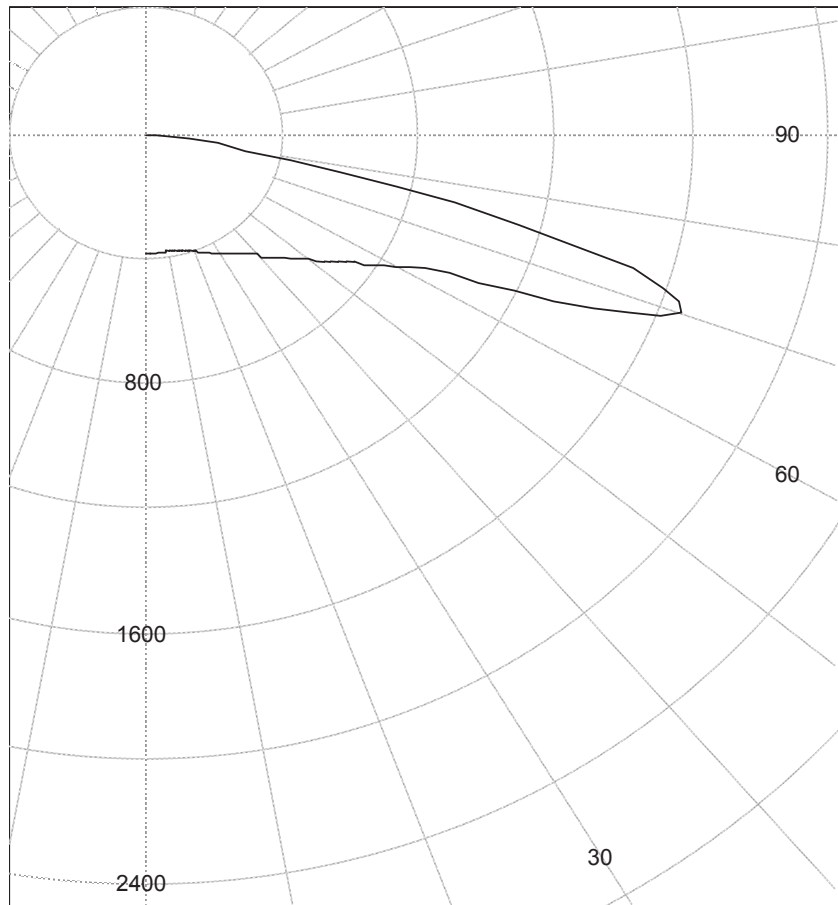
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Intensity in principal plane  
(based on overall max intensity)

Vertical Angle (°)	Intensity (cd)
0.0	389.0
10.0	380.0
20.0	396.7
30.0	449.8
35.0	473.7
40.0	510.4
45.0	562.0
47.5	593.1
50.0	630.7
52.5	673.7
55.0	719.8
57.5	775.2
60.0	850.3
62.5	961.6
65.0	1196.8
67.5	1482.5
70.0	1667.8
72.5	1551.1
75.0	1131.5
77.5	668.7
80.0	302.5
82.5	93.2
85.0	12.4
87.5	1.3
90.0	0.0
92.5	0.0
95.0	0.0
97.5	0.0
100.0	0.0
102.5	0.0
105.0	0.0
120.0	0.0
135.0	0.0
150.0	0.0
165.0	0.0
180.0	0.0

### Principal Vertical Plane



Plane of maximum intensity (cd)

House side max intensity  
1137.4 cd @ (90.0°, 72.5°)

Street side max intensity  
1667.8 cd @ (77.5°, 70.0°)

Coordinates expressed in the C Type coordinate system  
Data for the two symmetric halves of the luminaire has been averaged.





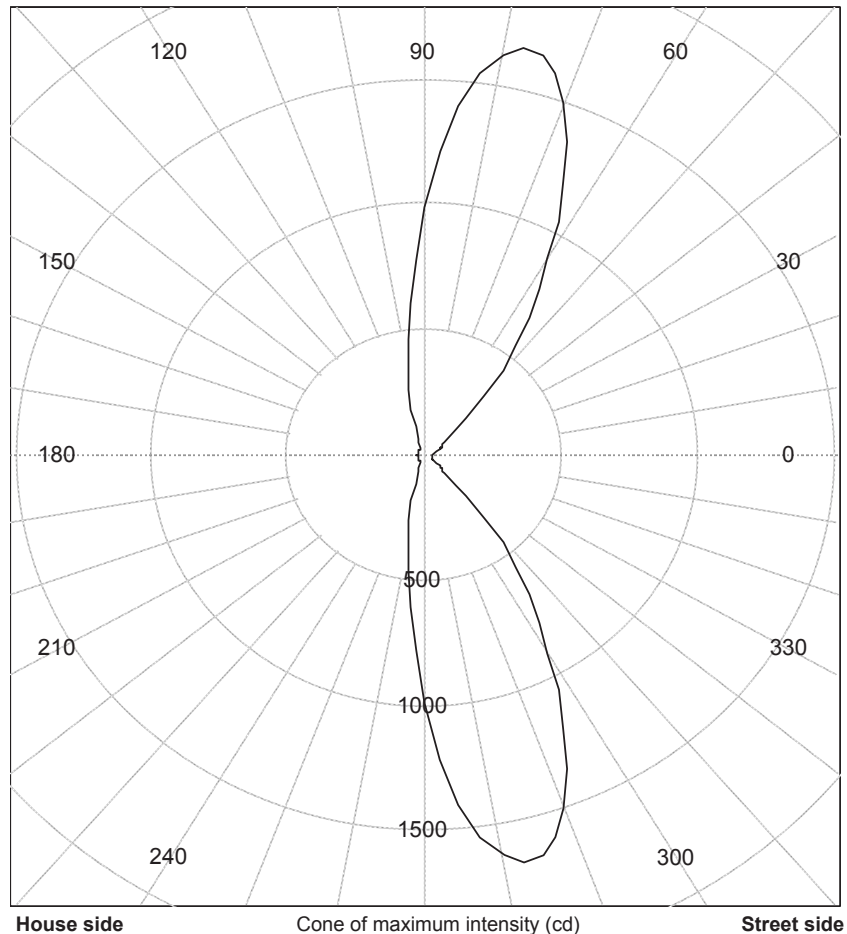
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Intensity in principal cone  
(based on overall max intensity)

Lateral Plane (°)	(V70.0) (cd)
0	22.7
15	26.1
30	68.2
40	95.7
45	218.7
50	443.3
55	666.2
60	908.7
65	1208.7
70	1501.9
75	1659.0
80	1630.3
85	1403.4
90	994.0
95	607.8
100	356.8
105	187.9
110	72.2
115	35.8
120	31.3
125	27.8
130	22.7
135	22.1
140	22.6
150	25.8
165	25.6
180	28.6

### Principal Conical Surface



House side max intensity  
1137.4 cd @ (90.0°, 72.5°)

Street side max intensity  
1667.8 cd @ (77.5°, 70.0°)

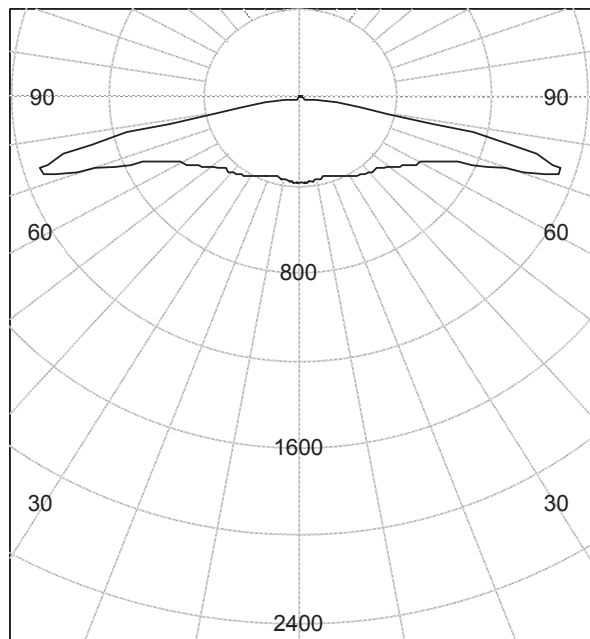
Coordinates expressed in the C Type coordinate system  
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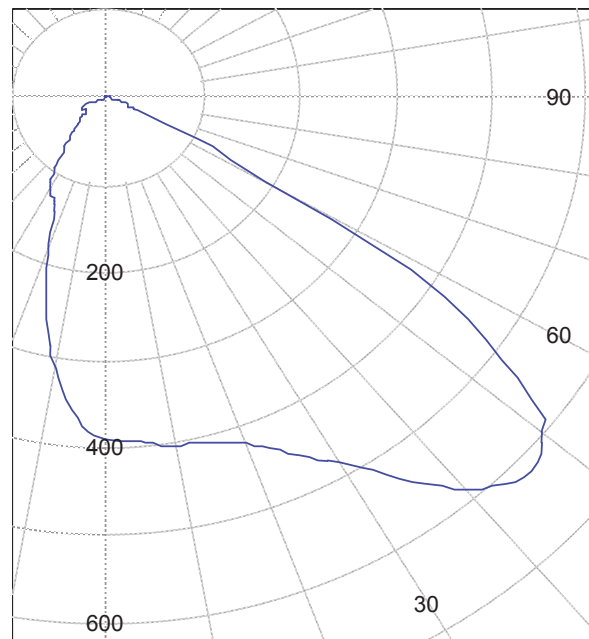
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**Polar curve through L90 / L270**



(L90) (cd) (L270)

**Polar curve through L0 / L180**



House side (L180) (cd) Street side (L0)



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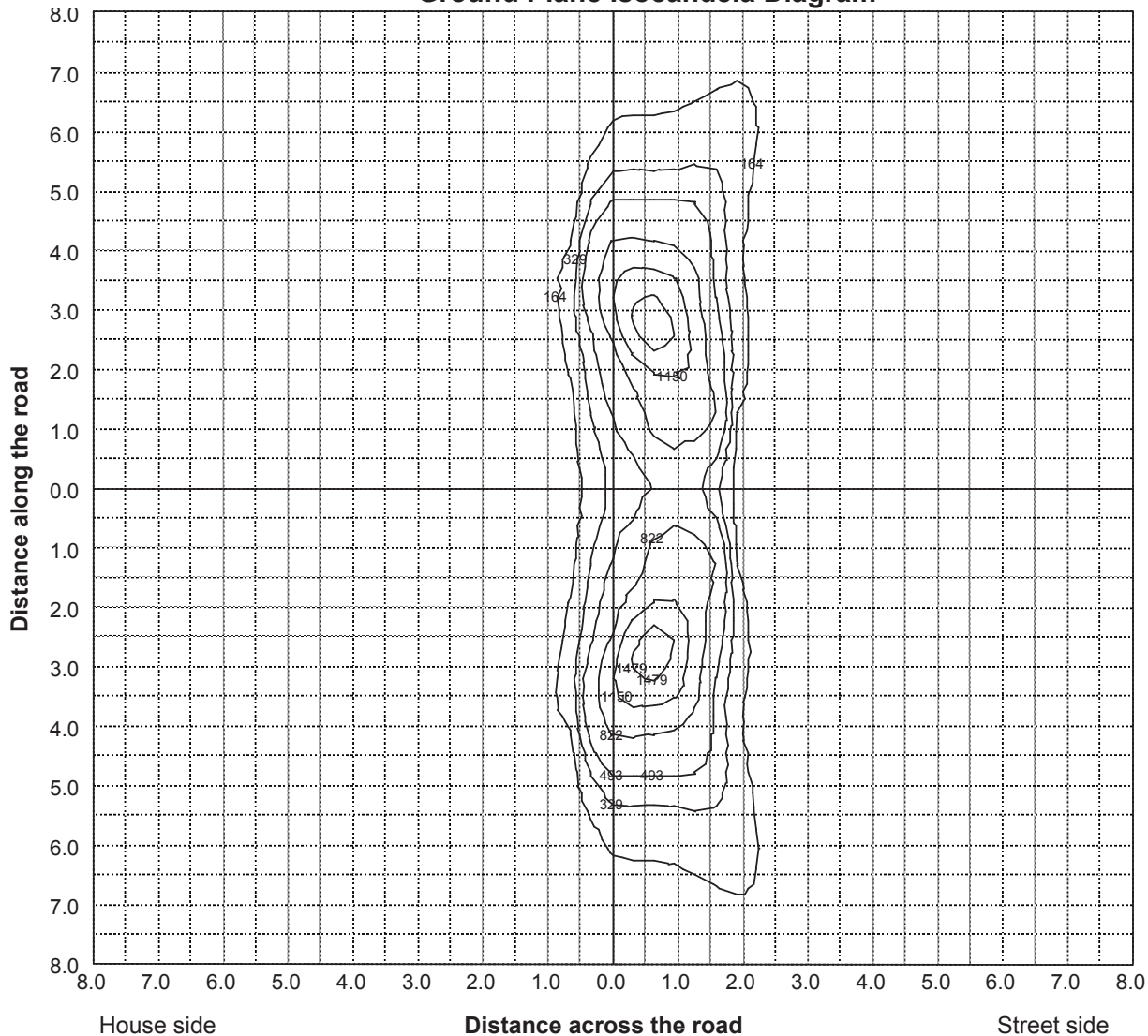
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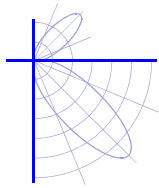
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### Ground Plane Isocandela Diagram





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Vertical	Intensity data (cd)								
	L-Plane								
	L0	L15	L30	L40	L45	L50	L55	L60	L65
0.0	389	389	389	389	389	389	389	389	389
10.0	404	401	400	397	394	391	388	387	382
20.0	421	422	425	426	426	426	426	426	419
30.0	481	488	514	504	494	486	481	478	473
35.0	530	542	581	588	575	555	536	520	509
40.0	583	607	672	683	679	664	637	603	568
45.0	611	645	758	782	783	787	772	724	668
47.5	610	643	784	829	835	840	838	798	731
50.0	592	636	798	864	885	889	895	868	799
52.5	547	611	800	887	922	932	937	924	860
55.0	481	583	800	891	936	957	961	957	910
57.5	398	524	794	880	925	957	965	971	948
60.0	188	337	763	1072	954	967	974	987	984
62.5	114	140	580	1029	1138	1091	1069	1099	1111
65.0	35	76	183	727	926	1048	1076	1089	1196
67.5	26	34	101	303	557	763	953	1110	1279
70.0	23	26	68	96	219	443	666	909	1209
72.5	21	23	47	55	86	162	344	565	873
75.0	18	20	33	38	51	78	126	238	470
77.5	15	18	25	28	35	38	58	89	186
80.0	13	15	19	19	19	21	26	38	76
82.5	12	11	13	11	11	12	15	17	23
85.0	9	6	7	5	5	5	5	7	7
87.5	1	1	1	1	1	1	1	1	1
90.0	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0
95.0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	0	0
120.0	0	0	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0





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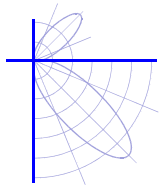
Vertical	Intensity data (cd)								
	L-Plane								
	L70	L75	L80	L85	L90	L95	L100	L105	L110
0.0	389	389	389	389	389	389	389	389	389
10.0	381	381	379	378	376	372	368	364	361
20.0	410	401	394	391	385	375	363	350	336
30.0	470	459	440	427	413	393	370	343	317
35.0	500	485	460	442	429	405	375	341	308
40.0	546	526	494	461	441	413	379	339	298
45.0	619	582	540	492	462	427	383	334	284
47.5	667	616	568	513	474	435	385	331	274
50.0	722	658	604	540	490	444	387	327	262
52.5	777	704	644	574	509	455	390	322	247
55.0	830	754	691	613	531	467	393	315	227
57.5	882	809	746	662	559	481	395	305	203
60.0	942	881	820	721	591	492	393	292	177
62.5	1075	1001	924	802	630	502	389	273	147
65.0	1280	1248	1129	928	684	512	379	248	118
67.5	1450	1516	1407	1157	800	535	365	218	91
70.0	1502	1659	1630	1403	994	608	357	188	72
72.5	1265	1503	1559	1432	1137	710	320	155	57
75.0	885	1109	1144	1146	1014	646	187	135	46
77.5	501	650	664	659	644	360	57	90	38
80.0	247	326	275	254	246	87	10	44	15
82.5	107	123	70	48	41	9	5	11	4
85.0	29	18	10	8	6	3	2	2	2
87.5	1	1	1	1	1	1	1	1	1
90.0	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0
95.0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	0	0
120.0	0	0	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0



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Vertical	Intensity data (cd)								
	L-Plane								
	L115	L120	L125	L130	L135	L140	L150	L165	L180
0.0	389	389	389	389	389	389	389	389	389
10.0	357	352	347	341	336	332	324	316	314
20.0	321	303	285	267	250	235	210	184	177
30.0	289	259	229	200	175	155	136	124	118
35.0	272	236	200	166	144	133	121	104	92
40.0	253	208	164	134	121	114	102	76	63
45.0	228	168	126	109	102	95	76	56	45
47.5	209	144	110	100	93	84	66	49	41
50.0	186	121	96	92	85	73	58	45	38
52.5	160	101	86	83	76	66	52	40	33
55.0	134	84	78	75	68	60	46	36	29
57.5	109	73	69	66	60	52	42	32	27
60.0	86	63	60	56	49	45	38	30	26
62.5	66	53	51	45	41	40	36	29	27
65.0	52	44	42	37	35	34	33	28	29
67.5	42	37	34	29	28	28	30	27	29
70.0	36	31	28	23	22	23	26	26	29
72.5	29	24	21	17	16	17	22	19	14
75.0	20	16	14	12	11	12	16	13	10
77.5	15	11	10	8	7	7	9	10	8
80.0	8	7	6	4	4	4	6	6	6
82.5	3	3	3	3	2	3	2	2	3
85.0	1	1	1	1	1	1	1	1	1
87.5	1	1	1	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0
95.0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	0	0
120.0	0	0	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0



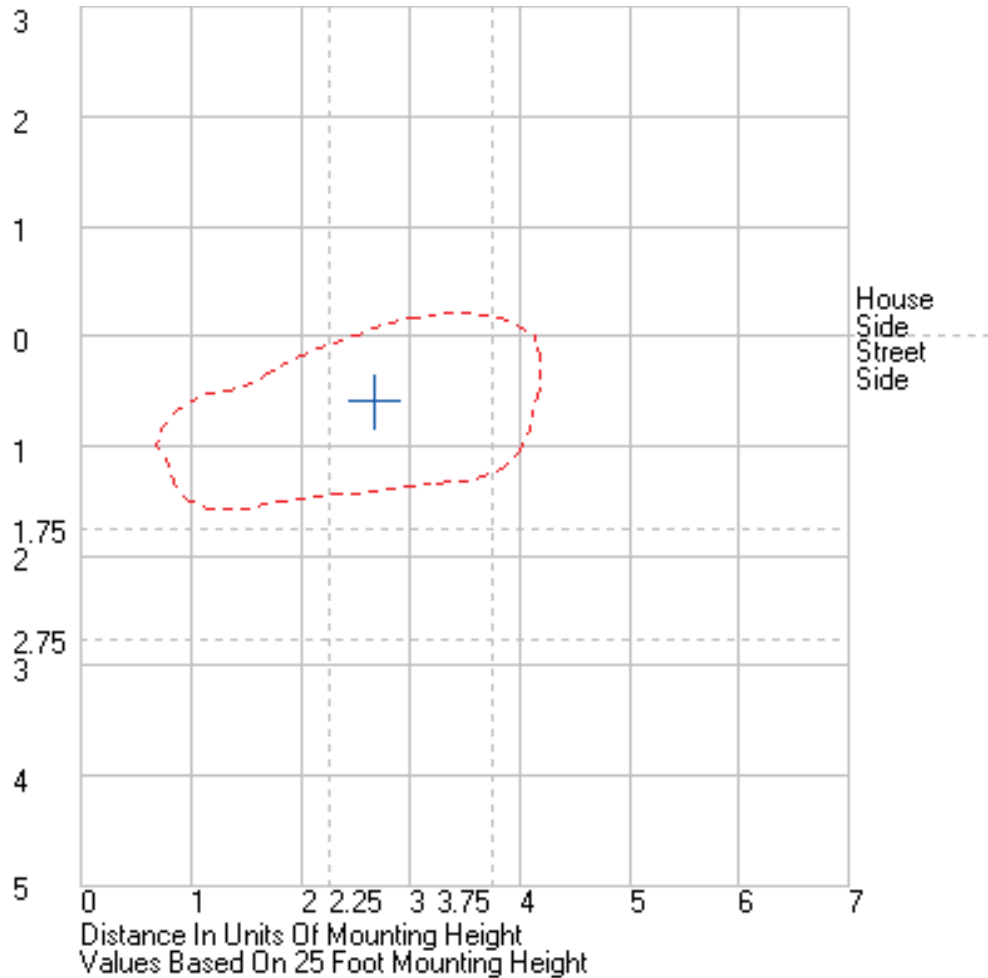
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### LM-79 Performance Data

<b>Spectral</b>	CIE 1931 (x, y) <sup>(1)</sup>	(0.458, 0.414)
	CIE 1976 (u', v') <sup>(1)</sup>	(0.260, 0.528)
	Correlated Color Temperature (CCT) <sup>(1)</sup>	2740 K
	Spatial Δ (u', v') Uniformity <sup>(2)</sup>	0.0102
	Color Rendering Index (Ra) <sup>(1)</sup>	73.8
	Special CRI 9 (R <sub>9</sub> ) <sup>(1),(3)</sup>	-22.8
	Distance from Planckian Locus (Duv) <sup>(1),(3)</sup>	0.0012
	Scotopic/Photopic Ratio <sup>(1),(3)</sup>	1.09

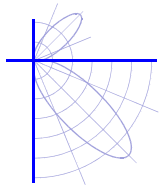
<b>Electrical</b>	Voltage	120.0 V	(Setpoint 1)
	Frequency	60.0 Hz	
	Current	0.134 A	
	Power	15.6 W	
	Power Factor	0.973	
	Current THD	16 %	
	Voltage	277.0 V	(Setpoint 2)
	Frequency	60.0 Hz	
	Current	0.077 A	
	Power	16.1 W	
	Power Factor	0.757	
	Current THD	11 %	

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer  
Photometric and spectral values were measured at Setpoint 1

(1) Value is computed from the weighted average of the spatial measurements

(2) Value is the maximum deviation of the spatial u' and v' measurements from the weighted average

(3) Quantity is in addition to the scope of IESNA LM-79-08



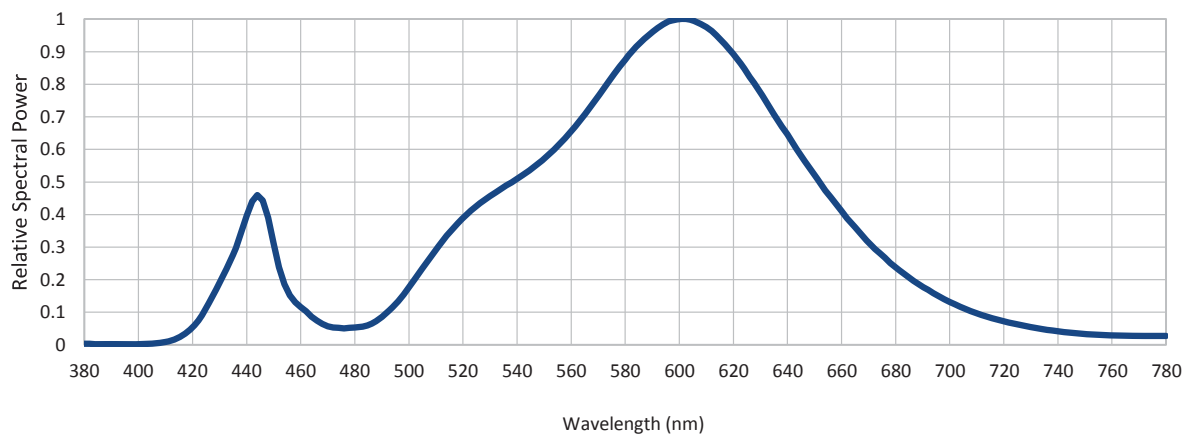
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### LM-79 Performance Data

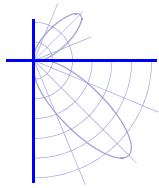
#### Summary relative spectral irradiance distribution (wavelength – nm, irradiance – relative to peak = 1)

380	0.003	480	0.053	580	0.875	680	0.237
385	0.002	485	0.061	585	0.923	685	0.206
390	0.002	490	0.086	590	0.959	690	0.178
395	0.002	495	0.125	595	0.988	695	0.154
400	0.002	500	0.177	600	1.000	700	0.132
405	0.004	505	0.234	605	0.995	705	0.113
410	0.009	510	0.291	610	0.975	710	0.097
415	0.023	515	0.344	615	0.939	715	0.084
420	0.054	520	0.389	620	0.892	720	0.072
425	0.113	525	0.426	625	0.835	725	0.063
430	0.192	530	0.456	630	0.774	730	0.054
435	0.278	535	0.484	635	0.708	735	0.047
440	0.397	540	0.510	640	0.646	740	0.042
445	0.451	545	0.538	645	0.581	745	0.037
450	0.312	550	0.572	650	0.523	750	0.033
455	0.169	555	0.610	655	0.464	755	0.031
460	0.116	560	0.656	660	0.411	760	0.029
465	0.081	565	0.707	665	0.360	765	0.028
470	0.057	570	0.763	670	0.313	770	0.027
475	0.051	575	0.820	675	0.275	775	0.027
						780	0.027



The relative spectral power distribution combines the weighted spectral power distributions of all spatial measurements.





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### LM-79 Performance Data

#### Spatial measurements

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0° plane	Horiz. 90° plane
0.0	( 0.257, 0.521)	( 0.257, 0.521)
10.0	( 0.257, 0.522)	( 0.257, 0.521)
20.0	( 0.258, 0.522)	( 0.258, 0.521)
30.0	( 0.258, 0.523)	( 0.258, 0.523)
40.0	( 0.258, 0.525)	( 0.259, 0.526)
50.0	( 0.259, 0.527)	( 0.261, 0.530)
60.0	( 0.261, 0.530)	( 0.268, 0.536)
70.0	( 0.265, 0.534)	I <= 10% peak
80.0	( 0.255, 0.532)	I <= 10% peak
-	-	-

#### Spatial measurements

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0° plane	Horiz. 90° plane
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

#### Test procedure

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimize stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilized supply. The photometric output was monitored and measurements were performed once stability was achieved.

The goniophotometer was used to measure the spatial distribution of both luminous intensity and, in conjunction with a spectroradiometer, spectral irradiance. The distribution locus comprises points in two or more planes (as indicated in the table above) at no more than 10° vertical intervals. The CIE (x,y) coordinates and other derived metrics (CIE (u', v'), CCT and CRI) are calculated from the weighted sum (weighted for intensity and represented solid angle) of the measured spectral irradiances.

Sample Orientation

Horizontal

Stabilization & total operation time 6.75 / 22.75 hours

#### Equipment and uncertainties

LightLab International R80A C-gamma rotating mirror goniophotometer with a test distance of 8 m.

Luminous Intensity ± 4 %  
Luminous Flux ± 4 %  
Horiz., Vert. Angles ± 0.25°

Temperature ± 1 °C  
Luminous Efficacy ± 4.5 %

PhotoResearch PR-670 spectroradiometer (grating with 380 - 780 nm range, 2 nm / pixel, 5 nm bandwidth, incandescent/halogen calibration source). Measured at a distance from the sample deemed >5 times the maximum observed luminous opening dimension.

CIE (x, y) coordinates ± 0.003  
CIE (u', v') coordinates ± 0.002  
Spatial Δ (u', v') uniformity ± 0.001  
Rel. Spectral Irradiance \* ± 2 %  
Duv \* ± 5E-04

CCT ± 100 K  
CRI (Ra) ± 2  
Scotopic / Photopic Ratio \* ± 0.02  
R9 \* ± 2

Yokogawa WT210 power meter connected in circuit to the sample electrical supply

Voltage ± 0.5 %  
Current ± 0.5 %  
Current THD \* ± 3 %  
Frequency \* ± 0.1 Hz  
Power ± 0.5 %  
Power Factor ± 0.02

This report contains data that are not covered by the NVLAP accreditation. Quantities marked with \* are not covered.

Calculator / report version 1.0.7 / 5.7 (30th Jan 2017)

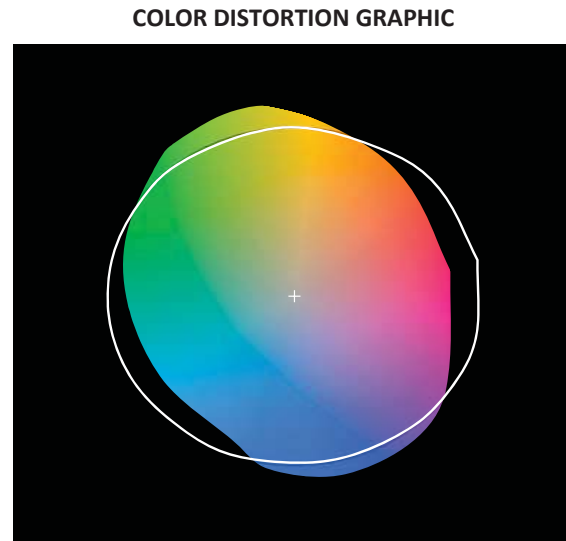
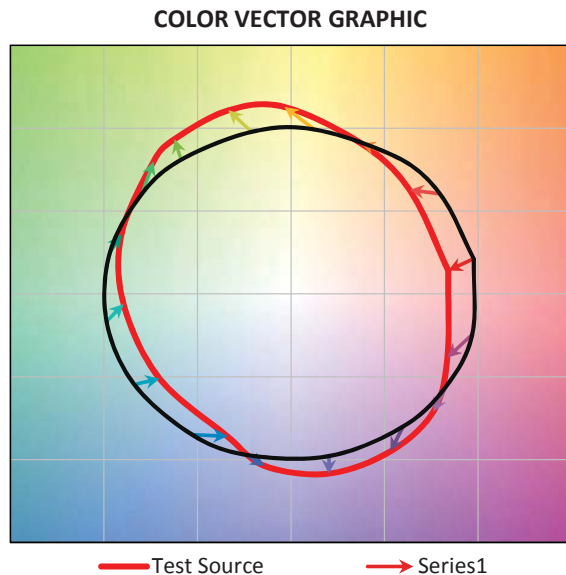
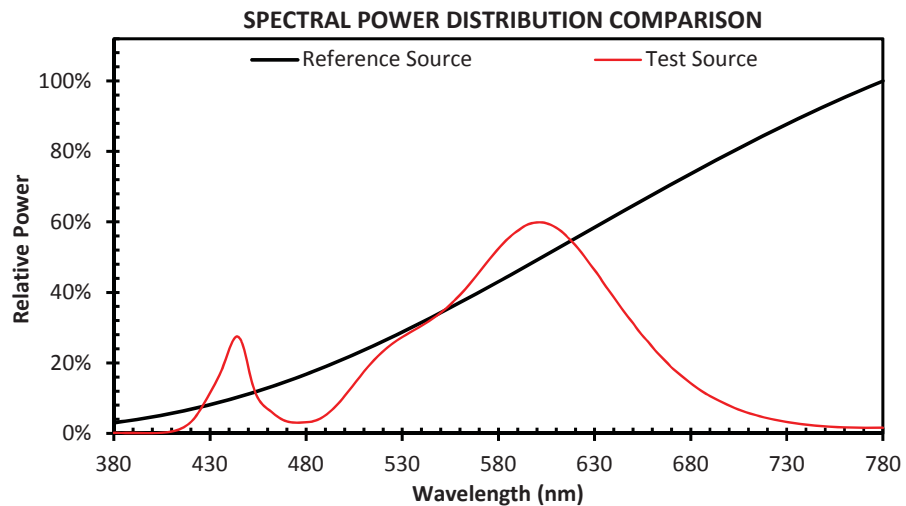
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## Test Report No. LLI-18077-5

Leotek Electronics - Cobra head roadway luminaire. Product ID: GCJ0-15H-MV-27-2R-XX-300  
Grey painted cast aluminum housing with plastic driver door. Fixture extends ~ 9.5" x 18.25" x 4.5"  
15 LEDs in 3 x 5 array with clear plastic sheet of individual lenses.  
One Philips Advance Xitanium driver. Model: XI075C070V105CNY2 set to 300ma.  
Operating at 120 VAC and 60 Hz.

$R_f$	71
$R_g$	97





## Test Report No. LLI-18077-5

Leotek Electronics - Cobra head roadway luminaire. Product ID: GCJ0-15H-MV-27-2R-XX-300  
Grey painted cast aluminum housing with plastic driver door. Fixture extents ~ 9.5" x 18.25" x 4.5"  
15 LEDs in 3 x 5 array with clear plastic sheet of individual lenses.  
One Philips Advance Xitanium driver. Model: XI075C070V105CNY2 set to 300ma.  
Operating at 120 VAC and 60 Hz.

**Test Distance** 8.0 m  
**Test Temperature** 25.5 °C

**Notes** The laboratory has not participated in the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

Tested in accordance with the applicable sections of publications: IES LM-79-08 (Sec. 12), IES LM-16-93, IES LM-58-13, CIE 13.3:1995, CIE 15:2004, ANSI C78.377:2011, ANSI C82.77:2002.

The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the IESNA Type C coordinate system (L, V) as defined in IESNA publication LM-75.

This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with \* are not covered.

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

*RT*